Casualty Loss Reserve Seminar

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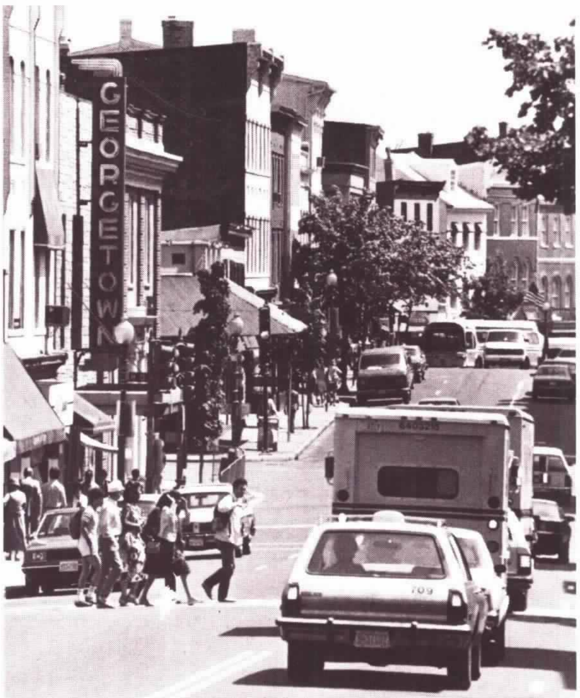

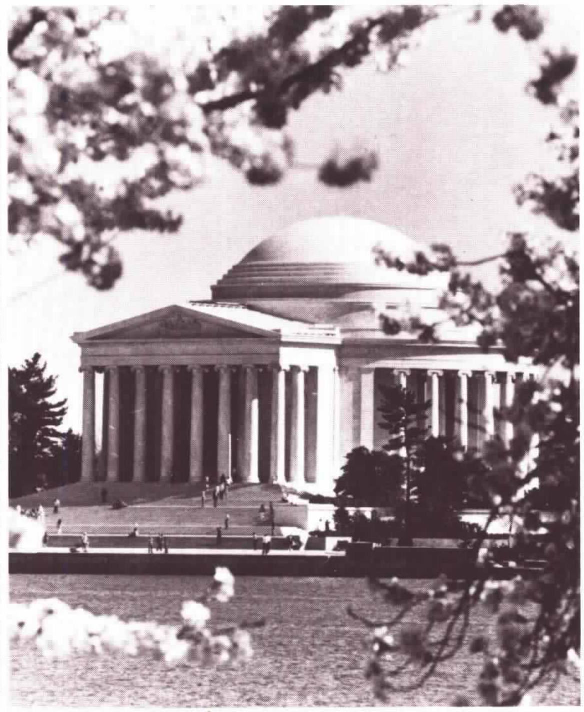

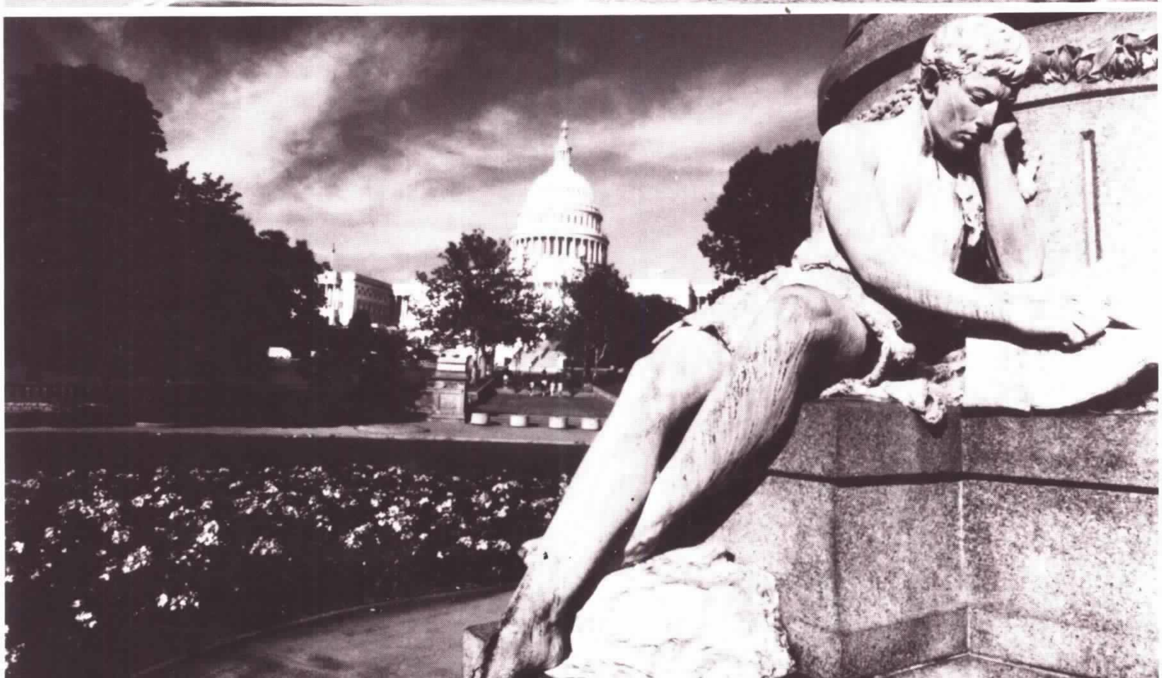

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Charles A. Bryan
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Irene K. Bass
Casualty Actuarial Society

Moderator

W. James MacGinnitie
Tillinghast/Towers Perrin

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Nebraska Department of Insurance

Gary Slaiman
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Antritrust Monopolies and Business Rights

John H. Snyder
A. M. Best Company

MR. BASSMAN: Good morning, and welcome to the 11th annual Casualty Loss Reserve Seminar co-sponsored by the Casualty Actuarial Society, American Academy of Actuaries, and the Conference of Consulting Actuaries. My name is Bruce Bassman, and I am a consulting Actuary with Tillinghast in Philadelphia. I am the Chairman of this year's CLRS program committee. Based on the preliminary results, it appears that we have set another attendance record; current registration count is about 825.

I hope that many of you get to enjoy the sightseeing around the capital area during your stay.

Thank you in advance for filling out the evaluation forms that have been provided in your folder. These are critical to the committee in assessing the effectiveness of the many breakout sessions that are conducted. These should be given to the session monitors located in the rear of the meeting room.

Last year we introduced a seventh session during the afternoon of the second day. This track was used to repeat some of the sessions conducted earlier. We've decided to retain the additional session, but because the first session is a general session, we will be repeating only one session this year: Loss Reserve Opinion Requirements.

At this time I would like to Chuck Bryan, president of the Casualty Actuarial Society, to make a few remarks.

MR. BRYAN: I serve two functions: one is to welcome all of you to this Casualty Loss Reserve Seminar, the premier loss reserving event; the other is to make noise while those people that are still entering the room are able to get seated. I'll try to serve both functions effectively.

As Bruce mentioned, there are over 800 people registered for this premier event. I think to all of us that indicates how important the issue of loss reserving is in the United States and in the property casualty industry. There are sessions that relate both to the theory of loss reserving, as well as to some of the regulatory requirements.

Because all of you have expressed an interest in loss reserves by attending this conference, I would like to also recommend to you three other items that will probably also be of interest to you.

There is a Canadian Property and Casualty Liabilities Seminar that is held in October. There are also two publications put out by the Casualty Actuarial Society that those of you who are not members of the CAS may not be aware of. The first is the "Casualty Actuarial Society Forum," which is published twice annually, and the other is the "Casualty Actuarial Society Proceedings," which is the official document that contains the learned papers of the Casualty Actuarial Society.

I also might note that this conference is somewhat unusual in that about 30 percent of the people that are attending are not affiliated with the Casualty Actuarial Society. This is a tremendous opportunity to blend the knowledge, skill, and intellect of people from the actuarial field, the accounting field, the legal field, and from general business management.

I'm sure during the sessions as questions come up and as an opportunity for discussion presents itself, everybody will avail themselves of the opportunity of getting all disciplines involved in these discussions.

I do want to welcome all of you. I want to congratulate Bruce Bassman and his Casualty Loss Reserve Seminar Committee for the wonderful program they have put together.

I would now like to introduce Irene Bass. As you know in 1991, continuing education requirements are now in place for the actuarial profession. Irene will say a few words about that.

MS. BASS: Thanks, Chuck. Thanks for warming up this audience. Wow! Eight hundred and twenty-five people is great. It's great because 825 people have a chance for some wonderful continuing education. It's also great because I have to report the number of attendees to the board, and this time they won't get upset.

We have this year, in January of 1991, a revision to the qualification standards of the American Academy of Actuaries. There are qualifications there for giving public statements of actuarial opinion, both general statements and specific statements. The specific statement that applies to most of us in this room would be the reserve opinion associated with the "Fire and Casualty Annual Statement."

There are three kinds of requirements: A basic education requirement, an experience requirement, and a continuing education requirement. The continuing education requirement is 12 hours per year with some hour carry forward provisions. Six of those 12 hours have to be from organized activities such as meetings and seminars, as this one.

There was some confusion at some point as to whether or not if you are giving a statement of opinion on a loss reserve, whether all 12 of those hours had to be in the specific narrowly-defined area of loss reserves; they do not. They must be associated broadly with what you are giving your opinion on.

The CAS in conjunction with the American Academy brings you this program today. The CAS also offers many other opportunities for you. As Chuck mentioned, in a couple of weeks, on October 3 and 4, there is the Canadian Property and Casualty Liabilities Insurance Seminar in Montreal. If you are a reserve groupie, I think you could probably sign up for this yet.

October 7 and 8 at the Marriott, in Boston, is a special interest seminar on risk theory. They promised me that even I will be able to understand it, so that means that it will be at a level that is for most of us.

March 12 and 13 of next year, in Dallas, is the rate-making seminar. This is our annual seminar on rate-making. It is sort of the counterparts of this. It has become an annual event very well attended.

Then in April and October of next year, we will have two other special interest seminars. The topics, yet to be determined. There are other places for you to do continuing education also. Please be reminded that regional affiliates offer continuing education opportunities, and the CAS meetings themselves offer continuing education opportunities.

If you have any questions or you would like to discuss continuing education as it is in the qualification standards of the American Academy, I will be here today. Please feel free to come up and ask me any questions or discuss anything that you would like.

Before I leave, I would like to do one thing. I realize it is early in the program to thank. Perhaps we shouldn't thank yet for something that we haven't seen, but I know it's going to be good. I know that Bruce Bassman will spend a better part of his day today thanking all of the people on the faculty and all the staff for this wonderful program, but I want to make sure somebody thanks Bruce. Would you please join me early in thanking Bruce for his work?

MR. BASSMAN: Thank you, Irene. Thank you, Chuck.

Before we start our first panel, I wanted to make a comment about handout materials. As you enter your breakout session room, please be aware that there may be some handout materials as you walk in. Look for those as you enter, so that we can minimize disruption as the panels get started.

At this point, I would like to turn the program over to Jim MacGinnitie. Jim will be introducing the panelists for our next session. Jim is a consulting actuary with Tillinghast, in Atlanta.

MR. MACGINNITIE: Thank you Bruce. This morning's general session is titled, "Solvency Viewpoints," and it is of critical importance to us as we do our work as loss reserve specialists. Because, as all of you know, probably the single most important contributing factor to solvency or its lack in the property casualty business is inadequate loss reserve.

Concern for the solvency of the insurance industry is widespread today. A few years ago, we had some major insolvencies in the property casualty industry in mission and transit and some others that have been memorialized in the monograph on "Failed Promises." Most recently, the life insurance industry has been hit hard with the takeovers of Executive Life, First Capital, Mutual Benefit, and several others.

In addition, in the public mind insurance has also been a real problem in something called the FDIC and the FSLIC. The "I" in both of those stands for "insurance." The fact that to you and me those are totally different businesses is irrelevant when it comes to the public mind. They see banks and savings and loans and the problems with their insurance funds is of a similar nature.

A year or so ago, in Rhode Island the Credit Union Insurance Fund collapsed. People are still showing up on TV every once and a while trying to get their money out of the credit unions in Rhode Island.

Periodically, we are bombarded with projections that show the insolvency of Social Security, which in the minds of a large part of the public is viewed as an insurance fund, just like another insurance company. Of course Medicare has a much shorter fuse with respect to its solvencies -- insolvency.

Perhaps finally, the Multiple Employer Trusts that are supposed to pay medical bills seem to fail with some regularity, leaving people with unpaid doctor bills, unpaid hospital bills, and very poignant stories that also play well on the evening news.

Well, as I say, all of this runs together in the public mind, and it has caused a great deal of concern with respect to the solvency of this industry. To talk about the solvency problem from three different viewpoints, we have assembled a panel today with representation from the rating agencies, the federal government, and the NAIC.

Our first speaker is Jack Snyder. Jack is a vice-president at A. M. Best, in their property casualty department. He joined the company a few years ago to run the Financial Performance Index Program, which was the new program they put in to deal with the smaller and newer insurers.

Prior to joining Best, he was involved with an investment banking and advisory firm, Fire Mark Consultants. Prior to that, with both Smith Barney and Harris & Upham.

Or maybe that was all one firm by the time you were there, was that?

(No verbal response)

MR. MACGINNITIE: Okay. Also, an underwriter for the famous reinsurer up there in Stanford, General Re. Jack is a graduate of Cornell and Bucknell. He is going to talk to us about the A. M. Best study of insolvencies in the property/casualty business and what causes them and what to do about it.

MR. SNYDER: Thank you, Jim.

Good morning. I wanted to thank Jim and the Casualty Loss Reserve Society for inviting me. As Jim pointed out, it has been a very exciting business the last two years not only for the actuaries but certainly for rating agencies, in general. I guess ever since -- I guess the impetus behind the excitement was probably "Failed Promises," which came out in the spring of 1990, as you know, as I'm sure a lot of you have read or at least have seen excerpts of it.

It was quite a revealing or insightful document into the failure of some of the largest insolvencies to date: The transits, the missions, et cetera. Some of the ugliest scars that the industry has had to date.

They left the overall reader, though, with the general impression -- and for that matter all of the press, and eventually the public that finally ended up seeing various excerpts and insights into it -- that the industry was in pretty rough shape, that it was mismanaged, that there were elements of fraud and embezzlement. And basically just left a bad taste in just about everyone's mouth.

We at the A. M. Best Company, given our data base and the fact that over the years we have tracked and monitored the industry, thought it would not only be informing but also we clearly felt it was a responsibility on our part to come out with a broader-scope study and analyze entire industries' insolvencies, not just a few of the more exciting ones. We formed some overall observations based on the findings of what we considered to be the most comprehensive evaluation of insolvencies to date.

What culminated, which took about a year, was a study of 372 property casualty insolvencies over a 22-year period, beginning in 1969. There are copies of it; I did bring copies. Maybe some of you have already received one or seen one. This study is approximately 80 pages. There will be copies available outside the meeting room after the session is over. If for some reason we run out, maybe you could see someone in the program or come up to me personally and drop me a card and I'll make sure you get one.

To get back to the study, we hope that those people have a chance to review and read it. I think you're going to come away with an entirely different perspective on the scope and the nature of the problems that are affecting the industry and also the magnitude of the insolvencies. What is the trend? Is it going up? Is it going down? Is it a runaway situation like the S&Ls? Are we approaching kind of a "melt-down" of the industry? We try to address a lot of these issues.

In addition, we address some of the state regulatory issues: What are the state resources at hand? What is the overall effectiveness of the 52 jurisdictions that regulate the industry? We have received a lot of favorable feedback on it and we intend to renew it. It is going to become a renewed publication each year.

Also, the life/health, the other half of the equation, we're going to have a study out on that, very similar in nature, this December. That also will be renewed annually. In the back of the study, if you do get a copy, we reference source publications, articles, you name it, that have some relevance to the overall topic.

We hope that it will become more or less a reference item where anyone that endeavors to look into or investigate the industry's insolvencies or issues relating to it. If you don't find it within our small analysis, you might find it in some of the other source references that are mentioned.

What I would like to do now is just go through and highlight certain aspects of the study. I'm not about to go through the entire thing, but I thought at least I would touch on some highlights. I have a selection of slides I would like to show you, and these are slides of graphs that are right out of the study. Now, the trick is to see if we can get this to happen.

Could I please have the lights dimmed and the projector turned on?

Good, you can bring them down.

The first slide basically is some of the raw information that we put together -- basic numbers, head count, of the insolvencies. As you can see from '69 to '80 -- 1990, the two underwriting cycles, the two soft cycles that culminated in 1975 to 1985 resulted in those red spikes. As you can see post-1985, we have had a continuation of kind of an annoying number of insolvencies. They haven't yet eclipsed 1985's level, but they certainly are higher than the historical trend.

You know, we went 15 years of less than 15 -- on the average of, you know, say, 10 insolvencies a year. From 1985 going forward, you know, the average is more like 30. It certainly is not an exponentially growing curve, which, say, the S&L, if you were to graph S&L insolvencies or bankruptcies, you would see things growing exponentially.

The one thing that is evident, though, is the profile of the insolvencies, despite it following the underwriting cycle. It is a pretty predictable industry in terms of when are there going to be the most insolvencies. Well, they are going to be when you can tell me when the soft market is going to culminate.

I will get into a little later on what we project to be '92 and 1993 when we think the soft market will turn. Those are the raw numbers, but they can be somewhat misleading because that doesn't relate to the base of companies that are operating.

This is a failure frequency whereby we took the number of insolvencies related it to the base of companies that are operating at that point in time. As you can see, the same profile emerges, but it's a little less severe on the right side because you've had about 30 percent increase in the number of companies operating in the industry from, say, 1969 to 1990. Therefore, those spikes are somewhat mitigated.

I guess the more interesting thing on this slide is that when you look at the failure frequency of the industry, up until 1985 it was less than 1 percent of the total number of companies that are becoming insolvent. 1985 obviously was an unprecedented year with 1.4 percent, but you can see since then it has gone down. In fact, through our estimate, through

1990, it actually was lower than, say, 1989's. I don't expect it to continue to come down. At some point we will see it ramp back up, but I'll pick that up later on.

If you are to compare this with, say, bankruptcy rates of other industries, other financial industries, banks, S&Ls, clearly it is superior. I don't want you to necessarily take comfort in that fact, because this industry should be held to a higher standard. It is based on faith and trust that you're going to be around to pay the client, so it should be held to higher standards.

I'm not trying to minimize it, "Hey, we have a problem, but don't worry about it." It is a problem, but I think at this stage it is still very manageable. At some point, and probably in the renewal of the study, we will compare the bankruptcy rate or the failure frequency of the insurance industry with many others.

I can say right now the gut feeling is that, by and large, it is superior; that is, it is substantially lower, has a better track record than essentially any other industry that's out there -- including all financial industries.

You saw the numbers and the failure frequencies. This slide basically takes the same numbers and relates it to the premium volume of the industry. What we have done, we took the company that went insolvent one year prior to its insolvency, we took its annual premium line, and then we accumulated all those for the companies involved.

This basically takes that premium volume of the insolvent carriers and relates it to the total industry premium volume. Again, the only thing that jumps out is, that with the exception of 1985, again, the premium volume involved, as far as the market destruction and what happened with that volume and those policyholders, it has been less than .5 percent of the industry's overall premium volume. Again, in 1985, it was an unprecedented 1 percent of the industry's premium volume, and a good half of that was mission alone.

Interesting enough, though, since post-1985, the premium volume, although the numbers have been higher than historical, those numbers of the companies involved have been relatively smaller in size. There has not been a lot of premium volume represented by those insolvencies.

This next chart basically takes that 372 count and distributes it among the 52 jurisdictions that are involved. The top six states, in terms of numbers of insolvencies over this time period, we have highlighted in red. It is the ones that you would expect to be up front, because these are the states that have a lot of companies -- Texas, California, Pennsylvania, New York, Illinois, and Florida. All the way down to six or so that I believe didn't have any insolvencies at all, at least according to our documentation.

Well, you can see it's a pretty diverse group. Some states have absolutely no problems with it, other states appear to have, from just looking at raw information, appear to have more of a problem.

We tried to develop the same thing, a failure frequency by state. In order to do that you need to know what the number of companies that are domiciled by state, whether it is primary regulatory oversight.

This slide just shows the average number over the 22-year period, the average number of companies that operated within those jurisdictions. As you can see, Illinois has close to 300 companies, on average, that it regulates; all the way down to West Virginia, I believe it has only 3 -- or Nevada. Yes, Nevada. To look at just numbers of insolvencies without having any context as far as, well, how many companies were these regulators overseeing is misleading.

The next slide develops a failure frequency again. We took the six companies -- the six largest states, sorry, in terms of number of failures, and we distributed them now -- or you can see them distributed now through this spectrum. Some of the smaller states where there are very few companies involved or very few companies domiciled and being regulated, it doesn't take many failures to really distort this kind of relationship.

I would just like to point out, for instance, Wyoming jumps out to the front, by this analysis, as having the highest failure frequency. I would like to point out that Wyoming only had an average of 4 domiciled companies over the last 22 years -- and 3 of them went insolvent.

(Laughter)

That's why you have that distortion. You know, if I was looking at this from a national or a macro-perspective, I wouldn't necessarily start working in Wyoming overnight. Yes, there are a lot of insolvencies, but you're only talking about a potential universe of, you know, three or four companies.

Louisiana, though, jumps up. Ironically, Wyoming and Louisiana have had commissioners recently that have been indicted and have been charged with crimes. Doug Green (phonetic) of Louisiana is the more recent.

Some of the other states, though, that we highlighted earlier -- Florida, California, Texas, on down the line, and all the way to Illinois, which is toward the later end of the spectrum. From this failure frequency perspective, this begins to really start to position them more or less where the states are relative to one another.

Illinois, if you remember, had the most number of companies under its jurisdiction. Yet, when you look at its failure frequency -- and it had one of the highest number of insolvencies of the states -- but when you look at it relative to the number of companies they monitor, they are towards the right half or the lower end of the range. Just from that much, you can say, you can make an observation, "You know, Illinois seems to know what it's doing or seems to have a pretty good handle on things."

This (indicating) is what are the resources that are dedicated at each state level. These (indicating) are the overall budgets of the states. These are not just the PC budgets, these are the budgets that run the entire insurance department -- oversees the life/health, does the market and the rate, performs the market conduct and the rate filing and function that departments run. And in some states maybe even run other aspects of the states' financial oversight.

It is interesting that within the top five states -- California, New York, Texas, Florida, and North Carolina -- just those five, they represent over half of the budgetary resources that are being spent at the state level. It is a concentration of regulatory dollars certainly at that end of the spectrum.

Then again, they do comprise a lot of companies, but not 55 percent. In fact, I believe the number is in the area of 20 to 30 percent as far as the number of companies that they are responsible for, have primary regulatory oversight of. There is tremendous disparities among the states in terms of resources if you measure it just by looking at overall budgetary dollars.

Once you get outside of the top 10, when you're looking at less than, say, $10 million a year for these departments. There is at least a minimum of $1 million, I would think, just to cover certain overhead expenses. Just to have even one regulator, one office, there is some fixed overhead that just can't be ignored. But there is definitely a disparity.

This next chart, and I'll take a second to explain it since it is somewhat confusing, tries to relate some of the things we just talked about. What it does is on the bottom axis we plot the average failure frequency of the 52 jurisdictions. The dash line running up around .7 percent is the state's average.

On the left side of the Y axis we have running up is the budget dollars per domiciled company, where we just took that total budget and divided by the total number of domiciled companies within that state. As you can see there, the average is running across there at around $60,000. Then we put quadrants in place.

Basically if you look in the first -- this lower left-hand quadrant, quadrant 3, we consider that to be the most effective region of the chart, meaning they have below average failure frequency and they have below average budgetary resources available. The extreme quadrant would be the quadrant on the upper right-hand corner, quadrant 1, which means that you have above average resources but above average failure frequency.

Then we took the six states that we talked about earlier that had the highest number of failures or the largest number of failures, and, again, we indicate them on the chart. You kind of get a plot that is somewhat expected. Where states spend a lot of money they generally have had pretty good failure frequency. They have gotten good bang for the buck.

Certainly New York and North Carolina come to mind as two states that have been very active and very progressive in terms of resources and regulation. They have below average failure frequency.

Illinois and Pennsylvania are also two states that appear to be doing a very good job. Illinois has below average resources, about half of the average relative to the 52 states, and yet it has about half of the annual failures, the failure frequency of the states. Pennsylvania, slightly above the states' average in terms of failure frequency. But again, it is working with a relatively modest budget in comparison to the others.

Texas, I think Texas has always had the wrap of, you know, being a poor or a weak state on the regulatory front, but it doesn't jump out as being a state that is really out of control when you relate it to these kinds of factors.

I guess the two that do appear to be out of sync with the rest of the chart is California and Florida. They have tremendous budgets, but they have higher, substantially higher, failure frequencies than one might expect. I think a lot of that has to do with -- you know, we just looked at overall budget dollars. We didn't break it down by department, what is being devoted to the examination teams, et cetera.

I've got a feeling that California and Florida -- and we're going to improve upon this in our next update when we get actual state budgets and try to allocate what is being devoted for the solvency function -- but I've got a feeling that California and Florida spend a lot of money in other areas, rate filing, market conduct, and other areas that are functions of the department.

I think there is not a balance, and I'm looking forward to see what our next round of analysis will give us. Right now there certainly is a lot of money, but there doesn't appear to be a lot of money being spent on regulatory oversight, within at least those two states.

Prop 103, for instance, in California, I've heard that there are upwards of 50, 75 lawyers on staff just to provide that rate filing review and all the litigation associated with it. Rate filings are an important function certainly, but we can't lose -- you know, we've got to keep our eye on the ball, which is also let's protect the policyholder in terms of solvency oversight. That's kind of the macro look.

We then broke it down and looked at individual company characteristics and company characteristics that appeared frequently and where there might have been a correlation in terms of insolvency characteristics. This one looks at the number of insolvencies and breaks them down by size. Small being less than 5 million in surplus; medium being 50 million or less; large being all above.

You can see that up until the mid-80s again it has been relatively a small or medium-size company problem. But as you can see in '85 and then subsequently I guess in -- I guess that's '88 and '89. We have had now large companies coming into the realm of the possibility of becoming insolvent.

Just to back up for a second, since I'm not going to elaborate any more on it with different slides. If you looked at the failure frequency by size categories, small, medium and large, although there has been a lot of small insolvencies small companies don't necessarily mean that they have a higher probability of failing.

In fact, if you look at the statistics of looking at small company insolvencies related to the base of small companies that are out there, they actually have a better failure frequency than medium companies. Medium companies, 5 to 50 million, in terms of just overall statistics, are the class of companies that have the highest failure frequency, even though the small companies get all the numbers.

Small is not necessarily bad. I know that that has been an issue on the regulatory front as far as capitalization requirements, you know, that there should be higher capitalization requirements across the board. I think for some classes of companies, small property mutual-oriented companies, it could be a mistake, because you could be putting out of business a lot of strong and solid companies that have a good track record when it comes to insolvencies.

Ownership. As far as the industry, these have been the trends: Back in 1978 or '79, mutual companies gave ground, in terms of their numbers, to stock companies and now stock companies represent the predominance in terms of how companies are structured. Those trends are just going to continue to increase.

Mutuals, particularly smaller ones, continue to emerge. Larger mutuals are demutualizing and any new formations have generally been stock because stock, its obviously much more flexible capital structure allows you to raise capital when you need it, et cetera, intent management with stock plans. It is definitely a continuing trend. The mutual is not a dying breed but certainly going to be relegated to just certain segments of the market.

If you compare the failure frequency of the stock versus mutual, there is quite a difference. Stock in mutual companies have represented about the same number of companies within the industry over the last 22 years, roughly 49 percent to a 46 percent split.

When you look at the insolvencies that occurred among the two groups, it has been somewhat lopsided: 75 percent of the curve were stocks and 16 percent were mutuals. Basically, stock companies have had a failure frequency or a failure rate that has been four times greater than mutuals.

There are a lot of reasons for that, as I'm sure a lot of you are aware of, and that basically reflects the volatility and the nature of the business, that the two companies, two structures are right. Mutuals traditionally have been involved with personalized businesses, classes of business, property that are more or less predictable and are not considered as volatile as other classes such as commercialized.

If you look at stock and mutuals historically, stock companies have always had in terms of a combined ratio a more volatile and less profitable results. With the exception of the later half of the eighties, we are now beginning to see some overlap between the two experiences, the underwriting experiences, between stock and mutuals.

I believe that a lot of this, the fact that they are now beginning to converge, is the fact that mutuals are beginning to search for new marketing avenues, other areas of growth as they see their marketplaces collapsing. And a lot of them have engaged in writing auto lines, since a lot of these have been traditionally property.

I know a lot of companies in the last couple of years that are coming to see us have had severe problems like the rest of the industry with underwriting the auto. You might see this continue where the mutual may, in fact, be no different in terms of their underwriting experience than stock.

Just a continuation of the stock versus mutual phenomena. This is kind of an interesting chart because basically it shows the count of purse-lines-oriented insolvencies versus commercial-lines-oriented insolvencies. In the seventies, the insolvencies were predominantly personalized. In the eighties, they were predominantly personalized.

I would hazard a guess at this stage that the nineties might see the flip again. It might become a personalized-driven insolvency problem. You know, as you can see, it was quite dramatic. I think that what happened, as we surmise, is that during the mid-seventies you had the two gas crises. I'm sure a lot of you remember waiting in line at the pumps for hours on end to get your tank filled.

I think back then it was very difficult for personalized companies, particularly the auto writers, to secure rate increases to adjust for inflation, to adjust for claims experience because there was tremendous pressure on the political or maybe the regulatory spectrum that said: "Hey, we're not driving our cars as much, we're not taking our vacations. We can't possibly be having the same accident experience that we had before gas got expensive and unavailable. So, rate increases? No way! If anything, we might want to consider rate rollbacks or something to that effect."

I think what everyone forgot was that, you know, 99 percent of your accidents occur to and from work or around town, which was still the driving that was going on. It was just the other driving, the holidays and the vacations where people weren't jumping in their cars, so the rate experience, the rate adequacy possibly became less adequate. And maybe companies, for that matter, were surprised by the fact that their claims experience didn't really improve during this period of time.

Therefore, you did have some larger insolvencies, personal line insolvencies, in the early seventies. The eighties we all know about. Where between the cash flow and the writing and the competitiveness within the underwriting, the commercial lines marketplace, we know what drove those problems.

But again, I think that there is a good chance of seeing personal-lines-driven insolvencies in the nineties; because again, maybe rate restrictions, a more difficult environment, the more political and consumeristic environment the personal lines companies have to operate within. This kind of supports that we just talked about personal lines companies had a worse underwriting experience in the seventies and obviously commercial by far had a disastrous underwriting experience in the mid-eighties. But they are beginning to cross.

In fact, through 1991 through six months, personal-lines-combined ratios continued to rise versus while commercial has stabilized. In some areas, some lines of business it has improved. This is kind of a confusing chart, but basically what it says is that younger less-experienced companies have a higher chance of failing. That seems to be common sense. This just kind of bears out that relationship.

Nine out of 10 restaurants fail in their first year. Well, a substantial percentage of insurance companies fail within their first couple of years. I'll just point you to maybe years in operation. Fifteen companies that have been 15 years or less in operation. They represent 27 percent of the industry in terms of that age group, and yet they account for 50 percent of the insolvencies.

This is by charter age too. This is not by so-called age of the management team and age of the operating plan. If you were to truly be able to measure that kind of an age where companies have maybe gone through a dramatic change, you probably would even see a greater percentage of insolvencies occurring within companies that are changing strategies or books or business or management.

Growth rates. This is the industry's growth rate in terms of writings, year-to-year change, you can see it operates within a band of about 5 percent to 25 percent. We hope that '91, '92, '93 at some point we will hopefully see it climb back up. But historically it has been in that range of 5 to 25 percent, at least in the last two underwriting cycles.

If you look at the insolvencies, three are average growth rate, prior to insolvencies for the 372 companies we are talking about. Eighty percent of the companies that we reviewed had excessive growth rates or below average growth rates. Only 20 percent of the companies fell within that band that was considered normal growth, in between 5 and 25 percent.

So, no growth or excessive growth are certainly determinants and potential characteristics of a company that might be in financial jeopardy. But again, there was 80 percent that fell outside that band that we just saw, companies either growing too fast or not growing enough. This goes into some overall, this just shows some overall industry results.

You know, I think the striped hatch mark line, the underwriting income loss, we've seen losses now since -- I guess our last underwriting profit was 1977 or 1978. I don't think we will ever see a return to underwriting profitability as we knew it back then. The investment income component is just too great for the industry, in general. I think the only thing the underwriting is going to do is just shape the overall operating income curve, which is the red.

(Interruption to the proceedings)

MR. SNYDER: -- Some years greater than others. But the underwriting profitability component of the equation, we don't see any more. We see maybe, at best, the industry improving to say 103, 104 at certain phases of the underwriting cycle.

This kind of combines a number of the previous relationships we've shown. I'll just go through it briefly. The failure frequency is the blocks or the bars or the columns on the bottom. Again, you see the two spikes, 75 and 85. We then plot against it the prime rate, it's a measure of interest rates, and the CPI, it's a measure of the claims cost.

The one relationship I just wanted to show here which might help us think about what we expect to see in the nineties, the early nineties, is interest rates obviously play a big role. Insurance is considered a financial institution, and they are very sensitive to changes in interest rates.

I think -- well, if you look at 1977 to 1980, thereabouts, you saw a tremendous spike in interest rates. At one point in December, I think it was 1980, the prime rate hit 20 percent. You had a tremendous tripling of interest rates over that three-, four-, five-year period.

That encouraged a lot of companies into the cash flow underwriting philosophy or strategy when you saw that you could reinvest funds or invest premium dollars at those kind of levels, you could absorb a lot more in terms of underwriting loss and still come out ahead. Particularly in the liability lines where you are sitting on the premium dollar for quite a long time it became very, very competitive, and basically extended the underwriting cycle, the softness in the underwriting cycle.

So a dramatic rise in interest rates definitely encouraged price cutting, cash flow underwriting. Its a great party up until the time that interest rates collapse, as they did in the early eighties. At that point I think a lot of the liability writers and a lot of the companies that engaged in that kind of practice found themselves with a rate structure that was more or less inadequate given the new environment they were operating in and the reinvestment rates that they could forecast or bet on.

By the time that took its toll on the underwriting cycle, it culminated with that spike in 1985. Some of the same thing occurred in the seventies, the mid-seventies with spiking interest rates and then a collapse, but it wasn't as dramatic as we saw in the eighties.

Now, going forward to help us maybe project what we might expect in the early nineties. Since the soft market began in 1987 interest rates have risen by the Wright's (phonetic) Scale 3, 4 percent. They subsequently have come down since 1989, and they continue to come down as the recent cut by Allan Greenspan.

My best guess, and we're not economists, we don't have a crystal ball that's any better than yours, is that we expect interest rates certainly might come down again or more likely maybe stabilize but they certainly are not going to go up. But the encouragement to engage in cash flow underwriting, as far as management is concerned, it's not there.

We haven't had the dramatic rise in interest rates. It has been relatively stable. We don't see that necessarily driving and prolonging the soft market. We expect in '92, '93 a turn in the underwriting marketplace, not as sharp as what we saw in the eighties but certainly a turn as cash flows and as underwriting profitability really begins to impact the bottom line.

As far as combined ratio expectations, it is about a 109 right now for the industry. We see maybe going to 112, 113 -- and maybe even that's high at this juncture. This just relates some of the underwriting experience with the failure frequency again.

Oddly enough, after we plotted it we saw that, gee, the way we have the scale set up with the failure frequency being on the left and the combined ratio being on the right, the peaks of the combined ratio and the peaks of the failure frequency occurred relatively close to one another, based on these scales.

As you can see in 1975, they came very close to matching as well as in '85. Based on our expectations for '92, '93, I think again we're going to see an overlap, if the forecast holds true, which is a combined ratio of 112, 113, matching a failure frequency of about a little over 1 percent. That's essentially our projection for what will be the spike in '92 or '93 in terms of PC insolvencies. At this point it's about 45 companies, representing about 1 percent of the industry's companies. It is below what we saw in '85, so we don't see return to the magnitude or the severity of the '85 cycle.

The primary causes of insolvency, I think this is something that is certainly pertinent to this group.

Twenty-eight percent of the ones we identified as the primary cause was loss reserve related, deficient loss reserves or inadequate pricing; rapid growth followed.

Alleged fraud is very interesting because through the seventies there was very little alleged fraud. In the eighties, though, it was peppered with alleged fraud. Some of the more notable insolvencies that you are familiar with had components of alleged fraud, if not fraud.

Reinsurance failure, another development in the eighties. I guess what we gained from this or what we observed from this was the insurance industry was a victim of white-collar crime just like all financial institutions during the eighties. You had a lot of related causes or related characteristics between what happened in banks and S&Ls, and insurance companies -- but not to the same degree. But certainly I think it had it's share of white-collar crime.

Where was A. M. Best? What was our track record during this period? This basically plots the ratings of the group of companies, the 372 companies, 3 years prior, two years prior, 1 year prior to the year of insolvency. You can see a good third if not a half of the companies were not followed by us.

The companies that were followed by us, you can see the rating distribution. You can see the rating, the so-called A, B, and C-rated categories collapsing as you go towards year insolvent. Basically what the overall track record or batting average is for the A. M. Best Company over the 22-year period is in terms of the A-rated category, the black bar at the end there (indicating).

There were 6 A-rated, A+, A-, and A-rated insolvencies over the 22-year period out of 40,000 ratings assigned. Out of 40,000 ratings assigned, 6 ended up being As. No one had an unconditional A+ but six ended up being A-rated that went insolvent.

Clearly, we are not perfect but it is certainly a batting average, I think. It is commendable and we continue to try to improve upon it in terms of our ability to monitor and our ability to analyze and work with companies that might be facing difficulty.

The other interesting point of this chart is a large number of the companies that have gone insolvent -- in fact, since 1985, 50 percent of the insolvencies that were in this study since 1985 were companies that were not rated by us. For that matter, I don't think they were rated by any of the other agencies.

An unrated company, if you look at the population of so-called unrated companies, there are not a lot of companies we're talking about but they accounted for a large number of the insolvencies, 50 percent since 1985. That in itself is considered a high-risk characteristic in my book.

Now, some companies have a legitimate reason not to be rated, captives, et cetera, where there is no need to have third-party information or a third-party business involved, but a lot of them. A lot of them we work cooperatively with companies, and either they submit the information to us or they don't.

In the case where they resist or do not want to be reported or rated, I think in a lot of cases because there is a problem or there is something that they don't necessarily want broadcasted to the industry. That's it. That's again a selection. There are other studies within the study. Hopefully they will be outside on the table afterwards. I appreciate your attention.

MR. MacGINNITIE: Thank you, Jack.

We can have the lights back up now, if anybody remembers where the switch is?

(Laughter)

MR. MacGINNITIE: At least they did that. Good.

Our next speaker is Gary Slaiman. Gary is the counsel for the Antitrust Subcommittee of the Senate Judiciary Committee. A position he has held for the last 2½ years. Prior to that, Gary was an attorney with one of the major Wall Street law firms in their Washington office for five years. I believe prior to that came out of the UVA Law School, down the road in Charlottesville.

He also pointed out to me this morning that is a recent graduate of the NAIC Financial Examiner's course. Gary has been instrumental in drafting some of the proposed legislation in the United States Congress, and he is going to talk to us a little bit about that process and that proposed legislation.

MR. SLAIMAN: Thank you very much.

It is my pleasure to be here today. That was a great presentation. I very much appreciated and learned a lot from it. In order to give the next speaker a chance for rebuttal, though, I don't think I'll take the full time I might have been allotted, since I don't want to cut him short.

Let me say just as a disclaimer that my views and what I say today are my personal views. They don't necessarily reflect the committee or the chairman's views on these matters.

The reason I'm here and was invited this year is because Chairman Metzenbaum, who chairs the Antitrust Subcommittee for which I work, introduced in August, just before we went out for the summer recess, a major piece of legislation calling for a federal role in the regulation of insurance.

As you are probably aware, there is no such role today, and in fact there are laws on the books that actually prohibit the federal government from even studying the business of insurance. This is a major piece of legislation. It will have an impact. I will describe it in some detail this morning.

Let me give you a little backdrop, though. Whereas you have had Jack Chessan speak to you in the past, and Chairman Dingell I think will soon introduce a similar piece of legislation, his interests and his emphasis has been on subject matter that is probably more important to you, and that is the property and casualty side.

Chairman Metzenbaum's interest and the hearings he has held over the last close to two years have emphasized the life side. This bill and whatever comes out of the House will have an impact on you because it will regulate both the life and the property and casualty side, but you shouldn't be uninterested in what is happening on the life side because it is driving today some of this federal and legislative interest.

First Executive, Mutual Benefit, First Capital -- some of these large-scale insolvencies on the life side have created a crisis in confidence both in the American public and up on the Hill as well. That is, in large part, what has motivated our effort quickly to get some legislation out there. This bill is not the final bill that will pass the Congress. But it's a large bill, it takes up a lot of issues, and it is the basis for starting in some detailed discussion of what the federal role should be in this area.

The hearings that we have had over the last year and a half or two years have shown us that the quality of regulation while, in large part, quite good, is not uniformly good. I think you gathered that from some of the comments, from Mr. Snyder's remarks.

The NAIC while performing the function of trying to create some uniformity and high-quality regulation is limited by the nature of what it is. It cannot dictate to the state legislators what laws they should pass. It can suggest to the states a whole series of model laws which have been proposed. Some of those have been around for over a decade and not been adopted by every state.

As long as there is not uniformity and as long as some states are not going to have this high-quality of regulation that we think is necessary, we think that you've got to have a federal role to dictate in some way to all the states some minimum level quality of regulation. That's what this bill would do. It creates an insurance regulatory commission.

This commission would primarily adopt federal minimum standards. It would not get into the business of day-to-day regulation. That would be left with the states. The way these federal minimum standards would be foisted upon the states, it's fair to say, would be through an accreditation process.

The IRC would accredit states on the basis of whether they had adopted these federal minimum standards and whether they had quality regulations. An accredited state would then be able to issue an interstate insurance license, to allow companies domiciled in that state to allow those companies to do business in interstate commerce.

If a state was not accredited, those companies domiciled in the state would not be able to do business in interstate commerce. They would either be forced to move out of the state to a state that was accredited or to stop doing business. It is our sense that that hook will be the hammer that gets the states to adopt these federal minimum standards.

Now, there are a whole list of areas in the bill that describe those areas in which we are going to propose federal minimum standards, which the IRC will do. Everything from minimum capital standards to some consumer disclosure requirements.

Now, some of these standards in the bill are not very specific, they sort of hit the issue. They describe a general context of where we would have the IRC go. The IRC would promulgate these minimum standards based on a whole series of hearings and rulemaking procedures that is typical of a federal independent regulatory agency.

Now, some of the areas that would be of particular interest to this group concern the Commission's requirement that it prescribe requirements for setting standards for liabilities and reserves and how those should be set.

Additionally, another one of the standards calls for the Commission to require that there be an opinion on an annual basis by a qualified actuary. Now, we have not defined in the bill what is a qualified actuary. I understand that that is not a simple issue.

I expect that in future incarnations of the bill, or we will leave it to the IRC, that will be fleshed out as to what is qualified. But it is our sense that it is very important to have a qualified actuarial analysis on an annual basis so that we know what those loss reserves are and that they are being handled correctly.

In fact, most of our interests, because it has been on the life side, has been on the assets side. We have had several hearings on whether one should market-to-market, how the asset side should be treated, but the loss side is just as important.

Additionally, another one of the standards that would be set by the IRC is some minimum standards of what kind of resources a state must have to be accredited. Included in that is consideration for how much actuarial support a state regulatory body should have in order to be given quality regulation.

The other parts of the bill call for federal regulation of reinsurance. Where we have left to the state authorities the regulatory responsibilities for the primary insurance companies, we feel that this is not adequate in the reinsurance area, because the states do not have jurisdiction over foreign reinsurers and reinsurance is not, we believe, regulated carefully enough.

We don't believe it is sufficient to merely regulate reinsurance through credit for reinsurance. There needs to be a better understanding of the quality of the books of the reinsurer himself. We would call for the federal regulatory body to actually regulate reinsurance, have reports filed by reinsurers, have exams done at the federal level of reinsurers.

Additionally, another title in the bill calls for a national guarantee fund. It is again our sense that there are too many gaps in the current guarantee fund system. We feel that people have fallen through the cracks. We are also concerned that a post-insolvency funding system, given a real crisis, would be not up to the task of making policyholders whole quickly enough.

The bill calls for preinsolvency funding by the industry of the federal guarantee fund. It would call for no federal funds but it would be assessed against the companies, and state guarantee funds would be preempted once this national guarantee fund was in place. The membership in this guarantee fund, the companies that would become members, would be any company holding an interstate insurance license.

Now, if there were companies that were in states that weren't accredited and didn't feel like they were going to do interstate insurance, the business of insurance in interstate commerce, there may still be a role for state guarantee funds. But by and large, we would see them being preempted by a national guarantee fund.

An additional title in the bill calls for a national liquidation process. Once a state had determined that a particular company was insolvent, it is at that point that we would move -- as the state would move to a court to try to marshall those assets, we would then move that process to the federal level out of the concern that there are too many fights between state authorities over assets held in their respective states.

We think that it makes a lot of sense to hold that function at the federal level. We do not have in the bill, but are currently considering including, since we will have a prefunded guarantee fund, the possibility that that fund would be able to provide cash infusions to companies that aren't necessarily insolvent but need money to make it over the hump, I mean, much as the Federal Reserve would do for banks.

Once you have a national fund with those resources it makes sense to not force companies to necessarily go under in order to keep doing business if, in fact, they are a healthy company but being subject to a run or excessive policy surrenders.

We think it makes sense to hold that function once you have created an insurance regulatory commission, because you would want the regulators to work closely with the guarantee fund to figure out whether a company is, in fact, healthy and just needs the cash infusion to make it past this run that they might be experiencing, rather than calling for them to be called insolvent and taken over by the authorities.

The final title in the bill provides for new federal criminal penalties, both for fraud and other aspects of insurance. Some of which has already passed the Senate in the form of an amendment sponsored by Senators Metzenbaum and Bryan as part of the crime bill which is now before the House for consideration. There are additional provisions in our bill over and above what already passed the Senate. That is an overview of the bill.

As I said, the bill is not the final product that is going to pass the Senate. It needs a lot of work. I welcome input from you all as you look at it and as members of the various actuarial associations look at it. We would appreciate comments and help on it. I don't think people should sell it short. There is a possibility that it may become law, and possibly soon.

The normal gestation period for a bill of this complexity and controversial nature is several years, if ever it would pass. But when you've got a volatile situation both on the P and C and the life side and you may be faced with other big insolvencies, Congress may feel the need, particularly if it's an election year, to act, to do something to calm policyholders around the country.

If that sort of mentality developed and if you had more insolvencies and a general crisis atmosphere, legislation like this may well move and move quickly. People should take it seriously. Because there isn't a reservoir of insurance knowledge inside the beltway, and we readily admit our own ignorance on a lot of these matters, the fact of the matter is that if Congress is looking for something, they don't have many places to turn.

The federal government isn't in a position to draft legislation. There aren't that many committees on the Hill that have the expertise. Once you have a bill in and this is the only bill in, it could become the vehicle. I'm happy to have described it a bit. I will take questions after the next speaker.

MR. MacGINNITIE: Thank you very much, Gary.

As you can tell this is an area that is developing and developing rapidly. Our final speaker this morning is William McCartney. Bill is the director of insurance in the state of Nebraska, a position that he has held for the last four-plus years. He is also a vice-president of the NAIC. For those of you familiar with NAIC politics, that means he will be president next year.

Prior to joining the insurance department in Nebraska, he was out there in the trenches as a broker with one of the major alphabet houses. He knows the business not only from the regulatory but from the service and brokering side.

MR. McCARTNEY: Isn't it ironic that here we are in Washington. You know one of the three biggest lies in the English language. "Hello, I'm from Washington, I'm here to help you."

(Laughter)

It is also ironic that after holding a series of hearings over the course of the past couple of years, the NAIC has testified at least 15 times just in 1991 alone. I have done it four times. Isn't it ironic that after all of these hearings and all of this investigation into the regulation of the insurance industry, that the most significant thing which our critics have come up with is something that the NAIC put in place 2½ years ago.

Really what the proposed bills would do, among other things, is create national standards for the regulation of insurance. Something the NAIC did a couple of years ago. What does the federal government bring to the table? Well, I don't know? I can't think of a whole lot, except another layer of bureaucracy.

If the NAIC can't dictate to the states how the laws should be structured -- and I will concede that it cannot dictate -- how can the federal government in the same respect dictate to the states? It really can't. It can do the same things that the other state insurance departments can do if the state fails to live up to the minimum standards, and that is not recognize the companies domiciled in those states on an interstate basis.

You know, these bills that are floating around do a little bit more than just provide standards for state insurance departments. Reading the bills, you could conclude that not only could state insurance departments be certified or accredited to regulate the insurance industry, but so could some form of self-regulatory organization.

I guess that would mean that Mutual of Omaha could decide that it doesn't want to be regulated by me anymore. It could join a self-regulatory organization and that SRO could be certified or accredited somehow by this insurance board and it could be the regulator. I have said this a number of times that, except for actuarial science self-regulatory organization is the biggest oxymoron I've run into since I've been insurance commissioner.

Really what does the federal proposal do? It sets forth a series of minimum laws, capital, surplus, those kinds of things. That's the first part of the NAIC standards program. There are about 20, 23 minimum provisions that states have to have in order to become accredited. The federal proposal talks about resources of insurance departments. Well, that's the second part of the NAIC program.

Does the department have an adequate staff of financial analysts, financial examiners to regulate the insurance companies domiciled in that state? Does it have a sufficient budget? Can it do the things it needs to do carry out the laws that are in the first part of the standards?

Then the third part has to do with procedures. The laws are in place, the staffing and the budget is there. But are the procedures in place? Are there written procedures for handling different things which often confront insurance departments?

Are there written procedures for the analysts to talk to the examiners and the examiners to talk to the lawyers and all of the things in the departments to work together? That requirement is in place and has now been in place for almost three years.

Gary said that there is not a lot of expertise inside the beltway, and Congress looks to groups such as this to help it as it wrestles with these difficult issues. If there really is expertise in the area of regulating the insurance industry, it rests with the state insurance departments. While we are called in on a regular basis and held accountable for everything we've screwed up, we are rarely consulted, we are rarely asked for input in coming up with these proposals.

To be perfectly frank, I've looked at the various proposals. I personally prefer one proposal because it contains not only the provision for an insurance regulatory oversight board; but it also lists the salary level which those folks will be compensated at, and it is roughly $135,000 a year. My application is already in. Once this happens, I hope they will defer to somebody who has been regulating companies for a while.

One of the proposals contains a provision that the other doesn't, and that's for a national guarantee fund. I will be the first to admit that we need to do something with our guarantee fund structure.

Actually, folks, it has worked pretty well for the last 20 years. It has been around for a couple of decades, and it has really worked pretty well. There haven't been any major problems with capacity or anything up to this point; but, we're looking a number of alternatives. We have held a couple of hearings and we will hold some more.

Something that I personally find to have merit is to move away from this post-assessment funding into some kind of prefunding. And again, I will disclaim that these are not the opinions of the NAIC and maybe not of any other insurance commissioner. But like Rush Limbaugh says, "They ought to be."

(Laughter)

But we ought to have, I think, some kind of preassessment funding. I would like to see the funding or the premiums charged be risk-based, so that some company with a lower-quality asset portfolio would pay a higher premium than some company with a high-quality asset portfolio. Perhaps some company dealing with riskier lines of insurance would pay a higher premium than some plain vanilla personal lines carrier. But those are issues that need to be worked out, and we are looking at them.

You know, the reason we haven't had a preassessment guarantee fund, except for one in New York, is because of the experience that we have had in Washington with social security, the highway trust fund, and all of these other funds that have built up cash balances over time.

As soon as there is a budget crunch, along comes the legislature, sticks in an IOU and takes out all of the money. I don't have any reason to believe that if we have some kind of national guarantee fund, as some have suggested, that the same thing won't happen. The insurance industry will contribute and contribute and there will be this huge pot of money all ready to pay off a major insolvency; and, when it occurs, the money will be gone because it will have been used for funding of the Contras or building highways or --

(Applause)

A couple of other things I want to mention, and then I'm going to sit down because I want to save time. Another thing which is in these proposals is a federal criminal penalty for insurance fraud. This federal criminal penalty has passed the Senate and is basically a draft that the NAIC put together earlier this year.

You know, the NAIC and state regulators haven't said, "There is no role for the federal government when it comes to the insurance business." We haven't said that. We have said, "As a matter of fact, we could use some help."

Earlier this year, we said, "Look, there has been a problem with cheats and frauds and crooks in the insurance industry and we could use a little help." It is hard to get the attention of either federal or state law enforcement authorities when you've got a company domiciled in one state, doing business in a second state, and all of the principles are living in a third state. We could use some help. And we put together a federal insurance company looting proposal which was introduced and has now passed the Senate.

What we have said is, when it comes to regulation, we don't see what the federal government brings to the table. We don't see what it can add to the efforts of the states already in place. We don't believe that the proposals currently being discussed do that. They would add another layer of bureaucracy. They would make it more difficult for the states to do what is already a difficult job. We believe the federal government, in its oversight role -- beating us over the heard, holding us accountable -- is proper; but much beyond that would be counterproductive.

MR. MACGINNITIE: Well, we have some time for questions, and hopefully for some answers. What I would like to do is ask you to jot down your questions if you have them and make sure that they somehow win there way up here to me. If you pass them to the center, I think I've spoken to someone in each of the three main aisles about perhaps getting them up here. While you're doing that, I'll start with a question or two that I might have.

Jack, you might want to reposition down here so you're near the other microphone and we don't have to share just one. I'll start with something that is kind of a general question that I've seen in several different write-ups on regulatory action, including this morning's "Wall Street Journal," where the front page column says that we could save some money on bank insolvencies if we would only move more rapidly when a company or a bank, in this case, gets in trouble.

Many of you are aware of a proposal, a study, that was authored by Dick Stewart (phonetic) on behalf of the NAIB, I believe, that essentially said the same thing about property casualty companies, that once they are in trouble, move quickly and at least stop the flow of blood and reduce the cost of the insolvency. I guess I would ask each of the three panelists what their perspective of that question of speed of action is.

I'll start with you, Jack.

MR. SNYDER: Sure.

I think what was pointed out by some of the other speakers, it's a tremendous undertaking monitoring the solvency of the industry. I don't think any one entity holds the magic key or the mechanism to do it and to do it in the most effective manner. I think it takes a cooperative effort from all of the parties involved, from the states, the NAIC to some kind of federal role that is yet to be determined.

(Inaudible)

I think all parties, for that matter, in the actuarial community, the accounting community, anyone that has an objective -- plays a professional role within the community. I think our responsibility from a rating agency perspective is one that needs to be improved upon in terms of communicating and having a more effective relationship with the states where that might house or have primary oversight on a troubled company.

I think if you get a copy of the study, in the back we list 372 companies. We show their 5-year and their 3-year ratings prior to becoming insolvent, as well as the primary cause of the insolvency. You will see in a lot of cases they were rated by us NA 7, which means it was below our minimum standards. These are companies that truly didn't even meet our lowest rating category.

These are companies we identified early on, and there's a substantial number of them, that were companies that were in trouble. We are finally taking over and either liquidate or rehabilitate. We need to work more closely with the states. That's one of the reasons why we think we can play an effective role.

The rating agencies in general, in terms of supplementing the states's efforts in monitoring the companies, not replace them, no means by that, but just supplementing, having a different point of view, having a different approach to revealing and analyzing a company.

Again, as you people can appreciate, evaluating the health of a company, evaluating the adequacy of loss reserves, it's not a scientific pinpoint accuracy-driven business; it's a subjective business. I think that a lot can be done towards accelerating the process of either rehabilitating or liquidating a company that would save tremendously in terms of overall cost to guarantee funds. We certainly would like to, you know, see that happen.

MR. MCCARTNEY: You know, that has been something that has been around for a long time. One of the real weaknesses of state insurance departments and regulators has been that we haven't acted quickly enough. There have been some recent studies, and by recent I mean within the last three or four months, which have looked at savings and loans and at banks and have concluded that, you know, not in every case does it always work out for the best if you move quickly. You have to balance different interests and different problems.

In some cases it is important to move quickly, but not in every case. I will concede that it is important for regulators to be on top of the situation, to know exactly what is going on in the company, but that does not translate into liquidating the company as soon as you become aware of a potential problem.

We have a couple of working groups in the NAIC looking at risk-based capital requirements for insurance companies. Terry Lennon, from New York, is chairing the life and health risk-based capital working group. Vinnie Laurenzano from New York, is chairing P and C.

This has great potential from our perspective. No longer will we say, "minimum capital and surplus of 2 million bucks" and, whether you're writing automobile insurance or major reinsurance, that's all you need. It will be based on the riskiness and the kinds of business that you're writing.

There will be triggers, and ideally it will say as you move down this list, different regulatory actions will be indicated. Currently, under the due process laws and those kinds of things, we are limited in what we can do as regulators.

We cannot take a company down. We cannot liquidate it, technically, under most laws until it is insolvent. Now, there is some leeway there when it is impaired or hazardous. But by and large, the courts aren't going to let us liquidate a company until it's demonstrably insolvent.

Well, it may take years for it to become insolvent, even though we know it's going to get there. As we move to risk-based capital, those triggers will be in place and we will be able to take some extremely strong regulatory action before a company becomes insolvent. There will be money left at the end of the day to pay creditors and others who are now left holding the bag, and that's a good, ideal situation.

MR. SLAIMAN: The committee has held hearings and stated fairly strongly that we feel that companies in trouble have not been brought down early enough when things were known that we believe should have rendered a judgment that that company should be brought down. First Executive is a case in point.

I will admit that hindsight makes that an easy criticism to make, but I do find that commissioners often are making a judgment that if they don't act to bring down a company, they can rehabilitate it; and that they don't want to at precipitately on the chance that they can save a company. It is our sense that that judgment hasn't been exercised correctly in a number of very important instances.

MR. MACGINNITIE: We've got some superb questions from the audience and too little time to go through them all. One for Jack Snyder. "Is there any evidence that open competition in California contributed to the large number of insolvencies there?"

MR. SNYDER: In terms of Workers Compensation or--?

MR. MACGINNITIE: Until 103 in California you could charge what you wanted.

MR. SNYDER: Oh, okay.

MR. MACGINNITIE: Presumably I think the questioner thinks that maybe some people charged too little and became insolvent.

MR. SNYDER: Part of the study has a section that dealt with rate regulation, use and file, prior approval, which basically anchored the two ends of the spectrum in terms of how easy it is to change your rates. Then there is a combination within there, depending on personal lines and commercial lines and by some of the states.

Within the states where we could definitely compartmentalize them as being strictly prior approval or strictly use and file, we studied the insolvencies that occurred within those two jurisdictions. Although, it was somewhat simplistic in its overall approach, there were no conclusive findings in terms of the rate regulation and does, say, prior approval lead to a more rigid rate environment and, consequently, more insolvencies.

There was some evidence of that, but it wasn't enough to make any kind of conclusive comment. So at this point in time, I would be reluctant to try to say that rate regulation, looking at past insolvencies has been a large contributor. It obviously impairs the overall profitability of the industry, and that in itself will erode capital over time.

I think the more rigid the environment becomes the more you will see greater erosion in that cushion of capital within the industry, particularly if you combine it with limiting, or in this case with Geremonte (phonetic), in California, the so-called capital utilization regulations where you have to write a certain level of writings to premium. We are trying to put the industry too much into a box, and I think that's really going to hinder its innovation and its ability to become more effective and more secure for the policyholders.

MR. MACGINNITIE: Okay. Question for Gary Slaiman. "What is your position on self-regulatory organizations? Can they be effective? How would you differentiate them from rating agencies such as A. M. Best?"

MR. SLAIMAN: Well, I appreciate the question since Bill had mentioned this as well. Our bill would not permit a self-regulatory authority to get accredited. It would have to be a state authority. I guess I'm pretty suspicious of self-regulatory bodies. I know that some members of the insurance industry have suggested they can take care of themselves and do it well.

Wearing my antitrust hat, I am particularly concerned that you would have big insurance companies deciding which companies would be safe enough or good enough to be covered by the fund and draw it down. If they chose among the big guys, it would hurt the little guys, and you would find that there are real threats of anticompetitive activity going on under the guise of self-regulation. So, I would be quite anxious about it.

MR. MACGINNITIE: Question for director McCartney. "What sort of activity within the NAIC is there with respect to hiring more actuaries at adequate salaries and support," like more than 105 --

(Laughter)

MR. MACGINNITIE: -- "and putting them in position to directly advise commissioners?"

MR. MCCARTNEY: Well, we tried to pass the "actuaries full employment act" a year or so ago --

(Laughter)

MR. MCCARTNEY: -- when we required actuarial certification of loss reserves. We thought that would help. Jim told me this morning that it looks like more and more actuaries are graduating from college and moving into the actuarial profession. I think that's good. Maybe they won't be lawyers now.

(Laughter)

MR. MACGINNITIE: The inevitable lawyer joke.

Okay. I'm not sure who this question is for. Maybe it's aimed at Gary. "Is not the federal government much of the problem by demanding smaller and smaller reserves for tax filings?"

MR. SLAIMAN: I'm sorry. Could you repeat the question?

MR. MACGINNITIE: "Is not the federal government much of the problem by demanding smaller and smaller reserves for tax filings?" The IRS keeps hammering us on excessive reserves.

MR. SLAIMAN: You know, I'll have to admit some ignorance on the tax side. We haven't dealt with any tax issues in our bill. We're leaving that to the main, of the Finance Committee, in their best judgment. But let me just address sort of the question, that isn't the federal government a problem, since that's also been raised today.

I think the federal government in this particular instance has a very important role. In spite of what Bill has said, the NAIC, for all of their good work, and maybe we robbed them of some of their best ideas in this bill, doesn't have the power and authority to accomplish what needs to be accomplished.

It is only the federal government that can set up a system that can force the states across the board, each of the 50 states, to have quality regulation. That's what I think our role is, and I think it's a necessary one.

MR. MACGINNITIE: A question I think primarily for Director McCartney. Actually I've got a couple of questions here. They both run to the thrust that adequate reserves require adequate rates. A number of regulators seem to be interested in holding rates down, and that makes it difficult to come up with adequate reserves.

MR. MCCARTNEY: Well, I'm not one of those.

(Laughter)

MR. MCCARTNEY: If there are some, I'm not one of them. But since I have the microphone -- no, I'll let it pass. Thanks.

MR. MACGINNITIE: Okay.

(Laughter)

MR. MACGINNITIE: Should I play lawyer and bore him with cross-examination? No, I think -- let's move on. He got here at 3:00 this morning because of air traffic problems, I assume at O'Hare, so I have to be gentle.

Final question before we take our break. To Gary Slaiman: "Would Metzenbaum's bill support some role for the NAIC for coordinating or setting model laws for the states? Or would the NAIC, in effect, be overshadowed by the IRC?

MR. SLAIMAN: Well, I think in fact, and we haven't discussed this with the NAIC, but I think in fact the NAIC would have a tremendously important role since they are the reservoir of expertise in the area; and we don't deny that. The IRC in promulgating this federal minimum standards would be subject, as I said earlier, to the same rulemaking requirements of any federal regulatory agency.

You would have notice in common periodicals. You would have filings in the "Federal Register." You would have testimony and expertise sought by this commission. I would envision that the people that would come up and have the lion's share of the role in terms of informing the commission, educating them, and testifying on these standards would be either the NAIC or something like the NAIC. So, I see them as continuing to exist and having a significant role.

MR. MACGINNITIE: Bill, the last word?

MR. MCCARTNEY: Yeah. I just want to follow up a little bit. We've had some experience dealing with federally mandated standards for regulation of insurance. Many of you may not be familiar with these because they are on the other side, they are on the life and health side, but they dealt with Medicare supplement.

They were put in place -- gee, a long time ago, a decade or so, by the Baucas Amendment to the Medicare Act. It basically said that the states should come up with minimum standards for regulating insurance departments. The NAIC should develop it and then, when the NAIC adopts those standards, they will be mandated on all the states by the Medicare Act.

At first it sounded like a good idea and we worked real hard to get those in place. In the five years, the five legislative sessions I've been through as an insurance commissioner, every year we had to go back and make changes to that. If you just remember the last three or four years, the history of that, we had some pretty goods ones in place. Congress came along and passed the Catastrophic Act, put in these catastrophic benefits, one year.

All of the states had to really scramble. The NAIC first had to really scramble to update the standards to meet the catastrophic amendments. Got them all in place, and then 10 months later Congress repealed the Catastrophic Act in response to complaints from the senior citizen community.

The states then worked very, very, very hard to make the changes mandated by the repeal. The next year the Medicare supplement was changed again. The Supplemental Health Insurance Panel was abolished.

We looked at this. We decided, early this year we had a commissioner's retreat, sort of poetic justice in that, a commissioner's retreat here in Washington, designed specifically to look at federal issues.

(Laughter)

MR. MCCARTNEY: We had a number of very important people from the federal community come in and speak to us, including Senator Metzenbaum; Senator Bryant; Senator Derenberger, on health issues; Congressman Dingell, and there might have been a couple of others. The membership got the message that "it ain't business as usual anymore, we ought to take a look at this."

I chaired a group that said, "How can we do some of the things that Chairman Dingell and Senator Metzenbaum are talking about, and that's federal standards for insurance departments. As we looked at this, our frame of reference was our experience with Medicare supplement and also the fact that our state legislators appropriate funds for all of our Departments. In our states, 12 of us are appointed and report to the voters.

The other 39 of us are appointed. To whom do we report? The voters who elect us? Our governors? The legislators who appropriate funds for our departments? How do we report to them? How do we respond to them? How do we work for them while, at the same time having this federal oversight board dictating to us these other issues? It really becomes a federalism problem. Gary is right, in many respects, the NAIC can't dictate to the states. But as we tried to look at how the federal government could do it -- (Inaudible) -- under any kind of constitutional or workable scheme.

MR. MACGINNITIE: Okay. Thank you very much. I apologize to those of you who wrote excellent questions and we didn't get a chance to ask them. I hope the editors of the actuarial review and the actuarial update will avail themselves of not only the questions but the availability of the panelists now and going forward to provide material for their columns. I hope that you will join me in expressing our appreciation for three excellent presentations.

1991 CASUALTY LOSS RESERVE SEMINAR

2A: CONSIDERATIONS IN SETTING LOSS RESERVES

<u>**Faculty**</u>

Agnes H. Heersink
Tillinghast/Towers Perrin

Stephen T. Morgan
American Re-Insurance Company

MR. MORGAN: Considerations in setting loss reserves. My name is Steve Morgan and this is Agnes Heersink. We have a few announcements we would like to read to you. This session will be recorded. If you get up to ask a question, we ask you to please speak into the microphone so that it can be recorded properly. At the end of the session we would like you to evaluate the session, as well as the meeting. I believe we can leave those forms with you, and you can leave them here as you leave.

I must read the disclaimer. The views expressed are the views of the individuals and not necessarily the views of any other rational human being on the face of the earth.

(Laughter)

That's not what it really says. "The views expressed are the views of the individuals and not necessarily the views of the co-sponsors or the employers of the participants" -- and any other rational human beings on the face of the earth.

I would like to take a little survey, if I could, before we get started. By a show of hands, how many people are here voluntarily?

(Show of hands)

MR. MORGAN: Involuntarily?

(Show of hands)

MR. MORGAN: A few hands, a few hands. Those are the people from my company. They had to come to see me speak.

How many people here are underwriters?

(Show of hands)

MR. MORGAN: Claims people?

(Show of hands)

MR. MORGAN: Insurance agents?

(Show of hands)

MR. MORGAN: Okay. A few. Budding actuaries?

(Show of hands)

MR. MORGAN: All right! Regulators?

(Show of hands)

MR. MORGAN: Very good, very good. Steve Morgan fans?

(Show of hands)

MR. MORGAN: No, I don't think there will be any of those.

By way of introduction, my name is Steve Morgan. I'm an actuary with American Re-Insurance in Princeton, New Jersey. I've been with American Re for the last four years. I'm an associate in the Casualty Actuarial Society. I have 7 exams of the 10 that are given by the Society. I am also a member of the American Academy of Actuaries, which membership is based upon experience.

Agnes Heersink is a fellow in the Casualty Actuarial Society and is with Tillinghast in Dallas, Texas, and is also a member of the American Academy of Actuaries. Agnes will start off and give the basic definitions and concepts and will go through Part II, Section A, Actuarially Sound Reserves, which probably sounds something like a self-contradiction, but she will go through that area. Then I will start with the uncertainty portion of the speech.

MS. HEERSINK: Before we get started on this, you may have noticed in your packet there was a copy of something that was called "Statement of Principles," regarding property and casualty loss and loss adjustment expense reserves. This is essentially the material that we are going to cover.

This is part of what is published by the Casualty Actuarial Society and we will go through many of the principles that we will be discuss in the slides that we will be showing you. You may want to take some time later on to read this at your leisure. Or if there are some points that we covered that you didn't quite grasp, you may be able to get the answer by reading through this.

Another one that we may be referring to from time to time that you also have in your packet is a glossary of terms. Now, some of these will be included in the slides and we will discuss them in some detail, but others of them you will be hearing in future sessions as you go through the basic track.

You may want to refer to that also from time to time in order to clarify some of the concepts if you don't grasp them the first time they are presented to you.

(Slide 1: Outline)

The first slide here is just an outline of our session. As Steve mentioned the first part of it is just the basic definitions and concepts. We will talk about some of the basic concepts. Steve had not asked if any of you were in the financial or the accounting side of the insurance business. If you are, some of these things will be probably clearer to you than they are to some of those in the other disciplines.

We will define some key dates, define some elements in the loss reserve, talk about loss adjustment expenses. And then get into, as Steve said, maybe something which will sound like an oxymoron of actuarially sound reserves, why that estimate is uncertain and then some other considerations.

(Exhibit 1)

This slide is just the basic definition of a loss reserve. When a company issues an insurance policy, it makes a promise to pay either the insured or on behalf of the insured in the event certain accidents or certain circumstances happen in the future. When those circumstances occur, the insured makes a claim against the insurance company, which then creates a liability for the insurance company.

A loss reserve is simply the amount that the company sets aside to pay for the unpaid claims. The characteristic of a loss reserve: this is an estimated liability. As we go through this session, I hope it will become clear to you why this is an estimated liability.

I would like to mention here, though, even though a loss reserve is an unpaid liability, you will be hearing a lot of discussion also with paid losses and reported losses. Now, don't get confused here, because even though the estimate is for unpaid liabilities, the techniques that are used to make that estimate are based upon paid losses or reported losses. That, again, will become clearer as you go through the sessions.

The loss reserves are important both for the financial condition of the insurance company and for underwriting income. The accounting aspects of a loss reserve are that a loss reserve fulfills the basic accounting principle of matching assets and liabilities or of matching revenues and
loss costs.

(Exhibit 2)

On the left-hand side of this graph, is the balance sheet of any company, not just necessarily an insurance company. For those of you in the accounting department, you may have seen the yellow document that has to be prepared at every year end and has to be filed with your state's insurance department shortly after the end of the year. The thing is called the "annual statement."

Pages two and three of that document are the company's balance sheet. Page two is the asset side of it, which simply is a listing of all the company's assets. It will list the bonds, the stocks, agent's balances, any other items that go on the asset page. On page three, are the liabilities of the company.

If the liabilities are less than the assets, then you have that little thing that is hanging down there on the liability side. There will be a surplus in the company. If the liabilities exceed the assets, then I'm afraid you're in a situation of an insolvent company, like we were talking about in the General Session, first thing this morning.

Now, why is it important? Why are the loss reserves important, from the accounting standpoint? In all likelihood the largest portion of the liability part of the balance sheet is going to be the reserve that is set aside for unpaid liabilities. If that number is understated, in other words, if you have said that you expect to pay out this much in the future and it turns out to be less than what is needed, then the surplus at that point in time is going to be overstated and the company will look stronger than it really is.

On the other hand, if you have set aside more monies than are needed to pay those claims in the future, then the surplus will be understated and the company will not look as strong as it really is. For those of you who may have any contact with stock analysts, Wall Street, in any form, you know that the company's strength is crucial to its stock price.

On the right-hand side of this graph, you have the company's statement of income. In an insurance company, you have the premiums coming in, but you have losses and expenses being paid out. Part of those losses and expenses will be already paid at any particular point in time, but a large portion of that, again, is going to be the loss reserve that is set aside for your unpaid liabilities.

Now, again, the basic principle here is if the losses and expenses are less than the premium, you will be making a profit. If your losses and expenses are greater than the premium, you will have a loss. Now, again, on the loss and expense side, a large portion of that total amount is going to be a loss reserve, which remember we defined as an estimated liability.

Again, why is this important that that be accurate? Well, think of it in terms of you being a person in your company that is responsible for a new program. You have done your research. You have talked to underwriting, you've talked to your marketing people. You've done your research in the external market, and you've decided there's a good insurance program out there that will provide us this nice little niche in the market place out there.

After talking to your actuaries, you've decided this is the premium that we need to charge for this product in order to be able to earn the rate of return that the company demands for an investment. You introduce the program, and now it comes time to evaluate and decide, well, do we need a rate change on here? Do we need to raise the premium? Do we need to lower it? You know, how are we doing on this thing?

Well, again, a large portion of the data that you're going to be looking at is that loss reserve that's set aside for future payments. Now, what if it's set at too high a level? Then you will be looking at this and you're saying, "Well, this program really isn't doing as well as we thought it was going to do. It's not giving the company the rate of return that we thought it was going to bring."

We've got this little problem out there because some of your competitors have decided, "Boy, that's really a good program. We're going to mimic it. We're going to charge about the same premium. If they can make a good buck on it, so can we."

It looks like from your data that you probably should be raising your premium by 10 percent but, if you do that, you're afraid you're going to lose your market share. Now, if the reserves have been set at too high a level, you're not getting an accurate assessment of where that program stands at that time, because you've set aside more monies than what you're going to need in the future to pay those claims.

On the other hand, if those reserves have been set at too low a level, then you may be coming in and saying, "Hey, this program is really doing great. You know, we can reduce these premiums by 10 percent. We can undercut the competition that's come in, and we can make ourselves a bundle." So, you slash the premiums by 10 percent.

A little while later, your assistant comes in to see you and says, "Hey, boss, you know, I think we've got a problem here because, suddenly, these numbers don't look as good as they did six months ago."

If the loss reserves are not set at the level they should be set at, you may be making the wrong decisions about your programs because you're getting a false reading as to what your true income is from those programs.

(Exhibit 3)

Now, before we talk about some of the elements of that, we want to talk about and define some key dates. The first key date in here is the accounting date, which is any date that is selected for statistical or financial reporting purposes. It defines a group of claims for which liability exists; that is, all claims which have occurred on or before the accounting date. If you think back again to the annual statement that had to be filed at year end 1990, you are trying to estimate the liabilities for all accidents occurring on or before December 31, 1990.

The second definition is valuation date. This defines the time period or the date through which transactions are included when evaluating the existing liability. The evaluation date may be prior to the accounting date, the same as, or at a later date.

(Exhibit 4)

Next, some definitions in connection with some different kinds of loss reserves. The first one is a definition of a "carried loss reserve." This is the loss reserve amount that is shown on the financial statement. When we had the slide up before of the balance sheet, the carried loss reserve is the number that will show up on lines 1 and 2 of page 3 of the balance sheet. The carried loss reserve may also be referred to as a booked loss reserve.

The other definition here is the "indicated loss reserve." This is the estimated loss reserve that results from the application of a particular loss reserving procedure. Again, as you go through the basic track in these sessions, you will be learning about various loss reserve procedures, various techniques.

Generally, when you are trying to estimate what reserve you need to put on your books -- in other words, when you're trying to estimate that carried reserve that's going to show up in your financial statements, you will perform more than one type of actuarial procedure to come up with an indicated loss reserve.

Those indications can vary a great deal. But when all is said and done, you have to come down to a single number that shows up on your financial statement. Steve later will get into some of the considerations of how you should try to make that determination and the judgment that goes into determining the carried loss reserve based upon the indicated loss reserves.

(Exhibit 5)

The next slide gives you various components of a loss reserve. The first one is the "case reserve." This is simply the sum of the values that have been assigned to specific cases that have been reported to you. A claim has been reported to you because an accident has occurred. You have set a value on that claim that you think represents the amount that you're going to have to pay out on that claim. The case reserve is simply the summation of all of those individual reserves for individual cases.

The second type of reserve, which also may be used in setting a case reserve for an individual case is the "formula reserve." Based upon your past experience, for example, you may say, "I've gotten a claim now for theft on a homeowner's policy. From my past experience, I think that claim is going to cost me $1,000." You may set up this reserve then prior to doing any investigation about the particular circumstances of that individual claim.

The next element of a loss reserve is the development on "known claims." When a claim is first reported and you set up, for example, a formula reserve on it, you then need to investigate the particular circumstances of that claim.

At some later point in time, maybe it's six months later, you've said, "Well, now instead of this claim costing $1,000, now because I've learned that there was a break-in here. But the only thing that was stolen was the color TV that was bought a week ago, which was covered under the VISA's Consumer Protection Plan, and the door that was jimmied really isn't going to cost very much to fix." Instead of it costing $1,000, maybe you're going to end up with it being $200. Or maybe it's even going to turn out to be less than the homeowner's deductible.

On the other hand, you may find out that when the burglars broke in they not only jimmied the door, they smashed the door. They got a hold of your grandmother's silver plate that you've had in the family for years and they got your gold coin collection. They got upset because you didn't have the latest Nintendo system, so they smashed your grand piano and they punched some holes in the walls. Instead of this claim costing you $1,000, it's going to cost you $10,000.

The development on known claims is just different values on that claim at different valuation dates. The development on that can be either upward or downward.

The next type of reserve, which may or may not be identified separately, is "reopened claims." At any accounting date there are going to be some claims that are closed. A few of those claims will reopen at some date in the future. There may be some additional information on the medical condition, for example, of the person who was injured, so at sometime in the future, that claim is reopened. Your loss reserve has to have a provision for that type of occurrence.

The next item is pure "IBNR." I notice in here we've got pure and we have the letters I-B-N-R. IBNR stands for "incurred but not reported." The accident has occurred, but for one reason or another the report of it has still not reached the company. Your loss reserve has to have a provision for those types of claims also.

The last category here is "claims in transit." These are claims that have occurred. You have the loss report from the insured, but it is not yet entered into the company's statistical reporting system. It may not be feasible or practical to try to isolate the claims in transit.

You may want to do it, though, because if you find out, for example, that there is a backlog in processing claims, it may mean that you need additional claims adjusters. Or it may turn out that you find out that there is some problem in the statistical reporting system and claims are simply not entering into your statistical records as soon as what they should be.

Now, very few companies are going to separate their loss reserves into this complete list of separate categories. If you're going to use all of those different types, though, your data system has to be sophisticated enough to provide information on all those various categories.

If you wanted to establish a reserve for the reopened claims, you have to have information on how many reopened claims you can expect to happen on that book of claims. If you want to separate out the development on known claims from the pure IBNR, then you have to be able to track the book of claims that were reported as of the accounting date and how that body of claims, the value on that body of claims, changes over time as opposed to the claims that are reported in a future reporting period. Your data system has to be quite sophisticated if you want to have all of these various elements.

(Exhibit 6)

The next slide is just a graphical presentation of the life cycle of a claim reserve. In this particular example, we're assuming that an accident occurs on April 2, 1990. At this point it is a pure IBNR claim. The accident has occurred but the claim has not yet been reported to the insurance company. For whatever reason, it takes 10 days for this claim to be reported to the company. The claim now becomes a claim in transit.

Four days later, the accident enters into the company's statistical record. The first reserve that is set up in this claim, in this example is a formula reserve. The claim is generally then assigned to a claims adjuster, and the claims adjuster will do the investigation.

The adjuster may interview the claimant, interview witnesses, review the police report, review medical records, review the damage reports. Anything that pertains to that claim that may provide him with the answer as to how do I come up with the best estimate as to what this claim is going to ultimately cost us.

After that investigation is done, which in this case takes approximately five weeks, a case reserve is established on that claim. Then the rest of the time in there you're trying to settle that claim. You're talking to the claimant: "What's it going to take to settle this claim?" Perhaps an attorney has become involved in it, so you have to deal with the attorney.

In this particular one, we have a situation where after three months, for whatever reason, the case reserve has been revised on it. You've gotten additional information on the claim. You decide, "The value I put on this back in May is no longer my best estimate, I have to change it." That change can be either up or down again.

Finally, on February 5, 1991, a settlement is agreed upon, but you still just have a case reserve. Four days later, the payment is sent; it still is a case reserve. The draft finally clears on February 25,

1991. You close the claim. The dollars in this claim move from the reserve side to the payment side, and you close the claim.

Now, different companies have different definitions of when a claim is closed. Some of them will close a claim when that draft clears the company, some will not close it until they get a release from the claimant. Some of the companies I work with will not close a claim until they get the final bill from the attorney to close that claim out.

Up to this point, we have been talking about loss reserve and probably, in some cases, not really distinguishing all the various elements of a loss reserve. Because a loss reserve, again, by definition, is the amount that is needed to pay the unpaid liability of the insurance company.

An insurance policy, generally, has a provision not only to pay the insured for damage to his property or make payments on the insured's behalf in case you have a claim against the insured, there are also expenses associated with settling that claim. The two parts of loss adjustment expenses are given on this following slide.

(Exhibit 7)

The first one are called "allocated loss adjustment expenses," which in your sessions here you may see abbreviated by the letters A-L-A-E or A-L-E or even just A-E for some version of allocated loss adjustment expense. It depends on whether or not they want to cut out one of those terms when they make up their letters.

By far and away, the largest portion of allocated loss adjustment expenses are attorney fees. These are costs for defending the insured against claims and suits made against the insured. Now, not all claims are going to have attorney fees. But again, when you look at a body of claims, the allocated expense is going to be primarily attorney costs.

A second category of this is court costs. You could also conceivably have some additional investigative costs in connection with the claim. Maybe you have to pay to get a medical record, maybe you have to pay a private investigator to do some investigation on it. Those all go into allocated loss adjustment expense. They are expenses that you can assign to a specific case.

The third item on this list is "independent adjuster fees." That has an asterisk by it so we will defer on that one for just a moment.

The second category of loss adjustment expenses -- unallocated loss adjustment expense. These are expenses in settling a claim which you cannot assign to a specific case. These are basically the costs that are associated with running a claims department.

In all likelihood, the largest portion of that is going to be the cost of the salaries and benefits for the personnel the company has hired to settle the claims. In addition to that, you have the claims department overhead. There are cars for the claims adjusters, there is additional travel, there is rent, there are supplies, postage, telephones -- everything that it takes to run the claims department.

A third item is company overhead. This is the claims department's share of corporate expenses. Again, the fourth one under here, you notice we have the same one we have under allocated: You have the independent adjuster fees. Now, these can be either allocated or unallocated, depending on how the company treats them.

By independent adjuster's fee means that the insurance company goes outside of the company to hire an adjuster to handle either a single claim or a group of claims. In some cases, they may consider this as essentially additional personnel, treat it then as an unallocated expense, and put it in their unallocated loss adjustment expenses.

On the other hand, they may be hiring this adjusting firm and say, "We want you to handle all our collision claims. You're going to handle them for us for a set dollar amount per claim." Then that dollar amount, then, which can be assigned to a specific may go into the allocated loss adjustment expense.

Now, a company needs to make an estimate of the reserves needed for the expenses as well as for the amounts that will be paid to the insured or on behalf of the insured. The data, however, that is available to come up with an estimate for the expenses is usually different than it is on the loss side.

For allocated expenses, you quite often have the same components that you do for losses to evaluate them. You will have paid allocated. In many cases, the company will set up a reserve for the expenses on individual claims. The same way you had the case reserves on the loss side you may have case allocated loss adjustment expense reserves; but many companies do not.

On the other hand, for the unallocated expenses, the data that is available for this is generally only the amounts that are paid during a calendar year. You don't have development of unallocated expenses. It is just how much did the company have to pay in this calendar year in order to handle the claims in this year. The techniques that are used to establish an unallocated loss adjustment expense reserve are different than the ones used to establish allocated reserves.

(Exhibit 8)

Now we come to the definition of an actuarially sound reserve. This is a provision for the unpaid amount required to settle all claims, whether reported or not, for which liability exists on a particular accounting date.

If you remember again from our slide on the life cycle of a claim, that means you not only have to set up a reserve for that claim that is almost settled, you may have sent out the draft already and you're just waiting for the draft to clear to put it in the paid column. You also have to set up a claim or a reserve for those claims that have just been reported to you and for the claims that have occurred that you don't even know how many of them there are and have not yet been reported to you in any form.

The characteristics of an actuarially sound loss reserve, again, is for a defined group of claims; that is, all claims that have occurred on or before the accounting date; it will be as of a given valuation date; and it will be based on estimates derived from reasonable assumptions and appropriate actuarial methods. That says a mouthful.

The second part of this based on appropriate actuarial methods is what these sessions are about. The next sessions will go into the various actuarial methods that will be used to come up with a reserve.

I want to talk just a little bit about the other part of that, which is the reasonable assumptions. Here you have somewhat of a problem, because I am not aware of anywhere where the term reasonable is defined.

What may be reasonable to you is necessarily not going to be considered reasonable to somebody else. What may be considered reasonable to you is not going to be considered reasonable by the regulator who gets your annual statement and says, "I don't think your reserves are adequate because you made some assumptions that I don't believe are reasonable." It's a gray area.

Let me give you an example in here of something that, hopefully, you can say is probably not reasonable. Suppose from your past experience you determine that a certain type of claim generally costs you $5,000, and you have made your estimate of the number of IBNR claims that you expect to come in the door sometime later, in the future. On those IBNR claims you've decided that you're going to settle those claims for $1,000, or that you're going to settle them for $10,000.

Now, remember, your prior experience said that, on the average, this type of claim closes for $5,000. Is it reasonable, now, to assume that you close this group of IBNR claims for $1,000? Or do you have a reason why it's going to cost you $10,000 to settle those claims?

I have to qualify that to some extent because, otherwise, one of you is going to come to me and say, "Yes, but in my company we've changed this and this and this and this, and therefore it's reasonable for us to assume that the average values on these claims is going to change a great deal."

Let me qualify it as just saying, unless there have been some very unusual circumstances within your company, in my opinion it would not be reasonable to assume such a drastic change in the value of your IBNR claims compared to your prior experience.

Another example is in the work that I do as a consulting actuary, we quite often work with small companies who don't have the sophisticated data systems set up to provide the data elements that we can get from larger companies, and so we quite often will rely on what we call industry data.

Now, is it reasonable to rely on industry data? Well, we need something to base the reserves of the company on. On the one hand, we know that an individual company's experience is not going to be equal to an industry average. Each individual company has their own way to set reserves, they have their own way of settling claims, they have their own criteria as to when they're going to settle a claim.

You may have one company that says, "We're going to fight everything that comes in the door." You may have another one that says, "We're going to pay anything that comes in the door."

Those companies are going to have different patterns of how losses are paid out over time. What we do is we try to come up with an industry pattern that we think most closely approximates the company that we're dealing with.

If we're looking, for example, at a private passenger company, we're not going to be looking at an industry pattern which deals with worker's compensation. The patterns are not the same. You cannot use information related to worker's compensation and apply it to a private passenger, auto, bodily injury claim. It doesn't work, and in that case it's not reasonable.

One other situation. Suppose at the end of 1975 you set up reserves for all claims occurring on or before December 31, 1975. Here it is 16 years later and you look back on that and you say, "Boy, those claims should have been reserved at twice what we had them reserved for. Does that mean that your reserve that you had back at the end of '75 was not an actuarially sound reserve? Well, not necessarily.

Suppose, for example, your company was one that specialized in a line of business that is called general liability. It is a commercial line of experience and it's other than worker's compensation, auto, property, fire, and all the rest. Lots of stuff gets lumped into general liability. Suppose also that you specialized in writing programs for waste disposal companies.

Now, if you've been in the insurance industry for any length of time and read the industry press, you know what has happened in court decisions concerning the liability of companies in connection with pollution. You have a different body of information now to establish reserves than you did back at the end of '75.

The assumptions that you have made at the end of '75 in connection with what your liabilities were going to be at that time are different than the assumptions that you have to make knowing everything that you know about court decisions that have happened in the past 16 years. An actuarially sound reserve also depends upon the information that you have at the time you are making your reserve estimate.

(Exhibit 9)

The next slide is essentially the counterpart for an actuarially sound loss reserve. This is for an actuarially sound loss adjustment expense reserve. The definition is the same as for the loss reserve, except that it has the amounts required to investigate, defend, and effect the settlement of all claims. But again, we have the same characteristics as for a defined group of claims. It is for a given valuation date, and it is based upon reasonable assumptions and appropriate actuarial methods.

(Exhibit 10)

The last slide that I will make any comment on is the next one which is a little graph concerning uncertainty. Again, I remind you that a loss reserve is an estimate. You are estimating the unpaid liability for a certain body of claims, some of which you know a great deal about but some of them you know nothing about because they have not even been reported to the company yet.

You don't even know the number of those incurred but not reported claims. You know how many claims have been reported to you, but you don't know anything about the claims that have been incurred but have not been reported to you yet.

The only thing I think you can say with certainty about a loss reserve is that whatever number you choose to put on the liability side of your annual statement is going to be wrong. You may be close, but it is not going to be the exact number that when all is said and done and all those claims are closed is going to be the true and accurate value. Your goal in this is to try to come up with the best estimate that you can based upon the information that you have at that time.

Now, Steve will make any additional comments he wants on certainly and other considerations in setting loss reserves.

MR. MORGAN: Thank you, Agnes.

(Exhibit 10)

This is a very important slide I have up here right now. What this slide says, if we don't get plenty of questions, I'm going to be able to show slides of my vacation to the world's largest ball of twine.

(Laughter)

But I'm saving the twine slide for later, so let's put back the cartoon for just a minute. Have plenty of questions ready when I get finished.

(Laughter)

There could be a third person in that cartoon where it says, "1 plus 1 equals 2" and a little balloon could go up from his mouth saying, "For sufficiently large values of 1." The actuaries in the audience might appreciate that.

Like Agnes said, our whole job is to minimize error. There is uncertainty. It's not very exciting to work in a profession where you're always wrong no matter what you do. Our goal is to minimize error, to bring in the boundaries, to make it that what we have come up with is a reasonable approximation of what's going to happen.

If there wasn't any uncertainty in the world, you would need a lot less actuaries, claims people, underwriters, and accountants. I apologize for slighting the accountants earlier in my little poll. We've got to remember that reserving is not an exact science; it's a nebulous thing.

There is no black box that will predict exactly the right answer. There is no right procedure. What you try to do is minimize the error and to realize what you're coming up with when you're estimating loss reserves.

I just realized I forgot to tell my joke. I came prepared with a joke. Let me tell that, and then I'll go on to the less important stuff.

Insurance company president takes his two top actuaries out to dinner. It is one of the insurance company President's favorite restaurants. They sit down. The waiter comes over. The company President says, "I want the biggest steak you have. I want it to be medium rare, I want you to bring mushrooms on it, I want you to bring onions, and I want some au jus on the side."

The waiter says, "What about the vegetables?"

The company President says, "They will have steak too."

(Laughter)

See, they referred to the actuaries as vegetables. I'm sure that could work with accountants and claims people, but I've only heard it referring to actuaries. Now to the less important part of the speech.

(Exhibit 11)

The true value of the liability for loss and loss adjustment expenses at any accounting date can only be known when all attendant claims have been settled. The value of the claims become a certainty once all the losses are closed. A year, 2 years, 10, 30 years, or in the case of a reinsurance company, never -- that 's the only time that the value of the claims become known for certain.

The uncertainty inherent in the estimation of these liabilities implies that a range of reserves can be actuarially sound. I'm sure you've all seen polls. The Gallup Poll will do a survey that says, "75 percent of the people in the United States think Dan Quayle's not such a bad person."

They will put a margin of error saying plus or minus four points, which means the estimate of people who thinks he is not such a bad guy could be as high as 79 or could be as low as 71. It is not exactly 75 percent. The 75 percent given in the sample is just the point estimate. It is probably the best estimate, but it is not exactly correct.

Mathematical derivations for the range, can go from an optimistic set of assumptions or a liberal set of assumptions on what you think is going to happen with a body of claims to a pessimistic view or what some people might determine as a conservative view.

Within that range will probably fall your best estimate -- the worst case, the best case, and what you really think is going to happen -- that gives you the range. As long as you develop this range, the actuary is given a better chance to get the final answer, 10, 20, 30, whatever, how ever many years down the road, include the right answer.

I recently did an analysis on Workers' Compensation where the low point of my range was my best estimate. I developed a high range that was set upon some very pessimistic assumptions I had seen. I had indications that there were certain things in the data that, if they came to be, the high estimate would probably be needed.

I felt comfortable enough to say that the low side, based on the actual data, was probably the best estimate. Some actuaries, split the middle, sometimes it's 40 percent. It can be anywhere, but it's just an estimate. It's your best idea of what you think is going to happen.

The most appropriate reserve within a range of actuarially sound estimates depend upon both the relative likelihood of estimates within the range -- as with the example I just used, the low was my best estimate -- and the financial reporting context in which the reserve will be used.

The financial reporting context: It could be for internal management, you're making presentation to the president. This may be used for planning or put in the financials. You may be making this presentation to external auditors for one of the accounting firms. You might be making an estimate for regulators. When you have conditions or standards of solvency, it might necessitate a higher value to be put in for the actuarially sound reserve.

If you're working on part an acquisition, this is also another consideration. In what context will the numbers be used? You can also use an actuarially sound reserve in a commutation. A commutation is severing a relationship between two different companies. Finally, there might be a different standard or a different actuarially sound reserve when the reserve is used as a part of a reserve certification.

The acceptance of a reserve within the range is an important consideration for an actuary. Do they book the reserve that I come up with? Do they book the point estimate that I'm going to come up with? I think too many times actuaries, myself included, in the past thought that that is the number. You should book this number right here. That's not right.

What an actuary must decide is what gets booked within the range of reasonableness. The answer an actuary or someone else comes up with is only an estimate. It is 99 percent sure that it's wrong. What gets booked on a financial basis: Is it close enough to be within the range of reasonableness? Is it optimistic, pessimistic, liberal, conservative?

An actuary can accept if you don't book what he said but have a prescribed plan for getting the reserves up to that level over a specified amount of time. That will also fall within the range, if you will, of acceptable reserves.

(Exhibit 12)

In terms of considerations, different kind of dates -- Agnes referred to some of these earlier -- fall into a very important consideration. This involves how we organize the data we look at, what is meaningful. It will get into homogeneity, which I will talk about later, and emergence and settlement patterns, which I'll talk about.

The most important date is accident date, the date on which the losses occurred. This is a way of organizing the data on the idea or the theory that losses that happen within a given time period bear some kind of a relationship to each other.

Report date is the date on which loss is first reported to the insurer. There might be a few days lag, like we saw in one of the slides that Agnes presented, or it might be a few years. It all depends upon the type of loss.

Recorded date is the date that it first gets on to the systems of the company. I once worked for a rather small company that has since died. I was looking at the claims reports and the first column had the claim number, the policy number, and the reserve amounts. Then over to the right it showed accident date. The next column was report date. I noticed that every reported date, or recorded date, was either the day of the accident or one day later.

I said, "My God, this is great! My job is going to be a piece of cake. I'm going to have nothing to do here." Then I though, "Well, no, that can't be right." Just virtually every date, all the way down, the report date was either the accident date or one day later. I decided to talk to the coding person, I said, "You know, it's really amazing how the report date always follows the accident dates so closely. Do you know why that is?"

She said, "Well, nobody told us what to put in there, so we decided to put in either the day of the accident or one day later."

In cleaning up the data, I had to resort to other methods. I went on to another area in coding that talked about recording date. I found out shortly thereafter that there had been, roughly, a three- or four-month backlog in the coding of claims because of the adoption of a new computer system. Literally, nothing was getting onto the system. All the recording dates or accounting dates, when it gets into the system, are going to be worthless.

Luckily the date that the people processed the claim reserve change or the paid loss was entered on the documents. Even though it didn't get into the system, they coded something called an action date. That was the date that they physically did the work. When it got into the system, into the computer data I would be looking at months later, it would have a later date on it.

Therefore, when I got to do my triangles, which you will be seeing later on, I adjusted the data so that it was organized by action date. The accounting date would have been totally useless, and it would not have been a good predictor or a good way of estimating what is going to happen in the future.

Accounting date defines a group of claims for which the liability exists; namely, all claims incurred on or before the accounting date as of 12/31 for accident year-whatever.

Valuation date defines the time period which transactions are included when evaluating the existing liability. This references the work being done in the claims department when the paid loss was made, when the claim file was taken out of diary and the reserve was reevaluated, adjusted upwards or downwards.

(Exhibit 13)

You see all these various data elements that we use in the prediction of IBNR for loss reserves. We have dollars, paid losses, case reserves, incurred losses, all the other things. We have counts which we use, reported claims, closed claims, and so on. I have never seen reopened claims in a company database. I think the only place that the actuarial students will see it is on their actuarial exams.

I don't know, has anybody here used reopened claims? Probably everybody will raise their hands.

(Show of hands)

One gentleman in the back used reopened claims. You're alone.

Actuaries tend to like to look at ratios in our construction of triangles. We can look at the relationship between paid losses and incurred losses. We can look at the relationship between incurred losses and earned premiums. This can give us an idea of is the business getting better, is the business getting worse.

We can look at different ratios such as frequency and severity. We can look at how the claims -- the number of claims we're getting for a certain accident and relate it to the amount of premium that was written for that calendar year. That's a good test of reasonableness.

It's probably not reasonable if, in the last accident year, you're estimating 10 claims for every $1,000 of earned premium and the prior year you're seeing only 5 claims, your estimate is that you're only going to have 5 claims for every $1,000 of earned premium.

You need a test of reasonableness to see if those ultimate number of claims make sense compared to some stable base like written premiums, earned premiums, or exposures. That's one of the things, as I'll mention later, you've got to do when you get done is see if what you've done makes sense. Is it possible? Is it reasonable? Have you reflected the uncertainty?

It is also possible, by looking at these ratios, like paid to incurred losses, that you can adjust your data if you see that there is a problem. If you see, and I'll talk about this a little bit more later, if the case reserves look like they have changed over time, in terms of adequacy, maybe you need to adjust your data.

You can't look at it just the way it is. You need to make an adjustment if the case reserve adequacy has changed. If the speed at which losses are being paid have changed or if you've got a three-month backlog in your claims department or whatever might be the problem, then you also need to make an adjustment. Whatever it is, you need to be able to adjust for it. These data elements in various combinations can help you decide and help you determine what is going on.

(Exhibit 14)

Loss reserving accuracy is often improved by subdividing experience into groups exhibiting similar characteristics. I give several examples here. It often reduces the uncertainty if the data is combined in such a way that the losses in that database are homogeneous.

If you look at only the homeowners' property losses by themselves or only the homeowners' liability losses, you would expect that the property losses which settle faster will emerge quicker. You would probably want to group those together in making your estimations and try to get the homeowners' liability claims off by themselves.

Homogeneity sometimes has to be sacrificed when the database is small. I've seen reserve indications where the homeowners' and the farmowners' have been combined because there is just not enough farmowners' experience written to be credible. We will talk about this a little later. You have to sometimes sacrifice homogeneity or it can increase your uncertainty -- we talked about earlier.

You often want to group things by state, by line of business, like you see here, by emergence pattern, settlement pattern, how long it takes the losses to get reported. Down at the bottom is products' liability. From an actuarial viewpoint, it is often wise and considered good, to split off products' liability.

Often it takes several years before those losses are reported. The techniques you need to use for products' liability would vary greatly with something like homeowners' property. You would expect it to turn over fairly fast. Reported fairly fast, the value of the claim is known fairly quickly and settled fairly quickly.

You can think of this as a cake. An actuary once said that you can think of homogeneity and credibility as a cake. If you start to cut the cake, you have pieces of cake, which is fine. You can serve those pieces of cake. If you start to cut it too many times, you're left with a pile of crumbs. I think that's a good analogy to understand homogeneity and credibility, which we'll get into in just a minute.

Think of it as if you cut the cake a few times, it's okay; you keep cutting it, and you have a mess on your hands. You have nothing to look at. You have something that doesn't even look like cake any more.

(Exhibit 15)

Credibility is a measure of the predictive value that is attached to a body of data. When looking at a body of data, look at a triangle. Ask yourself, how much do I believe what I see? How much do I think what happens in the data will reproduce itself again in the future? The squaring of a triangle, which you may have heard about, is the prediction of loss reserves. How much will history repeat itself in the future? How will claims have developed and changed in the past? How will they do so again in the future?

Credibility is a very important concept. How often will this sample, the Gallup Poll or whatever, made in the past, reproduce itself in the future? The reference to Quayle: How many people last year thought Quayle was a good guy? How many people will think Quayle is a good guy next year?

Stability leads to credibility. The more stable the data, the better the credibility. The more stable it is, the more credible it is. It goes around in a circle: Stability breeds credibility and vice versa.

A group of claims should be large enough to be statistically reliable; meaning, a lack of variation or a modest amount of variation. There are mathematical derivations for the number of claims to achieve credibility.

When I worked in primary lines, they used to remember that the number of claims to be statistically credible for private passenger automobile was 1,084, and that had a mathematical derivation in a state rate file. Some things just never change.

There are methods which use premiums, again, claim counts, in different ways as saying that something is statistically credible. I think it's important to remember that it's how much you can believe the data; how much will what has happened, happen again...was it a fluke, is it a pattern?

Finally, there is a point at which partitioning will divide the data into groups too small to provide credible development patterns. This is the cake analogy. Larger companies tend to make more breaks in the data before they are left with a pile of crumbs. Smaller companies usually have to combine data together. You know, they start with crumbs because the data is so small that they have to put things together, like the homeowners' and the farmowners' that I mentioned earlier.

(Exhibit 16)

Emergence in settlement patterns. This is somewhat related to homogeneity. We like to group data according to emergence patterns. That's one of the concepts of homogeneity. If it takes a month for a claim to come in, it's probably to go ahead and group all of those similar kinds of claims that come in. If it's a fire, most fires are reported fairly quickly.

The valuement -- the value is fairly certain at the point in time of the fire. You know how much the contract covers. The value, it's fairly easy to determine the losses inside of a fire. You can set the value, you can set the reserve, and you can settle it fairly quickly.

On the other end of the spectrum is medical malpractice or professional liability. If the surgeon has left his house keys inside of a patient, you're not going to know for several years that that's happened. It will take a while before it becomes evident that there is a problem with the operation. That takes a long time to emerge. A products liability is another example. If you have a certain product, it may work fine for several years and then all of a sudden something has happened to it and a loss has emerged.

Settlement refers to the delay between reporting of the claim and when it is settled and closed. Fire, for example, it turns over fairly quickly. The settlement pattern is affected, and we will see later on, by internal and external factors.

If there is a court case involved, that usually takes out or sends out the settlement pattern out into the future. If substantial investigation is needed, if a lot of information-gathering is required, that pushes the settlement date out into the future when you get all of your information necessary to settle the claim.

When you look at emergence patterns and settlement patterns by using the data, you have to still ask yourself, is it reasonable? Is this pattern I'm seeing in the data consistent and similar to what I've seen in the past? Is it like other companies'? Is this product liability? Is this professional liability? Is this actuarially sound? Is it like other things I've seen in the past? Is it reproducing itself? Can I use past patterns to predict what is going to happen in the future?

(Exhibit 17)

This gives you a sense of the scale of time period between the accident and the emergence which can be termed as the IBNR. If the emergence comes in a calendar year or time period later than the accident year, then it is termed to be true IBNR. It could be a calendar quarter, but generally it is in a later accident year.

I probably should have said this earlier, but the difference between report date and recorded date, once it is inside the company and once it gets on the system, it is usually referred to as pipeline IBNR. I have not seen specific studies made of pipeline IBNR, other than the problem I had at the company I worked with before. That was truly pipeline IBNR. The claims were in the company. They were sitting on the floor in the coding department. It was a big pipeline. The pipeline got choked.

You go work your way down to products, which I've given you an example of earlier, where the emergence pattern is stretched and the settlement period is even longer. In that settlement period, again, are things like court cases, investigation.

You can have the unusual example. I've seen property losses where the value of the property loss goes into dispute and it is taken to suit so the property loss -- I remember one exactly was a property loss on a cargo policy, and it took 13 years by the time it wound its way through the courts. Very unusual, but it can happen. It can add to your tail.

An actuary who sees or someone doing reserves who see this in the data would probably tend to ignore that. It's not going to happen again or probably would be very unlikely for it to happen again. This gives you an overall idea of the spectrum of emergence in settlement patterns.

The other thing that we can relate to before we go on off of this slide is the emergence in settlement patterns can affect the methods you use to predict loss reserves. For products liability and medical malpractice, it's usually not done that you look at paid loss development or how paid losses change over time as a predictor of what the ultimate losses are going to be because they come in so slow.

The body of paid losses you have or even claim counts that you have at any point in time early on is so small as to be statistically unreliable or not credible. You rely upon other methods, methods to predict the reserves that add stability and add credibility to the reserving process.

It is okay for collision to use paid losses because they turnover so fast. Use claim counts on collision because you get so many claims come in so quickly. When you get down to products liability, the claim counts and the claim amounts take so long to come in that they are unreliable for making estimates. Sometimes you don't even have incurred losses reported, and you have to resort to other ways of what you expect to have happen. I believe some of those methods probably you will get into later on in other sessions.

(Exhibit 18)

Take a minute, if you would, just to look at these different, what they call internal factors that can affect the loss reserving process. I think one of the things I would like you to remember from this slide is that I consider consistency a virtue.

If claims are consistently inadequate, if there is a consistent backlog, if reserves are consistently redundant, if the management takes a consistent view that they are not going to put up the reserves until they have to -- in a reserving process, you can adjust for that. If things are consistent, you can pick it up in the methods that you use to predict IBNR.

The problem comes when the adequacy changes, the speed of payments or speed of settlement changes. It becomes very difficult to use the data you have to make predictions about what is going to happen in the future, so consistency is a virtue.

You look for changes, you look for alterations. You look for things that are not quite like they used to be. Reinsurance plans have the type of reinsurance program you have, in effect, changed over time?

Have the limits, coverages, and exclusions changed dramatically from one time period to the other?

Claims handling practices: Are they understaffed? Do they have a good diary system? Are they using average reserves? Generally, talk to the people. See what their attitude is, see if their overworked, see if they're underworked. It is good to talk to the people.

We as actuaries tend to forget that it's people who make up these numbers. We tend to look at the cold numbers on a computer printout or on a Lotus worksheet and tend to forget that people inputted these numbers. They may be having a bad day. They may have their own biases. They may have their own way of looking at claims.

You have got to talk to these people to see what influences them in the setting of these numbers. It will help you interpret the numbers better. Just taking a look at the cold numbers really tells you nothing. You need to know who made up the numbers, you know, what kind of pressure they're under, you know, from too much work, what their background is, what their level of experience is. Then it gets into credibility, how much can you believe what you're looking at.

Business growth: Has the company gotten into something new recently? That can impact business growth. Loss ratios tend to be a little bit higher when you get into a new line of business. You have to take that into account.

Due to business growth, are you now using more external claims adjusters? We just opened up a new operation in California and you haven't got your branch office ready. You're writing business there, you're using agents but you may have to rely upon outside claims adjusters. That is going to affect your claims handling.

One of the items I didn't mention, but was on the chart earlier, was claim expenses, allocated and unallocated claim expenses.

Case reserve adequacy: Is it changing? Are losses more adequate or less adequate than they used to be? There are actuarial ways of testing that. Some of the ratios on the data elements can give you an indication if that has changed over time. Again, consistency is a virtue. If it has changed, you need to make different adjustments than you do if it hasn't changed.

Mix of business: What? Where? How much has it changed? You know, the regulatory environment in a particular work, what's your mix -- meaning regulated and unregulated? What are you writing? If you're using old data applied against more recent data, has that mix changed?

If you're doing combinations of your data where you have to combine maybe several states together or several territories or whatever, you have to see how that has changed over time because it may not be valid in terms of emergence, settlement, case reserve adequacy, and any one of these other things.

Organization changes: The management desires filter down to the claims department, they filter down to the underwriters, they filter down to the actuaries. Has this changed? Is your parent putting a lot of pressure on the company? If you're owned by a holding company, what's going on with that? Has the president changed? Is the president now a claims person and will tend to give more attention to the claims operation? Is the president, God forbid, an actuary? What would happen?

Contract changes: What is being covered? You're going to have to start laughing or I'm going to slow the slides. Contracts changes: What is being covered in the policy? What endorsements are being written by state? What deductibles is the company offering? What are the limits of the contracts? What are the exclusions? Have there been any new exclusions, like a pollution exclusion? What has changed and what is inside those contracts that might make you change your loss estimate?

(Exhibit 19)

Take a minute, if you would, to look at these. It's what they call external factors. These things tend to come from the outside and can also affect the consistency or affect all of these other things that we've been talking about -- society, social inflation, which I'm sure you've all heard about. The propensity for people to sue, it's becoming greater and greater every day, that can impact the data. Regulation, there is talk about having actuaries set up

(Inaudible)

-- as a part of the regulatory process. What have they mandated in terms of claims handling any one of a number of things.

The judiciary: What is the case law that is going on in a particular state and how will that affect the settlements that you're making. Workers' Compensation legislation, how will that affect benefit levels? How will that affect the kinds of losses you're having in Workers' Compensation?

Seasonality, weather-related losses: There tend to be more home fires or fires in buildings during the winter. You get into if you're writing crop insurance, you know that obviously has a seasonality impact in it also.

Residual markets: What impact do they have on your losses, the amount that you're writing in a residual market?

Inflation, that gets to size of loss. That's an external impact, but it has a direct impact on the company. Losses that used to be under deductible would not be covered, have now grown over the deductible because of inflation and you now have to consider them in your database. The economy, if the economy is down. Things like credit insurance suffer if people are losing their jobs and are unable to pay their bills, so credit insurance goes up.

You have, back in the seventies when the cost of gasoline rose so dramatically, in the early seventies that the number of miles driven dropped and then there was an accompanying somewhat drop in the claim frequency of accidents. If people are out of work, there has always been the theory that they are going to file more Workers' Compensation claims.

There is not a real strong correlation there but there has been some indication if people are out of work, that they will tend to bring out claims where even if they could have continued working. If it wasn't serious enough to put them out, but since they've gotten laid off, it's a way of getting benefits.

(Exhibit 20)

The loss reserve we set up is a point estimate in time of a company's outstanding liability. It's the best estimate in the range. It's what we think will happen. It's not the only answer. Remember, as I said earlier, we work in a profession where you're consistently wrong. You try to minimize that error. You try to come close to the answer. Through various techniques and various ways of looking at the numbers, hopefully, you will.

Reasonableness of loss reserves should be measured against relative parameters. As I was saying earlier, you want to take your ultimate claim counts that you've predicted and put them up against the premium you've written. Is it consistent with what's happened in other years? If it has changed, has the book of business changed? Are we writing a worst book of business, a better book of business? Is the number we've come up with reasonable?

You can do that by comparing with other accident years. You can look at other companies' data. You can look at your own prior studies. You should try several different approaches. Do all of the answers make sense? Are they all close to each other, are they far apart?

The underlying assumptions and methods should be documented and subjected to sensitivity analysis. How much does your answer change by switching one of the variables? You probably don't want the answer to change radically by just moving one variable around.

How often or how much does the answer change by making a slightly different assumption on frequency, a slight different assumption on severity? If you find that the answer doesn't move appreciably due to a certain variable, maybe that variable should be taken out of the process. If it doesn't add anything to the answer, maybe you don't need it there.

There are statistical ways of doing the sensitivity analysis, but I think the thing I would like for you to remember is: How much does the answer change by the different assumptions you make? Then, finally, are the assumptions reasonable? Do they make sense in the context? Is it possible for what I've predicted to happen? Is it within the realm of reasonableness?

That's probably the final thing you want to ask yourself, "Does what I do or what I have done make sense?" If not, you've got to go back and try it again and see if you can come up with a better answer.

Okay. That's all for our prepared portion -- unless Agnes has anything else to say?

(No verbal response)

MR. MORGAN: I would ask for some questions now, or I'm going to put up the slides of the ball of twine.

You can take that down, sir, if you want to.

Yes, you want to see the twine?

QUESTION: Where did you go on your vacation?

(Laughter)

MR. MORGAN: I went to see the world's largest ball of twine. No, really I went to Cancun. It was hot as hell!

Any other questions?

(No verbal response)

MR. MORGAN: Yes? Would you step to the microphone, please.

QUESTION: In your presentation you had referred to actuarial sound on several times. What is your definition of actuarial sound? If you make errors, how many percent? Is that the actuarial sound?

MR. MORGAN: We were discussing this concept last night.

I'll try, and then I'd like to get Agnes' viewpoint on this. Is it based upon what you know at the time, based upon a set of assumptions, based upon the best information you have? You can come up with an actuarially sound reserve at that point in time which is 100 percent wrong, ultimately 5, 10, 15, 20, 30 years later. Does that make sense? Based upon what you know now, based upon what you see that isn't actuarially sound. You have conformed to standards of practice, if you will, of what other actuaries would have done in a similar situation. You can put 15 actuaries, 15 loss reserving people in the room, give them the same body of data and I'll guarantee you will get 15 different answers.

I was reading a thing in "Money Magazine" sometime ago where the financial data on 50 different people was given to 50 different tax accounting firms, and I think they had 49 different answers on what the tax should be. You're going to have different estimates, each one of them based upon the assumptions that they made whether it is this tax calculation or a loss reserve estimate was valid.

Agnes?

MS. HEERSINK: If you've got 15 actuaries that are making an opinion, you're probably going to get more than 15 answers because at least one of them in there is going to say, "Well, this is what I think is going to happen, but there is also a definite possibility that that assumption is not right.
Therefore if this happens, that's going to be your answer."

The other thing I'd like to say is that hindsight is a great way to look at things. Now, when you're 10 years down the road and you say, "Boy, I sure know a lot more about these claims." On the other hand, you may have had 10 percent of your claims settled when you had to make the reserve estimate. Now, 10 years later, you've got 95 percent of your claims closed.

Of course you know more. Hindsight is always better. But again, I think the actuarially sound assumption, and if you go back to the slide, it has to be based upon reasonable assumptions at the time that you are making it. You are not expected to be a seer, to look in your crystal ball and say, for example, in connection with what happened in pollution. "I'm going to forecast that in 10 years the courts are going to say that I'm liable for that pollution, even though I don't believe my policy says that I'm liable for it." You're not expected to be able to see those kinds of things in the future, so it has to be based upon a reasonable assumption at the time that you are making it.

MR. MORGAN: One example of that I've seen in studies is where you have a stop loss to protect the company, the actuary might come in and predict that the loss ratio is going to be 100 percent, implied by his ultimate losses. Well, that's impossible because the stop loss provides protection over a 75 percent loss ratio.

Under those set of circumstances, his estimate was actuarially sound but it wasn't necessarily reasonable, because he didn't take into account the fact that the company has a stop loss. You could use any one of a number of other examples that says the same thing.

Any other questions?

(No verbal response)

MR. MORGAN: Yes? If you would step to the mike, please.

QUESTION: Agnes, you mentioned the average value of reserves and reserves established for claims in transit, or the pipeline claims. First of all, how often do you find reserves like this in the industry being used? For the first one, the average value, what lines of business are they typically used for?

MS. HEERSINK: In our work that we do, I would say we don't generally look into claims in transit. From time to time, we will go into a company and we will want to see if they have any information which will give us information whether or not there has been a problem in the delay of getting claims into the system.

Quite often in our work, too, we don't even have the data to be able to separate between development on reported claims and true IBNR. If we look, for example, at an accident year, which Steve has referred to, and it is also in your definition if you're not clear what that is, that simply refers to a body of claims that have occurred during a 12-month period of time.

At the end of that year, anything that hasn't been reported to the company as IBNR. If you estimate the value at the end of the accident year, you have certain claims that are IBNR, certain claims are known. If you look at that same body of claims; namely, all claims that occur during that accident year, 12 months later, you now have some claims that used to be IBNR that are now known claims, many times in our work we cannot distinguish between that. All we know is the value of the reported claims at the end of the accident year, the value of the reported claims 12 months later. That is a different set of claims now that have been reported.

The other question in connection with average value of claims, this is something that we do definitely like to look at. Unfortunately, for a number of the companies we work with, we cannot get reputable, reliable claim counts. If you can get claim counts, we do like to look at average outstanding value, which just means how much reserve have you set up.

When Steven mentioned in there, talking about reserve adequacy, that's one of the main things we look at. Has the average outstanding value increased over time? Because basically we assume that with inflation and for the same type of business, that average value is going to go up over time. It's going to cost more for a claim that occurs in 1990, then it did for the same type of claim to have occurred back in 1980. We do like to look at claim counts for any line of business that we can get it for.

MR. MORGAN: I think, specifically, you probably see it for medical-only Workers' Comp, you can see average reserving, collision losses, I referred to earlier, anything that has got a relatively low value and is relatively stable will lead itself to average reserving.

QUESTION: In your examples with unallocated loss adjusting expense. Normally, it almost seems that you're drawing an internal expenses versus an external expenses delineation, but I know that's not true. Is there anything written somewhere that says, like, if the company bills for data processing, it bills or keeps track of hours spent by internal adjusters on a specific file and so on to prevent that from being called an allocated expense? I mean, is it ever laid out as to what is allocated and what isn't?

MR. MORGAN: I think there are definitions in Regulation 30, isn't there? I think regulation 30 delineates what is allocated an unallocated. I believe I've seen it in there.

QUESTION: (Inaudible)

MR. MORGAN: I have seen companies where the primary company will form an adjustment company to handle their own claims and there were no unallocated claim expenses. They were able to allocate everything to a specific claim since they formed a separate company to adjust the claims for the insurance company. They were billing everything.

That's got some nice advantages to it, because usually unallocated loss adjustment expenses don't get ceded off to a reinsurer, whereas allocated expenses can. It is definitely to the advantage of company, a primary company, to form a separate adjustment company. Then they get rid of the unallocated and allocated split, everything is allocated.

QUESTION: Is that actuarially sound?

MR. MORGAN: Consistency is the virtue, again. As long as they are consistently doing it that way, there is not a problem. Your goal is to set up an adequate reserve, as close as you can be. As long as it's consistent and it's done on every claim and it's done consistently, again, then I don't see that as a problem.

MS. HEERSINK: We just worked with a company that was writing mainly through managing general agents. They had an agreement with these managing general agent that those agents would be the ones that were handling the claims. We made a determination that this company did not have to put up a reserve for unallocated loss adjustment expense, because they were essentially paying for this in advance. They were paying for it as a percent of the premium.

MR. MORGAN: The other thing on allocated loss adjustment expense and unallocated, the definition that I like to use for allocated is if you can assign it to a specific claim, then it's allocated. That helps get rid of a lot of the confusion about lawyer fees, expert witnesses, outside claims adjuster, and any one of a number of other things.

If you can assign that bill or assign that amount of money to a specific claim, then you can consider it allocated. The lights, the proverbial lights, heat, and water is tough. I worked on claim 1, 2, 3 when we turned the lights on today. The slides are coming out.

(Laughter)

MR. MORGAN: Oh, one more question. All right.

QUESTION: I heard that the LAE reserves for the long-tailed lines are inadequate. I read about a study. Have you all seen that?

MR. MORGAN: I'm sorry. Would you repeat that, please?

QUESTION: LAE reserves for the long-tailed lines are inadequate. I read a study about that in the "National Underwriter," or someplace. Is that just "Chicken Little"?

MR. MORGAN: I think that's probably pretty accurate. We find, reinsurance companies, if you want to talk about extending the tail. LAE reserve is sometimes tougher to predict than the loss reserve. You have a smaller volume of data. The LAE will tend to lag. Even the loss payments which have lagged themselves, especially to a reinsurer. I think that that has been true, that's a particularly tough nut to crack.

You get a lot of variability when you're looking at loss reserves. You have to try a lot of different methods because the size is smaller, there are less of them. The contract terms are not consistent in terms of the way the loss adjustment expenses are handled for primary company or even for a reinsurer. It can add to the complexity, and that's probably a pretty safe bet.

Would you agree, Agnes?

MS. HEERSINK: Yes. I would say from what we've seen I would not be surprised if they are inadequate.

MR. MORGAN: It's a tough nut to crack.

Okay. Thank you very much.

1991 CASUALTY LOSS RESERVE SEMINAR

2A: CONSIDERATIONS IN SETTING LOSS RESERVES

Exhibits

(Slide 1: Outline)

Considerations in Setting Loss Reserves

I. **Basic Definitions and Concepts**

A. Accounting aspects
B. Key dates
C. Elements of a loss reserve
D. Loss Adjustment Expenses

II. **Basic Principles**

A. Actuarially sound reserves
B. Uncertainty

III. **Considerations**

A. Data elements and organization
B. Other considerations
C. Application of judgment

Exhibit 1

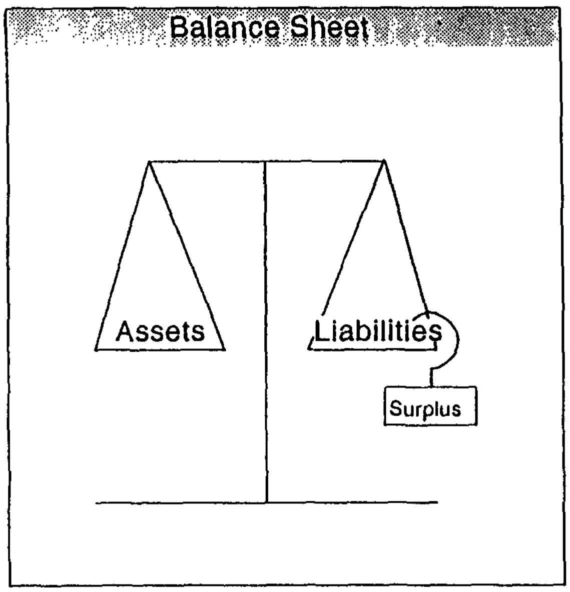
LOSS RESERVE

DEFINITION:	Amount set aside to settle unpaid claims.
CHARACTERISTIC:	Estimated liability.
IMPORTANCE:	Accurate evaluation of financial condition and underwriting income.

Exhibit 2

ACCOUNTING ASPECTS OF LOSS RESERVES

Fulfills Basic Accounting Principle of Matching Revenue and Costs



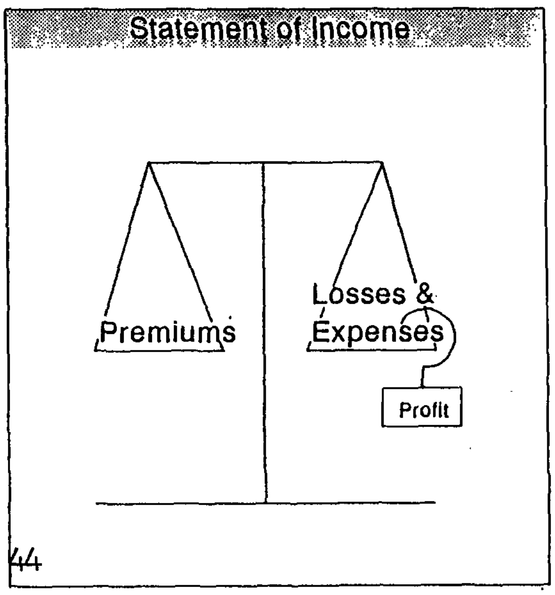


Exhibit 3

KEY DATES

ACCOUNTING DATE:	Defines a group of claims for which liability exists; namely, all claims incurred on or before the accounting date.

VALUATION DATE:	Defines the time period for which transactions are included when evaluating the existing liability.

Exhibit 4

CARRIED LOSS RESERVE:

The loss reserve amount shown in a published statement or in an internal statement of financial condition.

INDICATED LOSS RESERVE:

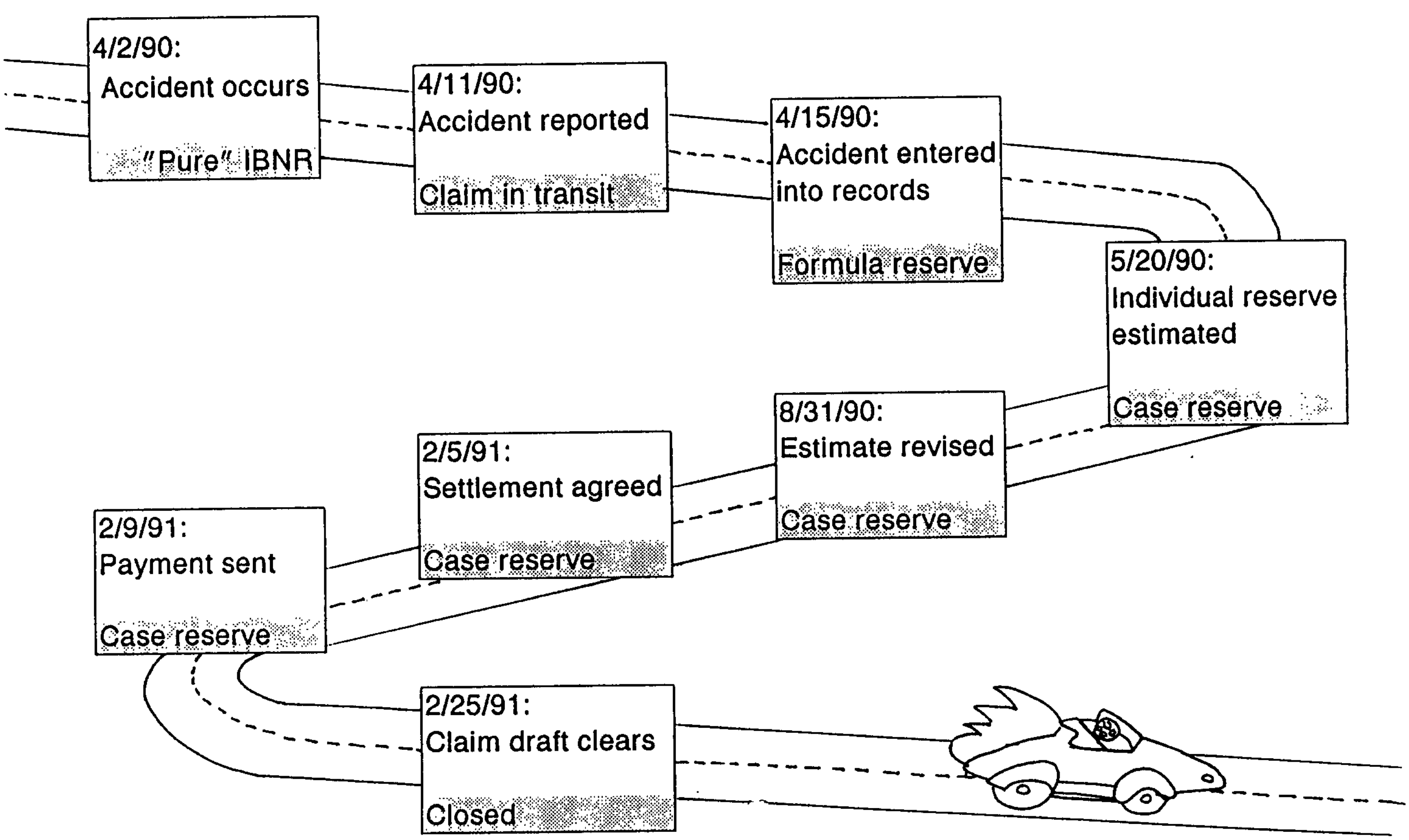
The estimated loss reserve that results from the application of a particular loss reserving procedure.

ELEMENTS OF A LOSS RESERVE

- o Case Reserve
- o Formula Reserve
- o Development on Known Claims
- o Reopened Claims Reserve
- o "Pure" IBNR
- o Claims in Transit

Exhibit 6

LIFE CYCLE OF A CLAIM RESERVE



LOSS ADJUSTMENT EXPENSES

Allocated: can be assigned to specific claims

1. Attorney fees
2. Court costs
3. Independent adjuster fees*

Unallocated: cannot be assigned to specific claims

1. Claims department salaries/benefits
2. Claims department overhead – cars, rent, supplies, etc.
3. Company overhead
4. Independent adjuster fees*

* Depends upon billing detail

Exhibit 8

ACTUARIALLY SOUND LOSS RESERVES

DEFINITION

A provision for the unpaid amount required to settle all claims, whether reported or not, for which liability exists on a particular accounting date.

CHARACTERISTICS

For:	A defined group of claims
As of:	A given valuation date
Based on:	Estimates derived from reasonable assumptions and appropriate actuarial methods

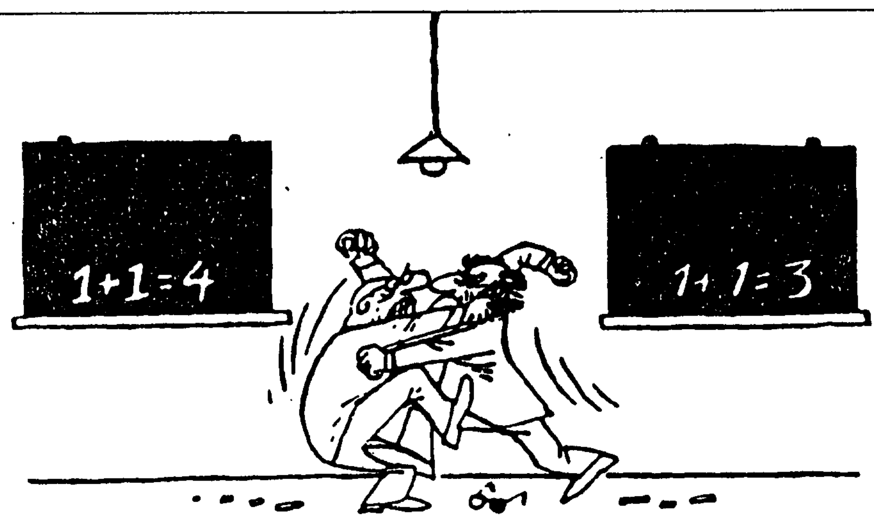
ACTUARIALLY SOUND
LOSS ADJUSTMENT EXPENSE RESERVES

DEFINITION
A provision for the unpaid amount required to investigate, defend, and effect the settlement of all claims, whether reported or not, for which liability exists on a particular accounting date.

CHARACTERISTICS	
For:	A defined group of claims
As of:	A given valuation date
Based on:	Estimates derived from reasonable assumptions and appropriate actuarial methods

Exhibit 10

UNCERTAINTY



Mitro/Ta Nea/Athens
World Press Review/November 1979

Reprinted from: The Actuarial Review - November, 1980

Exhibit 11

UNCERTAINTY

o The true value of the liability for loss or loss adjustment expenses at any accounting date can be known only when all attendant claims have been settled.
o The uncertainty inherent in the estimation of these liabilities implies that a range of reserves can be actuarially sound.
o The most appropriate reserve within a range of actuarially sound estimates depends on both the relative likelihood of estimates within the range and the financial reporting context in which the reserve will be used.

Exhibit 12

KEY DATES

ACCIDENT DATE:	The date on which the loss occurred.
REPORT DATE:	The date on which the loss is first reported to the insurer.
RECORDED DATE:	The date on which the loss is first entered into the statistical records of the insurer.
ACCOUNTING DATE:	Defines a group of claims for which liability exists; namely, all claims incurred on or before the accounting date.
VALUATION DATE:	Defines the time period for which transactions are included when evaluating the existing liability.

TYPICAL DATA ELEMENTS

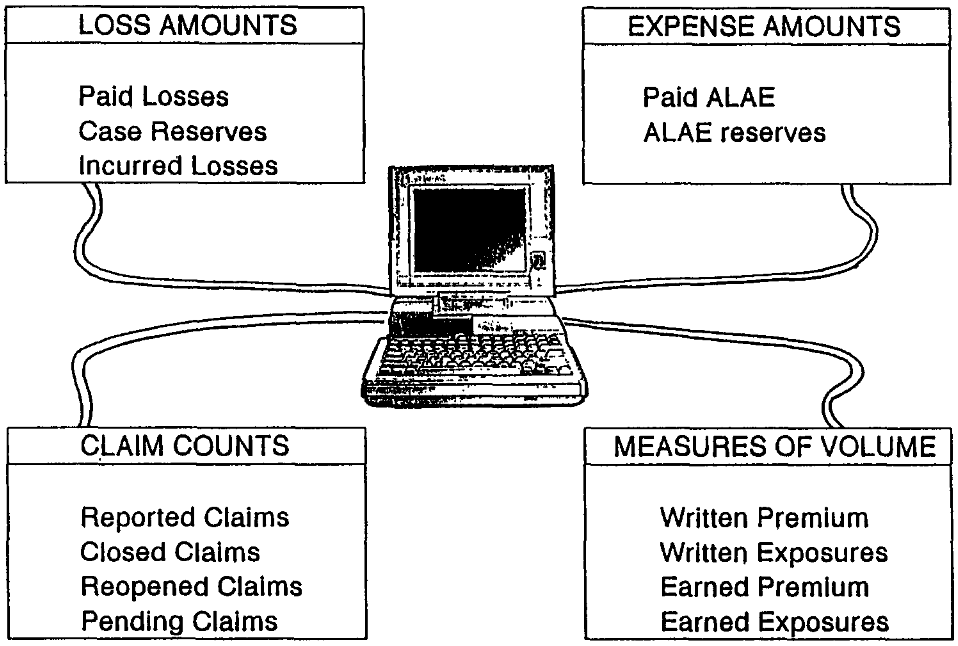


Exhibit 14

HOMOGENEITY

Loss reserving accuracy is often improved by subdividing experience into groups exhibiting similar characteristics. For example:

BY PRODUCT: **BY COVERAGE:**

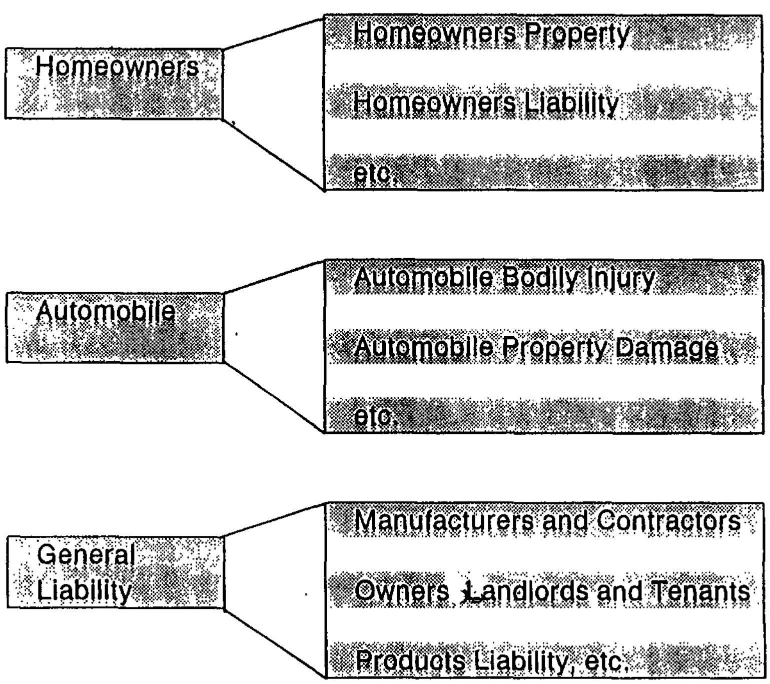


Exhibit 15

CREDIBILITY

- Credibility is a measure of the predictive value that is attached to a body of data.
- A group of claims should be large enough to be statistically reliable.
- There is a point at which partitioning will divide the data into groups too small to provide credible development patterns.

Exhibit 16

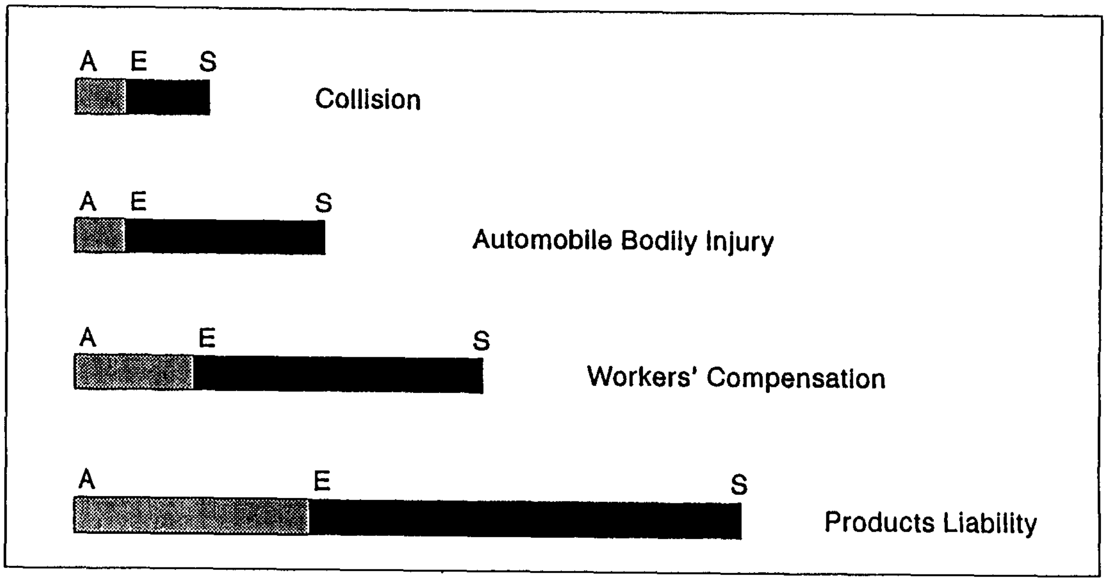
EMERGENCE AND SETTLEMENT PATTERNS

EMERGENCE
The delay between the occurrence of a claim and when it is recorded on the company books.

SETTLEMENT
The delay between the reporting of a claim and when it is settled (closed).

Exhibit 17

EMERGENCE AND SETTLEMENT PATTERNS



A = Accident E = Emergence S = Settlement

Exhibit 18

OPERATIONAL (INTERNAL) FACTORS CAN AFFECT SETTING LOSS RESERVES

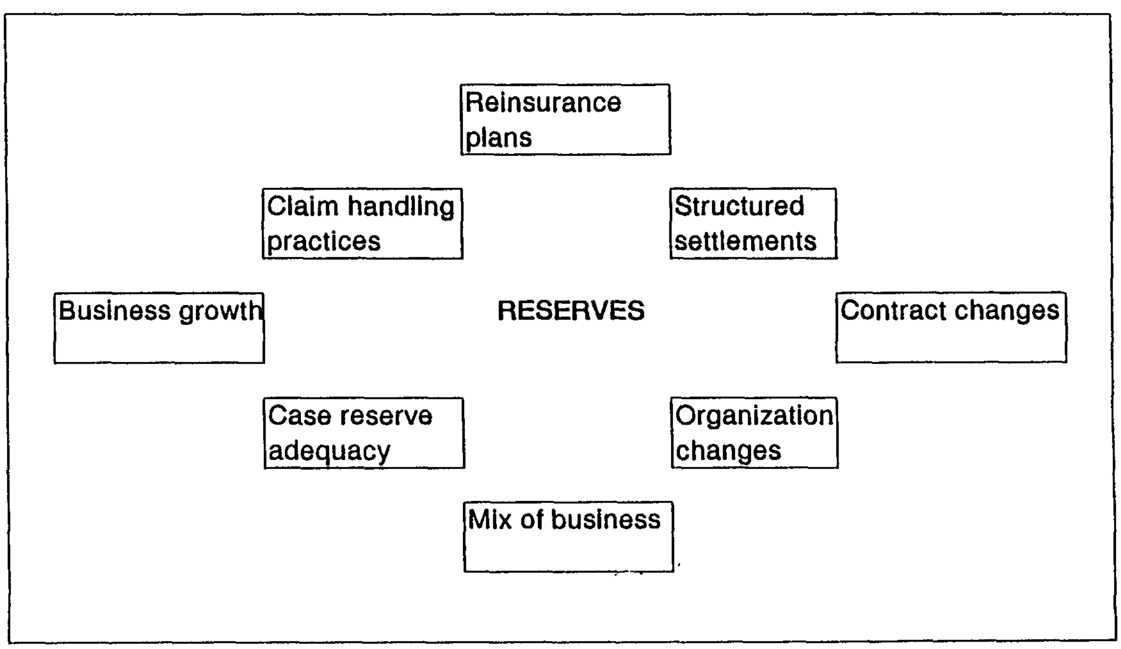


Exhibit 19

ENVIRONMENTAL (EXTERNAL) FACTORS CAN AFFECT SETTING LOSS RESERVES

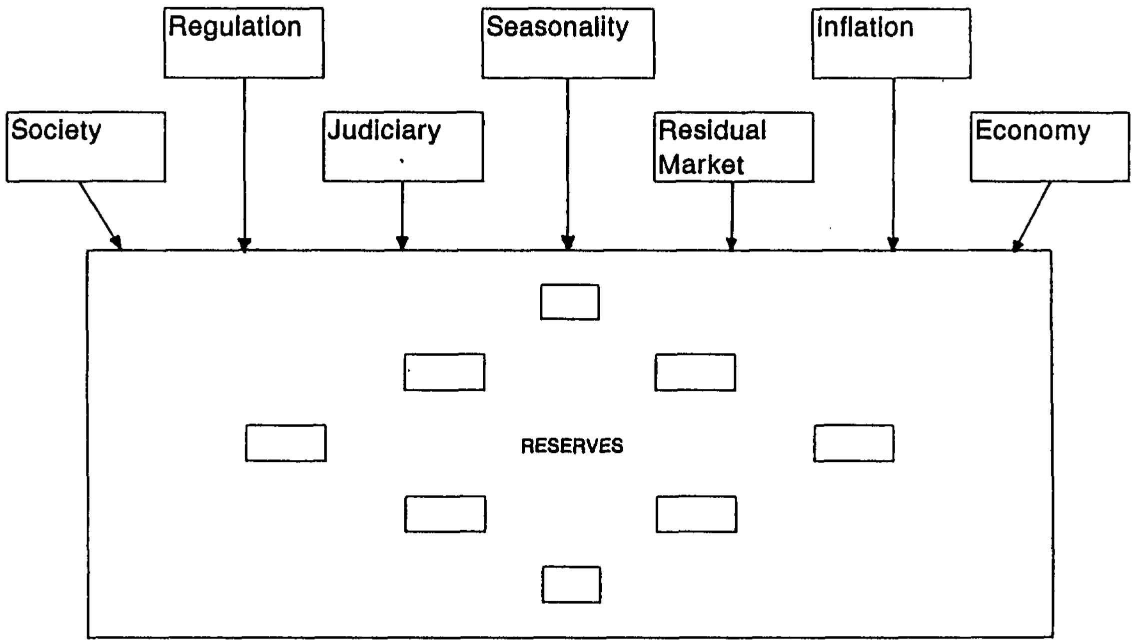


Exhibit 20

APPLICATION OF PROFESSIONAL JUDGMENT

- Loss reserve is a "point in time" estimate of a company's outstanding liability.
- Reasonableness of loss reserve should be measured against relevant parameters.
- Underlying assumptions and methods should be documented and subjected to sensitivity analysis.

1991 CASUALTY LOSS RESERVE SEMINAR

2B: LOSS ADJUSTMENT EXPENSE RESERVES

<u>Moderator</u>

Gary V. Nickerson
Universal Underwriters Group

<u>Panel</u>

Jerry McAndrews
Universal Underwriters Group

Ronald J. Swanstrom
Coopers & Lybrand

Gregory M. Wacker
Fireman's Fund Insurance Companies

MR. NICKERSON: Loss Adjustment Expense Reserves. We have a broad topic to cover this morning and we have an hour and a half to cover it, which isn't too much time for such a topic. So we are going to select a few topics to present to you that will give you a better understanding of this reserve and also talk about some of the forces that are driving loss adjustment expenses.

We have three speakers in our panel this morning. I'm your moderator, Gary Nickerson, from Universal Underwriters Insurance Group where I am an Assistant Vice President and Actuary.

We will have our three speakers give their presentations and then we will have some time for questions and answers. So make sure that you take notes during the presentation so that we can have a lively time of questions and answers following the three presentations.

I should point out that the views expressed are the views of the individuals and not necessarily the views of the cosponsors or the employers of the participants.

At this time I would like to introduce our first speaker, Jerry McAndrews, who is Vice President of Claims at Universal Underwriters Insurance Group. He is going to speak to us from the perspective of somebody on the front lines, somebody who is responsible for paying and controlling loss adjustment expenses, among other things. Jerry?

MR. McANDREWS: Thank you Gary. I appreciate the opportunity to speak to you this morning. And as Gary has indicated, the main reason that I am here is to give you a front line perspective. And my mission is to really explain to you what goes through an Executive Vice President's mind when he is making decisions about reserving, how it can affect actuaries, and give you some processes that maybe you should go through in evaluating reserves and maybe talking to your claims person to see what is happening with reserves. And hopefully it will make your reserving much more accurate.

The objective the presentation is to examine the elements that change both allocated and unallocated loss adjustment expenses, which are different...and which are difficult to measure and predict. How we are going to do that is to look at the elements of allocated loss adjustment expenses, elements of unallocated loss adjustment expenses, and at the end I'll give you some solutions to the unpredictability of expenses.

Some of the elements of allocated loss adjustment expenses. Change in economic conditions. Recently we have experienced a slight recession or downturn in the economy. And from a claims perspective, that means a lot to me. Our fire losses, for instance, have increased significantly. When fire loss is increased, both frequency and severity, it usually does coincide with the downturn or recession. I think people have financial problems, and what happens is, is that we are required to do arson investigations in several of new fires. That causes the allocated loss adjustment expenses to go up drastically, because you can't do an arson investigation half-way. You have to get electrical engineers. You have to get structural engineers. You have to get attorneys involved. You have to get the different investigative bodies involved. It is sometimes as much as 80 or 90,000 dollars just to do a proper investigation and to go through a good arson investigation, as you know, it is very difficult to prove that an insured set a fire, let alone anyone else. So it is something you really have to go about very tediously. It causes expenses to go up drastically. So when there is a downturn economy, even though there may not be a direct correlation to other people for claims made, this is the time to really start to look for arson fire, financial failings, and usually the allocated loss adjustment expenses will go up drastically. So what I am saying to you is examine the economy, what is going on, and use some common sense approaches as to if you see frequency severity go up, a claims person should be able to tell you that expenses will go up in the same type of fashion.

Another type of change that a claims person will monitor quite closely is change in both statutory law and case laws. And I'm giving you these cases, not because they are on the cutting edge, and to tell you that yesterday they came down and it is going to change drastically. But I want to give you these cases to show you the thought process that a claims person would go through in evaluating how it effects his loss adjustment expenses. This should help you analyze different kinds of documents you may get, if you are reviewing any (inaudible) IA. Different material you see cases come down and you see change in statutory laws. You may want to ask the claims executive and say, you know, how do you expect that will affect your loss adjustment expenses. And I want to give you some examples of things that happened through 84 through the present and show you the though process that at least I went through.

The first case is actually the San Diego Navy Federal Credit Union versus Cumus Insurance Society, Inc. It is a 1984 case. Cumus Council. I don't know if all of you are familiar with it, but it came out of California.

What basically happened was that the court decided that whenever you have a conflict with your insured, in other words, you are disputing coverage...if you feel that for one reason or another that the insured may not have coverage for a particular lawsuit that was filed against him, we will send out a reservation of rights letter, reserving our rights saying that potentially some exclusions and provisions may be applicable.

Well, in this particular court decision the judge indicated that if, in fact, you feel there is a conflict of interest you are required to hire an attorney for your own insured so that he can fight the insurance company's allegation. So the insurance company has to retain an attorney for the declaratory judgment action on its own interest. We have to retain an attorney for the insured to dispute or act as an adversary. And then we also have an attorney involved where he has to defend the tort action. So we have three lawyers involved. And if you have more than one named insured, separate interest involved, several (inaudible) of interest, you may have five or six lawyers. And it may sound fair initially, because insurance companies could really just deny coverage and put an insured in a situation where he has to retain an attorney to defend himself against his own insurance company and they felt that it was fair to do that. Well, that was well and good, but when a case was decided like this, rather than be statutory law, the definitions are very, very broad. So, what happens was...and I will say this...adjusters do send out reservation of rights letter quite frequently. There are always allegations of punitive damages, which are gross in want and negligence, and a lot of times they say, well, that's not covered under the insurance policy.

Obviously, if an attorney puts in a lawsuit, in excess of the policy limits, $100,000, $25,000, $1,000,000 limit on the policy, you have to send out a letter to the insured notifying them that there is a suit in excess of the policy limits and that there may be some potential of his own exposure. Therefore, he may want to retain counsel and get him involved in the defense of the matter. Well, as soon as that happens in California then we have to retain an attorney to represent him in these matters. There were no clear definitions of when you could or when you had to retain counsel when you didn't have to retain counsel. So immediately, it was by case law and it means that all cases tried prior to this date...the expenses escalate immediately. I don't know if some of you noticed it or didn't notice it, but that's when it happens by case law and when these types of things happen you should take note of them immediately.

Obviously, the claims person will try and counter some of these things by settling cases, by limiting reservation of rights letters. I really...considering only those cases who were...clearly we feel that there is no coverage, which we should have been doing anyway, so it was a beneficial process, but it was a very expensive process.

So the next step that happened in the process was that there was an outcry in the state of California from insurers saying this is ridiculous, the insured gets his own counsel, sometimes it's $250 an hour where the insurance attorney may be $85, $95, $110 an hour. Sometimes the attorney had no idea what was going on in a tort action. He was simply a friend of maybe the insured, and he decided to get an attorney and expenses went up drastically. So there were some things involved there that were confusing and caused the loss adjustment expense to escalate rapidly.

But the reason I'm pointing this out is because it happens...I know I was going to move to this...a lot of consumer advocates were moving in this direction. But when it happens by case law there is very seldom clear definitions of how you are to monitor these expenses.

So now we move into the next era of this type of situation where the California Tort Reform Act of 1987 said this is ridiculous. What we are going to have to do is to put some controls on this. It is skyrocketing expenses. So what they finally did by legislative action...you will say, from this date forward, September 6th the bill passed...everything that happens from this date forward the law is in effect...unlike case law. In case law everything is not tried or is filed on a certain date. All of it is open, so they can go backwards. But from this date forward now, if cases were filed under the old law then you will usually see...and I'm giving you generalities, it is not exactly what happens in all cases...but generally speaking, those cases that are continuing and ongoing will still be on the old law but legislative action furthered...forward...you'll have expenses that start from a certain date and go forward.

So the legislature finally decided what we need to do is control this. For instance, in the state of California, punitive damages are not covered by insurance. They say punitive damages are to punish and make an example out of the person. So, in other words, if you are grossly and wantingly negligent...drunk and run up on the sidewalk and kill a child that's in a crib or something like that...a stroller in there. If you are grossly and wantingly negligent we want to punish that person for being drunk and doing such an outrageous act. It is not fair to pass that on to an insurance company because then you're not really punishing the person. So in California they say, we don't want to cover punitive damages. So finally the legislature said, well, then it makes sense that if the insurance company sends out a reservation of rights letter or punitive damages saying they're not covered and you may have to retain your own attorney to represent yourself for punitive and exemplary damages and the insurance company doesn't have to pay. They also said limit situations or where there are just allegations and a lawsuit of conflict of interests but there is no proof to that effect yet doesn't create a conflict of interest yet.

So what happened was that California attorneys would put all these things in to their pleadings. Maybe file a lawsuit for $600 million, and I'm exaggerating a point now, but I asked an attorney once...I called him up and I said, this lawsuit is outrageous, the number of...the amount of money you are pleading in here. And this is before they had some limitations on it. And he said to me, he said, well, they thought me in law school that it doesn't cost any extra for the zeros. So, I mean, you know, they can basically put whatever they want on it, but it creates a conflict. And as soon as it creates a conflict you are back under the old law. We had to start retaining counsel for our insureds, which meant our expenses went up, which meant that we were more apt to try and settle cases if we saw the expenses skyrocketing and going out of control. So they learned this trick real quick. They filed a lot of the lawsuits with these types of allegations and finally the legislature came out and said, hey, under these circumstances you don't have to do it. Also you need to have a lawyer that has been practicing tort law for five years and they came out and said that the rate that the insurance company pays their lawyers is basically the rate you have to pay Cumus counsel even when you have it. So see, they got more reasonable.

And now when that law passed from cases forward, then you can see a leveling of allocated loss adjustment expenses. There is a control and from that date forward there is a change. And so you have to be aware of how these types of case law and statutory law are going to affect allocated loss adjustment expenses.

So that gives you a basic idea. Foley versus Interactive Data Corporation was a similar situation. It just happened in 1988. You are going to be seeing most of the effects of it, but with discrimination being at the forefront of the law right now along with hazardous waste materials, the state of California was requiring insurance companies to defend wrongful termination lawsuits. And wrongful termination you could file a lawsuit both in breech of contract and both tort, which tort meant pain, suffering, inconvenience...there's some different types of damages you can allege in tort. Where in contract it is back pay, maybe some expenses and so the damages were a lot more limited in tort action. So in that case they came down and said, look, you can't have a tort action basically. The only thing you can have is breech of contract. Breech of contract is not covered by insurance and so there was a...we had several cases that were on the books that caused us both losses and loss adjustment expenses to escalate drastically when they were allowed to be tort filings in wrongful termination. As soon as this case came down it dropped our allocated loss adjustment expenses immediately. We'd settle some of these cases or some of them we would say we no longer have to cover it because of this case and we were able to back out and the insured had to retain some counsel. And so immediately you see a reduction in loss adjustment expenses.

So this is how you can kind of go through a see-saw. And if you are working with your claims person who is being aware of all these changes I think it will be helpful for you to see how they can cause a loss in your trends. You can predict them better and I think in the bottom line you'll be more accurate.

Another thing that changes the allocated loss adjustment expenses is a change in market conditions. By that I mean, going through an underwriting cycle. It's as simple as that. As a claims person staffing, when we go through an underwriting cycle, premium increases drastically. Well, obviously, losses increase drastically. And in less you are a heck of a man, you are not able to staff quite as fast with qualified trained people as you could in the cycle where it is flat or you're going down. So what you have is a less trained individuals handling some severe claims. And when that happens, normally an inexperienced adjuster, what he'll do when he gets a lawsuit in the door or he gets a serious accident in the door, monitoring things are a little more difficult, he'll send it out to an attorney and an adjuster to do a full investigation, defend our interest, and he'll get to his next file. I mean, you go from 2,000 claims to 7,000 claims and you're not able to keep up with staffing, you're going to have that sort of situation. What happens is that you're giving an open checkbook, basically, to an adjuster or an attorney to go out and defend the case. So the attorney, for instance, gets a case that is not developed. So the first thing that he wants to do, obviously...his objectives or billable hours and he'll move up through the corporate or the law firm by billable hours, (inaudible), how many clients he has and he can bill a significant number of hours. So he can do all the...he can file interrogatories. He can take depositions. Where normally an adjuster, when he working a file, can take report of statements.

We can get a lot of this information by a good preliminary investigation. When the file goes to an attorney, when you have plenty of time, it should be fairly well developed so if you know if it is a case you want to settle. You know if it is a case you want to try. But when it's given to him undeveloped and he bills all his hours, he does all the discovery. The same way with an adjuster. You may say, look, I have the people in this area, there are people that moved to New York or they're on Interstate 80 and some people are in Los Angeles. I'll try to get telephone recorded statements from my end of it, but I need you just to do the court group. Whereas when you are busy, they might say do a full investigation. He is allowed to do that, so Crawford & Company is allowed to call Crawford & Company in Los Angeles and the Crawford & Company in New York. They all establish files. Thirty-five dollars to establish a file. Another $50 for secretarial work to get all these...those are the elements that go into making loss adjustment expenses go up. But see how all of a sudden when your cycle is going up drastically, most companies, I think your allocated loss adjustment expenses will go down.

Adversely, however, when it's going down if you have a claim man who says, look, we can't do this any longer. I'm not going to cut staff immediately but what we need to do is start taking some of this work in-house. In other words, I want you call that lawyer when he files a complaint. I want you to get an extension and say, look, we want to work with you on this case. It seems like a case we want to settle. You can send me a copy of all the medical bills. Let me know where you're at on the settlement value and let's talk about settlement. He's able to do a lot of that without an intervention of another attorney, which is $125 to $85 an hour. So every hour he spends on working the phone and developing it, the less you're going to have in allocated loss adjustment expenses. So if it is handled right.

But the problem is that it is really tough to break those kind of bad habits when the cycle goes down. Staff, if they want to continue to assign it out to an attorney or an adjuster to continue to have them do the work...cause that's their mode of operation for maybe three or four years. So you really need to change that thinking and if the Claims Vice President is smart, he'll do that. If he's not you are not going to see a lot of trend changes on it. And then you have a different type of a problem. The problem we'll get into a little later.

Change in company procedures. This is a kind of an area that we're going to go into as the panel. When you talk about field adjusters and in-house adjusters, there is a distinction between allocated loss adjustment expenses and unallocated loss adjustment expenses. I had a definition of allocated loss adjustment expenses and for some reason ISO and some of the other areas don't always agree with me. But, allocated loss adjustment expenses to me is any expense I incur that relates to a particular claim file is an allocated loss adjustment expense. An unallocated loss adjustment expense is an expense I can't relate to a file...building, lights, paid employees, those kinds of things. So those are the kinds of expenses that I say are unallocated. Now you are going to get some other views on that and other definitions. And it's just key to see the difference between the two. But, basically, we're going to talk about field adjusters and in-house adjusters.

My way of thinking...most insurance companies that do business in major metropolitan areas and spend more than $200,000 in adjuster expenses a year should have their own staff people available to their investigators...do their investigation if they can. So all of a sudden you were using Crawford & Company in Chicago. You decide to put a field man in there, an adjuster. He starts taking your statements. He starts doing investigation. He gets extensions on time and lawsuits and those kinds of things. So now you're shifting. You're taking away from allocated loss adjustment expenses and possibly putting in unallocated loss adjustment expenses. So the procedures are changing. It may start slow...one, two, three individuals. If your company starts to do that you should see some trend changes. So if you're staffing different and your people are starting to do different procedures and different tasks to handle a claim, it is going to change your trends. It's going to be very subtle, but it's going to change and you have to be aware that that's happening.

The same with in-house counsel. It is very popular right now. In-house counsel is where you actually hire a lawyer for whatever fee you can get him for. He handles...he's your employee basically. He handles all your lawsuits in, say, Chicago or New York or wherever. A lot of companies, especially when they're merging, they will have one of the companies have an in-house counsel program and they'll ask the other companies to use the in-house counsel program. So...and normally that runs $65 or $75 an hour for an in-house counsel, whereas an independent counsel will be as much as $110 or $115 an hour right now. And that works real well on the very basic liability cases. Obviously, you get into a quadriplegic, a brain injury, and you're talking about engineers, you'll want a seasoned trial lawyer who is used to the jurisdiction venue to try the case for you. So you may not use him on the very significant cases, but certainly on the $5,000, $10,000, up to a $100,000 cases. You'll do that. And when you see that trend going that way, obviously there is going to be some shifts and so you have to be very careful to monitor and see what they are doing in those areas.

Elements in unallocated loss adjustment expenses, again, changing staff responsibilities. And I kind of talked about that already when the cycle changes you make your staff start actually handling the cases, doing investigation, taking telephone recorded statements. As simple a thing as that can really change your expenses. Instead of having Crawford & Company set up their file for $35 or $40 an hour clerical (inaudible) and then he may take an hour or two recorded statements, then have the clerical transcribe the statement...a $200 or $215 bill. You get the guy who picks up the telephone call. He takes the telephone recorded statement himself and summarizes the statement, it's in the file, it's already done. You have 20 to 50 minutes of his time, depending on the statement when it's done. Do you see the difference? Two hundred dollars. Boom. That quick. It's going to take a little more time. He's not going to handle as many files, but it's something that if a claims executive starts moving in that direction to do those kinds of things it sure is going to change some trends in loss adjustment expenses.

Now on the other side, you have unallocated. He's going to need more staff. He's going to need more adjusters. So you have to watch your unallocated loss adjustment expenses go up. Personal changes...you get a new Vice President of Claims and he has a whole different philosophy on how to handle it than the previous ones, you better talk to him on his philosophy and what are some of the things that he is going to be doing. Because they could make life hell for a while. They can really cause some trends in the past to not look exactly the same. If you don't believe me you can ask Mr. Nickerson here. He and I worked together. Sometimes I make his life not so easy.

Automation. Simple thing is you go from PMS and switch to a brand new claim system. That can control or can change your unallocated loss adjustment expenses significantly. For instance, Massachusetts...a lot of forms, a lot of drafts, weekly drafts have to be issued. You may have (inaudible) clerical people issuing drafts. All of a sudden you go to an automated work comp system whereby you can say issue a draft to this person for three months. They have a broken leg and they're not going to be able to go back to work. The computer automatically issues checks for three months. So instead of a clerical person sitting down and following through screens, typing in dates, temporary, total, permanent, partial, whatever. All of those things are done by computer. Five people...you don't need them anymore. Five people, $20,000 a year, is $100,000 plus benefits is $150,000 or $200,000. That can change drastically if that's one of your main items for work comp or some other things. So if you have some different kinds of computer systems going in, obviously it is going to increase unallocated because you are going to have put the system in and it's going to cost you some money. But it also, on the other side of unallocated, is the clerical and some other things are going to drop drastically. So you have to monitor these kinds of things and go through.

Some of the solutions to this is in passing communication. Periodic meetings with your claims people. Talking...if you go through this kind of list both with allocated and unallocated, once your recorder, once every half year and say have you done anything in this area? Do you know any cases or statutory law changes? Are you doing anything in automation? Are you going through this kind of a checklist with your claims person and the claims person going through this checklist with their actuary? If those two are in concert it is an orchestrated effort to control these things. It is an orchestrated effort to predict them. I think you are going to see solutions to a lot of the problems that you may have in predicting allocated loss adjustment expenses.

Awareness of the changes. I think just being aware. Just coming to this meeting and saying, hey, you know I wasn't aware that these kinds of things changed loss adjustment expenses drastically. Being aware of it. Making someone in the claims department aware of how significant he causes actuary to make changes and vise versa. You know, the claims man telling him the same thing. Just being aware and talking to each other and setting up some structured meeting I think really will help solve some of the problems.

Periodic reports. I think you need finance, actuary and claims to get together and agree on what reports mean something to each of them and agree that they measure the things you want because so often I'll get in a meeting and say, yeah, but how does this correlate with this report and my report says this and this report says that and then you can't really agree on what these reports are telling you. And this is kind of your feedback to the programs that you are putting in. And if you all agree on what reports are going to tell you what, I think it helps you monitor the situation significantly. So I'll conclude by saying we'll have some questions later on and if I can be of any help or any assistance, please don't hesitate to ask me any questions. Thank you very much.

MR. NICKERSON: Thank you, Jerry. Well, that helps us understand some of the real world impacts on loss adjustment expenses. Now it's time to turn to the ivory tower.

Our next speaker is Greg Wacker, who is an FCAS. He works for Fireman's Fund as Assistant Vice President and Associate Actuary. His current responsibility is to provide pricing support for workers' compensation and general liability. Greg?

MR. WACKER: Thank you. Today I want to talk about two separate issues.

(Slide 1)

One I'm going to talk about is workers' compensation ALE reserves. Since workers' compensation is generally a no-fault line of business why is ALE important? I'll show you a slide very shortly here that shows you that ALE is, in fact, becoming much more important in this no fault line of business.

Maybe even a little more elusive is determining what is allocated loss adjustment expense for workers' compensation. I think there will be some surprises here. I will look at the NCCI definition, or more precisely, the Actuarial Committee's working definition. As you probably wouldn't be surprised, this definition isn't necessarily consistent with the other bureaus around the country.
I will discuss some of the grey areas of this definition, particularly hitting upon the expense transfers and reallocations. When I say expense transfers, it is one of the areas Jerry hit upon earlier, I mean allocated to unallocated loss adjustment expense.

I will then go over quickly why the changes in the expense allocations are important and what are the issues on reserving.

(Slide 2)

The second part of my talk I want to hit briefly on some of the regional differences in allocated loss adjustment expense. I think you'll be surprised as to the magnitude that region can have on your allocated loss adjustment expense. We will discuss some of the implications on reserving for that also. In discussing regional differences, I will focus on workers' compensation, other liability and even homeowners.

(Slide 3)

For this next slide I want to thank Ron, who supplied me with the numbers, which are from A.M. Best. As you can see, there has been a steady increase in ALE reported for workers' compensation. The graph is reported ALE, as a factor to loss, by accident year. There is, of course, the issue of underreserving, or the lack of appropriate reserving. Since these are reported results, if there is an issue of underreserving it would, in fact, make the trends more pronounced.

As you can see as you get up into '89, workers' compensation ALE in total is approaching 6 1/2 or 7 percent of loss. What is more striking about that is the medical portion of workers' compensation tends to have a very low allocated loss adjustment expense factor. Since medical represents in the neighborhood of 40% of your total losses in workers' compensation, the ratio of ALE to loss for indemnity alone is significantly higher.

(Slide 4)

I would like to go over this broad outline of the working definition of ALE from the NCCI. This definition has not been finalized by the NCCI, but I want to use it as a basis to point out some of the major areas of workers' compensation ALE, how it differs from other ALE definitions and the major implications on reserving and reporting. Going down the list, the obvious one is attorneys fees which of course is included in ALE.

The next category includes Court ADR, alternative dispute resolution. That's when you, instead of going to court you go to an arbitrator or the like. Also included here are costs associated with compensability determination. This is one of the areas that is a little bit fuzzier because medical exams associated with the determination of compensability are considered allocated loss adjustment expense. I wouldn't be surprised if a lot of companies consider these costs in their losses. It's not easy, necessarily, to recognize the differences between these costs from other medical bills coming in. The other two, expert testimony and arbitration fees. Those are pretty obvious.

Another area is medical cost containment expenses. This includes bill auditing expenses. In other words, the costs associated with auditing specific medical bills in order to reduce costs by eliminating over charging or miss classifications and so forth, are to be classified as allocated loss adjustment expense.

This brings up one of the problems. It is difficult to allocate the cost to a specific claim. You don't go hire someone specifically to do this one task. A lot of these things is where you have people on staff doing these activities. So it is an issue of how do you distinguish the cost associated with the bill auditing of a specific claim. Again, I think you'll find most companies, will include these costs in unallocated loss adjustment expense.

PPO expenses or preferred provider organizations. These costs are generally fees associated with belonging to these organizations for the right to use the PPO. Hospital utilization reviews are also to be considered as allocated loss expense.

Developing this definition is where pricing and reserving meet. There is a little bit of friction associated with that because the definition that the NCCI is coming up with is generally from a pricing standpoint. With pricing, you want to identify as much of the specific costs associated with a claim and you want to allocate these costs as well as you can for reporting purposes. With as much ALE identified as possible, it can be treated similar to loss in the pricing process. This is important because, as you were shown earlier, allocated is becoming a much larger percentage of the total cost for workers' compensation. When you have a part of the total cost that's running 7 or 8% of premium, just loading on a flat percentage for pricing starts losing its appeal because there are substantial differences by jurisdiction, as we will point out. So the NCCI is attempting to develop a definition that will allow the proper allocation of these costs to the various jurisdictions to allow for appropriate pricing. So there are issues as to how we actually record the ALE data in our systems. Is the same information that's getting into the reserving databases getting into bureau reporting?

Back to the specific categories: Vocational rehab evaluation expenses. That's very similar to the medical exam expenses and is to be treated as ALE.

Probably one of the most interesting items is independent adjusters fees, which are specifically <u>excluded</u> from this definition. As Jerry pointed out, independent adjusters fees are costs that can be allocated directly to a file, and, therefore, he considers that allocated loss adjustment expense. However, if you are attempting to develop consistent reporting so you can develop rates and do ratemaking on a consistent level, you can't have the cyclicality associated with independent adjusters. There are times you'll be using independent adjusters a lot and, therefore, your ALE costs would go way up and other times they would not be used nearly as much, dropping those costs way down. So these are specifically excluded from the definition. So in the NCCI definition use of independent adjusters is ULE not allocated loss adjustment expense.

(Slide 5)

What are the implications on reserving? I've talked about just one definition and I've focused on workers' compensation, but I think as you can see these types of issues are not confined to workers' compensation. I don't think there has been a consistency established between the definitions of ALE and ULE. So what can happen as these new definitions are developed by the NCCI, ISO or senior management, for that matter...there is a shifting between the cost of ULE and ALE. Now aside from some of the things that were mentioned by Jerry and just general economic trends, it doesn't affect at any point in time the total of the ALE and ULE because you are just moving the dollars from one to the other. But it does introduce some potentially difficult issues in terms of reserving.

Going back to the proposed NCCI definition, there is cost shifting between ULE and ALE, where the new definition generally expands ALE; more categories that were generally thought to be ULE at this point in time are defined as ALE. That would generally increase ALE and, of course, it would be on a go forward basis when this actually starts being implemented. Therefore, historical ALE would not be consistent with current ALE.

Another issue is the ability to accurately allocate some of the costs. Even talking to our own claims people, there is a real question as how do you properly allocate auditing expenses. It is a tricky question, and probably the answer is not very well.

The problem that arises is that reserving is generally based upon historical patterns. You look at how your allocated loss adjustment expenses have come in in the past and generally relate that to paid losses. ALE in most instances is only recorded on a paid basis. A few companies actually have the ALE case reserves, but generally it is just on a paid basis. It normally comes in very slowly, so you see only a small percentage of the ultimate ALE in the first year or two of development on an accident year. So what is relied upon in reserving is a long history. If you have a very long tailed line of business, the longer the history you need.

ULE reserving, on the other hand, by its very definition...it can't be specifically allocated to a claim. Therefore, it can't be specifically allocated to an accident year. So it's more formula driven. There are a number of different formulas used to estimate ULE reserves, generally based on the calendar year paid ULE and relating that to some distribution of losses paid or incurred by year.

So these are two completely different procedures that develop the reserves for ALE and ULE. If you start transferring cost from one to the other, there is nothing saying that, the formulas in fact, will work out to a zero sum game. Meaning, if I transfer 25% of my cost from ULE to ALE that my methods will pick up that transfer, from a reserving standpoint, and move the proper amount of reserves into ALE from ULE. It becomes a lot trickier because there are two completely different procedures so the effect of a changing definition of ALE or ULE is quite unpredictable.

So what should you do? Defining what is the ALE definition within your company is probably the key. They vary significantly. As we try to define ALE more succinctly there will be many opportunities for costs to be shifted between ALE and ULE. I think regulations generally define loss adjustment expense fairly closely, but really not the break between ALE and ULE. That is really a key, and as you saw with the graph I showed with Workers' Compensation and in many of the other lines of business, ALE is becoming such a substantial part of the total cost of doing business that it getting a lot more attention from both a pricing and a reserving standpoint. Therefore, there will probably be a push, at least for some of the statistical and rating organizations along with regulatory bodies to really get a succinct definition of ALE which would cause, in most instances, some shifting of cost.

So one must find out your definition of ALE. How, in this instance here, does it compare with the NCCI definition? If there are differences, are there going to be changes associated with that over time. Are you going to change the definition for internal reporting? Is it going to flow into the reserving database? And so forth. Another important point is to measure the dollars involved. There may be some instances where 25 to 30% of your total LAE costs may be shifting between ALE and ULE.

The final point is to remember that shifting costs between ULE and ALE in and of itself should not change your overall reserving balance, and that's probably the key. It should be a zero sum game. If you are adequately reserved in loss adjustment expenses, shifting of costs because of a change in definition would not change that.

For the second part of my presentation, I want to discuss ALE differences by region. The information I will show you is actual Fireman's Fund data. I have not specifically identified what state I'm dealing with here. I've just identified it as State A. But State A will remain constant throughout my presentation. I will show there exists a consistency across a number of lines of business.

(Slide 6)

To explain the graph a little bit here...the 1.0 represents the nationwide paid-to-paid ratio. This is ALE paid to paid loss ratios, which is the basis that most people use to determine or develop their loss adjustment expense reserves.

What you see here in workers' comp indemnity and, if you recall, I said earlier that indemnity is where most all the allocated loss adjustment expense is for workers' compensation, and it is a substantial figure.

State A here has consistently over time exhibited figures that are substantially higher than the nationwide overall. So this shows for 1985 and 1986 that State A had a 40% higher figure than the nationwide average. Now if you look at this point, the remainder of the nation had a figure that was about .8. The relationship between State A and the remainder of the nation is almost two to one. As you can see from this graph, there is not a real consistency as to when the differences actually emerged. Obviously, when we are working with 1990, we are working with a relatively small amount of data because for the 1990 accident year the amount of paid ALE is very small even in workers' compensation.

(Slide 7)

A line that is even more dramatic is general liability. Here you have instances where State A's ALE costs are three times as large as the remainder of the nation. This again, is on a paid ALE basis relative to paid loss, the basis that most allocated loss adjustment expense reserves are set.

Of course, the implications of this are pretty straightforward. If you have a book of business that is moving in or out of State A there can be a dramatic impact on your reserve need. What is also very important is the fact that allocated loss adjustment expense emerges so slowly, for some lines only 5 or 10% of the ALE is emerged at the end of the accident year. Even if you have what seems to be a relatively minor shift of a book of business over time by year (i.e., small percentage movements by year), it can add up. If you use a 10 to 15 year history to do your reserving, there could be a substantial impact on the reserve need. Another problem is, these relationships between states may not be consistent over time, meaning State A being two to three times as high as the remainder of the country may not have been that level over time. The punch line here is allocated loss adjustment expenses are becoming a much larger piece of the total cost of doing business but it is not consistent everywhere. You can't look at it as one large piece because there are some slices of allocated loss adjustment expense that exhibit substantially different patterns and substantially different costs associated with it, which lead to different reserve needs.

(Slide 8)

One final slide. It is the homeowners line. This, again, is the same state. Even a line like homeowners, one that you think is very stable; not much there. Again, you produce ALE levels that are in the neighborhood of two to three times as high. And, of course, most of these ALE costs are associated with section II, the liability portion of the homeowners policy. So even this stable, predictable line of business, when it comes to ALE, there is a lot of unpredictability associated with that. Gary?

MR. NICKERSON: Thank you, Greg. One of the unifying principles of loss reserving is the search for patterns. Patterns that can be expected to continue into the future. Something that makes this complicated is that the patterns change, so we look for a pattern in the change of these patterns. This has a big impact on the techniques that are selected to project a reserve.

Our next speaker, Ron Swanstrom, is a FCAS and a Senior Consultant with Coopers & Lybrand. He comes to us from a perspective of the consultant who does work for many clients. His clients are typically insurance companies or other insurance organizations and so he will be speaking from a very broad perspective on trying to evaluate these reserves and looking at a lot of different patterns.

Gregory M. Wacker - Slide Presentation

CASUALTY LOSS RESERVE SEMINAR

LOSS ADJUSTMENT EXPENSE RESERVES

Workers Compensation ALE Reserves and Regional Differences in ALE Costs

I. Workers Compensation Allocated Loss Expense

ALE becoming more of a factor in this No-Fault line of Business

What is Workers Compensation ALE?

- NCCI Definition
- Grey Areas

Expense Transfers / Reallocations

- Independent Adjusters vs. Claims Staffs
- Hearing Representative vs. Lawyers
- Independent Medical Exams: ALE or Loss?
- Other Areas

Why Changes in Definitions / Expense Allocations Are Important.

- Implications on Reserving

(Slide 1)

II. Regional Differences In Allocated Loss Expense

Workers Compensation

Differences in state laws have a significant impact on ALE costs.

Other Lines of Business

General Liability

There can be dramatic differences in ALE costs by state

Where fundamental differences exist, distributional shifts in one's book of business can influence the reserve need.

Homeowners

Surprisingly, even this line has significant regional differences in ALE costs, primarily those costs associated with the settlement of Section II losses.

(Slide 2)

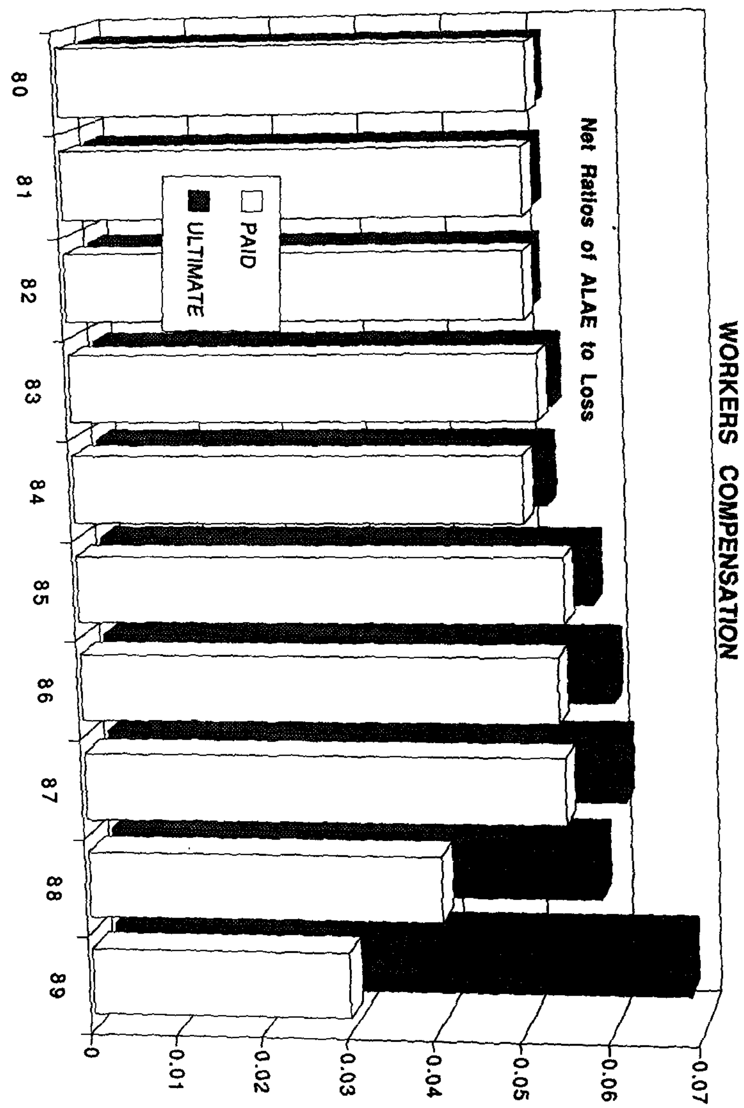
WORKERS COMPENSATION ALLOCATED LOSS EXPENSE

NCCI DEFINITION

- ⇨ Attorney's Fees Whether Outside or Staff Counsel
- ⇨ Court, ADR, Compensability Determination Related
  - * Medical exams of claimants to determine compensability
  - * Expert testimony
  - * Arbitration fees
- ⇨ Medical Cost Containment Expenses
  - * Bill auditing expenses
  - * PPO expenses (fees for the right to use a PPO)
  - * Hospital utilization reviews
- ⇨ Vocational Rehab Evaluation Expense

Independent Adjusters' Fees Are Specifically Excluded

(Slide 4)



SOURCE: 1990 BEST'S AGGREGATES & AVERAGES

(Slide 3)

IMPLICATIONS ON RESERVING

ALLOCATED VS UNALLOCATED LOSS EXPENSE

⇨ Cost Shifting Between ULE and ALE

- ✱ The new definition generally expands ALE
- ✱ Ability to Accurately allocate some of the costs is questionable
- ✱ Most Companies consider independent Adjusters ALE

⇨ Reserving Based on Historical Patterns

- ✱ ALE reserves generally estimated by comparing paid ALE to paid loss by accident year
- ✱ ULE reserving more of a formula approach based on Calendar year results
- ✱ Historical patterns no longer predictive of future results

⇨ What To Do?

- ✱ Determine ALE definition for your company
- ✱ Compare with NCCI definition
- ✱ Where differences exist:

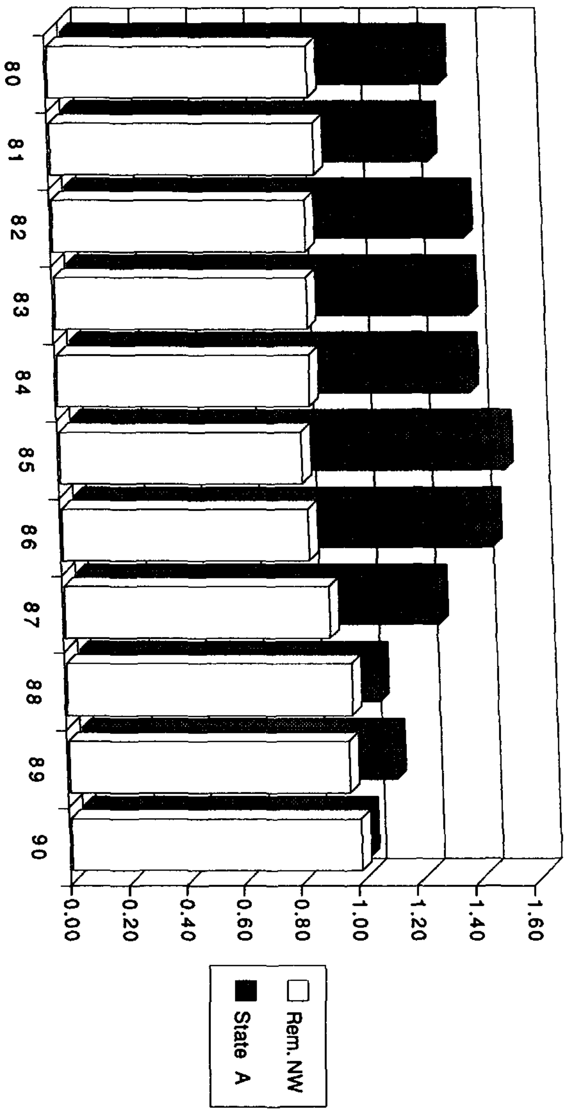
  Will there be a change for internal reporting?

  Measure the Dollars involved

  Remember shifting of costs should have no net effect on reserves

(Slide 5)

WORKERS COMPENSATION - INDEMNITY
PAID ALE TO PAID LOSS EVALUATED
@1Q91

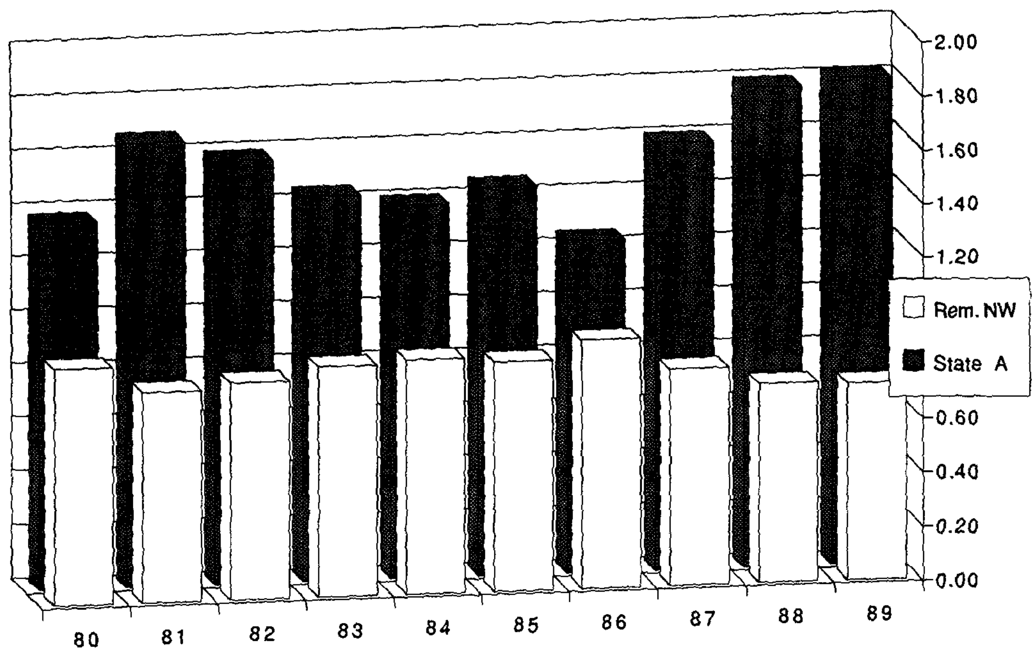


Note: 1.0 Represents the Nationwide Paid to Paid Ratio

(Slide 6)

GENERAL LIABILITY BODILY INJURY

PAID ALE TO PAID LOSS EVALUATED @ 1Q91

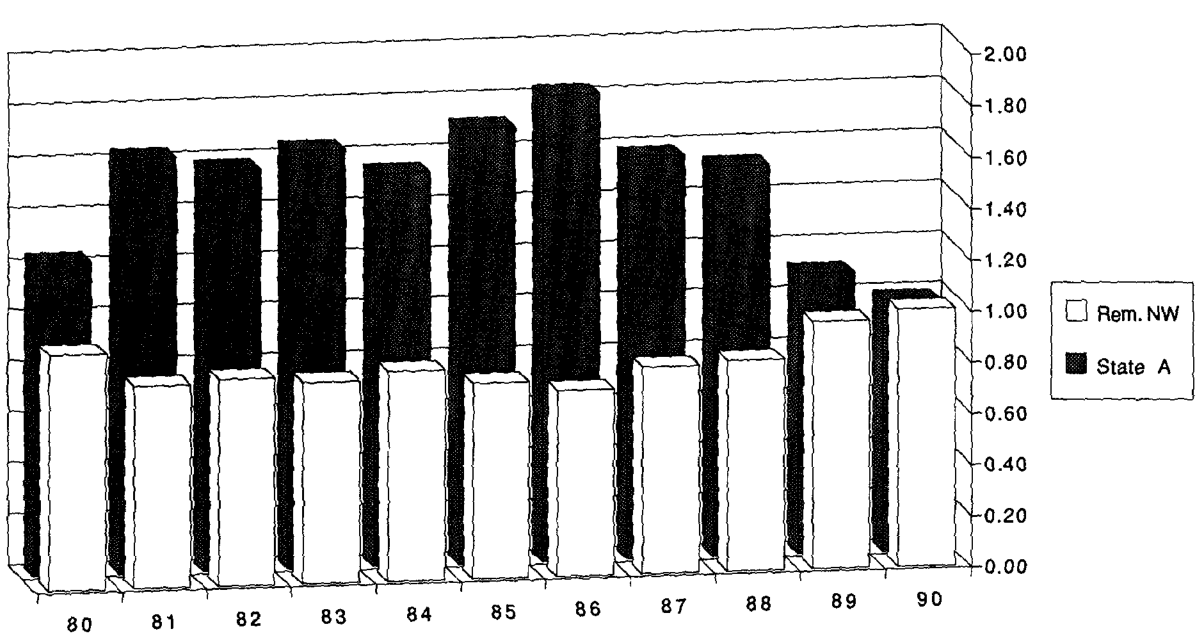


Note: 1.0 Represents the Nationwide Paid to Paid Ratio

(Slide 7)

HOMEOWNERS

PAID ALE TO PAID LOSS EVALUATED @1Q91



Note: 1.0 Represents the Nationwide Paid to Paid Ratio

(Slide 8)

1991 Casualty Loss Reserve Seminar

Session 2B: Loss Adjustment Expense Reserves

Alternatives to Development Approach

Presented by:
Ronald J. Swanstrom, FCAS, MAAA
Senior Consultant
Coopers & Lybrand
Chicago, Illinois

Introduction

Loss adjustment expense (LAE) reserves have grown significantly in recent years in absolute dollar amounts, as a percentage of loss reserves and as a percentage of the insurance industry's total liabilities. Allocated loss adjustment expense (ALAE) reserves have also grown, especially for long-tail lines of business. Many companies have taken actions in an attempt to slow this growth. This paper will discuss how these actions can cause the standard paid ALAE development approach to underestimate the required ALAE reserve. The paper will offer an alternative method, incremental paid ALAE to paid loss, which is more adept at dealing with the changes.

Industry Trends in LAE Costs

The consolidated industry totals from the 1990 edition of *Best's Aggregates & Averages* show that LAE reserves have increased to $41.6 billion at the end of 1989 from $30.7 billion at the end of 1987. LAE reserve as a percentage of total liabilities has increased from 9.5% at the end of 1987 to 10.6% at the end of 1989. LAE reserve as a percentage of loss reserve has increased from 16.5% to 18.3% over the same time period. The following table summarizes this information:

	12/31/87	12/31/88	12/31/89
LAE Reserve (billions)	$30.7	$36.3	$41.6
LAE Reserve/Total Liabilities	9.5%	10.0%	10.6%
LAE Reserve/Loss Reserve	16.5%	17.4%	18.3%

The insurance industry's ALAE experience from the 1990 edition of *Best's Aggregates & Averages* shows increases similar to the increases for LAE overall. In general, for long-tail lines of business, the ratios of ALAE reserve to loss reserve for accident years 1980 through 1989 show an increasing trend. Ratios of ultimate ALAE to ultimate loss also show an increasing trend. While medical malpractice ratios show the most significant changes and most obvious increasing trend, private passenger automobile liability, commercial automobile liability, general liability and workers' compensation all show some increase in the ratios of ultimate ALAE to ultimate loss.

The insurance industry has taken many actions in response to these trends. The example in this paper uses the experience of a company which implemented two significant changes early in 1989. The company significantly decreased its use of outside claim adjusters. In addition, the company increased its use of inside legal counsel. Both of these actions will affect both the amount and timing of the company's ALAE payments.

The remainder of this paper applies the paid ALAE development and incremental paid ALAE to paid loss methods to the company's automobile liability data. The results show how the changes affect each of the methods. Portions of this analysis relate ALAE to loss. The paper does not describe the procedure used to estimate ultimate losses. It assumes that these estimates are reasonable.

Paid ALAE Development Method

Exhibits 1 through 3 show the paid ALAE development projection. Exhibit 2 shows the actual and selected paid ALAE link ratios. It also accumulates the link ratios to find cumulative paid ALAE development factors. Exhibit 3 multiplies the development factors by the current paid ALAE. The result is the projection of ultimate ALAE.

Exhibit 3 also shows the resulting ratios of ultimate ALAE to ultimate loss. The last two years, 1989 and 1990, are the lowest during the period 1977 through 1990. It appears that the company's actions have dramatically reduced their ALAE costs as a percentage of ultimate loss. The incremental paid ALAE to paid loss method will show that this may not be the case.

Incremental Paid ALAE to Paid Loss Method

The second method used to estimate ultimate ALAE is the incremental paid ALAE to paid loss method. This method multiplies ratios of paid ALAE to paid loss by the expected loss payment at each point of development. The sum of these amounts is the resulting estimate of required ALAE reserve.

Exhibit 6 shows the ratios of paid ALAE to paid loss at each point of development. The percentages in the 12 month column equal the ratio of ALAE paid during the first 12 months of the accident year to loss paid during the first 12 months. The percentages in the 24 month column equal the ratio of ALAE paid to loss paid during the 12 month period from the end of the accident year to 12 months after the end of the accident year. The negative percentages result from the treatment of salvage and subrogation and reinsurance recoveries in the paid loss triangle. The paid loss during a 12 month period can be negative due to salvage and subrogation recoveries. Also, the company in one instance did not record a reinsurance recovery as paid when the claimant was paid resulting in negative paid loss in a subsequent development period.

The shading in Exhibit 6 highlights the portion of the triangle where the changes implemented by the company could have had an effect. The selected ratios give significant weight to these two diagonals.

Exhibits 7 through 9 develop the expected payout of the total loss reserve. The total loss reserve is the difference between the ultimate loss shown in Exhibit 3 and the current value of paid loss. Exhibit 8 uses the paid loss link ratios to find the payment pattern at the bottom of the exhibit. The payment pattern is based only on the paid loss experience. Exhibit 9 shows the resulting expected payout of the total loss reserve. To clarify this exhibit, the numbers in the 48 month column are the estimates of the loss to be paid for each accident year from 36 to 48 months of development.

Exhibit 10 shows the expected ALAE payments. Each entry in this exhibit is the product of the selected ALAE to loss ratio from Exhibit 6 and the expected loss payment from Exhibit 9. It is important to note that the ALAE to loss ratio for the first 12 months of an accident year has no effect on the calculation for any accident year since all accident years are at least 12 months old.

The calculation of ultimate ALAE corresponding to the incremental paid ALAE to paid loss method is in Exhibit 11. The sum of the current paid ALAE and the expected future ALAE payments from Exhibit 10 is the estimate of ultimate ALAE. The resulting ratios of ultimate ALAE to loss for 1989 and 1990 are slightly lower than the ratios for earlier years indicating that the company's actions have had some favorable impact. However, the effectiveness of these actions is much less than indicated by the paid ALAE development method. We need to understand why these two methods give such different results for 1989 and 1990.

Comparison of the Methods

The following table compares the estimates resulting from the two different methods for accident years 1982 through 1990. All dollar amounts are in thousands.

	ULTIMATE ALAE		ULTIMATE ALAE TO LOSS	
Accident Year	Development	Paid to Paid	Development	Paid to Paid
1982	$543	$543	8.61%	8.61%
1983	698	696	7.50%	7.48%
1984	1,255	1,245	9.76%	9.68%
1985	2,248	2,271	11.28%	11.39%
1986	2,696	2,738	9.41%	9.56%
1987	3,698	3,912	9.4%	9.95%
1988	3,925	3,714	9.55%	9.03%
1989	2,574	3,140	7.05%	8.61%
1990	2,447	3,408	6.75%	9.40%
Total	$20,084	$21,667	8.72%	9.41%

The estimates from the two methods are relatively close for accident years 1982 through 1988. They differ significantly for accident years 1989 and 1990, the two years most affected by the company's responses to increasing LAE. To determine which method better accounts for these changes, we need to understand how the changes affect the timing and amount of the company's ALAE payments.

The two changes implemented by the company are a decrease in the use of outside claim adjusters and an increase in the use of inside legal counsel. Both actions should reduce the amount of ALAE paid by the company. However, the significance of the reductions will vary considerably by development period. Claims that settle quickly behave that way because they are relatively easy to settle. Claims that take longer to settle may require considerable legal and adjusting activity. Despite the effort to use inside adjusters and legal counsel, these claims will require outside experts at a significantly higher cost. The implication is that the company's efforts to reduce ALAE expense will have the largest effect during the first 12 months of an accident year reducing ALAE payments during this period significantly. The effect on later periods of development may not be significant.

If these observations hold, the paid ALAE development approach will understate required ALAE reserve unless the selected link ratios account for the above changes. The changes in the use of outside adjusters and legal counsel should result in larger future link ratios, mainly for early periods of development. The denominator of the 12 to 24 month link ratio, the amount of ALAE paid during the accident year, will be smaller than under the previous utilization of outside claims adjusters and legal counsel. Because of the effect mentioned above, the reduction in the numerator of the link ratio, the amount of ALAE paid from 12 to 24 months after the end of the accident year, will not be as significant. Therefore, if the selected link ratios do not recognize the effect of the company's actions, the paid ALAE development projection will be low for recent years.

If the above scenario is correct, the reduction in ratios of incremental paid ALAE to paid loss should be most significant in the first 12 months of development. Exhibit 6 shows that this is indeed the case. The ratios affected by the changes at 12 months of development are those for accident years 1989 and 1990 only. For this company, these ratios are both 3.5%, lower than for any other accident year. At 24 months of development, the ratios affected are those for accident years 1988 and 1989 only. While these ratios are lower than most earlier years, the reduction is not as significant as during the first 12 months. At development points beyond 24 months, it appears that the ratios on the last two diagonals are not different from earlier diagonals. The selected ratios recognize these effects. The incremental paid ALAE to paid loss approach should provide a more accurate estimate of the required ALAE reserve under these changing conditions.

Conclusion

The growth in insurance company LAE costs has caused many companies to take action in an attempt to slow this growth. Using the experience of a company which has taken action to reduce its ALAE costs, this paper has shown that the paid ALAE development projection may understate the required ALAE reserve. As the triangle of paid ALAE to paid loss ratios shows, the effect of the company's response to increasing ALAE varies by development period. The incremental paid ALAE to paid loss method used to estimate ultimate ALAE is better suited to properly adjust for these changes and should provide a more accurate projection of the required ALAE reserve.

Automobile Liability
As of 12/31/90

Exhibit 1

Cumulative Paid ALAE ($000's)

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	131	271	372	456	478	479	479	490	491	491	491	491	491	491
1978	130	300	393	479	501	524	524	524	524	524	524	524	524	
1979	146	340	464	567	622	625	631	631	640	640	640	640		
1980	145	282	343	372	392	392	392	392	392	392	392			
1981	159	340	428	511	569	571	573	573	573	573				
1982	182	320	391	459	487	513	520	543	543					
1983	156	370	526	643	661	696	696	696						
1984	303	638	904	1,031	1,216	1,241	1,245							
1985	463	980	1,551	1,861	2,101	2,208								
1986	653	1,274	1,828	2,218	2,546									
1987	712	1,705	2,409	3,037										
1988	717	1,780	2,642											
1989	531	1,195												
1990	494													

Automobile Liability
As of 12/31/90

Exhibit 2

Paid ALAE Development

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	2.069	1.373	1.226	1.048	1.002	1.000	1.023	1.002	1.000	1.000	1.000	1.000	1.000	
1978	2.308	1.310	1.219	1.046	1.046	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
1979	2.329	1.365	1.222	1.097	1.005	1.010	1.000	1.014	1.000	1.000	1.000			
1980	1.945	1.216	1.085	1.054	1.000	1.000	1.000	1.000	1.000	1.000				
1981	2.138	1.259	1.194	1.114	1.004	1.004	1.000	1.000	1.000					
1982	1.758	1.222	1.174	1.061	1.053	1.014	1.044	1.000						
1983	2.372	1.422	1.222	1.028	1.053	1.000	1.000							
1984	2.106	1.417	1.140	1.179	1.021	1.003								
1985	2.117	1.583	1.200	1.129	1.051									
1986	1.951	1.435	1.213	1.148										
1987	2.395	1.413	1.261											
1988	2.483	1.484												
1989	2.250													
1990														
Average	2.171	1.375	1.196	1.090	1.026	1.004	1.010	1.003	1.000	1.000	1.000	1.000	1.000	
Hi/Low	2.180	1.370	1.201	1.087	1.026	1.003	1.005	1.001	1.000	1.000	1.000			
Wghtd.	2.212	1.425	1.211	1.114	1.032	1.004	1.009	1.003	1.000	1.000	1.000	1.000	1.000	
3 Year	2.376	1.444	1.225	1.152	1.041	1.006	1.015	1.000	1.000	1.000	1.000			
Selected	2.300	1.450	1.220	1.150	1.040	1.010	1.005	1.003	1.000	1.000	1.000	1.000	1.000	1.000
Cum.	4.954	2.154	1.486	1.218	1.059	1.018	1.008	1.003	1.000	1.000	1.000	1.000	1.000	1.000

Automobile Liability
As of 12/31/90

Exhibit 3

Paid ALAE Development Method

Accident Year	Paid ALAE ($000's)	Paid ALAE Development Factor	Ultimate ALAE ($000's)	Ultimate Loss ($000's)	ALAE/Loss
1977	$491	1.000	$491	$5,593	8.78%
1978	524	1.000	524	6,118	8.57%
1979	640	1.000	640	5,916	10.82%
1980	392	1.000	392	5,040	7.78%
1981	573	1.000	573	5,013	11.43%
1982	543	1.000	543	6,304	8.61%
1983	696	1.003	698	9,303	7.50%
1984	1,245	1.008	1,255	12,861	9.76%
1985	2,208	1.018	2,248	19,936	11.28%
1986	2,546	1.059	2,696	28,655	9.41%
1987	3,037	1.218	3,698	39,325	9.40%
1988	2,642	1.486	3,925	41,113	9.55%
1989	1,195	2.154	2,574	36,487	7.05%
1990	494	4.954	2,447	36,234	6.75%
Total	$17,226		$22,704	$257,898	8.80%

Automobile Liability
As of 12/31/90

Exhibit 4

Incremental Paid ALAE ($000's)

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	131	140	101	84	22	1	0	11	1	0	0	0	0	0
1978	130	170	93	86	22	23	0	0	0	0	0	0	0	
1979	146	194	124	103	55	3	6	0	9	0	0	0		
1980	145	137	61	29	20	0	0	0	0	0	0			
1981	159	181	88	83	58	2	2	0	0	0				
1982	182	138	71	68	28	26	7	23	0					
1983	156	214	156	117	18	35	0	0						
1984	303	335	266	127	185	25	4							
1985	463	517	571	310	240	107								
1986	653	621	554	390	328									
1987	712	993	704	628										
1988	717	1,063	862											
1989	531	664												
1990	494													

Automobile Liability
As of 12/31/90

Exhibit 5

Incremental Paid Loss ($000's)

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	2,698	1,842	672	299	110	8	0	(35)	0	0	0	0	0	0
1978	3,267	1,609	641	478	37	90	(5)	(0)	0	0	0	0	0	
1979	3,110	1,680	544	412	82	39	0	50	0	0	0	0		
1980	2,927	1,222	658	227	23	0	(18)	0	0	0	0			
1981	2,973	1,125	683	183	228	(180)	0	0	0	0				
1982	3,682	1,531	711	(9)	154	121	(3)	117	0					
1983	4,334	2,336	1,612	801	156	40	7	17						
1984	5,901	2,831	2,084	1,314	515	124	91							
1985	7,681	6,216	2,984	1,295	832	676								
1986	12,051	6,794	4,307	2,490	2,229									
1987	15,580	9,404	6,829	3,724										
1988	16,606	12,180	7,086											
1989	15,389	9,338												
1990	13,972													

Automobile Liability
As of 12/31/90

Exhibit 6

Incremental Paid ALAE to Paid Loss

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	4.9%	7.6%	15.0%	28.1%	20.0%	12.1%		-31.0%						
1978	4.0%	10.6%	14.5%	18.0%	58.8%	25.4%	0.0%	0.0%						
1979	4.7%	11.5%	22.8%	25.0%	67.0%	7.8%		0.0%						
1980	5.0%	11.2%	9.3%	12.8%	86.8%		0.0%							
1981	5.3%	16.1%	12.9%	45.3%	25.4%	-1.1%								
1982	4.9%	9.0%	10.0%	-796.6%	18.1%	21.4%	-217.2%	19.7%						
1983	3.6%	9.2%	9.7%	14.6%	11.6%	87.2%	0.0%	0.0%						
1984	5.1%	11.8%	12.8%	9.7%	35.9%	20.1%	4.4%							
1985	6.0%	8.3%	19.1%	23.9%	28.8%	15.8%								
1986	5.4%	9.1%	12.9%	15.7%	14.7%									
1987	4.6%	10.6%	10.3%	16.9%										
1988	4.3%	8.7%	12.2%											
1989	3.5%	7.1%												
1990	3.5%													
Average	4.6%	10.1%	13.4%	-53.3%	36.7%	23.6%	-42.6%	-2.3%						
Hi/Low	4.6%	9.8%	12.9%	18.3%	33.6%	17.1%	0.0%	0.0%						
Wghtd.	4.5%	9.2%	12.7%	18.1%	22.4%	24.2%	26.3%	23.0%						
Selected	3.5%	8.8%	12.7%	18.1%	22.4%	24.2%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%

Automobile Liability
As of 12/31/90

Exhibit 7

Cumulative Paid Loss ($000's)

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	2,698	4,540	5,212	5,510	5,620	5,629	5,629	5,593	5,593	5,593	5,593	5,593	5,593	5,593
1978	3,267	4,876	5,517	5,995	6,033	6,123	6,118	6,118	6,118	6,118	6,118	6,118	6,118	
1979	3,110	4,790	5,334	5,746	5,828	5,867	5,867	5,916	5,916	5,916	5,916	5,916		
1980	2,927	4,150	4,808	5,035	5,058	5,058	5,040	5,040	5,040	5,040	5,040			
1981	2,973	4,098	4,781	4,965	5,193	5,013	5,013	5,013	5,013	5,013				
1982	3,682	5,213	5,924	5,915	6,069	6,191	6,187	6,304	6,304					
1983	4,334	6,670	8,282	9,083	9,239	9,279	9,286	9,303						
1984	5,901	8,732	10,816	12,130	12,646	12,770	12,861							
1985	7,681	13,896	16,880	18,175	19,007	19,682								
1986	12,051	18,845	23,152	25,642	27,870									
1987	15,580	24,984	31,814	35,537										
1988	16,606	28,786	35,872											
1989	15,389	24,727												
1990	13,972													

Automobile Liability
As of 12/31/90

Exhibit 8

Paid Loss Development

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977	1.683	1.148	1.057	1.020	1.001	1.000	0.994	1.000	1.000	1.000	1.000	1.000	1.000	
1978	1.492	1.131	1.087	1.006	1.015	0.999	1.000	1.000	1.000	1.000	1.000	1.000		
1979	1.540	1.114	1.077	1.014	1.007	1.000	1.008	1.000	1.000	1.000	1.000			
1980	1.418	1.159	1.047	1.005	1.000	0.997	1.000	1.000	1.000	1.000				
1981	1.378	1.167	1.038	1.046	0.965	1.000	1.000	1.000	1.000					
1982	1.416	1.136	0.999	1.026	1.020	0.999	1.019	1.000						
1983	1.539	1.242	1.097	1.017	1.004	1.001	1.002							
1984	1.480	1.239	1.121	1.042	1.010	1.007								
1985	1.809	1.215	1.077	1.046	1.036									
1986	1.564	1.229	1.108	1.087										
1987	1.604	1.273	1.117											
1988	1.734	1.246												
1989	1.607													
1990														
Average	1.559	1.192	1.075	1.031	1.006	1.000	1.003	1.000	1.000	1.000	1.000	1.000	1.000	
Hi/Low	1.552	1.191	1.078	1.027	1.008	1.000	1.002	1.000	1.000	1.000	1.000			
Wghtd.	1.604	1.222	1.092	1.044	1.012	1.001	1.003	1.000	1.000	1.000	1.000	1.000	1.000	
3 Year	1.648	1.249	1.100	1.058	1.017	1.002	1.007	1.000	1.000	1.000	1.000			
Selected	1.620	1.240	1.100	1.055	1.015	1.005	1.005	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Cum.	2.390	1.475	1.190	1.082	1.025	1.010	1.005	1.000	1.000	1.000	1.000	1.000	1.000	1.000
% Paid	41.8%	67.8%	84.1%	92.5%	97.5%	99.0%	99.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Automobile Liability
As of 12/31/90

Exhibit 9

Expected Payout of Total Loss Reserve

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977														
1978														0
1979													0	0
1980												0	0	0
1981											0	0	0	0
1982										0	0	0	0	0
1983									0	0	0	0	0	0
1984								0	0	0	0	0	0	0
1985							126	127	0	0	0	0	0	0
1986						468	158	159	0	0	0	0	0	0
1987					2,554	735	249	250	0	0	0	0	0	0
1988				2,762	1,671	481	163	164	0	0	0	0	0	0
1989			5,939	3,068	1,856	534	181	182	0	0	0	0	0	0
1990		9,931	6,227	3,218	1,947	560	189	190	0	0	0	0	0	0

NOTE: Expected payout based on ultimate loss from Exhibit 3 and payment pattern from Exhibit 8.

Automobile Liability
As of 12/31/90

Exhibit 10

Expected ALAE Payments

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120	132	144	156	168
1977														
1978														0
1979													0	0
1980												0	0	0
1981											0	0	0	0
1982										0	0	0	0	0
1983									0	0	0	0	0	0
1984								0	0	0	0	0	0	0
1985							32	32	0	0	0	0	0	0
1986						113	40	40	0	0	0	0	0	0
1987					572	178	62	62	0	0	0	0	0	0
1988				500	374	116	41	41	0	0	0	0	0	0
1989			754	555	416	129	45	45	0	0	0	0	0	0
1990		874	791	582	436	136	47	48	0	0	0	0	0	0

NOTE: Expected ALAE payments equal selected ratio from Exhibit 6 times expected loss payment from Exhibit 9.

Automobile Liability
As of 12/31/90

Incremental Paid ALAE to Paid Loss Method

Accident Year	Paid ALAE ($000's)	Future ALAE Payments ($000's)	Ultimate ALAE ($000's)	Ultimate Loss ($000's)	ALAE/Loss
1977	$491	$0	$491	$5,593	8.78%
1978	524	0	524	6,118	8.57%
1979	640	0	640	5,916	10.82%
1980	392	0	392	5,040	7.78%
1981	573	0	573	5,013	11.43%
1982	543	0	543	6,304	8.61%
1983	696	0	696	9,303	7.48%
1984	1,245	0	1,245	12,861	9.68%
1985	2,208	63	2,271	19,936	11.39%
1986	2,546	192	2,738	28,655	9.56%
1987	3,037	875	3,912	39,325	9.95%
1988	2,642	1,072	3,714	41,113	9.03%
1989	1,195	1,945	3,140	36,487	8.61%
1990	494	2,914	3,408	36,234	9.40%
Total	$17,226	$7,062	$24,288	$257,898	9.42%

NOTE: Future ALAE payments from Exhibit 10.

1991 Casualty Loss Reserve Seminar

Session 2B: Loss Adjustment Expense Reserves

Alternatives to Development Approach

Presented by:

Ronald J. Swanstrom, FCAS, MAAA
Senior Consultant
Coopers & Lybrand
Chicago, Illinois

Growth in LAE Reserves

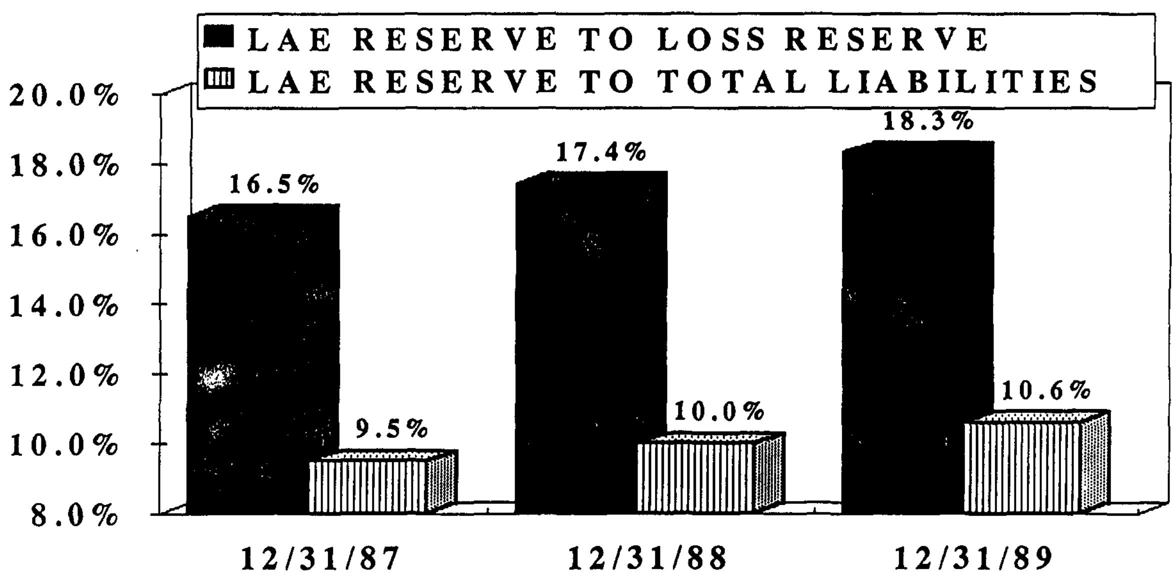
Consolidated Industry Totals ($000)

	12/31/89	12/31/88	12/31/87
Loss Reserves	$227,715,903	$207,781,302	$186,528,266
LAE Reserves	$41,578,333	$36,257,441	$30,736,765
Total Liabilities	$393,012,863	$361,513,877	$322,938,580

Source: 1990 Best's Aggregates & Averages

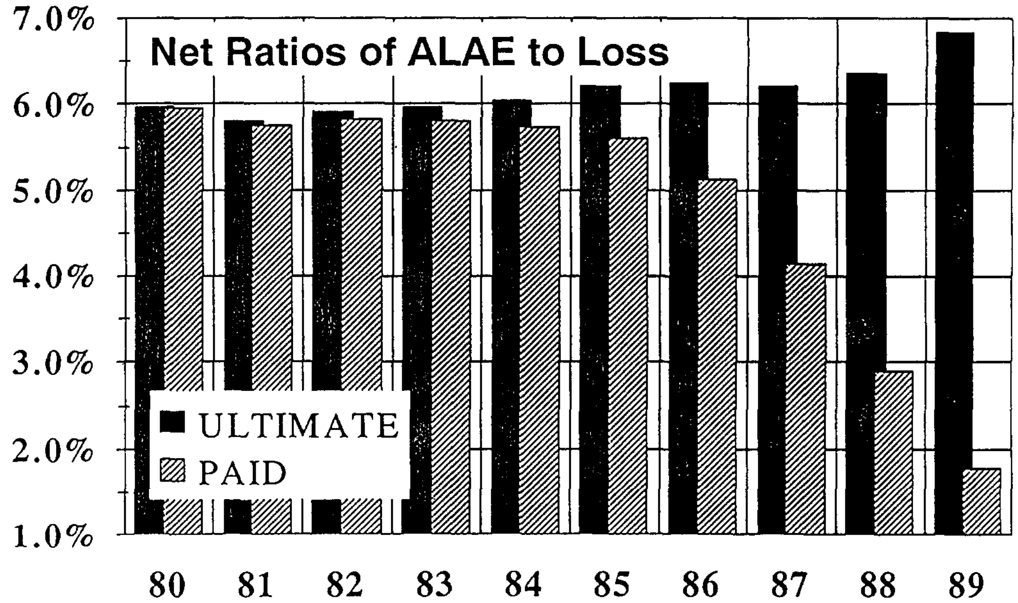
Growth in LAE Reserves

Consolidated Industry Totals ($000)



Source: 1990 Best's Aggregates & Averages

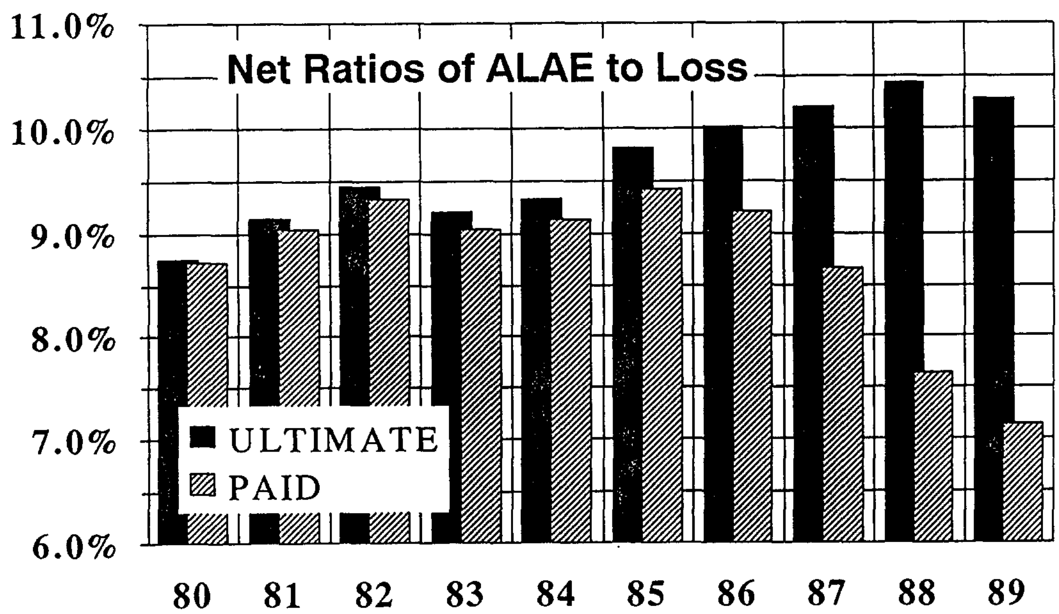
Private Passenger Auto Liability



Source: 1990 Best's Aggregates & Averages

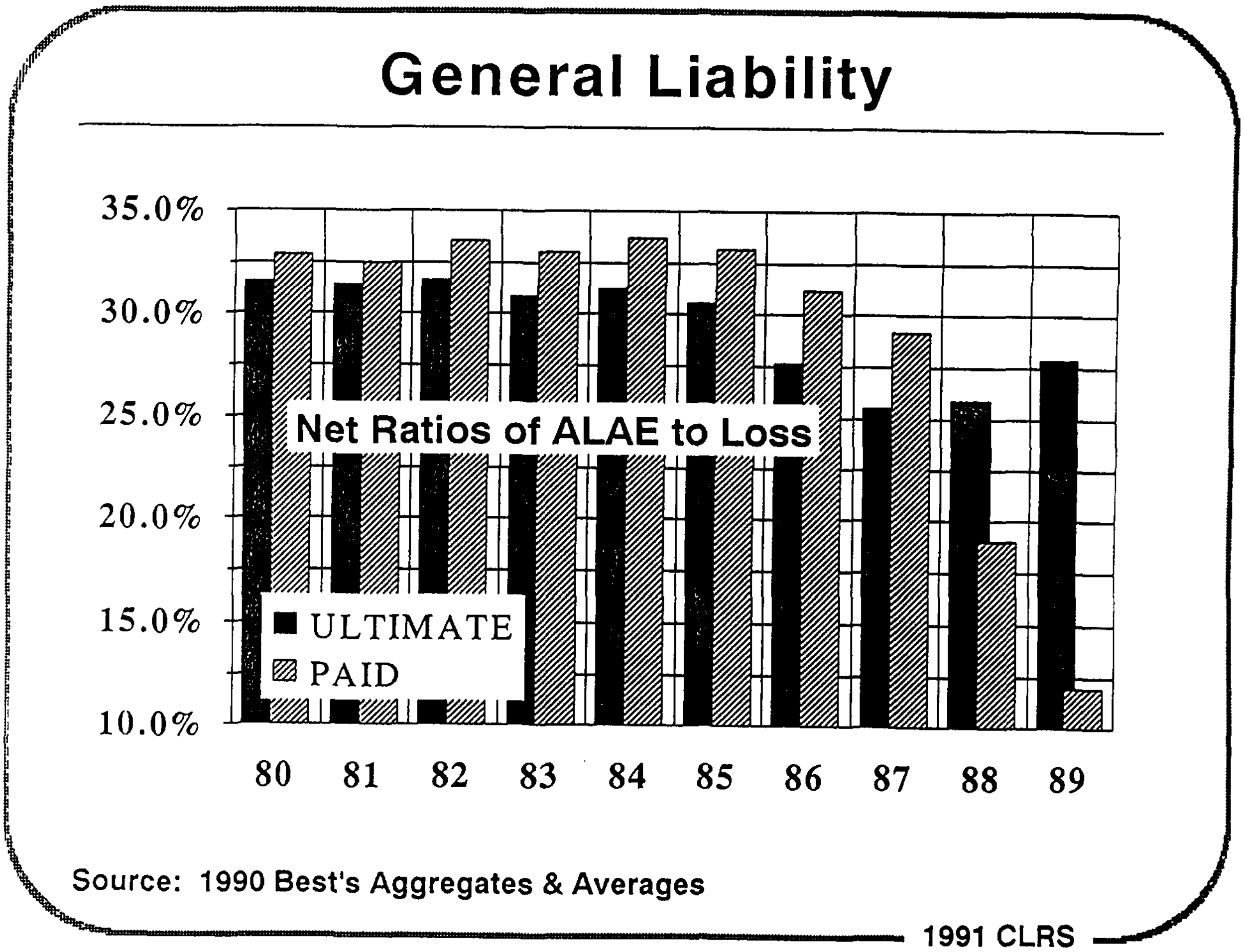
1991 CLRS

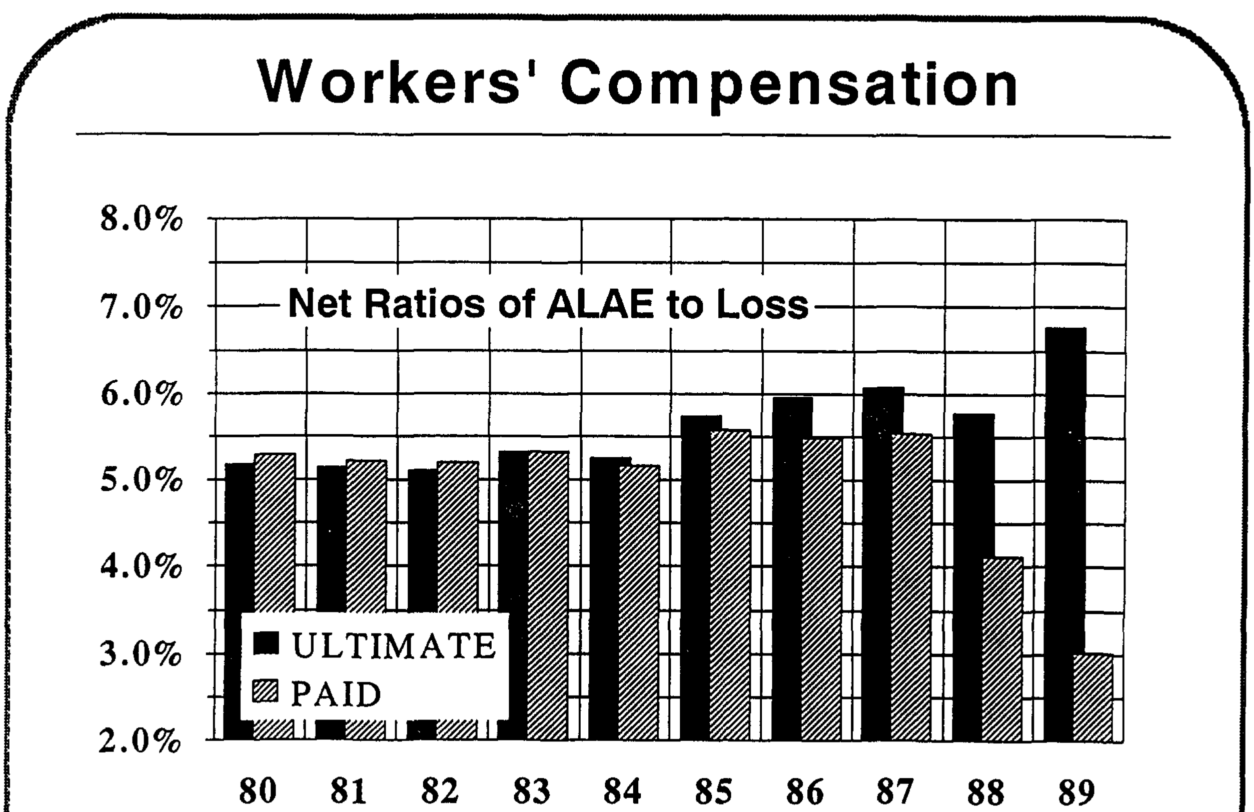
Commercial Auto Liability



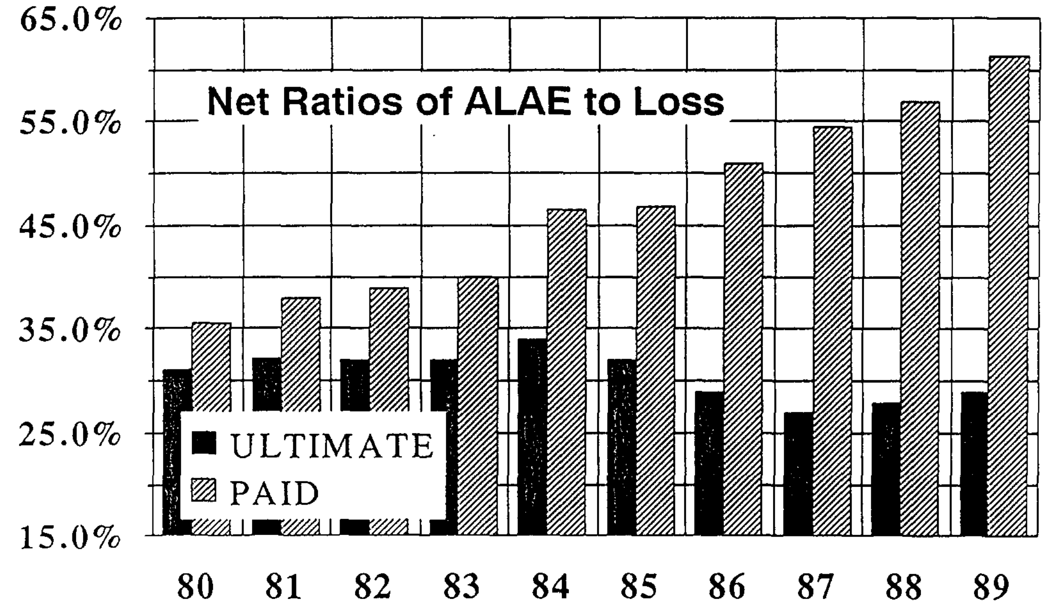
Source: 1990 Best's Aggregates & Averages

1991 CLRS


General Liability
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
Net Ratios of ALAE to Loss
ULTIMATE
PAID
80
81
82
83
84
85
86
87
88
89
Source: 1990 Best's Aggregates & Averages
1991 CLRS


Workers' Compensation
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
Net Ratios of ALAE to Loss
ULTIMATE
PAID
80
81
82
83
84
85
86
87
88
89
Source: 1990 Best's Aggregates & Averages
1991 CLRS

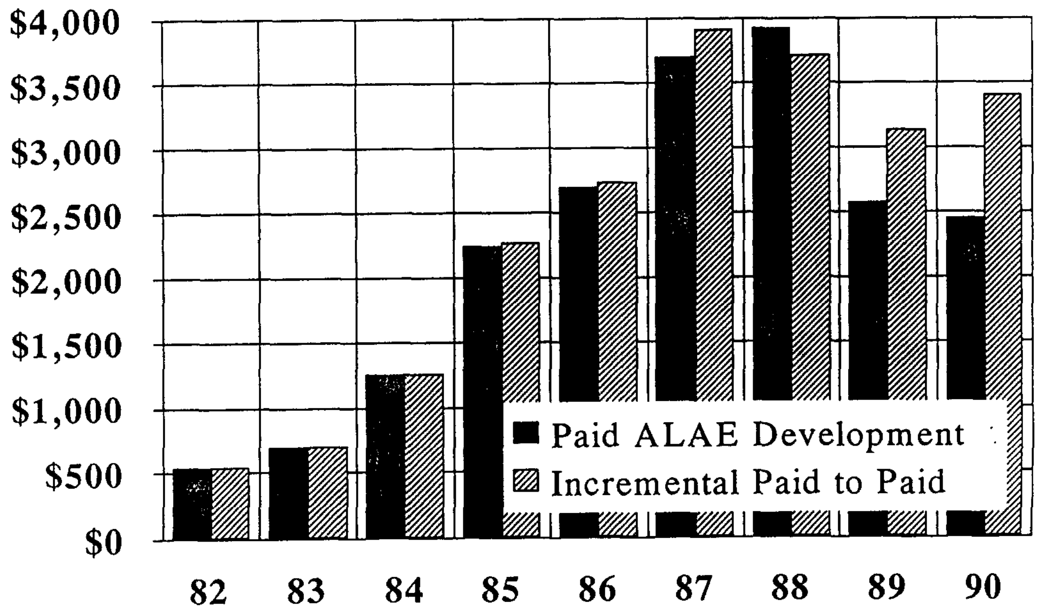
Medical Malpractice



Source: 1990 Best's Aggregates & Averages

Comparison of Methods

Ultimate ALAE



Comparison of Methods

Estimates of Ultimate ALAE

Accident Year	Paid ALAE Development	Incremental Paid ALAE to Paid Loss
1982	$543	$543
1983	698	696
1984	1,255	1,245
1985	2,248	2,271
1986	2,696	2,738
1987	3,698	3,912
1988	3,925	3,714
1989	2,574	3,140
1990	2,447	3,408
Total	$20,084	$21,667

Responses to Trends

- Decreasing the use of outside claim adjusters.
- Increasing the use of inside legal counsel.

Comparison of Methods

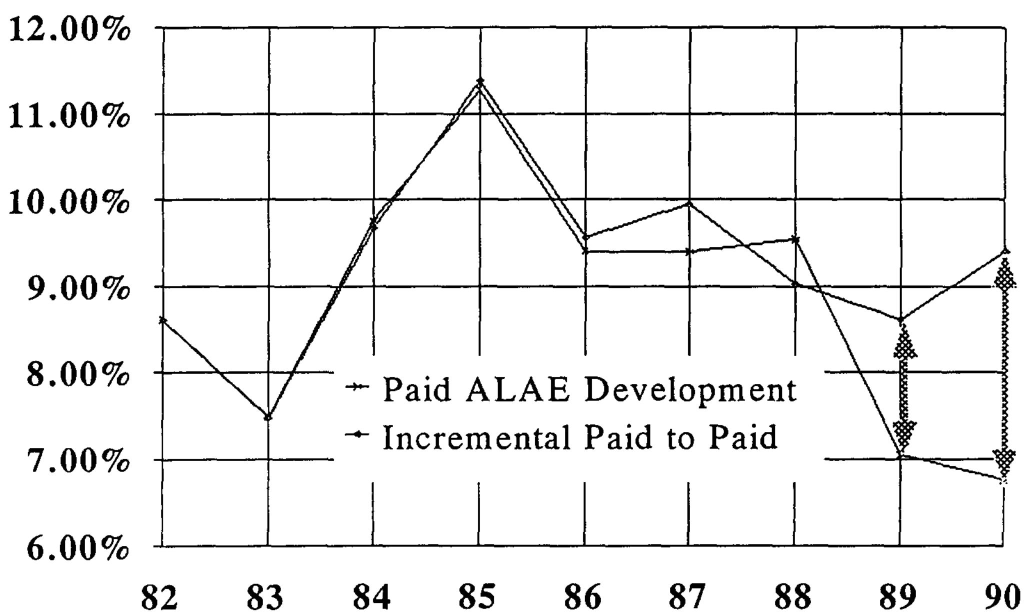
Ratios of ALAE to Loss

Accident Year	Paid ALAE Development	Incremental Paid ALAE to Paid Loss
1982	8.61%	8.61%
1983	7.50%	7.48%
1984	9.76%	9.68%
1985	11.28%	11.39%
1986	9.41%	9.56%
1987	9.40%	9.95%
1988	9.55%	9.03%
1989	7.05%	8.61%
1990	6.75%	9.40%
Total	8.72%	9.41%

1991 CLRS

Comparison of Methods

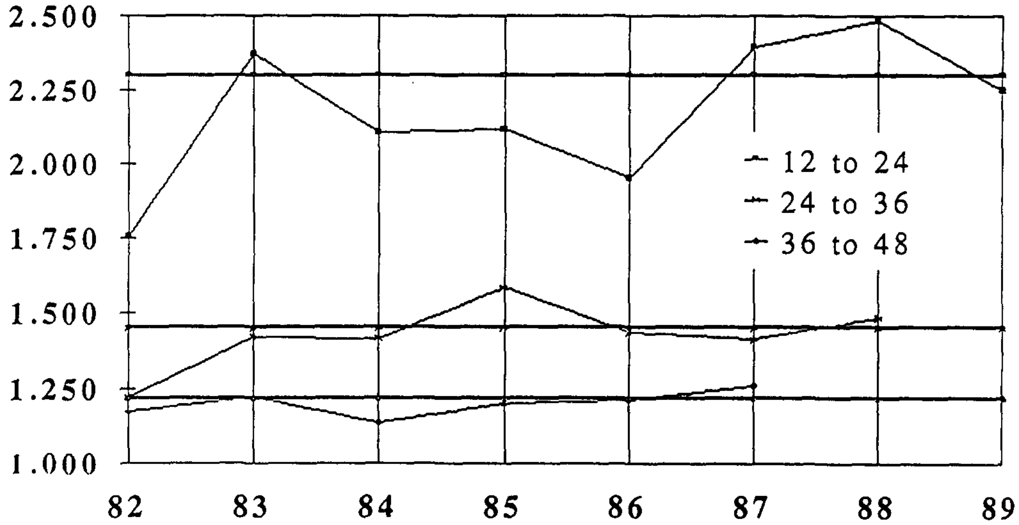
Ratios of Ultimate ALAE to Loss



1991 CLRS

Paid ALAE Link Ratios

Early Stages of Development

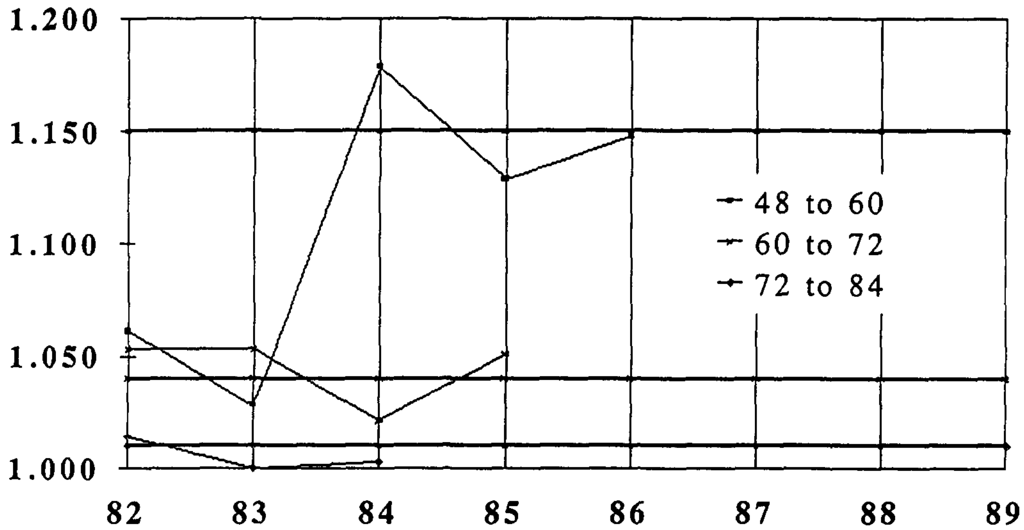


Note: straight lines represent selected factors.

1991 CLRS

Paid ALAE Link Ratios

Later Stages of Development

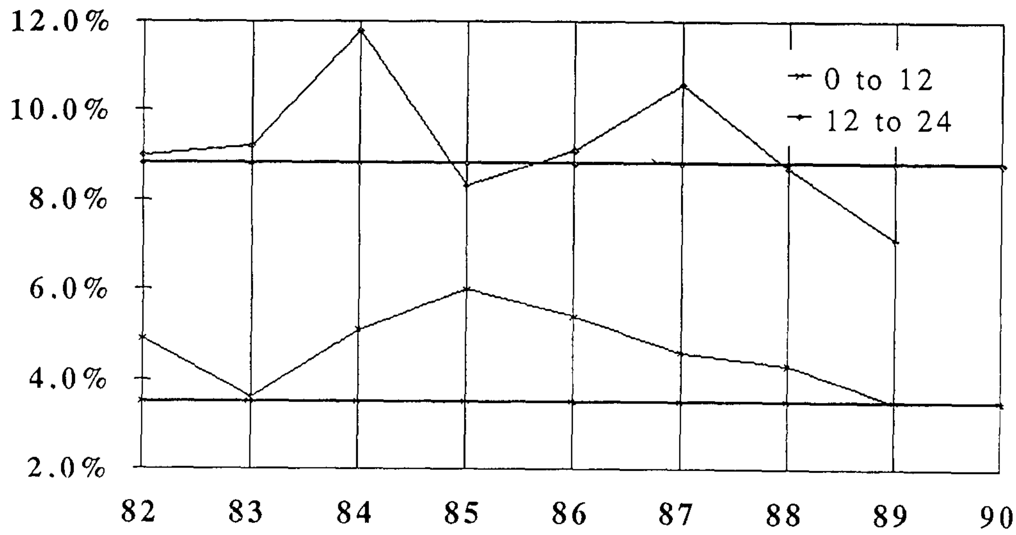


Note: straight lines represent selected factors.

1991 CLRS

Incremental Paid ALAE to Paid Loss

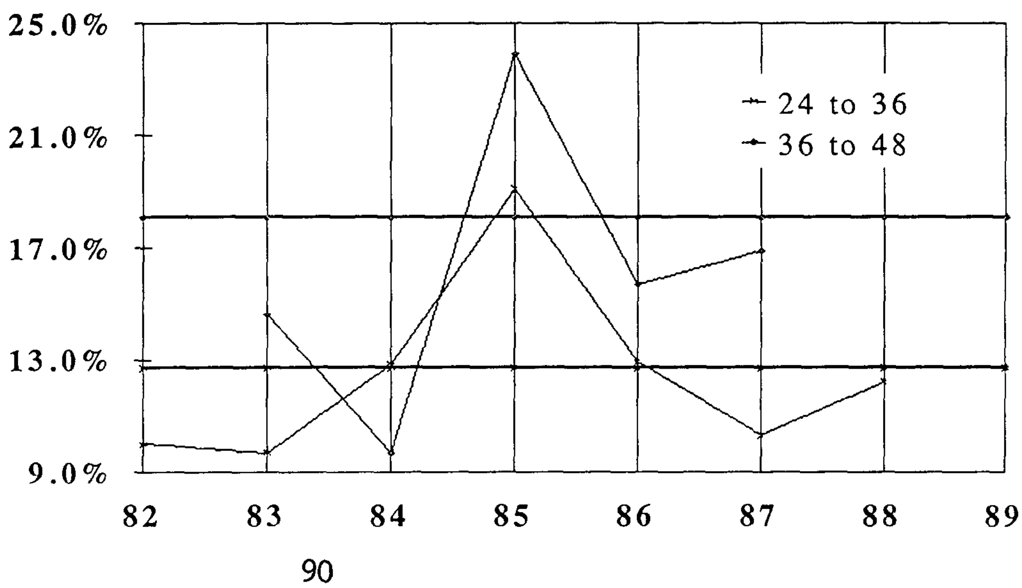
Earliest Stages of Development



Note: straight lines represent selected ratios.

Incremental Paid ALAE to Paid Loss

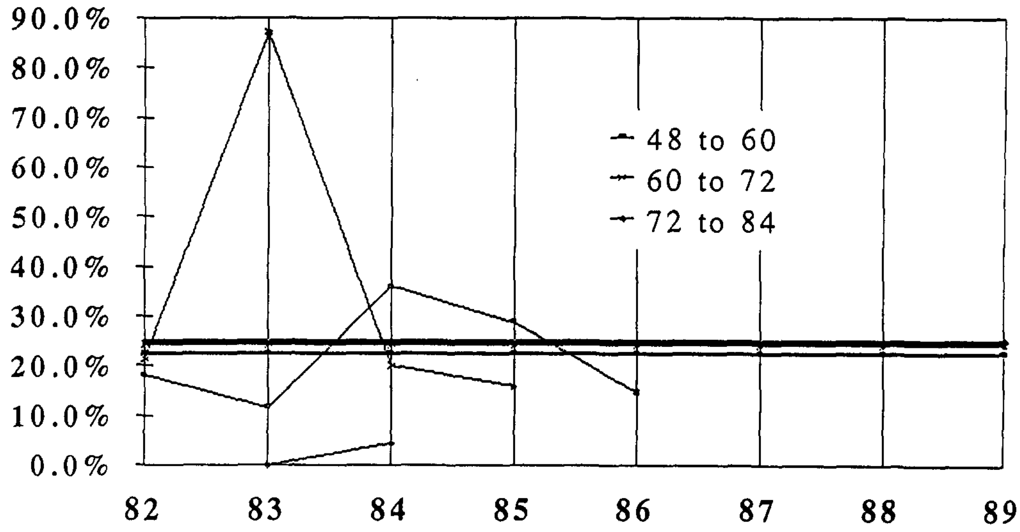
Early Stages of Development



Note: straight lines represent selected ratios.

Incremental Paid ALAE to Paid Loss

Later Stages of Development



Note: straight lines represent selected ratios.

Conclusions

Results of Insurance Company Response to ALAE Trends

- reduces ALAE paid in earliest stages of development
- does not significantly affect ALAE paid in later stages of development
- should result in larger future link ratios
- causes paid ALAE development method to understate required ALAE reserve

Conclusions

Use of Incremental Paid ALAE to Paid Loss Method

- does not depend on current value of paid ALAE
- recognizes reductions in ALAE paid in earliest stages of development
- recognizes lack of significant reductions in ALAE paid in later stages of development
- results in more accurate projection of ALAE reserve when changes affect different stages of development differently

1991 CLRS

MR. NICKERSON: Thank you, Ron. This was a good illustration, I think, of somethng that we see a lot in loss reserving. We saw two different methods used in a reserving situation. The two methods looked at a triangular array of data, which represents the development history. They are both attempts to look at a pattern in history, a pattern that can be expected to continue into the future. You very often have these two different types of techniques.

One is to look for that pattern along the rows. Look at the data horizontally along the rows, look for the pattern or change there, and project that into the future.

The second method is to look for a pattern that goes down the columns. You can project the future that way, and that gives us two different projections.

When they give you different results like they did in Ron's example, which is a real life example, which is more reasonable? Which do you prefer? I think the message is that we really do need to know the story behind the numbers and it is very helpful to understand these forces that are driving the numbers so that we have an appreciation for which pattern is most likely to continue into the future.

Well, now it's your turn. We've had our presentations and I asked you to be patient and hold off your questions until the end. Now we can take your questions and so if you have a question, if you will just come to the center aisle here and speak into one of the microphones we would appreciate it and then we can all hear.

QUESTION: My question is directed to Greg. Your statement at shifting amounts from allocated to unallocated should not change the total reserve, but this implies that allocated and unallocated have the same loss development pattern. Is that what you're implying?

MR. WACKER: I think there is obviously very different development patterns between ULE and ALE, but the fact is that the development patterns of the individual components that are shifting should not be changing. If you are shifting the category of independent adjusters from ALE to ULE or the other way, the amount of reserves you need for that component shouldn't change. What will happen, of course, is your patterns for the aggregate of ULE or the aggregate of ALE will be changing as you are moving the various components from one to the other. So the fact of just shifting one to the other shouldn't change the overall reserve.

QUESTION: Well, okay, if you say so, but I think allocated would have a much higher leverage.

MR. WACKER: Well, it will. If you want to use an example; if all of a sudden you shift a large amount of expenses that were categorized as ULE into allocated loss adjustment expense and these expenses that you've shifted into ALE are paid more quickly, then your ALE patterns will become shorter because you will have a lot of expenses that will show up very quickly in ALE. So it really should be a zero sum game just from the affect of shifting.

QUESTION: Jim Foote from Travelers. I have question for Greg also. The National Council's uniform definition of allocated is geared towards, as you point out, pricing. And you also pointed out that most companies probably don't set case reserves on allocated. Now that...along with adopting uniform definition they are going to require reporting on unit stat cards of allocated. How do you see that changing the state mix of allocated with current company practices for allocating their IBNR back to state probably somewhat fuzzy?

MR. WACKER: I think that somewhat fuzzy is being a little bit generous. I think it will have a dramatic impact. I think that was what some of the graphics that I showed on the second part of my presentation pointed out. With workers' compensation I had one state that was consistently running two to three times as high as the remainder of the country. Now reporting that on individual basis and if you case reserve, because at that point you'll be reflecting those differences much sooner, I think it will have a dramatic impact on reported ALE. This is because state laws for the administration of workers' compensation have a dramatic impact on allocated loss adjustment expense. In some states it is very easy to close claims, while other states it almost requires attorney involvement in order for an insurance carrier to close a claim. So I think it will have a significant impact on the pricing side and then on reserves if that information flows into the reserving side, particularly if you have shifting books of business.

QUESTION: Greg, I'm wondering if you feel like your company and your competing companies fully reflect the state differences and expenses when they do the pricing?

MR. WACKER: I think we have done a lot of work in that area attempting to do that, but I think that the biggest impediment is the ability to recognize the differences in pricing. Most companies aren't big enough in any given jurisdiction to really determine what is randomness versus what is specific state results. This is where conformity such as the NCCI definition will help. That's where you'll be able to get industry data that will be state specific on the ALE costs which will allow us to recognize the differences of state costs even where we don't have a substantial book of business.

QUESTION: I'm Kelly Tibitoe from Hanover Insurance and this is a question really for any of the panelists. I was wondering if any of you would comment on the extent of the linkage between legal expenses and the associated loss expenses that maybe as more companies attempt to control their litigation costs they may, in fact, be settling the losses at a higher rate?

MR. NICKERSON: Sure. That's advanced by most of the legal profession. However, it's my feeling that that's not the case. And as a simple example, if you get an adjuster out or someone out to talk to a claimant, no matter how severely injured, and you are going to take care of his car rental and you are going to make sure that his medical bills are paid and make sure that...or assure them that the other party has insurance and adequate limits to take care of him and say, look, you can always get an attorney if my offer is unacceptable. And then you know where you're at. And if you can get out there and settle a case, you are settling a case without...obviously, if I'm going to make an offer of $20,000 and that's been my offer, the attorney, before he takes the case is going to have to get a lot more or at least his fee on top of that. So it is my contention that if you investigate a claim quickly and you get out and talk to the people quickly and you increase your payment pattern on some of those things that your allocated loss adjustment expenses will go down. It's more of a supply side rather than something else. But the attorneys will advance the argument that if you go ahead and settle a case quickly, you're going to have to pay a lot more...say, an attorney is already involved obviously...the plaintiff's counsel is already involved...you're going to have to pay a lot more to get the case settled because if the defense counsel does discovery, they'll find out maybe that the guy was intoxicated or had a previous existing conditions or went through all those things. But whatever happens, you are talking about a lot of discovery. You're talking about a lot of experts. You're talking about spending a lot of money with a lot of experts outside the claims adjustment process that are going to drive that figure up.

I think that you can fairly easily, if you get a medical authorization from the people right away...find out if they have preexisting conditions...that's our job really to find out where the case is. If you do a good job, you're going to be able to get statements from all witnesses, get a good medical history and I think you're able to settle a case, if you make a reasonable offer to the people, settle it rapidly and settle it with reducing allocated loss adjustment expenses.

And, obviously, that was an excellent question because there's a lot of disagreement in the area over whether or not my theory works or the attorney's theory works.

MR. WACKER: I'd like to make a short comment on that too. There's a couple of issues. We as a company spend a lot of time measuring or attempting to measure that effect. We've done a lot of things in terms of loss expense in areas of controlling costs.

And we've done a lot of work in trying to measure the effectiveness of staff counsel versus the outside counsel. One other thing that is related, in one jurisdiction at this moment, there is attempts to put on statutory caps on loss adjustment expense including allocated loss adjustment expense, which leads to that very same question "What is the impact on losses?" Because if companies are forced to operate under a certain limitation, particularly in allocated loss adjustment expense, it's kind of like the waterbed approach, if you push down on one side it's going to come up somewhere else. So that's a major issue and it's a major concern to us.

MR. NICKERSON: We have time for more questions.

QUESTION: As a small or medium sized company actuary I appreciate the opportunity to hit another claims manager. How does...these are probably are very elementary questions, but I'd still like to get your opinion. Does your company set per case ALAE reserves?

MR. McANDREWS: No we do not. And probably one of the primary reasons, and I would like to move to that stage, and we will with the new claims system but we're on the, what they call the PMS system. Some of you are probably familiar with it. It does not have a feature where you can set that type of reserve. And if it does it's really not that accurate. But I think it's a situation that we have to move to because I think it gives more information to actuaries and to people who predict it. But, number two, I think it makes the adjuster or the party involved more accountable. Once he sets a reserve of $15,000 to $25,000 to $35,000 he has to go through the process of thinking how much he's going to spend on the case, maybe where a break even point is, and it might make him think that he should settle the case earlier or maybe have a budget with an attorney and say, look, I want to spend X amount on this case and go through discovery and it causes him to go through some very good thought processes. And if, in fact, he misses his reserves constantly, as a manager it gives me a tool to review him in his performance review and then we get into a whole different other issue. So I think it is an excellent tool. I'm going to be doing it as soon as our system comes about to...

QUESTION: It's remarkable. It sounds like exactly the same argument that I had because I'm on the exact same system.

Another question. What about what I would call ALAE expenses associated with salvage and subrogation recoveries? How do you all handle those?

MR. McANDREWS: Well, on salvage, and we can talk about that specifically. That normally towing and storage is involved in that and pools expenses are maybe the two things that affect that...two or three things that affect that the most. You have some adjusters that you can get of on the outside, but usually pool commission is 10%. Those usually are reduced by the amount of recovery so it comes out of loss for us most of the time. Once in awhile I'll have an adjuster, but basically we handle salvage as coming out of the loss. That goes into the payment side of it and we don't necessarily code it as ALE because of that.

QUESTION: It sounds like your netting it out against...

MR. McANDREWS: That's exactly right.

QUESTION: Okay. That's basically the procedure because just as a matter of information, I guess, generally, my company started a full salvage and subrogation unit recently and started coding it as ALAE expense and all of a sudden the actuarial numbers goes somewhat crazy on you and you're starting to project things that shouldn't be...

MR. McANDREWS: It causes a big problem. And you're right. In fact, we just got some interrogatories from either the IRS or somebody on exactly that issue. How do you code it? Because it's becoming a very key issue. So how you do it is going to be very significant in the future.

On subrogation, we try to do the same thing. In other words, the attorney takes his one-third recovery, 25%, 10%, depending on the contract out of his ultimate recovery, so you can net it out that way. However, there are some filing fees and different expenses that have to be coded as ALE. Now when that happens it causes numbers to go funny too. So (inaudible) handle it is an excellent point. Not everybody handles it the same way and there are not clear rules right now. But if you handle it the way I do it I guess it has the least affect on ALE as anything, but if we switched all of a sudden you would see a significant change.

QUESTION: I agree. Thank you, Jerry.

MR. SWANSTROM: I just wanted to say one thing on that case allocated reserves. In this case, we did not have them available and in many cases where I see it established there is usually some type of average, $5,000, $10,000. So often it's not very useful. But if there is a system set up that does a good job of estimating the allocated reserves it should certainly be taken into account and may provide a much better projection than the paid allocated projection would.

MR. NICKERSON: Any other questions? You've got one more thing to do. Each of you has a session evaluation form. Before you leave, I would like for you to take a moment to fill it out. There is a gentleman standing at the back of the room who will be happy to take your evaluation forms as you leave.

1991 CASUALTY LOSS RESERVE SEMINAR

2C/4D: INTERMEDIATE TECHNIQUES I

Panel

Diane R. Rohn
Tillinghast/Towers Perrin

Layne M. Onufer
William M. Mercer, Inc.

MS. ROHN: When you go back to your office and your PC, if you are interested in this method, try to derive the 220.1. I did do that. It does come out to that number, so that's kind of nice. It will give you practice at using this method.

So, what are we trying to do? We are going to try to project the ultimate loss for 1988. It is key to note that the 1988 year is 36 months old as of year end 1990. We might also want to consider what is old enough to be considered mature. Here, our tail at 84 months is a factor of one, and we have derived 1985 and 1986 ultimates by using another loss reserving method.

In order to consider what is mature, you might want to consider what line of business that you are working with. Lines with exceptionally long tails may need to have more accident years, than a shorter tail line like auto liability, to be considered "mature". Also, you might want to consider how many claims are outstanding for the older accident years.

If there is just a small number of claims outstanding at the older maturity levels, then our outstanding losses would be very volatile and would hinge on known claim information. We probably wouldn't want to use this method. We would want to project using another method, such as paid or incurred loss development method. So, you need to take that into consideration.

(Slide)

Slide 5 shows the same type of triangle, except this is for cumulative closed claims. As I talked about earlier, we have projected ultimate claim counts for 1984 through 1990. You can project to the ultimate values either using the claim count triangle that is shown here, or a reported claim count triangle in order to get another idea of what your ultimate claim counts would be. You probably would project the triangles using a straight development approach.

(Slide)

Slide 6 shows the guts of the method. Column 1 shows our estimated ultimate losses, and these will be the same ultimate losses that show up on Slide 4, that we had on the right-hand side. And these are our current best estimates of what our ultimate losses will be as of 12/31/91.

Now, remember that I said that accident year 1988, the year that we are trying to project, is 36 months old. So, what we have done in Column 2 is that we have picked up the actual paid losses at 36 months for accident years 1984 through 1987. This differs from other methods in which we usually look at the last diagonal. In this method we are actually looking at the actual values at 36 months, and not the diagonal.

So, if we subtract from the ultimate losses the paid losses at 36 months we get an estimate of outstanding case reserves plus IBNR at 36 months. We'll do the same procedure for estimated number of claims. In Column 4 we have the ultimate number of claims. In Column 5 we have the number of closed claims at 36 months, and if you subtracted two, then you'll get an estimate of the number of outstanding claims at 36 months.

If we ratio the two together, Column 3 and Column 6, we get an average outstanding value, and, for this slide, I have used an exponential trend in order to fit the average outstanding. Note that this data is very nice and smooth, so that is why I chose an exponential trend.

And also, you could do a regression analysis using linear trend, or if you had some kind of perhaps knowledge that the legal system had changed or have some other type of information, and you had a better assumption of what the trend actually should be, then you could use that assumption in order to proceed to get the average outstanding for 1988.

Here, my exponential trend had a very good R squared, and it came out with a trend factor of 1.093, and 9 percent trend for auto liability seems reasonable. And also, it's not shown here, but there would be a Column 8 here which would be the exponential fit of the data, because you can't derive the 2,551 from these numbers listed here in Column (7). You actually have to do the regression, get an exponential fit, and then trend that by 9.3 percent in order to get the 2,551.

Are there any questions at this point? No? Okay.

(Slide)

Moving on to Slide 7, we have the derivation of what the ultimate losses for 1988 will be. We have taken our forecasted average outstanding that we calculated on Slide 6 of 2,551, and we multiplied that by the number of outstanding -- and that was calculated, if you go back to Slide 5, as the ultimate minus the number of closed claims for 1988 at 36 months (160-141).

Multiply those two numbers together, one times two, and the result is an estimated reserve number. That is an estimated outstanding for 1988. We add the paid losses to date for accident year 1988 to get an estimate for 1988 of ultimate losses.

I would suggest that you, as an exercise, derive an ultimate loss based on the paid loss triangle and compare what that procedure would give you to what you get here using the average hindsight method.

I did that. I got an answer that was very close. It is $1,000 different using the paid loss development technique.

(Slide)

Slide 8 lists some of the advantages and disadvantages of the average hindsight method. First of all, the good thing about this method -- I'm sorry.

QUESTION: I would like to ask you a question about this method. You say compare (Inaudible)

MS. ROHN: In this example it did, right.

QUESTION: What would you suggest if you find that your more recent accident years -- (Inaudible) -- your data tends to be a lot different from what has happened historically?

MS. ROHN: Then you would need to use some judgment. If your averages in the past won't be reflective of what you are going to get in the future, then you might go ahead and use a different trend assumption, if you feel that is appropriate, select a different outstanding or even just use a different method, if that's the case.

Do you have anything to add to that?

So, one of the advantages of this method is that it is unaffected, by recent changes in case reserving practices. If you are not sure if your reserves have been consistent over time, then this would be a good method to use, because it is not affected by these case reserves -- it doesn't even use those case outstanding.

And another nice thing about this method is that you can easily adjust your trend assumption. The disadvantage is that it is sensitive to payment pattern shifts. If there was a change in the settlement rate of your payments, then that would distort your averages.

We already talked about how the averages are highly variable when there's only a few number of claims, and if that's the case, then you may want to consider that those years should be your more mature years.

This method may be insufficient if your book of business has changed significantly. This would be an example of policy limits changing dramatically, or if your line of business or your type of business that you write has changed over the years. Perhaps you started off writing premises liability, and you have changed to products liability at a later accident year. Such a dramatic change would severely distort this method.

I would like to mention also that you can do the average hindsight method using incurred losses. Of course, that is based on the assumption that you think your case reserves have been consistent over the years, and instead of projecting an outstanding average, you would just be calculating an IBNR number instead.

I think that's it for this method. Are there any questions?

QUESTION: Yes, I have two questions about the trend. One is, you said (Inaudible) -- adjust the trend assumption. Before you said that you don't want to -- you have to use the fitted values in your regression trend. Now, if you select the trend not based on a regression you wouldn't have fitted values.

MS. ROHN: You could select something judgmentally, though, at that point.

QUESTION: Yes. I guess another problem I see, particularly in the first iteration in this method, you know, you are basing the trend, and you say you've got data points which fit very well, you get a 99.6 percent R squared. In the first iteration you would have only had three data points to fit a trend to, and, I mean, on real life data you don't usually get very good trend (Inaudible)

MS. ROHN: Right.

QUESTION: You would have to use a lot of judgment in the trend selection.

MS. ROHN: Well, in that case you may not even use this method. If you had a very poor fit, or if your average data were very low, very high, very low, you probably don't want to use this method then. You probably will want to use your paid or incurred, or we will be talking about the Bornhuetter-Ferguson method. You might want to use something like that instead. That is a good point.

MS. ONUFER: Diane, I will make a comment on that.

With regards to the first question, I use this method all the time, not necessarily to estimate ultimate losses, but always as a check on the estimates of ultimate losses that I have. And I will always -- I will always run, because it is in the LOTUS spread sheet and I don't have any choice, run a regression on the average outstanding, the historical average outstandings that I have.

And it is not uncommon to find that you just -- I don't get good fits, especially as the years go out. So what I'll tend to do is, I'll go back and take a look at the average closed paid claim amounts and run a trend on those, and then kind of extrapolate from what I see happening on the average closed paid amounts to what I think is probably happening on the average outstanding amounts.

What was your second question again, because I had a comment on that.

QUESTION: The second question was doing a trend analysis on three data points.

MS. ONUFER: Oh. This example is kind of misleading, because we cut off at 1986. But it is not uncommon, for example, to have data going back 1978 and going forward, and then you would have had far more points in your column to run a regression on.

MS. ROHN: Yes?

QUESTION: Just a question. Would it be common to maybe go up to maybe just a couple of accident years using another method and then use this method because you don't want to base a projection of a loss development factor on only one year, just to (Inaudible) -- that last point, perhaps? And that way you would have more trend points.

MS. ROHN: Go ahead.

MS. ONUFER: Yes. I think Diane sort of made the point in the beginning that -- and this example does -- is that you only use it for the more recent accident years. But I have a couple of comments on that. Mostly the reason for that is because, as you go out past somewhere between 36 and 60 months, somewhere in there, this method starts to fall apart.

The number of claims that are still open are very few, and your average outstanding amounts are very volatile, and they are very, highly dependent on a particular claim, one or two that happen to be open at that point in time.

Even if you don't use this method, I think it is always a good idea to pick your best estimate of ultimate loss, convince yourself that you have absolutely got the best estimate of ultimate loss for all your accident years, including the most recent ones, then go back and do this estimate and see what the -- I call them the implied average outstanding amounts are.

And if we are looking -- we are soon going to be looking at 1991. If I've got an average applied outstanding amount at 12 months for 1991 of $5,000, and all the prior years were six, seven, eight, nine, and ten, I have a suspicion that my '91 estimate may well be low, and it really gives us good information about the quality of the estimates that we think we have picked.

MS. ROHN: Any other questions? Okay.

Then I would like to introduce Layne. Layne is a fellow in the Casualty Actuarial Society, and she is also a member of the American Academies of Actuary. She is currently a principal and consulting actuary with William M. Mercer in Irvine, California. She has had over 14 years of actuarial experience, and she is also a member of the CAS Committees for Continuing Education.

MS. ONUFER: Well, these slides are prepared by the Casualty Loss Reserve Seminar people. I think they are an excellent group of slides. They tell us that our goal is to estimate future settlement dollars for claims reported to date. I confess, I am not exactly sure what they had in mind when they wrote that statement.

(Slide)

The goal of all of our methods, basically, is to estimate ultimate losses or to test how good out estimate of ultimate losses is, and this one is another one that does that, also.

This method is very different and very unusual from the kinds of methods that we have looked at to date, and I am going to spend one minute and tell you how I approach a loss reserve review, and then tell you how this method is different, and why it is unique, and why it is unusual, and why it is very special, I think.

I will generally start out with the incurred loss development method and come up with some estimates of ultimate. Then I will move over to the paid loss development method, and kind of compare those two. And unless I've got a very lucky day, those two estimates aren't coming out very close.

I will then go take a look at Bornhuetter-Ferguson, because I happen to like Bornhuetter-Ferguson very much, and if I've got a sufficient amount of information, I'll do an average accounts times average amount method. And I will then go and I will apply the average outstanding method that Diane just went through and see if my estimates make a lot of sense, as I mentioned previously.

All of these methods I use on an accident year basis. The method that we are going to talk about today, the Fisher-Lang, is on a report year basis. A claim gets put in a particular report year based on the year that it was reported. For example, a claim could have happened in 1989. It would be in the 1989 accident year. Perhaps it wasn't reported until 1991, so it would be in the 1991 report year.

(Slide)

The advantage of the report year using -- organizing data by report year is that at the end of the report year, the number of claims is finished. We know by January 10th or by January 15th how many reported claims we have for that year. It is a solid number. We don't have to worry about projecting or estimating it. And that is nice in actuarial science to have a solved number that we can work with.

What makes this method so special is that we can use this to test what is happening in our claims department. Frequently we will go in and we will ask our managements to believe that case reserve adequacy is eroding, and our management will say, show me, and then we kind of say, well, you know, well, I have a feeling, or I see this number here, and they will go, well, you may see a trend in these numbers, but I don't see a trend in these numbers.

This method and what you are going to learn about, I think, in the session not after this one, but the one after that, gives you a tool to go to your management or to go to your client and say, this is what is happening in your claims department and I've got the proof, I've got the evidence.

So, it's a very powerful tool when things are happening in your claims department that you need to show management with substantial evidence.

If you will excuse me for a minute, we go out to breakfast every Saturday morning. We take our two sons. They are nine and six years old. And we always go to one of these restaurants that has, you know, the handout, the crayons and the little menu that the kids can color on so my husband and I can talk and keep the kids occupied.

And frequently on these little color things they'll have a maze, and one of my sons has figured out that if you go to the end of the maze, the point where it says End, and work your way backwards, it is very easy to get to Start.

The other one doesn't believe that, or wants to challenge it -- I'm not sure which one -- and always goes to the start and tries to work his way to the end of the maze, and I think that is true for this particular method, that if we go to the last slide, and work our way forward, we are going to be in a lot better shape than if we try to go forward and work our way to the back.

(Slide)

So, let's go take a look at Slide 20. This is where we are going to end up. Now, if you could just have some faith in me that eventually we are going to get to those earlier slides, and we're going to get to these values -- just have some faith. We're going to get there.

Here is the total number of reported claims, and as I mentioned before, they are already set. We know at the end of -- we know by January 15th or so of 1987 that the number of claims we have is 432. That is this number right here.

So, we need the total number of reported claims. Then we need the average size of incurred loss that is going to happen per report year. If we have the average size of the loss, that gets reported that year, and we multiply it by the number of claims, that is going to give us our estimate of ultimate losses, and that's a very comfortable method.

How much does a widget cost? It costs $2. How many do we have? Four hundred. Therefore our inventory is $800.

How many claims do we have? We have 432. What are they going to cost? $2,159. What is the cost this year going to be? Well, I just multiply the cost times the number, and I come up with my estimate. So, that's where we're heading.

(Slide)

Again, this number, the number of reported claims is given. We have that. We're set. Easy. Piece of cake. Yes?

QUESTION: One more step to go beyond this, and that is to somehow allocate these ultimate -- (Inaudible)

MS. ONUFER: Can I put that off to the end? Normally I would answer the question right away, but if I go through it it is easier to answer

QUESTION: Okay, no, I was just thinking since you were starting at the end.

MS. ONUFER: Yes, I lied. I started sort of towards the end. Okay.

Again, the total number of reported claims is a given. So what we really have to kind of determine is what is the average incurred loss.

Well, the average incurred loss, it turns out, is going to be a weighted average of the average cost in each increment, and I forgot to say that this method differs very much not only because it is report year and traditionally we look at accident year, but also because this looks at incremental data rather than cumulative data.

So, I get confused all the time. Just keep in mind when you are looking at these numbers that it's incremental. So, for example, this number here, 1652, it's the average cost of the claim that closes in zero to 12 months, 1,652. The 3,459 is the average cost of a claim that closes in 13 to 24 months, and doesn't include any average values of any claims that close before 13 months. It's an incremental value.

This number right here, the .568, it's the percentage of claims that were closed in the first 12 months. And the .034, 3.4 percent of the claims closed in 49 to 60 months. If I take this as my average cost, and I use these as my weights, and I multiply this times this plus this times this and so forth, I get a weighted average of these costs, and I come up with the 2,796.

(Slide)

So, again, back to Slide 20, we are going to take an average cost. It is the weighted average of the incremental costs, 12-month incremental costs, and we are going to multiply it by the total number of reported claims, which we already know.

I should have mentioned also that if you have any questions anywhere along the line, do please stop me. It is a difficult method, not conceptually, but the arithmetic tends to bog us down. And so, if you get lost on Slide 13, the probability of being able to move on and understand 14, 15, and 16 starts to diminish. So, please do stop me.

So, we are going to focus on how do we come up with the average size of a claim for a given report year. The data that we need is the total number of claims by report year that's given. We'll need the number of claims that are settled by report year and by age, and we'll need the paid claim by report year and by age.

When I started out in the insurance industry, report year data was just very difficult to get a hold of. Now, with PCs and the computer kinds of systems we have, it seems like people can organize data just about any way we want to, and it is easier to get a hold of report year data.

This is a neglected method, but I think it's a powerful one, and one that I think we should consider using, and asking our departments to start organizing things by report year for us.

Again, the number of claims are a given, and a report year is the year in which a claim is reported to a company. And it's a known quantity. It never changes.

Remember that to get our average, overall average for a given report year, we are going to take a look at the -- we are going to use as our weights the portion of the reported settled claims, and so I am going to talk a little bit about how we get those weights.
Well, it turns out that 260 claims were closed in the zero to 12-month period for the 1986 year; 115 were closed in the 13 to 24-month period for the 1986 year; 30 in the 25 to 36- month 17 in the 37 to 48-month period, and 10 in the 49 to 60-month.

For this particular year, '86, all the claims have been settled. All the claims have been closed, and that is why the 432 equals the 432. Again, this is incremental data. I always do tend to forget, and it becomes very obvious when you ask yourself why the number in the 13 to 24 column is less than the number in the zero to 12. That kind of brings it back to memory that you are looking at incremental data.

(Slide)

And, just one more time, for 1990, 290 claims have closed in the zero to 12-month period, and the number that were reported was 511.

If I were to take this 220 and I were to divide it by the 511, that would tell me the percentage of claims that settled in the zero to 12 month period. Likewise, if I were to take the 293 and divide it by 532, that would tell me the percentage of 1989 report year claims that closed in the zero to 12-month period, and the 13 -- and 138 divided by 532 gives me the number of claims that were closed in the 13 to 24-month period.

We can find that triangle, those divisions actually on Slide 16.

(Slide)

Any questions about Slide 16? It is just straight division. Or what these numbers represent?

Similarly, I have a triangle of the incremental dollars that were paid in each period. For example, the 355 was \$355,00 that were paid on claims that closed in the zero to 12-month period for the report year 1986. Thirteen to 24, there was \$345,000 paid on claims that closed in that period on 1986.

(Slide)

If I take this amount, the \$355,000, and I divide it by the number of claims that closed in that same incremental period, I will get the average claim size of a claim that closed in the zero to 12-month period.

And that is all Slide 14 is. We have taken in the numerator, the dollars that were paid in the 12-month period, and we have divided it by the number of claims that were settled in that were settled in that period.

And so, she said this was going to be hard. This is a piece of cake. Now the hard part comes. Any questions so far? This is a smarter group than this morning. They had a lot of questions.

(Slide)

This Slide 15 is a repeat of 14 except that now there are like magical numbers filled in. It is no longer a triangle. It is a rectangle. And the question is, how do we fill in these numbers?

Well, what we are going to do, what this particular slide does, although this is not the only way to do this, but what this particular slide does is, it puts an exponential regression on these four values. So, for example, if you were in a LOTUS spread sheet, you might input 1986, 1987, 1988, 1989. These would be your X values.

Then, 3,000, 3,092, 3,202, and 3,348 would be not quite your Y values, because you are doing exponential trends, so you'd put this column down, one column over, you would take the natural log of these values, and they would end up being your Y values. So, these would be your X values, the natural log of these would be your Y values, and then you'd run your regression.

And you would find out that indeed the X coefficient was 3.7 percent, and I did this, and it works. I did not do this one, this one, or this one, or this one, so I don't know if they work. Then, if you put 1990 over in the column, and you fit it back to your Y equals MX plus B only in exponential form, you will get this value, $3,459.

Similarly, to get these two values you will run a regression here, and this will be the fitted value from the regression. Any questions about that?

QUESTION: I would just make the same remark I made about the previous method. You have very few data points -- (Inaudible) -- data that I work with has very extreme volatility, and very little -- (Inaudible)

MS. ONUFER: I agree, and I'd like to use average methods, I mean, I'd like to use as many methods as I possibly can, but frequently the volatility stops you short.

And again, you know, we could have many points back here to help us in our regression.

Okay. Gee, I can't believe it. ·No questions?

QUESTION: Yes.

MS. ONUFER: Good.

QUESTION: Are you using each of these columns as a separate fit for the -- (Inaudible)

MS. ONUFER: The way that this slide is set up, these columns, each of these columns are treated as a separate fit, but to tell you the truth, this isn't -- maybe it's a good example, because it raises the question.

Generally, what we find out is that as you go out over time, the longer a claim tends to settle, the higher the trend, and that pattern isn't existing here. I personally, in my practice, would probably try to -- I would change this, and I would have at the end of the day a monitonically increasing function.

I didn't run the rest of the regressions. I know that when I ran this one the R squared was .99999999, but then you are only looking at four points, and so you would be hard pressed not to get a good R squared.

Here, I would take a look at this R squared, see how good this fit was. If this R squared was less impressive than .99999, I would have -- maybe I would move the 4.8 down to something less than the 3.7. This 8.7 looks like an anomaly, and I would suspect the R squared there probably wasn't as good.

Or, it's possible that you've got so few points back here you are not really capturing the real trend. And these should be moving up. It is hard to say, but I would end up with a monitonically increasing function as I go across.

(Slide)

Well, we have seen Slide 16 before. We said it was simply the quotient of the number of claims that closed in a given period divided by the total reported claims, and that is -- the total reported claims is a given, solid number. Okay. Yes?

QUESTION: How did you handle a reopened claim?

MS. ONUFER: Well, somebody asked that question this morning, and I said my preference is to have it assigned -- to have a reopened claim put back in the year that it was originally reported, but I have been thinking about it, and I think the answer -- I'm not sure yet, because I have to think it through a little bit more. I think I would treat a reopened claim as a new claim and put it in the year it was reopened and call it another report.

But the truth of the matter is, it is whatever your company -- whatever your company does, you are going to have to live with. It is most important that you know how they treat reopened claims. Did that answer your question?

QUESTION: Yes.

MS. ONUFER: Okay. And really most important, to make sure that your company treats reopened claims the same way every year.

So, here comes the really hard arithmetic. I mean, this is the crux of the whole thing. Oh, question.

QUESTION: On the last slide there, there are some footnotes on there.

MS. ONUFER: Is it 16?

QUESTION: Eighteen I think it was.

MS. ONUFER: I don't think I got to 18 yet.

QUESTION: I'm sorry. Fifteen?

MS. ONUFER: Were you jumping ahead?

QUESTION: I jumped ahead. I'm sorry.

MS. ONUFER: Okay. That's why it's the really hard part.

(Slide)

I'm going to confuse you. I'm going to go back here. This .568 here represents the percentage of claims that have closed in the zero to 12-month period. If I take one minus the .568 that gives me the percentage of claims that are still open, and that number is 47.2 percent. One minus .568 is 47.2 percent.

Similarly, if I want to know what claims are still open at the end of 12 months for the 1989 report year, I would take one minus .551, and in fact, if I wanted to know the number of claims that were opened for the 1989 report year at the end of 24 months, I would take one minus .551 minus .259. So, one minus .551 -- this is for 1989 -- is the portion of ultimate claims that are still open at the end of 12 months or still open at the beginning of the 13 to 24-month period. Of that, history tells us that .259 of the percentage of the claims closed in the 13 to 24-month period.

So, as a percentage the proportion of open claims that were settled in the 13 to 24-month period, if I know the percentage of open claims, 25.9 out of this denominator are the proportion of claims that were open at the beginning of 13 months that closed in the 13 to 24-month period. Now, have I lost you?

So, this again, we saw a triangle already without these values. Now we want to come up with -- we want to fill in the triangle and come up with a rectangle. How do I get the .249?

Well, I know that the percentage of claims that are going to close in the 13 to 24-month period based on the 1989 report year. I just calculated that in the last slide. It was .259 in the numerator and one minus the .551 in the denominator. That is the percentage of claims that are going to close in the 13 to 24-month period of open claims.

I know the percentage of claims that are open for 1990 report year at the end of 12 months is one minus the .568, so I just take this percentage of then one minus the .568, and I got .249. I don't think I did that real well.

QUESTION: Are you just using one year -- (Inaudible)

MS. ONUFER: The question was, am I using one year because I want to get responsiveness, because it seems like it would be unstable, because I am using one point? The slide uses one year. I would use an average, because I would want stability, unless I knew something was happening in the company that would make me suspect that this was the only year that was valid.

I would use an average. I would have gotten this equivalent ratio for the '88 year, the '87 year, the '86 year. I would have taken an average of those, and then I would have applied it to this. But can you imagine the explanational nightmare of somebody standing up here trying to do that?

Another question? Or is that the same question everybody had? Yes, good.

QUESTION: You have made an assumption here that after five years -- (Inaudible)

MS. ONUFER: Well, the number of claims that are reported at the end of each report year is done. That's a fait accompli. This particular model happens to have made the assumption that everything was closed after five years. It was for simplicity. The real world doesn't look like that unless it is a property claim. I mean, who would need this model? Yes?

QUESTION: (Inaudible) -- one year, and I don't recall whether they gave a reason why they -- (Inaudible)

MS. ONUFER: Okay. Lest I lead you astray and they say according to Fisher-Lang? Thank you. Okay.

Similarly, if we wanted to calculate this .091 this particular -- the way this display is done, the proportion of claims or as a percentage of claims that are going to get closed in the 25 to 36-month period is .070.

The percent that is still open is one minus this number, minus this number, or one minus .586, minus .273, so that's the proportion of claims that are going to close in the 25 to 36-month period of the claims that were still open at the beginning of the period.

And the percentage of claims that are still open in 1990, or at least theoretical -- it is not actually actual anymore -- is one minus .568 minus .249, and again, we could have used an average. This factor could have been an average of the historical calculations there.

QUESTION: (Inaudible)

MS. ONUFER: Well, as soon as you -- if I were doing this, what I would probably do myself, I think, is, I would probably limit this data, maybe to 100,000, maybe to 250,000, maybe to 500,000, if my data base had the capability of doing that, and I would probably come up with estimates of ultimate loss at this limited value, and then what I would do is develop increased limit factors to take me from the limited value out to ultimate.

The higher the policy limits, and if the policy limits are unlimited, these averages are going to be erratic. They are going to be tough to get a hold of, because you are going to have very large claims and they are influencing any given year. That's my practical suggestion.

Maybe the, yes, the best way, because now we are required to do reserves on both a net and direct basis, is, I would start my first limit at whatever my company was retaining, and maybe that's 500, but it might -- 500 might be too high. It depends how big the book of business is, and how stable it is, and so forth.

This method is going to fall apart, like most methods will fall apart, if there's changing retentions going on, if there's a changing mix of business going on. I had a company that was writing worker's compensation, and it was primarily -- in 1982 was primarily writing in the States of Pennsylvania, Maryland, Delaware, West Virginia, and Virginia, and decided to become national.

And, as you may recall, the size of a loss for a worker's comp claim is very much a function of the benefit level in a given state. When this company decided to go national, all the data from 1982 and prior was useless because it was now, we're looking at averages of all these different benefit levels of all the states.

By 1985 they had decided that this was not a good strategy, that they didn't have the resources to go national, and they went back to what they called their core states. That rendered all the history from 1983 through 1985 useless now, because it was representing all the states, and we were pulling back and looking at just five again.

And, of course, the '82 and prior data was pretty old, so it was hard to use that at that point also.

(Slide)

So, here we are back almost at the end of the maze. And remember that -- let me go back to 20. We said they were going to come up with estimates of ultimate loss. The estimates of ultimate loss were going to be the average incurred loss per report year times the number of reported claims, and the average incurred loss was going to be a weighted average of the average cost in each incremental period times its weight, times the number of claims, the percentage of claims that closed in that period.

And we are almost done. I think I have an outstanding question, which I will get to.

We are going to skip the summary of the method slide, because I think we have done that one. Any questions? Okay.

(Slide)

The advantage of this method is that you get information than accident age to age method. You get settlement patterns, and you can impact -- you can use inflation's impact directly, and it can be used to evaluate the claims department, and I guess I don't like that language.

I think that rather than evaluate the claims department, it can be used as a very good management tool to let the claims department know if something is happening within itself that it is unaware of, if reserving practices are changing out there in the field, and the people in the home office don't know that it's happening. For whatever reason it might be happening, it gives us information. And it's a good tool for the claims department.

The disadvantage is that it is limited to evaluating reserves for known claims. Therefore, by default it doesn't give us an estimate of the IBNR claims.

There was a question earlier which I asked to please defer which said, how do you take these estimates of -- the report year reserve estimates and allocate them back to accident year?

I think that the goal of this method is to -- it is not a complete model where you can take the numbers that come off of this method, the report year method, and put them into your financial statements, or put them on your balance sheet as, this is my reserve liability. It is missing the IBNR.

And when of financial people fill out the balance sheet, they need a financial number on there. That includes not only the reserves for known claims but the reserves for the unknown claims, the IBNR.

So, this method doesn't do it, and it doesn't serve that purpose. I don't think the goal of this method is to take these report year estimates and try to allocate it back by accident year. I think it is more of a tool to evaluate what is happening in our claims department.

If we've got an accident year model and we see that the incurred estimates are up here, and the paid estimates are down here, the question is, is the reason that the incurred estimate is up here, is that a loss experience deterioration, or is it because the claims department -- is what's happening in the claims department that they really are strengthening case reserves?

And we really want to test the assumption of, are they strengthening case reserves. Then we take a look at this model. So I don't know if I'm sidestepping the question or avoiding the question, but I don't think the purpose of his is to translate back into an accident year.

I think the purpose of this method is really to test what is happening with the adequacy of case reserves as an aid to help us understand other methods, and as an aid to explain to management what is happening in our company, what is happening in our claims department, what is happening here?

QUESTION: (Inaudible)

MS. ONUFER: Exactly. Yes. I just -- I have so many -- as a consultant, I have so many instances where the client -- and this is not a facetious comment -- in all hones good faith tells me what is happening in the underwriting department, we are underwriting better than we have ever underwritten before.

And you go to the claims manager, and we are settling claims and reserving claims better than we ever had before, and the president of the company puts that all together and says, I should be having the best year I ever had, and here, my loss ratio is worse than ever before, and what is happening?

And so, you can't just say, well, maybe your claims manager is not doing such a good job, or maybe the under writers aren't doing such a good job. You really need to come back with some good evidential material of what is really happening.

There's a lot of statistics that we don't go through in this particular seminar that we can look at that gives us evidential information. This is the almost irrefutable method, if this kind of data is available. It is really a powerful, powerful tool.

Another place where I used this kind of method, or I used at least a report year analysis, was, I had a client that was a governmental agency, and they didn't care, they weren't require, the state did not require them -- they were a state governmental agency.

The state did not require them to accrue reserves, to put it on an accrual basis, you know, in other words, the total incurred amount.

All they really cared about was, they budgeted each department, and all they cared about was how much was going to get paid in the next year, and it was for environmental liability, where the data was very thin, so I did a report year analysis.

I didn't care about the IBNR, because if it hadn't reported, then it wasn't going to get paid out into the future, and it kind of reflected what was going to, you know, kind of came up with -- applied a payment pattern and came up with what was going to get paid from the prior accident years.

QUESTION: This would be good, then, for evaluating a claim for -- (Inaudible)

MS. ONUFER: Yes.

QUESTION: What if you first answered that -- (Inaudible) -- retro date started in the first column? Would you still use that?

MS. ONUFER: I have to get more concrete. I went into the claim estimating business in 1987?

QUESTION: (Inaudible)

They don't have higher occurrences. Occurrences in the first year -- (Inaudible)

MS. ONUFER: I think the kind of technique you have to go to is the kind of technique that is talked about in the Marker and Mull paper. It's a paper by Marker and Mull. Do you know the name of it? Reserving for Claims Made, I think it's called. It is not a put-off. It addresses all those questions in really detail.

Any more? You guys tired, or what? Well, we are going to have a switch in personnel, because my voice seems to be holding out better than Diane's, and so now I have not prepared this material. This is what you call winging it. But you will help me?

MS. ROHN: Sure.

MS. ONUFER: Okay. Again, the authors say that the goal is to estimate the dollars to be reported in the future. To me, the goal is to estimate ultimate losses. Subtract out what has been paid to come up with the loss reserves. It is based on expected ultimate losses and then the estimated portion of dollars yet to be reported.

(Slide)

And that is kind of confusing, so I think what I am going to do is start at the end of the maze one more time and work our way forward. Not quite at the end of the maze. Sorry. Yes, that one, 28.

And I wish I had a blank piece of paper. What I want you to do in your mind is cover up Rows 1 through 5 for a second. Go right down here to Row 8, and Row 8 is the estimated ultimate loss. It's the sum of two pieces. It's the sum of what has been incurred, or I would prefer to say reported to date. And then it's what they call the IBNR reserve, but I will call it the unreported.

So, in this, the Bornhuetter-Ferguson or the BF method is going to be the sum of two pieces, what has been reported to date -- that's a given -- and we are going to estimate what is unreported to date.

There is also a paid Bornhuetter-Ferguson method, if you will. It is going to be the sum of two pieces, what has been paid to date, which would appear on this line. It's a known, given fact. We know what has been paid to date, and we are going to estimate what has been unpaid to date, and the theory is exactly the same.

You just take -- instead of reported losses you just put in paid losses, and you are done. So, once you've got the idea, the flow of this method, of the incurred Bornhuetter-Ferguson, the paid Bornhuetter-Ferguson works the same way. Go ahead.

QUESTION: Yes. I am just wondering, I mean, to be consistent, I mean, IBNR gets used for a lot of different things.

MS. ONUFER: You are jumping ahead again.

QUESTION: For example, when we are talking about needing to estimate IBNR in the last method separately, I think we are talking about sort of what might make a pure IBNR those losses which have not yet get been reported, whereas here you have both the losses which have not yet been reported, plus I don't know what you see referred to as IBNR, or something like that, losses which have been reported but not enough to have been reserved, and yet there is this IBNR which includes case development on known reserves.

MS. ONUFER: Yes, and we are going to talk about that in a slide or two.

QUESTION: Are they not reported, though? I mean, they are sort of -- they are not unreported losses, is the point I am trying to make.

MS. ONUFER: Right, this is not a report year method. This is back to an accident year method.

QUESTION: No, you are just saying, though, that the IBNR is unreported losses, and we have to be careful how we reserve those.

MS. ONUFER: Oh, I see what you are saying. Right. You are right.

QUESTION: This IBNR includes not only unreported losses, but it specifically includes case development unreported losses.

MS. ONUFER: Yes, if you move -- let's just do that right now while we are on the topic. Let's move to Slide 27. It is a good comment, and it would tend to confuse.

(Slide)

When we were doing a report year method, when we were saying it doesn't estimate IBNR, what we are saying is, it doesn't give us an estimate of claims which have incurred but have not been reported yet, in the strictest sense, what we call the pure IBNR in the very strictest sense of IBNR.

A claim happened in 1989, but it has not yet been reported. Perhaps it will be reported in 1992. The Fisher-Lang report year method does not address that whatsoever.

In the insurance industry we seem to have many definitions for the same term. In this instance, when I talk about unreported, I am using the very broadest of definitions, or when we talk about IBNR, we are talking about the very broadest definition in this instance. I'm sorry. I really meant 25.

(Slide)

It includes Number 1, which is what we call the pure IBNR, which is the losses not yet reported to the company. But it also includes other categories of losses that we happen to not quite know about for one reason or another.

It includes claims in transit, you know, the claim happened, the report is in the mail, it is on our way to us, or it is sitting on the key punchers. They are not key punchers any more. Data processor. Yes. Word processor. Not word processor. The person who puts the information into the system, desk, in a big pile, and she just simply hasn't put it into the system yet.

It also includes future development on known claims. I don't think I'll go through that term. And it also includes reopenings on claims currently closed. So, it includes all of those categories in this example. I am sorry.

Let me go back and just then say one more time, what we are going to do, we are going to estimate IBNR or in this sense the very broadest form of unreported claims, those four categories that we just went over. That is a quantity that we are going to estimate. We are going to add that to a quantity that we already know what has been reported to date, and we are going to then come up with our ultimate.

To come up with our estimate of unreported amounts, we are going to need to have some sort of estimate of ultimate losses. We can either do that, as we see going further, by having earned premium or a measure of the exposure. We are also going to have to come up with an expected loss ratio or a pure premium for each year, and we are going to have to come up with an estimate of the percent of dollars as yet unreported.

Let me just move right on into the method, because I think if you see the method it will help you out a little bit.

I hope I am not confusing you. Let me go back and use my maze technique for a second, and jump again to Slide 28.

(Slide)

And now, if you can just blank out Lines 1 and 2, Rows 1 and 2 for a moment, we will move forward a little bit from there. We blanked out 5, 4, 3, 2, and 1. I think we understand 6, 7, and 8. We are going to blank out 1 and 2. If I stand in front of it we will blank out everything. Okay. Somehow, magically, we are going to have to come up with expected ultimate losses one way or another.

Somehow we are going to get there. Then, we are going to come up with an IBNR factor. It turns out to be a function, and you ought to put, right now, as we are standing here -- it turns out to be a function of the cumulative development factor, not just a development factor, but a function of the cumulative development factor. You will go back to your office and you will forget, and this will be very misleading.

We are going to come up with a percentage of the ultimate loss, which is unreported, and that is going to give just the dollars that are unreported, so 5 is the percentage of losses that are unreported, 3 is the total dollars that we expect to happen, and if I take their product, that is going to give me what I think is going to get reported in the future, or is unreported at this point in time.

So we've got two pieces. How do we magically get from 4 to 5, from Row 4 to Row 5? And how do we magically get to Row 3?

We are going to do the first part. How do we magically get from the cumulative development factor to an IBNR factor, or a percentage of unreported? I watched Diane. we did this session at 10 o'clock this morning, and I watched Diane go through this slide, and it is a bear.

(Slide)

They are missing two lines in here, which really makes the arithmetic very difficult. So, again, stop me if you don't see it. It is algebra, it's pure algebra, but, you know, they are missing a line in here, and they are missing a line in here, and it is really confusing.

And here is where I am going to need your help, because I never get this one right. Okay.

We said that what we defined as the IBNR factor, this is purely a definition up here. We are calling the IBNR factor the percent of unreported. Okay. And the second one, we are just assuming that IBNR is a function of ultimate losses.

The step that they are missing is that IBNR equals reported ultimate losses, that's the word "ultimate" there, minus reported losses. Yes? So far so good? Okay. Then the percent of unreported is simply -- this is really a dollar of IBNR, and your percent of unreported losses is your dollar of IBNR divided by ultimate loss. That's this amount.

And so I divided this side by ultimate loss. I have to divide these two quantities by ultimate loss. Now we get tricky. Ultimate loss divided by ultimate loss is one. That is where this comes from. And reported loss magically changes its name to incurred to date, and that is all that is happening here. And I apologize for the switch in terminology. Have I lost you? No? Okay.

So now I've got the dollars of IBNR divided by the ultimate, which again is the percent of unreported, and now I've got to remember that this really equals my reported losses or incurred to date times the cumulative loss development factor.

So, I replace ultimate with reported losses times the cumulative loss development factor, so let me do that in this line. One minus incurred to date divided by -- this is a parentheses here -- ultimate, and in place of ultimate I am going to put incurred to date -- again, excuse me for the switch in terminology -- times the loss development factor, cumulative loss development factor.

Oh, neat. These guys cancel. And you are left with whatever the loss development to ultimate factor. What? Sorry. Okay. So you are left with one minus the loss development to ultimate factor, or one minus to cumulative, and so that is what we get.

The percent of unreported equals one minus the quantity one over, I call it the cumulative loss development factor. This quantity in here, one over the cumulative loss development factor, turns out to be the percent reported, so it makes a whole lot of sense that the percent unreported equals one minus the percent reported. Question? Well, I don't know if you learned anything.

(Slide)

So, back to Slide 28. We now know that if we take one over 1.25, which I know is .8, and I subtract one from it, I am going to get 20 percent. So we have gotten Line 8, we have gotten 7, we have gotten 6. We now magically know how we get from the cumulative development factor to the IBNR factor. That was beautiful. Okay? And the only thing we need to come up with is, how do we come up with expected ultimate losses?

Expected ultimate losses can be the product of earned premium times what we expect to be the loss ratio. Expected ultimate losses, when you use this loss ratio method are very highly dependent on the adequacy of the rates.

Just because 65 percent was good in '87 does not mean that 65 percent is going to be good in 1990, and in fact, the person who set up this example suspects that premium adequacy is eroding, and they have picked higher -- I think that's what they suspect, or they could expect that, well, loss experience is deteriorating, one or the other.

For some reason, these historical loss ratios are not a good predictor of what is happening in the more recent years. When I talk to other actuaries about the Bornhuetter-Ferguson method, they either kind of like it or hate it. I mean, hate it. They won't even use it. They won't talk about it. They refuse to acknowledge the fact that it even exists.

I personally like it. And what I tend to do is, I tend to put my last year's estimates of ultimate losses in this Column 3. That is generally what I use as my best estimate of ultimate losses, is my most recent evaluation.

What it does for me as a consulting actuary, and maybe even if you are in a company would help you out, is, I find that my clients get very upset with me if one year I tell them that the ultimate losses is a million and the next year I tell them it is five million, and then the next year I tell them it is three million. The numbers kind of bounce around, and they don't like that.

The Bornhuetter-Ferguson method is a weighted average between Line 3 and between the incurred loss development method. So if you use as your weight your last set of estimates, you will tend to mute that volatility.

The actuaries who hate the Bornhuetter-Ferguson and who in particular hate that you use the most recent estimate, and it is very valid, said that if you made a bad mistake in your last estimate, you are going to perpetuate it going forward. Instead of correcting for it this time by using your last best estimate, you are keeping that mistake in there.

And that is a very valid argument. So you have got to be real comfortable that what you are doing when you are using your last set of estimates is really keeping the volatility down and not perpetuating a misestimate. Questions?

QUESTION: The Bornhuetter-Ferguson method is easy to use and explain.

MS. ONUFER: Well, I don't know. I find people really have a hard time with the Bornhuetter-Ferguson method. So I don't know if I agree with that.

QUESTION: That's what the paper says.

MS. ONUFER: It is on her syllabus also?

QUESTION: (Inaudible)

MS. ONUFER: It comes right off the paper? Well, if you are studying for the exam, remember this one. I don't think it's either easy to use or explain. And especially that derivation, which I have to sit there and fumble in front of everybody every time I derive it, and that is a frequent exam question, too, derive the percentage of unreported, theoretical percentage of unreported.

It's a compromise between the loss development method and the expected loss ratio method, so it is a weighted average. It tends to help you out if there is single large claim. If you see a sudden increase in your incurred losses or in your incurred loss estimates, and you are just real confused about what is going on, you don't want to fully believe what is happening, what your incurred loss development method is telling you but you don't want to discount it, either, since this is a compromise or a weighted average, it gives you a midpoint until you get a little further on in time and get some more information.

You are kind of like hedging your bet. You are telling management it looks like things are getting worse. Let's move the reserves up a little bit, but let's not move them all the way up here yet. Let's wait and see what happens a little bit more.

(Slide)

Let's go look at the Fisher-Lang report year method and see what is happening to loss reserve adequacy. It avoids overreaction, which is what I just talked about. It is suitable for new or volatile lines of business. And I tend to use it frequently for the most recent accident year, where I am real uncomfortable using the incurred or the paid loss development method.

I will run an incurred loss development method, I will run paid loss development method, I will come up with a potential loss ratio, I will compare those loss ratios to the historical loss ratio, and then judgmentally pick a loss ratio for the most current accident year. I tend to do that very frequently, because I am very nervous about the immature data of the current year.

It can be used with no internal loss history. That is true. You can use external development factors if you want to.

If you are using the incurred loss development method, you have to make sure that your incurred loss development factors are cumulative incurred loss development factors are pretty representative, the industry ones are pretty representative of what is happening in your company, however.

It has a huge dependency upon projected ultimate loss ratio premium. It has a huge dependency on the premium adequacy. If you make a bad guess about the estimated ultimate losses, as we discussed earlier, this method is going to give you not such a good answer, not such a reliable answer. And additional methods are necessary to develop the unreported percentages. Some things, you have to come up with unreported percentages.

(Slide)

Sorry, I apologize. I skipped Slide 29. Again, I was watching Diane go through this morning, and the thought that occurred to me with these considerations, and I am not going to read through them, you can do that for yourself, is, all the caveats of this method are the caveats of all the methods that we use. I am not sure why we find it necessary to repeat them here, but these are all true for this method as well as most of the methods that we use.

(Slide)

I talked a little earlier about what happens if we get a huge bump-up in the incurred loss development method. How do we handle that? Well, as actuaries we frequently turn to the Bornhuetter-Ferguson. This slide is an example of what has happened if that bump-up is just one very large claim, and the incurred loss development method, it turns out, will overreact to that one unusual large claim.

The best way to handle this method, by the way, is to go to your claims department and say, have you had any large, unusual claims, and take it right out of the data base, and then you can go back and use your incurred loss development method.

But if you have forgotten to do that, you know, your boss is pressuring you to get it done, and you have forgotten to do that step, or you don't have time, or for whatever reason, if you run through these two methods, you will see that the reported method, the incurred loss development method will overstate the ultimate losses, if there is one large claim in there. Questions? The arithmetic is pretty straightforward.

I use -- they call this the adjustment factor, but they call Column No. 3, which is one divided by two, they call it the expected incurred to date.

I call that the expected reported or emergence to date, I guess expected incurred to date, and what I use this for is, when I am trying to get a client that has been using a different consultant, I like to go in and show that the other consultant has misestimated what has actually happened to date. That is a joke. Okay? It is not a joke. I really do that.

And what I find is that none of us are perfect, and if you use this method it is almost going to show anybody out there has misestimated it. This is kind of an aside.

What you really can't do is, you really can't look at the individual years and see what is happening. What you really have to do is, because some of the years you know, because you are using average development factors, some of the years you know are going to come out a little bit high and a little bit low.

What you want to do is look at the bottom and see the total, if the total actual is very different from the total expected. In this case, it is deemed that it is off by factor of 1.14, and so in the last slide you might want to adjust your IBNR by that factor. Questions? Well, if you have any questions that you want to come on up and ask us -- oh, wait, we've got one. Everybody sit down.

QUESTION: A question about the development factor. You've got the (Inaudible).

MS. ONUFER: Yes.

QUESTION: The underlying ratios (Inaudible) age factors, do they come from (Inaudible). Is that where they come from?

MS. ONUFER: From reported to date.

QUESTION: Reported to date?

MS. ONUFER: Yes. When I am talking about reported, and when these slides are talking about incurred, we mean cumulative payments plus case reserves.

QUESTION: Paid plus outstanding?

MS. ONUFER: Case reserve outstanding, yes. Yes?

QUESTION: You have mentioned there is a paid version of this also. What would be the reason that you would want to get the paid Bornhuetter-Ferguson versus the incurred? Do you have a lack of faith in your case reserve?

MS. ONUFER: Exactly. He asked, why would you want to use a paid Bornhuetter-Ferguson over an incurred Bornhuetter-Ferguson and the answer is, if you think there is something happening with the case reserve and if you think it is inconsistent over time.

I use every method I can, and so I always do an incurred Bornhuetter-Ferguson, and I always do a paid Bornhuetter-Ferguson, and all those methods are pretty much mechanical the first time through.

Then you go through and you apply a little judgment to them, and you come up with what you think are the best estimates. Then I think the real actuarial work begins in explaining why each of these estimates is coming up with a different answer, going back and talking to people, sitting down, thinking it through.

And so I will do a paid Bornhuetter-Ferguson just to get some more information. I think it helps to get more information about what is happening.

Anybody else? Thank you very much.

RESERVE MODELS

Average Hindsight Reserve Method

Fisher-Lange Report Year Method

Bornhuetter-Ferguson Method

Slide 1

AVERAGE HINDSIGHT RESERVE METHOD

Goal:

Estimate The Average Future Settlement Value Per Claim For Recent Accident Years, Both For Claims Already Reported And Future Claim Reports.

Based on:

Projected Ultimate Losses And Hindsight [Past Outstanding] Average Values For More Mature Accident Years.

Slide 2

DATA NEEDED

- Cumulative Paid Loss Triangle
- Cumulative Closed (Paid) Claim Count Triangle
- Estimated Ultimate Number of Claims
- Estimated Ultimate Losses For Several Mature Accident Years

Slide 3

XYZ AUTO INSURANCE COMPANY

Cumulative Paid Losses

Accident Year	Months of Development 12	24	36	48	60	72	84	Ultimate
1984	$50.0	$80.0	$98.2	$107.8	$113.2	$117.2	$119.7	$119.7
1985	60.2	97.0	118.5	130.7	136.6	141.0		143.8
1986	75.5	120.1	147.0	162.4	171.0			178.7
1987	91.9	147.1	180.2	197.0				220.1
1988	115.0	184.1	226.4					*
1989	146.5	233.4						
1990	181.1							

Note: Amounts are in thousands of dollars.

* To be estimated.

Slide 4

XYZ AUTO INSURANCE COMPANY

Cumulative Number Of Closed Claims

Accident Year	Months of Development 12	24	36	48	60	72	84	Ultimate*
1984	50	75	88	94	97	99	100	100
1985	55	83	97	104	107	109		110
1986	63	94	110	118	122			125
1987	70	105	123	131				140
1988	80	120	141					160
1989	93	139						185
1990	105							210

* Estimated using claim count development factors.

Slide 5

XYZ AUTO INSURANCE COMPANY

Calculation of Average Outstanding Losses At 36 Months

Purpose: Project 1988's Future Settlement Dollars

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Accident Year	Estimated Ultimate Losses	Paid Losses @ 36 Months	Estimated Future Payments (1)−(2)	Estimated Ultimate Number Of Claims	Number Of Closed Claims	Number To Settle Beyond 36 Months* (4)−(5)	Average Future Payment (3)/(6)
1984	$119,700	$98,200	$21,500	100	88	12	$1,792
1985	143,800	118,479	25,321	110	97	13	1,948
1986	178,700	147,010	31,690	125	110	15	2,113
1987	220,100	180,172	39,928	140	123	17	2,349

Exponential Curve: R−squared = 0.996

Trend Factor = 1.093

Fitted forecasted value for AY 1988 = $2,551

* Includes IBNR Claims

Slide 6

XYZ AUTO INSURANCE COMPANY
ESTIMATED ULTIMATE LOSSES – ACCIDENT YEAR 1988

(1)	Forecasted Average Future Payment Per Claim	=	$2,551
(2)	Number Of Future Claims To Settle (Ultimate – No. of closed claims) = 160 – 141 (See Slide 5)	=	19
(3)	Estimated Future Loss Payments (1) x (2)	=	$48,469
(4)	Paid Losses to Date (Slide 4)	=	$226,374
(5)	Estimated Ultimate Losses (3) + (4)	=	$274,843

Slide 7

AVERAGE HINDSIGHT RESERVE METHOD

ADVANTAGES

- Relatively Unaffected By Any Recent Changes In Case Reserving Practices.
- Can Easily Adjust Trend Assumption.

DISADVANTAGES

- Sensitive To Payment Pattern Shifts.
- Averages Highly Variable When Only A Few Claims.
- May Be Insufficient If Book Of Business Has Significantly Changed.
(Example: Policy Limits Dramatically Increase)

Slide 8

FISHER-LANGE REPORT YEAR METHOD

Goal:

Estimate The Future Settlement Dollars For Claims Reported To Date.

Based On:

A Forecast Of The Future Settlement Values Of Cases Reported To Date, But Not Yet Closed.

Slide 9

DATA NEEDED

- Total Number Of Claims By Report Year
- Number Of Settled Claims By Report Year and Age
- Paid Claim $ By Report Year and Age

Slide 10

NUMBER OF CLAIMS
REPORTED BY YEAR

REPORT YEAR	CLAIM COUNTS
1986	432
1987	444
1988	454
1989	532
1990	511

Report Year = Year in which the claim was reported to the company.

Note: At 12/31/90 the report year count represents a known quantity for all years.

slide 11

NUMBER OF CLAIMS SETTLED
BY REPORT YEAR AGE

REPORT YEAR	Number Of Claims Settled In Period (months) 0-12	13-24	25-36	37-48	49-60	Total No. Of Claims Settled	Total No. Of Claims Reported	Remaining Claims Left Unsettled
1986	260	115	30	17	10	432	432	0
1987	261	120	33	19		433	444	11
1988	266	124	32			422	454	32
1989	293	138				431	532	101
1990	290					290	511	221

THE GOAL : Estimate the average closing costs of "remaining claims left unsettled".

Slide 12

PAID SETTLEMENTS

BY REPORT YEAR AGE

(AMOUNTS IN $000'S)

REPORT YEAR	Dollars Paid On Claims Settled In Period (months) 0–12	13–24	25–36	37–48	49–60
1986	$355	$345	$111	$68	$55
1987	359	371	125	81	
1988	380	397	140*		
1989	440	462			
1990	479				

*Example: For claims reported in 1988 that were settled between 25–36 months (i.e. during 1990), the paid settlement amount was $140,000.

Slide 13

AVERAGE COST OF CLAIMS SETTLED

BY REPORT YEAR AGE

REPORT YEAR	Average Settlement Cost In Period (months) 0–12	13–24	25–36	37–48	49–60
1986	$1,365	$3,000	$3,700	$4,000	$5,500
1987	1,375	3,092	3,788	4,263	
1988	1,429	3,202	4,375*		
1989	1,502	3,348			
1990	1,652				

$$\text{AVERAGE COST} = \frac{\text{\$ PAID In A 12 Month Period (slide 13)}}{\text{NUMBER OF CLAIMS Settled In The Period (slide 12)}}$$

$$\text{* Example :} \quad \frac{\$140{,}000}{32} = \$4{,}375$$

Slide 14

AVERAGE COST OF CLAIMS SETTLED

BY REPORT YEAR AGE

REPORT YEAR	Average Settlement Cost In Period (months) 0-12	13-24	25-36	37-48	49-60
1986	$1,365	3,000	3,700	4,000	5,500
1987	1,375	3,092	3,788	4,263	***5,830***
1988	1,429	3,202	4,375	***4,543***	***6,180***
1989	1,502	3,348	***4,663***	***4,842***	***6,551***
1990	1,652	***3,459***	***5,070***	***5,160***	***6,944***
Average % Increase	4.8%	3.7%	8.7%	6.6%	6.0%*

Numbers in bold are projections using an exponential fit to prior values within the same age interval.

Example : Projected 1991 calendar year settlement dollars for 1990 reports, namely $3,459, is the appropriate value on the exponential curve fit to the 13-24 months column.

* Judgementally selected

PORTION OF REPORT YEAR CLAIMS SETTLED

BY REPORT YEAR AGE

REPORT YEAR	Portion Of Claims Settled In Period (months) 0-12	13-24	25-36	37-48	49-60
1986	.603	.266	.069	.039	.023
1987	.588	.270	.074	.043	
1988	.586	.273	.070		
1989	.551	.259*			
1990	.568				

$$\text{RATIO} = \frac{\text{NUMBER OF CLAIMS SETTLED During Period (slide 12)}}{\text{NUMBER OF CLAIMS REPORTED (slide 11)}}$$

$$\text{* Example :} \quad \frac{\text{No. Settled in 13-24 month period} = 138}{\text{Total No. Reported} = 532} = .259$$

ESTIMATING FUTURE SETTLEMENT RATES

From Preceding Page

	1989
0–12 MONTHS	.551
13–24 MONTHS	.259

1.000 – .551 = Portion of ultimate claims open at beginning of 13–24 month period.

.259 = Portion of ultimate claims settled in 13–24 month period.

$\frac{.259}{(1.000 - .551)}$ = Proportion of open claims settled in 13–24 month period, of the claims open at the start of the period.

PORTION OF REPORT YEAR CLAIMS SETTLED

BY REPORT YEAR AGE

REPORT YEAR	Portion Of Claims Settled In Period (months)				
	0–12	13–24	25–36	37–48	49–60
1986	.603	.266	.069	.039	.023
1987	.588	.270	.074	.043	***.025***
1988	.586	.273	.070	***.045***	***.026***
1989	.551	.259	***.094***	***.061***	***.035***
1990	.568	****.249***	*****.091***	***.058***	***.034***

The bold numbers are values projected as illustrated below:

$$* .249 = (1.000 - .568) \times \frac{.259}{(1.000 - .551)}$$

$$** .091 = (1.000 - .568 - .249) \times \frac{.070}{(1.000 - .586 - .273)}$$

CALCULATION OF AVERAGE INCURRED LOSS

BY REPORT YEAR AND AGE

----REPORT YEAR 1990----

Time Since Beginning of Report Year	Portion of Reported Settled *		Average Cost **		
0–12 Months	.568	X	$1,652	=	$938.34
13–24 Months	.249	X	3,459	=	861.29
25–36 Months	.091	X	5,070	=	461.37
37–48 Months	.058	X	5,160	=	299.28
49–60 Months	.034	X	6,944	=	236.10
			Overall Average	=	$2,796

* Slide 18
** Slide 15

Slide 19

ESTIMATED INCURRED LOSSES ON REPORTED CLAIMS

Report Year	Average Incurred Loss		Total Number of Reported Claims **		Estimated Incurred ($000)
1986	$2,159	X	432	=	$ 933
1987	2,253	X	444	=	1,000
1988	2,383	X	454	=	1,082
1989	2,658	X	532	=	1,414
1990	2,796 *	X	511	=	1,429
			Total	=	$5,858
			Paid-to-Date	=	$4,168
			Indicated Reserve	=	$1,690

* Slide 19
** Slide 11

Slide 20

SUMMARY OF METHOD

Data: (1) Number of Claims By Report Year

(2) Number of Claims Settled By Report Year and Age

(3) Paid Claim $ By Report Year and Age

Project: (1) Portions of Reported Claim Counts To Be Settled In Future Periods

(2) Average Severities of Claims To Be Settled In Future Periods

Resulting Estimate: (1) Incurred Losses and Reserves, For Reported Claims Only

Slide 21

FISHER–LANGE REPORT YEAR RESERVE MODEL

ADVANTAGES

- More information than accident year age–to–age factor methods.
  - a. Settlement patterns.
  - b. Inflation's impact directly reflected.
- Can be used to evaluate claims department case reserving, by providing estimates for known cases that can be compared to current case reserves.

DISADVANTAGES

- Limited to evaluating reserves for known claims.
- Need additional method to forecast "pure" IBNR claims.

Slide 22

BORNHUETTER-FERGUSON METHOD

Goal:

Estimate The Dollars To Be Reported In The Future.

Based On:

Expected Ultimate Losses, and The Estimated Portion Of Dollars Yet To Be Reported.

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DATA NEEDED

- Earned Premium or Exposure By Year.
- An Expected Loss Ratio, or Pure Premium, For Each Year.
- An Estimate Of The % Of Dollars As Yet Unreported, Usually Based On Loss Development Factors (LDF's).

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"IBNR" RESERVES

For an accident year being valued as of 12/31/90, there are 4 categories of future claims activity that may not be reflected in either the paid dollars or the case reserves in the data:

1. Losses Not Yet Reported To The Company

2. Claims in Transit:
   (Claims Reported, But Not Recorded By 12/31/90)

3. Future Development on Known Open Claims

4. Reopenings On Claims Currently Closed

Bornhuetter-Ferguson And Most Accident Year Methods Produce "Broad" IBNR Which Includes All 4.

NOTE: (1) and (2) often termed "True", or "Pure", IBNR

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BASIC FORMULAS

IBNR Reserve = IBNR Factor X Expected Losses,
where:
IBNR Factor = % Unreported

Expected Losses = Loss Ratio X Earned Premium

or

Expected Losses = Pure Premium X Exposure

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IBNR FACTOR DERIVATION

IBNR Factor = % Unreported

= IBNR* / Ultimate Losses

= 1 - (Incurred To Date / Ultimate)

= 1 - (1 / LDF To Ultimate)

* "Broad", i.e. case development plus claims not yet reported.

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BORNHUETTER – FERGUSON EXAMPLE

	Accident Year			
	1987	1988	1989	1990
(1) Earned Premium	\$1,000	\$1,250	\$1,600	\$2,000
(2) Expected Loss Ratio	0.65	0.65	0.70	0.75
(3) Expected Ultimate Losses (1) x (2)	\$650	\$813	\$1,120	\$1,500
(4) Development Factor	1.250	1.350	1.650	2.000
(5) IBNR Factor 1 – [1 / (4)]	20%	26%	39%	50%
(6) IBNR Reserve (3) x (5)	\$130	\$211	\$437	\$750
(7) Incurred To Date	\$600	\$600	\$700	\$1,000
(8) Estimated Ultimate (6) + (7)	\$730	\$811	\$1,137	\$1,750

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CONSIDERATIONS

- Premium Adequacy; and Expected Loss Ratios.

- Changes in Operations:
  - Reinsurance
  - Longer-Tailed Lines (LDF selection more critical)
  - Underlying Limits, Deductibles
  - Claims Made vs. Occurrence
  - Claims Handling

- Changes in Mix Of Business That May Impact Either Loss Ratios, and/or Reporting Patterns.

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BORNHUETTER-FERGUSON METHOD

ADVANTAGES

- Easy To Use And Explain.
- Compromises Between Loss Development And Expected Loss Ratio Methods.
- Avoids Overreaction: Doesn't Apply Development Factors To An Unusual Claim Occurrence.
- Suitable For New or Volatile Lines of Business.
- Can Be Used With No Internal Loss History.

DISADVANTAGES

- Dependency Upon Projected Ultimate Loss Ratio or Pure Premium.
- Additional Methods Necessary To Develop Unreported Percentages.

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ILLUSTRATION OF "TEMPERING" EFFECT

	Expected	One Extra Large Claim Of $150
(1) Earned Premium	$2,000	$2,000
(2) Expected Loss Ratio	0.75	0.75
(3) Expected Losses (1) x (2)	$1,500	$1,500
(4) Incurred To Date	$750	$900
INCURRED DEVELOPMENT TECHNIQUE		
(5) Development Factor	2.00	2.00
(6) Loss Development Projection	$1,500	$1,800
BORNHUETTER–FERGUSON TECHNIQUE		
(7) IBNR Factor 1 – [1 / (5)]	50%	50%
(8) Bornhuetter–Ferguson Ultimate (4) + [(3)x(7)]	$1,500	$1,650

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Adjustment Factor

	(1)	(2)	(3)	
Accident Year	Expected Losses	Development Factor	Expected Incurred To Date (1) / (2)	Actual Incurred To Date
1987	$650	1.250	$520	$600
1988	813	1.350	602	600
1989	1,120	1.650	679	700
1990	1,500	2.000	750	1,000
Total	$4,083		$2,551	$2,900

Adjustment Factor = $2,900 / $2,551 = 1.14

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ADJUSTED BORNHUETTER-FERGUSON

	Accident Year			
	1987	1988	1989	1990
(1) IBNR Reserve (Slide 28)	$130	$211	$437	$750
(2) Adjusted IBNR Reserve 1.14 x (1)	$148	$241	$498	$855
(3) Incurred to Date	$600	$600	$700	$1,000
(4) Estimated Ultimate	$748	$841	$1,198	$1,855

NOTE: This Adjustment May Be Appropriate If The Expected Loss Ratio (or Pure Premium) Assumptions Now Appear Suspect, But Will Not Be Appropriate If The Difference Between $2,551 and $2,900 On Slide 32 Is Due Solely To A Speed-Up In Reporting Patterns.

Slide 33

1991 CASUALTY LOSS RESERVE SEMINAR

2D: EVALUATING THE SECURITY OF A REINSURER

Moderator

Emanuel Pinto
Skandia America Group

Panel

Shaun Flynn
Standard & Poors

Stephen J. Ludwig
Hartford Insurance Group

John H. Snyder
A.M. Best Company

Recorder

Margaret O'Brien
Skandia America Group

MR. PINTO: This is the session, Evaluating the Security of a Reinsurer. A little note here says that I should advise you all that the session is being recorded and tapes will be available shortly following the session at the cassette sales booth.

Let me take a few minutes before getting onto the panelists, who will comprise the main substance of this hour and a half, by just touching on a couple of points of interest. One thing that I would like to bring to your attention is a booklet that has been put out by the Reinsurance Association of America. It is called "Guide to the Evaluation of Property Liability Reinsurers." It's about the NAIC Insurance Regulatory Information System, the IRIS tests and it is simply a summary of the results on the IRIS test for a composite of reinsurers and some discussion about how each of the individual tests may bear differently on reinsurers and any special characteristics of reinsurance that may have an impact on the IRIS tests. The IRIS tests, I believe, are receding somewhat into history, but they still are being used and the booklet gives various measures of central tendency; means, medians, various percentiles for reinsurers on individual IRIS tests. It is updated periodically. This latest one here has data through '89, but it is soon to be updated.

Of more interest is the development, in the regulatory community, referred to as Risk Based Capital Requirements. A lot of you may already be familiar with it, but it is quite important and so for those that are not I will mention a little bit about it. It's not something that applies specifically to reinsurers. It will apply to primary companies as well and what it refers to, basically, is an effort by regulators to set capital requirements for insurance companies that reflect the various risk characteristics associated with an insurance company. For example, how much capital is required to support the risk that reserves are inadequate. There are many other risks inherent in an insurance company. You have asset risk; depending on the type of assets that are involved there may be a default risk or interest rate risks such as asset liability mismatch or reinvestment risks. The unearned premium reserve has similar risks associated with it, and premium adequacy is an important consideration here. This risk based capital formula is still in its formative stages. There is an NAIC working group. It's spearheaded by the New York Department. Vinnie Lorenzano and Elise Liebers are involved in it. They are evaluating all the different types of risks that have been characterized or that a particular insurance company may have...credit risk, reinsurance recoverables, agents balances...to try to determine how much capital is required to support the various risk elements. Ultimately, I believe the plan is either to have this included as schedules in the annual statement or conceivably a supplement because it could be quite involved, but probably within the statement itself and it is designed to incorporate information otherwise available in the statement. It's going to have quite an impact in terms of evaluating financial solidity. You may have a company that has, let's say, $250 million in equity and this risk based capital formula will come up with an amount that says you should have $300 million in equity. So it would appear that you're shy. It will be used to target regulatory resources and it's not entirely clear now whether the amount that will come out of this risk based formula is intended to be a minimum capital or a target capital. It will use information by line of business. It's quite involved and as the work on it has progressed more and more people have become involved and it is reaching a point now where they hope to begin testing the existing formula around year end. I think they'll have a preliminary formula in place for testing. Originally, the intent was to have it included in the 1992 annual statement blank, but it doesn't look like they will make it. It is probably more likely 1993, but perhaps in 1992 on some sort of a test basis.

It is a development worth watching, and if there is any further interest in it, I would be happy to take any questions. But now, not to take any more time away from our panelists, we have three individuals today who have all worked closely in this area of evaluating the financial wherewithal of insurance companies and particularly reinsurance companies.

Our first speaker today will be Shaun Flynn who is a Vice President with the insurance group of Standard & Poor's (S&P). He is involved with the claims-paying ability rating process for property/casualty, life/health, and reinsurance companies for both domestic and international companies.

MR. FLYNN: Good morning! My name is Shaun Flynn, and I work with the insurance group at Standard & Poors. To give you some background about myself, I spent a good part of my career working in the reinsurance business with Guy Carpenter & Co., the world's preeminent reinsurance broker. I also was fortunate enough to begin my career in the rating business with the A.M. Best Co., and that has proved to be a very valuable learning experience.

(Slide 1)

What I want to do today is to review the rating methodology profile used in evaluating reinsurance companies at S&P. You'll be happy to hear that you're going to get the twenty minute version of this presentation, moving through the slides very quickly, as opposed to the two hour version which can have a hypnotic effect on an audience.

(Slide 2)

One of the fundamental things S&P looks at when evaluating the claims-paying ability of any insurance company is industry risk. We look at the reinsurance business and believes it's a business that is relatively risky when compared to the other sectors of the property/casualty and life/health insurance business. Some of the factors examined are rivalry among existing firms, and the growth potential of the market. In this regard, the reinsurance business is very competitive today with little growth potential in the market for companies offering traditional reinsurance products. Growth today is occurring in the area of finite risk business and business obtained from the non-traditional sources (the alternative markets). We also recognize that the nature of the tail in claims reporting and settlement is very long for reinsurance companies. Moreover, it's very difficult to determine adequate levels of reserve adequacy. Another area we focus on is, in our assessment of industry risk, is the regulatory environment. This industry risk factor has both positive and negative implications for the reinsurance business. There are some positive regulatory changes in the wings than in theory will promote solvency. But, one potential problem is that increased regulation may reduce returns that in S&P's opinion are already inadequate. In other words, if you want to create an environment where you guarantee there are no losers by excessive regulation, it's going to be difficult to have any winners.

Again, in S&P's opinion, the returns associated with the reinsurance business, are not commensurate with the risk associated with being in the business. For instance, S&P's research indicates that return on equity (ROE) has averaged about 12% over the last cycle - about 8% since 1950. It is noteworthy that most of the Chief Executive Officers, and Chief Financial Officers that we've talked to in our management meeting process, tell us that they want 15% to 20% ROE's over a cycle. Also, parent companies of reinsurers are, for the most part, requiring that their reinsurance subsidiaries generate a 15% to 20% ROE, and the reinsurance industry is not meeting these objectives. Reinsurance industry rate of returns also are inadequate compared to those of Corporate America where an index of S&P 500 companies were earning ROE's of 15% over the last cycle. Another important area we look at when evaluating industry risk is the potential threat of new entrants to the business, and this is very low today. We are now seeing a consolidation of the reinsurance industry, as many ceding companies, particularly large stock agency companies are adopting new security guidelines. These guidelines require a minimum of a $100 million in surplus to writer property reinsurance, and $200 million in surplus in order to accept casualty related risk. This is a fundamental change in the way business has historically been done. As many of you know, during the '70s naive capacity was abundant...anyone could have put a shingle out and written business...those days are gone. On the opposite side of the coin, the barriers to exit are still very low in the reinsurance business. S&P is more concerned about continuity in the marketplace instead of solvency - the historic concern. S&P believes there are going to be a lot of companies exiting the reinsurance business and collecting the money from those companies can be just as difficult as getting monies from an insolvent company.

(Slide 3)

Just to give you a little bit of perspective about current market conditions...earlier I made the comment about the market being a mature market...you can see in the late '80s premium growth has been nominal. In fact, in seven of the last twelve years, on an inflation adjusted basis, premium growth has been negative. Still, we're seeing modest growth today as some of the major direct writers are growing their facultative books. That's a somewhat traditional source of business, but most reinsurers are looking for alternative ways to grow the business. You may notice, that in 1985-1986, there were 30% plus increases on the premium side for the U.S. reinsurance industry. This was driven by the competitive environment that existed in the late '70s and early '80s and resulted in grossly inadequate rates. In fact, during the years 1984 and 1985 and 1986 there were record numbers of insolvencies.

(Slide 4)

This slide provides some perspective of the U.S. reinsurance market as compared to the international reinsurance market. The U.S. market appears highly fragmented when looking at premium volume for 77 active professional reinsurance companies. This data excludes about another 30 reinsurance departments of primary companies. But, these 100 plus companies are collectively writing about $13 billion in premium volume. Furthermore, a recent U.S. Department of Commerce Study indicates estimates that about another $9 billion has been ceded abroad from U.S. domiciled companies. You can see from the slide that the top 15 German reinsurance companies have gained marketshare since 1984 and, in fact, these companies alone have $13 billion in premium. Munich Re itself has $7 billion, Swiss Re has $5 billion, Lloyd's has $3.5 billion and that excludes Lloyd's facultative business. In this regard, the U.S. businesses resembles the U.S. banking industry. It is highly fragmented and is going through a consolidation process. The European banks are very large, and you don't have a fragmented industry, and the European reinsurance companies are also very large. For example, the top 50 non-U.S. reinsurance companies, generated more than two times the volume of the entire U.S. reinsurance industry. This serves as evidence that the reinsurance business is truly a global business.

(Slide 5)

Another important aspect of our claims-paying ability rating process is that during this process we spend at least one <u>day</u> a year day talking to management of the companies we rate. We discuss some of the issues shown in this slide, such as strategic goals, assessing management's operational skills, and discussing controls in place to ensure that desired results are achieved. We also review financial goals, and attempt to develop an understanding of the risk tolerance level of management. From my perspective this is one of the real advantages a rating agency such as S&P has when evaluating a company's financial strength, when compared to another insurance company or an individual responsible for reinsurance security analysis. We get a chance to sit down and meet with, again at least once a year with, American Re, Pru Re, Gen Re, Kemper Re, Skandia America Re, North American Re, Swiss Re, Munich Re, Hannover Re, and the list goes on, to discuss the competitive advantages offered by each company, to get an idea of where they believe the business is going, and to understand how they are going to respond to ever changing market conditions.

From an analytic perspective, we generally get concerned if a company's strategic plan does not make sense. For instance, if the company plans to embark on a strategy to dramatically grow its book of business in today's market. As mentioned previously we attempt to get a feel, for management's financial risk tolerance level for some obvious reasons. For instance, we try to understand the level of debt to capital a holding company is happy with and what sort of constraints debt service is going to place on an operating insurance company. Furthermore, we don't evaluate a company's capital base on a two to one, or a three to one premiums to surplus ratio, but try to understand what benchmarks for capital adequacy a company is using to evaluate its own capital position.

(Slide 6)

The next area we will examine is termed business review. At S&P we generally examine the following areas. We evaluate a company's business review, ownership, organizational structure, geographic dispersion, product mix, distribution channel, market share, and competitive advantages offered by a particular company.

This analysis leads to an overall understanding of a company's business characteristics. From a solvency perspective, two things come to mind. One, we tend to like large blocks or diversified books of business. We get concerned when companies are concentrated in terms of products sold or a geographic dispersion of business written. An extreme example would be a London Market company who consistently writes large line sizes at the upper end of a catastrophe reinsurance program for Travelers, Aetna, or Hartford. If the wind blows the wrong way they're going to be blown out of the water. I don't believe this as much today as it did before the mid 1980's. But, there are probably some companies sitting out there today that are technically insolvent, after what's gone on with catastrophe losses throughout the world over the last several years.

(Slide 7)

Another important rating factor is operating performance. We focus on after tax return on assets (ROA), and return on revenue (ROR). We don't tend to focus on return on equity, like management of many insurers do, because of the leverage effect on the balance sheet. We also look at some other measures of financial returns. One of the ratios we like to examine - largely ignored by most analysts - is the ratio of unassigned funds to total assets. This ratio gives you an idea of how much a company has been able to grow its retained earnings base, since it began business, after dividend requirements. Interestingly enough, the work done by Edward Altman, in corporate bankruptcy studies, indicates that this ratio is the single most predictive measure of bankruptcy.

Another issue we believe people should pay more attention to is taxes, particularly those incurred on a statutory reporting basis. This issue is important when analyzing operating insurance companies versus holding companies. In many cases where there is debt at the holding company level, the operating insurance company will attempt to maximize taxable investment income. Thus, reporting a large amount of taxes incurred on a statutory basis (on a stand-alone basis). These amounts are then paid to the holding company (that is tax advantaged) in lieu of dividends. Thus, the incurred tax number in the statutory statement is not valid. By moving taxes up to the holding company, to service debt requirements, operating insurance companies are getting around statutory dividend restrictions. This practice, coupled with the need to pay shareholder dividends, could constrain the capital growth of the operating insurance company, and inhibit its ability to respond to market conditions.

(Slide 8)

Just to give you some benchmarks for comparison, here are examples of profitability measures for the U.S. reinsurance industry. From these figures you can really see the recovery in 1986 was being driven by the dramatic rate increases. You also can see that the industry has done pretty well despite soft market conditions, in terms of maintaining a stable ROA and ROR. One of the reasons this has happened is that investment income has grown because of an expanding asset base. The invested asset base has grown because a lot of reinsurance companies have been over capitalized in order to meet ceding company capital requirements. Accordingly, this has driven down ROE which we talked about previously.

(Slide 9)

An issue that is more interesting for an actuarial audience is looking at underwriting performance with a focus on loss reserve adequacy. We look at the combined ratio as a measure of underwriting performance, but as you can appreciate, those results are driven by current estimates of loss reserves. Thus, in our analysis process, assessing the adequacy of loss reserves is probably the most difficult thing we have to do. In this process we generally try to sit down with a company and attempt to find out how they establish reserves. This includes the procedures for establishing IBNR reserves, case reserves, and additional case reserves (ACR). For instance, does the reinsurer work with ceding companies to establish ACR, or is this done independent of what the ceding company may believe? In an attempt to further our analytic procedures on this subject, and to ask the right questions of management, we have a ACAS on our staff. Of course, we do the traditional Schedule P analysis and do payment projections and incurred loss projections in a multitude of ways by adjusting selected loss development factors. This process many times lead us to request additional data from companies based on their internal business segments. These business segments would include areas such as general liability excluding asbestos, facultative casualty, casualty treaty, etc. We will then take the data presented to us and attempt to develop a level of comfort with loss reserve levels. In the end we do not try to come up with a number and haircut a company's surplus for reserve deficiencies but, we try to get a handle on the magnitude of the problem. In this regard, we generally take a very conservative approach by assuming that no company has redundant reserves, they are either adequate or you've got a problem.

Another topic that comes to mind is that we have the ability to talk with companies on a confidential or proprietary basis. We are exempt from SEC disclosure requirements regarding insider information. We can receive insider information and do not have to disclose this information to people who call us asking our opinion about companies. Our opinion is our rating, and what we publish in the public domain. But from these phone calls one of the things we are hearing an awful lot about today is the dramatic increase in precautionary claims notices being filed, which are related to environmental issues. Of course, no one knows if this will result in a large number of actual claims at the end of the day.

We also spend a lot of time evaluating the financial strength of companies outside the area of reserves, and reinsurance is one of those areas. For instance, we try to understand what a company's reinsurance buying philosophy is. We try to understand why they believe their retentions and limits are appropriate. We also evaluate the quality of reinsurers they deal with. These are some of the reasons, that from our perspective, it takes the better part of a day to sit down with a company and learn about these issues.

(Slide 10)

This slide demonstrates that the reinsurance industry is now producing less volatile and better combined ratios than the primary industry. This has occurred over the last several years beginning in 1988. There are a number of reasons for this phenomenon. Ceding companies, for the most part, have shifted to purchasing greater amounts of less premium intensive and less volatile non-proportional business. Ceding companies increased their retentions and you have what has been termed a decoupling effect by some people in the marketplace. As a result, reinsurers are sharing less ground up losses on a dollar for dollar losses with ceding companies.

(Slide 11)

Also, U.S. professional reinsurance companies have not been large writers of catastrophe business over the last several years, a point that many people fail to recognize. For instance, in 1989 only about two and one-half percentage points of the 110% combined ratio were due to catastrophe losses. Large writers of catastrophe business are the London market and Lloyd's, the French market, and the major European direct writers. This becomes evident when we do look at the combined ratios of the international reinsurance companies versus the U.S. reinsurance companies. Since 1988 the non-U.S. reinsurers have suffered substantially from catastrophe losses. They've also suffered from run-off of U.S. liability business. Much of which was written through the London market. S&P believes that international reinsurance companies will continue to suffer and certainly will not show improved results in 1990. In fact now they are seven percentage points worse than the U.S. industry on a combined ratio basis. Most notably, Lloyd's, and Munich Re have recently reported some sub-par underwriting results.

(Slide 12)

I've mentioned previously that S&P believes that reinsurance is a relatively high risk business. This is largely due to the long-tail nature of claims reporting and settlement. This phenomenon is demonstrated by the slide shown that depicts accident year loss ratio development for 77 active professional reinsurance companies. You can see that is has historically been very difficult for reinsurance companies to establish accurate loss reserve levels on an accident year basis. For example, back in accident year 1981 the original loss ratio reported on a cumulative basis by this group of professional reinsurance companies developed adversely by 3.7 percentage points by calendar year 1990. You also can see that the large amount of adverse development experienced in the years 1982 through 1984, and can understand why 30% rate increases occurred, causing the marketplace to harden dramatically in 1985 and 1986.

Since 1987 competitive pressures began mounting, and you can see that the loss ratio in accident year 1989 has already developed adversely by almost two percentage points, after only twelve months of development. For this reason, we tend to believe that the improvement shown in the industry reported combined ratio for the first six months of 1991, and even the improvements shown in 1990, may very well be overstated due to underestimating what accident year loss ratios will ultimately develop to.

(Slide 13)

Adequacy of capital is another very important factor in our rating analysis. We look at operating leverage on a net and gross basis. But, we're more interested in trying to determine if a company's capital base can adequately support the business being written, along with the associated liabilities. Again, adequate reinsurance arrangements and adequate loss reserves play an important role in determining if a company's capital base is sufficient.

In our analytic process we also look at reserve leverage in terms of reserve to surplus, only from the perspective that the more leveraged you are the more exposed your capital base potentially becomes. We firmly believe that any company can be off by 5% on its loss reserve levels over a cycle. Thus, if you're levered at two-to-one, you could potentially lose 10% of your surplus, and if you're levered at three-to-one you could lose 15% of your surplus.

We also look at investment leverage. We're concerned with the double levering effect of affiliated investments. More importantly, we spend a lot of time looking at those affiliated companies and seeing if they are adequately capitalized. We also are concerned about how exposed a company's portfolio is to changes in interest rates as well as changes in the equity market.

(Slide 14)

In the previous slide we talked about various leverage ratios. As you can see from this slide, leverage ratios have been coming down over the last several years, and that certainly gives the impression that the industry is over-capitalized. This may be true, but from S&P's perspective not to the extent that most people believe. You need to recognize that the capital base of reinsurance companies are more exposed to uncertainty than those of primary insurance companies. For instance, environmental claims are the black hole of the industry. You should recognize that 54% of all loss reserves represent IBNR reserves. Also, workers' compensation and general liability business, written on a proportional basis, are reserved at over four times premium. Plus, there's a lack of retrocessional capacity today, and some reinsurance companies are being forced to reduce their line sizes or develop alternative means of coverage to make up for this lack of capacity. If companies do not do this they may be exposing their capital base. It is also interesting to note that on a loss reserve to earned premium basis (not shown on this slide), the industry is leveraged at an all time high at 222% of premiums.

(Slide 15)

When looking at a non-U.S. reinsurance company it is important to recognize that they are generally levered at about two times more than U.S. reinsurers. This largely occurs as surplus levels are depressed, as asset values are understated. Many European reinsurers are valuing assets at the lowest value principle, which is the lower of cost or historic market...the lowest value ever. You also need to recognize that the non-U.S. companies are balance sheet oriented. Moreover, as we talk to many European companies they tell us they try to establish liabilities as high as possible and minimize taxable income. More importantly, this approach is supported by regulators, tax authorities and helps promote solvency. In fact, of the 600 plus retirements from the insurance business that we track, about 70% of these companies are U.S. companies. This is not surprising from our perspective, as in the U.S. the focus is generally on maintaining short-term profitability. Moreover, companies are influenced by tax authorities and by consumer activists to minimize reserve levels.

(Slide 16)

I also want to point out that in terms of reinsurance leverage we look at more than the ratio of reinsurance recoverables to surplus. We look at Schedule F, and make our own assessment of potentially uncollectible reinsurance by looking at the quality of individual reinsurers. We then discuss our opinion with companies that we are rating to get their perspective. Following these discussions we will haircut a company's stated capital base if necessary. We also scrutinize how companies collateralize reinsurance recoverables, and where necessary obtain documentation that the letters of credit received are clean and irrevocable, and are with sound banks (S&P also rates banks and other financial institutions).

(Slides 17 & 18)

One of the more interesting slides we've put together today depicts reinsurance recoverables. Collectively the group of 77 active U.S. professional reinsurance companies showed $13.2 billion of reinsurance recoverables. In effect U.S. reinsurance companies have ceded liabilities off their balance sheets equal to their collective surplus. Furthermore, there's a $300 million liability on the balance sheet established as a provision for reinsurance. From S&P's perspective, that's not going to be enough to cover the amount of reinsurance that will ultimately become uncollectible. This becomes evident when you examine the aging schedule of paid recoverables. This schedule shows that 30% of paid recoverables are over 90 days past due. Twenty-five percent are over 180 days past due. If a recoverable on paid losses is over a 180 days you've got some type of problem.

(Slide 19)

I'm going to move quickly through the investment side, by briefly making a few comments. When analyzing a company's investment portfolio we examine portfolio performance. We also focus on asset allocation strategy, and the credit quality of the portfolio. We also have developed some capital models that are used to determine a company's exposure to its capital base from investments in non-investment grade securities and mortgage loans. Fortunately, these are not major issues for reinsurance companies, nor should they be as the reinsurance business contains enough underwriting risk.

One of the more interesting situations existing today is the decline in interest rates. The rates that we are experiencing are going to reduce investment income and could reduce profitability. This is going to be tough going because, as we all know, loss costs will probably increase at a rate exceeding interest rates available to insurance companies today. On the other side of the coin, surplus levels of reinsurance companies should be increasing due to unrealized capital gains on the bond portfolio (resulting from declining interest rates). Still, most companies do not want to realize these gains, pay a tax, and reinvest at a lower interest rate than what they are currently earning.

(Slide 20)

From a liquidity perspective, one of the focal points our review process is an analysis of cash flow. From this perspective we get particularly concerned when underwriting cash flow is negative for a company, particularly if this has occurred for several years. If coupled by a bond portfolio that's underwater and a weak cash position, a company could be forced to sell securities to pay losses. Reinsurance companies should exhibit outstanding liquidity characteristics, given the risk characteristics of the business, and the exposure to catastrophic events.

(Slide 21)

To give this topic some more perspective, here's some data of underwriting cash flow for the industry. Things improved a little bit in 1990, but we believe that only modest improvement will occur for 1991. The increase in 1990 was driven by the growth in premium volume experienced, mostly finite risk related and alternative market related.

(Slide 22)

The final point I'd like to discuss today regarding our analytic process, is termed financial flexibility. We look at sources of additional capital the company has if they do have a liquidity problem. For instance, some of the more astute reinsurers have developed access to the capital markets, either by establishing a commercial paper program or bank lines of credit, to provide access to cash should the need arise. We also look at access to reinsurance markets. Could a company cede more or less business? How could these transactions impact the balance sheet and income statement? Overall, we are just trying to get a perspective at sources of additional capital and the potential threats to the company's capital structure.

(Slide 23)

To summarize some perspectives we have on the reinsurance business today: The U.S. reinsurance industry and the international reinsurance industry is strong and largely solvent. The U.S. market is now going through a consolidation process and continuity - when a company goes into run-off mode - is going to be a bigger concern than insolvency. Those of you who have dealt with the New York Insurance Exchange and some other run-off problems, can truly understand that this represents a problem for ceding companies. There's a lack of retrocessional and catastrophe reinsurance coverage in the marketplace today. Accordingly, some reinsurance companies have exposed their capital base.

Competitive pressures continue in traditional markets that should hold premium growth down. Still, we're seeing substantial growth in the finite risk area and in the alternative markets. Most importantly, we firmly believe that the returns being generated today are not adequate for the risk associated with being in the reinsurance business. It is unfortunate that the flight to quality being experienced today is forcing medium size companies to become overcapitalized - in order to meet ceding company guidelines of $100 million for property and $200 million for casualty business. This also is driving down financial returns. Most unfortunate is that well managed small sized companies, that are financially sound may be forced out of the business. Furthermore, we believe that the exposure to uncollectible reinsurance is understated. We further believe that combined ratios are now understated and reserves are significantly exposed to external influences, most importantly, environmental claims. Thank you!

MR. PINTO: Thank you, Shaun. Our next speaker will be Steve Ludwig, who is an actuary with the Hartford Group. Steve, with Robert McCauley, co-authored a paper "A Non-Parametric Approach to Evaluating Reinsurers Relative Financial Strength." That paper won the Dorweiler Prize and I believe that Steve is going to share some aspects of that with us now and I'm going to try to help him with his slides.

MR. LUDWIG: Good morning. As Mel said, the title of my talk is "A Non-Parametric Approach to Evaluating Reinsurers Relative Financial Strength." This represents work that the late Rob McCauley and I did in the mid '80s. For those of you that want a more complete description of this approach, the 1988 Proceedings of the CAS contains the paper describing the approach fully. I'm going to go through these pretty quickly though.

First, I just wanted to go over some of the information sources available to a ceding company who is trying to evaluate the solvency of their reinsurance markets. I've listed A.M. Best separately from the other rating agencies, basically because they've been around the longest and they rate the most companies...the largest number of companies.

(Slide)

Best's provides a few sources of information that are valuable to a ceding company. The first of those that we used back in the '80s and it just now disappeared this year was the Best Trend Report. That has now been consolidated into an expanded version of the Key Rating Guide and that summarized the financials for a five-year history for all companies in the industry and provided about 20 or so ratios spread across liquidity, leverage, loss reserves and profitability and was very valuable to us in putting together our model.

The second source of information Best's provides is the Best's Insurance Report, the large green book that has all the narratives associated with each company. That is also very valuable, except we receive it so late in the year, I don't think we've gotten a 1991 version yet. It would be helpful if it came out a little earlier.

And finally, Best has an on-line system, Best Link, where a ceding company can tie into much of the annual statement data for any of the insurance markets that Best's reports on.

(Slide)

The second source is the NAIC. Their most valuable contribution is requiring the companies to report their data uniformly in the annual statement. They also make all of their annual statement data available on tape. One advantage of purchasing the NAIC tapes is that they include a lot of the Schedule P and Schedule F detail that I don't believe are available on Best Link. And finally, the NAIC has its set of IRIS ratios that people may think are useful to look at.

An important source for us, historically, has been the reinsurance brokers. The Hartford buys a lot of reinsurance through the broker markets and Shaun, in his previous life at Guy Carpenter, was very helpful to us. Our main source of hard copy annual statements is from our brokers and they also provide a valuable source of supplementary information, taking us beyond just the numbers in the annual statement.

We have the other rating agencies that are helpful just to read their narratives and the summarized financials. Nothing is better than talking directly to your potential reinsurance markets and they can translate a lot of the annual statement.

And finally the insurance departments. If nothing else, they might have a hard copy of the annual statement and they also conduct periodic examinations of the companies.

(Slide)

My feeling is that for a ceding company trying to decide which reinsurance markets to use, nothing short of a complete review of each reinsurer's annual statement will be sufficient. However, this is a very time consuming process, so the idea of creating and using some sort of model that uses the annual statement data to identify weak companies has a lot of appeal. Some of these are up on the screen here. I'd like to go over them quickly and then get into the ranking model that we created a little more thoroughly later on.

I've listed out three here, the IRIS system, the AIA formula that was developed with a lot of help from Aetna in the late '70s, and our ranking method that was created at the Hartford. A fourth one that probably deserves to be on there is the A.M. Best Rating System, since in the early '80s that was really what ceding companies were relying on when they were choosing reinsurance markets. I think it is safe to say, for a typical ceding company, their approach to approving reinsurance markets in the early '80s might have been, if a company had an A+ or A rating from Best and had five or ten million dollars of surplus they would be approved. So A.M. Best ratings should have also been included there.

Most of you are probably familiar with the 11 IRIS ratios that are used. Each ratio has an acceptable range associated with it and if a company fails four or more of those 11 tests it is identified as a priority company.

With respect to reinsurance companies, the problem I have with the IRIS ratios is that there are some tests included here where the acceptable ranges really doesn't apply to reinsurance companies. And the fact that there is just one set of acceptable ranges for the entire industry means that virtually none of the reinsurance companies in the industry ever fail four or more tests. So this was not really providing an early warning to ceding companies if they were using this to evaluate the reinsurance markets.

To evaluate all the different models, we put together what we were calling the reinsurance industry: this is composed of 84 companies that over the '80 to '84 period were writing a minimum of a million dollars annually in reinsurance. And, as you can see here, back in the early '80s, there were only three or four companies that failed four or more tests. And quickly, when you get to the '84 and '85 years, all of a sudden you have, in 1985, 46 of the companies failing 4 or more tests. I think part of this is due to, as I said, the single set of ranges being set up for the entire industry and also just the nature of some of the tests themselves. In '85 when reinsurance rates increased dramatically and should have been a positive sign for the industry, all of a sudden a lot of the NAIC IRIS ratios were triggered and companies were being identified as priority companies.

The AIA Aetna formula. I'm not going to spend a lot of time on it, because I don't know that much about it. I can't tell you why they went to five decimal places on all of these ratios.

(Slide)

This slide and the next slide just goes over for the 84 companies, the distribution of Best ratings by year.

Back in the early '80s, as I said, a lot of companies required an A or A+ rating and Best rated most of the companies as A or A+. There was also a predominant rating here of NA3, which stands for insufficient experience. So in 1980 we had 30% of the reinsurance industry that was not assigned a rating due to insufficient experience. In some cases some of those companies did not survive long enough to ever get a letter rating. And that is one problem we had in the early '80s with the Best ratings. So out of the 59 companies that received ratings in 1980, 49 of those were A or A+.

(Slide)

And then, as you see, going from 1980 to 1985 there is a dramatic shift in the ratings. And at that point at least some of the problem companies, we think, were being identified. If you take this further out, up to the present, there's 11 companies listed as NA10, which means they are under state supervision. They've either been liquidated or they are in rehabilitation. We think that's a significant number from the initial 84 that started out.

And a new rating, NA4, has now taken a more significant piece of the industry here. NA4 stands for "rating procedure is inapplicable." So we are still left with some number of companies that probably have never received a rating during the whole 11 year period we're looking at.

Just one quick point on those 11 companies that are now in liquidation or rehabilitation. Looking at the 1982 ratings for those companies, we had three A+'s, three A's, a B+, two B's, and two NA3's. So out of the eleven it is possible that only six of those were actually being used to a great extent by a lot of the markets. How the markets responded to those companies that received NA3 ratings, I'm not quite sure.

Given those existing models, we were trying to come up with something, another model that we were more comfortable with, so we went out and tried to find a source of uniform data that we could use across the 84 companies, something short of trying to gather 84 annual statements for the five years of history. So what we ended up using was the A.M. Best Trend Report. This had 20 ratios in the four categories shown for five years of history. And we were using the 1980 to 1984 period.

What I'd like to go through now, is just how we identified which ratios we wanted to include in our model.

(Slide)

From the 84 companies, we identified what we thought were the ten strongest and ten weakest companies out of the 84. This was based on our evaluation of the annual statements we had looked at over the years. So we were going to use these two sets of ten companies to create our model.

The way we evaluated the data was by taking each one of the 20 ratios shown in the Best Trend Report and look at the ratio value for each of the 20 companies. We're using something called the Wilcoxon Rank Sum Test. The way that works, in an example here as shown for 1980 for the gross leverage ratio, we felt that the lower the value for gross leverage the better. So, as you can see, the strong companies, the lowest ratio shown is 2.0 to 1 for gross leverage. The highest ratio was 12.0 to 1 for the weak company No. 10.

We ranked these ratios from one to 20, from lowest to highest, and then just summed the ranks. And, as you can see for gross leverage for 1980, the sum of the ranks for the strong companies was 84 1/2 and the sum of the ranks for the weak companies was 125 1/2.

The way we interrupt these ranks is if these two groups of companies were from the same population and exhibited the same values...if the values were distributed the same way, the sum of the ranks should be 105 and 105. Any deviation off of 105 is telling us that this ratio is, in fact, discriminating between the two groups of companies.

(Slide)

On the next page I've just listed some values for this test to help interpret what the 84 1/2, 125 1/2 means. If the null hypothesis is that both sets of ten companies represent random samples from the same population, then this null hypothesis can be rejected at the 93% level of significance, given the 125 1/2, 84 1/2 sums. What we were looking for then were ratios that consistently demonstrated their ability to discriminate between the two groups of companies over the five year period.

(Slide)

On the next page I've separated the 20 or so ratios out into two groups. The first thing we are looking at here are the 11 IRIS ratios. And I've shown the rank sums over the five year period for the strong companies versus the weak companies. And, as you can see, for tests such as Surplus Aid to Surplus over the five year period there is a significant difference in the rank sum between the two groups of companies.

(Slide)

On the next page I've listed out the remaining tests we took directly from the trend report, or developed from the trend report. And, again, there are a number of ratios here, such as ceded leverage, that really seem to be doing a good job of splitting the two separate companies apart from each other.

From these 20 or so ratios we then chose ten tests that over the five year period had consistently demonstrated their ability to discriminate between the two groups of companies. And from these ten tests, you can see that five of those are also IRIS ratios. So what this indicates to me is that the IRIS ratios are effective tests, but the way they were incorporated into the NAIC model was just a simple pass/fail. They were just not working effectively for reinsurance companies.

(Slide)

For those tests that did not show up as being good discriminators, based on the simple ranking, we redefined those a little bit and then ran them through the rank sum process again. Rather than just looking at each test as the simple ratio and ranking from lowest to highest we redefined the ratios to be the company ratio minus the industry median. The idea here is that for some tests, such as change in net written premium, the strong companies may be clustered around the median value for the industry and be showing some stability while the weaker companies might be on both sides of the median. So we looked at the absolute value of the difference between the median and the company value. And by doing that we identified four other tests that we felt, just by doing the simple redefinition of the test, could be used in our model. Those are listed here, and two out of those four, as you can see, are IRIS ratios. So, in total, our model uses 14 tests that have historically discriminated between the two groups. Seven of those tests are IRIS ratios. So, again, I think just the way the IRIS model incorporates those ratios is a problem. The ratios themselves are pretty good.

(Slide)

I'd like to go through an example of how we take these 14 tests and then come up with a rank for an individual company. This happens to be a company that was declared insolvent in 1985. The way that we look at a company is for each year, we go through each of the 14 tests and rank that company. You can see, for example, in 1981 for ceded leverage this company was ranked 53rd out of the 84, meaning that it cedes a significant part of its gross premiums and loss reserves.

The value right above it, change in gross leverage divided by change in net leverage, means that there was the same relationship of large gross/low net the prior year and that had stayed constant.

As you can see, going into 1982, something happened to its relationship between gross and net leverage. It could be that it lost some of its retro capacity and was forced to keep more net or it could be exactly the opposite. It was not writing some profitable business and decided to cede more off. I don't know what the explanation is, but there was a change in its relationship of gross to net leverage and that shows up in the ranks.

For an individual year then, we have the 14 test average rank shown at the bottom. And for 1981 for this company it was 46 1/2. If all the companies were equally strong and all the test results for those companies were basically random variables from the same distribution, you would expect that average to be 42 1/2 for all the companies. This 46 1/2 is worse than average. That placed it 61st out of the 84 companies based on the 14 test average rank. And as you can see as the years went on it stayed very low, 63, 64 and finally 80th of the 84 companies. When you see this rank 61st out of 84 companies and you keep in mind that 25 companies were not even receiving a rating, it's surprising to see that it received an A+ rating and only failed two IRIS ratios.

(Slide)

We look at all the companies in this way. We look at each individual test rank over a number of years so that we can try to focus in on which area is the source of the problems and if there is any area that is showing large changes from year to year. If you look down 1981 under the loss reserve test you can see this company is ranked 80th for both one year and two years reserve development. So that is clearly one source of the problem. When I looked at the Best insolvency study and looked at the cause of insolvency for this company, loss reserves were listed as the cause. So, hopefully, we were as accurate on some of the others as we were on this one.

We tried to evaluate how well this technique would have worked historically and the way we went about this was to look at the average Best rating assigned to various groups of companies over time. We assigned points to the different Best ratings, an A+ was worth eight, an A was seven, down to a liquidated company was worth zero. So we looked at the ten strong companies and the ten weak companies that were used to create the model. If you look at, say, the 1981 average Best ratings, there really is not much difference...7.6 versus 7.2. As you go down toward the present you can see the strong ten companies held their high ratings of A or A+. The weak ten deteriorated pretty quickly. So we are at least confident that we picked out a reasonably good set of strong and weak companies to create the model that we are using.

Beyond that, we looked at the other 64 companies that weren't used to create the model in the first place and we looked at the initial ranking that was based on '82, '83 and '84 information. We looked at how well that initial ranking has held up over time. So based on the rankings for '82, '83 and '84, we split the 64 remaining companies into thirds. And, as you can see, again, back in 1980 and 1981 and 1982, there really was not much difference in the Best rating assigned to what we have set as the top, middle and bottom thirds.

(Slide)

As you move on, go up to 1990, the top third of the companies based on our '82, '83 and '84 rankings are receiving an average rating of an A. The middle third is between a B and a B+. And the bottom third is between a C+ and a D. So we think that our initial ranking, based on '82, '83 and '84 data, has held up pretty well going forward, and that if that had been used by ceding companies to determine who to do business with and if they were able to do business just with the top third of the companies in the ranking that they would have been well served.

We also went back a year earlier and said, if we had just done this based on 1981 data, would we have seen the same progression of ratings? And we did. If we look back at the 1981 rates, the top third was 7.7, the middle third 7.4 and the bottom third 7.1. If we looked at those ratings again in 1985 they were 6.3, 5.6 and 4.3 versus the numbers there. So we were pretty satisfied that even if we had gone back with this model and used 1981 data, we could have done a pretty good job of distinguishing between strong and weak companies.

(Slide)

I would just like to go over some of the enhancements we think could be made to this model. Some of it is just due to the data source we used. We did not have Schedule F information. If we could now maybe use the NAIC database to look at ceded dollars to affiliates versus non-affiliates, unauthorized versus authorized, and domestic versus foreign, we think that could help maybe fine tune the ceded leverage numbers we have. We did not take into account the line of business breakdown for the insurance companies, perhaps that would help. And, maybe, we could use some of the new Schedule P detail to help us look at reserves more closely.

(Slide)

For some of the concerns, such as geographical distribution of exposures I'm not sure that we're able to really determine if a company is exposing itself to catastrophe loss in the Gulf or in California. We just don't have a source for that information. And, of course, management philosophy and parent company commitment are more qualitative issues that we can not put into the model. I should state that when we were looking at reinsurance companies that were part of a group, we looked at the company on a stand alone basis. We didn't give any credit to that company for its parent.

I'll cut it off there. There are a lot more exhibits and basically they go and show percentile distributions for the 14 ratios and I hope they match up with the RAA data that Mel has talked about. Thank you.

MR. PINTO: There's obviously a lot to say on this topic. We would like to advise our affiliates, we'll be running a few minutes late.

Obviously A.M. Best has had a key role in solvency assessment over the years and for many years and we are fortunate today to have Jack Snyder, Vice President with Best's to discuss Best's approach to reinsurance solvency assessment. So as not to shortchange Jack for being last, we may be running a few minutes late and if people could just leave quietly if they need to or stay with the program.

[We regret that Mr. Snyder's portion of this session was inaudible. Please accept our apologies for any inconvenience.]

MR. PINTO: Well, I guess we've pretty much run out of time. I suppose we could try taking one question if anybody had one. Gary?

QUESTION: (Not at microphone) I wonder if there is any difference when you're looking at a domestic (inaudible) of a foreign nature given the difference in foreign accounting...(inaudible). I know both John and Steve mentioned leverage as (inaudible). I wonder if there's a difference in (inaudible).

SPEAKER: Yes. I think in one of slides, in the handout material, demonstrated the leverage, in terms of premiums to surplus...reserves to surplus is two times that of the U.S. company. There is a lot more touch and feel with the international companies.

QUESTION: (Inaudible)

SPEAKER: No, their domestic substance.

QUESTION: In the U.S.

SPEAKER: The branches.

QUESTION: I suppose in foreign branch...resident branches, that
they wouldn't be fully licensed and domiciled?

SPEAKER: Well, the branch would be...as far as the branch, they more or less would fall right in line with...I mean, they have to subscribe to the NAIC guidelines.

QUESTION: Right.

MR. SNYDER: They basically have to be held to the same standards as any domestic company whether it is foreign owned or not. So in terms of leverage measures, at least from A.M. Best's perspective, it is really no different. In some cases, there's a nice added advantage with a domestic...with a branch, because it's generally was very well healed, very deep pocketed parents that have up...at least the branches that we look at...have been pretty supportive in terms of capitalizing and making sure that the branch is fully capitalized.

SPEAKER: Well, it's fully capitalized.

SPEAKER: And as Mel knows, also, he works for Skandia who was owned by a non-U.S. parent and Skandia is as conservatively run as any other U.S. reinsurer. So I don't off the top of my head think there's an awful lot of difference. They don't seem to try to do things on the cheap. They try to invest. I think they're very conscious of being regulated against and out of U.S. market.

MR. PINTO: I'm still trying to think about Swedish accounting. In any case, I think we best wrap it up now. The gentlemen will be around if you have further questions, you can catch them when they're circulating. I'd like to thank all three of them for a very substantial presentation.

SHAUN FLYNN

Standard & Poor's

Ratings Group

SLIDE 1

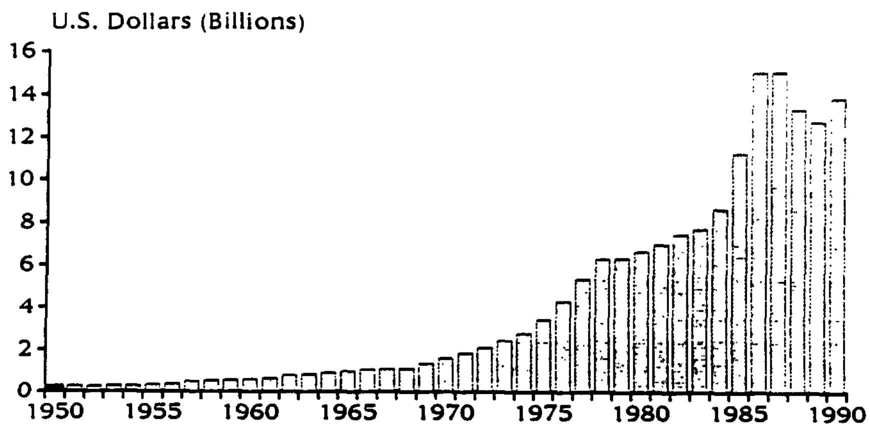
Rating Methodology Profile

- Industry Risk
- Management & Corporate Strategy
- Business Review
- Operational Performance
- Capitalization
- Liquidity
- Financial Flexibility

Industry Risk

- Rivalry Among Existing Firms
- Potential Threat Of New Entrants
- Growth Potential Of The Market
- Nature Of Tail In Claims Reporting & Settlement
- Regulatory Environment
- Risk Adjusted Return On Capital

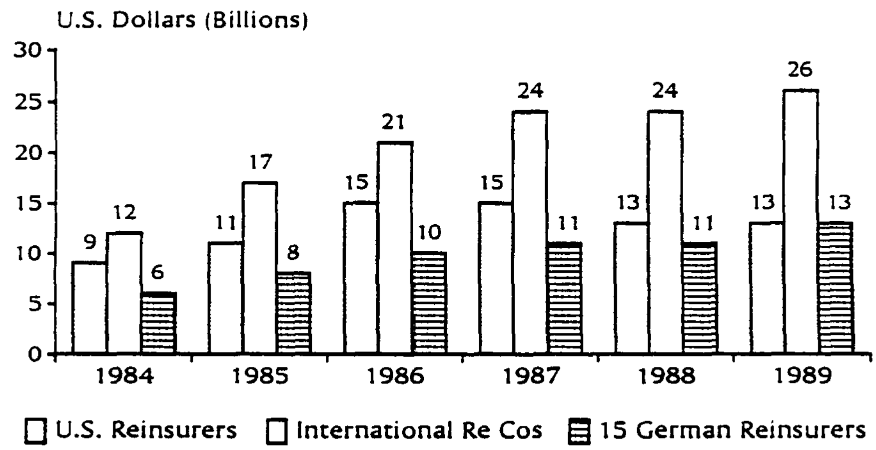
U.S. Reinsurance Industry
Net Premiums Written



Source: Statutory Statements

SLIDE 4

Domestic vs. International Reinsurers
Net Premiums Written



Source: Statutory Statements & ISI

SLIDE 5

Management & Corporate Strategy

- Strategic Goals
- Operational Skills / Planning / Controls
- Financial Goals / Risk Tolerance
- Background Of Senior Officers

SLIDE 6

Business Review Analysis

- Ownership
- Organizational Structure / Non-Insurance Activities
- Geographic Dispersion
- Product Mix
- Distribution Channel
- Market Share
- Competitive Advantages

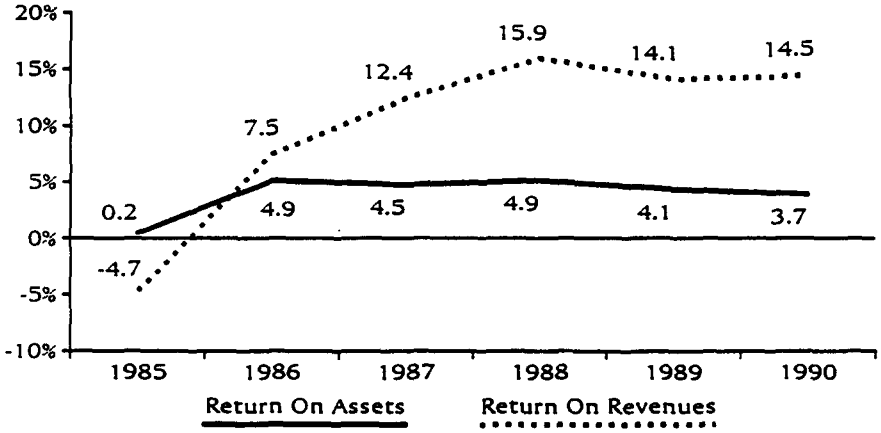
SLIDE 7

Operational Performance

- Sources, Stability & Quality Of Earnings
- Focus On Return On Assets, & Return On Revenue
- Review Other Measures Of Profitability
- Review Tax Position

SLIDE 8

U.S. Reinsurance Industry
Profitability Measures



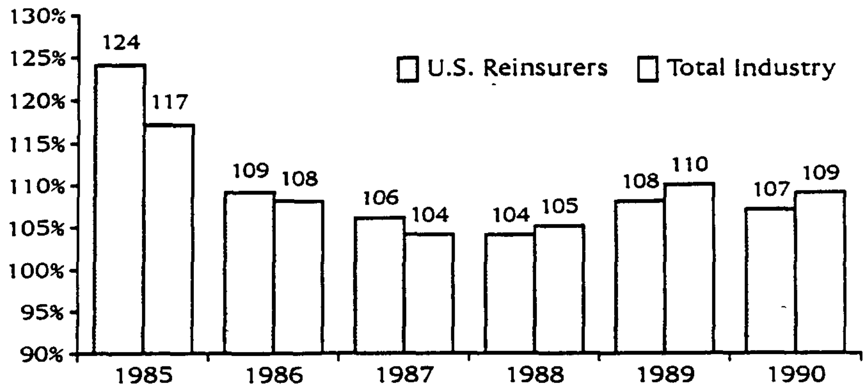
Source: Statutory Statements

SLIDE 9

Underwriting Performance

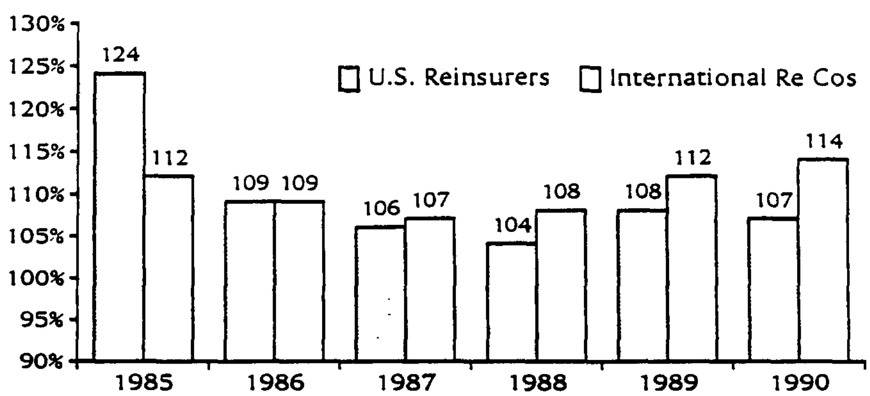
- Combined Ratio
  - Trends In Loss & Expense Ratios
  - Industry Comparisons
- Adequacy Of Loss Reserves
  - Methodology For Establishing Reserves
  - Paid & Incurred Loss Projections
  - Accident Year Combined Ratio
- Effects Of Reinsurance
  - Reinsurance Buying Philosophy
  - Retentions & Aggregate Limits
  - Usage Of Reinsurance
  - Quality Of Reinsurers

U.S. Reinsurance Industry
Combined Ratio



Source: Statutory Statement

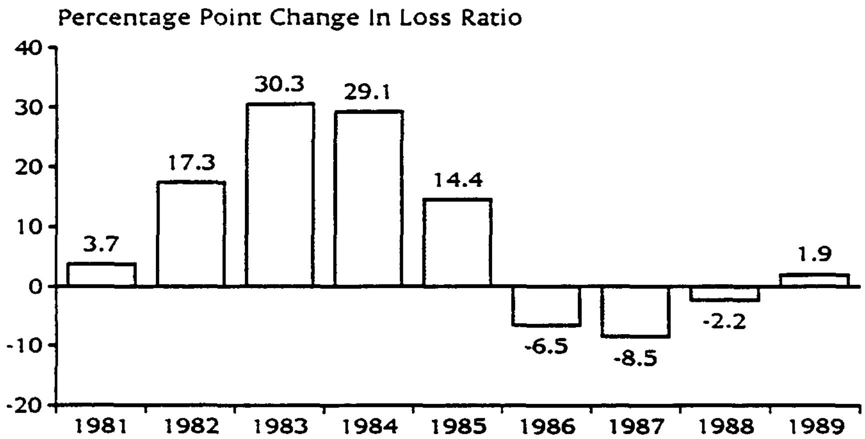
Domestic vs. International Reinsurers
Combined Ratio



Source: Statutory Statements & ISI

77 Active U.S. Reinsurers

Development Of Incurred Losses By Accident Year At Calendar Year 1990



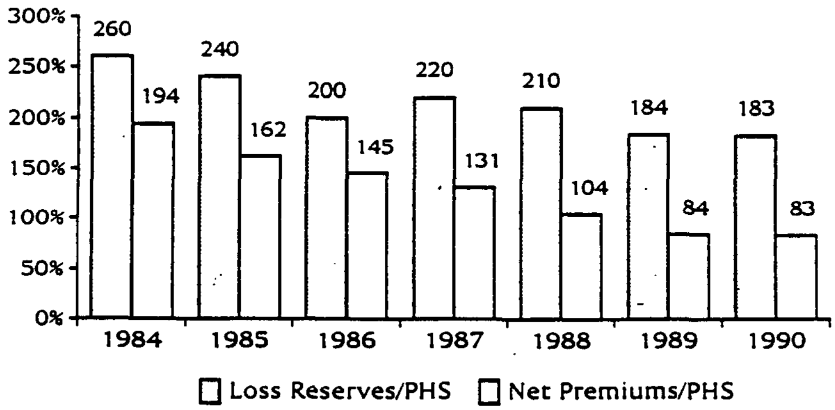
Source: Statutory Statements

Capitalization

- Operating Leverage
  - Net Premiums To Surplus
  - Gross Premiums To Surplus
- Loss Reserve Leverage
  - Loss Reserves To Surplus
  - Loss Reserves To Earned Premium
- Investment Leverage
  - Affiliated Investments To Surplus
  - Common Stocks To Surplus
  - Real Estate Investments To Surplus
  - Portfolio Vulnerability

SLIDE 14

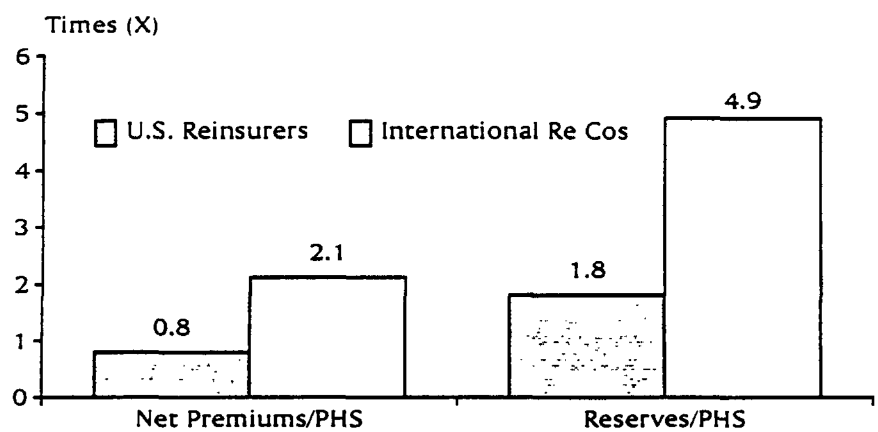
U.S. Reinsurance Industry
Leverage Ratios



Source: Statutory Statements

SLIDE 15

Domestic vs. International Reinsurers
Leverage Ratios For 1989



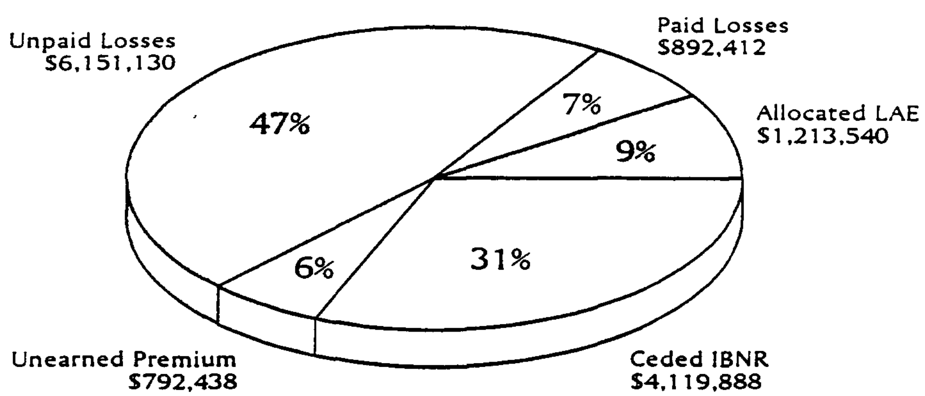
Source: Statutory Statements & ISI

Capitalization (Continued)

- Reinsurance Leverage
  - Reinsurance Recoverables To Surplus
  - Aging Of Paid Loss Recoverables
- Financial Leverage
  - Debt To Capital
  - Interest Charge Coverage
- Other Threats To Capital
  - Shareholder Dividend Policy
  - Capital Needs Of Non-Insurance Entities

1991 Reinsurance Survey

Reinsurance Recoverables Active Reinsurers (000's)



Total Recoverables = $13.2 Billion or 100% of Statutory Surplus

Source: Standard & Poor's

SLIDE 18

77 Active U.S. Reinsurers
Aging Of Paid Recoverables

1 - 29 Days	59.2%
30 - 90 Days	10.9%
91 - 180 Days	5.3%
Over 180 Days	24.9%
Total Paid Recoverable	100.0%
Wgt. Avg. Collection Period	63 Days

Source: Statutory Statements

SLIDE 19

Investment Activities

- Asset Allocation Strategy
- Credit Quality Of The Portfolio
- Asset Concentration / Diversification
- Return On Investments (Current Yield & Total Yield)
- Asset-Liability Management

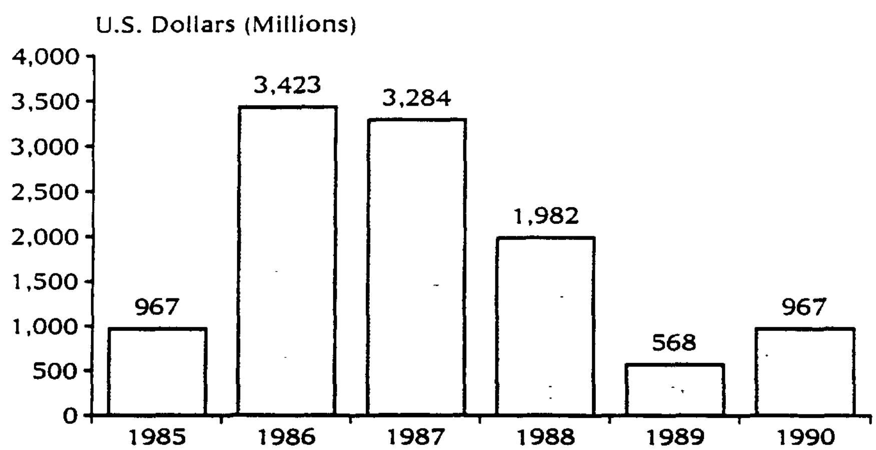
SLIDE 20

Liquidity

- Underwriting Cash Flow
- Total Cash Flow
- Liquidity Of Investment Portfolio
- Other Sources (Bank Lines / Commercial Paper)

SLIDE 21

U.S. Reinsurance Industry
Underwriting Cash Flow



Source: Statutory Statements

SLIDE 22

Financial Flexibility

- Available Sources Of New Capital
- Anticipated Cash Requirements
- Shareholder Dividend Policy
- Access To Reinsurance Markets
- Impact Of Non-Insurance Activities

SLIDE 23

Concluding Remarks

- Reinsurance Industry Strong & Largely Solvent
- Now Going Through A Consolidation Process
- Continuity Bigger Concern Than Insolvency
- Lack Of Retro & Catastrophe Coverage
- Competitive Pressures Continue In Other Markets
- Returns Not Adequate For Risks Of Business
- Exposure To Uncollectible Reinsurance Is Understated
- Combined Ratio Now Understated
- Reserves Exposed To External Influences

Premium growth returns to U.S. reinsurance industry

This article was prepared by Shaun P. Flynn, vice president, and Thomas Walsh, rating statistician, of Standard & Poor's Insurance Ratings Services for initial publication in the National Underwriter.

After enduring two years of substantial declines in premium volume, the U.S. reinsurance market experienced an 8.6% increase in net premiums written to $13.9 billion in 1990. The growth in premium income provided the catalyst for improved underwriting performance, and continued profitability, for the reinsurance industry. Still, S&P believes the level of profitability achieved by most industry participants does not adequately compensate reinsurers for the inherent risks of the business.

Premium growth returned to the marketplace in 1990 as demand for facultative business increased, particularly for top-tier companies, and alternative risks transactions of a finite-risk or financial reinsurance nature generated substantial amounts of new business. Still, premium volume remains far below 1988 levels, and the decline of recent years reflects primary companies retaining more business, decreased rate levels, and changes in the buying habits of ceding companies. Most notable was the switch from proportional business to less premium-intensive nonproportional business.

Underwriting results also improved in 1990 as the combined ratio decreased to 107.4% from 108.8%. This is largely attributable to reduced catastrophe losses, and reflects a 1.4 percentage point decline in the loss ratio to 76.7%. Yet, improved underwriting results were not shared equally among all reinsurance market participants, and the nation's three largest reinsurance companies, General Re, Employers Re, and American Re, produced underwriting results that substantially outperformed their peers, demonstrating that ceding companies are willing to pay a price for top-notch reinsurance security. Also, the recent change in buying habits of primary companies toward purchasing less proportional reinsurance has enabled reinsurers to continue outperforming the primary insurance industry in terms of underwriting results.

Despite the industry's failure to achieve an underwriting profit, statutory surplus grew 6.0% to $13.2 billion, for a group of 77 active professional reinsurance companies, and after-tax operating income amounted to $1.6 billion, resulting in a 12.7% return on average equity (68 basis points in 1985). Still, this return on equity falls below returns registered by "Corporate America", and are especially unattractive given the long-tail nature of the business written, and the reinsurance industry's exposure to unknown hazards.

S&P's opinion of leading U.S. reinsurers

(000s omitted) Group/Company Name	Net Written Premiums 1990	1989	*S&P Claims-Paying Ability Rating
General Reinsurance Group......	2,065,003	1,796,611	AAA (Superior)
Employers Re Corp..................	1,103,810	1,099,343	—
American Re-Insurance Co.	875,515	871,220	AA+ (Excellent)
North Amer. Re/Swiss Re Grp. .	700,275	639,872	AAA (Superior)
Prudential Reinsurance Co........	562,556	503,362	AA (Excellent)
U.S. Fidelity & Guaranty	460,299	415,739	BBB+ (Adequate)
Berkshire Hathaway Group	432,586	157,965	—
Skandia America Re Corp.........	414,122	262,162	AA (Excellent)
The St. Paul Companies...........	404,904	416,934	AAA (Superior)
Constitution Re Corp.	318,405	240,184	—

*Ratings are shown as of August 15, 1991.

These are some of the major results produced by the 28th annual Survey of the U.S. Reinsurance Market. This survey has been conducted by Standard & Poor's Insurance Ratings Services over the last four years, and is a continuation of the work done by the late John R. Zech and his colleagues, which began in 1962. We express our sincere appreciation to the many organizations that provided the underlying data.

In line with the format of this year's survey, we have categorized reinsurers into the two following groups:

*Professional reinsurance companies, including data for all active reinsurers.

*Reinsurance departments of primary insurance companies.

Taken together, these two groups comprise the "U.S. Reinsurance Industry," and are referred to as the "domestic market" or "domestic reinsurers" throughout the survey. Furthermore, to make our study as complete as possible, we continue to try to obtain data from organizations that have stopped writing reinsurance business, or have drastically reduced reinsurance operations. However, in some cases this information was unavailable.

For this year's survey, we continue to produce customary exhibits of key balance sheet and income statedment data for the U.S. reinsurance industry. The contents of these exhibits are briefly outlined below.

*Exhibit A shows five years of net premium figures and combined ratios for professional reinsurance companies, including individual results of 77 active reinsurance companies ranked by premium volume. Furthermore, these results are shown for individual companies, as opposed to consolidated group data, so readers of the survey can identify the individual risk bearers with which they do business.

*Exhibit B presents additional balance sheet and income statement data for the same group of professional reinsurers.

*Exhibit C presents on an aggregate basis, net premium figures and combined ratios for reinsurance departments of primary companies.

*Exhibit D presents U.S. reinsurance industry premium figures, broken down by market segment.

*Exhibit E is a new exhibit to the survey, that illustrates loss reserve development, plus a 10-year history of calendar and accident year loss ratios for all active professional reinsurers.

After highlighting a few points from these exhibits, we will briefly discuss some issues of importance to the industry, and where S&P believes future trends are in the reinsurance business.

Exhibit A shows the combined ratio for professional reinsurers was 107.4% in 1990, down from 108.8% in 1989. The main component of the combined ratio, the loss ratio, decreased to 76.7% from 78.1%. The substantial decline in this ratio was aided by a reduced level of catastrophe losses during the year. For instance, 1989's record level of catastophe losses added about 2.8 percentage points to the loss ratio. Still, 1990 was the second worst year on record for domestic catastrophe losses, and reinsurers needed to make up for for prior years reserve deficiencies. This was evidenced by a calendar loss ratio that was 2.5 percentage points higher than 1990's accident year loss ratio. The other portion of the combined ratio, the expense ratio, remained relatively stable at 30.8% The ratio remained on par with the 1989 expense ratio of 30.7% due to similar increases in underwriting expenses and premium volume. Furthermore, the combined ratio over the last six years averaged 105.8% for professional reinsurers now actively writing business, which compares favorably to the six-year total insurance industry market average of 109.0%.

Overall, the reinsurance industry is producing less volatile, and better, combined ratios than the primary industry, because of the shift to writing more nonproportional business over the last several years. However, S&P believes many small and medium-sized reinsurers are being forced to write more premium intensive proportional business, and their underwriting results have been weaker than the top-tier companies. More importantly, the better combined ratio for 1990 does not necessarily mean that market conditions are improving, but merely documents the fact that the markeplace is very competitive. Basically, there is excess capacity for traditional insurance products, and this soft market is commanding softer prices.

Also in 1990, premium growth returned to the marketplace, as the group of 77 active reinsurers achieved an increase in net premiums written of a little more than 10% following an unprecedented two-year decline. As evidence of the industry consolidation going on, it is noteworthy that this group of active reinsurers now accounts for about 97% of total premium volume for reinsurance companies. Back in 1985, these currently active companies accounted for only 80% of total premiums written by professional reinsurers.

As expected, the results of companies included in the "other reinsurers" category remain considerably weaker than those of active reinsurance market participants. Accordingly, the 30 or so reinsurers in this segment include reinsurance companies that are in a run-off mode and historically have not done very well in the reinsurance business. Furthermore, statistics for this category would be even worse if the results of run-off companies that did not respond to our request for data were included. S&P will continue to try to obtain this information for run-off companies, and believes that a continued focus on only active reinsurers may overstate the overall profitability of business now being written.

As shown in Exhibit B, loss reserves for domestic reinsurers increased 9% to nearly $26 billion in 1990, but for the first time in three years grew at a slower rate than premiums. Nevertheless, the ratio of reserves to net premiums earned reached a six-year high of 222% last year. Also, the ratio of loss reserves to surplus for active reinsures increased to about 185%. This means that a 10% deficiency or underestimation in reserves (which is not inconceivable) would reduce surplus by about 19%. Of particular interest is the inverse relationship between active and other reinsurers. Conversly, the unlisted professional reinsurers in the "other reinsurers" segment had substantially different results from the 77 active reinsurers. During 1990, these companies experienced a 10% decrease in premium volume (nearly 80% since 1985) and a 38% increase in loss reserves, resulting in a 64.0 percentage point increase in the loss reserves to net premiums earned ratio, now at 277%.

Although the traditional measure of operating leverage (the premiums to surplus ratio) makes it appear that there is excess capital in the reinsurance industry, an examination of another leverage measure, the ratio of reserves to surplus, suggests the industry's capital is less impressive although still adequate. Specifically, the ratio of net premiums written to surplus for active reinsurers was close to 86% in 1990, remaining substantially less than the 159% reported in 1985. But, the ratio of loss reserves to surplus has remained at near historically highs levels, and at 185% is up 4 percentage points from 1989's result. Also, the ratio of loss reserves to earned premium at 222% is at a historic high. Thus, the reinsurance industry is as leveraged as ever from a loss reserve perspective. Still, in 1990, surplus levels of these active reinsurers grew 6% to $13.2 billion. Furthermore, in contrast with 1989, 21 companies experienced a decline in surplus, with eight companies realizing a decrease of greater than 5% of surplus, largely due to unrealized losses on the equity portfolio. Overall, the growth in the industry's surplus level will aid reinsurance companies in meeting security guidelines established by ceding companies that tend to favor the larger financially strong reinsurers.

Six year history of cash flows active reinsurers (000's omitted)

Year	U/W Cash Inflows	U/W Cash Outflows	Net Cash From U/W	U/W Cash Flow Ratio	Total Cash Flow Ratio
1985	7,546,897	6,580,186	966,711	114.7%	134.2%
1986	10,872,997	7,449,664	3,423,333	146.0%	165.0%
1987	11,405,248	8,120,959	3,284,289	140.4%	156.8%
1988	10,747,381	8,765,549	1,981,832	122.6%	138.0%
1989	10,169,983	9,602,269	567,715	105.9%	125.3%
1990	11,044,187	10,077,569	966,618	109.6%	130.8%

Net investment income, excluding realized gains, increased 11.2% to $2.5 billion, as a result of a larger invested asset base. This increase was driven by underwriting cash flow and total cash flow ratios remaining

EXHIBIT A
U.S. Professional Reinsurance Companies
(000s omitted)

NPW Rank	Company Name	Net Premiums Written						% Change		Combined Ratios						
		1985	1986	1987	1988	1989	1990	1989-90	1985-90	1985	1986	1987	1988	1989	1990	6 Yr.Avg
49	Abeille Reassurances (USB)	9,336	28,795	34,162	33,478	34,028	34,745	2.1%	272.2%	123.9%	97.1%	97.1%	98.9%	109.3%	110.8%	103.7%
76	AGF Reinsurance Corp of the US	5,040	1,252	2,005	3,250	3,353	6,953	107.4%	38.0%	379.0%	NM	103.7%	74.1%	127.0%	59.6%	278.5%
22	American Agricultural Ins Co	87,719	124,086	147,683	106,060	96,847	132,065	36.4%	50.6%	117.1%	92.0%	90.9%	103.3%	115.9%	105.6%	102.6%
77	American Fuji Fire & Marine Ins Co	3,922	6,733	5,475	3,522	3,580	5,892	64.6%	50.2%	117.5%	106.0%	104.2%	105.0%	191.6%	123.5%	120.6%
3	American Reinsurance Co	730,224	947,495	1,002,760	937,336	871,220	875,515	0.5%	19.9%	116.3%	98.0%	99.5%	101.5%	103.8%	103.7%	103.1%
42	American Royal Reins Co	25,871	39,954	47,390	51,777	50,013	45,859	-8.3%	77.3%	110.6%	97.3%	91.8%	96.6%	109.9%	111.4%	102.5%
32	American Union Reins Co	73,759	75,615	73,210	70,098	72,432	81,230	12.1%	10.1%	122.9%	112.0%	99.9%	106.7%	116.4%	112.5%	111.6%
75	Asset Guaranty Reinsurance Co	—	—	—	9,122	7,742	7,559	-2.4%	NA	—	—	—	104.0%	56.6%	106.7%	84.8%
38	AXA Reinsurance Co	17,124	41,701	38,159	35,292	44,200	54,033	22.2%	215.5%	112.5%	99.7%	98.0%	101.3%	112.7%	109.9%	105.3%
54	BalticaSkandinavia Re Co of America	28,250	25,002	22,684	18,281	28,096	31,826	13.3%	12.7%	114.9%	105.4%	92.6%	105.6%	109.4%	113.4%	107.4%
64	Belvedere America Reinsurance Co	—	—	33,248	22,553	29,350	25,480	-13.2%	NA	—	—	94.7%	99.1%	117.9%	113.4%	106.9%
50	Capital Reinsurance Co	—	—	—	55,504	32,775	34,009	NA	NA	—	—	—	35.9%	28.4%	45.4%	36.6%
70	Chartwell Reinsurance Co	21,899	67,103	75,062	37,436	10,105	16,067	59.0%	-26.6%	182.1%	123.0%	106.2%	122.0%	162.7%	114.4%	123.3%
24	Christiania General Ins Corp of NY	50,364	61,589	74,738	84,270	93,877	112,114	19.4%	122.6%	110.9%	100.9%	98.5%	99.5%	104.9%	105.6%	103.3%
10	CIGNA Reinsurance Co	219,451	256,773	273,536	282,498	272,945	302,574	10.9%	37.9%	134.1%	105.6%	101.9%	100.2%	110.9%	107.4%	109.0%
53	Clarendon America Ins Co	38,820	288,978	107,338	34,415	24,944	32,489	30.2%	-16.3%	60.2%	79.8%	110.4%	80.5%	128.2%	99.1%	94.3%
66	Cologne Reinsurance Co of America	10,357	11,092	11,453	16,780	22,004	23,245	5.6%	124.4%	122.3%	108.3%	103.3%	107.2%	111.7%	109.2%	110.3%
7	Constitution Reinsurance Corp	141,932	225,283	234,786	258,193	240,184	318,405	32.6%	124.3%	108.2%	100.8%	98.9%	101.6%	103.5%	107.7%	103.3%
21	Continental Reinsurance Co	198,499	260,714	289,271	248,040	184,276	147,535	-19.9%	-25.7%	113.0%	98.5%	109.6%	116.6%	104.9%	114.4%	109.2%
28	Dorinco Reinsurance Co	73,954	76,103	53,840	51,805	66,351	87,036	31.2%	17.7%	134.6%	155.2%	106.3%	96.7%	86.0%	107.3%	116.6%
2	Employers Reinsurance Corp	760,380	1,211,829	1,251,696	1,135,190	1,099,343	1,103,810	0.4%	45.2%	115.8%	104.9%	99.9%	99.8%	104.3%	102.7%	103.5%
51	Enhance Reinsurance Co	—	47,641	54,281	35,629	34,559	32,706	-5.4%	NA	—	36.1%	38.0%	46.5%	66.5%	50.3%	45.8%
73	Excess Mutual Reinsurance Co	13,458	17,664	15,031	12,982	11,430	11,993	4.9%	-10.9%	104.6%	90.0%	75.6%	89.4%	102.1%	116.5%	95.2%
35	Executive (ERIC) Reinsurance Co	—	—	38,467	51,731	52,014	61,117	17.5%	NM	—	—	100.8%	100.0%	99.4%	98.7%	99.3%
52	Finmar Reinsurance Corp	5,745	23,435	30,959	32,632	33,697	32,686	-3.0%	468.9%	—	102.4%	99.9%	101.9%	103.6%	104.9%	102.9%
56	First Excess & Reinsurance Corp	23,031	25,869	12,473	12,143	14,524	30,231	108.1%	31.3%	131.6%	147.0%	114.8%	111.1%	111.6%	109.5%	125.1%
57	Folksamerica Reinsurance	8,667	16,612	21,302	19,378	20,462	30,180	47.5%	248.2%	119.5%	103.4%	99.9%	103.8%	107.3%	104.7%	104.9%
33	Frankona Reinsurance Co (USB)	20,157	15,695	23,639	37,230	47,445	62,811	32.4%	211.6%	124.9%	107.5%	101.3%	102.9%	106.2%	106.7%	107.1%
34	General Ins Trieste & Venice (USB)	40,925	47,732	41,247	36,036	35,169	62,317	77.2%	52.3%	110.2%	102.8%	103.0%	104.3%	108.3%	105.6%	105.5%
1	General Reinsurance Corp	1,417,323	2,243,332	2,040,174	1,626,645	1,566,089	1,766,303	12.8%	24.6%	111.1%	103.3%	99.0%	98.7%	99.0%	98.1%	100.9%
37	General Security Assurance Corp of NY	29,290	46,434	42,000	39,188	42,664	56,251	31.8%	92.0%	110.6%	98.3%	100.1%	100.9%	109.8%	90.4%	100.6%
60	Gerling Global Reinsurance Corp	27,195	26,810	16,116	17,330	26,382	28,203	6.9%	3.7%	119.5%	102.9%	97.5%	102.0%	109.6%	109.6%	108.3%
55	Great Lakes Reinsurance Co (USB)	15,808	15,820	13,979	21,160	25,621	31,324	22.3%	98.2%	107.7%	99.3%	99.6%	101.4%	105.3%	105.8%	103.6%
48	Hansa Reinsurance Co of America	11,364	19,357	20,430	19,951	16,716	37,410	123.8%	229.2%	115.1%	98.7%	95.8%	99.4%	113.9%	106.9%	104.1%
44	Insurance Corp of Hannover	27,392	28,737	32,179	33,196	37,563	43,178	14.9%	57.6%	120.8%	118.5%	110.7%	108.8%	109.3%	112.9%	113.0%
15	Kemper Reinsurance Co	295,327	405,991	304,058	223,978	243,135	243,545	0.2%	-17.5%	114.5%	103.0%	101.9%	102.6%	107.0%	112.7%	106.5%
36	Liberty National Fire Ins Co	64,829	95,944	47,829	58,775	56,139	58,260	3.8%	-10.1%	99.5%	85.8%	97.1%	98.3%	99.3%	99.4%	95.3%
30	Mercantile & General Re Co of America	47,247	70,565	80,080	60,674	67,073	84,373	25.8%	78.6%	124.6%	103.1%	103.4%	106.9%	122.6%	109.7%	110.6%
39	MONY Reinsurance Corp	67,073	77,557	63,430	53,796	43,336	48,733	12.5%	-27.3%	133.3%	102.4%	87.2%	115.7%	136.0%	118.6%	112.7%
13	Munich American Reinsurance Co	229,884	309,511	296,408	284,889	263,491	268,859	2.0%	17.0%	107.1%	99.2%	98.5%	101.5%	110.8%	109.1%	104.0%
14	Munich Reinsurance Co (USB)	229,519	362,288	382,734	340,262	307,416	258,562	-15.9%	12.7%	105.3%	96.2%	101.0%	102.6%	108.9%	105.6%	102.9%
16	NAC Reinsurance Corp	26,592	122,689	154,509	171,430	192,323	217,106	12.9%	716.4%	153.5%	109.9%	107.8%	106.8%	108.5%	108.2%	108.8%
12	National Reinsurance Corp	220,301	352,127	316,110	281,087	243,145	268,953	10.6%	22.1%	114.3%	104.0%	102.2%	102.0%	107.7%	102.0%	104.6%
17	New England Reinsurance Corp	97,005	206,925	211,228	204,425	197,683	197,763	0.0%	103.9%	174.4%	102.0%	101.4%	101.7%	105.6%	108.3%	110.1%
67	New Zealand Reinsurance of America	11,448	7,827	13,843	13,837	14,692	18,175	23.7%	58.8%	198.2%	102.8%	107.3%	96.6%	111.8%	116.4%	123.0%
65	Nordic Union Reinsurance Corp	17,708	33,864	26,599	22,598	21,242	24,014	13.0%	35.6%	111.6%	104.0%	99.9%	103.3%	104.2%	106.4%	104.2%
11	North American Reinsurance Corp	264,450	331,612	291,360	274,784	267,657	289,187	8.0%	9.4%	130.9%	107.5%	104.3%	101.9%	118.2%	109.1%	111.1%
18	North Star Reinsurance Corp	105,973	116,801	103,039	72,836	132,808	182,556	37.5%	72.3%	114.9%	115.9%	118.4%	108.0%	108.8%	110.9%	112.9%
61	Phoenix Reinsurance Co	—	45,747	37,176	34,253	30,414	27,949	-8.1%	NA	—	99.2%	87.8%	87.9%	119.1%	114.3%	99.7%
29	PMA Reinsurance Corp	65,284	111,485	135,675	96,817	82,168	85,116	3.6%	30.4%	101.8%	103.3%	103.0%	112.0%	114.9%	112.5%	107.7%
4	Prudential Reinsurance Co	488,780	651,407	681,706	537,386	503,362	562,556	11.8%	15.1%	124.8%	95.8%	107.0%	113.8%	106.7%	119.1%	110.4%
20	Putnam Reinsurance Co	(7,462)	187,584	150,103	138,792	153,280	166,143	8.4%	NM	65.4%	99.7%	104.0%	103.1%	103.0%	103.0%	102.2%
25	Re Capital Reinsurance Corp	—	1,008	54,450	84,168	92,263	106,615	15.6%	NA	—	125.4%	98.8%	98.4%	99.3%	99.0%	99.1%
31	Reinsurance Corp of NY	67,718	113,348	109,045	102,343	98,914	82,279	-16.8%	21.5%	133.5%	106.6%	108.2%	109.2%	125.8%	122.5%	116.1%
47	San Francisco Reinsurance Co	60,660	74,315	61,390	48,111	29,464	37,528	27.4%	-38.1%	125.0%	107.1%	180.6%	99.3%	126.4%	115.7%	126.8%
26	Scor Reinsurance Co	37,299	50,933	103,104	110,649	102,108	95,383	-6.6%	155.7%	113.3%	97.1%	90.6%	95.2%	104.9%	101.6%	99.0%
43	Security Reinsurance Co	35,884	50,732	59,014	44,005	50,023	44,493	-11.1%	24.0%	116.4%	100.5%	86.3%	88.3%	101.2%	107.3%	98.2%
72	Shelter Reinsurance Co	—	—	25,345	19,245	16,604	15,606	-6.0%	NA	—	—	76.4%	95.8%	142.1%	124.0%	107.0%
59	Signet Reinsurance Co	20,345	40,005	42,492	46,452	31,313	28,214	-9.9%	38.7%	122.5%	103.8%	101.9%	108.3%	119.4%	116.1%	110.5%
58	Sirius Reinsurance Corp	22,484	43,857	32,764	21,059	23,370	28,993	24.1%	28.9%	111.2%	103.5%	99.5%	101.9%	104.3%	105.8%	103.7%
5	Skandia America Reinsurance Corp	110,528	155,262	380,349	234,306	262,162	414,122	58.0%	274.7%	130.7%	114.0%	104.7%	104.5%	114.4%	110.2%	110.4%
46	Sorema North America Reinsurance Co	17,843	10,642	11,571	12,504	7,974	37,818	374.3%	111.9%	113.4%	112.8%	109.1%	127.4%	129.1%	112.3%	116.2%
6	Swiss Reinsurance Co (USB)	323,216	405,304	356,107	342,443	346,166	370,988	7.2%	14.8%	130.2%	107.5%	104.3%	103.1%	116.0%	108.7%	110.8%
63	Toa Reinsurance Co	10,265	18,395	19,011	13,661	17,996	25,943	44.2%	152.7%	119.4%	102.2%	100.2%	109.7%	124.6%	116.7%	111.7%
9	Transamerica Reinsurance Co	—	—	152,382	257,402	280,178	313,546	11.9%	NA	—	—	96.6%	100.3%	104.9%	105.6%	102.6%
8	Transatlantic Reinsurance Co	192,417	251,955	305,211	311,139	319,110	317,480	-0.5%	65.0%	124.7%	108.8%	105.0%	105.1%	108.7%	107.0%	108.7%
27	Trenwick America Reins Corp	18,263	59,917	97,492	103,872	94,922	93,622	-1.4%	412.6%	115.1%	105.5%	104.3%	101.6%	105.4%	107.8%	105.1%
23	Underwriters Reinsurance Co	174,615	166,005	196,957	150,591	129,677	120,268	-7.3%	-31.1%	125.5%	108.1%	136.8%	99.1%	105.7%	108.3%	114.8%
68	Unione Italiana Reins Co of America	13,593	19,911	6,009	7,925	9,610	16,717	74.0%	23.0%	122.5%	221.2%	138.0%	121.3%	146.5%	128.0%	151.0%
74	United Reinsurance Corp of New York	8,606	16,034	13,548	13,210	11,755	10,014	-14.8%	16.4%	118.1%	95.0%	85.6%	94.7%	112.5%	117.8%	101.7%
45	United Republic Reinsurance Co	—	1,465	13,866	17,365	20,912	39,165	87.3%	NA	—	113.4%	102.7%	97.1%	108.1%	99.4%	101.5%
62	Unity Fire & General Ins Co	34,197	40,173	33,153	32,019	35,251	27,868	-20.9%	-18.5%	119.0%	109.7%	104.8%	109.6%	115.5%	126.1%	113.6%
40	USF Re Insurance Co	4,159	19,961	21,501	36,732	48,585	47,725	-1.8%	NM	114.6%	95.7%	117.6%	115.5%	106.5%	111.1%	109.8%
69	Vesta American Reinsurance Corp	(201)	13,372	27,127	20,834	20,186	16,089	-20.3%	NM	—	101.8%	102.6%	101.4%	103.9%	105.6%	103.4%
71	Western Atlantic Reinsurance Corp	—	—	—	6,383	16,248	15,907	-2.1%	NA	—	—	—	97.0%	115.0%	102.4%	107.6%
19	Winterthur Reins Corp of America	95,401	93,581	100,139	74,025	100,096	172,727	72.6%	81.1%	117.3%	109.8%	102.7%	106.6%	115.7%	105.4%	109.3%
41	Zurich Reinsurance Co of NY	11,567	19,364	20,426	19,951	16,725	47,628	184.8%	311.8%	116.0%	99.5%	95.6%	99.2%	114.0%	109.9%	105.5%
	Active Reinsurers	**7,620,073**	**11,480,698**	**11,719,113**	**10,491,144**	**10,252,976**	**11,293,740**	**10.2%**	**48.2%**	**119.1%**	**103.3%**	**102.3%**	**102.5%**	**106.9%**	**106.1%**	**105.8%**
	Other Reinsurers	1,833,880	1,099,250	503,250	594,251	435,512	389,599	-10.5%	-78.8%	—	—	—	—	—	—	—
	Total Reinsurance	**9,453,953**	**12,579,948**	**12,222,363**	**11,085,395**	**10,688,488**	**11,683,339**	**9.3%**	**23.6%**	**124.1%**	**109.3%**	**105.9%**	**104.2%**	**108.8%**	**107.4%**	**109.0%**

Notes: (USB) = United States Branch NA = Not Available NM = Not Meaningful

EXHIBIT B
U.S. Professional Reinsurance Companies Balance Sheet Items And Ratios
(000s omitted)

NPW Rank	Company Name	Policyholder Surplus (a)			Net Premiums Written				Loss & LAE Reserves						Net Investment Income			
		1989	1990	% Change	1989	Ratio To Surplus	1990	Ratio To Surplus	1989	Ratio To NPE	Ratio To Surplus	1990	Ratio To NPE	Ratio To Surplus	1989	% Of NPE	1990	% Of NPE
49	Abeille Reassurances (USB)	52,471	58,834	12.1%	34,028	0.65	34,745	0.59	53,732	1.55	1.02	59,940	1.69	1.02	7,684	22.2%	9,969	28.2%
76	AGF Reinsurance Corp of the US	41,465	51,188	23.4%	3,353	0.08	6,953	0.14	39,500	12.06	0.95	33,612	5.81	0.66	6,114	186.6%	6,028	104.2%
22	American Agricultural Ins Co	122,824	124,424	1.3%	96,847	0.79	132,065	1.06	205,144	2.19	1.67	215,629	1.93	1.73	20,215	21.6%	22,696	20.3%
77	American Fuji Fire & Marine Ins Co	30,417	43,109	41.7%	3,580	0.12	5,892	0.14	12,826	3.75	0.42	14,571	2.80	0.34	3,139	91.7%	4,147	79.7%
3	American Re-Insurance Co	619,363	661,098	6.7%	871,220	1.41	875,515	1.32	2,034,315	2.32	3.28	2,115,342	2.56	3.20	198,939	22.7%	217,689	26.4%
42	American Royal Reins Co	56,418	56,408	0.0%	50,013	0.89	45,859	0.81	76,452	1.52	1.36	83,211	1.75	1.48	9,989	19.8%	10,556	22.2%
32	American Union Reins Co	58,730	105,631	79.9%	72,432	1.23	81,230	0.77	78,339	1.10	1.33	83,724	1.10	0.79	11,632	16.3%	9,922	13.1%
75	Asset Guaranty Reinsurance Co	50,581	51,993	2.8%	7,742	0.15	7,559	0.15	540	0.23	0.01	1,991	0.60	0.04	3,969	171.2%	5,026	150.9%
38	AXA Reinsurance Co	56,909	147,045	158.4%	44,200	0.78	54,033	0.37	71,420	1.90	1.25	88,836	1.80	0.60	8,985	24.0%	10,945	22.2%
54	Baltica-Skandinavia Re Co of America	54,847	55,455	1.1%	28,096	0.51	31,826	0.57	31,768	1.32	0.58	32,999	1.20	0.60	6,288	26.2%	6,635	24.2%
64	Belvedere America Reinsurance Co	29,910	30,944	3.5%	29,350	0.98	25,480	0.82	23,116	0.91	0.77	27,756	1.11	0.90	4,748	18.8%	5,443	21.7%
50	Capital Reinsurance Co	94,582	99,236	4.9%	32,775	0.35	34,009	0.34	9,450	1.27	0.10	39	0.00	0.00	14,435	194.0%	15,296	147.4%
70	Chartwell Reinsurance Co	52,161	54,296	4.1%	10,105	0.19	16,067	0.30	130,939	8.72	2.51	126,746	6.95	2.33	15,700	104.5%	13,395	73.4%
24	Christiania General Ins Corp of NY	79,887	81,124	1.5%	93,877	1.18	112,114	1.38	87,427	0.96	1.09	104,314	0.97	1.29	14,556	16.1%	14,593	13.6%
10	CIGNA Reinsurance Co	187,267	180,522	-3.6%	272,945	1.46	302,574	1.68	460,309	1.63	2.46	397,425	1.31	2.20	48,947	17.4%	45,868	15.2%
53	Clarendon America Ins Co	183,220	120,872	-34.0%	24,944	0.14	32,489	0.27	71,072	1.54	0.39	44,448	1.36	0.37	47,162	102.4%	28,313	86.8%
66	Cologne Reinsurance Co of America	57,658	60,212	4.4%	22,004	0.38	23,245	0.39	27,096	1.28	0.47	37,128	1.50	0.62	7,116	33.5%	6,603	26.7%
7	Constitution Reinsurance Corp	200,941	206,858	2.9%	240,184	1.20	318,405	1.54	405,610	1.71	2.02	476,414	1.60	2.30	51,978	21.9%	56,388	18.9%
21	Continental Reinsurance Co	124,468	158,683	27.5%	184,276	1.48	147,535	0.93	272,321	1.37	2.19	248,903	1.69	1.57	31,977	16.1%	32,455	22.0%
28	Dorinco Reinsurance Co	166,197	178,782	7.6%	66,351	0.40	87,036	0.49	281,993	4.54	1.70	290,911	3.65	1.63	32,293	51.9%	34,517	43.3%
2	Employers Reinsurance Corp	1,328,608	1,363,688	2.6%	1,099,343	0.83	1,103,810	0.81	2,671,948	2.42	2.01	2,839,425	2.55	2.08	300,148	27.2%	315,561	28.3%
51	Enhance Reinsurance Co	106,947	115,165	7.7%	34,559	0.32	32,706	0.28	8	0.00	0.00	597	0.04	0.01	16,555	107.0%	19,082	119.6%
73	Excess Mutual Reinsurance Co	15,707	15,489	-1.4%	11,430	0.73	11,993	0.77	10,868	0.95	0.69	10,165	0.85	0.66	1,542	13.5%	1,494	12.4%
35	Executive (ERIC) Reinsurance Co	94,126	91,532	-2.8%	52,014	0.55	61,117	0.67	76,277	1.51	0.81	111,987	2.03	1.22	10,857	21.5%	14,064	25.5%
52	Finmar Reinsurance Corp	30,409	52,367	72.2%	33,697	1.11	32,686	0.62	34,270	1.03	1.13	37,982	1.16	0.73	4,566	13.7%	6,225	19.1%
56	First Excess & Reinsurance Corp	58,746	62,742	6.8%	14,524	0.25	30,231	0.48	43,043	3.39	0.73	45,902	2.30	0.73	6,940	54.7%	6,997	35.0%
57	Folksamerica Reinsurance Co	51,918	51,847	-0.1%	20,462	0.39	30,180	0.58	35,049	1.74	0.68	41,392	1.47	0.80	6,700	33.2%	6,640	23.6%
33	Frankona Reinsurance Co (USB)	50,281	72,332	43.9%	47,445	0.94	62,811	0.87	75,187	1.76	1.50	96,804	1.61	1.34	9,271	21.7%	12,694	21.2%
34	General Ins Trieste & Venice (USB)	58,826	55,810	-5.1%	35,169	0.60	62,317	1.12	70,059	1.99	1.19	75,616	1.56	1.35	9,030	25.7%	8,294	17.1%
1	General Reinsurance Corp	2,564,936	2,779,468	8.4%	1,566,089	0.61	1,766,303	0.64	5,023,443	3.14	1.96	5,227,614	2.99	1.88	556,705	34.8%	558,937	32.0%
37	General Security Assurance Corp of NY	35,536	43,370	22.0%	42,664	1.20	56,251	1.30	47,493	1.12	1.34	50,775	0.98	1.17	7,910	18.7%	8,816	17.1%
60	Gerling Global Reinsurance Corp	88,902	95,928	7.9%	26,382	0.30	28,203	0.29	131,639	5.64	1.48	138,693	4.89	1.45	9,383	40.2%	14,515	51.2%
55	Great Lakes Reinsurance Co (USB)	53,200	54,500	2.4%	25,621	0.48	31,324	0.57	29,709	1.33	0.56	37,685	1.19	0.69	6,572	29.3%	7,018	22.2%
48	Hansa Reinsurance Co of America	57,234	53,193	-7.1%	16,716	0.29	37,410	0.70	26,664	1.52	0.47	33,060	1.07	0.62	4,778	27.2%	8,196	26.6%
44	Insurance Corp of Hannover	50,293	52,388	4.2%	37,563	0.75	43,178	0.82	68,842	1.92	1.37	62,428	1.46	1.19	7,911	22.1%	8,805	20.6%
15	Kemper Reinsurance Co	354,449	343,625	-3.1%	243,135	0.69	243,545	0.71	433,847	1.87	1.22	369,389	1.58	1.07	45,193	19.5%	39,291	16.8%
36	Liberty National Fire Ins Co	60,631	65,458	8.0%	56,139	0.93	58,260	0.89	33,342	0.58	0.55	25,088	0.47	0.38	7,013	12.2%	7,013	13.0%
30	Mercantile & General Re Co of America	105,059	102,049	-2.9%	67,073	0.64	84,373	0.83	127,597	1.93	1.21	142,153	1.73	1.39	16,505	25.0%	18,615	22.7%
39	MONY Reinsurance Corporation	86,032	92,270	7.3%	43,336	0.50	48,733	0.53	135,625	2.83	1.58	141,681	3.01	1.54	18,984	39.6%	19,805	42.1%
13	Munich American Reinsurance Co	233,146	248,705	6.7%	263,491	1.13	268,859	1.08	526,586	2.00	2.26	578,112	2.11	2.32	59,927	22.7%	61,277	22.4%
14	Munich Reinsurance Co (USB)	334,256	367,301	9.9%	307,416	0.92	258,562	0.70	490,485	1.47	1.47	540,821	2.07	1.47	76,390	22.8%	68,733	26.4%
16	NAC Reinsurance Corp	189,018	197,391	4.4%	192,323	1.02	217,106	1.10	391,323	2.05	2.07	470,621	2.19	2.38	44,770	23.5%	51,034	23.7%
12	National Reinsurance Corp	228,140	219,694	-3.7%	243,145	1.07	268,953	1.22	672,412	2.66	2.95	756,541	2.97	3.44	68,812	27.3%	71,463	28.0%
17	New England Reinsurance Corp	258,397	296,577	14.8%	197,683	0.77	197,763	0.67	299,678	1.49	1.16	320,901	1.62	1.08	34,679	17.3%	38,246	19.3%
67	New Zealand Reinsurance of America	28,856	27,652	-4.2%	14,692	0.51	18,175	0.66	13,101	0.95	0.45	16,463	0.94	0.60	3,504	25.5%	3,366	19.3%
65	Nordic Union Riensurance Corp	29,697	30,972	4.3%	21,242	0.72	24,014	0.78	26,693	1.26	0.90	32,352	1.37	1.04	6,151	29.1%	4,383	18.6%
11	North American Reinsurance Corp	256,577	230,394	-10.2%	267,657	1.04	289,187	1.26	430,369	1.69	1.68	471,027	1.61	2.04	38,876	15.3%	35,164	12.0%
18	North Star Reinsurance Corp	118,704	122,068	2.8%	132,808	1.12	182,556	1.50	249,080	2.32	2.10	293,397	1.69	2.40	25,568	23.8%	28,681	16.5%
61	Phoenix Reinsurance Co	57,350	53,261	-7.1%	30,414	0.53	27,949	0.52	37,963	1.24	0.66	30,774	1.05	0.58	5,764	18.9%	5,080	17.3%
29	PMA Reinsurance Corp	86,809	101,839	17.3%	82,168	0.95	85,116	0.84	292,667	3.20	3.37	324,861	3.85	3.19	28,135	30.8%	32,385	38.4%
4	Prudential Reinsurance Co	506,759	508,956	0.4%	503,362	0.99	562,556	1.11	1,415,035	2.85	2.79	1,487,620	2.75	2.92	150,384	30.3%	158,065	29.3%
20	Putnam Reinsurance Co	112,385	126,947	13.0%	153,280	1.36	166,143	1.31	264,148	1.66	2.35	351,190	2.20	2.77	27,912	17.6%	35,674	22.4%
25	Re Capital Reinsurance Corp	75,332	85,328	13.3%	92,263	1.22	106,615	1.25	101,958	1.12	1.35	130,737	1.28	1.53	9,904	10.9%	12,581	12.3%
31	Reinsurance Corp of NY	86,747	75,233	-13.3%	98,914	1.14	82,279	1.09	273,139	2.68	3.15	276,034	3.19	3.67	22,536	22.1%	35,577	41.2%
47	San Francisco Reinsurance Co	56,258	105,935	88.3%	29,464	0.52	37,528	0.35	126,592	4.05	2.25	126,847	3.55	1.20	16,227	51.9%	15,939	44.6%
26	Scor Reinsurance Co	115,752	132,989	14.9%	102,108	0.88	95,383	0.72	195,255	1.93	1.69	223,403	2.38	1.68	18,247	18.0%	24,516	26.1%
43	Security Reinsurance Co	52,643	48,268	-8.3%	50,023	0.95	44,493	0.92	48,672	1.05	0.92	52,581	1.07	1.09	9,297	20.1%	7,310	14.9%
72	Shelter Reinsurance Co	18,932	18,932	0.0%	16,604	0.88	15,606	0.82	30,889	1.79	1.63	32,882	2.01	1.74	4,509	26.1%	4,073	24.9%
59	Signet Reinsurance Co	53,222	52,556	-1.3%	31,313	0.59	28,214	0.54	115,524	3.72	2.17	114,741	3.78	2.18	12,621	40.6%	11,354	37.4%
58	Sirius Reinsurance Corp	30,530	32,263	5.7%	23,370	0.77	28,993	0.90	30,961	1.34	1.01	33,840	1.16	1.05	7,645	33.2%	8,393	28.8%
5	Skandia America Reinsurance Corp	326,526	311,610	-4.6%	262,162	0.80	414,122	1.33	432,843	1.64	1.33	585,548	1.50	1.88	52,358	19.8%	56,274	14.4%
46	Sorema North America Reinsurance Co	101,504	100,830	-0.7%	7,974	0.08	37,818	0.38	21,768	2.64	0.21	31,100	1.31	0.31	5,454	66.2%	9,689	40.7%
6	Swiss Reinsurance Co (USB)	331,598	337,603	1.8%	346,166	1.04	370,988	1.10	536,321	1.63	1.62	582,638	1.56	1.73	58,019	17.6%	63,483	17.0%
63	Toa Reinsurance Co	51,944	51,954	0.0%	17,996	0.35	25,943	0.50	28,027	1.65	0.54	36,283	1.47	0.70	5,696	33.6%	6,717	27.2%
9	Transamerica Reinsurance Co	166,069	193,520	16.5%	280,178	1.69	313,546	1.62	402,035	1.48	2.42	554,063	1.74	2.86	47,086	17.4%	64,961	20.4%
8	Transatlantic Reinsurance Co	206,622	212,744	3.0%	319,110	1.54	317,480	1.49	625,594	1.91	3.03	713,024	2.28	3.35	63,306	19.3%	70,084	22.4%
27	Trenwick America Reins Corp	125,157	129,275	3.3%	94,922	0.76	93,622	0.72	213,823	2.21	1.71	244,641	2.58	1.89	23,519	24.3%	26,813	28.3%
23	Underwriters Reinsurance Co	160,152	164,749	2.9%	129,677	0.81	120,268	0.73	452,966	3.00	2.83	411,024	3.41	2.49	61,690	40.9%	55,062	45.7%
68	Unione Italiana Reins Co of America	56,104	56,258	0.3%	9,610	0.17	16,717	0.30	45,842	4.98	0.82	48,666	3.00	0.87	7,337	79.8%	6,963	42.9%
74	United Reinsurance Corp of New York	29,577	28,529	-3.5%	11,755	0.40	10,014	0.35	13,894	1.16	0.47	14,904	1.39	0.52	2,925	24.5%	2,921	27.3%
45	United Republic Reinsurance Co	30,383	30,558	0.6%	20,912	0.69	39,165	1.28	15,053	1.02	0.50	30,341	0.73	0.99	4,169	28.2%	4,914	11.9%
62	Unity Fire & General Ins Co	30,359	31,045	2.3%	35,251	1.16	27,868	0.90	46,337	1.32	1.53	45,040	1.45	1.45	7,027	20.1%	7,974	25.7%
40	USF Re Insurance Co	25,971	25,667	-1.2%	48,585	1.87	47,725	1.86	28,697	0.58	1.10	35,880	0.74	1.40	3,735	7.6%	4,496	9.2%
69	Vesta American Reinsurance Corp	21,646	24,153	11.6%	20,186	0.93	16,089	0.67	24,145	1.21	1.12	20,497	1.14	0.85	3,062	15.3%	3,663	20.3%
71	Western Atlantic Reinsurance Corp	19,907	29,031	45.8%	16,248	0.82	15,907	0.55	9,665	0.63	0.49	8,400	0.57	0.29	1,735	11.4%	2,706	18.5%
19	Winterthur Reins Corp of America	165,981	156,311	-5.8%	100,096	0.60	172,727	1.11	154,247	1.53	0.93	233,517	1.67	1.49	19,255	19.1%	24,193	17.3%
41	Zurich Reinsurance Co of NY	58,435	101,418	73.6%	16,725	0.29	47,628	0.47	27,607	1.57	0.47	60,892	1.40	0.60	5,626	32.0%	8,596	19.6%
	Active Reinsurers	**12,409,601**	**13,158,469**	**6.0%**	**10,252,976**	**0.83**	**11,293,739**	**0.86**	**22,559,673**	**2.20**	**1.82**	**24,294,578**	**2.22**	**1.85**	**2,636,286**	**25.7%**	**2,771,350**	**25.3%**
	Other Reinsurers (b)	454,872	822,887	80.9%	435,512	0.96	389,600	0.47	995,443	2.13	2.19	1,382,261	2.77	1.68	135,787	29.0%	166,124	33.3%
	Total Reinsurance	**12,864,473**	**13,981,356**	**8.7%**	**10,688,488**	**0.83**	**11,683,339**	**0.84**	**23,555,116**	**2.20**	**1.83**	**25,676,839**	**2.24**	**1.84**	**2,772,073**	**25.9%**	**2,937,474**	**25.6%**

(a) Surplus as reported in statutory statements. (b) Totals for "Other Reinsurers" adjusted for prior years to include certain reinsurers previously shown separately.

Relationship between premiums, surplus, and reserves for active reinsurers (000's omitted)

Year	Net premiums written	Statutory surplus	Loss reserves	Change in NPW	Change in PHS	Change in RES	NPW/PHS	RES/PHS	RES/NPE
1986	11,480,698	8,142,513	15,035,836	50.8%	64.6%	32.3%	141.0%	184.7%	144.1%
1987	11,719,113	9,232,488	18,689,471	2.1%	13.4%	24.3%	126.9%	202.4%	161.0%
1988	10,491,144	10,800,084	20,929,408	−10.5%	17.0%	12.0%	97.1%	193.8%	196.2%
1989	10,252,976	12,409,601	22,559,673	−2.3%	14.9%	7.8%	82.6%	181.8%	220.1%
1990	11,293,745	13,158,469	24,294,578	10.2%	6.0%	7.7%	85.8%	184.6%	221.7%

NPW = Net Premiums Written; PHS = Statutory Surplus; RES = Loss Reserves

positive in 1990 at about 110% and 131%, respectively. Still, the increase in investment income experienced last year was less than 1987's 20.5% and 1986's 19.1%, as interest rates today have substantially declined from 1986 levels. Looking at investment income in terms of the investment ratio (investment income to net premiums earned), we see that this ratio increased for the third consecutive year to 24.7%. Once again, this was primarily because of an expanding asset base, and a relatively stable earned premium base.

If we subtract the investment income ratio from the combined ratio, we have another measure of profitability, the operating ratio. The operating ratio for 1990 was, 82.7%, indicating that the domestic reinsurance industry was quite profitable on an operating basis. Over an extended period, a ratio of less than 100 percent indicates profitability while an operating ratio over 100 percent indicates a company's operations are unprofitable. The operating ratio registered in 1990 was substantially better than the 84.1% in 1989, but still a little worse than the 1988 result of 82.2%. Nevertheless, all the previously mentioned results are substantially better than the 87.5% recorded in 1987. Furthermore, as a result of last year's improved underwriting performance, return on revenue increased modestly to 14.5% for the 77 active reinsurers in the marketplace today. But, despite an improved combined ratio, return on assets declined to 3.7% from 4.1%, and return on equity declined to 12.7% from 14.3%. This occurred because, in the aggregate, realized capital gains were virtually nonexistent, and taxes incurred increased substantially for professional reinsurers. It is noteworthy that this is the fourth consecutive year that return on equity has declined, and these declines are exacerbated by the fact that reinsurers have increased their capitalization levels to demonstrate their committment to the business. Still, it is not clear if this capital has been invested wisely, as returns for the reinsurance business are now substantially below those achieved in many other industries, and in S&P's opinion are not comensurate with the inherent risk associated with the business. Nevertheless, 1990's results are in stark contrast to return on revenue of a negative 4.6%, return on assets of 17 basis points, and return on equity of 68 basis points reported in 1985.

Based on the financial returns of active reinsurers, it is not surprising that reinsurance companies in the aggregate were tax payers for the fifth consecutive year, following many years when tax credits were generated. Specifically, active reinsurers taxes incurred on a statutory basis ranged between $460 million and $480 million over the past three years. This represents an effective tax rate of 24.2% for 1990, down 1.6 percentage points from 1989. The amount of taxes incurred by the insurance and reinsurance industry, over the last several years, far exceeds initial estimates made by the Government Accounting Office, when the Tax Reform Act of 1986 became law.

Six year history of tax rate for active reinsurers (000's omitted)

Year	Pretax operating income	Taxes incurred	Effective tax rate
1985	(363,948)	(129,141)	NM
1986	899,371	129,445	14.4%
1987	1,681,361	429,337	25.5%
1988	2,067,433	474,625	23.0%
1989	1,809,333	466,634	25.8%
1990	1,992,265	481,856	24.2%

The volume of business written by professional reinsurance departments, as shown in Exhibit C, continues to grow as evidenced by a 5.1% increase to $2.2 billion in premium volume, which represents a 22.2% increase since 1985. It is noteworthy, that much of the growth in this business segment comes from the larger reinsurance departments that write the bulk of reinsurance business conducted by primary companies. A number of these departments are ranked among the top 10 professional reinsurance groups. However, when compared to direct writers and broker market companies, the market share for reinsurance departments of primary companies remains just below 16.0%, substantially down from the 19% reported in 1987. Also, it is difficult to make judgements

Financial returns active reinsurers (000's ommitted)

Return on Revenue Year	Pretax Operating Income	Total Revenue	ROR
1985	(363,948)	7,822,322	−4.65%
1986	899,371	11,944,620	7.53%
1987	1,681,361	13,587,646	12.37%
1988	2,067,433	12,961,939	15.95%
1989	1,809,333	12,784,827	14.15%
1990	1,992,265	13,733,418	14.51%
Return on Assets Year	**Net Income**	**Total assets**	**ROA**
1985	29,848	20,780,965	0.17%
1986	1,239,564	29,244,903	4.96%
1987	1,430,185	34,405,266	4.49%
1988	1,796,314	38,498,575	4.93%
1989	1,660,861	41,831,311	4.14%
1990	1,618,143	44,849,236	3.73%
Return on Equity Year	**Net Income**	**Statutory Surplus**	**ROE**
1985	29,848	4,946,562	0.68%
1986	1,239,564	8,142,513	18.94%
1987	1,430,185	9,232,488	16.46%
1988	1,796,314	10,800,083	17.93%
1989	1,660,861	12,409,303	14.31%
1990	1,618,143	13,158,468	12.66%

from this data about the overall profitability of primary companies with reinsurance departments versus professional reinsurers. The main reason is that primary companies do not provide information about investment income earned on their reinsurance portfolio of business.

Also, it appears that underwriting results for this business segment more closely follow the results of the primary insurance industry, and the business written is, for some companies, more proportional in nature. Other companies write business that is more catastrophe-oriented than the typical portfolio of a professional reinsurer. Accordingly, primary insurance companies that participate in the reinsurance business, either through reinsurance departments or management firms, continue to generate underwriting results substantially weaker than professional reinsurance companies. Specifically, during 1990 these companies produced a combined ratio of almost 124%, almost 18 percentage points worse than active professional reinsurance companies. This sub-par underwriting performance is largely the result of a handful of major reinsurance departments of primary companies suffering unusually large underwriting losses. For example, the Berkshire Hathaway Group, and the St. Paul Cos. registered 1990 combined ratios of 124.9% and 130.8%, respectively. But F&G Re (USF&G) produced an underwriting profit in 1990 as evidenced by a combined ratio of 95.9%. In addition, as is the case with professinal reinsurers, a number of primary companies exited the reinsurance business, or discontinued underwriting certain lines over the last several years.

Exhibit C

Reinsurance Results Of Primary Companies With Reinsurance Departments

(000s omitted)

Net Premiums Written		Underwriting Experience		
Year	**Premiums ($000)**	**Loss Ratio**	**Expense Ratio**	**Combin ed Ratio**
1985	1,800,731	91.3%	29.2%	120.5%
1986	2,522,231	83.1%	29.9%	113.0%
1987	2,928,396	78.3%	26.7%	105.0%
1988	2,269,421	79.6%	29.3%	108.9%
1989	2,094,957	85.0%	32.5%	117.5%
1990	2,201,351	92.0%	31.8%	123.9%
% Change		**Six Year Average**		
1989-1990	5.1%	84.4%	29.7%	114.1%
1985-1990	22.2%			

Exhibit D has been expanded this year, and now includes premium volume and combined ratios (when available) for the domestic market dating back to 1950. After posting a two-year decline in premium volume, the domestic reinsurance market achieved growth of 8.6% in volume to $13.8 billion. Also, real premium growth, net premiums written adjusted by the GNP implicit price deflator, was positive for the first time in three years, after declining 8% in 1989 and 14% in 1988. Real premium volume has declined in seven of the last 12 years.

This year, as shown in Exhibit E, S&P has captured incurred loss information from Schedule P of the 1990 statutory statement. This information shows that incurred losses have developed adversely for accident years 1981 through 1985, by calendar year 1990. For example, for accident year 1983 the loss ratio, as originally estimated in 1983, developed adversely by 30.3 percentage points at year-end 1990. Large rate increases received during

Distribution of premiums and loss reserves by class of business active reinsurers (000's ommitted)

Line of business	**NPE 1988**	**NPE 1989**	**NPE 1990**	**LR/NPE 1990**
Medical malpractice	40,687	24,989	32,147	1649.9%
Workers' compensation	225,308	237,011	214,438	536.0%
Other liability	983,730	869,305	874,384	411.0%
Auto liability	458,040	410,056	505,641	238.0%
Other proportional property	4,086,535	3,071,952	3,160,909	264.3%
Non-proportional property	980,881	1,081,615	1,173,268	83.2%
Non-proportional casualty	3,731,863	4,360,451	4,794,624	171.9%
Other non-proportional	158,409	194,221	204,362	118.8%
Total	10,665,453	10,249,600	10,959,773	221.7%

LR = Loss Reserves
NPE = Net Premiums Earned

1984 and 1985 encouraged reinsurers to establish more conservative loss reserves, that translated into incurred losses developing redundantly for accident years 1986 thru 1988, by calendar year 1990. Most interesting is that accident year 1989 has already developed adversely by 2.0 percentage points after only 12 months of development, indicating the more than 4 percentage point deterioration in the combined ratio in 1989 was actually understated. This creates a question as to how accurate is the improvement shown in the combined ratio for 1990.

The breakdown of premiums and loss reserves for active reinsurers by line of business shows that nonproportional reinsurance business accounts for nearly 57% of premium volume (up from 46% in 1988), despite this form of business being less premium-intensive than proportional business, which now accounts for the other 43% of premium volume. Furthermore, nonproportional casualty business accounts for over three-quarters of all nonproportional business written by active reinsurers. The distribution of proportional business is more evenly spread by line of business, with liability lines of business accounting for about 33% of all proportional premium volume. Overall, long-tail lines of business account for about 60% of all reinsurance premium volume. In terms of loss reserves, the workers' compensation and other liability lines are the most heavily reserved at 536% and 411% of net premiums earned, respectively. It is interesting to note that nonproportional casualty business is reserved at only 172% of every dollar of earned premium.

Schedule F in the statutory statement filed by insurance companies was revised in 1989 to provide for more detailed reporting of reinsurance recoverables and to require companies to show a liability for potentially uncollectible reinsurance. But, in S&P's opinion this attempt by the National Association of Insurance Commissioners (NAIC) to encourage a more accurate reporting of uncollectible reinsurance was not as successful as anticipated.

This is evident when we observe data collected for 77 active reinsurers who reported total reinsurance recoverables of $13.2 billion (equal to 100% of statutory surplus), but reported a provision for reinsurance as a liability on the balance sheet of only $336 million, down from $369 million in 1989 (up from $260 million in 1988), which represents a mere 2.5% of total reinsurance recoverables. These recoverables are in the form of paid losses, unpaid losses, and unearned premium, as well as ceded incurred-but-not-reported (IBNR) and allocated loss adjustment expenses. Additionally, these 77 companies collectively wrote off only $30 million in uncollectible reinsurance according to the notes presented in the stat-

Exhibit D
Summary Net Premiums Written
(000s omitted)

Year	Professional Reinsurers	Percent Of Total	Combined Ratio	Primary Professional	Percent Of Total	Combined Ratio	Total Domestic Reinsurance	Percent Change
1950	201,000	85.9%	NA	33,000	14.1%	NA	234,000	NA
1951	223,000	83.5%	NA	44,000	16.5%	NA	267,000	14.1%
1952	230,000	85.2%	NA	40,000	14.8%	NA	270,000	1.1%
1953	238,000	82.6%	NA	50,000	17.4%	NA	288,000	6.7%
1954	225,000	78.9%	NA	60,000	21.1%	NA	285,000	-1.0%
1955	255,000	77.5%	NA	74,000	22.5%	NA	329,000	15.4%
1956	286,000	74.7%	NA	97,000	25.3%	NA	383,000	16.4%
1957	325,000	66.3%	NA	165,000	33.7%	NA	490,000	27.9%
1958	362,000	66.2%	NA	185,000	33.8%	NA	547,000	11.6%
1959	352,000	62.6%	NA	210,000	37.4%	NA	562,000	2.7%
1960	385,000	63.3%	99.2%	223,000	36.7%	NA	608,000	8.2%
1961	399,000	60.6%	98.1%	259,000	39.4%	NA	658,000	8.2%
1962	460,000	58.2%	97.8%	330,000	41.8%	NA	790,000	20.1%
1963	484,000	58.5%	102.4%	343,000	41.5%	NA	827,000	4.7%
1964	544,000	59.5%	103.0%	371,000	40.5%	NA	915,000	10.6%
1965	592,000	60.2%	108.4%	392,000	39.8%	126.9%	984,000	7.5%
1966	639,000	59.8%	102.4%	430,000	40.2%	105.6%	1,069,000	8.6%
1967	640,000	59.0%	103.2%	444,000	41.0%	102.1%	1,084,000	1.4%
1968	682,000	60.7%	100.0%	442,000	39.3%	96.9%	1,124,000	3.7%
1969	841,000	62.8%	99.0%	498,000	37.2%	99.3%	1,339,000	19.1%
1970	1,007,000	62.7%	97.9%	598,000	37.3%	96.5%	1,605,000	19.9%
1971	1,216,000	65.9%	95.9%	628,000	34.1%	92.8%	1,844,000	14.9%
1972	1,372,000	65.2%	97.4%	732,000	34.8%	95.0%	2,104,000	14.1%
1973	1,607,000	66.6%	99.5%	805,000	33.4%	94.7%	2,412,000	14.6%
1974	1,845,000	66.5%	109.6%	930,000	33.5%	106.6%	2,775,000	15.0%
1975	2,321,000	67.8%	109.9%	1,102,000	32.2%	103.7%	3,423,000	23.4%
1976	2,904,000	67.7%	101.2%	1,384,000	32.3%	99.6%	4,288,000	25.3%
1977	3,631,000	67.9%	99.7%	1,720,000	32.1%	98.0%	5,351,000	24.8%
1978	4,332,000	68.9%	99.5%	1,955,000	31.1%	104.3%	6,287,000	17.5%
1979	4,608,000	72.8%	103.0%	1,725,000	27.2%	109.8%	6,333,000	0.7%
1980	4,841,000	72.9%	104.7%	1,803,000	27.1%	116.1%	6,644,000	4.9%
1981	5,269,000	75.4%	105.6%	1,720,000	24.6%	121.5%	6,989,000	5.2%
1982	5,703,000	76.4%	109.5%	1,766,000	23.6%	118.3%	7,469,000	6.9%
1983	6,286,460	81.7%	116.3%	1,411,710	18.3%	125.2%	7,698,170	3.1%
1984	7,286,299	84.4%	130.9%	1,350,655	15.6%	131.4%	8,636,954	12.2%
1985	9,453,953	84.0%	124.1%	1,800,731	16.0%	120.5%	11,254,684	30.3%
1986	12,579,948	83.3%	109.3%	2,522,231	16.7%	113.0%	15,102,179	34.2%
1987	12,222,363	80.7%	105.9%	2,928,396	19.3%	105.0%	15,150,759	0.3%
1988	11,085,395	83.0%	104.2%	2,269,421	17.0%	108.9%	13,354,816	-11.9%
1989	10,688,488	83.6%	108.8%	2,094,957	16.4%	117.5%	12,783,445	-4.3%
1990	11,683,339	84.1%	107.4%	2,201,351	15.9%	123.9%	13,884,690	8.6%

utory statement. Furthermore, only $93 million of losses were incurred due to commutations of outstanding recoverables. It would appear that domestic reinsures would have a far greater exposure to uncollectible reinsurance, particularly since about 30% of all paid recoverables are over 90 days old (25% over 180 days old), and since a great deal of naive retrocessionnal capacity has historically existed in the market place.

The problem with accounting for uncollectible reinsurance continues to be that ceding companies are not identifying troubled companies, amounts past due, commutations being offered, or companies in liquidation, on an accurate or consistent basis. Also, current statutory accounting practices do not require the disclosure of ceded IBNR for authorized companies in Schedule F. Other reporting problems have emerged as the schedules making up the 90-day rule permit a ceding company to omit all disputed recoverables from consideration for a penalty. However, what constitutes a dispute is not clear. Nevertheless, some positive developments have occurred; for instance every reinsurer who received premium income in the current year is now listed in schedule F.

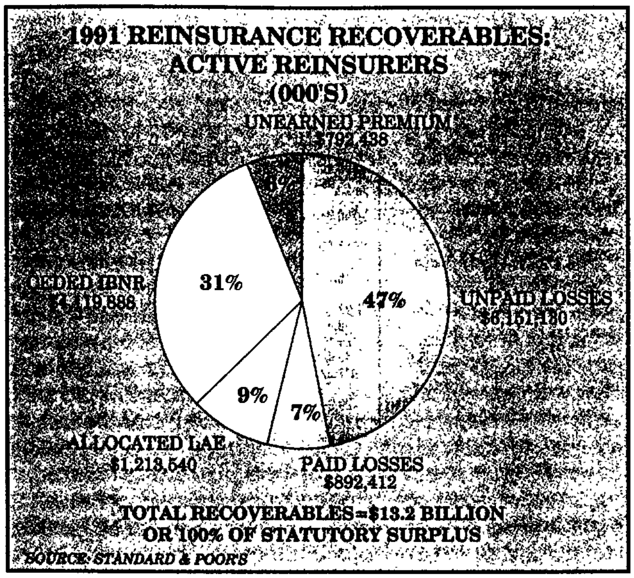
Paid loss reinsurance recoverables for 1990 active reinsurers (000's ommitted)

Aging of paid loss recoverables	$ Outstanding	Reinsurance
1 to 29 days old	528,405	59.2%
30 to 90 days old	97,397	10.9%
91 to 180 days old	47,019	5.3%
Over 180 days old	219,789	24.6%
Total	892,412	—
Weighted Avg Collection Period	63 Days	—

Exhibit E
1991 Reinsurance Survey
Loss Reserve Development
Active Reinsurers

Company Name	* Loss Ratio CY 1990	AY 1990	Ten Year Avg. AY	Percentage Point Change in Original Loss Ratio For Each Accident Year At Calendar Year 1990 AY 1989	AY 1988	AY 1987	AY 1986	AY 1985	AY 1984	AY 1983	AY 1982	AY 1981
Abeille Reassurances (USB)	85.1%	73.2%	74.2%	44.7	-14.9	-15.4	-5.3	103.1	NA	NA	NA	NA
AGF Reinsurance Corp of the US	25.9%	74.7%	163.6%	6.7	-8.1	-0.6	-39.4	47.6	226.2	120.3	76.5	60.2
American Agricultural Ins Co	95.0%	82.1%	87.9%	5.7	-12.4	2.5	-1.4	6.7	2.1	12.8	6.3	23.4
American Fuji Fire & Marine Ins Co	90.3%	55.4%	91.4%	13.0	-5.8	-12.9	-10.0	64.3	148.6	171.8	155.0	NA
American Re-Insurance Co	68.1%	66.0%	70.1%	-2.5	-3.0	-15.9	-17.7	8.5	46.2	32.4	24.6	7.6
American Royal Reins Co	77.4%	95.9%	71.9%	-1.9	-4.2	-21.2	-22.8	3.9	42.8	23.5	16.7	19.7
American Union Reins Co	79.8%	69.2%	72.3%	9.6	-0.6	-8.8	-25.9	-5.3	24.6	15.7	17.1	6.5
Asset Guaranty Reinsurance Co	51.0%	42.3%	46.9%	12.5	NA	NA	NA	NA	NA	NA	NA	NA
AXA Reinsurance Co	74.8%	75.4%	73.9%	5.1	0.9	-10.3	-13.7	15.4	7.8	12.0	3.6	6.5
Baltica-Skandinavia Re Co of America	74.0%	54.5%	70.6%	15.1	8.9	5.6	-7.5	56.2	65.6	53.8	47.2	20.0
Belvedere America Reinsurance Co	76.6%	77.0%	88.1%	5.0	-4.3	0.6	NA	NA	0.0	0.0	0.0	0.0
Capital Reinsurance Co	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chartwell Reinsurance Co	73.4%	84.8%	92.5%	1.2	1.5	-12.1	-2.9	100.2	86.7	79.3	37.9	-12.3
Christiania General Ins Corp of NY	68.3%	66.6%	82.8%	3.6	4.0	2.7	11.5	6.1	23.8	8.3	17.6	24.0
CIGNA Reinsurance Co	82.9%	77.2%	73.0%	0.3	4.2	-5.9	4.8	-7.2	-7.6	-8.0	8.1	-4.7
Clarendon America Ins Co	82.7%	81.7%	61.2%	0.3	1.2	-1.2	0.5	20.0	NM	-33.0	0.0	0.0
Cologne Reinsurance Co of America	68.3%	78.7%	77.8%	25.0	39.0	29.2	-23.2	6.3	36.5	27.4	16.4	12.1
Constitution Reinsurance Corp	76.5%	73.6%	75.7%	2.5	-1.1	-0.2	-3.4	9.7	10.3	10.0	4.6	2.5
Continental Reinsurance Co	86.6%	81.6%	72.0%	2.2	-13.4	-0.5	-8.3	34.9	53.4	70.4	153.4	37.5
Dorinco Reinsurance Co	91.1%	73.7%	93.8%	33.6	11.8	5.4	-3.8	20.7	91.9	66.4	57.7	49.8
Employers Reinsurance Corp	79.5%	74.8%	78.9%	0.7	-1.3	-11.1	-12.1	13.4	24.9	8.7	5.6	7.4
Enhance Reinsurance Co	12.0%	12.0%	3.5%	0.1	0.0	0.0	0.0	NA	NA	NA	NA	NA
Executive (ERIC) Reinsurance Co	67.3%	70.0%	67.3%	4.0	-1.1	-27.9	NA	NA	NA	NA	NA	NA
Excess Mutual Reinsurance Co	109.2%	108.3%	87.1%	4.0	-5.4	-6.1	-5.1	-6.4	-2.9	-0.4	-5.7	-3.7
Finmar Reinsurance Corp	73.0%	72.9%	72.5%	-0.3	2.1	NA	NA	NA	NA	NA	NA	NA
First Excess & Reinsurance Corp	73.6%	69.7%	95.4%	1.2	-19.0	-16.9	-71.0	34.0	121.5	137.8	146.6	84.3
Folksamerica Reinsurance	69.2%	74.3%	75.8%	2.3	3.2	-6.5	-13.9	2.0	26.1	-2.2	13.4	-2.3
Frankona Reinsurance Co (USB)	79.0%	72.4%	80.7%	-1.3	-8.0	-4.5	26.6	26.6	54.1	89.6	57.1	NA
General Security Assurance Corp of NY	53.9%	54.0%	66.3%	-2.8	2.8	-10.7	-11.0	2.3	6.5	5.9	4.1	4.6
General Ins Trieste & Venice (USB)	99.6%	95.7%	79.4%	0.3	-3.7	5.6	-0.9	-20.3	4.2	7.1	-0.6	7.4
General Reinsurance Corp	69.9%	71.5%	75.3%	-4.1	-3.1	-10.5	4.5	36.0	44.9	59.6	27.6	2.2
Gerling Global Reinsurance Corp	64.1%	64.9%	84.4%	-6.6	2.4	-13.8	-11.7	-11.2	-4.7	34.2	15.8	18.3
Great Lakes Reinsurance Co (USB)	75.5%	75.9%	72.2%	2.1	-2.9	0.0	-9.9	5.8	5.7	7.2	6.2	NA
Hansa Reinsurance Co of America	69.6%	82.8%	68.6%	-10.7	-11.0	-14.6	-15.5	1.3	11.7	16.6	2.7	15.9
Insurance Corp of Hannover	84.5%	77.8%	85.0%	0.2	-5.5	-14.1	-14.1	14.0	138.7	117.0	11.0	-4.8
Kemper Reinsurance Co	84.4%	79.2%	83.6%	-1.0	-37.0	-6.3	-7.5	4.4	13.9	19.9	16.2	8.1
Liberty National Fire Ins Co	47.5%	46.4%	57.4%	0.4	-0.8	-2.1	0.2	3.2	0.0	0.0	3.3	1.1
Mercantile & General Re Co of America	73.3%	61.0%	75.2%	13.4	-2.1	-14.0	-19.4	5.1	36.8	55.7	13.6	15.1
MONY Reinsurance Corp	80.2%	70.2%	69.6%	-0.1	-8.9	-0.7	-10.9	25.0	41.6	54.8	18.1	10.9
Munich American Reinsurance Co	75.1%	69.4%	71.8%	3.8	1.8	-4.2	3.6	7.4	33.6	20.4	-6.1	-8.4
Munich Reinsurance Co (USB)	76.0%	69.5%	71.6%	5.2	5.8	1.2	1.7	0.2	20.4	16.9	0 7	1.8
NAC Reinsurance Corp	71.8%	73.5%	73.4%	0.5	-4.7	-14.0	-10.8	43.8	273.3	285.5	155.4	4.4
National Reinsurance Corp	72.8%	71.2%	81.8%	-0.6	-3.6	-11.5	-3.4	8.4	14.7	19.6	0.7	-1.2
New England Reinsurance Corp	75.8%	71.4%	70.2%	2.1	-1.3	-2.4	-0.6	6.4	9.5	10.0	1.0	-1.7
New Zealand Reinsurance of America	89.6%	93.1%	115.1%	-3.8	-6.9	-41.9	7.4	NA	NA	NA	NA	NA
Nordic Union Reinsurance Corp	75.6%	73.8%	74.3%	0.5	-4.5	2.4	0.8	4.7	10.4	12.3	5.4	1.2
North American Reinsurance Corp	73 6%	65.9%	77.3%	2.9	3.2	4.4	-1.0	14.0	19.8	27.6	7.5	-6.1
North Star Reinsurance Corp	68.8%	68.8%	66.5%	12.0	2.6	-4.5	-5.3	9.0	18.6	9.9	12.3	6.8
Phoenix Reinsurance Co	72.0%	75.4%	65.8%	4.7	-5.2	-8.1	-15.4	26.1	48.1	53.7	86.7	NA
PMA Reinsurance Corp	85.5%	98.1%	83.6%	0.0	-4.3	-13.2	-17.6	42.3	4.6	14.0	7.2	-1.7
Prudential Reinsurance Co	81.2%	81.4%	75.6%	9.8	-6.0	-16.3	-24.4	-11.6	2.7	26.7	12.7	-23.4
Putnam Reinsurance Co	76.8%	77.0%	81.6%	1.1	-2.9	-0.9	0.3	0.0	NA	NA	NA	NA
Re Capital Reinsurance Corp	60.7%	70.1%	64.9%	0.0	-8.4	-11.7	65.6	NA	NA	NA	NA	NA
Reinsurance Corp of NY	85.9%	77.5%	76.2%	5.8	-3.6	-11.7	-7.0	10.0	17.0	7.3	13.2	6.4
San Francisco Reinsurance Co	81.7%	80.0%	93.8%	8.3	0.4	-0.9	12.3	44.2	46.1	51.4	67.9	NA
Scor Reinsurance Co	62.8%	52.5%	70.4%	21.7	-1.7	11.1	-19.7	0.6	66.2	11.4	37.5	8.2
Security Reinsurance Co	64.0%	54.1%	65.0%	13.8	3.4	-6.4	-12.0	-5.0	21.3	88.6	37.0	10.0
Shelter Reinsurance Co	118.3%	78.2%	84.6%	18.8	14.0	18.6	NA	NA	NA	NA	NA	NA
Signet Reinsurance Co	85.5%	67.0%	79.9%	18.9	4.7	-11.9	-8.8	33.2	86.2	19.4	22.9	18.4
Sirius Reinsurance Corp	77.4%	75.4%	73.5%	3.0	1.1	2.5	1.0	-0.5	18.8	13.0	13.7	7.8
Skandia America Reinsurance Corp	74.9%	69.1%	66.7%	3.5	11 0	-39.7	-30.2	37.7	22.6	39.0	37.6	16.9
Sorema North America Reinsurance Co	70.6%	50.8%	85.5%	-1.0	-9.0	-7.8	-5.0	14.2	71.9	95.2	75.6	157.9
Swiss Reinsurance Co (USB)	72.7%	65.3%	77.1%	3.0	1.6	4.6	-1.0	14.0	19.5	25.7	6.4	-7.4
Toa Reinsurance Co	79.1%	56.9%	76.3%	105.8	67.4	-24.9	-2.7	-34.8	-67.9	-127.8	NA	NA
Transamerica Reinsurance Co	76.2%	76.7%	75.1%	0.7	-0.6	4.3	NA	NA	NA	NA	NA	NA
Transatlantic Reinsurance Co	79.7%	80.4%	84.2%	3.8	-8.5	-10.1	-17.7	0.8	11.8	10.1	18.1	10.9
Trenwick America Reins Corp	72.2%	80.2%	73.5%	1.7	-0 6	-11.3	-18.6	7.8	21.5	44.5	25.3	18.2
Underwriters Reinsurance Co	82.7%	81.2%	85.6%	0.5	0.5	0.2	-1.5	-6.9	115.8	114.2	34.0	30.1
Unione Italiana Reins Co of America	144.1%	52.7%	135.0%	0.3	40.0	51.3	12.9	167.2	278.5	333.3	201.9	189.7
United Reinsurance Corp of New York	81.4%	70.9%	69.8%	5.2	2.0	-14.6	-3.5	8.6	14.9	25.6	19.7	7.6
United Republic Reinsurance Co	70.8%	70.9%	70.0%	-0.7	-0.4	-11.3	48.3	NA	NA	NA	NA	NA
Unity Fire & General Ins Co	82.0%	82.0%	73.8%	-13.0	-1.3	-13.5	-17.4	0.6	6.9	16.5	5.4	3.2
USF Re Insurance Co	70.3%	70.5%	64.2%	0.3	-4.4	4.6	1.9	2.8	32.9	28.9	32.0	16.8
Vesta American Reinsurance Corp	73.9%	71.9%	71.5%	0.8	-2.6	1.1	50.3	NM	57.0	33.7	17.6	20.7
Western Atlantic Reinsurance Corp	57.8%	54.0%	63.7%	6.0	-21.9	NA	NA	NA	NA	NA	NA	NA
Winterthur Reins Corp of America	69.7%	68.0%	76.6%	0.8	6.9	-3.3	-6.6	9.7	23.2	12.2	12.7	18.7
Zurich Reinsurance Co of NY	75.8%	63.5%	71.4%	20.3	-2.4	-7.9	-13.6	3.8	7.6	8.1	4.3	17.7
Weighted Average	75.1%	72.5%	75.8%	2.0	-2.2	-8.5	-6.5	14.4	29.1	30.3	17.3	3.7

* = Incurred Loss + Allocated Loss Adjustment Expenses / Net Premiums Earned AY = Accident Year CY = Calendar Year



S&P looks to the future

As discussed over the last several years, S&P continues to believe the most important reinsurance story of the 1990s will be the consolidation of the reinsurance industry, resulting in bigger, better-capitalized global reinsurers. Substantial barriers to entering the reinsurance market have been created over the last several years, after virtually no barriers to entry existed in the early 1970s. Specificially, a reinsurance company today needs at least $100 million in capital to meet ceding companies market security guidelines, and about 40 of the 77 professional reinsurance companies in our survey have close to this amount of capital. This suggests that going forward almost one-half of the companies now operating in the reinsurance industry will be under severe pressure to maintain a longer-term market presence. Thus, it is becoming more evident that small and medium sized companies will either have to exit the business or find themselves a partner.

This phenomenon was demonstrated in 1990 as two medium-sized companies with excellent long-standing reputations, Unity Fire & General Insurance Co. and General Security Assurance Corp., which were both owned by Rockleigh Management Corp., merged with SCOR Re. Also, another medium-sized company, Philadelphia Re, was forced to exit due to poor operating performance and a perceived lack of commitment to the U.S. reinsurance market. Most recently Unione Italiana Reinsurance of America announced its was going into run-off. Another noteworthy organizational change that occurred in 1990 was the decision by Home Insurance to put its reinsurance operation US International Re into run-off. Also, Skandia America bought the business of Metropolitan Re, whose parent Metroplitan Property & Casualty made the decision to exit the reinsurance business. Finally, Xerox Corp., which owns Crum & Forster insurance companies, is now attempting to sell about one-half of its ownership in Constitution Re in the open market.

The flight to quality which began at the end of the last cycle continues, as ceding companies look for well-capitalized reinsurers, and as mentioned, in many cases ceding companies are instructing only to place business with reinsurers that have a capital base of more than $100 million for property business and $200 million for casualty business.Accordingly, during 1990 companies such as American Union Reinsurance Co., AXA Reinsurance Co., PMA Reinsurance Corp., San Francisco Reinsurance Co., and Zurich Reinsurance Co. of N.Y. experienced dramatic growth in capital, bringing statutory surplus to greater than $100 million. Most recently and subsequent to year-end 1990, Cologne Re of America, received a $40 million capital contribution to bring surplus to the magical $100 million level. By achieving the $100 million benchmark for capital and surplus, these companies have demonstrated their commitment to the U.S. reinsurance business. Another differentiating factor used by ceding companies when choosing a reinsurer are rating agency assesments, and highly rated reinsurance companies have an effective competitive advantage.

As a result of this flight to quality, the industry is characterized by a relatively high degree of industry concentration as the top five reinsurers accounted for 40% of business written in 1990, and the top 10 reinsurers accounted for 54%. This is more concentrated than the collective market shares of 37% and 44%, respectively, for these companies back in 1985. As further evidence of the consolidation process in the reinsurance industry, we again refer to the dramatic decline in business for those companies included in the "other reinsurer" category. At year-end 1985, nearly 20% of all premiums were written by companies no longer in the business (3% last year).

Going forward, corporate strategies aimed at maintaining market share are focused at expanding into special risk operations (finite risk), expanding internationally, and creating a competitive advantage by providing superior client services. Expansion into the alternative risk marketplace also is a goal among a number of reinsurers who are seeking to provide underwriting, captive management, fronting, and financial reinsurance services to self-insured groups. S&P also believes that acquisition activity will accelerate in the reinsurance industry as larger companies, unable to increase rates, will seek to expand by purchasing other reinsurers, or the books of business, within various market niches. To summarize, reinsurers can no longer offer only the traditional reinsurance services and will have to offer innovative reinsurance products; offer more financial, managerial,and actuarial services to their clients; and engage in acquisitions to create a competitive advantage and attract market share.

S&P further believes that pressure will continue on reinsurance intermediaries as some broker market companies are seeking to create a competitive advantage by developing client services and establishing a more direct relationship with ceding companies, thus threatening the way intermediaries have historically done business. Ultimately, only the most competent and professional reinsurance brokers will continue to exist with a meaningful market presence. Still, broker market companies gained in market share during 1990 (to 61.2% in 1990 from 60.4% in 1989), versus nine major direct writing companies. But many broker market reinsurance companies also write business on a direct basis, at an increasing frequency—particularly facultative business—and the actual industry distribution of business written by market

	Net premiums written ($000)						Percentage change	
Market Segment	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1989–90**	**1985–90**
Nine major direct writers	4,263,016	6,287,584	6,085,032	5,328,696	5,061,374	5,361,242	5.9%	25.8%
Reinsurance dept. of primary co's	1,800,731	2,522,231	2,928,396	2,269,421	2,094,957	2,201,351	5.1%	22.3%
Principally broker market co's	5,190,937	6,292,364	6,137,331	5,756,699	5,627,114	6,322,097	12.4%	21.8%
Total reinsurance	11,254,684	15,102,179	15,050,759	13,264,816	12,783,445	13,884,690	8.6%	23.4%

segments, in S&P's opinion, is about evenly split between business conducted through brokers or on a direct basis.

The past several years will always be remembered for record levels of catastrophe losses, and 1990 was no exception. It was the second worst year on record for U.S. catastrophe losses as insured property damage was estimated to be to $2.8 billion. Still, this represents a substantial improvement from 1989's record levels of domestic catastrophe losses, which amounted to $7.6 billion, nearly three times the largest previous annual figure of $2.8 billion in 1985. In comparison, annual catastrophe losses between 1983 and 1988 averaged $1.6 billion. The trend of unusually large catastrophe losses continues in 1991 as catastrophe damage losses increased to about $1.4 billion for the first four months of the year, compared to $550 million over the same period last year. Furthermore, European storm losses exceeded $8 billion in 1990, almost three times those experienced in the U.S., and virtually led to collapse of the LMX market, and greatly reduced capacity for property catastrophe reinsurance protection. Overall, increased catastrophe losses over the past several years is disturbing, and suggests that climatic changes are occurring. This is something that the scientific community is beginning to acknowledge, but remains unable to empirically validate and explain. Furthermore, despite excess capital in the marketplace, capacity for catastrophe coverage has declined dramatically as a result of a series of mostly weather-related losses experienced over the last several years.

Rate increases also have accompanied the demand created by catastrophe losses, and S&P believes these conditions have created a lack of retrocessionnal protection and increased rates for retrocessional business. Accordingly, small and medium-sized reinsurance companies may be unable to obtain adequate retrocessionnal capacity, or find the cost prohibitive, and will have to substantially reduce their line sizes, despite maintaining the most conservative operating leverage in recent memory. The alternative is to continue offering the same capacity, as in prior years, and further expose the company's capital base.

The Tax Reform Act of 1986 also has reduced margins significantly by increasing federal taxable income for the reinsurance industry, principally through provisions that require the discounting of deductible loss reserves and the creation of an Alternative Minimum Tax (AMT). Tax Reform also has benefited foreign reinsurers at the expense of the domestic industry as the latter would probably lose business if it attempted to offset increased tax costs with higher premiums. Discussions on whether to raise the current level of Federal Excise Tax (FET) from 1% to 4% and to override the waiver of excise tax treaties with certain countries have stalled. The emphasis is now being placed on creating regulatory barriers to entry for foreign reinsurers that may help in leveling the playing field for domestic reinsurers to compete with their foreign counterparts.

As recently as the mid-March, the House Commerce Committee's oversight and investigation subcommitte proposed that all companies that want to write reinsurance business in the U.S. would need to be pre-approved by a federal regulatory process according to a set of solvency standards that the Federal Government would develop and implement. Furthermore, because of the industry's relatively small size and global perspective, the U.S. government believes it is in the best position to oversee regulation. In light of future regulatory actions, an alien company will probably need a subsidiary in the U.S. if it wants to write a meaningful book of U.S. business. For instance, one proposal being considered by the NAIC is that alien reinsurers (non-U.S. companies) would need to provide a U.S. Trust Fund equal to 25% of it U.S. reinsurance obligations, maintain minimum levels of capitalization, and submit to the jusidiction of the U.S. court system. There are also a host of other requirements that need to be met to attain the NAIC's proposed white list.

It is unclear why the focus is now on exerting greater regulatory control over alien reinsurers, particularly since historical problems have largely existed with U.S. companies. For instance, insolvent companies such as Mission, Integrity, Ideal Mutual, Transit Casualty, and Midland were licensed in most major states, and thus were under regulatory auspices. Still it is likely that some new regulatory requirements will be placed on alien reinsurers, which will make it difficult for these companies to compete for U.S. business, and will provide new market opportunities for U.S. reinsurers. As pressure continues to mount for more regulation, the reinsurance industry needs to promote solvency and self-regulation to avoid more federal intervention.

Another interesting event occurred last year in the legal arena in both state appellate courts and the U.S. Circuit Court of appeals. Both courts ruled to allow reinsurers the right to offset amounts owed to an insolvent insurer by amounts the insolvent company owes the reinsurer. These are important rulings that could go a long way in reducing the previously discussed reinsurance recoverable exposure that reinsuers have to troubled companies.

Separately, the Chicago Board of Trade (CBOT) is continuing to pursue the introduction of financial futures contracts for reinsurance coverage for health and automobile coverage. Ultimately, the CBOT would like insurers to hedge their financial performance by the use of CBOT reinsurance futures. But, this concept has a long way to go, and will not become viable unless liquidity is achieved in this marketplace. Another area targeted by reinsurance companies for growth is providing reinsurance capacity for public entity business or reinsuring self-insured business of municipal pools. These entities are generally self-insured up to a certain retention level, and are looking to reinsure the rest of their exposure. At present, the major direct writing companies appear to be out front, as municipalities are endeavoring to create a long-term relationship with financially strong companies.

Also, finite-risk business is becoming more competitive, and subject to more price competition. Recently, there has been an explosion in the number of companies entering this business, either directly or through a separately owned management facility. These companies have differing levels of expertise in writing this business. In fact, some new participants have put few transactions on the books, and their ability to effectively rate and administer this business still needs to be tested.

In conclusion, estimated total premium volume for the reinsurance industry, as defined by S&P, reached $13.8 billion last year, an increase of 8.6% from year-end 1989 levels. However, premium volume is still about $1.3 billion less than its peak in 1987. S&P anticipates that premium growth will continue at this level for 1991, largely due to premiums generated from business characterized as finite-risk transactions, super-catastrophe protection, or ceding companes purchasing more facultative business. S&P still believes that traditional treaty reinsurance products will continue to suffer from overcapacity. S&P also anticipates that the combined ratio as reported will continue to improve for 1991, but only time will tell if this is achieved by putting up inadequate loss reserves.

S&P further believes the consolidation process going on in the industry will continue, and utlimately will result in about 15 large reinsurance companies dominating the U.S. market. These companies will include today's major direct writers as well as some broker market companies, as ceding companies will still be reluctant to put all their eggs in one basket. Still, many small to medium- sized broker market reinsurance companies are fighting for their lives and are looking to sell their existing book of business, merge with another company, or attract a white knight.

Finally, reinsurance companies are expected to continue to outperform the primary industry despite an overly competitive operating environment. For instance, once the primary market turns, reinsurance companies will benefit from the healthy increase in premiums that the primary insurance companies will experience. Secondly, if the primary market continues to flounder, primary insurance companies will ultimately be forced to begin reducing retention levels, resulting in more business for reinsurers. Both these scenarios are positive in the long run for the reinsurance industry. This is not surprising since reinsurance is a higher-risk business than the traditional property/casualty insurance business, and reinsurers should be compensated for the risks.

August 15, 1991 *Shaun P. Flynn (212) 208-1365*
Thomas Walsh (212) 208-8864

A NONPARAMETRIC APPROACH TO EVALUATING REINSURERS' RELATIVE FINANCIAL STRENGTH

STEPHEN J. LUDWIG

DOMESTIC REINSURERS: INFORMATION SOURCES

- A.M. BEST
- NAIC
- REINSURANCE BROKERS
- RATING AGENCIES
- DOMESTIC REINSURERS
- INSURANCE DEPARTMENTS

SOLVENCY MODELS

- NAIC INSURANCE REGULATORY INFORMATION SYSTEM
- AIA/AETNA FORMULA
- REINSURER RANKING MODEL

Slide 2

NAIC INSURANCE REGULATORY INFORMATION SYSTEM

	USUAL RANGE
NET WRITTEN PREMIUM TO SURPLUS	<= 300%
CHANGE IN NET WRITTEN PREMIUM	-33% TO +33%
SURPLUS AID TO SURPLUS	< 25%
TWO YEAR OVERALL OPERATING RATIO	< 100%
INVESTMENT YIELD	>= 5%
CHANGE IN SURPLUS	-10% TO +50%
LIABILITIES TO LIQUID ASSETS	< 105%
AGENTS BALANCES TO SURPLUS	< 40%
ONE YEAR RESERVE DEVELOPMENT TO SURPLUS	< 25%
TWO YEAR RESERVE DEVELOPMENT TO SURPLUS	< 25%
ESTIMATED CURRENT RESERVE DEFICIENCY TO SURPLUS	< 25%

Slide 3

AIA/AETNA FORMULA

COMPANY SCORE = 19.00916 – .11305 * (Two Year Operating Ratio)
– .04106 * (Liabilities to Liquid Assets)
– .06742 * (Change in Surplus)
– .00335 * (Net Written Premium to Loss and Loss Adjustment Expense Reserve)
– .07314 * (Change in Liability Mix)

Score (S)	Index of Financial Strength
2.2 <= S	10 Very Strong
:	:
0 <= S < .5	6
:	:
S <= –2.2	1 Very Weak

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DISTRIBUTION OF A.M. BEST RATINGS
(1980 - 1985)

RATING	1980	1981	1982	1983	1984	1985
A+	37	37	32	26	7	4
A/A-	12	18	31	37	37	28
B+	7	5	2	5	14	19
B/C+/C	3	2	3	4	1	4
NA-3	25	22	16	9	7	4
NA-4	0	0	0	0	0	2
NA-5	0	0	0	2	2	5
NA-6	0	0	0	0	3	6
NA-7	0	0	0	1	11	8
NA-10	0	0	0	0	0	3
OTHER	0	0	0	0	2	1
TOTAL	84	84	84	84	84	84

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DISTRIBUTION OF A.M. BEST RATINGS
(1986 - 1990)

RATING	1986	1987	1988	1989	1990
A+	6	11	13	13	15
A/A-	36	36	35	35	34
B+	8	3	4	4	2
B/C+/C	1	1	0	0	0
NA-3	8	7	6	7	5
NA-4	7	9	9	10	12
NA-5	3	5	5	5	3
NA-6	4	2	1	1	1
NA-7	5	4	2	0	0
NA-10	5	6	9	9	11
OTHER	1	0	0	0	1
TOTAL	84	84	84	84	84

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DISTRIBUTION OF "UNUSUAL" NAIC IRIS TEST RESULTS

NUMBER OUTSIDE OF USUAL RANGE	1980	1981	1982	1983	1984	1985
0	33	41	31	19	5	1
1	29	23	28	22	11	10
2	12	11	17	18	16	13
3	7	4	5	15	13	14
4	0	1	3	8	14	19
5+	3	4	0	2	25	27
TOTAL	84	84	84	84	84	84

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A.M. BEST: TREND REPORT

- LEVERAGE TESTS 5
- PROFITABILITY TESTS 6
- LIQUIDITY TESTS 5
- LOSS RESERVE TESTS 4

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EXAMPLE OF WILCOXON RANK SUM TEST
1980 - GROSS LEVERAGE

STRONG COS.	RATIO VALUE	RANK
S1	2.0	1
S2	3.0	2
S3	4.2	5
S4	4.5	6
S5	5.0	7.5
S6	5.0	7.5
S7	5.5	9.5
S8	6.7	14
S9	7.0	15
S10	8.2	17

SUM OF RANKS = 84.5

WEAK COS.	RATIO VALUE	RANK
W1	3.5	3
W2	4.0	4
W3	5.5	9.5
W4	6.0	11
W5	6.2	12
W6	6.5	13
W7	7.5	16
W8	9.0	18
W9	10.0	19
W10	12.0	20

SUM OF RANKS = 125.5

VALUES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY

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UPPER TAIL PROBABILITIES FOR THE DISTRIBUTION OF WILCOXON'S RANK SUM STATISTIC

RANK SUMS (WEAK COS)	PROBABILITIES
105	.515
110	.370
115	.241
120	.140
125	.072
130	.032
135	.012
140	.003
145	.001
150	.000

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WILCOXON RANK SUM TEST RESULTS
(Sum of Ranks for Strong Companies)/(Sum of Ranks for Weak Companies)
IRIS RATIOS

	1980	1981	1982	1983	1984
Net Written Premium to Surplus	98 / 112	96 / 114	93 / 117	91 / 119	97 / 113
Change in Net Written Premium	103 / 107	97 / 113	120 / 90	118 / 92	120 / 90
Surplus Aid to Surplus	71 / 139	73 / 137	67 / 143	70 / 140	76 / 134
Operating Ratio	97 / 113	90 / 120	66 / 144	57 / 153	55 / 155
Yield on Investments	116 / 94	120 / 90	124 / 86	117 / 93	112 / 98
Change in Surplus	122 / 88	104 / 106	120 / 90	127 / 83	138 / 72
Current Liquidity	90 / 120	89 / 121	111 / 99	123 / 87	130 / 80
Agents Balances to Surplus	116 / 94	117 / 93	113 / 97	123 / 87	112 / 98
1 Yr Reserve Development to Surplus	96 / 114	95 / 115	69 / 141	55 / 155	79 / 131
2 Yr Reserve Development to Surplus	109 / 101	93 / 117	68 / 142	57 / 153	69 / 141
Estimated Reserve Deficiency	89 / 121	80 / 130	98 / 112	96 / 114	100 / 110

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WILCOXON RANK SUM TEST RESULTS
(Sum of Ranks for Strong Companies)/(Sum of Ranks for Weak Companies)

	1980	1981	1982	1983	1984
Net Leverage	106 / 104	104 / 106	102 / 108	98 / 112	93 / 117
Gross Leverage	84 / 126	83 / 127	77 / 133	78 / 132	90 / 120
Combined Ratio	100 / 110	104 / 106	75 / 135	68 / 142	58 / 152
Net Operating Income to Net Earned Premium	116 / 94	122 / 88	142 / 68	144 / 66	155 / 55
Return on Surplus	120 / 90	102 / 108	144 / 66	131 / 79	153 / 57
Quick Liquidity	94 / 116	92 / 118	122 / 88	100 / 110	100 / 110
Premium Balances to Surplus	132 / 78	128 / 82	127 / 83	121 / 89	120 / 90
Investment Leverage	100 / 110	103 / 107	111 / 99	109 / 101	93 / 117
Ceded Leverage	63 / 147	62 / 148	62 / 148	65 / 145	80 / 130
(% Change in Gross Leverage)/ (% Change in Net Leverage)	N/A	98 / 112	120 / 90	118 / 92	142 / 68
Gross Leverage / Net Leverage	60 / 150	59 / 151	63 / 147	64 / 146	69 / 141

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TEN TESTS CHOSEN

- GROSS LEVERAGE
- SURPLUS AID TO SURPLUS (IRIS)
- OPERATING RATIO (IRIS)
- NET OPERATING INCOME TO NET EARNED PREMIUM
- YIELD ON INVESTMENTS (IRIS)
- PREMIUM BALANCES TO SURPLUS
- CEDED LEVERAGE
- ONE YEAR LOSS DEVELOPMENT TO SURPLUS (IRIS)
- TWO YEAR LOSS DEVELOPMENT TO SURPLUS (IRIS)
- GROSS LEVERAGE / NET LEVERAGE

Slide 13

WILCOXON RANK SUM TEST RESULTS
(Sum of Ranks for Strong Companies)/(Sum of Ranks for Weak Companies)
BASED ON COMPANY RATIO MINUS INDUSTRY MEAN

	1980	1981	1982	1983	1984
Change in Net Written Premium (IRIS)	83 / 127	113 / 97	78 / 132	80 / 130	91 / 119
Net Written Premium to Surplus (IRIS)	114 / 96	127 / 83	112 / 98	91 / 119	77 / 133
Current Liquidity (IRIS)	104 / 106	121 / 89	124 / 86	118 / 92	103 / 107
Estimated Reserve Deficiency (IRIS)	88 / 122	98 / 112	86 / 124	81 / 129	75 / 135
Net Leverage	102 / 108	124 / 86	98 / 112	108 / 102	70 / 140
Combined Ratio	90 / 120	78 / 132	75 / 135	90 / 120	88 / 122
Change in Surplus (IRIS)	94 / 116	85 / 125	101 / 109	92 / 118	59 / 151
Return on Surplus	109 / 101	93 / 117	88 / 122	84 / 126	101 / 109
Quick Liquidity	98 / 112	98 / 112	93 / 117	105 / 105	112 / 98
Agents Balances to Surplus (IRIS)	119 / 91	111 / 99	105 / 105	121 / 89	115 / 95
Investment Leverage	102 / 108	113 / 97	102 / 108	94 / 116	84 / 126
(% Change in Gross Leverage)/ (% Change in Net Leverage)	N/A	87 / 123	81 / 129	80 / 130	91 / 119

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- CHANGE IN NET WRITTEN PREMIUM (IRIS)
- COMBINED RATIO
- ESTIMATED RESERVE DEFICIENCY (IRIS)
- % CHANGE IN (GROSS LEV. / NET LEV.)

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COMPANY XYZ

	INDIVIDUAL TEST RANKS			
	1981	1982	1983	1984
LEVERAGE TESTS				
CHANGE IN NET WRITTEN PREMIUM	29.5	62.0	22.5	52.0
GROSS LEVERAGE	45.0	46.5	53.0	2.0
GROSS LEVERAGE / NET LEVERAGE	49.0	50.0	59.0	29.5
CHANGE IN GROSS LEV. / CHANGE IN NET LEV.	4.0	50.0	71.0	83.0
CEDED LEVERAGE	53.0	51.5	63.5	2.0
SURPLUS AID TO SURPLUS	43.0	36.5	37.5	83.0
PROFITABILITY TESTS				
COMBINED RATIO	32.0	29.5	22.5	84.0
OPERATING RATIO	36.0	33.5	39.5	83.0
NET OPERATING INC. TO NET EARNED PREMIUM	29.0	20.5	13.0	53.5
YIELD ON INVESTMENTS	69.0	67.0	51.0	60.5
LOSS RESERVE TESTS				
ONE-YEAR RESERVE DEVELOPMENT	80.0	67.0	69.0	83.0
TWO-YEAR RESERVE DEVELOPMENT	80.0	76.0	73.0	84.0
ESTIMATED RESERVE DEFICIENCY TO SURPLUS	44.0	64.5	77.5	82.5
LIQUIDITY TEST				
PREMIUM BALANCES TO SURPLUS	58.0	53.0	63.5	76.0
FOURTEEN TEST AVERAGE	46.5	50.8	51.6	61.8
OVERALL ANNUAL RANK	61	63	64	80
NUMBER OF COMPANIES RANKED	84	84	84	84
A.M. BEST RATING	A+	A+	A	NA-7
NAIC IRIS TEST FAILURES	2	1	2	—

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AVERAGE A.M. BEST RATINGS

YEAR	STRONG 10	WEAK 10
1980	7.8	7.1
1981	7.6	7.2
1982	7.6	6.9
1983	7.7	6.0
1984	7.6	3.6
1985	7.3	2.5
1986	7.4	3.2
1987	7.4	3.1
1988	7.5	3.1
1989	7.5	3.3
1990	7.6	2.8

A+=8 A=7 A-=6.5 B+=6 B=5 C+=4 C=3 NA7=2 NA10=1 L=0

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AVERAGE A.M. BEST RATINGS

YEAR	TOP21	MIDDLE 22	BOTTOM 21
1980	7.5	7.5	7.1
1981	7.6	7.6	7.2
1982	7.5	7.5	7.1
1983	7.4	7.4	6.4
1984	6.7	6.8	3.9
1985	6.4	6.3	3.7
1986	6.4	5.8	4.6
1987	6.6	5.6	4.7
1988	6.7	5.6	4.4
1989	6.7	5.5	4.7
1990	7.0	5.5	4.8

A+=8 A=7 A-=6.5 B+=6 B=5 C+=4 C=3 NA7=2 NA10=1 L=0

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ENHANCEMENTS

- <u>1.) ADDITIONAL TESTS / DATA SOURCES</u>
  - •A.) SCHEDULE F - CEDED PREMIUMS AND LOSSES
    - -CEDED TO AFFILIATES vs. NON-AFFILIATES
    - -CEDED TO AUTHORIZED vs. UNAUTHORIZED
    - -CEDED TO DOMESTIC vs. FOREIGN
  - •B.) PROP./LIAB. PREMIUM AND LOSS BREAKDOWN
    - -PART 2B - PREMIUMS WRITTEN
    - -FIVE YEAR HISTORICAL DATA
    - -SCHEDULE P DETAIL
- <u>2.) REMOVAL OF HIGHLY CORRELATED TESTS</u>
- <u>3.) MISCELLANEOUS CONCERNS</u>
  - •A.) GEOGRAPHICAL DISTRIBUTION OF EXPOSURES
  - •B.) MANAGEMENT PHILOSOPHY
  - •C.) PARENT COMPANY COMMITMENT

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CHANGE IN NET WRITTEN PREMIUM (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	-15.5	-2.8	7.0	30.3	108.0
1981	-20.5	-4.8	8.0	21.0	40.0
1982	-16.0	-5.8	4.0	15.8	39.5
1983	-21.0	-4.5	5.5	19.8	60.5
1984	-31.0	-9.0	14.0	33.8	63.5
1985	-32.2	-2.0	36.0	69.5	102.4
1986	-48.3	-1.9	25.4	59.1	110.7
1987	-65.4	-24.4	-5.0	10.5	27.5
1988	-65.8	-21.6	-4.2	7.4	18.3
1989	-31.2	-12.0	-2.7	11.4	31.8

USUAL RANGE: -33% TO +33%

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OPERATING RATIO (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	69	83	89	96	100
1981	74	83	89	94	98
1982	78	85	93	100	106
1983	84	94	99	105	113
1984	93	101	113	128	148
1985	91	95	103	118	158
1986	81	88	93	101	174
1987	73	82	88	95	164
1988	61	77	84	88	103
1989	52	76	85	94	101

USUAL RANGE: < 100%

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SURPLUS AID TO SURPLUS (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	0	0	1	5	15
1981	0	0	1	6	15
1982	0	0	1	5	15
1983	0	0	1	5	11
1984	0	0	1	5	14
1985	0	0	1	4	14
1986	0	0	0	2	5
1987	0	0	0	1	4
1988	0	0	0	1	4
1989	0	0	31	***	***

USUAL RANGE: < 25%

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YIELD ON INVESTMENTS (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	6.0	6.6	7.9	9.3	10.4
1981	6.5	7.2	8.6	10.3	12.3
1982	6.7	7.3	8.7	10.3	11.8
1983	5.9	7.1	8.3	10.0	10.8
1984	6.8	7.6	8.5	10.2	11.6
1985	5.5	7.5	8.4	9.7	10.5
1986	5.6	7.0	7.8	8.7	9.3
1987	5.3	6.2	7.4	8.1	8.8
1988	5.9	6.3	7.3	8.2	8.8
1989	5.9	6.8	7.7	8.5	9.1

USUAL RANGE (CURRENT): > 5%

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ONE YEAR LOSS DEVELOPMENT (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	-11	-2	3	12	24
1981	-7	0	4	12	26
1982	-6	0	4	13	26
1983	-6	0	6	16	32
1984	-3	6	16	35	61
1985	-1	4	23	60	102
1986	1	4	20	59	132
1987	-2	1	11	24	141
1988	-9	-1	5	10	21
1989	-9	-1	2	9	***

USUAL RANGE: < 25%

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TWO YEAR LOSS DEVELOPMENT (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	-20	-4	0	8	37
1981	-11	-1	4	16	28
1982	-7	0	6	14	29
1983	-9	0	7	22	52
1984	-4	2	13	43	84
1985	-1	6	26	57	93
1986	0	10	44	126	205
1987	2	11	45	97	173
1988	-7	1	19	32	72
1989	-14	-2	8	24	***

USUAL RANGE: < 25%

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ESTIMATED RESERVE DEFICIENCY (IRIS)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	-46	-20	-5	4	28
1981	-44	-20	-6	12	26
1982	-40	-26	-8	7	26
1983	-38	-14	-2	18	48
1984	-51	-21	8	57	150
1985	-33	-7	23	67	167
1986	-46	0	37	101	172
1987	-119	-27	-2	23	80
1988	-94	-50	-23	-1	17
1989	-109	-47	-17	5	***

USUAL RANGE: < 25%

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COMBINED RATIO

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	98	102	107	112	117
1981	99	104	107	113	123
1982	104	108	114	120	127
1983	108	113	117	125	138
1984	114	120	132	148	176
1985	107	113	121	136	182
1986	97	101	108	125	202
1987	93	99	103	109	181
1988	97	101	103	111	122
1989	101	106	111	122	148

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NET OPERATING INCOME TO NET EP

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	-1	3	8	12	19
1981	2	5	9	15	21
1982	-5	0	6	13	22
1983	-12	-4	2	7	16
1984	-29	-20	-9	0	10
1985	-44	-22	-5	0	6
1986	-73	-8	3	8	11
1987	-32	3	8	13	22
1988	-1	7	10	16	29
1989	-1	2	8	14	39

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GROSS LEVERAGE

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	1.6	3.1	4.5	6.1	9.2
1981	1.7	3.1	5.1	6.3	9.0
1982	1.8	2.8	4.6	6.1	8.8
1983	1.9	3.0	4.4	6.5	8.7
1984	2.4	3.7	5.3	8.7	15.1
1985	2.1	3.9	5.5	9.5	20.6
1986	2.4	3.6	5.4	8.4	18.3
1987	2.0	3.1	4.8	7.0	16.3
1988	1.3	2.7	4.0	5.7	9.3
1989	1.3	2.3	3.5	5.2	6.5

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CEDED LEVERAGE

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	0.0	0.0	0.5	1.5	4.4
1981	0.0	0.1	0.5	2.1	3.5
1982	0.0	0.1	0.5	1.8	4.1
1983	0.0	0.3	0.7	1.7	4.2
1984	0.0	0.4	1.3	2.3	6.8
1985	0.0	0.5	1.1	3.4	7.9
1986	0.0	0.4	0.9	2.8	6.7
1987	0.0	0.3	0.8	1.8	4.9
1988	0.1	0.2	0.6	1.5	3.2
1989	0.0	0.2	0.6	1.4	2.1

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GROSS LEVERAGE / NET LEVERAGE

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	.97	1.00	1.13	1.52	2.07
1981	1.00	1.03	1.13	1.57	2.26
1982	1.00	1.04	1.19	1.56	2.24
1983	1.00	1.07	1.21	1.66	2.24
1984	1.03	1.13	1.33	1.63	2.15
1985	1.00	1.13	1.33	1.71	2.24
1986	1.00	1.09	1.24	1.66	2.18
1987	1.02	1.08	1.21	1.45	2.03
1988	1.03	1.08	1.19	1.45	2.06
1989	1.00	1.09	1.20	1.50	1.88

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CHANGE IN (GROSS LEV. / NET LEV.)

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	-	-	-	-	-
1981	0.93	0.99	1.01	1.07	1.18
1982	0.91	0.98	1.00	1.05	1.16
1983	0.90	0.98	1.01	1.07	1.19
1984	0.35	0.57	0.77	0.94	1.35
1985	0.86	0.97	1.02	1.09	1.35
1986	0.72	0.87	0.97	1.01	1.16
1987	0.70	0.93	0.99	1.02	1.12
1988	0.87	0.94	0.97	1.02	1.07
1989	0.93	0.99	1.01	1.05	1.17

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PREMIUM BALANCES TO SURPLUS

YEAR	10TH PCTL	25TH PCTL	50TH PCTL	75TH PCTL	90TH PCTL
1980	4	10	22	34	62
1981	5	12	22	35	64
1982	4	9	21	35	64
1983	-9	4	17	33	56
1984	-12	6	19	34	69
1985	-19	0	18	32	51
1986	-26	1	14	30	52
1987	-14	3	12	33	47
1988	0	5	13	24	35
1989	0	3	13	24	33

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1991 CASUALTY LOSS RESERVE SEMINAR

2E: REINSURANCE RESERVING I

Moderator

Gregory T. Graves
Milliman & Robertson, Inc.

Panel

John A. Pagliaccio
Mony Reinsurance Corporation

Marvin Pestcoe
Milliman & Robertson, Inc.

MR. GRAVES: Thank you for coming. This is section 2E: Reinsurance Reserving I. Before we get into the session, I want to cover a few housekeeping items.

We're recording this session, so it is very important if you have a comment or a question at the appropriate time to use the microphone. We ask that you do that, please. At the end of the session, please hand in your evaluation forms to me and I'll see that they get submitted to the proper people. We also wanted to say that this presentation is our own. We think that it's based upon reasonable and sound actuarial principles, but the opinions represented are our own and they don't represent the opinions of the American Academy, the CAS, or any other body of actuaries or others.

This session is designed to provide a basic understanding of loss reserve principles, considerations, and techniques. We are looking specifically at reinsurance assumed here. This session, I want to stress, is not intended for the experienced reinsurance actuary.

If you have more advanced questions, we ask that you save those to the end because we want to make sure that we cover the material that we were asked to do. To start with, we would just like to have a show of hands. How many of you have reinsurance experience of one type or another?

(Show of hands - most raised their hands)

MR. GRAVES: Okay. How many of you have reinsurance reserving experience?

(Show of hands - many raised their hands)

MR. GRAVES: Does everyone have handouts? You should have handouts for the Sections A, C, and D.

QUESTION: How about B?

MR. GRAVES: We'll tell you about B later.

We have a few objectives here, and we have two speakers to handle those objectives. The objectives are, first, we would like to generally describe how reinsurance reserving differs from primary reserving. We would also like to describe some of the more common methods that are used in reinsurance reserving. John Pagliaccio, who I will introduce in a minute, will handle those.

Then after that, we would like to discuss some of the more practical issues and applications of these methods. We are going to look at two areas in particular. One is tail factor selection and the other is loss ratio selection for initial expected loss ratios to use in a Bornhuetter-Ferguson methods or for immature years to just pick a loss ratio if that seems to be a good method to use.

Last year, we had a section which basically reviewed the types and forms of reinsurance. We found that because of the audience level of experience of the reinsurance, that really wasn't that helpful. There is one page in the handout which essentially covers that and it is exactly the same exhibit as was in last year's presentation.

We just want to say that from here on out we will be looking at assumed reinsurance and specifically casualty excess treaty, so just keep that in mind.

With that out of the way, I would like to introduce our panelists. The first one is John Pagliaccio, and John is currently vice-president and actuary of Mony Reinsurance Corporation, in New York, with the responsibility for loss reserving. He became an associate of the CAS in 1976 and is a member of the American Academy of Actuaries. Over the last 18 years, John has held positions in both pricing and reserving at primary companies as well as having experience as an actuarial consultant before joining Mony Re.

A second panelist is Marvin Pestcoe. Marvin currently works in the New York office of Milliman & Robertson as a consulting actuary. He started with M&R in January of 1989. Before that he was with Prudential Reinsurance, for six years. He has a degree in economics from Yeshiva University and became an associate of the CAS in 1989.

With no further ado, let me ask John to make his presentation.

MR. PAGLIACCIO: The technology is a little bit intimidating, I think. I am now wired for sound.

Presumably all of you can hear. I'm hooked in here somewhere.

As Greg already mentioned, last year we had a section, Section A, which dealt with an overview of the various forms of assumed reinsurance. I believe there was a handout for that. You can put it aside. We're going to skip through that. Since with that show of hands on how many of you have reinsurance experience, I doubt you need it. Again, we're going to focus on casualty, domestic, treaty business.

The first thing we're going to be dealing with is the more important differences between reinsurance reserving, the considerations that enter reinsurance reserving and primary reserving. The most often cited and possibly the most important difference is that in reinsurance you're faced with much more extended reporting patterns than primary.

Hopefully, you have or will get hold of the "RAA Loss Development Study." The 1991 edition is out. They devote a section in there to a comparison of primary versus reinsurer's reserve and development, historical development, patterns. Having written down the numbers, let me read them to you.

For general liability in that 1991 edition, at 48 months, the percentage of ultimate is 39 percent for a reinsurer versus 72 percent for a primary company, which gives you a 2.56 versus a 1.27 development factor to ultimate, in 48 months to ultimate. Obviously a lot more extended for reinsurer than a primary company.

The major reason usually cited for that more extended development pattern is the underlying retention feature in reinsurance. The claims just don't get reported to a reinsurer until they reach the underlying retention, or half the underlying retention, depending on what the contracts read. It's probably more common nowadays that the ceding company reports at half the underlying retention which has built into a lot of the contracts in recent times.

The other reasons usually given for the more extended reporting pattern is the actual physical process. The reinsurer is at the receiving end, in effect, of a process that starts with a claim coming into the primary company, and then it has to be identified as a potential for reinsurance protection. At the primary company level, the information has to be prepared and the claim has to then be submitted to the reinsurer.

It's, in effect, another whole claims reporting step. If you're a broker market reinsurer, it also has to then go through the broker intermediary before it's actually received by the reinsurer. There is obviously then some more extended physical reporting process there. That typically adds three or six months even in the best of circumstances to the lags.

We had an example cited of some amount of tail even in the property business just because of that reporting process. There is probably some other, you know, peripheral reasons to add to the more extended reporting, more claims in suit, more litigated claims, and just more difficult claims to deal with coming through on the reinsurance end. That's probably the most cited difference between primary company and reinsurers.

What that leads to in the actual reserve process is it's pretty uncommon except for the larger, long-established reinsurers for any reinsurer to have a full development pattern. I mean, typically a reinsurer is going to look at their triangle data, their own data, and come to the conclusion that they simply don't have enough data to fill out the tail. They don't have enough years of existence in effect, enough years of history to fill out the tail with their own development.

Again, if you look at the RAA data, the RAA studies go out to 35 years, 36 years or so with action out in the tail there. There aren't that many reinsurers, U.S. reinsurers, that have been in business for that long. All the rest of us obviously -- the company I'm at has been in business less than 20 years, sits there and says, "Hmm, well, it's time to come up with a tail from some other source, either using RAA data or curve fits, something." You should recognize that you have to do something at that point, unless you happen to work for Gen Re.

Along with the more extended loss development is the fact that there is less stability in the development histories. This is somewhat unscientific. I mean, I've never seen a study that's taken a primary company and a reinsurer of comparable size and tried to lay the two development triangles next to each other, but you do generally, just by observation, see less stability in a triangle of development factors of excess casualty for reinsurer than you would for a primary company, a typical primary company enterprise. It kind of makes sense too. People don't buy reinsurance protection to cover well-behaved, low-risk classes of business.

Generally, the protection is bought to actually cover riskier classes of business with higher limits, less predictable, higher severity, lower frequency. All of which leads, in effect, to more erratic loss development behavior. Again, if you look at the GL, the RAA's latest loss development study, and you look at GL, "General Liability" section, combined treaty and facultative.

You can go focus in on a point. If you go look at the 32 to 33, this is years, 32 to 33 year development point for the entire reinsurance industry, you will find a factor, I don't remember what it is exactly, roughly 1.15, 15 points of development out at the 32 to 33 years. It is surrounded by 1.00's and 1.01's, but you get a blip out there for the entire industry. Again, fairly erratic development.

It's kind of hard to pinpoint causes of those particular things. Part of it may be just litigated claims, a large claim that the loss, in effect, and it goes from zero to some very large amount.

Along with that, introducing another subject in that same vein is the data itself is usually somewhat less homogeneous than you would find in that primary company leading to it's less stable development history. We will deal with the less homogenous data down the line.

The less stable development history causes problems similar or comparable to the more extended development patterns. You have to deal with it in some fashion. You have to either come up with smoothing methods, curve-fitting methods, pay a little bit more attention in effect to the selection of development factors when you're faced with these wide ranges in the actual historical factors.

A lot of problems that just aren't a problem in a primary company where the range of development factors at any particular age point is tight. The problems are magnified or arise for the first time when you're looking at reinsurer where the range of factors is extremely wide.

The third point to keep in mind, again, we're comparing a reserving exercise done for a reinsurer versus a primary company, is the wider swings in year-to-year underwriting results. Again, it's hard to come up with anything hard and concrete in terms of a comparison. The closest I could come was to look at the Best's casualty loss reserve development reports. Industry data out of Best's from Schedule P, look at the entire industry and then look at reinsurers.

Unfortunately, the general liability section of Schedule P for reinsurers probably has mostly pro rata or almost all pro rata business, and it doesn't focus on the excess. I'm sure there will be a session on annual statements sometime.

To make a long story short, it's hard to come up with historical data on excess reinsurance loss ratios. It's just not readily available -- only since '88 when the change was made to introduce reinsurance lines A, B, and C in the annual statement did you get clean casualty excess loss ratios.

If you do go back into industry sources, you see somewhat wider swings on, say, year-to-year loss ratios. Even looking at composites, you see loss ratios that jump 70 or 90 points between two successive years, up or down.

If you're coming out of a primary company where you're used to smoother changes in loss ratios, there is a certain acclimation process to go through when, say, picking loss ratios for Bornhuetter-Ferguson, where the Bornhuetter-Ferguson loss ratio in one year could be 100% and then the next year it could be 200%.

It's hard sometimes for people to grasp that magnitude of change and actually make that selection. Not having the industry data obviously is another handicap in the process because there is no good external data source to point to. At least in the past.

The next problem is less homogeneous and less distinct data groupings. Again, comparing to a primary company, a reinsurer -- well, we have an example I guess in the handouts. It is a very well-defined example. Since I made it up, I could define what business was going to be in that example. All casualty treaty business, mostly GL.

I have one of my compatriots sitting in the back who is chief actuary at another reinsurer. He giggles when he looks at the example. You can never get such a clean-cut, well-defined history in a development triangle. Generally, you have mix of lines. You have a wide range of underlying retentions and limits being purchased. You might not even know what some of the business is that has been tabulated in your development triangles.

The coding schemes in existence, say, 10 years ago just don't match the diversity of business that was underwritten subsequently. You should never, in effect, believe you know what's in there. It always will deserve a little bit more investigation into the past history.

That less homogeneous and less distinct data groupings I would imagine contributes something to the less stable development histories, and in effect causes comparability problems over time. Whether one accident year is really comparable to another is just another problem for the reinsurance actuary, hopefully, to delve into and deal with in the course of the reserving exercise.

Just to touch on a few other miscellaneous items real quickly. A reinsurer, generally, has the case reserves reported, or almost always, has the case reserves reported to it by the ceding company. Your own claim department may be setting ACRs and may not be --"additional case reserves."

You're not dealing with your own case reserves, you're dealing with the ceding company case reserves in your development history. There is obviously no guarantee that they have been set consistently over time, set consistently between ceding companies or, in effect, are consistent in any direction on the triangle. Probably, again, adding to the less stability problems.

You want bad contracts too?

(No verbal response)

MR. PAGLIACCIO: Marvin likes the other consideration of bad contracts. Along with the wide swings in underwriting results, you can have some particular pieces of business that produce phenomenal loss ratios, not like 100%, in some cases, not even like a 1,000% but like 10,000%. How you deal with those extremely bad contracts certainly isn't written down anywhere in actuarial literature.

It is left up to each individual practitioner to decide what to do. Of course if you're a consultant or a company person, you have different approaches to the problem. If you're a company person, you would find the underwriter, if they're still living, and kill them. Anyway, a host of problems to deal with. When you're dealing with reinsurance reserving, a host of differences between primary company and reinsurers.

Now I'll pause, because I don't know if I can reach the rest of my handouts with this mike hooked to me. I may have to drag it along.

So much for concept. You've got a handout called Section C. You've just been treated to, in effect, both A and B. We're going to go into C. You've also been treated to most of the concepts. Concepts in reinsurance are not very much fun. The fun is actually in doing something. As long as you don't believe you're going to get the exact, right answer, it's fine.

What the objective is of Section C is to present to you my made up company, called Made-Up Re, which gives you sample calculations for a number of the more basic reserving methods and is an introduction to the following sections of the presentation. You can compare results of some of the alternative methods.

If you look at the handout, I try to make it explicit that this is a typical professional reinsurer, not too big, not too small. It has been in operation for 15 years. You will notice I only go up through '89, so the material is from last year. At year end '89, this company had $100 million in surplus and wrote about $100 million in premium.

This book of business that we're dealing with in the example, the "Casualty Treaty Book of Business," is only one part of the total. It's not even the biggest part for premium, but it certainly is for the IBNR reserves. It makes it easier, domestic U.S. primary companies are the ceding companies, and only domestic U.S. primary companies.

You don't have any currency translation/transaction problems, nor any retrocession business; it is all per-risk or per-occurrence excesses. Nice and simple, relatively simple coverage forms. It's mostly firsts and seconds, in terms of layers.

On the second page, it shows you the average limit and retention of the treaties that comprise this book of business over time. I should point out that you're really being treated because, in actual practice, I'm not sure if I have those numbers from my own company. It's a lot easier to get them from Made-Up Re than it is for any real reinsurer.

You can read for yourself the short history of this company. Let me read to you, though, the last paragraph on the second page. It says, "Note that the development patterns shown are typical in terms of the average development for the above-described type of business, the inherent variability given the size of the book of business, and the presence or absence of any trends as evidenced by industry development statistics."

That means these are "real" numbers in the sense that if you were actually doing the reserve exercise, you would expect to see factors on this order. I didn't gimmick them up very much. If anything, they might be somewhat smoother.

The first exhibit that's in the handout provides you with the complete incurred loss development history for Made-Up Re.

To make it nice and easy, since this is not a test exercise, you have the dollars of loss, the triangle of factors below that, and a number of averages computed. Again, the averages and the variability is what you would be facing, more likely than not, doing a company of this size, with this book of business.

Since there is a requirement that we do multiple methods, the second triangle is paid loss, not something that is heavily relied on by reinsurers, but something that you should have and should review. The third is a triangle of paid to incurred.

Now, before I get ahead of myself, let me tell you also that asbestos and pollution, to the extent identifiable, has been purged from these triangles. It has also been purged, pollution in particular was purged, from the last RAA, the 1991 edition of the "RAA Development Study." Asbestos had been previously and now pollution is also.

By the way, you really should get hold of one of those books, if you're serious about this subject. Sleep with it under your pillow.

(Laughter)

Okay. Now we're going to do some reserving. What we're going to look at in particular on Exhibit 4 is an incurred development method.

What we have arrayed there in Column A is the accident years and in Column B, the months of development as of the end. I put that there for myself because I can never figure out where things are. Column C is the reported incurred losses. Presumably it matches the last diagonal of your development triangle.

If you happen to be auditing a reinsured, you might want to check that because that always doesn't work. Column B is the age-to-age development factors, starting with the 12 to 24 going back to the 168 to 180 factor. They have been selected based on the company's development triangles. We will come back to that in a moment or two.

They probably represent both the magnitude and if you were to plot them and look at the curve, the kind of curve you would typically see in the selection and the development factors for, again, this kind of business and this kind of company. The next column is the age-to-ultimate factors. The tail factor up there, the 1.95, is loosely based on an inverse power curve fit of the age-to-age factors in Column B.

I'm not cutting into the presentation because Marvin is going to do -- right?

MR. PESTCOE: That's right.

MR. PAGLIACCIO: He is going to do modeling of tail factors. Again, you would probably see that, though, something on that order as typical tail factors from 180 to ultimate. Then you've got developed losses and IBNR, columns F and G.

Presuming that you can all follow the calculations, let me just point to a couple of items that shouldn't surprise you when you do this for real. One is answers like an accident year with 27 million in developed losses, followed by one with 8, and then one with 15. If you will look at the premium volumes on the first page. Okay, those obviously don't track premium volumes. That kind of variability and results, accident year to accident year, is nonetheless probably
understated.

The other obvious feature is given 133 million, 134 million unreported losses, the fact that we're carrying or we're indicating about 126 million -- it's at the bottom of the page, I don't know if everyone can read it -- the total IBNR, and fairly substantial amounts even back at 180 months. Again, a typical kind of representation.

Let me run you through. Having spent much too long on that already, let me run you through what else is in there.

Exhibit 5 is another incurred development method, using factors, age-to-age factors, in Column B that are from industry data.

Again, RAA development factors. Calculations are all basically the same. Obviously the answers and the distribution of the IBNR by year are going to vary more than a little.

Now, here is an alternative. Exhibit 6 has a development method using paid data.

It's important to remember this one because if you coming out of a primary company, sometimes paid methods do give you the best answer. When you're dealing with a reinsurer and the tail factor from 180 to ultimate is 1.3 on a paid method, and probably understated at that, and the 12 to ultimate is getting hit by a factor of 93, people have a tendency not to use paid, to shy away from paid methods.

There is just too much leverage in the factors, and also there is no industry paid development triangles available so you really can't throw it up against the wall and compare it to anything. It has got to be all your own paid history; but it's good to look at. It also proves you've been doing your job.

Then we come to something more fun. Next to paid and incurred development, I guess the most basic or the most commonly used method in reinsurers is the Bornhuetter-Ferguson method. We will spend a little bit more time on it. This is a variant of Bornhuetter-Ferguson, it comes in different flavors. Basically it starts off with an array of the earned premiums and an initial expected loss ratio which is an initial expectation of the ultimate loss ratio for each one of the accident years. You see those filled in here.

Are you going to cover selections of?

MR. PESTCOE: Absolutely, not these but others.

MR. PAGLIACCIO: Not these but others.

These, in effect, were selected by me. Marvin is going to talk about techniques for selecting the initial expected. Let me, instead of dealing with techniques, actually point out the numbers that are in here.

You have a 95 percentage point screen before 84 and 85, and plus it's favorable, but you have a progression of smooth numbers in the '75 through '79 year and then that movement from '80 through '84, with climbing loss ratios.

One of the real difficulties historically in reinsurance reserving was to convince the management and the underwriters, who probably were the same people, that their results were deteriorating to that extent. If you were brilliant enough to determine it actuarially for yourself. The second part of the problem was trying to convince the management and all the rest. It was hard enough trying to figure out for yourself that those loss ratios were actually climbing that much over time. Again, this is Made Up Re, which may be smooth, more than real companies. It may be better, in effect, than real companies.

In the methodology, what you do is you multiply Column B times Column C and come up with Column D, which is expected losses. It really is the initial expectation of losses. Your initial loss ratio applied to earned premiums. Then you have Column E, the development factor to ultimate, which should tie into what was shown on the incurred development method A, which is basically the company selected age-to-age factors accumulated up to age-to-ultimate factors. So, that is consistent, hopefully, with the example A, alternative A.

In Column F, you have the unreported ratio. These headings are somewhat abbreviated. The calculation of it is shown or how you do the calculation is shown in the write-up. It is 1 minus 1 over the age-to-ultimate factor. It represents the proportion of losses yet to be reported based on the development factor to ultimate. Then, if you take D times F, the expected ultimate losses times F, the proportion of losses yet to be reported, you come up with unreported losses, which are IBNR. In the case of incurred development, our equivalent to the IBNR.

You know, every methodology has its pluses and minuses. This methodology has traditionally been cited as advantageous where, for more recent accident years like 1989, you don't have a lot of reliance in the reported losses for that accident year. This methodology, which keys to earned premium and an initial expected loss ratio, in effect, smooths through the variability and the reported losses, particularly at early maturities.

Before I do what's next, let me go back. Obviously all of these methods are tied to selections of development factors. This is a blow-up of one section of the development triangle on Exhibit 1. You can't do, obviously, incurred development or Bornhuetter-Ferguson without having in some fashion decided on your age-to-age development factors. This expands somewhat on the statistics that are on the development triangle.

You can see for yourself, but let me just emphasize it again, that in 13 points, 13 actual development points in the history running down to 10, it seems like a substantial amount to me. In a primary company in normal circumstances would be a fair number of points on which to base development factors.

However, you've got min/maxes, the highest and lowest actual development points that are very widely separated. Again, in this Made Up Re example, if anything, they are closer than you would see it most places, other than the largest reinsurers.

Your's are a lot wider than this and you're bigger than Made-Up Re. These kind of ranges, if anything, are probably too tight. In similar fashion, the average and the standard deviation measures of variability, even though they are extremely large compared to primary companies, are probably too small.

You are faced with, even when you start doing averages, fairly widely separated averages. There are going to be large dollar differences emerging. If you were to take this all year weighted average and, say, the mid 3 of 5, or the 5-year average, those kind of differences could produce $5 million to $10 million of IBNR difference at the end, when you start running these development factors through and you've got tails of 1.2.

Exhibit 8 and 9 are comparisons of ultimates. There are requirements that you do more than one method, obviously, when doing loss reserves no matter what kind of exercise you're going through. This is a proof of why you should be doing more than one method.

If you look first at Exhibit 8 and you start running down accident year by accident year, you wonder whether these methods which are relatively consistent, you know, are even dealing with the same company. You're going to have to come to a decision on what's the answer. There is no good and true way to unfailingly pick the right answer, given the variability in these kind of results.

You can see why techniques like Bornhuetter-Ferguson are heavily relied upon if you look at the answers you're getting for the '89, even '88, '87, '86 accident years. Just like people have a hard time believing that you can run it up to a 300% loss ratio in a year, people have a hard time believing that 2 years later it's running down to a 40%.

At some point the auditors have to come in. They have a hard time believing that you can run the business at 300, and 2 years later come back down to 40. The other thing to look at is to focus on the impact of some of these numbers.

If you look at Exhibit 9, you can see the impact of your choices over time.

Terrific! We're going to go all the way down to the bottom line on Exhibit 9. I've managed to walk you through all of these exhibits. Nobody has either fallen asleep or tried to kill me because I've done something wholly unreasonable.

When I come down to the end, I probably have a choice of assuring the well-funded retirement of all the chief underwriting people by claiming that there is a redundancy of $32 million in the reserves or getting them all fired by producing a $26 million deficiency.

That's typical of the choices that you face at the end of any one year as you start doing multiple methods. Given the amount of leverage in the development factors, you end up with that kind of result; and they are obviously tremendous percentages of surplus.

Giving that as the conclusion -- are we going to take questions now?

MR. GRAVES: No, I think we better move on. We're running a little bit behind, so we'll just have Marvin come up. Hopefully, no one has any earth-shattering questions.

MR. PESTCOE: All right. I guess I'm going to focus on two things. Two of the key factors that John had to come up with when he was doing his example, two of the ones that had the most judgment in them and were the most difficult to come up with were the loss development tail and the loss ratio.

Now, I guess both of these are factors that you would have to estimate even if you were in a primary company. They are, however, much more important, and much more difficult to estimate when you're in a reinsurance environment. The tail is the clearest example.

In John's example you had a tail of 1.2 for the 1975 year to ultimate. Now, obviously in a primary company you wouldn't see that perhaps even if you were writing medical malpractice only. The tail factor selection and the loss ratio selection are very important for the reinsurer. They are big numbers and they have a big influence on the answer, but they are also rather difficult to do.

Okay. Let me start with the tail factor selection. The first question is a definitional question. What is the tail? In reinsurance, I think it was clearly illustrated in John's example, there is a lot of instability in the factors, particularly as you move out to the right.

In reinsurance the focus is not going to be just on picking a development factor for the last factor to ultimate, which might be the focus in a primary company, but also trying to replace some of this instability in the far right-hand side of the triangle with more stable factors.

The tail in reinsurance can often begin even where you have data. In fact, one way of thinking about it is that the tail starts where you no longer trust your data, which is not necessarily where the data runs out but can be well before that.

There are two basic methods that you can use for picking both tails and loss ratios, it's going to sort of run through both of these sections, and that's using industry data or using curve-fitting.
John alluded somewhat to industry data. Several times he mentioned the RAA. He suggested you sleep with the RAA under your pillow. I guess I agree to some extent. If you're starting out in doing reinsurance reserving, your starting point should be industry data.

I guess what I'm going to try to do is I'm going to talk a little bit about industry, but I'm going to be focusing more on what you do beyond that, how you can use your own data to supplement industry information or even to replace it. Or at least to judge whether or not it's relevant to you.

For loss development factors, for the tail factors in particular, the two basic sources are the "RAA Loss Development Study" and "Best Casualty Loss Development" -- let me get the name right, "Best Casualty Loss Reserve Development Study."

First, let me just briefly describe each of those, and I'll talk about a couple of caveats in using each. The RAA is casualty excess of loss. It's the combined development -- people refer to it as "industry development." It pretty much is industry development, but really it's the development for the member companies of the RAA. I think there are roughly 35. Those 35 companies make up a very large portion of the industry in the most recent year.

It is important to emphasize that what the "RAA Study" is - the history is only for those 35 companies. As you move further and further back in the triangle, older accident years, it's possible that there are only a handful of companies, not 35 but only a handful of companies that represent the very tail of the triangle, which is what people tend to use the RAA for.

Even though those 35 companies make up the bulk of casualty excess of loss experience for the most recent year, that triangle may not be the bulk of casualty excess loss experience for the part you're using it for, for the tail.

It has a lot of data. It goes back, I think, into the sixties, 1960, so that really has a lot of information. It is broken up in a lot of useful ways. It is broken up by line of business and by treaty versus facultative. And even within facultative there are some splits. So, that's the RAA.

The Best's, which I think is less well-known perhaps and certainly more recent, is a composite of Schedule P information for 200 selected companies. In contrast to the RAA, it is a mixture of both pro rata or proportional business and excess business, which is, obviously a disadvantage. It has all the level of detail that Schedule P does. It does have some paid information and it has the companies estimates of IBNR and so on. That's a brief description. (Note that currently the annual statement does separate out excess assumed reinsurance from proportional. As a result, Best's is no longer a mixture of the two.)

In terms of caveats, I guess the most important caveat whenever you use industry information is you need to ask yourself whether the data is representative. Now, that encompasses a number of different things. One thing to note is I think it is important to emphasize that even if you have data going back to 1965, even if you're Gen Re or if you have some of the advantages of being Gen Re because you have the RAA study, the question is: How relevant is 1965's data, how relevant is the development on 1965 accident year to what you're doing now?

That's the question you really have to ask yourself. That's the question you have to ask yourself whenever you use old data. It might be an argument for using curve fits to more recent data for development.

Second, the issue about how representative is the data is sometimes it is not even very clear what's in the data. I think that John mentioned that RAA this year, the most recent study which just came out I think a couple of weeks ago, had a dramatic change in GL change, a very large change in the tail for GL. What happened was that in the past it excluded asbestos, and this time through they included environmental as well -- excluded environmental as well.

As recently as a year ago, there were people debating both sides about whether that would even make a change in the development, whether there was enough environmental or asbestos in those accident years to have a big impact on the tail. The people, probably the majority who thought it would, had their opinion confirmed when the tail came in much, much lighter.

There is a question about what is in there, what sort of mixes of business, are those mixes of business at all representative of what you're writing as a company? There is also a question of whether the attachment points and limits are representative of what you're writing? There are a lot of issues when you deal with RAA or really industry data, in general.

What I'm going to try to talk about are some ways that you can use your own information to generate some loss development tails, some fitted development factors. The general class of methods are curve-fitting. In other words, what you're going to do is you're going to take the development that you know about and you're going to extrapolate beyond it to the development you're looking for.

There are two basic approaches you can take. One is you can fit a curve to age-to-age factors, and project what those age-to-age factors are going to be ultimately, project out as many age-to-age factors as you want, and accumulate them to get to percent reported. The second approach is that you can directly fit percent reported.

I'm not going to talk about fitting percent reported. That is well beyond the scope of this talk. I believe there is a session on that whole approach, which is report lag modeling. I think there is a dedicated session to that, so I won't deal with that at all. I'm going to talk about fitting age-to-age factors, which is also a fairly common approach.

In particular, I'm going to focus on two questions about fitting age-to-age factors. They are the question of smoothing and the question of far how out you should project your curve. I'm going to illustrate that with an example from Made Up Re's data.

Okay. On the next page, I have a graph of the age-to-age factors that John selected for Made Up Re. The age-to-age factors themselves are the squares, I guess -- I'm sorry, the age-to-age factors are the diamonds. I have two fits, which I will talk about in a minute, to those age-to-age factors.

The first thing I just want to mention is you can see that the fit is very good, both fit. The two smooth lines, the squares and the pluses, are both fitted curves that fit to John's age-to-age factors. You can see that they're both quite good. They both seem to fit the data well.

There do appear to be two outliers, I guess I'll just point them out, one at 96 months and one at 156 months. They really jump out at you as being off of the curve. We're going to talk about how we're going to deal with those outliers.

One thing I should mention is that you may notice that I've fit and graphed the curve, starting with 36 months, rather than 12 months. When you're fitting curves and particularly when you're graphing the fits that you've made, it's important to focus on the area of the curve that you're interested in.

Here, we're interested in the tail. If I were to try to graph from 12 months to ultimate, the 12 to 24 factor would be so large that I wouldn't be able to even distinguish that this factor was now right or that factor was now right, because the scale would be so tiny. It is real important to graph your fits, and it is important to graph the right range so that you really can get a feel for whether you're fitting well or not. Okay, so let's talk about those two outliers.

The next exhibit in your handout is a Lotus exhibit that is a little messy.

What I have in the overhead is I just summarized some of the key columns. In the handout, the first column are the selected development factors. Those are the factors that John selected from the triangle. The next several columns, two through four, are just a method of fitting those factors to a curve. In this case, I've used the Sherman inverse power curve.

I won't go into the details of how to do that, but I think there is enough information on the handout exhibit that you can actually follow that. Whatever method you use to fit to the development factors, I show the selected and I show the fitted development factors. Obviously if you're fitting a curve to anything, you want to compare the fitted to the actual to see if you have a good fit.

Columns 5 through 7, I show the fitted factors, the tail factor that is implied by each, and the R2. What I've done is in Column 5 I fit to all the factors, in Column 6, I've excluded that one outlier that was all the way in the tail, that very high factor, and in Column 7, I've excluded the factor that was somewhat low, further to the left in the triangle.

Now, in terms of whether or not outliers should be taken out of the data before you fit, there are no rules. You know, obviously you can't point to anything and say that this definitely should be or this definitely shouldn't be taken out. I think there are a couple of things to consider, though, before you go ahead and remove a factor.

I think one thing that is clear is that any one factor should not significantly affect the tail factor. You can see that in your example, in Column 6, if we exclude 168 to 180, the tail factor goes from 1.16 -- from 1.2, if we don't exclude it, to 1.16. I guess it's arguable whether or not that is significant. I think in this case that's a fairly significant impact of one factor.

The second thing is no one factor should -- the exclusion or inclusion or exclusion of a factor should not significantly impact the quality of the fit. I guess one way of measuring that is the R2. I showed the R2s going from when I don't exclude that big factor the R2 is .94, and when I do exclude it, it is .98; so, that seems like that's a pretty big impact for one factor. Based on this, I would say that the 168 to 180 is a good candidate to either be excluded or smoothed before you fit the curve.

Now, you don't want to lose the information that you've had that "blip" in the data. In fact, what you probably want to do is -- you know, you don't want to just exclude it and then think your problem is gone away. The fact that you had that "blip" in the data means something happened and you probably ought to be pursuing that with your data processing department or with your claims department, to try to find out why it is that that factor was so large.

Given that all of the research doesn't turn up anything, and unfortunately that sometimes happens, I think it is a real good candidate to be smoothed before you fit the curve. Now, the way I smoothed it was the simplest way and probably the worst way. I just took it out. You can also smooth it by distributing some of that development to other factors. That's probably a more reasonable thing to do, but for this example all I did was I took that one out.

One thing I do, do in this example, and I think you should do, is if you make a judgment call like that, you probably ought to run through the remaining calculations both with and without the factor, just to see what kind of an impact that had on losses to get some feel for how much that judgment call was worth.

Okay. That's as much as I'm going to say about smoothing factors. The next issue is how far out you want to carry the fitted curve. I think this is a real important point. Let me move on to the next slide.

Okay. I think this is actually a hidden parameter when you fit to age-to-age factors. There is a tendency not to notice this. But when you fit to age-to-age factors, what your model says is that any given age, you can estimate what the age-to-age factor will be, but to get the age-to-ultimate factor you have to project out a large number of these age-to-age factors and then accumulate them.

The question is, how far out do you keep generating these age-to-age factors? If you look at the previous exhibit for a minute, you can see that even at 300 months all five columns -- Columns 5, 6, and 7 -- still had positive age-to-age factors. If I were to extend that out to 1,000 months, especially for the Sherman curve, you would still have significant age-to-age factors.

The question is, How far out do you extend it? This can make a very big difference, as I think you can see on this graph. All this graph is, the boxes are the cumulative percent reported if you extend things out to 26 years, and the pluses are if you extend it out to 38 years. I believe -- I don't show it on the overhead but you can see on the handout -- that for the 180 month to ultimate factor, that makes a difference of a factor of 1.2 or 1.33.

I think a lot of people focus on outliers because they're real obvious when you look at the graph. For this particular example, however, the decision of how far out to extend it, had a much bigger impact on the tail than the question of whether or not to smooth outliers. I think it's a real important to bear in mind. This is a hidden parameter for methods like the Sherman curve.

Okay. How do you pick between these two? Again, there are no rules. I think a couple of things you can do, though, is look at RAA data. You know, see how far out RAA says there is still development, and that might be an indication of how far you should extend it.

Another thing you can do is extend it out a relatively short number of months. Then for that final factor, the 300 to ultimate for example, instead of assuming it's 1 maybe use something simple like a Bondi or something, something you would use in a primary environment. Because the factors there are so small that might be perfectly acceptable. Maybe the 300 to ultimate will be equal to the last age-to-age factor, just like you would on a simple Bondi.

Okay. I think the final two slides on this section take this to the last step to showing how you would apply these factors. Column 1 is reported losses, columns 2 and 3 are the selected age-to-age factors. The first thing to note is that I haven't just used the tail factor, the fitted curve, for the last factor to ultimate.

As I said before, that is not really what the tail is for in reinsurance. In fact, I've gone back and I've replaced the factors all the way from 96 to ultimate with fitted factors, because that's where the instability is, at least that was my judgment of where the instability really started. That's something that I just wanted to emphasize, that you use the fitted curve not just to get you to ultimate for the last point but also to smooth out some of the other points.

The other thing to note is, as I've mentioned, I'm showing the impact on the cumulative data, and I guess on the next exhibit the impact on IBNR, reflecting with and without my judgment pick of excluding the 168 to 180 factor. I think that's real important.

You can see here it had a pretty dramatic impact on losses, so you want to know that number. You want to know that excluding that one factor impacted your IBNR, I guess, by $16 million. I mean, that's obviously a very dramatic difference. That's all I was going to say on tail factors.

I guess the next area is loss ratios. Now, again, you may need to estimate loss ratios if you're in a primary environment just as you would in reinsurance, but there are a couple of differences that make it more important and more difficult in reinsurance. It is more important to estimate loss ratios in reinsurance because, typically, your factor for your percent reported for the most recent year may be as low as 10 or even lower percent of your losses.

In other words, for your most recent couple of years, your loss development answers are going to be very leveraged. You're going to have very, very large factors; factors 9, 10, 11, 12 or bigger. It is really helpful to have some other base aside from losses to use for projecting the most recent immature years. It is very important in reinsurance, more important probably than in primary, to get loss ratios, but it is more difficult, for a lot of reasons.

Probably the most important reason that it is more difficult to estimate loss ratios is that the swings in the loss ratios from year to year, the swings in rate adequacy for reinsurance are so much more dramatic than they are in primary. A simple rule like using your prior year's loss ratio to estimate your most recent year is just going to be really ridiculous for reinsurance in most situations. It's not going to be appropriate at all.

That's the motivation for estimating loss ratios. I guess there are two uses, two key uses for loss ratios once you have them: You can use them for Bornhuetter-Ferguson; John's illustration showed that. Or you could just set the most recent year, set it's ultimate losses at the loss ratio. As I said before, the development factors are so large for reinsurance, those are virtually the same thing. Your Bornhuetter-Ferguson only slightly modifies the loss ratio.

There are two main methods for selecting loss ratios. You have the same choice that you had for development tails: You can either go with industry data or you can go with internal data. Again, I want to say that your starting point should probably be industry data. Although, the industry data is not as good for loss ratio as it is for loss development. I talk briefly about industry data, but then I want to talk about some ways you can use your own experience to supplement that data.

The two sources are RAA and Best. Here, the RAA refers to a special study that RAA does, showing the calendar year loss ratios for their member companies. It is a calendar year, so it isn't as good, it isn't quite what you want. Also, it is their total loss ratio, it's not just their excess. Best, again, has Schedule P data so you can get loss ratios from there.

Okay, now for the internal data. I'm going to talk about estimating loss ratios by coming up with an index of your rate adequacy by year. What I mean by that is that for each year you're going to say that your rates adequacy in that year was some percentage of the adequacy for a base year.

Now, the first thing I'm going to do is illustrate how you would use that to come up with loss ratios once you had your rate adequacy index. The second thing I'm going to do is I'm going to illustrate how you would get a rate level index using a very basic, simplistic -- well, a basic model, which is more for illustrative purposes to show you the kinds of considerations you would look at rather than something you would necessarily want to go ahead and do.

But anyway, let me start with the next slide where I show once you have an index how you would use it. Okay, on this exhibit -- let me start just by going column to column on this exhibit. One thing is I've only focused on the more recent years because that's typically where you're going to want to select a loss ratio.

I have selected '83 and '84 as my base years. I have just run this off with two different bases so you get some feel of the sensitivity to that. You can see the footnote. My starting point is the developed loss ratio for those years. Those developed loss ratios are a 50/50 weighting of John's alternative A and Alternative B. For the base year, you want to base the loss ratio on its losses. That's your starting point. Obviously you want to pick a base year that is sufficiently mature that you believe your ultimate loss estimate.

Then, columns 2 through 4 have my rate level indices just divided through so that different years are the base. In column 2, the rate level index has 1989 as the base, and then I've just varied it so that '83 and '84 are the base. Bear in mind that this rate level index -- we'll discuss how I got it in a minute, but there are two things to bear in mind. The first thing is small is good. Obviously you could show an index any way you want. But this one is measuring the loss ratio in the year as a percentage of the loss ratio in the base years. The smaller it is, the better you are.

Given I have columns 2 through 4, what I do in column 5 and 6 is in column 5 I take the 259 loss ratio that we got from the losses for 1983 and I see what that loss ratio corresponds to for the more recent years, given the rate level index in column 3. You can see the column heading shows the math of that calculation.

Just to take a quick example, 1983 was 3½ times worse in loss ratio than 1989, so the 259 loss ratio in 1983 corresponds to only a 73 loss ratio in 1989. I've done the same thing in column 6. Then in column 7 I just select, I just arbitrarily select.

One thing I just wanted to note. I think John made a real good point. One of the things that John mentioned was it's kind of hard when you're in a primary environment or when your experiences are in a primary environment to get used to the kinds of loss ratios you see in reinsurance. One of the things that that does is effect the way you select.

If you're just selecting loss ratios judgmentally, you're going to tend to put much less swing, I think, in loss ratios than you would if you had developed it based on real data. In John's example, he selected loss ratios and he selected loss ratios that ranged from 200 to 80.

He mentioned that it would be kind of hard to explain to an auditor, you know, that you have that wide of a swing. Well, you can see when I develop these out, I get loss ratios that range from 315 to 52. I think this is not very atypical. I mean, I think that you can see swings this large, particularly in casualty excess.

I just want you to bear in mind that you have to get used to these big numbers, and, on the flip side, you have to get used to the small numbers, because when reinsurance rates are good, they are very good. I'm going to talk in a minute about why that is, why it has such dramatic swings.

Now, might be a good time. Let me put up the next slide.

What I've done is I've shown -- in your handout, I think you have enough backup to reproduce the calculation of the rate level index. What I've tried to do is I've tried to break this up into pieces. This exhibit shows the inputs into the process, the next exhibit is going to show the outputs, and then the final couple of exhibits are going to be some backup calculations that are referenced.

Now, in a primary environment, say, personal auto it is relatively easy to get a rate level index. Basically what you're going to look at is you're going to look at what rates you had approved, perhaps by state, you know, and what your trend factor was; and you've pretty much captured the index.

In reinsurance, there are three factors that you need to look at, which makes it much more complicated. You need to look at what the change in your rates are. You know, how your rates have changed from year to year; and that's going to have a very wide swing.

In addition, though, you have to look at changes in primary rates. Since typically a reinsurance year premium is quoted as a percentage of the primary company's premium, if their rates go down, even if you've held the line on rates, your premium adequacy is going to go down. Not only do you have to look at how your rates have changed, but you also need to get some feel for how the primary subject premium, how the rates underlying the subject premium have changed so you have a leveraged impact there. It is easy to forget that piece of it.

Then the final thing which, if anything, is most often forgotten is not only do you have to look at how your rates are changed and how the adequacy of the subject premium has changed, but you also need to look at whether there have been any changes in the coverage that you've been offering.

In my example, the aspect of coverage that I focus on is, how much limit you're providing and what your retention is, what your average limit and retention is. That's only one part of coverage. Perhaps it is the most important part, but there are other things as well, terms and conditions, loss ratio caps. There are a whole host of different coverage issues that can change within the cycle.

What tends to happen is all three of these indices tend to move in the same direction at the same time. When there is a soft market for reinsurers, it is typically true that there is a soft market for primary companies. Your rates are going down; the base is going down on which you apply your rates.

In addition, typically, what happens is there is so much competition that you're offering more coverage. All of these three things move in tandem and they emphasize the cycle.

Okay. If I have time, I'm going to talk briefly about this calculation. Okay, again the focus is rates and coverage, the two main pieces. Columns A through C focuses on rates, columns D through F focus on coverage. One footnote to notice is in the notes there is a typo. The following note should say "Column F is the annual trend rate of 12 percent".

Anyway, let's focus on the rates first, columns A through C. The inputs to the process are the average premium that you have received. That should be a number which is possible to get. The second is the average adjusted premium. What I mean by "adjusted" is, you've adjusted it for your share, participation in the treaty.

Those two sets of numbers are not necessarily always easy to get. As John pointed out, it is very difficult to get data in the format you want for reinsurance and you may not be able to get this, but you probably should be able to get some proxy for it.

Then the final input is in column C, the primary adequacy index. As I mentioned, you need to also focus on whether the subject premium adequacy is deteriorating. Here, I've quoted this one, for whatever reason I've quoted this, in a way that low is bad. As opposed to low being good, here low is bad. That means that 1983 for primary companies was much worse than 1989. Okay, that covers rates.

The next three columns are the inputs for the coverage calculation. I have the average limit on a 100 percent basis. That might be somewhat more difficult to get. Although, again, maybe you can get some approximation for it.

Average limit, average retention, and the excess loss trend -- the trend is obviously important because even if nothing else changes, the coverage you're going to provide every year is going to potentially be higher because your trend is going to be larger. It is important to emphasize that's the excess loss trend, rather than ground-up loss trend.

Now, one thing, even before we get to any adjustments, you can see right from this exhibit, from the inputs, what is going to be happening in the cycle. If you look at column A, you can see that your average premium received is going down. Even though, if you remember Made Up Re's example, their premium was fairly constant, their <u>average</u> premium was going down; so, their rates were getting worse.

You can look at column C, the primary adequacy index shows that in '83 and '84 primary adequacy was lower. That corresponded to when your rates were lower. Those two are moving in tandem. Then if you look at columns D and E, you can see that in the soft part of the cycle, '83 and '84, you had much lower retentions. Even on a nominal basis you can see that the limits and retentions that you're offering is a little bit higher. We will get to a trend example where it is clearer.

In 1986, rates picked up, primary adequacy picked up. Suddenly the retention shot up, so you're offering less coverage. Actually if we look at the output exhibit, you can see that much more clearly.

Okay. Columns 1 through 3 deal with -- develop a rate index; columns 4, 5, and 5 develop a coverage index; and then the final, column 7, is the rate level index, which combines the two of them. If you look at column 1, we have the average rate. That was just the average premium received divided by the average subject premium. You can see that your rates dramatically increased as it came out of this soft market.

Then you have the average rate on subject premium adjusted to 1989 rate level. Here, I've adjusted the denominator of the average rate for the fact that the primary adequacy was changing over that time. You can see now it is starting to emerge that 1989 is not quite as good as the prior years. Really the peak was in 1986. Again, you can see the dramatic increase.

In 1984, you have an average on-level rate of 4 compared to 1986 average on-level rate of 18 or 19; so, a dramatic increase. I think that's not completely atypical. I developed an index, and in columns 4 and 5 I showed the trend to limit and retention.

Here you can see very clearly, I think, that as time went on, as the market hardened, retentions dramatically increased and at least for '85 and '86 the limits decreased slightly so that you were offering less coverage even though you were getting more rate. In fact, that's picked up in column 6, the coverage index.

I won't go into the details of the calculation of the coverage index, but it is shown in your handouts; and it is just based on increased limit factors. In other words, if you have columns 4 and 5, you know what your average limit and retention are, and you have a selected increase limit factor, you can generate a coverage index. That's shown in backup exhibits.

Then in column 7 we have our rate level index that was used in the first exhibit. Let me skip to the last page of the handout, and let me quickly go over a couple of limitations to the use of this method.

I think this is a useful method for selecting loss ratios, particularly to illustrate some of the issues. A couple of things you want to bear in mind before you go off and do this. I mentioned that for the coverage the only thing I reflected was limit and retention. Obviously there are other coverage issues.

This method is easiest to apply if I use the average limit and average retention to get my coverage index. Obviously if you had a wide spread, that would not be a reasonable thing to do.

I would only mention one possible refinement. I didn't emphasize this but in the illustration I labeled the exhibits as being just "Casualty Treaty Working." You want to try to do this on as homogeneous a group as you can get. You don't want to try to do this on your whole casualty book, and certainly on your whole reinsurance book. You want to really break up the reserve groups before you apply this method, since it relies so heavily on averages.

Okay. That's all I was going to say. I don't know if we have one or two minutes left for questions.

MR. GRAVES: That's right. If you have a question, please again use the mike in the center, if you would. Anybody?

(No verbal response)

MR. GRAVES: Okay. Well, thanks very much. Could we have a round of applause for our two panelists?

(Applause)

1991 CASUALTY LOSS RESERVE SEMINAR

2F: LOSS RESERVING FOR SMALL COMPANIES

Moderator

Alfred O. Weller
Ernst & Young

Panel

Robert A. Giambo
Trenwick America Reinsurance Corporation

Raymond S. Nichols
Consulting Actuary

Margaret Wilkinson Tiller
Tiller Consulting Group, Inc.

Recorder

John Woosley
Ernst & Young

MR. WELLER: Welcome to Session 2F, Loss Reserving for Small Companies. The hour and a half in which you get the big picture of small reserves.

Before we get into the actual session, I want to do a little demographic study so we have a better idea of how to target what we're going to say. Let's start out with audience splits. How many of you currently work for a small insurer? It's just about unanimous. How many people do work which relates to small insurers, sell to them or something? Okay. So it's about ten percent of the latter group, ninety percent of the first group.

When we say small, what do you mean? How many people mean less than a million dollars in premium? How about less than ten million? Ten to twenty-five? Okay. So far we're picking up three or four people in each group. How about twenty-five to fifty million? Alright, now it's starting to grow a little. Fifty to a hundred million? Okay, fifty to a hundred seems to be where the mode is.

How about staff in terms of small insurers? How many people see more people in this room than their insurance company has staff? Okay, only about four or five. How about the primary versus reinsurance distinction? How many are in primary cover? Probably about twenty percent. How many are in reinsurance? About ten.

How many actuaries? Non-actuaries? So it's about an eighty/twenty split. Other? Okay.

Just about any actuary you talk to will have encountered a small insurer reserving problem at some point in his or her life. You really are not alone; it is just some function of how often you encounter it, and if you're a small company you encounter it far more often than if you're not, but even in a large company you're going to get stuck with doing reserves for one particular account, one particular reinsurance treaty, and get into similar problems.

My favorite cartoon in this area, which I don't have with me...somebody may remember a character named G.I. Joe that was drawn during World War II by Bill Mauldin. And in one cartoon Joe is with a friend in a foxhole and they're looking at a newspaper describing all the land that Patton and all the troops in Europe have conquered and Joe's basic reaction is "The hell with them, this is the most important hole in the world. I'm in it." And I think that's basically the attitude you need to take in a small company. State Farm may have reams more data, but it is the immediate problem that you have to solve.

In terms of small company credentials, probably the smallest problem that I ever encountered was an insurance device that had 0.8 claims and had to allocate it across three operating divisions. So what you mean by "small" varies a lot by the environment you're in.

To address the issues, I've got three panelists that are going to attack it from different perspectives. Ray Nichols is going to speak first. He'll be talking about general reserving principles and general problems at small insurers. Margaret Tiller will go second. She will talk about the primary and direct market. And then Bob Giambo will go third and talk about small reinsurer problems.

Ray is going to go first. Ray is an independent consulting actuary with two decades of experience in the casualty actuarial profession. He's got extensive experience. I could probably spend the next five minutes going over the depth and breadth of his resume, but it's probably sufficient to say that he has small company experience and large company experience and a broad breadth and with that I'll Ray go.

MR. NICHOLS: Good morning. It has been my good fortune (mostly) to have worked in a variety of actuarial environments. I have seen, with my sleeves rolled up, the loss reserving function in jumbo, medium and regional companies. This includes well run, mediocre and insolvent companies. It also includes the loss reserving functions of alternatives such as captives and risk retention groups.

Today, I will share with you my observations on reserving for small companies. The point of view will be the differences between the loss reserving environment in a small company, (300 employees or less), versus this environment in a large company.

It is a basic observation that a small company is not a little big company. (See RSN Slide 1) The resources available to small companies are out of scale to their size, the business climate for a small company can change more rapidly, small companies must be more flexible, and they must tolerate a higher level of disorder.

The resources available to small companies are out of scale to their size. This shows up, for example, in the cost of key personnel. The managers and professional people in a small company are as well trained as those in a big company. They are worth as much in the market place and they must be paid. As a result, the compensation for key people is a more significant portion of the cost of overall compensation. A small company must make do with relatively fewer key people, such as actuaries, than their big competitors.

Rates of change in growth (or decline) can be larger in a small company than in big companies. It is hard to imagine a State Farm or an AEtna growing or declining thirty percent in one year. On the other hand, it is not unusual for a small company to lose or gain an important agent, move into or out of a state, or lose or gain an important program. Such events can easily change a small company's business volume by thirty percent or more in one year.

Because of the potential for rapid change in the business climate, small companies must be more flexible. They develop products, programs, and sales promotions much more rapidly than large companies. They can respond quickly to marketing opportunities and competitive pressures and, in fact, they must respond quickly to survive. They do this by being less formal and by having their key personnel less dedicated to handling one function. This creates more flexibility, but it also creates disorder in the organization.

Because small companies and big companies are different, the main tasks and responsibilities of their actuaries are different. (See RSN Slide 2) For example, look at the situation in loss reserving. There are three primary reasons for estimating accurately loss and loss adjustment expense liabilities:

a. To quantify the financial position of an insurer,
b. To estimate the cost of insurance products accurately, and
c. To measure the value of an insurer as an investment.

These are all important in both small and large companies, but in a small company the second and third reasons have a higher priority. The small company actuaries do not have the luxury of specializing only on the financial position.

The economies of scale allow actuaries in large companies to specialize. The complexities of the business may require this specialization. For example, the workers compensation reserves may be broken down into medical, wage loss, rehabilitation, scheduled benefits, pension/non pension, lump sum settlements, retrospective reserves and allocated loss adjustment expense reserves.

Specialization in a large company may not be a loss reserving strength, but may be in response to loss reserving weakness. Large companies are not just bigger, but also more complex. For example, the practices and procedures in a large account department may be very different from the practices and procedures in a "main street" commercial lines department. The loss reserve analyst may have to specialize to understand and to work with this complexity. The actuary may not be able to estimate accurately the loss and loss expense liabilities without specializing in loss reserving.

For actuaries in small companies, resources are finite and the scope of their involvement in their company is broader. Small companies thrive by doing one or two things very well. For example, they are good at insuring homeowners in Connecticut, insuring municipalities in Massachusetts, insuring doctors in Indiana, etc. The effectiveness of the actuarial department is measured by how well it contributes to this effort. Rarely does loss reserving provide the margin of difference required to make a small company thrive. If the actuarial department is to provide a margin of difference, it is usually in the tasks of measuring insurance costs.

In a volatile business environment in which a company's advantage can disappear almost overnight, the chief management challenge is to reduce the cost and the time of product innovations. For the actuaries this means a greater role in marketing and pricing than in loss reserving. It also means a closer contact with decisions, less margin for error, greater pressure on the technical staff, and faster feed-back of results.

Both in large companies and in small companies the actuaries are knowledge workers who accomplish their mission through the depth and scope of their analysis. In a large company the actuary will accomplish this analysis through a technical review of the data. In a small company, an actuary will often accomplish this mission through an in depth understanding of the company's book of business.

The company's book of business is under constant attack from competitors and can undergo rapid changes. The actuary must stay informed about the following dimensions of the book:

a. Statistical Data,
b. Contracts and Agreements,
c. Sources of the business,
d. Line of business,
e. New and Renewal Business,
f. Underwriting and policy administration,
g. Competition, and
h. Geography.

The small company actuary has a much better chance of forming alliances and communicating with the claim department. Most of the key people will be in the same building and go to the same management meetings. For example, the actuary will find out before the fact when there is a claim initiative to close old cases. He or she will hear about unusual large claims, about changes in claim processing systems, and many other events that have an important impact on the actuarial reserves.

The small company actuary takes a more hands on approach getting data. The first task of the information processing system is to process transactional data. The company must get out the policies, get out the bills and manage the claim files. Small companies may not have the resources to move beyond transaction processing. The loss reserve actuary and the people working with him or her often do their own data processing.

Actuaries do not like to look at data on a policy number or claim number basis. They like to group data by class and territory. We must compare premiums to losses and adjust both to current conditions. In this situation, small company actuaries must develop their own data sources and management reports.

Over the last decade the development of micro computers and the software to run them have given small company actuaries an extraordinary tool. Using only the personnel within the actuarial department it is easier now to develop the data sources needed by the actuary. At the very least, the small company actuaries are now able to prototype the kind of reports they want. They can develop these prototype reports using microcomputer and computer software like LOTUS, APL and PARADOX. The prototype then becomes tangible evidence of what data the actuary needs and what information the actuary will produce when the data becomes available.

Also, loss reserving models in small companies are easier to base on exposures than in big companies. (See RSN Slide 3) Most actuarial departments that I have seen depend on four general types of loss reserving models. They are:

a. Grossing Up Models,
b. Loss Development Models,
c. Bornhuetter/Ferguson Models, and
d. Exposure Based Models.

One of these, the last or exposure based models, are easier to use in small companies. Actuaries in small companies find these model helpful because they can be used to translate underwriting and marketing actions into financial results. They are a good tool for communicating with managers that must control costs and must develop new products and programs.

I will demonstrate what I mean by an exposure based model, one that might be used in a small company. (See RSN Slide 4)

Slide 4 is my interpretation of a model outlined to me by Charlie Even, an actuary I worked for at the

Traveler's. Along the right hand side where you see the WWW's the model carries written policy information. In the center, where the EEE's are, the model derives accident period information from the policy period information. Along the top of the model are calendar period results that are derived by summing the accident period information from the center.

Now such a model will simulate how underwriting actions get translated into financial results. Understanding the dynamics of this process is important because it is through the policy period that the company sells new business, takes rate increases, etc. It is through the accident period that reserves are assigned, rates are justified and costs are measured. Thus through the parallelogram model our small company actuary can develop information to talk to a variety of managers, underwriters, agent and others about the financial results of their actions. Also, through such a model, the small company actuary can check other models used in loss reserving.

As a semi-real example I have developed a model of a new company writing personal automobile liability insurance in the Northeast. In the next slide the viewer can see important characteristics of change along the right hand side. (See RSN Slide 5) I have listed these characteristics as:

Exposures,
Exposure growth,
Premiums,
Rate increases,
Losses,
Loss Inflation, and
Pure Premiums.

In the center of the exhibit the viewer will see where premiums and exposures are earned, and losses and pure premiums are incurred. Above is the sum of the earned premiums, incurred losses paid losses, loss ratio and loss reserves, giving the calendar period results.

Such a model, if accurately calibrated, will translate the actions taken by the underwriting department into expected calendar year results. Armed with such a model the actuary is better able to talk with the managers. He or she is also able to monitor actual results as they unfold and predict the results of management actions.

In summary, small companies do not have the resources to be little big companies, but that does not mean the loss reserve function is weaker in a small company. The advantages big company actuaries have are specialization and volume of data. The advantages small company actuaries have is close communication with the basic business forces shaping the organization.

MR. WELLER: Thank you, Ray. Margaret Tiller is going to be our next speaker. Margaret is President of the Tiller Consulting Group, Inc. Margaret has a wealth of credentials and a wealth of experience. She is going to speak to us about direct and primary business and she is in a position to give some unusual insights because of her background in alternative risk financing mechanisms. Margaret?

MS. TILLER: Al and I were competing for who had worked on the smallest company or the company with the fewest claims, and he thought he was going to win with his 0.8 claims. Well, I think I have an example to beat him. I have a company that's been in business for five years. They have $25 million of surplus. They have just had their first claim, for $500,000. That's an excess company, so I won't talk about that too much. But their expected claims run less than 0.8 a year.

When Al asked me to do this talk I, of course, said, "Sure, no problem." Then I sat down to write what I was going to talk about and I thought, well, gee, what does he mean by "small company?" And I was very interested to see that a lot of you work for companies with 50 to a 100 million dollars of premium volume and you consider that small. I consider that huge, absolutely huge. (See MWT Slide 1)

The usual measure people use when they look at insurance companies is premium volume. What is the exposure? Is it writing nationwide or only in a few states or only in one state? And do they have a large percentage of a particular type of business either by line or by category within line? For example, are you writing E&O for pension actuaries and you have 80% of the market?

But, in all of these situations you may find that there are few claims. I just mentioned my client that has a fairly substantial premium volume, $25 million in surplus, and just had their first claim in five years. So premium volume may not be a good criterion. Similarly, nationwide exposures might not be a good criterion because many risk retention groups have nationwide exposures yet, we hope, very few claims. Also, particularly with risk retention groups and with some specialty companies, you'll find that they are writing a major portion of a particular type of business.

In addition to risk retention groups, I have one company that writes a large percent of a particular commercial auto market in one state. So when I think about what defines a small company, I use their volume of claims.

There are also some categories that you might not think of at first. As Al mentioned, I work a lot in, what we call, alternative risk financing. There are a lot of self-insureds (I don't like that term, but it's very common - "risk retainers" is really a better term), entities that retain their risk rather than purchase insurance. There are also pools of these entities, both public and private. The private usually are risk retention groups, but not always. Many of those are really pools operating as insurance companies. Some of the self-insureds and pools, in fact, are larger than some of the small insurance companies. I have one self-insured whose contribution for losses every year for liability and workers' compensation is on the order of magnitude of $20 million. That is larger than the premium volume of some of the "small" insurance companies.

Also, if you work at a large insurance company, you may have occasion to write some single insureds that want some specialized retrospective rating plans. You then find yourself looking at individual, large insureds. What you're really then doing is helping them with alternative risk financing mechanisms. Some of the techniques that a small company would use would also be applicable for these larger insureds at the larger companies. So I think that the key to defining "small" is a small number of claims per year, not the usual measures of size.

There are two areas that I would like to concentrate on in which I think small companies can really do a lot better than large companies in understanding what is going on and in which using large company techniques really is not appropriate for the small companies. Those two areas are exposure and, what I call, "mixed distributions," which we'll talk about in a few minutes. (See MWT Slide 2)

As Ray mentioned, you need exposure for some reserving techniques. But even more importantly, perhaps, you need to really understand the exposures so that you can check the reasonability of your results regardless of what reserving method you use. What's the pure premium ending up to be? Have the rates been adequate? Are they continuing to be adequate? Do we need to make some adjustments there? The feedback between what's happening in rates and reserves in a small company can be a lot quicker than at a large company and needs to be if the small company is going to survive.

What do you use as your exposure base? Well, the easiest one to get is usually actual premium, i.e. what has really been charged. There are some problems with using this as an exposure base because it often involves judgmental changes that vary from one year to the next, such as scheduled credits and debits. There always seem to be scheduled credits, and I really haven't seen too many scheduled debits. There must be something I don't understand about the system. I guess that's what is called off-balance. You also have to adjust for rate changes that have taken place.

An alternative to actual premium is "manual premium." I put that in quotes because it has different definitions depending upon what line of business you're talking about. Some business has no manual premium. Think of all the A-rated classes. What do you do with them? For those classes that do have a manual premium, you're still going to have to adjust for rate changes.

My favorite approach is to use the rating base as your exposure base. If you are doing automobile liability insurance, use car year. You may want to split it into types of cars, even autos versus pick-ups versus long haul trucks, something simple like that. That assumes, of course, that your rating base is a good reflection of the underlying exposures. Sometimes you get some kind of bizarre rating bases, and you wonder what it really has to do with the price of tea in China. But usually the rating bases are pretty good.

This, of course, again assumes, as for manual premium, that there is a rating base. One of the nice things about this approach is that you do not have to adjust for rate changes. So I really think that the rating base is your best exposure base, and at a small company you ought to be able to get those statistics very regularly.

One of the things that I've found as I've looked at small company experience is that there seems to be a lot of mixed distributions. (See MWT Slide 3) You've seen a lot in the actuarial literature that claim size looks like a lognormal or a Pareto or some other curve. Well, with small companies, for some reason, there seem to be more than one claim size distribution operating.

How do you know if that's the case? The first thing you do is understand what the underlying exposures are. I have a client that writes workers' compensation for automobile dealers. You might think that all automobile dealers are alike. Well, that's not true. There are car dealers and there are heavy truck dealers. I don't mean pick-up trucks, I mean the big trucks, the ones that weigh many tons. We've noticed that there is a difference in the workers' compensation experience for those two types of dealers. So when we look at combined data, we don't see things that make sense. When we split the data apart, then we can see what's happening. You need to really understand what the business is that's being written and think about the underlying exposures.

The second thing to do is look at the individual insureds. The company that I mentioned that built $25 million of surplus only has ten insureds. If one insured suddenly goes berserk, loss control goes out the window, and the insured has bad experience, that one insured could sink the company. So you need to ask, first of all, how many insureds are there? And then ask to see a list by size of premium volume. You may find that, yes, it has a thousand insureds, but one insured is 30% of the business. If you look at premium volume by size, that situation will stand out like a sore thumb.

You also need to look at claims by size. This can give you clues that a mixed distribution may exist. For example, if you're looking at homeowners claims, you're going to have a lot of little claims. Those tend to be lost items or small property damage claims. I learned all about ice damns on roofs last winter. In St. Louis, there were thousands of claims that were all under $1,000. And at the other end of the spectrum, you are going to have the "total" claims, the houses that burned down. What you're really looking at is two different types of phenomena happening, so perhaps you should model them differently rather than trying to fit both into one model.

Also look at the detail of the claims. Look at what caused these large claims and who they happened to. That will help you in this process of determining whether you are looking at mixed distributions.

Now I want to go through an example (See MWT Slide 4), which happens to be medical malpractice for a hospital that retains its professional and general liability risks. We split the data into three categories after kind of playing with them for awhile. One of the things that I like to do when I first get data is what I've heard other people call "massaging the data." You just look at it. You flip through it. You might put all the individual claim information in Lotus if the number of claims is small enough. You just look at the data and spend time working with them until suddenly you'll start to see patterns.

I should tell you one of the reasons we split the data into three categories was that the OB/GYN exposure changed dramatically. There were some changes in hospital procedures. There were some changes in doctors. At some point that even wasn't enough and the hospital decided that the doctors would provide their own coverage. The hospital's residual coverage for the OB/GYN exposure was then much less.

And what we saw, when we looked at the data, was that there seemed to be three distinct categories: the OB/GYN related claims, the claims under $100,000 (which because general liability and professional liability were handled together, tended to be the general liability claims), and the claims over $100,000 that were not the OB/GYN claims. These last were the much more serious professional liability claims: failure to diagnose, removing the wrong kidney, those sorts of things.

These are the claims less than $100,000. They are not very exciting. I never have figured out how the hospital could have seven claims for $35 back in '75. I think that was probably an error. The data are supposed to be the claims with losses, but I think they snuck some with no losses in. But you can see that the largest in any one year was just barely over $100,000 and that was for all the claims under $100,000. Obviously, for the more recent years, there may be claims that have not been reported. There also may be claims that have been reported that are not up to their full value, so this chart will continue to develop. But by and large, it looks fairly stable.

Then you look at the claims greater than a $100,000 (See MWT Slide 5), excluding the OB/GYN claims, and, in fact, you can tell that none of them were greater than a million dollars. They all seem to be in the hundred to a million dollar range. And I attribute the fact that none have been reported in the more recent years mostly to development. There are probably some lurking. Also, I think there is a reporting problem. The hospital changed claim administrators, and I have serious doubts as to whether all the claims are getting into the system. I'm expecting any year now, hopefully next year, that there is going to be a big bulge when the claim administrator realizes they've been filing claims instead of putting them in the computer system.

And then the third category, of course, is the OB/GYN claims. (See MWT Slide 6) There you see the big dollars. You can clearly see in '84 - '85, the hospital had one claim greater than a million. They also had one greater than a million in '85 - '86 and another in '81 - '82. The other OB/GYN claims were for smaller amounts. The claims over a million dollars are all OB/GYN claims. So we modeled the three categories separately and got a much more accurate picture of what was happening with this particular hospital.

What do you do when you decide that you, in fact, do have mixed distributions? How do you analyze this data? The approach I usually use is to estimate the total number of claims with loss first. The reason I do this first is because if you split and analyze each of the three categories of claims separately, just looking at number of claims and not looking at losses, you may have a credibility problem. You may only have one claim a year or two claims a year in a particular category, but the total number of claims overall should be stable. It frequently is. So I usually estimate the total number of claims with loss first. Then I look at the specialty claims as a function of the total claims or, if we know there is a different exposure, as a function of whatever that other exposure is. So then I would estimate, in this case, the OB/GYN claims and the claims over $100,000 that are not OB/GYN and then subtract to estimate how many are under $100,000.

However, we know that the claim size distributions are different. That's why we separated the data in the first place. So you do need to analyze the claim sizes separately. Then you can combine the claim size estimates with the numbers of claims to get ultimate losses.

The next thing to do is put together a table that summarizes your results. And this is very important, because this is going to help you check for reasonability. (See MWT Slide 8)

This slide is actually from a slightly different example. I ran into a size problem on my slide with the other example, but this example is similar. This is professional liability only, but the categories show up fairly similarly. The claims under $100,000 are what I call the general liability cases. Somebody fell out of bed. That's usually considered professional liability, but it's really a kind of slip and fall. The ones over a million dollars tend to be the OB/GYN claims. The ones from $100,000 to a million tend to be the Non-OB/GYN serious claims.

You summarize the ultimate claims with losses and the projected ultimate losses. You ought to look at average claim size also. You'll notice that I've shown everything to one decimal here. It is entirely realistic that for some of these categories you may expect less than one claim a year. We didn't in this particular situation, but that would be entirely appropriate. And when you start dealing with fractions of claims, it is very easy to get average claim sizes, particularly in the over-a-million category, that aren't actually the right size. So you have to keep fiddling here and there until you make sure that everything makes sense.

Returning to MWT Slide 7, another way that you might want to look at this is go back to whatever you are using as your exposure base. Check the loss rates. Make sure that they are making sense.

You have to do the reasonability checks. When you are dealing with small companies and small numbers of claims, you may think you have a reasonable assumption at every point along the way, but you may have gotten yourself into the wrong ball park. If you do the reasonability checks, you should see that.

MR. WELLER: Okay. After primary insurance comes reinsurance. Bob Giambo is Senior Vice President and Chief Actuary at Trenwick America, which he characterizes as a small reinsurer and some of you may debate, but I'm going to let him speak for himself on reinsurance problems with small companies.

MR. GIAMBO: By way of background, I agree, Trenwick fits my definition of a small reinsurer in the current marketplace. It will be writing approximately 90 million in net written premium this year. With 130 million of statutory surplus, it doesn't get us in the top 20 of U.S. reinsurers out of probably about 40 active markets. We have 75 employees. We also have no significant business written prior to '86 that isn't somehow protected. And I'll be speaking from the perspective of a small reinsurer in the broker market, meaning we get our business through brokers as opposed to direct writers, and there are no small direct writers. That's just an impossibility in the reinsurance field.

Finally, you have to keep in mind that my comments tend to emphasize casualty problems. Property is property even for reinsurance. It's not that hard to reserve, no matter what.

And for those of you from primary companies these comments, I would say, are relevant with some adjustment because at some point you are going to have to figure out what your ceded reserves are to come up with both gross and net reserves in the annual statement. And small primary companies, essentially, have to come up with the reserves for small reinsurance programs. I think the comments I'll give you today are relevant to that. And finally, we review our reserves quarterly and anything less frequent would almost be criminal in our business.

I'd like to start off with the differences between small reinsurers and small primary companies, which tend to be differences between primary companies and reinsurers, more than anything else. And the first thing to keep in mind is the length of the tail. Just inherent in reinsurance, but particularly in excess of loss reinsurance is the long time it takes for claims to come in. I would recommend that you attend a mini-session on the Reinsurance Association of America's loss development study, which is an accumulation of excess-of-loss loss development. Take the 1986 accident year for me. I would roughly say I know that approximately 50% of the ultimate losses have been reported to me for my excess general liability. For the 1990 accident year, as of today, I know less than 10% of the losses. Loss development factors are huge.

And just to give an example of why there is large loss development, I'll tell this story on workers' comp that I picked up. In 1950, a woman fell down on the job, hurt her hip, got some workers' comp. She turned 65 recently, needs a hip replacement. The state has decided that the original injury was the fall. It's now a workers' comp claim. A 1950 claim is now showing up on some reinsurers' books as a claim for the first time. Literally, a thirty year tail, a forty year tail, even in workers' comp. So that's a problem we face in reinsurance and it just becomes worse at a small reinsurer.

There are other problems. Lines of business are not as well defined at a reinsurance level as a primary company. Reinsurance treaties tend to group GL and auto, for sure, and sometimes GL, auto, and workers' comp. But you get a very bad job of having the premiums split out separately when it's reported to you. And sometimes the losses aren't identified more specifically than as "casualty." So you're not sure of your lines of business. You have to estimate.

I can tell a story, in my own company, on our facultative business. All of a sudden I noticed workers' comp premium showing up and I asked why. Well, it turned out in prior years when we wrote reinsurance of umbrellas the underwriters would say, "Well, we have a GL and an auto exposure and we'll call it 60% GL and 40% auto." Then one year they realize that we are getting workers comp and employees liability loss claims coming in, so now they say, "On a going forward basis, we'll now call 5% of the premium workers comp." So all of a sudden we have written workers' comp business because of the coding of the company. So the definition of line isn't very clear.

I would bring up the following in the line of business category; when you are a reinsurer, often specific claim information isn't reported to you. By that I mean all the losses are reported on a piece of paper with one grand total, which is the transaction you book. You don't get specific claim detail. The reserving methods that require claim count just don't apply for a large part of your book of business. So you don't have the luxury of claim counts even at a reinsurance level. And I would say that the annual statement lines of business are not very useful for analyzing your data.

Another problem that we face, and I think a lot of small companies potentially face, is we're concentrated in a few large treaties...sort of the old 80/20 rule. Eighty percent of our business comes from 20% of the treaties. I can analyze a handful of contracts and get 50% of my premium volume. That's a mixed blessing. On the one hand, the law of large numbers doesn't really work for you, but on the other hand, you can concentrate on ten contracts and see where half your book is going. So you don't have the law of large numbers and you have a concentration problem.

And last, the reinsurance product is not standardized, at least in the broker market. Contract terms differ with respect to how they handle allocated loss adjustment expense, how retentions work, inner aggregates, a whole slue of things that vary from contract to contract, so that old actuarial principle of adding up all your homogenous exposures and analyzing them just doesn't apply.

Because you're small as a reinsurer and like us, not been in business very long in an industry that has a 20-30 year tail, you are forced to rely on sources of industry data. (See RAG Slide 1) This is to overcome the lack of internal data. But at least I can argue, to a certain extent, that industry is relevant to the small reinsurer. The similarity we have with other large broker companies is that we write the same business. We write the same treaties. We're on the same business as the broker large companies are, we just take a smaller piece. In a certain sense you would expect their loss development, our loss development, to be similar on the business we hold in common. So I think you can argue that industry data is relevant. You can obviously argue this point that, but it's the only thing you have.

The best source is the RAA Loss Development Study. Also, ISO gives you some loss development information, primary versus excess, and if one wanted to one could use their size of loss studies to reproduce the Pinto and Gogol paper. That would allow you to use ISO information to come up with loss development by layer.

We look at the A.M. Best casualty loss reserve development book, which basically will give you the Schedule P's for companies and totals by line, primary and reinsurers. We also go through individual company annual statements for reinsurers and analyze those on occasion. It helps you with payout patterns and some loss development.

But the absolute, most critical source of information is a treaty submission. Now for those of you not familiar with broker market reinsurance, brokers bring you a submission that's supposed to contain a lot of information that will help you price it. Usually if the program has been around long enough and the ceding company has enough experience, there will be loss development triangles for the company that will allow you to use the company's own excess-of-loss loss development to price the product. If you save enough of these, you can add them all up and come up with a set of loss development factors that you can use to reserve the product. So the treaty submission becomes your best, I think, source of data as a small company.

And last but not least, consultants. We thought of entering medical malpractice reinsurance sometime back (we never actually wrote any business). But before doing so I asked a consultant to give me loss development triangles for claims-made versus occurrence, hospital versus doctors, that kind of information, so that if we ever wrote any I'd be able to reserve it. So you can use that as a source of data.

Okay. Here's the reserving philosophy for me and my company, which probably applies to all companies. (See RAG Slide 2) You can't do reserving in a vacuum. It's just reinsurance pricing after the fact. And what I mean by that, if you're not pricing the product you can't reserve it because of the long tail. Why? How do you set a loss ratio for the current accident year when no losses are going to be reported for years? I would say to those people who are consultants that it is difficult if not impossible for an outside actuary to walk into a reinsurance company without first reviewing the pricing of the reinsurance product because you have absolutely no idea where to start. You're reserving to an expected loss ratio.

I also liken this to the pay-me-now or pay-me-later approach when I deal with my underwriters. If I price a treaty, and let's say it's going to produce a 120% loss ratio, they either have to convince me that it's not or we're going to throw that piece of business into the reserve test at a 120% loss ratio as a starting point. So we're going to catch you one way or another, between pricing and reserving. Those two functions have to be linked.

I also tell my auditors, you should be able to go to my pricing files, walk over to the reserving files, and see a connection between the two.

A couple of last comments. I listened today at the General Session and somebody was saying, "inadequate reserves is a cause of insolvency." I take extreme exception to that, because it's inadequate pricing that is the cause of the insolvency. It's the inadequate reserve that just delays the recognition of the problem. To think that reserving alone will prevent insolvency is absolutely wrong. It's the inadequate pricing side of the house that causes all the insolvencies, other than fraud.

So once again, you have to tie the two pieces together. And the last story on this, before moving along...I received a submission recently where the ceding company wanted us to reinsure them on a quota share basis. And they shared their reserving philosophy. It turned out they were assuming it was 65% loss ratio business and then they did some kind of Bornhuetter-Ferguson approach. Then they supplied their latest rate review that says that they needed a 40% rate increase, but they were only going to take ten. And here you're stuck. You're reserving it at 65 and you need a 30% rate level increase. Something is wrong.

Okay. Quickly, the reserving methods are pretty standard. (See RAG Slide 2) They are less sophisticated than what primary companies can do and it's just loss development and paid development factors. Take your reported losses and just multiply them by factors.

Another thing that we look at is how much IBNR the industry is carrying as a function of earned premium. We stratify the data by accident year and by line, and calculate IBNR to earned premium factors, which you then apply to your own business. This gives you an extra view of what your company's reserves would be if it was reserved at an industry level based upon annual statement information.

But more importantly, you should split out the large accounts and reserve them separately using information that you pull from the pricing files.

I wanted to go quickly through a Bornhuetter-Ferguson because we all talk of it and this is the second to the last page in the handout. (See RAG Slide 5) And basically what the Bornhuetter-Ferguson approach does is let me start off with a first guess at what I think the loss ratio is going to be and I'll talk later on about where these first guesses should come from, but basically it's called the initial expected loss ratio and you plug this first guess in. And you just do the simple math to come up with the initial expected losses, which is the premium times the loss ratio.

The next piece is how much of the losses on a percentage basis do I expect to be reported at the particular point in time I'm working at it? These percentages are equal to one over the loss development factors to ultimate. That's the amount of ultimate loss you would expect to see reported to you at this point in time and, therefore, the complement is the amount you expect to see unreported.

So then you go through and you say, okay, here are the total losses I expected. How much is then expected to be reported to me today? This is just this column times that column and you compare it to what is actually in the door.

And then you use the unreported percentages to come up with unreported losses and those are basically your IBNR. That's the IBNR you would carry.

What I'll talk about later is where these loss ratios come from and why you should compare expected versus actual reported loss. But I provide this for people who are unfamiliar with the Bornhuetter-Ferguson technique.

Okay. Another topic...say you just had to organize the data at a small reinsurance company. (See RAG Slide 3) The first issue to think about is accident year versus underwriting year. An underwriting year for a reinsurer is similar to policy year for a primary company, only it's more stretched out. Underwriting year '91 represents all treaties written with an effective date somewhere in 1991. The problem is that a treaty written at the end of 1991 could itself reinsure things on a policy year basis and, literally, exposure goes through 1993. An underwriting year can represent three years on a calendar. So as a result, it takes you much longer to see the results on an underwriting year basis, accurately or with some confidence, than it does for an accident year. But on the other hand, the accident year has a problem of the premiums being reported late. They are booked over several calendar years. The losses don't match up with the premium. Each has its advantages and disadvantages.

Next is the lines of businesses you want to analyze and I keep it real simple, GL, comp, auto, med mal and property. But you do want to split the lines into, what I would call, "type of business." And the basic distinction is excess-of-loss versus quota share or pro rata. You also want to pull out, if you have the time, business that has large, what we call, "inner-aggregate deductibles." These are basically treaties with large retentions that further delay the reporting of losses to reinsurers.

And with respect to pro rata business, I point out that the annual statement uses a definition which is inappropriate. The annual statement says, consider all proportional business, book it to GL, auto, medical mal, as the case may be, and your non-proportional business book to lines 30 a, b and c, which are the reinsurance lines. But what happens if it's a quota share of an umbrella book of business? The annual statement calls that proportional. You throw it into GL and it really is excess of loss. So you really have to keep a slightly different split of the reserving information from the annual statement. And then at the end of the year, try to figure out how to fill out your annual statement correctly. But the way you analyze the data shouldn't be the way the annual statement is filled out.

The last thing I would mention is you may want to analyze by layer if you are looking at your excess of loss business. I think of it as the low layer or high layer, under the first million dollars, more than a million dollars.

And the last thing would be to get control of the data. I feel a small company has an amazing advantage over a big company with respect to data processing (and the data processing area reports to me in mine), in that the amount of data to be manipulated is less, and actuaries can do it themselves. Your data processing area is there to process information, create databases. Once those databases are created, now with PCs, we can analyze them. I don't think I could do that at a big company. Literally every month I have every transaction on losses, premiums, and all the contracts we have on a PC, one way or the other, and using easy software can write all the reports I ever need. I think that is the major advantage of a small company over a big company. But it requires is the actuary who wants to get his or her hands dirty. If you want to be an actuary where the data is somehow delivered to you in final format, created by programmers, you'll wait forever. If all you say is give me the data, I'll figure out how to handle it, I think you'll have a big advantage.

Okay. Other reserving tips. The first one, and the most important thing that people should come away with from my portion of this session, is you've got to keep track of pricing levels over time. If you don't know if your rates are up, if you don't know if your rates are down, if you can't say approximately how much, then you can't reserve nor can you stay in business very long and know if you're making money on your business. It's not easy. I keep track of our facultative business separately from the treaty. When we come up with a budget loss ratio for the next year, I literally go through 20, 30 treaties and, based upon the pricing information, attach a loss ratio there to them and add them up. And every time we price a large treaty for renewal, we go back and reprice the old years so we have a better idea of what we thought of the '86 year and the '87 year and so on. You're constantly going back and trying to keep track of pricing and loss ratios by contract or group of business.

We developed monthly numbers that say how much loss do I expect to be reported in a month, which I then compare to what actually came in in the month. It allows you to test whether the loss development patterns that you're using conform with the way the losses are actually coming in. But it also allows me to do my reserve test one month before the end of every quarter. I have enough time to do the analysis. One shouldn't do the year end reserve test on the year end data, because you don't have enough time. But then you just look at what came in in the month of December and if the two are close you feel fairly comfortable with the ultimate loss ratios you were using. So this is a technique to buy some time to get your reserve test done a month before the close of every quarter.

And the last thing that we do is look through the annual statements and prepare some summary exhibits that compare ourselves to other reinsurers. What is our IBNR level compared to theirs with suitable adjustments for mix of business? Why do we seem to have more outstanding case reserves than they do, which is a plus? Why is our loss ratio higher than theirs? Those kinds of things. That's something you have to do just to make sure that you're in the ball park when you're a small company.

Okay. I'd like to go back to the Bornhuetter-Ferguson technique. It's the technique I think most reinsurers ultimately go with, mainly because it's a mix of the responsiveness of loss development factors with the stability of just picking a loss ratio and sticking with it. The problem you have with a loss development factor approach to reserving is that the numbers just bounce around because the loss development factors are very large.

What goes into that is the initial expected loss ratio. And with that you have to be realistic. And that's the first thing. And my story on that was I reviewed a book of a syndicate on the New York Insurance Exchange. The New York Insurance Exchange didn't do well during '83 - '84. It's a well known fact. Their initial expected loss ratio for that business for those years was a 65% loss ratio. They never changed. Clearly wrong. There's no way, at this point in time, you can expect that that year is going to be 65% as a starting point.

The other thing is to be consistent between accident years. Your '86 loss ratio better be your best one and they probably should be getting higher as '87, '88, '89 and '90 roll around. That's just the way the cycle is going. You have to be consistent and realistic with your initial expected loss ratios.

A couple of last points I would make here. The first part of the last slide (See RAG Slide 6), is an example of somebody who is picking initial expected loss ratios inconsistently. If they think rates have been going down at 10% per year but losses have been trending upward at 10% per year, their loss ratio should be going up at about 20% a year. These initial expected loss ratios don't reflect it. They are fooling themselves by picking overly optimistic loss ratios for 1990.

On the other hand, the second part shows a case where people have built those assumptions into their initial expected loss ratio. These are going up at the 20% a year, roughly, but they've started them at the wrong place.

The other thing you have to look at when you use a Bornhuetter-Ferguson technique, is whether the expected reported losses versus the actual reported losses seem in line. Now this is a highly stylized one, but the number I always look at is the grand total. I mean, when in total the expected reported losses are 30% under the actual, I know something is wrong with the expected loss ratio. This is the area where people go wrong in reserving and reinsurance. They say, oh, the business must have been profitable to start with and even though we've cut the rate, the loss ratio still must be good. This is what will throw the reserves off the most.

I'd just like to close with comments for the primary companies in the audience who, I think, now have the problem of, in effect, coming up with their ceded reserves because they have to certify assumed and net reserve figures on the annual statement. To do it well you need to learn something about the basic techniques of reinsurance pricing. You can't do the reserving without the pricing and you need to understand the exposure methods of rating and the experience methods of rating. I would suggest that as an annual exercise you try to price what the treaties which reinsure your company should cost and compare it to what you are actually charged. You need to do that because you need to come up with some kind of loss ratio for that business as a starting point. You should also do it because you want to know if your reinsurers are making too much money (or not enough and they'll eventually come back and complain).

As a primary company, you have certain advantages over the reinsurers. You have more information that you can use to price the reinsurance you purchase than what you give the reinsurers. It's just a fact of life of the broker market. We don't quite get as much information as we like and there is some resistance to that.

Every quarter, we at Trenwick, literally look at all our individual retrocessional treaties (we have about four per year that we use), so you have multiple years of it, and come up with indications between the loss development approach, a Bornhuetter-Ferguson approach, and then we look at that and say even that doesn't necessarily make sense, so we ultimately select a best guess by treaty and we use that to generate our ceded reserves. We also need it to get letters of credit from non-authorized reinsurers. There's a whole host of reasons why ceding companies should be analyzing their treaties and the IBNR needed on those treaties.

That's it.

MR. WELLER: Thank you very much, Bob. Well, we are now open for questions. You can ask about what the panelists spoke about or you can ask about what you are interested in that we didn't speak about.

MS. TILLER: Can I make a point?

MR. WELLER: Go ahead, and Doug has a question.

MS. TILLER: I want to make a point about the Bornhuetter-Ferguson. I agree that expected loss ratios are usually the problem, but it could also be a problem that your development pattern is not correct. Or to make it even worse, it could be both. So don't solely focus on the expected loss ratios.

MR. WELLER: And it could be either the premium development pattern or the reported loss development pattern.

MS. TILLER: Right.

MR. WELLER: Okay. Doug?

QUESTION: Doug Haseltine is my name. I didn't hear any comments about claim file audits, which sometimes are used for smaller companies where the values on claim files may not represent realistic values. Could anybody comment on that?

MR. NICHOLS: I'll take that. I didn't mention that specifically, but that goes along with the idea of getting to know the book of business better. It's not enough that you have to know the products that people are selling, who they're selling it to, what kinds of business you're in. At a small company, you can get down to individual claim files. You can look at the procedures in the files. You can look at the philosophy of the claim department; often, that's written down. You can talk to the people that handle claims: the adjusters, the examiners, the management. That's a lot easier in a small company and thanks for pointing that out, Doug. That is a very good procedure.

MS. TILLER: I want to add something. There are actually some small companies that don't set case reserves. And so then you have a big problem, but I agree that if they do set them that auditing their accuracy is critical.

MR. WELLER: Second question?

QUESTION: Marty Kelly from Balis and Company, a reinsurance brokage firm. Question for Bob Giambo. Correct me if I'm wrong, Bob, but I think you mentioned that the use of RAA data was appropriate for a small reinsurer. What if we turn the tables around on that - is RAA data appropriate for a small ceding company?

MR. GIAMBO: I guess I would say the RAA data is as appropriate for a large reinsurer as a small reinsurer. We can argue whether it is appropriate for either of those. My point is that a small reinsurer participating on the same types of treaties, just with smaller participations, should see the same kind of loss development that the larger reinsurer participating on those treaties should see.

In so far that the RAA data, particularly for general liability is a mix of D&O, lawyers, professional, management, like there's no such thing as plain GL anymore, but general liability and products...it's hard to say that those factors unadjusted, upward or downward, for the particular book of business you're using, is right. A ceding company with a primary company might consider that, at least to come up with some idea of the tail.

But on the other hand, at least they have some of their own experience. I mean, what the reinsurers all face is an additional lag between the time the primary company knows about a loss and they're told about it and that can be a very significant amount of time in and of itself.

The RAA of and by itself would be too long. It would be too long of a tail, but you'd have to guess how much too long it would be for a primary company.

MR. WELLER: Any comments? Third question? Going once, going twice...okay. You have three minutes to get to lunch - those near the back of the room, save some tables!

RSN 1

SLIDE 1

A SMALL COMPANY IS NOT A LITTLE BIG COMPANY

* SMALL COMPANY RESOURCES ARE SMALLER THAN THEIR RELATIVE SIZE
* SMALL COMPANIES ARE SUBJECT TO GREATER RATES OF CHANGE
* SMALL COMPANIES CAN ADAPT FASTER TO A CHANGING BUSINESS CLIMATE
* SMALL COMPANIES CAN TOLERATE A HIGHER LEVEL OF DISORDER

RSN 2

SLIDE 2

SOME DIFFERENCES AMONG LOSS RESERVISTS IN SMALL AND LARGE COMPANIES

* HIGHER PRIORITY ON MEASURING COSTS AND ON DEVELOPING PRODUCTS
* LESS CONCENTRATION ON SPECIALIZED RESERVE AREAS
* MORE FOCUS ON THE BOOK OF BUSINESS
* MORE HANDS ON DEVELOPMENT OF ACTUARIAL DATA

RSN 3

SLIDE 3

SMALL COMPANY ACTUARIES ARE MORE LIKELY TO USE EXPOSURE BASED MODELS

- * TYPES OF RESERVE MODELS

  GROSSING UP

  LOSS DEVELOPMENT

  BORNHUETTER/FERGUSON

  EXPOSURE BASED

- * EXPOSURE BASED MODELS HELP TRANSLATE UNDERWRITING/MARKETING ACTIONS INTO FINANCIAL RESULTS

RSN 4

SLIDE 4

EVEN'S PARALLELOGRAM

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             |                   |                    |
             |SSS SSS SSS SSS    | SSS SSS SSS SSS    |SSS SSS SSS SSS
             |                   |                    |
WWW      EEE|EEE                 |                    |
WWW          |EEE EEE            |                    |
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WWW          |            EEE    | EEE                |
WWW          |                   | EEE EEE            |
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SLIDE 5

AUTO LIABILITY

ACCIDENT YEAR @ 12/31/92	1989
Earned Exposures	164
Earned Premium	$90,899
Expected Incurred Losses	$45,025
Expected Loss Ratio	49.5%
Expected Paid Losses	$38,388
Expected Loss Reserves	$6,637

		1st Qtr 1989	2nd Qtr 1989	3rd Qtr 1989	4th Qtr 1989
Earned Exposures		8	23	48	86
Earned Premium		$4,156	$12,066	$25,473	$49,204
Expected Incurred Losses		$1,993	$5,953	$12,928	$24,150
Written period					
4th Qtr 1988					
Cars	6.0	1.50			
Exposure growth	30040.8%				
Premiums	$1,609	$804			
Rate increase	0.0%				
Losses	$761	$386			
Loss inflation	12.0%				
Pure Premium	$254	$257			
1st Qtr 1989					
Cars	25.0	6.25	6.25		
Exposure growth	4469.8%				
Premiums	$6,703	$3,352	$3,352		
Rate increase	0.0%				
Losses	$3,261	$1,607	$1,654		
Loss inflation	12.0%				
Pure Premium	$261	$257	$265		
2nd Qtr 1989					
Cars	65.0		16.25	16.25	
Exposure growth	1267.7%				
Premiums	$17,429		$8,715	$8,715	
Rate increase	0.0%				
Losses	$8,722		$4,299	$4,423	
Loss inflation	12.0%				
Pure Premium	$268		$265	$272	
3rd Qtr 1989					
Cars	125			31.25	31.25
Exposure growth	859.5%				
Premiums	$33,517			$16,759	$16,759
Rate increase	10.0%				
Losses	$17,256			$8,506	$8,750
Loss inflation	12.0%				
Pure Premium	$276			$272	$280
4th Qtr 1989					
Cars	220				55.00
Exposure growth	540.6%				
Premiums	$64,890				$32,445
Rate increase	0.0%				
Losses	$31,243				$15,400
Loss inflation	12.0%				
Pure Premium	$284				$280
1st Qtr 1990					
Cars	350				
Exposure growth	445.9%				
Premiums	$103,234				
Rate increase	0.0%				
Losses	$51,132				
Loss inflation	12.0%				
Pure Premium	$292				

Loss Reserving for Small Companies

I. What is a small company?

- May have large premium volume with few claims.
- May have nationwide exposures with few claims.
- May have majority of one type of business with few claims.
- Don't forget "self-insureds" and pools.
- Key is few claims a year, not usual measures of size.

II. Exposure

A. Actual Premium as Exposure Base

B. "Manual" Premium as Exposure Base

C. Rating Base as Exposure Base

III. Mixed Distributions

A. May have more than one claim size distribution operating.

- Understand underlying exposures.
- Consider individual insureds.
- Look at claims by size.
- Look at claim details.

B. Example

Professional and General Liability

Claims Less Than $100,000 at 10/31/90 Excluding OB/GYN Related Claims

Accident Period	Reported Claims With Losses	Reported Losses
(1)	(2)	(3)
11/1/75-76	7	35
11/1/76-77	4	80,823
11/1/77-78	2	54,553
11/1/78-79	1	500
11/1/79-80	4	22,763
11/1/80-81	2	19,490
11/1/81-82	4	9,508
11/1/82-83	4	136,753
11/1/83-84	5	22,906
11/1/84-85	5	104,177
11/1/85-86	4	48,662
11/1/86-3/31/87	0	0
4/1-10/31/87	0	0
11/1/87-88	2	35,001
11/1/88-12/31/89	0	0
1990	6	42,911
Total	50	578,082

223

MWT 5

Professional and General Liability

Claims Greater Than $100,000 at 10/31/90
Excluding OB/GYN Related Claims

Accident Period	Closed Claims With Losses	Reported Claims With Losses	Paid Losses	Reported Losses
(1)	(2)	(3)	(4)	(5)
11/1/75-76	0	0	0	0
11/1/76-77	0	0	0	0
11/1/77-78	1	1	990,415	990,415
11/1/78-79	2	2	826,556	826,556
11/1/79-80	2	2	738,085	738,085
11/1/80-81	1	1	510,749	510,749
11/1/81-82	2	2	977,488	977,488
11/1/82-83	0	1	0	105,000
11/1/83-84	2	2	287,867	287,867
11/1/84-85	0	0	0	0
11/1/85-86	0	0	0	0
11/1/86-3/31/87	0	1	270,000	290,000
4/1-10/31/87	0	0	0	0
11/1/87-88	0	0	0	0
11/1/88-12/31/89	0	0	0	0
1990	0	0	0	0
Total	10	12	4,601,160	4,726,160

MWT 6

Professional and General Liability

OB/GYN Related Claims at 10/31/90

Accident Period	Closed Claims With Losses	Reported Claims With Losses	Paid Losses	Reported Losses
(1)	(2)	(3)	(4)	(5)
11/1/75-76	0	0	0	0
11/1/76-77	1	1	770,893	770,983
11/1/77-78	1	1	6,673	6,673
11/1/78-79	1	1	12,858	12,858
11/1/79-80	0	0	0	0
11/1/80-81	2	2	20,588	20,588
11/1/81-82	4	4	1,523,099	1,523,099
11/1/82-83	1	1	26,013	26,013
11/1/83-84	2	2	23,446	23,446
11/1/84-85	2	2	3,543,331	3,543,331
11/1/85-86	2	4	1,642,727	5,322,712
11/1/86-3/31/87	0	0	0	0
4/1-10/31/87	0	0	0	0
11/1/87-88	0	1	0	1
11/1/88-12/31/89	0	2	6,980	26,500
1990	2	2	1,051	1,051
Total	18	23	7,577,659	11,277,255

C. Estimation Method

1. Estimate total number of claims with loss.

2. Estimate "special" claims as a function of the total number of claims with loss or based on other criteria.

3. Estimate ultimate losses for each separate distribution.

4. Put together a table summarizing results.

5. Check for reasonability.

Professional Liability

Summary of Projected Ultimate Claims and Losses

Projected Ultimate Claims With Losses

Policy Period	<$100,000	$100,000 to $1,000,000	>$1,000,000	Total
(1)	(2)	(3)	(4)	(5)
7/1/84–85	58.0	1.0	0.0	59.0
7/1/85–86	38.0	2.0	1.0	41.0
7/1/86–87	52.0	1.0	0.0	53.0
7/1/87–4/30/88	46.0	1.0	1.0	48.0
5/1/88–89	58.0	2.0	1.0	61.0
5/1/89–90	55.0	2.0	1.0	58.0
5/1/90–91	59.0	3.0	1.0	63.0
5/1/91–92	63.0	3.0	1.0	67.0
Total	429.0	15.0	6.0	450.0

Projected Ultimate Losses

Policy Period	<$100,000	$100,000 to $1,000,000	>$1,000,000	Total
(1)	(6)	(7)	(8)	(9)
7/1/84–85	303,604	985,617	0	1,289,221
7/1/85–86	550,373	453,909	1,046,362	2,050,644
7/1/86–87	522,367	457,522	0	979,889
7/1/87–4/30/88	581,234	152,375	3,285,077	4,018,686
5/1/88–89	550,362	475,000	1,025,000	2,050,362
5/1/89–90	957,132	525,000	1,050,000	2,532,132
5/1/90–91	975,871	1,125,000	1,075,000	3,175,871
5/1/91–92	1,590,859	1,200,000	1,100,000	3,890,859
Total	6,031,802	5,374,423	8,581,439	19,987,664

Reserving Differences for Small Reinsurers vs Small Primary Companies:

* The length of the tail
* Lines of business less well-defined
* Concentration of larger treaties
* Lack of standardization

Sources of Industry XOL Data

* RAA Loss Development Study
* ISO
* Best's Casualty Loss Reserve Development
* Company Annual Statement's
* Treaty Submissions
* Consultants

RESERVING PHILOSOPHY

"Reinsurance reserving is just reinsurance pricing after the fact."

Reserving Methods

* Loss Development and Paid Development Factors
* Bornhuetter-Ferguson - Incurred and Paid
* IBNR / Earned Premium
* Reserve Large Accounts separately

Data Organization Issues

* Accident Year vs Underwriting Year
* Line of Business Groupings
* Type of Business
* Layers
* Get control of the underlying data

<u>Other Reserving Tips</u>

* Keep Track of Pricing Levels over Time
* Develop Expected Monthly Reported Losses and Monthly Paid Losses
* Compare with other reinsurers

SETTING INITIAL EXPECTED LOSS RATIOS IN A BORNHUETTER-FERGUSON

* Be realistic
* Be consistent
* Compare Expected vs Actual
* Use pricing information

SAMPLE BORNHUETTER-FERGUSON REVIEW
GENERAL LIABILITY - EXCESS OF LOSS

ACCIDENT YEAR	EARNED PREMIUM	INITIAL EXPECTED LOSS RATIO	INITIAL EXPECTED LOSSES	EXPECTED PERCENTAGE REPORTED	EXPECTED PERCENTAGE UNREPORTED
1984	335	280.0%	938	60.71%	39.29%
1985	2,272	85.0%	1,931	55.22%	44.78%
1986	6,404	50.0%	3,202	48.90%	51.10%
1987	16,819	60.0%	10,091	41.10%	58.90%
1988	26,612	67.0%	17,830	32.27%	67.73%
1989	26,368	71.0%	18,721	19.17%	80.83%
1990	22,343	78.0%	17,428	8.68%	91.32%
TOTAL	101,153	69.3%	70,141		

ACCIDENT YEAR	EXPECTED REPORTED LOSSES	ACTUAL REPORTED LOSSES 05/31/91	EXPECTED UNREPORTED LOSSES	ESTIMATED ULTIMATE LOSSES	ESTIMATED ULTIMATE LOSS RATIO
1984	569	253	369	622	185.7%
1985	1,066	1,785	865	2,650	116.6%
1986	1,566	538	1,636	2,174	33.9%
1987	4,148	2,796	5,944	8,740	52.0%
1988	5,754	5,112	12,076	17,188	64.6%
1989	3,589	3,927	15,132	19,059	72.3%
1990	1,513	1,552	15,915	17,467	78.2%
TOTAL	18,205	15,963	51,937	67,900	67.1%

EXAMPLES OF POTENTIALLY IMPROPER IELRS

INCONSTISTENT IELR'S

ACCIDENT YEAR	IELRS	SCENARIO
1986	50.0%	Rates since 1986 have declined 10% per year and loss inflation is 10% year
1987	55.0%	
1988	60.0%	
1989	65.0%	
1990	70.0%	

CONSISTENT IELRS BUT OVERALL LEVEL UNREALISTIC

ACCIDENT YEAR	IELRS	EXPECTED REPORTED	ACTUAL REPORTED
1986	30.0%	1,821	2,765
1987	36.7%	2,025	3,044
1988	44.8%	2,192	3,292
1989	54.8%	2,251	3,328
1990	66.9%	2,160	3,189
		10,449	15,619

1991 CASUALTY LOSS RESERVE SEMINAR

2G: REFLECTING UNCERTAINTY IN LOSS RESERVES

Moderator

Neil A. Bethel
Tillinghast/Towers Perrin

Panel

Robert P. Butsic
Fireman's Fund Insurance Companies

Robin A. Harbage
Progressive Corporation

MR. BETHEL: Good morning. This is Session 2G: Reflecting Uncertainty in Loss Reserves. My name is Neil Bethel. I'm with Tillinghast in Los Angeles.

We have two panelists today. Our first speaker will be Bob Butsic. Bob is an Assistant Actuary with Fireman's Fund. He's an Associate of the Society of Actuaries, and a Member of the American Academy. He has a BA and an MBA from the University of Chicago. His duties at the Fund include forecasting and actuarial finance.

His talk will describe an approach to reserve uncertainty, which results in a risk margin provision through an adjustment to the discounting interest rate.

Our second speaker is Robin Harbage, who is a Corporate Actuary with Progressive Corporation. He is an Associate of the Casualty Actuarial Society and a Member of the American Academy. He has a BA from the College of Wooster and an MBA from Ohio State. His duties at Progressive include loss reserving and reinsurance.

Robin will discuss a modeling method to measure uncertainty. He said that a variation on this method has been in use at Progressive for about 14 years. Incidentally, this method is not used in the context of discounting.

Our topic is reflecting uncertainty in loss reserves. What gives this topic a sense of urgency, I think, is the increase in attention over the last few months to loss reserve discounting. Many believe, as I do, that these two issues are very closely linked.

There have been two discounting documents released in the last year that also relate to risk margins. The first is the Actuarial Standards Board exposure draft on discounting of loss reserves. There is a hearing on that exposure draft this Wednesday.

The second document is the FASB discussion memorandum on present value. With apologies to Wayne Upton of FASB, who has a session on this Tuesday morning, I'm going to take a little bit of time to go into this document as it relates to our topic of risk margins, but only briefly.

Before I discuss the FASB document, there are two other things. The Committee on Reserves, of which I am Chairman, has a research RFP pending on the topic of recognizing risk margins in financial reporting. The CAS Committee on the Theory of Risk also has a prize paper program on confidence intervals in loss reserves. The product of these two research projects will be available some time in late '92 or early '93, so there are some things coming down the pipeline on this topic.

The FASB document talks about both assets and liabilities and how to measure or reflect assets and liabilities. I'm just going to concentrate on the measurement of liabilities and specifically loss reserves. The document discusses two methods to measure liabilities: a direct measurement, a measurement that uses current assumptions and current information; and an accounting allocation, a method that uses the original booked amount and changes to that original booked amount. This would be like amortizing bonds, depreciation of real estate and so on.

In general, I feel that loss reserves should use direct measurement, but I think you could imagine a risk margin technique that might establish some kind of initial risk margin value and bring that down over time without a reflection of current information.

The FASB document describes five alternative ways of measuring assets and liabilities: Historical cost; current cost; current market value, which would be the amount that you would have to pay to settle the liability immediately; net realizable or settlement value, the nondiscounted amount needed to settle the liability, and this would be the equivalent of what statutory accounting generally treats loss reserve liabilities as today; and, finally, the present value of future cash flows.

Now, the FASB document says that accountants prefer cost or market value measurements over settlement value or present value, partly because they don't want to try to estimate future costs. But if we agree that for loss reserves, market values are not generally available, and we're left with the last two alternative measurement techniques, how do we choose between a settlement value and a present value?

Well, if present value is to be used, what objective does it serve? The first objective discussed was to reflect a discount amount, to reflect the time value of money. A more interesting objective, I think, is to use present value as a measurement surrogate; in this case, a measurement surrogate for market value.

The FASB document lists four criteria to help decide whether to use present value. First, observable marketplace values are not available. I think we would agree that's generally the case with loss reserves. Second, present value must be measurable with reliability. I think that's probably the key question, and we'll talk a little bit more about what reliability means.

Third, the increased cost is justified by better financial information. I think that's an individual judgment at this point. Fourth, present value serves the measurement objective. In other words, does present value serve as a good measurement surrogate for market value?

Another question: Should present value measurements be adjusted to reflect risk in timing or amount? I finally got "risk" on a slide, so you know you're in the right session. If present value is to be the measurement surrogate for market value, then we believe it must be adjusted for risk because the market value would capture a judgment about those risks. Again, the question is: Is risk reliably measurable?

Let's look at the definition of reliability. The FASB document says that reliability means the quality of information that assures that information is reasonably free from error and bias and faithfully represents what it purports to represent. You can judge, as you listen to Bob and Robin, whether the methods that they're talking about meet that criteria.

Another interesting statement in the section on reliability: FASB says an estimate that properly portrays economic events is reliable even though it requires considerable approximation. I think we can all agree that calculating present value and calculating risk margin requires considerable approximation. The question is whether it portrays economic events properly.

If there is to be discounting, what interest rates should be used? The FASB document lists five different alternatives: a risk free rate; an incremental or average transaction rate, which would be like a current investment or a borrowing rate; a liability settlement rate -- this is probably the most interesting, a rate that equates settlement price with future cash flows; and a final alternative, a rate that associates specific assets and liabilities, something like a portfolio rate.

Recently, the American Academy of Actuaries Committee on Property and Liability Financial Reporting put together a response to the FASB exposure draft and in that response, the American Academy suggested that a risk adjusted interest rate be used, in other words, a risk-free rate that is adjusted for risk if bonds are carried at market value. If bonds are carried at amortized cost -- the current approach, of course -- the risk adjusted interest rate should be further adjusted to reflect the earning rate on the bond portfolio.

Since that American Academy of Actuaries' response mentioned specifically Bob Butsic's work in the area of adjusting interest rate, I think this is a good lead-in to Bob's presentation.

CAS LOSS RESERVE SEMINAR

September 23, 1991

Risk Margins and Discounted Reserves: *Valuing Uncertain Liabilities*

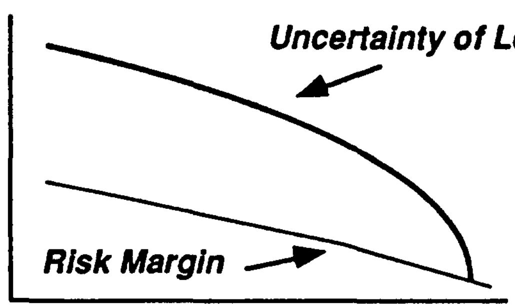
Robert P. Butsic

- **Purpose of Evaluation**
  - ➡ Economic (market exchange): what is company worth?
  - ➡ Statutory/GAAP (accounting requirements)
  - ➡ Tax (necessary evil)

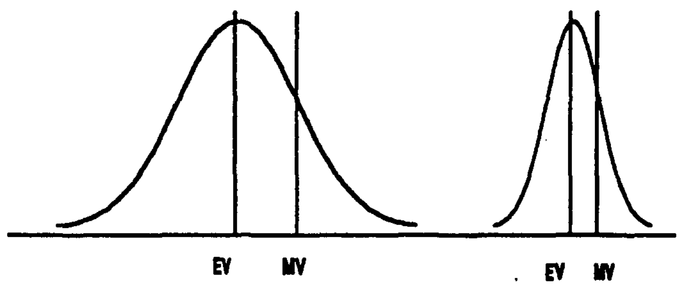
- **Economic Value Model**
  - ➡ Balance sheet components have separate values
  - ➡ Addition of franchise value (goodwill)
  - ➡ Economic Value = market value of (Assets - Liabilities)
    + Present Value of (Future Profits)

- **Basic Problem**
  - ➡ Determine market value of
    - Uncertain Liability
    - Paid in the future
  - ➡ For no risk, MV(Loss) =
    Loss / $(1+i)^n$ = PV(Loss)
  - ➡ Interest (i) is riskless;
    certain loss example

- **Risk Margins**
  - ➡ With uncertainty, we need a risk provision:
  - ➡ MV(Loss) = PV(Loss)
    + Risk Margin
  - ➡ RM declines through time:



- **Risk Margins**
  - ➡ Size of RM related to loss uncertainty:



  - ➡ RM influenced by time:
    PV operation reduces spread of loss values; Example:

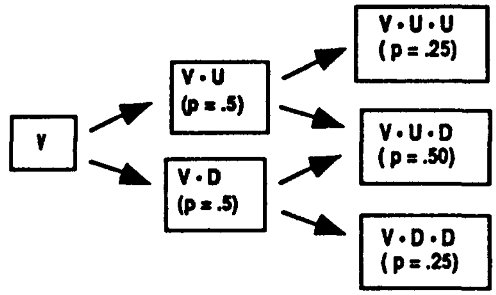
Two equally likely loss values:	Loss paid in 9 years
90 or 120;	(8% interest)
Std Dev = 15	PV Loss = 45 or 60
	Std Dev = 7.5

- **Defining Uncertainty**
  - ➡ Specific risk
    Highest at individual claim level
    Important for solvency
  - ➡ Systematic risk
    Key to valuation
    Commands market price

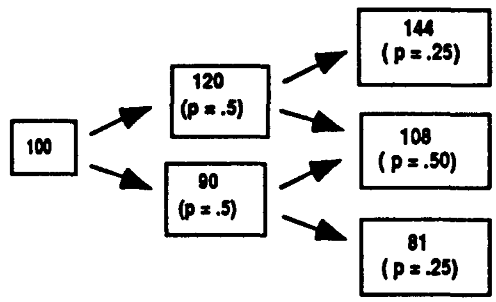
- **Reinsurance Model**
  - ➡ Determines Market Value of a Liability via reinsurance trade
  - ➡ Risk requires capital; return on capital related to amount of risk
  - ➡ Remove investment risk from picture
  - ➡ Numerical example (see Exhibit)
    - Cede risky reserve
    - Reinsurer's profit for bearing risk
  - ➡ Risk margin built into interest rate (3% in example)
    RM = 100 - 105/1.08 = \$2.78

- **Structural Approach**
  - ➡ Define how claim uncertainty is resolved through time
  - ➡ Binomial lattice (used in finance and physics to model diffusion processes):
  - ➡ Each period, new information moves MV:
    up (U) if info is adverse
    down (D) if info is favorable
  - ➡ For one period:
    Mean = .5(U + D)
    Std. Dev. = .5(U - D)
  - ➡ When loss is paid, MV distribution = dist of paid amounts

- **Illustration:**
  - ➡ Tree structure can be extended indefinitely
  - ➡ Continuous process can be developed using smaller intervals
  - ➡ Continuous version using rate of change in MV is *Lognormal Distribution*



- **Numerical example:**
  - ➡ Two periods, constant info flow
    i = .08
    U = 1.2 D = 0.9
    Mean = 1.05
    Std. Dev. = .15



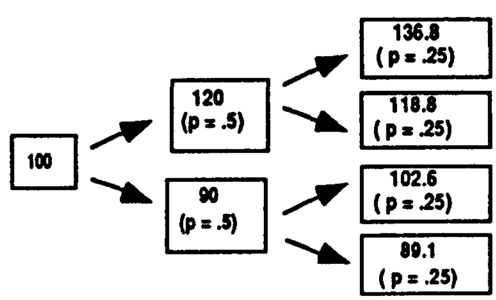
- Example shows constant risk reduction:

Time	0	1	2
EV(MV)	100.00	105.00	110.25
% Change		5%	5%
EV[PV(Loss)]	94.52	102.08	110.25
A: EV(RM)	5.48	2.92	0
B: SD[PV(Loss)]	19.19	13.89	0
A/B	.285	.200	
Prior RM x (1.08)		5.92	3.15
C: Change in RM from risk release		3.00	3.15
C / (Prior MV)		3%	3%

- **Note that:**
  - ➡ SD(Loss) is reduced through time
  - ➡ RM is related to SD(Loss); also reduced through time
  - ➡ Expected change in MV is same as reinsurance example
  - ➡ RM changes uniformly
  - ➡ Change in RM equals Risk Adjustment

- **Non-Uniform Uncertainty Resolution**
  - ➡ U, D different for Period 2; Numerical example:

i = .08
U_2 = 1.14 D_2 = 0.99
Mean = 1.065
Std. Dev. = .075



- **Declining Risk Example**
  - ➡ Shows Period 2 change in RM proportional to remaining risk:

Time	0	1	2
EV(MV)	100.00	105.00	111.83
% Change		5%	6.5%
EV[PV(Loss)]	95.87	103.54	111.83
A: EV(RM)	4.13	1.46	0
B: SD[PV(Loss)]	15.30	7.29	0
A/B	.270	.200	
Prior RM x (1.08)		4.46	1.58
C: Change in RM from risk release		3.00	1.58
C / (Prior MV)		3%	1.5%

- **Note that:**
  - ➡ RM at Time 1 is 1/2 as much;
  - ➡ Change in RM is 1/2 as much for 2nd period
  - ➡ RM and remaining risk at Time 0 are less:
    4.13 v. 5.48, 5.30 v. 19.19
  - ➡ MV at Time 0 is EV(Loss)/[(1.05)(1.065)]
    Corresponds to 3% and 1.5% risk adjustments

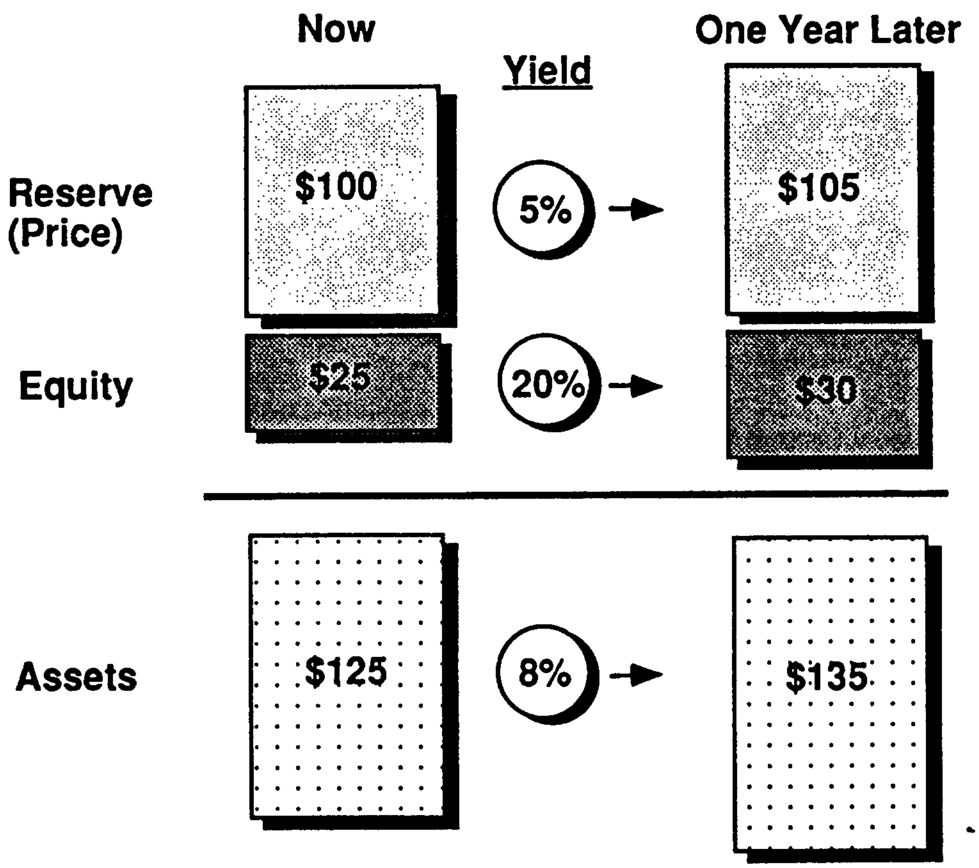
- **Practical Applications**
  - ➡ Risk margins have economic basis
    Should be included if discounted reserves are used
    Can be set directly and simply through interest rates
  - ➡ Non-uniform risk reduction:
    UPR vs. IBNR vs. case reserves
    (FF uses 1.5 / 1.2 / 0.8 ratio)
    W Comp life pension indemnity
  - ➡ Pricing: same theory
    UPR risk; forward contracts
  - ➡ Reinsurance: credit risk
    Risk adjustment is negative

- **Determining Risk Adjustments**
  - ➡ Historical industry results
    Use cash flows, actual Treasury yields
    Gives realized profit margin
  - ➡ Prospective method
    Required ROE and capital
    Reinsurance model

HOW THE RISK ADJUSTMENT WORKS: A NUMERICAL EXAMPLE

Required Equity	25%	of Discounted Reserves
Required Return on Equity	20%	Pretax
Yield Rate	8%	Riskless
Expected Paid Loss	$105	Paid One Year Later

What Price (Discounted Loss) Matches These Assumptions?



Yield Rate Relationship: 8% = [5% (100) + 20% (25)] / 125

Risk Adjustment = Profit Provision = (8% - 5%) = 3%

Formula is 3% = .25 (20% - 8%)

MR. HARBAGE: I found out about uncertainty last night on the airplane.

Why do you have uncertainty? Mr. Letterman gave me five items here that I've listed on why we have uncertainty. The fifth item because he says the process has to have uncertainty and variance in it.

Number four is the actual forecast can be right within some range. Number three, so marketing may remind you about that one time you were too high in your reserve setting. Number two, I mentioned this this morning, so we can maintain full employment, somebody is needed to predict the uncertainty.

Number one, uncertainty allows us to have fun describing events with a distribution which has both a mean and a standard deviation.

I should point out that the comments here are mine and not necessarily those of the CAS or of my company or, actually, David Letterman.

I'll be speaking about a particular model that we use within my company to predict the uncertainty in the loss reserves. It was mentioned that this is not in the context of loss discounting; however, we do discount for tax purposes. It is critical, to recognize that to discount and not have some provision for adverse development, as it is called in Canada, you are probably going to be over stating probable profit, and that could lead to trouble.

There are several goals and advantages to our modeling procedure. We try to avoid measuring parameter risk in reserve estimation. We're going to look at the process risk being just what the variance is in paid loss development that is going to occur.

It is important that the model be developed in such a way that I can explain the development of a confidence interval to our management and they can perceive and understand how uncertain our reserves are.

I want to calculate a reserve amount associated with that interval so I know how much we want to carry in addition to our best estimate if we want to have a high confidence that reserves will be adequate each year.

For statutory purposes, any reserve that I set, I have to be able to allocate into accident periods. So I need to understand how the model relates to different reserve dates or accident years.

I need a mechanism for releasing this reserve over time as the reserves become more certain. As Bob was pointing out, as time goes on, you have to recognize that the risk associated with adverse development is going down, and we want to release this reserve.

What is the procedure for doing this? The first step is to collect assorted accident period paid data. The process is relatively simple. It is a PC model based on paid loss development that can usually be run in our office in about half-an-hour. Although depending on how many variations of the model you need to run, it might take up to four hours to let the PC crank.

We develop the range for the paid data. Why paid? Because, we are trying to measure only process risk, not parameter risk.

When using the incurred data, I bring in my reserve assumptions. I might have a lot of uncertainty in the reserve setting process. I don't want to have that making the model more uncertain than it already might be just for paid data.

I assume some model for the development of the distribution. This could be uniform distribution, normal, log normal.

I simulate the loss and loss adjustment expense development. I run through a whole series of simulations on each development factor. We chose 500 simulations. Then I calculate the median standard deviation by accident year based on based on the simulation.

We select some desired probability of reserve adequacy. This is a management or subjective decision. How certain do you want to be that your reserve is going to be adequate for each given year? Finally, we calculate the required reserve associated with the selected probability of reserve adequacy.

We've been here for almost three hours and we haven't even looked at a loss development triangle yet so let's get started.

This is the development of number incurred. This is the claim count loss development by accident year. All I'm demonstrating here is that in the top portion of my loss development triangle, I have the actual historical loss development. The bottom portion is the place where my model will go through and select loss development factors based on the mean and standard deviation of the historical data and the assumed distribution.

Now, each of these cells in the model is not quite independent. I have built into the model some correlation between the columns within any accident year. The fact that the development for four to eight quarters or one year to two years may affect the subsequent development. If you have high development in one period, it may mean that you've had more paid losses and you have less expectation of future outstanding payment, so there is a correlation I've built into the model.

I do the same thing for average paid data. Then I have a frequency and I have a severity estimated distribution I can tie them together. I come up with a combination for the 500 simulations where I have number incurred by accident period, and average paid. I can come up with the ultimate losses. I do the same thing for allocated loss adjustment expenses, so I wind up with total loss and the allocated loss adjustment expense reserve estimate and what that reserve estimate has as variance.

The result of those 500 simulations looks like this. These are reserves by accident year across the columns. Resulting in estimates of all the claims still outstanding as of the end of 1990 for accident years 1982 and prior, for accident years '83 and prior, '84 and prior, et cetera. These are old reserve dates as they're currently evaluated.

What I've developed is the mean and standard deviation based on the 500 simulations. Now, as Bob suggested earlier, your standard deviation goes down as time goes on and that's to be expected. In fact, it starts out at 13 million and goes down.

Although the amount of uncertainty is going down because you have fewer and fewer claims outstanding for older accident periods, the relative amount of variance is growing for each period of time. I've calculated the relative variance by taking the standard deviation and dividing it by the mean. This is the coefficient of variation. You can see that it starts off at 3.3 percent, works its way up to 3.9, and it keeps escalating from there. That's important because you're settling the smaller claims and the smaller claims have less variability around them. You have fewer claims outstanding but they are the larger and more uncertain claims, so your relative variation does go up.

The last step in our process is to try to decide exactly what we want to have as the possibility of having adequate reserves and with this process we set up a reserve associated with this probability. In this case, we pick a 99 percent probability based on this model, that we will have adequate reserves. This is a subjective decision.

This is a one-tailed test because we only care about the probability that they are adequate and not the probability that they are inadequate.

As of the end of 1990, 7.8 percent of our carried reserves is our best estimate of the supplemental reserve required to assure total adequate reserves.

This is for one line of business. We analyze the need for our personal lines and commercial lines separately. Of course, once you've done all that, to determine total aggregate reserve, it is necessary to analyze correlations between your lines. Once the correlation between lines of business is measured we can employ portfolio theory to blend the distribution much as is done for a portfolio of stocks where the blend of stock, if less than 100% correlated, will result in less variation in the aggregate.

We may then allocate to accident periods.

What are the benefits of this procedure, if any? One, we derive estimates of the inherent risks of business types so that we know in our own minds how volatile are reserves. We derive a range around point estimates. They suffer from some subjective decisions but provide valuable information.

Number two, we analyze the risk of alternative products so that we can contrast between these.

Number three, we provide explicit recognition of confidence intervals in our reserving process. This is, I think, extremely important if you're going to discount reserves.

Four, it's a secondary check of our reserve adequacy. In the process of coming up with the distribution, we come up with a point estimate as the mean of this distribution and we can compare that with carried reserves.

Five, we match the profit recognition with the risks as claims develop so that we don't overstate our profitability for any given year and as the profitability becomes more certain, we can release that into the income.

I'll turn it over now to Neil for questions.

MR. BETHEL: Are there questions?

MR. BETHEL: Yes.

MR. MYERS: Glenn Myers, ISO. I have no real difficulty in principle with, you know, the steps that you're doing. The final step, though, of taking -- expressing the risk margin in terms of a discount rate strikes me as artificial and unnecessary.

In other words, you could just simply take your discounted loss reserve, put a risk margin in your annual statement and let it stop there. Why do you take that extra step? Neil, you might be the first one to take that one.

MR. BETHEL: The extra step of what?

MR. MYERS: Expressing the risk margin in terms of a lowered discount rate, rate of interest.

MR. BETHEL: Well, I think Bob might be better to answer this question, but if his methodology calculates that number as a product of determining an adjustment to interest rate, how it is expressed as the final step, I'm not sure you'll care, but that's the process by which you arrive at the determination of the risk margin to begin with.

MR. MYERS: What you do is you determine the risk margin first. Bob, as I understand it, that's what you do is you determine the risk margin. Then afterwards, what you do is you find, okay, what interest rate gives us this risk margin.

I can see that getting into all kinds of problems of this sort. Say, for example, suppose you're reserving different claims at different policy limits, you know. Technically, you know, the higher policy limits take longer to settle. You could be having separate interest rates for every policy limit.

Even in the example that Bob had up there, we had separate interest rates at different maturities or at different tails. Why not just simply go for the risk margin directly and then stop?

MR. BETHEL: Well, again, I think Bob should answer this. I don't think that the interest rate adjustment is being worked backwards from the risk margin. I guess that's where I would disagree with you.

MR. MYERS: Is that right, Bob?

MR. BUTSIC: Yes, his disagreement is correct. I think you have to determine the risk adjustment using some sort of estimation process. At the end of my talk, I described two different methods for doing that, and those would give you average values, perhaps, over all lines of business, or you could do it for a subset of lines of business. Once you've determined the risk adjustment, then the risk margin at any point in time can easily be determined.

MR. MYERS: That follows directly out of your diffusion process, then, the interest rate?

MR. BUTSIC: It can, yes.

MR. MYERS: Okay.

MR. GLUCK: I'm Spencer Gluck from Milliman and Robinson. I have a couple of questions for Bob but first I want to take this opportunity to recruit for the Actuarial Standards Board. Everybody -- it has been mentioned that there have been two different drafts of a discounting standard and there's a public hearing on that on Wednesday right here, so you can come and watch that.

Until that happens, we don't know how the discounting standard will resolve but everybody is very interested, if there is a discounting standard, in following it as soon as possible with a risk margin standard. Anybody who would like to serve on a subcommittee to help write the risk margin standard, please come talk to me.

Two questions for Bob. First, I guess, when you went through the tree structure, the binomial lattice process, it wasn't entirely clear to me where your expected value was -- you didn't show us, I think, how you calculated the expected value at different times, did you?

MR. BUTSIC: Not exactly. But if you take half of 1.2 and .9, you get 1.05.

MR. GLUCK: Is that right?

MR. BUTSIC: I structured the example so you would get results that equalled what you would have on a discounted process, to show that you can get to the same type of risk margin from more fundamental principles than by just discounting the payments at a low interest rate.

For most applications, I don't think it makes a difference how the risk margin is determined, but I think you'll need some very simplified rules if you're going to do this in financial reporting. This risk-adjusted interest rate may be one way to do that.

MR. GLUCK: I guess my second question relates to the last part of your presentation where you're determining the risk adjustments. I noticed certainly in the prospective method, to get to the answer, you have to have an assumption as to allocation of capital to support the underwriting business, and it wasn't clear to me. Did you similarly have to make an assumption about required allocated capital in the historical industry results approach?

MR. BUTSIC: No, because you only need to look at the present value of the industry cash flows. You can estimate what those are by looking at Schedule P and other Annual Statement data. You need to know the interest rate, which can be easily determined since it's published. Then you look at the actual combined ratio that was achieved in a line of business or the industry as a whole, and discount the reserves at an interest rate giving you the observed combined ratio.

You also have to discount the other cash flows. You discount the premiums and expenses at a riskless rate. The results are quite fascinating. I should have brought a slide on this. The profit margin or the risk adjustment is cyclical, of course, with the industry's actual results, but over longer periods of time, the average does, in fact, stabilize.

MR. ODALE: Bill Odale, W.H. Odale & Associates, Inc. This question may serve as grist for your meeting on Wednesday. I was gratified to see that on both detailed presentations, profit was connected with risk theory and the margin for deviation, the risk margin, was released as that risk went down, and taken into profit.

The question is this: While the recent literature put to rest the assertion that conservative means realistic, let me give you the background for that question. A number of years ago, in setting loss reserves, the thesis advanced was that based on a certain piece of accounting literature -- and I forget the reference -- that conservative had been defined as realistic. Therefore, loss reserves had to be, in effect, expected values.

Now, I notice in this presentation this morning, referencing both new accounting and actuarial literature, the point was made that we're interested in such things as market values which do have, as one speaker pointed out, risk in them and most, but not all, of the values mentioned in, Bob, your presentation, would have risk margin buried in them -- most, but not all.

I would like to think that we are now in a position that if somebody says we need conservatism in the reserves, that person would recognize that those reserves must contain a risk margin. I think this is true from your presentation but would like some reassurance.

MR. BUTSIC: I think you are essentially correct. Some actuaries, especially on the life side, have been using low interest rates for valuation. This conservatism does have an economic basis, although I'm not sure that was the original intent. It certainly makes great sense to value a liability as you would in a market transaction. I think that's the accounting principle that should be used in establishing the value of reserves.

Traditionally, a lot of insurance people have considered the fact, that the reserve is not discounted, as its own risk margin. I think that was probably okay when interest rates were fairly low, but I don't think it's theoretically proper. I believe there needs to be a separate reflection of risk, aside from failure to discount.

MR. BETHEL: Bob, one difference I think I noticed between your presentation and Robin's presentation, and you mentioned early on that you were talking about an economic value that would recognize risk and that that would be only parameter risk, essentially, because the economic model wouldn't provide a return, so to speak, on process risk. Robin's model is basically a model of process risk and not parameter risk.

Would you, Bob, see a different or additional risk margin process to be considered in a solvency situation as opposed to the model that you laid out?

MR. BUTSIC: Yes, and I think Robin's application is definitely appropriate for his context, which is giving management some feel for the potential variability of their own reserves. But from an external accounting basis, I don't think that because you have a small volume of reserves, that you can load a bigger risk margin and establish that as the value of your reserve. The value of the risk margin -- as a percentage of reserves -- should be independent of the scale of the reserves.

MR. HARBAGE: I agree with you. It should be independent of the size of the reserves. In the model I present, the smaller reserves are, the larger the probability you're going to have great variation in it. You get the law of large numbers working on your side as you become a bigger entity. So it's not completely independent.

MR. NASH: Nolan Nash, SCOR Reinsurance. I have to thank Bob Butsic. Every time I think there's not another interesting, challenging idea from you, you come up with another one. This diffusion process which, of course, I guess we're all guinea pigs, as you mentioned. It's something to new to most actuarial conclaves.

You didn't mention anything really at all about something that I think really can dominate the entire calculation. That is the values that you will affix to the favorable and unfavorable outcomes. Obviously, the values that are assigned to those favorable or unfavorable outcomes could easily dominate the calculations of this diffusion process.

I've been a fan of utility theory since many, many moons ago and I see some overlap there. I'd like to get you to talk about that a little bit and maybe spur your comments with something else that maybe I'll add.

A binomial process only sees two possible states of the world, favorable and unfavorable, and you may be too complicated for us already, but I can easily foresee where you might have weighted probabilities of many more states of the world and maybe to focus your thoughts on what I think dominates reinsurance an awful lot and maybe the insurance, too, is how the very small probability of an extremely catastrophic event influences behavior and even expected values that, in pricing, we calculate, may allow us to do something on an expected value basis, we never would do in taking certain earthquake accumulations or taking certain catastrophe treaties right now in the market. You see this market has just dried out. Maybe if I can throw in commentary from anyone about how small probabilities of massively disastrous occurrences affect behaviors.

MR. BUTSIC: I won't comment on everything you said, but with regard to this binomial structure, I hope I characterized it as an example. I think in order to do anything with it practically, you'd have to turn it into a continuous model, like the lognormal that I mentioned.

I believe that it has some promise and I tried to describe it just to give some ideas. It would be very difficult to use a continuous process model and describe it in a talk like this. I think it's easy to visualize the up and down movements with a discrete model.

QUESTION: Do you want to say anything about the unlikely probabilities of massive -- I think that's what really (Inaudible) risk theories, for real, in my mind, in the real world, is you see that typically quantified, that small probabilities with massively unfavorable outcomes (Inaudible)

MR. HARBAGE: I'm not sure I'm an adherent of the utility theory. Ultimately, it's the marketplace that shows the results of the individual or company's utility for these types of risks. For earthquake or other catastrophic risk, it might be fairly difficult to define what the implicit risk margins are in the pricing of these products and I particularly think that the prices are too low, given the risk, but there's no reason why you couldn't apply this procedure to using the interest rate adjustment for valuing catastrophic risks.

There is one interesting difference, though, when you're looking at catastrophic risks. If you were to sell a liability policy that's going to pay a claim, say, five years from now, or you were going to sell the liability policy right now, but the exposure wasn't going to begin until four years from now and then the loss was going to be paid a year later, so the losses are all going to be paid five years from now, I'd say the risk in those transactions is roughly equivalent. In other words, the risk is mostly because we don't know what's going to happen with inflation.

But if you take an earthquake contract, for example, you have no idea what the risk is going to be the day before you sell a policy versus maybe 100 years from when you sell a policy, so it's a slightly different process. So, there would be no risk adjustment. You just discount the expected loss for the five-year period or whatever. However, the risk margin has to be related somehow to the loss development or the expected value of the loss, so that's one interesting side light or potential application of this process.

QUESTION: Just one comment relating back to development. I take it there is a parameter -- a positive risk often valued (Inaudible) because it's diversifiable through reinsurance or large numbers operate. You get into certain realms with earthquake where a process risk isn't diversifiable even if you look at the whole world capital situation. So, I think that's where process risk has to be involved even in the marketplace, as a marketplace valuation, because it's not diversifiable for (Inaudible)

QUESTION: It goes the opposite way, as a matter of fact. You know you've got obviously a greater risk (Inaudible) all the earthquake insurance in the world (Inaudible)

QUESTION: I will add onto that that we've been doing studies with risk margins and increased interest rates. The thing that I have found is that the process risk still remains the large chunk of the pooled risk. I think your idea about how much you can diversify through the reinsurance process is probably quite a bit over stated.

MR. BUTSIC: If I may comment on that, I would say that you have to view the problem of how much risk you can actually diversify and what's the residual that you can't practically diversify. This would be the relevant risk in setting the risk margin.

QUESTION: Again, I'll have to disagree with that one, too.

MR. BETHEL: Yes, in the back?

QUESTION: I have to apologize. I got in early and I didn't get a copy of the transparencies but did I understand you to say that the economic value was the sum of the net worth and the present value of future income and, if so, haven't you double counted so that you would value a dollar invested, presumably in perpetuity, at $2, as the value of the dollar as an asset and the value of the dollar as interest rate?

MR. BUTSIC: I don't think so. The situation where you would end up double counting would be taking the present value of the investment income, let's say, from the current assets. You can't include that. You just take the value of the assets. Add to that the present value of the cash flows on the business you haven't written yet.

QUESTION: Doesn't valuation theory assume that it is the net worth of an enterprise that is, in fact, invested in generating future profits? I think you are combining a liquidation valuation and an uncertain valuation by adding them together.

MR. BUTSIC: I probably wasn't clear enough in defining what was meant by present value of future profits. It's actually the present value of the future profits on the business that you haven't yet written. I believe that, added into the present value of the assets, gives you the market value of the enterprise.

QUESTION: Now I think you're double counting the risk. If you define your net assets as being the assets less the liabilities, for those assets and liabilities not related to the business, in other words, excess net worth or surplus surplus, as they used to call them in the old days, than by the combination? If you like your value of economic value or your definition of economic value, I have hundreds of insurance companies I would love to sell on it.

MR. BUTSIC: We'll have to argue off the record a little bit later on this.

MR. BETHEL: Are there other questions?

(No response.)

MR. BETHEL: Okay, will you thank our panel one more time, please?

1991 CASUALTY LOSS RESERVE SEMINAR

LUNCHEON

Remarks

Bruce C. Bassman
Tillinghast/Towers Perrin

Richard J. Fallquist
Conference of Consulting Actuaries

Luncheon Address

Mavis A. Walters
American Academy of Actuaries

MR. BASSMAN: While everyone is finishing up their dessert, I would like to continue the program. Copies of Jack Snyder's insolvency study are now available out by the registration desk.

The success of this program over the years has been largely the efforts of the Program Planning Committee. At this point I would like to recognize the efforts of that group. On my left, Karen Nester, vice-president of American Re; Terry O'Brien, senior consultant with Coopers & Lybrand; Jane Taylor, senior vice-president for Reliance; Roger Hayne, consulting actuary with Milliman and Robertson. Missing today is Orin Linden, from Coopers & Lybrand, who became a new father during the last week.

To my immediate left is Russ John, the vice-chairman of the seminar committee for this year. Russ is the senior vice-president for Underwriters Re. Bill Bartlett is a senior consultant with Ernst & Young. Howard Cohen, vice-president for Geico. Bob Finger, principal for Milliman & Robinson. Gayle Haskell, vice-president and actuary for Crum & Forster. Sue Miller, vice-president for Capital Holding Corporation. And Nancy Meyers, vice-president for American Hardware Group. Please join me in expressing your thanks to the group.

(Applause)

Our job was putting the program together. The logistics of holding this meeting could not have been accomplished without the efforts of the staff of the American Academy with some assistance from the CAS. Gwen Hughes and her staff have done an outstanding job of making this whole thing happen. My sincere appreciation to them.

I would like to recognize the members of that group who put this thing together. Gwen Hughes, Renee Cox -- would you please stand -- Mary Dorsey, Elizabeth Hartsfield, Susan Schneider, Kathy Spicer, from the CAS, Jeanne Casey, Ken Krehbiel, Erich Parker, and Devara Bodog. Please join me in thanking this group as well.

(Applause)

They certainly belong up at the front of the room. I think someone thought they knew Bob Uker and they wound up in the back.

(Laughter)

Also, special thanks to Jim Murphy and Gary Simms from the Academy for the support that their people provided.

One of the co-sponsoring organizations of this seminar is the Conference of Consulting Actuaries, CCA. Ray Cole, the President of CCA, could not be with us today, but we do have Dick Fallquist to tell us a little bit about CCA activities. Dick is a fellow the Casualty Actuarial Society and a member of the American Academy. He is a consulting actuary, a resident of the Seattle area, and he is also a VP for the CCA. He is going to give us a little bit about some of the recent activities.

MR. FALLQUIST: Thank you. It's a pleasure to be here and to extend a welcome to you from the Conference of Consulting Actuaries, the CCA, which was just recently the Conference of Actuaries in Public Practice, known as the CAPP. This is the second year the Conference has co-sponsored this outstanding event.

The Conference is a multidisciplinary organization of actuaries, totalling more than 1,000 life, health, pension and casualty actuaries representing consulting and the public sector. Our focus is on consulting, both theory and practice, and developing effective consulting skills. Our classes of membership include Fellows, Members and Associates.

Membership requires both experience in consulting and a professional designation. Virtually all of our members are members of the American Academy of Actuaries, 75 percent are members of the Society of Actuaries. We currently have a growing number of consultants from the Casualty Actuarial Society, totalling nearly 75.

Our 1991 annual meeting is at the Broadmoor in Colorado Springs, September 30 through October 2. We are expecting a record turnout, and you are invited. If you are a consultant or in the public sector, I wish to invite you to consider joining our dynamic organization. I have brought year books, applications and publications for you to pick up in the hallway.

I wish to congratulate you on attending this great seminar and working to advance our knowledge of loss reserves.

Thank you.

(Applause)

MR. BASSMAN: Thank you, Dick.

At this time I am pleased to introduce our luncheon speaker, Mavis A. Walters. Mavis is the president of the American Academy of Actuaries and the executive vice-president of Insurance Services Office, Inc. Mavis' duties include coordination of ISO activities of national significance, as well as its federal affairs operation.

She has testified before Congress and in state legislative forums on pro-competitive benefits of rating service organizations. Other activities include discussions on investment income and ratemaking, competition, profitability of insurers, and the financial conditions of the property/casualty insurance industry.

She also has corporate responsibility for ISO's Corporate Communications Department. Prior to opening ISO's D.C. office, Mavis was associated with Legg Mason, a regional brokerage and investment firm. Before that, she was director of the Insurance Division of the Cost of Living Council. Prior to that, she was a consultant to the Price Commission in the Executive Office of the President.

Mavis began her career in New York with a predecessor to the ISO, the NBCU, for those that may remember that organization. She opened the D.C. office for ISO in May of 1975 as an assistant vice-president, was promoted to vice-president in January 1977; in January of 1982, to senior vice-president; and to her current position as executive vice-president in January 1988.

Mavis is a cum laude graduate of Fordham University, a Fellow the Casualty Actuarial Society, a member of the Academy, and has served on the board of directors of both actuarial organizations. And recently this past year was elected the president of the American Academy.

It gives me great pleasure to introduce to you, Mavis Walters.

(Applause)

MS. WALTERS: Thank you very much, Bruce, and thank you everyone.

I'm delighted that so many of you could attend this seminar here, in the greater Washington D.C. area. I think the Program Committee has done a terrific job at putting together this entire program with all of the issues that are of such immediate and direct concern to all of you who are involved in some way in the rendering of loss reserve opinions for property casualty insurance companies.

My remarks are not going to be specifically directed to some of those issues which you were talking about today but rather at the general political picture. Specifically, the legislative arena as it relates to broad property casualty insurance issues. Then I will conclude by speaking very briefly on the concept of professionalism -- standards of practice, qualification standards and, very importantly, discipline.

This morning's panel, of course, dealt with what is probably the hot issue of the day here in Washington; that is, solvency. You heard a variety of views on the magnitude of the problem, on appropriate solutions and on differing views on what should be the proper role of the states versus the federal government. This is an issue which has really engaged the interest of members of Congress. That's so for really a lot of reasons.

By coming on the heels of the S&L crisis and the problems with banks that raised the level of interest in insurance companies quite dramatically. The public is directly affected by the insolvency of insurance companies, and they have let their views be known to their elected officials.

Because of all of that, of course the media has picked up on this issues. And they keep feeding it with little tidbits, the occasional insolvency here and there or lowered ratings for insurance companies. The situation is ripe for overreaction by concerned citizens. Witness the run on Mutual Benefit Life, which was really the direct result of the heightened interest and almost panic on behalf of policyholders.

To spice things up even a little bit further, we have the traditional regulators of insurance, that is, the state insurance commissioners, trying legitimately and carefully to come to grips with this problem while at the same time the new kids on the block, that is, some members of Congress, have taken an interest.

This latter group have said that they don't believe that the traditional regulatory system is adequate and that they need to do something, that is, Congress needs to do something, to impose some sort of federal regulatory oversight to provide the necessary level of protection.

Then, just to make things even more interesting, we have various segments of the insurance industry itself, whether it's insurance companies through their trade associations, brokerage houses, or the academics coming forth with a few suggestions themselves for regulating the business.

Just to give you a really good idea of the level of interest here, in the last year, there have been 16 different hearings held in the Congress on this subject of insolvency, and the jurisdiction has been all over the place.

In the Senate, there is the Judiciary Committee's Subcommittee on Antitrust and Monopolies, (Senator Metzenbaum's committee) and an investigative subcommittee of Government Affairs; also the Labor, Commerce, and Banking committees all on the Senate side.

On the House side, you've had the Banking Committee and you have had the Energy and Commerce Committee, which of course is the big committee which is shared by Mr. Dingell. They of course have probably done the seminal work on this subject. You heard about that before. It was referred to this morning.

In the midst of all of this activity, we had at the end of July introduced two very important legislative proposals. One was the 80-plus page bill which was talked about this morning, introduced by Senator Metzenbaum, and there is the 12-page outline of a federal proposal which was floated by Chairman Dingell that has yet to be reduced to legislative language, and I expect there will be some changes in it.

There is lots and lots and lots of discussion and lots and lots of interest on this subject. It is interesting to note, too, a comment that was made this morning by Gary Slaiman, from Metzenbaum's committee, Senator Metzenbaum's staff person. He readily acknowledged, remember, that there really is not expertise in Washington on insurance issues. That obviously hasn't stopped the level of interest or the level of discussion that is going on, and never will, not in this town.

I would also like to point out that there was something not quite accurate in what Gary said this morning. He made some kind of an offhand comment that there are laws which prevent the federal government from even investigating insurance.

Now, I think you and I know that that's not true. My own personal prediction on the subject of solvency is that I would expect that there ultimately, probably will be federal regulation. There has just been too much time, attention, and interest focused on this subject for it to go away without Congress doing something. I would also predict that we're more likely to see legislation coming from Chairman Dingell and the House Energy and Commerce Committee than we are likely to see the legislation which Metzenbaum has introduced.

The reason I'm predicting that mostly has to do with the parochial political interest. I believe Mr. Dingell is much more apt to follow the political process which is necessary to get bipartisan support, get the respect of other members of Congress and get a bill passed; but I do think it is going to happen.

I think it should be fairly obvious that loss reserve opinions will become increasingly important and subject to greater scrutiny as a result of the focus on solvency. Indeed, Jim MacGinnitie made that observation this morning.

Furthermore, as no doubt all of you in this room realize, those loss reserve opinions now must be signed by a qualified actuary. I think you all realize that the NAIC definition of a qualified actuary at the moment is a person who is a member of the casualty actuarial society; a member of the American Academy of Actuaries who has been approved as qualified by the Academy's Casualty Practice Council; or, thirdly, a person who has demonstrated competency in advance to the regulator in the domiciliary state.

The scope of these loss reserve opinions and the definition of a qualified actuary continue to be the subject of discussion within the NAIC. I think it's fair to say there are going to be more changes made, probably by the end of this year. In fact, I think we can expect that some of those changes will further define the qualified actuary, picking up concepts of the appointed actuary in the UK.

Jack Chesson, who works for Senator Dingell, has particular interest in this. Indeed, Jack has expressed a high degree of respect and appreciation for actuarial expertise. You may hear more about that in the session that is going on, I believe, this afternoon. All of the activities that are going on, both at the federal level, in the investigations, and the NAIC's attention to loss reserve opinions are going to serve to strengthen and highlight the role of the actuary.

That brings with it certain responsibilities and obligations, which I will mention in just a minute. Let me move very briefly just to another legislative topic that has also generated a lot of discussion over the last year or two or three, and that's the subject of McCarren-Ferguson.

I think probably everyone in this room realizes that that's a federal bill which provides for state regulation of insurance and grants limited antitrust immunity to the business of insurance provided there is state regulation. Since 1986, legislation has been introduced to repeal or modify McCarren-Ferguson, but it was really never considered a serious threat until last year, or the last Congress.

In fact, at that time the new chairman of the House Judiciary Committee, Jack Brooks, of Texas, was successful in getting a bill passed out of the Judiciary Committee on a very slim margin. This was the first time that had ever happened. This year, Chairman Brooks has introduced his bill again and had a hearing. Actually we're just waiting for the next shoe to drop. It remains to be seen what's going to happen next.

There is some discussion going on between one of the insurance trade associations who has developed an alternate safe harbors bill that they believe is better than H.R.9. The bill which Chairman Brooks has introduced is terrible. The entire insurance community is united against that.

There have been some trade associations and insurance companies who said, "Well, maybe we should come up with a different alternative." Well, it remains to be seen, frankly, whether Jack Brooks and his staff will accept the alternative. At the moment, it doesn't look like they will, but it really remains to be seen what is going to happen. It's very difficult to predict what is going to happen on this front. In fact, I wouldn't even attempt to try and predict it.

It is interesting to contrast the McCarren-Ferguson issue with solvency for just a second; that is, solvency, as I said a few minutes ago, generates a great deal of interest all over the country. Citizens are concerned, the media are picking it up, members of Congress are concerned. You read about it, you hear about it in almost any publication you pick up.

McCarren-Ferguson, on the other hand, is a very much inside-the-beltway issue. Nobody cares about it. It's not being written about. Consumers aren't complaining. There really is only one member of Congress who cares about it, Jack Brooks. It really would be, I think, a sad commentary on our political system if the interest of one congressman could result in a bill being passed that really would so thoroughly change and disrupt the insurance business. That's a personal editorial comment.

When you think about the possibility, though, of changes under McCarren-Ferguson and what is going on in the solvency area, I think it certainly is clear that the demand for casualty actuaries is not going to dissipate. When we think about the Congress that's coming in next year, the issues that we just talked about, solvency, McCarren-Ferguson, they're not going to go away. There is going to continue to be some area, some level of concern.

In fact, it's likely that actuaries will be looked to more and more, both for their views on these subjects, as well as to be part of the solution. Certainly through the American Academy of Actuaries the profession should and will continue to speak out to offer a unique and informed perspective to public policy-makers concerning these important issues.

At the same time, to the extent that actuaries are identified as providing special expertise, it is critically important that all of us live up to the highest standards of professionalism. That means abiding by the applicable standards of practice as promulgated by the Actuarial Standards Board and being guided by the qualifications standards set forth by the Academy.

It also means following the code of conduct, which we hope soon will be adopted by all actuarial organizations to reflect uniform language. Finally, it means not ignoring unacceptable, incomplete, or unprofessional work by any of our colleagues. If our standards are to mean anything, we must use the discipline process as it was meant to be used and call attention to unprofessional activity.

That doesn't require that we become judge and jury of our own colleagues or our friends, but it does mean that we must call to the attention to the Academy's general counsel or to a member of a discipline committee where we might observe what we think is questionable work. They will take it from there. The opportunity for the actuarial profession to prove itself has never been greater, and I'm confident we will be able to meet that challenge.

Thank you for your attention.

(Applause)

MR. BASSMAN: Thank you very much, Mavis, for sharing your knowledge and your perspective on the political process that's taking place on Capitol Hill. It's certainly encouraging to hear that the actuary is going to have an ever-continuing and expanding role in that process. Thank you for sharing that with us.

That concludes our luncheon. The next sessions will begin in less than five minutes. I would like to remind you about the evaluation forms. We are interested in receiving the full-page forms, not the half sheets that are in your registration package. Thank you.

1991 CASUALTY LOSS RESERVE SEMINAR

3A-1/3A-1/3B: BASIC TECHNIQUES I

Faculty

Kay K. Rahardjo
Tillinghast/Towers Perrin

Glenn M. Walker
G.M. Walker Actuarial Services

MR. WALKER: Welcome to Loss Reserving Basic Techniques I. I'm Glenn Walker and my speaking partner is Kay Rahardjo. She'll be taking you through the more basic of the loss reserving techniques and then somewhere in the middle, I'll pick it up and finish the packet.

Her name is Kay Rahardjo. She is a consulting actuary with Tillinghast in the Dallas office. She has been there for two years. Previously, she was with M&R in their San Francisco office and I'll just turn it over to you.

MS. RAHARDJO: This is my partner, Glenn. He'll be talking to you a little bit later. Glenn was with GEICO for, I believe, 15 years, did you say? He's been at Fellow for seven years and he's now president of his own firm, G.M. Walker.

MS. RAHARDJO: G. M. Walker & Associates. I'll start out talking today about some of the basic techniques paid or incurred loss methods that you may or may not be familiar with. I hope we don't get too basic for you and I also hope, too, that you get something out of it.

Actually, I'm going to work from down there and if you have any trouble hearing me, just ask me to speak up. Does everybody have an outline? I'm going to follow it pretty closely. I believe most of my slides are (Inaudible)

MR. WALKER: How many people need extras? I have two sets that I don't care if I keep or not. I don't have four, though.

MS. RAHARDJO: (Inaudible)

QUESTION: (Inaudible)

MR. WALKER: It's very similar.

MS. RAHARDJO: There is the Basic Techniques I and the Basic Techniques II.

QUESTION: (Inaudible)

MS. RAHARDJO: Oh, okay.

MR. WALKER: I think there are some differences.

MS. RAHARDJO: Okay. The goal of our exercise today is to try to determine how much money EZ Insurance Company should set aside to pay for claims -- past, present and future claims -- that happen on behalf of the policies that it writes. The amount of money that they need to set aside is known as the reserve.

The reserves can be broken up into two components, the case reserves and the IBNR reserves. Now, the case reserves -- this may be very basic for you. I don't know. I don't know what your backgrounds are. The case reserves basically is the amount of money that the company needs to set aside in order to pay for claims that the company knows about already whereas the IBNR reserve is the amount of money that they need to set aside for claims that have occurred but they do not yet know about. Obviously, the second one, the IBNR reserves, are greatly more uncertain than the first, although there is uncertainty in both.

The first method that we're going to use in estimating the reserves is the paid loss development technique. Our goal here is we're going to try and use all of the past history, the past paid losses, to try to help us determine the amount of losses that will need to be paid in the future, and to do that, we're going to tabulate a loss development triangle.

We're going to try to group the losses in such a way that it will help us to determine the future losses and we're going to assign losses actually to accident years. What do we mean by accident years? Well, let's just take 1984, for example.

Any loss that is assigned to accident year 1984 will be on behalf of a claim that actually happened in 1984. It doesn't matter when the loss is actually paid. The payments might have been made in '85 or '86 or whenever. As long as the claim occurred in 1984, we're going to assign a losses paid back to accident year 1984.

So, you see here, in looking, they have shown the date of accident for each of these and we total up the losses and get the amount that was paid for accident year '84. There are two columns here or there are two kind of groupings of columns.

The first is showing the losses that were paid at the end of 1984, in other words, when the accident year was 12 months developed. Let's just look at Claim 49095. You'll see that initially, when someone set up the amount of money that needed to be paid, they said, "Well, I think this claim will eventually settle for $12,000," and eventually it turned out that $12,500 was paid and that was paid some time in 1985.

So, any of the losses that are paid, we add that up and try to tabulate this into the loss development triangle. You see that all of the paid losses here that were paid in 1984 are totalled up. You get $3,361,000.00 and that's placed in the loss development triangle at 12 months of development.

Similarly, how much was paid at the end of 1985 and how old was accident year 1984 at the end of 1985, at 12/31/85? How much time had gone by? Well, 24 months had gone by, so we tabulated that here. The development stage is 24 months. At that time, we had $5,991,000.00 paid.

QUESTION: These are cumulative numbers?

MS. RAHARDJO: Yes, these are cumulative numbers, right, so it should be increasing or it certainly should not be decreasing with time, because once you've paid something, it's paid. You can't get it back.

QUESTION: (Inaudible)

MS. RAHARDJO: No, we're not taking salvage and segregation into account. That's not something we're looking at. Now, are there any questions that anyone has on this? This is a pretty basic step and this is really the most important step and if you have any questions, then it's a good time to ask. No one is going to volunteer.

QUESTION: I've got a question.

MS. RAHARDJO: Yes?

QUESTION: Your case reserves, is that the additional amount that is going to be paid over and above the paid loss or is that the total that you anticipate?

MS. RAHARDJO: That's the total that you anticipate to pay. So, you can see that someone said, "I think this claim is going to settle out for $12,000," and it settled out actually for $10,500.00, so they over-did it. They put too much up.

QUESTION: If you go down one more, you go to paid losses of $5,000 and the case reserve was three which would indicate that is only the additional amount you're going to pay on that claim.

MS. RAHARDJO: If you see at the end of '84, that same claim, the number is $51,000? Someone had initially set aside $2500.

MR. WALKER: I think he's right on that particular case, that the case reserve in this context is the additional amount because in the earlier claims, I don't think it is.

QUESTION: It's not the ultimate you're going to pay; it's just the additional amount.

MS. RAHARDJO: Okay, yeah, I see what you're saying. Yeah, you're right, because obviously, I mean, if your case reserve was 3,000 that doesn't make sense if you've already paid 5,000. Yes, you're right.

So, we do the same sort of grouping of losses for each of the accident years and we come up with a full loss development triangle that looks like this. We're going to try to use this triangle to estimate the final total cost. That's all the question marks here at the end. So, no questions at all on the loss development triangle?

(No response.)

We're going to use the loss development triangles to come up with loss development factors. This is just going to tell us how much the losses grow from one period to the other. They show a sample calculation here. The 1.783 was taken by taking the ratio -- let's just try to put both of them up at the same time. The 1.783 was just taken as the ratio of the 59.91 to the 33.61. This is just saying that the 3.4 million grew about what, 78 percent, to 5.99 million at the end of 24 months. So, how much did it grow from 24 to 36 months? Well, it grew up 22-1/2 percent.

Let's just pick another one out of the air right here. For accident year 1986, the 36 to 48 month development factor, 1.138, you would find that by taking the ratio of 10639 to 9351. Okay.

So, we have all these factors. What are we going to do with them? We're going to try to select a representative factor for each of the development periods that will help us in really predicting the future, to try to predict what the ultimate value is for each of the accident years.

To do that, we're going to compute several different kinds of averages. They show four averages here: the simple average; four-point average; the average taking out the high point and the low point; and the weighted average.

I just want to point out about the weighted average, I've seen many kinds of weighted averages. There is a variety of ways to compute these so if you ever see a weighted average, don't automatically assume that it was computed in this way because there are many ways to do it.

Once again, we are trying to use these averages to help us try to pick a representative factor for each one of the periods. What would be the best one to choose? Well, a lot of times, you might have other kinds of information that will help you in selecting the best factor. There is really not a right factor or a wrong factor. Some are just better than others, I would say.

I believe they point out in your handout if you've started writing a lot of business in a particular state in the last two or three years, you might want to use the later development factors because they might be more predictive of the future. That's what we're trying to do. We're trying to predict the future.

Another example that I thought of, if the company had, say, a fire in their data processing department back in 1988, they might have paid their claims a lot more slowly, so you might not necessarily want to look at the development factors along the 1988 diagonal because they might not be as representative of the future as others.

Now, another technique that they point out that's given to you in your handouts, I believe, is a trending method. If you can see that the factors are actually increasing or decreasing with time, you can actually fit curves through it, a linear curve or an exponential curve. Personally, I don't like these myself but I think the averaging methods are better. If you see that there is a trend -- this is an editorial comment -- I don't think that you need to get so scientific as to fit a curve through it. You can really kind of eyeball it and just use something else.

I don't think that you have to get as scientific as all this. This seems to be putting in a bit more precision but it is something that you might see. I believe I point out in your handout that you might see this sometimes in certain packages, certain software packages, so here it is. You have seen it, anyway, and we've talked about it so you understand it.

So, once again, we have all the development factors. We have the various averages. We've seen that there's a bit of a trend in the data, so what is it we want to select? Well, we've selected these loss development factors as being representative of the future. You might recognize these as being the same as the average factors. I would submit to you that probably in the absence of any other information, the average is not a bad choice.

Now, we have this thing down here called age to ultimate. Well, first of all, let's go back and talk about what each of these selected factors mean. What do we talk about when we're saying the selected factor for the 12-to-24 development period is 1.796? What we're saying is if you take losses, let's just say we had $1,000 of losses at the end of 12 months, what would the losses be at the end of 24 months?

Well, if our loss development factors are correct, and this is a big assumption, by the way, if the loss development factors are correct, that $1,000 at the end of 12 months should grow to be $1,796.00 at the end of 24 months. This factor 1.796 is applied to the thousand dollars, multiplied, to give us the losses that we expect at the end of 24 months.

Similarly, if we had $1,000 at the end of 24 months, what would it grow to at the end of 36? It should grow to be $1,233. We can take this process further. Finally, we get to the last development factor that was selected, the 1.037, and that's just telling us that losses at the end of 72 months will grow about 3.7 percent until the end of 84 months.

Now, what is going to happen after that? Our triangle stops. Are we to assume that there is no more development? You could, but it's really not a very good assumption. There probably are some more losses out there that need to be paid and we need to come up with a factor that's going to get us from 84 months out to the ultimate value. In other words, how much more are the losses at 84 months going to grow before they stop growing any more?

To predict that, we need what is called a tail factor. We need to get from 84 months to ultimate. How do we do that? Well, there are a variety of ways. I believe tail factors are covered in Basic Techniques III, so I can punt on this. I don't have to talk about it too much more.

We are going to make the assumption here that the incurred losses at 84 months are the same thing as the ultimate losses. Another way of saying that is that the case reserves that are set at 84 months are exactly correct. We'll see a little bit later that the incurred losses at 84 months are 10,292,000. If we take the ratio of the incurred to the paid losses, we get our tail factor that we're going to apply here.

I just wanted to show you -- I just wanted to go back to the triangle, the paid loss triangle. This is back on exhibit, well, it's my Exhibit I-3 page 1. You see what the paid losses were at 84 months for accident year 1984. It was 9,759,000 and that's just what we're using in the base of the calculation to calculate the tail factor.

I sure wish I had something to write with up here but I don't. Does this write on the slide?

MR. WALKER: No.

MS. RAHARDJO: Thanks, anyway. What have we done down here, age-to-ultimate factors? Let's talk about this a bit. The 1.055, we know that that factor is going to take us from 84 months to ultimate. In other words, we're saying that the losses at 84 months are going to grow about 5-1/2 percent.

What is this 1.037 saying? This is telling us what the losses are going to do from 72 to 84 months. What if we wanted to find out what the losses are going to do from 72 to ultimate? In other words, if we want to try to find out the losses for 1985, they are 72 months developed. How much are they going to grow?

Well, the way to determine that is to take the product of these two numbers. The 1.037, remember that's the 72 to 84 factor; the 1.055 is the '85 to ultimate factor. So, if you take the product of those two, you should get the 72 to ultimate factor.

Similarly, if we take the product of all of these factors we get the age to ultimates for each of the development periods. So, the 3.129 was determined by taking the product of 1.055 times 1.037 times 1.054 and so on, all the way back to the 1.796. This is going to give us the 12 months to ultimate factor. We take the 12 to 24 times the 24 to 36 times the 36 to 48 and so on, out to the 84 to ultimate. We take the product of all of those.

Okay. So, now that we have all those factors, we can apply the appropriate age to ultimate factor by the paid losses to get the ultimates. Now, again, let's just go back and review this a bit. Let's just take accident year 1988 as an example. Here is accident year 1988.

We are going to use the paid losses. They are at 36 months of development here, okay. On the last diagonal here, the 12,699,000, so we want to apply the appropriate age to ultimate development factor. What is the appropriate age to ultimate development factor?

Well, these losses for accident year '88 are 36 months developed so we want to apply the 36 to ultimate factor which is this one, the 1.413. So, taking the product of these two gives us the ultimate losses that are expected for that year of 17.9 million.

So, going back, let's just think about this some more. The 12,699,000 is what we've paid already. We know that. We have that information. How much is this going to grow before it finally stops growing? Well, we're saying here our process is predicting that it's going to grow 41.3 percent. We need to multiply it by the factor of 1.413. It's going to grow to 17.9 million. Similarly, we do the same thing for each of the accident years, apply the age-to-ultimate factors to get an estimated ultimate value for that accident year.

I see a lot of bewildered looks. Does anybody have a particular question?

QUESTION: I have one question.

MS. RAHARDJO: Yes?

QUESTION: For 1990, do you think that the 7.69 ultimate would be 21?

MS. RAHARDJO: That's correct.

QUESTION: So that would be the max that you'd pay out?

MS. RAHARDJO: According to this method, yes, according to this. Now, you want to try to use as much information as you can to try to come up with this because, obviously, this is a very important number. This is saying that this is going to grow by quite a bit, and there is a lot of uncertainty here. Look how large this factor is. It's saying that it's going to more than triple.

Can we really believe that? Is there something that might have been wrong or that we might have done wrong here? We're going to look at some other methods and try to compare what we get from using the other methods to try to determine the best value for this, the best ultimate value but for right now, yes, in the absence of anything further, that's what we're saying, that it's going to grow to $21.8 million.

QUESTION: You are also 3 points lower than you've ever been before.

MS. RAHARDJO: That's right. It doesn't look good, does it? That's a good point. That was my next point, by the way. You always want to do some kind of reasonability check and a good reasonability check is to compute the loss ratios and that's just the quotient of the ultimate losses with the earned premium, and as he so astutely pointed out, the loss ratio for 1990 is much lower and even for '89, it's much lower -- no, not really; I take that back, but for 1990, it is much lower than the previous years so we do need to investigate that some more and we will.

Another warning I want to point out to you is about loss ratios. There are many different definitions of loss ratios. This is one definition. Any time someone is talking about loss ratios, always make sure you know what definition they are using.

It's a term that people, that actuaries and others, throw around very loosely and they always know what they're talking about but you may not, and if you don't have the right understanding and the right definition, you might not really be getting the whole picture. So, always question what they mean by loss ratio, "Please define that for me."

Okay. So, what have we been trying to do? We've gone through this whole affair of constructing this loss triangle and the loss development factors, the age-to-ultimate factors, and we've tried to predict how much money we are ultimately or finally going to have to pay for each of the accident years. So, we know how much we're going to have to pay eventually.

We also know how much we've already paid to date, so if we subtract how much we've already paid from how much we will need to pay, we get an estimate of the reserves. That's what you see in column six. That's just the ultimates minus how much we've paid already.

As we talked about before, the reserve is split into two pieces, the case reserve and the IBNR reserve. Let's see, let's just sort of put this on top. Okay, well, this is really -- okay, I hope you can see. This is the reserve that we just calculated for each of the years. If we subtract the case reserves, we get the IBNR reserves.

The case reserves, again, that's something that we know. That's something that the claims department has set up for each of the claims. I mean, we can add up all the case reserves for each claim. The case reserves is something that we know. If we subtract that from the total reserve, we get the IBNR reserve.

One thing to point out here, when you talk about reserves, sometimes you hear about the so-called pure IBNR reserve and the pure just means that's the amount of money that you set aside for claims that have occurred that you don't know about yet.

What we're talking about here in the IBNR reserve, it's not only that pure segment, but it's also the development in the case reserves, because as I believe we said before, the case reserves are not always set correctly. Sometimes, they are too low and sometimes they are too high.

I would submit -- I don't know if Glenn would agree -- that usually the case reserves are too low, so they're usually going to develop upward. This IBNR reserve here is just going to be the -- it includes both the pure portion and the development in the case reserves.

So, we've seen one way of coming up with the ultimate losses and now we're going to look at another method. This is the incurred loss development method. Actually, this method is identical to the one that we've already seen, the paid loss development method. The only difference is the data that is used for input. Instead of putting paid losses into a triangle, we are going to put incurred losses into a triangle.

We start out with the same grouping and the same accident year, 1984. Instead of putting only the paid losses here, we're going to put the paid plus the case reserves. Incurred losses, by definition, are just paid losses plus case reserves.

So, we see what the paid losses are at the end of 1984 and we see what the case reserves are at the end of 1984.

QUESTION: Why would IBNR not be part of the incurred losses?

MS. RAHARDJO: Just by definition, I guess.

MR. WALKER: The object of this exercise is to determine what the IBNR ought to be, given the payment and the case reserves.

MS. RAHARDJO: So, if we add the paid losses at the end of 12 months with the case reserves at the end of 12 months, we get this 8.382 million. Similarly, we try to see what has happened to the paid losses at the end of 24 months and what has happened to the case reserves at the end of 24 months and add those two together to get the 9,781,000. Similarly, we do this for at the end of '86, at the end of '88 and so on.

Once again, we will have a complete loss development triangle, the goal of which is to compute the total final cost for each of the accident years. Once again, we will compute the loss development factors by taking the ratio of losses at one development period to the losses at the prior development period and now that we have all these factors here, compute the averages, the various averages and come up with selections.

Once again, I believe you'll see that the selections that are made here are the same as the simple averages. It is worth pointing out again that -- remember for the paid losses, we had to select a tail factor. Our assumption was that the case reserves at 84 months were exactly right so, in other words, the case reserves that someone had set up were not going to grow anymore and they weren't going to decrease.

Implicit in that assumption is that the tail factor for the incurred losses is just going to be one. These losses right here are the 10,292,000. That's at the ultimate value. They are not going to change anymore. That was our assumption. Remember, that's only an assumption. It may not be right but that's just what we used.

I would submit to you that from a practical point of view, probably it's not a bad assumption for automobile liability for incurred losses. You might not expect that they'll grow that much more after 84 months; however, for some lines of business, that's not a very good assumption. For workers' compensation, that would not be a good assumption and probably not either for general liability.

Once again, we can take the product of the factors, the report to report development factors, to get the cumulative loss development factors so that we can apply these to the losses at the latest evaluation. That's what you see right here. We've taken the incurred losses on the latest diagonal and we applied the age-to-ultimate factors to get another estimate of the ultimate losses.

You'll see that this estimate for the ultimate losses for 1990 is much lower than it was when we used the paid loss development method. Again, as a reasonability check, we can compute the loss ratio and, again, for 1990, it's much lower than the prior years and that's something that we'll look at a bit more.

Are there any questions?

QUESTION: (Inaudible)

MS. RAHARDJO: I wouldn't say in every case it is, but in general, I would say in what I use in my every day work, I would say the incurred loss method is usually more reliable and more useful and you certainly always want to look at the incurred losses. There's a lot of things that can change with the paid losses -- settlement rates and so forth.

QUESTION: In your first model, isn't there a case where your actual case reserves will be greater than your total reserve in the paid loss model?

MS. RAHARDJO: I'm sorry. Could you repeat the question? Oh, could you have a negative IBNR reserve? Is that it?

QUESTION: Yes.

MS. RAHARDJO: Yes, you certainly could. You certainly could. Some companies actually do set their reserves, their case reserves, very high, so that they actually do go down with time, so if you would take the ultimate here, what your estimate of the ultimate loss is and subtract the case reserves like we did back in the other slide, you could actually get a negative average for the IBNR, yes. That's possible and it's believable, too. If you get something like that, you shouldn't automatically assume that, "Well, I've done something wrong." It's believable. Yes?

QUESTION: On the loss ratio, what (Inaudible)

MR. WALKER: I'll be discussing that.

MS. RAHARDJO: He's going to cover that. You're in suspense now, aren't you? Yes?

QUESTION: Are there certain lines of insurance in which you would pay via the incurred loss method versus paid loss and what would characterize the paid from the other, for giving you an answer that you believe would (Inaudible)

MS. RAHARDJO: I'm not sure I would say I would do it for a particular line of business. I might do it in particular situations but not necessarily for a particular line. Well, I take that back, though.

For some lines of business that have really long tails, you might want to look at the incurred loss method more than you do the paid loss, particularly for some of the later years because some of these factors sometimes just get so large for the paid loss development method that there's just too much uncertainty right there.

So, for some of the longer tail lines, perhaps if you were going to make an argument, you might say that the longer tail lines might favor the incurred loss method more than the paid loss method. Would you agree with that or would you disagree?

MR. WALKER: I guess I was thinking, if I can take the liberty to rephrase your question a bit: Remember, you're using this method for each accident year. You're doing this to evaluate the reserve for 1984, for 1985, for 1986 and so on down the line. You're coming up with an indication that is separate for each accident year.

In reserving, there is no rule that says that you have to take the bottom line from either method. Frankly, I tend to think of the incurred projection as superior for perhaps accident years 1987 through '89; and the paid projection, (depending on the line of business) more reliable for '84 through '86. Don't hold me strictly to those particular years.

When you get back into '82-'83, the case reserves are probably okay and I would use a lot more modeling techniques on the accident year 1990 before I made a judgment on which one was better.

QUESTION: What if you go back as far as maybe 1950 on some real workers' comp claims, then is it safer to go back to your case reserves because you're looking at them more specifically than you are statistics?

MS. RAHARDJO: That's a tough one to call.

MR. WALKER: On that line, it's not likely that you have much more true IBNR so the case reserve probably is your best estimate.

MS. RAHARDJO: I've taken a little over half the time so I think I should turn it over to Glenn at this point.

MR. WALKER: Can you leave Exhibit 4 there?

MS. RAHARDJO: Sure.

MR. WALKER: If you will turn in your hand-out package --

QUESTION: (Inaudible)

MR. WALKER: I'm going to comment very quickly on comparing the two methods.

Interspersed in your hand-out package are cartoons which are for entertainment purposes only so we're not going to discuss them a lot. It occurred to me as I was putting this together that loss development techniques are used quite commonly by almost everybody. Usually, however, non-actuaries don't call them loss development techniques.

For instance, in my personal situation, my wife has pointed out to me, and I don't know where she came up with the idea, that you can estimate a child's adult height as three times his birth height. What I'm trying to point out here is that she has used an application of loss development, or height development as you might call it, in that you take whatever height the baby was born at and multiply it by three, and that is an estimate of the child's adult height.

As the child turns to be five years old, you don't use a factor of three anymore because you'll have him hitting the ceiling. You use a factor somewhat less than three. Even then, if your child is in fourth grade, 48 inches high, and he brings a friend home from school that's 54 inches high: My, you're big for fourth grade. You must be headed toward a height that will be very big." (Not that 54 inches is impressive, but when you talk about a nine year old child, 54 inches might be very big.)

The sole purpose of pointing this out is that we all use loss development or the techniques or the approaches to loss development that actuaries do, because (referencing to Exhibit 4) when this "child" was the age of this "man", he was only this tall, a little less than 4,000. Assuming that the growth pattern is the same, this is going to be a huge guy.

That's just an example. I'm sure you can come up with other examples of where we're just trying to get estimates of how much loss was incurred over a given body of accidents based on a less mature period of time than full maturity. You are interested at an early point in time in estimating full maturity.

Kay has discussed two techniques of estimating that: the paid projection and the incurred projection. Now I'll address the question that was asked. We've stated outright that there is an assumption in the payment projection model that the payment pattern is the same. There are several reasons why the payment pattern may not be the same.

Yet, with the incurred projection, we assume that there is no change in the case reserve adequacy. If there is ever a time in which the company's case reserving procedures change and, hypothetically, let's say that you just decide that you're going to add an element for inflation into your case reserves whereas previously, you had not done so, then all of the results arising from the incurred projection would be suspect until you had developed enough history under the new procedure that you can use data from that case reserving procedure only.

In more advanced topics, there are ways to adjust for that so that you can bring yourself back into that realm of assumption, but strictly using the incurred projection, not only are you going to take the hit from having boosted your case reserves but the way the mechanics of this model works, you're going to assume that every accident year subsequent to that is going to get the same hit when it reaches that level of maturity and it's just not going to, because it has already taken the hit.

Which is the best model? Every model that I could present to you, whether it be basic or advanced, has advantages and disadvantages.

The paid projection: real convenient, no estimates, hard data. We wrote the check out. We must owe it if we wrote the check out. However, especially for some of the immature periods of time like accident year 1990, we're getting a loss development factor of 3.2. It might be high. It might be low. It's okay to be a little bit high or low but the ability for it to be wrong is just so much greater when the factor is up to about three.

If the factor were about 1.05, we know it can't be any less than one and it's not likely to be so far off that it's further off in the opposite direction, so 1.05, if that's what the indication is, is a fairly safe estimate. There is a lot of give and take involved when we talk about loss development factors that come in around 3.

For the incurred projection, you are now using all of the available information. It is one thing to come up with a payment projection that estimates $20 million ultimate but if we know from the case reserves that there's already $22 million incurred, then that sheds some question on the indication for the payment projection.

The disadvantage of the incurred projection is that the case reserves are set knowing that they are just estimates. There is not the scrutiny given to case reserves as is to the payment. You write the check for the payment. You're sure you owe it. You establish a case reserve, you judge it to be merely a likely event.

Comparing the results, this is a fairly typical situation. No real surprises jump out at you and, in practice, while the degree of the numbers will change from time to time, the comparison of the numbers is fairly typical. No matter whether you like the paid development or the incurred development, your loss ratio will be 60 percent.

As a matter of fact, since remember, we selected the paid, we called it the tail factor at whatever the case reserves dictated, the only reason there's a difference at all is when we divided one by the other we came up with that tail factor of 1.055 which was not a precise number. It was rounded to three decimal points and when you reversed the process to multiply it back in, there was a $4,000 difference.

But even for 1985, when it was not that automatic, 62 versus 63 is fairly close and you ought to expect that on an accident year that has reached an age of maturity of seven or six accident years. Sixty versus 58, two apart; 60 versus 64, now it's starting to get wider but still at a manageable rate; 70 versus 64 at six points apart.

You get a little relief at accident year 1990 in that there's only five points difference and that does not mean that it's wrong, that it reversed from six to five. Things like that can happen. This is a random event. It's just that the expectation is that it will tend to converge as you use more mature periods, where more information is known and there's less opportunity remaining for surprises.

QUESTION: It's not a random event because you also -- would you run a (Inaudible) there?

MR. WALKER: Yes.

QUESTION: Great. The thing is, you might have rate changes that you paid to your priors.

MR. WALKER: I'm not talking about the loss ratio per se, because yes, the level of your rates will affect the loss ratio. What I'm talking about is the level of difference between the paid and the incurred.

QUESTION: Okay.

MR. WALKER: Does that answer your question?

QUESTION: Sure. Does that follow a company's philosophy in paying off losses more quickly and a change in their philosophy that "We want to settle things earlier rather than tie them up longer and have more legal expense," and then I cannot skew it in later years.

MR. WALKER: If you can do it consistently, then it wouldn't skew the later years as much as cause an earlier period of time at which the numbers will converge. In this case, there is still some activity back six years prior.

If you can manage your claims handling so that there's no more activity after three years, then the paid and the incurred will give you identical results for any accident year more than three years old, but I seriously doubt that there's going to be that much you can do to effect the difference between the later years just simply by having an aggressive claims policy. There's just so much you can know after one year.

This is a dumb cartoon that I'm not going to glorify by reading. A technical point that I do want you to get out of this is that as an actuary, you need to know what's going on in the claims department. Biorhythms are kind of extreme but if your most efficient claims handler has retired and you are no longer able to terminate your claims activity within three years of the date of accident, then something went on that you need to know about.

A third technique -- and this is the last technique that we'll get into in the basic techniques -- is called the average value projection. The mechanics of the average value projection are identical to the paid and the incurred
projection in that you take your data, you format it into triangle format where you identify the accident year and the accounting date of the claims transaction, and you put together factors that compare age to age and ultimate.

The difference is that whereas the development projections focus only on the total dollars of loss, whether it be paid or incurred, in this technique, we are interested in what we call the frequency and the severity, the frequency being how many policies do you have to write to create a claim -- it's actually the reciprocal of that -- or the severity being how much is a claim worth.

If you multiply the two together, the frequency times the severity -- sorry. If you multiply the counts times the severity, you get the same thing that we're after, and that is the ultimate amount of incurred losses which, if you subtract from that the paid losses, you can determine a reserve.

I'm not going to reconstruct the mechanics of the claim count development model because they are identical to what we've already gone over, but this is the pattern of claims having come in. These numbers just get bigger and bigger as you go on out.

What makes this method fairly reliable is that these numbers are minuscule. You can deal with those numbers except for possibly the last accident year where it gets a little higher. I'm not concerned terribly about error in these numbers so I will be able to estimate the total number of claims reported. What I don't know is how much is a claim worth.

By taking the same data, looking at the cumulative paid losses -- and that's whether or not the claim has been closed -- and dividing by the number of claims closed and formatting the data in our now familiar triangle format, I can run the same computer program and estimate an ultimate severity.

Now, knowing how many claims have been reported to date and its attendant count development factor, I can estimate the ultimate counts. Knowing what the present severity is to its current level of maturity and applying -- I don't have a good name for it, but a "severity development factor", I can estimate the ultimate severity.

I'm now ready to multiply column three by column six, the ultimate claims times the severity and estimate the incurred losses. We've already commented, focusing on accident year 1990, that the paid projection came out at a very low loss ratio of 57 percent, and the incurred projection with a loss ratio lower yet. Using this method, we're looking at 48 percent, so this is even lower still. Which do we believe?

Rather than going through the mechanics, I'll give you some insight as to what I would look at this point if I were doing a real analysis. Remember that the paid projection and the incurred projection had assumptions in them. I didn't discuss them in as much detail but the count projection and the severity have assumptions, too.

So, although all of the modeling may have been done in an actuarially sound manner, it is real difficult in practice to know for sure that the assumptions that are critical for the smooth operation of this model work in practice. I'll get into more as to what could have caused this.

But the first thing that jumps out at me is even though we've consistently had a pattern of severities that started out back in 1984 at $3,600 and natural inflation is taking its toll over time until it reached a $7,300 severity in 1989, this model was asking me to believe that the severity, that these 3,078 claims that were incurred during 1990 are only worth $5,980 a piece.

If that's true, then our loss ratio for that year may well have been down as low as 48 percent, but before I sign off on a reserve opinion stating that I believe that, I want to look at some other things. What could have caused a decline in the loss ratio?

The potential problems: Potential problems are largely a result of the assumptions not being true in practice. We assume that the claims settlement pattern doesn't change, sample problem, increasing delays in claim costs. We assume that the case reserving practices and philosophies have not changed. We already discussed what would happen in the event that, say, inflation were added to the case reserves.

No claim processing changes, not much different from what we've already discussed. Policy limits have no impact on loss development. Well, if you're writing policies of a hypothetical, recognizing that it's a nonsense of limit of $1,000 for automobile, pretty much every claim, you're going to put up $1,000 and there will be no further development because there's no opportunity for new facts to come in which would impact the size of that $1,000.

Then you decide to increase it to something a little more realistic like $100,000 and now there is an opportunity for development which was not reflected in your history. How you handle that is a matter of technique and judgment, but you need to be aware that there was a change. Otherwise, you're going to take a mechanical look at the bottom line answer and be deceived.

Loss development unaffected by changing lost cost trends. There are three sample problems: surges in inflation; increased litigation; diminished policy defenses. One thing that I have noticed does make an impact on this, and it varies from state to state, is changes in the statute of limitations.

If you change the statute of limitations from -- one example that I'm well familiar with is where they changed it from three years to one year. Case reserves got up real fast when claimants were required to submit their claims to the insurance company within one year.

No change in mix of business. You can't combine workers' comp and glass insurance because once the workers' comp starts kicking in and having a higher impact on the loss development factor, you're going to find that the future claims will not develop like the past claims.

No cyclicity in loss development. The best example I can think of is automobile collision where in the first three quarters of the year, the accidents tend to occur uniformly throughout the quarter. There's a lot of accidents in January, February and March, but they tend to be fairly spread out throughout the quarter; not too many accidents in April, May and June; the same with July, August and September, either way, they tend to be spread out.

October, November and December, the accidents do tend to occur further out in the quarter. The New Year's Eve accidents, they're all December; Christmas holiday, Thanksgiving, they're November but a whole lot later with more opportunity to have not been reported by the close of the accounting period.

So, an example of how to correct for cyclicity is to consider that every fourth quarter, hitting these ages of development, you might want to compare that to previous fourth quarters and not just take a whole broad base of data and assume that every quarter is a quarter.

No data anomalies, get rid of your catastrophes. Evaluate them separately and evaluate your data absent catastrophes. We have managed to leave about 15 minutes for general questions in which we can talk about anything that we discussed. Do you have questions?

(No response.)

MR. WALKER: Thanks for coming. You can get about a 15-minute head-start on your break. I think there are some evaluation forms. Is there somebody at the back of the room that is collecting the evaluation forms?

MS. RAHARDJO: If not, just leave them on the chair, I guess, in the last row, the chair that's on the corner, and someone will probably be around to pick them up. I believe they ask, too, that you fill out the sheets, the 8-1/2 by 11 sheets in the evaluation rather than what is printed on the back of the card. Again, thanks for coming. Hope to see you in the next 30 minutes.

1991 CASUALTY LOSS RESERVE SEMINAR

BASIC TECHNIQUES I

OVERHEADS

1991 CASUALTY LOSS RESERVE SEMINAR OUTLINE

BASIC TECHNIQUES I

- Paid Loss Development
- Incurred Loss Development
- Paid vs. Incurred Methodology
- Counts and Averages
- Comparing Results

BASIC TECHNIQUES I

Loss Reservist's job is to estimate:

1. Development in case reserves

2. (Pure) IBNR reserves

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

Exhibit I.2

CONSTRUCTION of LOSS DEVELOPMENT TRIANGLES

Accounting Report Dated 12/31/84

Claim Number	Date of Accident	Paid Loss	Case Reserve
46890	1/09/84	4,500	0
48948	1/23/84	8,500	0
49095	2/06/84	0	12,000
.	.	.	.
.	.	.	.
.	.	.	.
51000	12/23/84	0	2,500
Acc't Yr 84		3,361,000	5,021,050

Accounting Report Dated 12/31/85

Claim Number	Date of Accident	Paid Loss	Case Reserve
46890	1/09/84	4,500	0
48948	1/23/84	5,800	0
49095	2/06/84	10,500	0
.	.	.	.
.	.	.	.
51000	12/23/84	5,000	3,000
52109	12/28/84	0	4,500
Acc't Yr 84		5,991,234	3,789,754

CUMULATIVE PAID LOSSES
(in thousands of dollars)

accident year	12	24	36	48	60
	..........Development Stage in Months................				
1984	3,361	5,991	7,341		
1985	3,780	6,671			
1986	4,212				

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

Exhibit I.3
page 1 of 2

CUMULATIVE PAID LOSSES
(in thousands of dollars)

accident year	12	24	36	48	60	72	84	final total cost
	...............Development Stage in Months.................							
1984	3,361	5,991	7,341	8,259	8,916	9,408	9,759	?
1985	3,780	6,671	8,156	9,205	9,990	10,508		?
1986	4,212	7,541	9,351	10,639	11,536			?
1987	4,901	8,864	10,987	12,458				?
1988	5,708	10,268	12,699					?
1989	6,093	11,172						?
1990	6,962							?

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

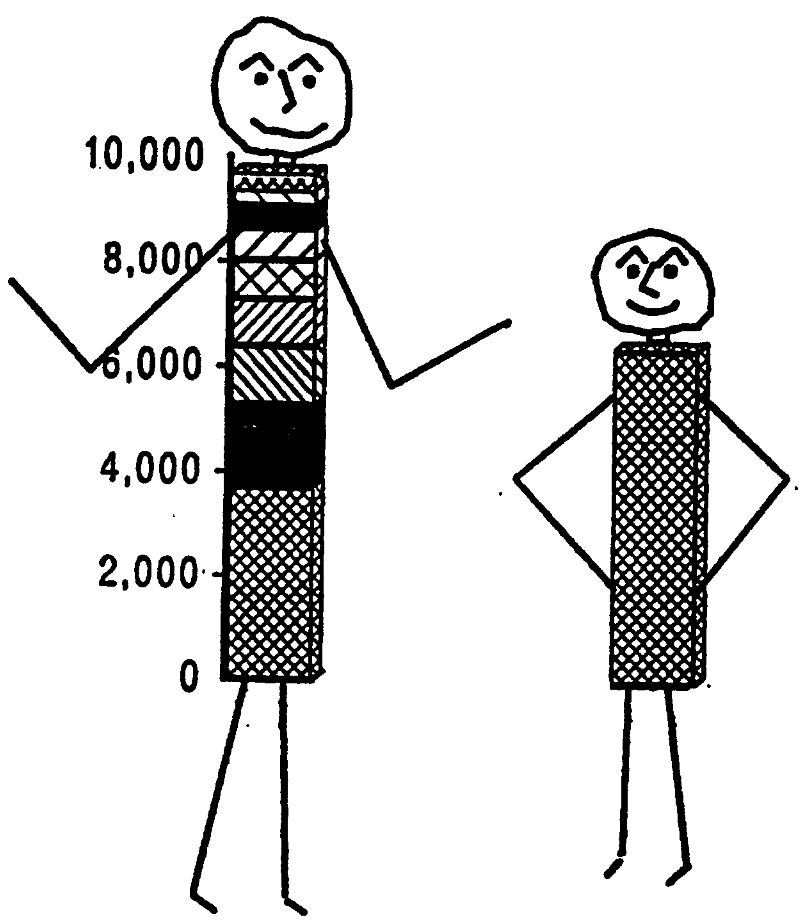
Exhibit I.3
Page 2 of 2

CUMULATIVE PAID LOSSES

accident year	12-24	24-36	36-48	48-60	60-72	72-84	to ultimate
	............Paid Loss Development Factors............						
1984	1.783	1.225	1.125	1.080	1.055	1.037	?
1985	1.765	1.223	1.129	1.085	1.052		
1986	1.790	1.240	1.138	1.084			
1987	1.809	1.240	1.134				
1988	1.799	1.237					
1989	1.834						
average	1.796	1.233	1.131	1.083	1.054	1.037	

SAMPLE CALCULATION: 1.783 = 5991 / 3361

Exhibit I.4



YES INDEED! IF HE GROWS LIKE I DID, HE'LL BE QUITE A GUY.

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

SELECTING PAID LOSS DEVELOPMENT FACTORS - AVERAGING METHODS

accident year	...........Paid Loss Development Factors...........					
	12-24	24-36	36-48	48-60	60-72	72-84
1984	1.783	1.225	1.125	1.080	1.055	1.037
1985	1.765	1.223	1.129	1.085	1.052	
1986	1.790	1.240	1.138	1.084		
1987	1.809	1.240	1.134			
1988	1.799	1.237				
1989	1.834					
1990						

AVERAGING METHODS:

	12-24	24-36	36-48	48-60	60-72	72-84
simple average	1.796	1.233	1.131	1.083	1.054	1.037
4 point average	1.808	1.235	1.131	-	-	-
avg w/o high/low	1.795	1.234	1.131	-	-	-
weighted avg	1.805	1.235	1.133	-	-	-

Example of Weighted Average

Year	Exposure Period	Weight	LDF
1984	1	4.76%	1.7825
1985	2	9.52%	1.7648
1986	3	14.29%	1.7904
1987	4	19.05%	1.8086
1988	5	23.81%	1.7989
1989	6	28.57%	1.8336
sum	21	100.00%	[illegible]

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

SELECTING PAID LOSS DEVELOPMENT FACTORS - TRENDING METHODS

accident year	...........Paid Loss Development Factors...........					
	12-24	24-36	36-48	48-60	60-72	72-84
1984	1.783	1.225	1.125	1.080	1.055	1.037
1985	1.765	1.223	1.129	1.085	1.052	
1986	1.790	1.240	1.138	1.084		
1987	1.809	1.240	1.134			
1988	1.799	1.237				
1989	1.834					
1990						

TRENDING METHODS:

	12-24	24-36	36-48	48-60	60-72	72-84
<u>Linear Trend</u>						
slope	0.011	0.004				
intercept	1.759	1.221				
r squared	0.730	0.580				
projected	1.834	1.245	-	-	-	-
<u>Exponential Trend</u>						
rate of change	0.6%	0.3%				
intercept	1.759	1.221				
r squared	0.729	0.580				
projected	1.834	1.245	-	-	-	-

Exhibit I.5
page 3 of 3

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

SELECTING PAID LOSS DEVELOPMENT FACTORS

accident year	..........Paid Loss Development Factors...........					
	12-24	24-36	36-48	48-60	60-72	72-84
1984	1.783	1.225	1.125	1.080	1.055	1.037
1985	1.765	1.223	1.129	1.085	1.052	
1986	1.790	1.240	1.138	1.084		
1987	1.809	1.240	1.134			
1988	1.799	1.237				
1989	1.834					
1990						

AVERAGING METHODS:

average	1.796	1.233	1.131	1.083	1.054	1.037
4 point average	1.808	1.235	1.131	-	-	-
avg w/o high/low	1.795	1.234	1.131	-	-	-
weighted average	1.805	1.235	1.133	-	-	-

SELECTING THE "TAIL" FACTOR

$$\text{Tail Factor} = \frac{\text{incurred losses for oldest year}}{\text{paid losses for oldest year}} = \frac{10{,}292}{9{,}759} = 1.055$$

SELECTED LDF'S	1.796	1.233	1.131	1.083	1.054	1.037	1.055
AGE TO ULTIMATE	3.129	1.742	1.413	1.249	1.153	1.094	1.055

No, on average I am not *comfortable.*

Reprinted from the Actuarial Review.

Exhibit I.7

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

ESTIMATING RESERVES USING PAID LOSS DEVELOPMENT

Accident Year	(1) Earned Premium	(2) Paid to Date	(3) Selected Factor Age-to-Ult	(4) Estimated Ultimate (2)*(3)	(5) Loss Ratio (4)/(1)	(6) Indicated Reserve (4)-(2)
1984	17,153	9,759	1.055	10,296	60%	537
1985	18,168	10,508	1.094	11,496	63%	988
1986	21,995	11,536	1.153	13,301	60%	1,765
1987	24,173	12,458	1.249	15,560	64%	3,102
1988	25,534	12,699	1.413	17,944	70%	5,245
1989	31,341	11,172	1.742	19,462	62%	8,290
1990	38,469	6,962	3.129	21,784	57%	14,822
	-------	-------		-------	-----	-------
	176,833	75,094		109,842	62%	34,748

Exhibit I.8

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

CASE RESERVE vs. IBNR RESERVE

Accident Year	Case Reserve	IBNR Reserve	Total Reserve
1984	533	4	537
1985	742	246	988
1986	1,189	576	1,765
1987	1,955	1,147	3,102
1988	3,367	1,878	5,245
1989	5,604	2,686	8,290
1990	9,599	5,223	14,822
	------	------	------
	22,989	11,759	34,748

IBNR = Incurred But Not Reported Losses

including any development in the case reserves

IBNR = Ultimate Losses - Paid Losses - Case Reserves

Exhibit I.9

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

CONSTRUCTION of LOSS DEVELOPMENT TRIANGLES

Accounting Report Dated 12/31/84

Claim Number	Date of Accident	Paid Loss	Case Reserve
46890	1/09/84	4,500	0
48948	1/23/84	8,500	0
49095	2/06/84	0	12,000
.	.	.	.
.	.	.	.
.	.	.	.
51000	12/23/84	0	2,500
Acc't Yr 84		3,361,000	5,021,050

Accounting Report Dated 12/31/85

Claim Number	Date of Accident	Paid Loss	Case Reserve
46890	1/09/84	4,500	0
48948	1/23/84	5,800	0
49095	2/06/84	10,500	0
.	.	.	.
.	.	.	.
51000	12/23/84	5,000	3,000
52109	12/28/84	0	4,500
Acc't Yr 84		5,991,234	3,789,754

CUMULATIVE INCURRED LOSSES
Incurred Losses = Paid Losses + Reserves for Reported Claims
(in thousands of dollars)

accident year	12	24	36	48	60
1984	8,382	9,781	10,110		
1985	9,337	10,847			
1986	10,540				

(Header: accident ....Development Stage in Months................)

Exhibit I.10

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

CUMULATIVE INCURRED LOSSES

Incurred Losses = Paid Losses + Reserves for Reported Claims

accident year	12	24	36	48	60	72	84	final total cost
1984	8,382	9,781	10,110	10,219	10,268	10,280	10,292	?
1985	9,337	10,847	11,092	11,192	11,235	11,250		?
1986	10,540	12,205	12,551	12,690	12,725			?
1987	11,875	13,832	14,238	14,413				?
1988	13,343	15,542	16,066					?
1989	14,469	16,776						?
1990	16,561							?

(Header: accident ....Development Stage in Months................. final)

accident year	12-24	24-36	36-48	48-60	60-72	72-84	
1984	1.167	1.034	1.011	1.005	1.001	1.001	
1985	1.162	1.023	1.009	1.004	1.001		
1986	1.158	1.028	1.011	1.003			
1987	1.165	1.029	1.012				
1988	1.165	1.034					
1989	1.159						
1990							
AVERAGING METHODS:							
average	1.163	1.030	1.011	1.004	1.001	1.001	
4 point average	1.162	1.029	1.011	-	-	-	
avg w/o high/low	1.163	1.030	1.011	-	-	-	
weighted avg	1.162	1.030	1.011	-	-	-	
SELECTED LDF'S	1.163	1.030	1.011	1.004	1.001	1.001	1.000
CUMULATIVE LDF'S	1.219	1.048	1.017	1.006	1.002	1.001	1.000

(Header: ....Incurred Loss Development Factors.........)

Exhibit I.11

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

RESERVE ESTIMATE BASED ON INCURRED LOSS DEVELOPMENT

Accident Year	(1) Earned Premium	(2) Incurred to Date	(3) Selected Factor	(4) Estimated Ultimate (2)*(3)	(5) Loss Ratio (4)/(1)	(6) Indicated Reserve (4)-Paid
1984	17,153	10,292	1.000	10,292	60%	533
1985	18,168	11,250	1.001	11,261	62%	753
1986	21,995	12,725	1.002	12,750	58%	1,214
1987	24,173	14,413	1.006	14,499	60%	2,041
1988	25,534	16,066	1.017	16,339	64%	3,640
1989	31,341	16,776	1.048	17,581	56%	6,409
1990	38,469	16,561	1.219	20,188	52%	13,226
	-------	-------		-------	----	-------
	176,833	98,083		102,911	58%	27,817

Exhibit I.12

BASIC TECHNIQUES I

Paid vs. Incurred Data

	PAID	INCURRED
Underlying assumption:	No changes in payment pattern.	No changes in case reserve adequacy.
Pro:	"hard" data - no estimates involved.	Using all the information available.
Con:	May generate large, volatile LDF's. May take a long time to develop to ultimate.	Using case reserves, which are estimates, to develop estimates of ultimate losses.

Exhibit I.13

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

A COMPARISON OF PAID VS INCURRED DEVELOPMENT

Accident Year	....LOSS RATIOS....		.....RESERVES.....	
	Paid Dev'l	Incurred Dev'l	Paid Dev'l	Incurred Dev'l
1984	60%	60%	537	533
1985	63%	62%	988	753
1986	60%	58%	1,765	1,214
1987	64%	60%	3,102	2,041
1988	70%	64%	5,245	3,640
1989	62%	56%	8,290	6,409
1990	57%	52%	14,822	13,226
	----	----	------	------
	62%	58%	34,748	27,817

Accident Year	........IBNR........	
	Paid Dev'l	Incurred Dev'l
1984	4	0
1985	246	11
1986	576	25
1987	1,147	86
1988	1,878	273
1989	2,686	805
1990	5,223	3,627
	------	------
	11,759	4,828

IBNR = Incurred But Not Reported Losses

= Ultimate Losses - Paid Losses - Case Reserves

"Our research actuary's onto something this time — he's been plotting reserves against the claim manager's Biorhythm chart."

Reprinted from the Actuarial Review.

Exhibit I.15

BASIC TECHNIQUES I

Average Value Projections

Vs.

Development Estimates

Development Projections –

Focus only on total dollars of losses, either paid or incurred

Average Value Projections –

Require separate estimates of:

(A) Ultimate Claim Counts (Claim Frequency) and

(B) Ultimate Average Cost Per Claim (Claim Severity).

The product of (A) x (B) yields ultimate losses
often referred to as Frequency/Severity Estimates.

Exhibit I.16

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

CUMULATIVE REPORTED CLAIMS

accident year	12	24	36	48	60	72	84	final claim count
1984	1,432	2,724	2,800	2,832	2,844	2,858	2,858	?
1985	1,428	2,772	2,850	2,866	2,870	2,888		?
1986	1,710	3,032	3,086	3,094	3,110			?
1987	1,358	2,780	2,990	3,000				?
1988	1,510	2,588	2,656					?
1989	1,488	2,604						?
1990	1,604							?

accident year	12-24	24-36	36-48	48-60	60-72	72-84
	1.902	1.028	1.011	1.004	1.005	1.000
1984	1.941	1.028	1.006	1.001	1.006	
1985	1.773	1.018	1.003	1.005		
1986	2.047	1.076	1.003			
1987	1.714	1.026				
1988	1.750					
1989						

AVERAGING METHODS:

	12-24	24-36	36-48	48-60	60-72	72-84	
average	1.855	1.035	1.006	1.004	1.006	1.000	
4 point average	1.821	1.037	1.006	-	-	-	
avg w/o high/low	1.842	1.027	1.004	-	-	-	
weighted average	1.827	1.038	1.004	-	-	-	
SELECTED CDF'S	1.821	1.037	1.006	1.004	1.006	1.000	1.000
AGE TO ULTIMATE	1.919	1.054	1.016	1.010	1.006	1.000	1.000

Exhibit I.17

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

CUMULATIVE PAID SEVERITIES
(cumulative paid loss / number of closed claims)

accident year	...............Development	Stage in	Months...	...	...	...	ult
	12	24	36	48	60	72	84 claim cost
1984	5,108	2,663	2,840	3,074	3,248	3,358	3,456 ?
1985	4,576	3,130	3,187	3,402	3,574	3,693	?
1986	5,386	3,267	3,415	3,598	3,784		?
1987	6,283	4,130	4,123	4,399			?
1988	6,225	5,186	5,363				?
1989	6,688	5,648					?
1990	6,295						?

accident year	............Severity	Development	Factors...	...	...	...	
	12-24	24-36	36-48	48-60	60-72	72-84	
1984	0.521	1.067	1.082	1.057	1.034	1.029	
1985	0.684	1.018	1.067	1.051	1.033		
1986	0.607	1.045	1.053	1.052			
1987	0.657	0.998	1.067				
1988	0.833	1.034					
1989	0.844						
AVERAGING METHODS:							
average	0.691	1.032	1.068	1.053	1.034	1.029	
4 point average	0.735	1.024	1.068	-	-	-	
avg w/o high/low	0.695	1.033	1.067	-	-	-	
weighted average	0.741	1.027	1.065	-	-	-	
SELECTED LDF'S	0.735	1.024	1.068	1.053	1.034	1.029	1.055
AGE TO ULTIMATE	0.950	1.293	1.263	1.183	1.123	1.086	1.055

Exhibit I.18

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

ESTIMATING ULTIMATE COUNTS AND AVERAGES

Accident Year	(1) Claims Reported to Date	(2) Selected Factor Age-to-Ult	(3) Est Ult Count (1)*(2)	(4) Avg Paid Cost to Date	(5) Selected Factor Age-to-Ult	(6) Est Ult Avg Sev (4)*(5)
1984	2,858	1.000	2,858	3,456	1.055	3,646
1985	2,888	1.000	2,888	3,693	1.086	4,011
1986	3,110	1.006	3,129	3,784	1.123	4,249
1987	3,000	1.010	3,030	4,399	1.183	5,204
1988	2,656	1.016	2,698	5,363	1.263	6,773
1989	2,604	1.054	2,745	5,648	1.293	7,303
1990	1,604	1.919	3,078	6,295	0.950	5,980
	18,720		20,426			

RESERVE ESTIMATE BASED ON COUNTS AND AVERAGES

Accident Year	(7) Earned Premium (000)	(8) Estimated Ult Loss (000) (3)*(6)/1000	(9) Loss Ratio (8)/(7)	(10) Paid to Date (000)	(11) Indicated Reserve (000) (8)-(10)
1984	17,153	10,420	61%	9,759	661
1985	18,168	11,584	64%	10,508	1,076
1986	21,995	13,293	60%	11,536	1,757
1987	24,173	15,768	65%	12,458	3,310
1988	25,534	18,277	72%	12,699	5,578
1989	31,341	20,044	64%	11,172	8,872
1990	38,469	18,407	48%	6,962	11,445
	176,833	107,794	61%	75,094	32,700

Exhibit I.19

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

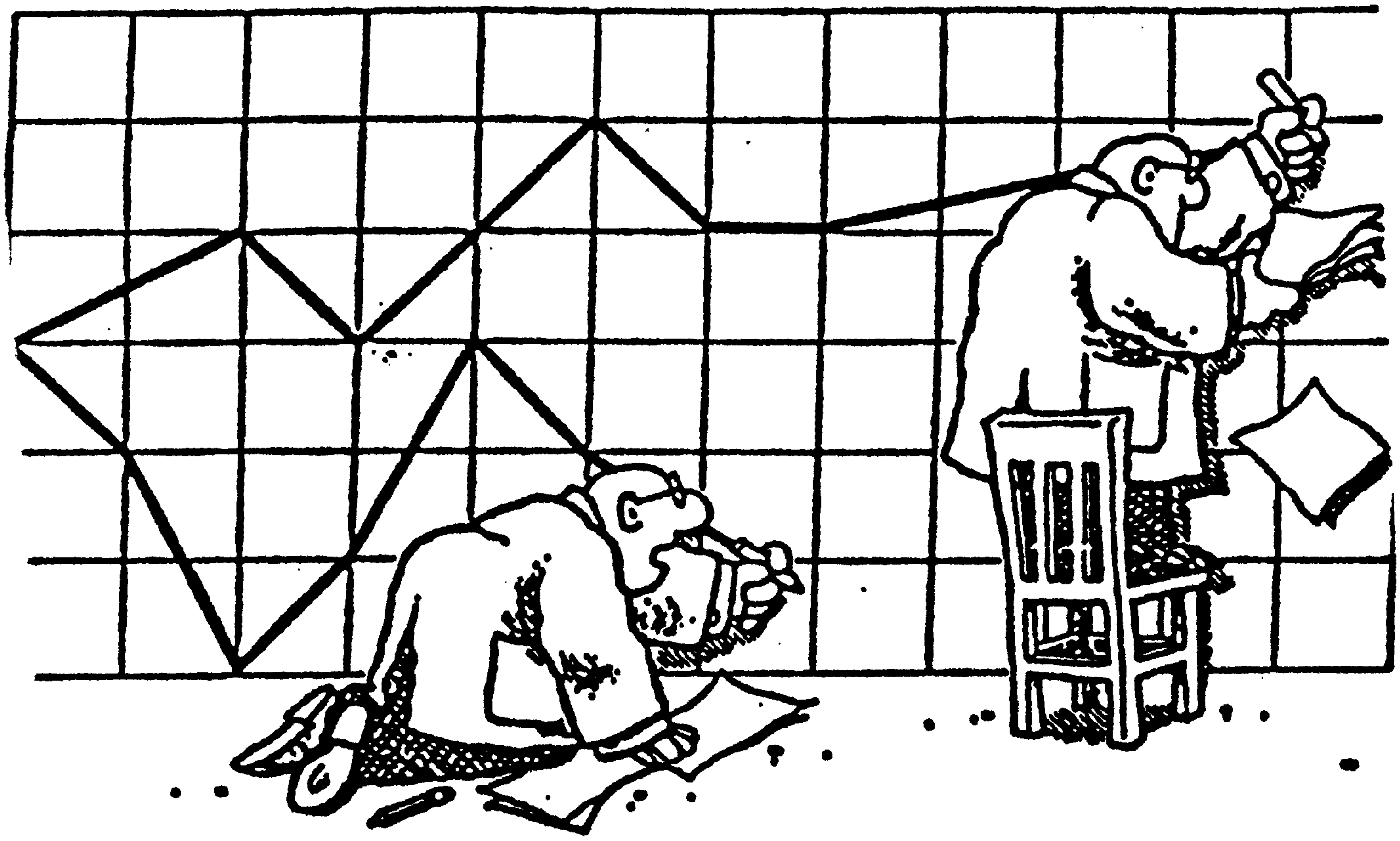
A COMPARISON OF RESERVES ESTIMATES
USING THREE METHODS

Accident Year	....Estimated Ultimate Loss Ratios....		
	Paid Development	Incurred Development	Counts & Averages
1984	60%	60%	61%
1985	63%	62%	64%
1986	60%	58%	60%
1987	64%	60%	65%
1988	70%	64%	72%
1989	62%	56%	64%
1990	57%	52%	48%
	62%	58%	61%

Accident Year	....Estimated Required Reserves....		
	Paid Development	Incurred Development	Counts & Averages
1984	537	533	661
1985	988	753	1,076
1986	1,765	1,214	1,757
1987	3,102	2,041	3,310
1988	5,245	3,640	5,578
1989	8,290	6,409	8,872
1990	14,822	13,226	11,445
	34,748	27,817	32,700

Accident Year	......Estimated Required IBNR......		
	Paid Development	Incurred Development	Counts & Averages
1984	4	0	128
1985	246	11	334
1986	576	25	568
1987	1,147	86	1,355
1988	1,878	273	2,211
1989	2,686	805	3,268
1990	5,223	3,627	1,846
	11,759	4,828	9,711

Exhibit I.20



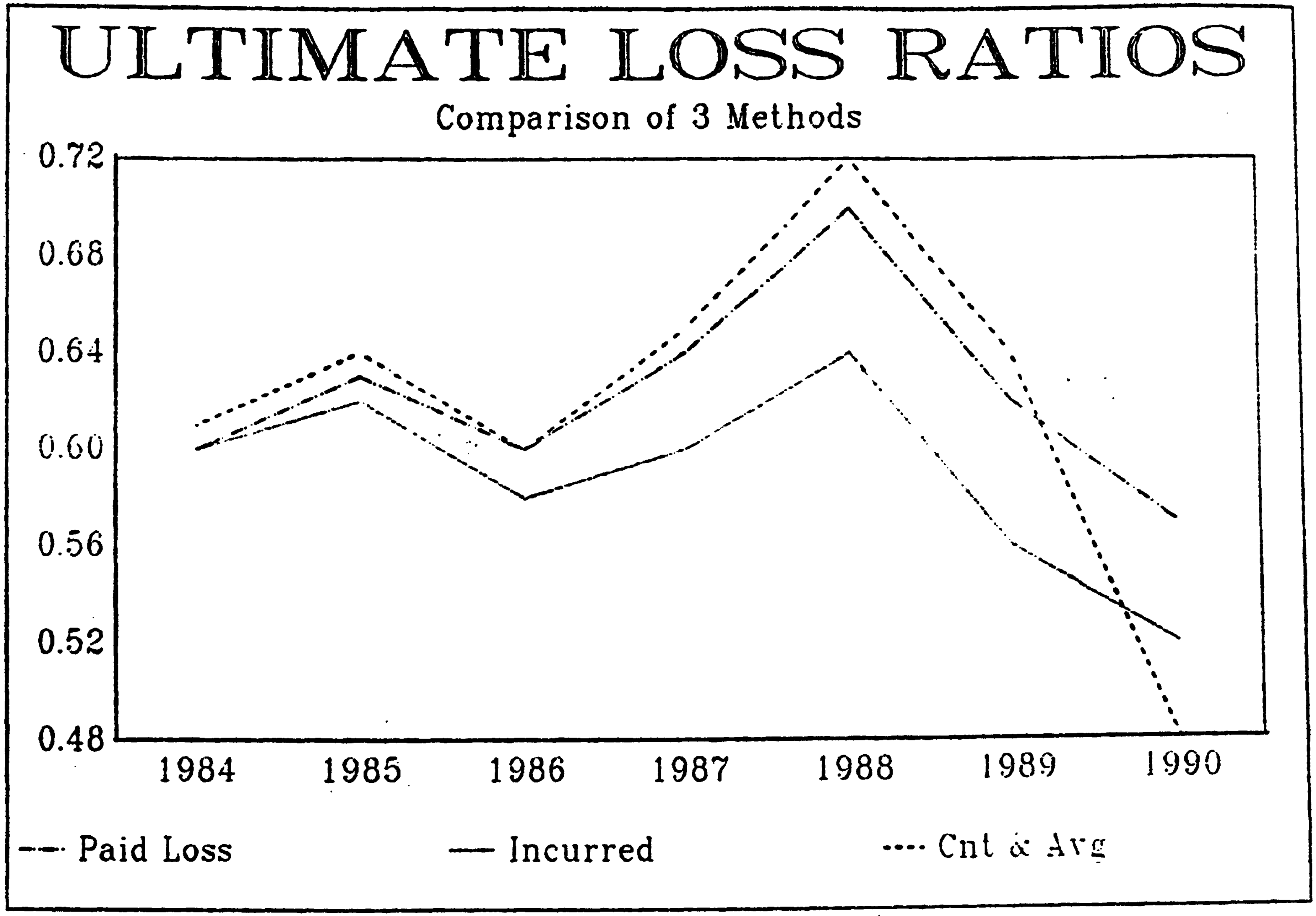
"HEY, I THOUGHT WE WERE WORKING WITH THE SAME DATA..."

BASIC TECHNIQUES I

Key Assumptions and Potential Problems Inherent in Development Factor Analyses

ASSUMPTIONS	SAMPLE PROBLEMS
. CLAIM SETTLEMENT PATTERNS UNCHANGING	. INCREASING DELAYS IN CLAIM CLOSING RATES
. CASE RESERVING PRACTICES & PHILOSOPHIES UNCHANGING	. CONSCIOUS EFFORT TO IMPROVE CASE RESERVING ADEQUACY . INTRODUCTION OF NEW CASE RESERVING PROCEDURES
. NO CLAIM PROCESSING CHANGES	. CHANGE IN DATA PROCESSING . REVISED CLAIM PAYMENT RECORDING PROCEDURES
. POLICY LIMITS HAVE NO IMPACT ON LOSS DEVELOPMENT	. INCREASING FREQUENCY OF FULL POLICY LIMIT CLAIMS . CHANGING POLICY LIMITS
. LOSS DEVELOPMENT UNAFFECTED BY CHANGING LOSS COST TRENDS	. SURGES IN INFLATION . INCREASED LITIGATION . DIMINISHED POLICY DEFENSES
. NO CHANGES IN MIX OF BUSINESS	. CHANGES IN REINSURANCE COVERAGES . INCREASED LONG-TAIL EXPOSURE . INTRODUCTION OF NEW OR REVISED COVERAGES
NO CYCLICITY IN LOSS DEVELOPMENT	. CLAIM SETTLEMENT OR RESERVING IMPACTED BY BUSINESS OR UNDERWRITING CYCLES
NO DATA ANOMALIES	. CATASTROPHIC OR UNUSUAL LOSSES REFLECTED IN LOSS EXPERIENCE . UNUSUAL CLAIM SETTLEMENT/ REPORTING DELAYS

Exhibit I.22


ULTIMATE LOSS RATIOS
Comparison of 3 Methods
0.72
0.68
0.64
0.60
0.56
0.52
0.48
1984
1985
1986
1987
1988
1989
1990
Paid Loss
Incurred
Cnt & Avg

1991 CASUALTY LOSS RESERVE SEMINAR

3C/5D: INTERMEDIATE TECHNIQUES II

Panel

Andrew Rapoport
Workers' Compensation Reinsurance Association

Scott Reddig
Nationwide Insurance of Columbus

Recorder

Gayle Haskell
Crum & Forster Corporation

MR. RAPOPORT: -- 5D, Intermediate Techniques II. You're in Salon V. I'm Andrew Rapoport from the Workers' Compensation Reinsurance Association. This is Scott Reddig from the Nationwide Insurance of Columbus.

I need to make some preliminary announcements. This session is being recorded. I understand that following the session you can get copies of the cassettes at the cassette sales booth just outside.

When we ask for questions, I will try to either repeat them or run around with a mike and get them loud enough. Tickets and evaluations will be collected at the end of the session. There are also copies of the handouts available near the door for those of you who missed them.

In intermediate session 2, we're going to talk a little bit today about when the patterns or when the techniques actually don't work, or what you need to do to adjust them for changes in your history.

So, the basic principle that we'll start with is loss reserve data should contain a long, stable history of homogenous claim experience where no significant operational changes materially affect either the mix of business or the handling of claims. There should be a sufficient number of claims to produce credible loss reserve patterns.

Now, in this, there is basically about five points that I thought were important to emphasize. As we go through this session, we will hit on those. What we're talking about is, first of all, when you have data, it is important, one, that you have enough stable history, that the history be consistent, that your data be homogenous or, in cases where it isn't, that the mix stays relatively stable.

I should ask here what's the background of this group? How many people here work for insurance companies? How many consultants? Government regulators? Accountants? Just people in business, regular? Unemployed? Retired? How many people in, say, workers' comp? Auto liability or physical damage? General liability? That will give me some idea. I may ask for some examples. One last question, how many students? How many are done with their exams?

We'll go through some examples of mix changes a little later. But first we'll talk about how the past history. You may have 20 percent from one state and 80 percent from another, and they may behave very differently. As those changes go, your past history may not reflect the future.

Claim handling changes: People within your claims department obviously don't stay there forever. Some of them do, but not all of them. Also, you may see payments accelerate or decelerate as new computers systems come in.

Case reserves can be strengthened or weakened due to turnover changes and procedures. Also, the estimates of reserves may change due to policy changes or due to personnel changes. All of those are patterns that you need to be sensitive to and to reflect when you make projections of the future.

External changes, environmental changes, and new causative agents impact loss costs. Other outside effects come into play. Society's attitude changes. An example from the syllabus is where they talk about malpractice insurance. In the 1950s, it was almost unheard of to sue a doctor; yet, it's a little more commonplace these days.

Court decisions change the rules. I know in some lines of business, for example auto insurance, a court decision regarding stacking of limits changed the coverage that was available. So past history may not show any losses above a certain level, but they may be quite common going forward after that court decision.

Changes in the economy affect claim inflation. An example is in workers' comp where you may have a lifetime payout pattern and there may be escalation of the wage benefit with the change in inflation. So that just as wages today are considerably higher than 10 or 20 years ago, the future benefit levels may accelerate.

In this session, I'm going to talk about the impact of mix changes. Then I'll turn it over to Scott who will go into some details on how to actually work with the method. He will be working with the Berquist and Sherman method, both looking at changes in case reserve adequacy and payment patterns. He's going to be showing how to adjust the data, and we'll work with some numbers.

Then I will come back for a couple additional points, one talking about net versus gross loss reserve analyses briefly, and I'll also talk about tail factors. Certainly, it's open for questions as we go along.

Slide 4 represents the history I'm going to be dealing with. Does it look stable or unstable? Stable. I would hope it looks stable. It looks stable if you look down the column -- for those that may be a little rusty, we have accident years as the rows, valued across the rows at 12 months after the beginning of the accident year, then 24 months and 36 months. We can see that we've had the same amount of loss payments for each accident year as of 12 months, 24 months, and 36 months.

However, it turns out that if we were to analyze this particular piece of data, we actually have two underlying claim categories. For one claim category, 75 percent of the losses come in within the first 12 months. Then there is a little bit of development, with approximately a third more coming through in the next two years.

The other claim category, B, has about 25 percent of the business and you can see that in the next three years it's going to increase six-fold. Most of the losses come in after 12 months. In essence, A is a very quick reporting, quick paying type of business. B is slower reporting and has a slower payoff pattern.

Now, in 1990, although we still had $2 million paid, apparently we had a flip flop in the type of business, so that now only 25 percent comes from category A, 75 percent from category B. However, the total still looks like $2 million.

(Slide)

Slide 6 shows the importance of looking at the subpieces, and looking at these mix changes. If we were to do a projection for 1990 based on just the total, since we always had $2 million the first year, $4 million the second, $5 million the third, then we'd come up with a projection of $5 million.

However, if we were to do projections based on category A versus category B, and we know that category A basically only has about 25 percent development over the next two years and category B, as I mentioned, has six-fold, we'd get a considerably different and larger amount. So that by splitting and analyzing the pieces, we get about $9.7 million instead of $5 million; obviously, a significant difference exists between these projections.

Now, normally you're not going to see things where they flip like this, or at least I've never seen it. But you may see business growing or decreasing slightly. It's going to be important to emphasize whether that change in business is due to things like a change in coverage or due to an expansion.

The key principle in this example is basically that you should search for the subdivisions of data related to possible causes of variable loss development. If you know there's differences in states, coverages, et cetera, keep track of those categories. That's important also to think about if you're ever in the position where you set up a database. Beforehand, keep track of things that you think will be relevant in the future.

Well, what kind of things? In the primary business, one of the things I mentioned briefly was geographic differences. This is pretty obvious. The laws may vary from state to state. For example, some may have a verbal versus a monetary threshold and PIP claims. Within a company, the regional offices of that company may handle things differently. As a result, it's important to keep track of where the business is coming from.

Again, just in terms of the legal climate from one state or one city to another, districts may have a significant affect on the size of settlements and therefore the size of the losses that you pay out. In terms of product lines, if you develop new products, it would be good if your system was able to separate your new type of business from your old type of business because there's no guarantee your new business will produce losses in exactly the same way as your old business.

Similarly to that, for sublines or coverages within the line of business, there may be divisions that you should identify. However, you may need to be careful that your system doesn't take over. I know some companies may have up to 200 subline or coverage differences which makes for a very complicated loss reserving process.

Deductibles are another exmaple. In my particular company we have retentions which are similar to deductibles. However, it is important to consider that you may have $50 deductible, $100 deductible, or $1,000 deductible policies. If you have a lower deductible, should your claims come in faster or slower? The answer is: Faster. If you have a higher deductible, they come in a lot slower. Also, would you get more or less losses in the higher deductible? The company would probably see less because the policyholder holds on to the first portion. You may get higher severity on a first dollar basis.

But the patterns are definitely different, so it's important to keep track. Also, cause of loss or type of loss payments are important. For example, homeowners, which covers different things, has a wind storm, theft, fire, and certainly some years you may have a significant exposure due to wind. Some geographical areas may have significant differences due to theft loss. All of these exposures would have different patterns in terms of how they are reported and paid.

For workers' comp, you may have differences for medical versus indemnity. For reinsurance, there are parallels. It's important to keep track of different attachment points, your losses, the production source, where is the business coming from, and the line or subline.

So, how do you decide what's impacting the data? This is probably the other important point or one of the most important points I want to emphasize. Go out and ask people, talk to underwriters. They may know more about the coverages. They may also know what they are planning in terms of the future. There may be a new line introduced.

You have to make sure that you're not out of the loop. If the business is changing and you're not aware of it, you may find very strange developments in your loss reserving data. Talk to the comptrollers in terms of accounting systems. Are there changes that may be affecting the way that losses are being recorded?

Talk to the claims department. Did they have a change in philosophy? Are they setting new standards for certain injury types in terms of what they're reporting? Talk to other actuaries, what their past experience is, what they know about the business and your company. If you can, talk to the agents.

The key thing is to learn as much as possible about your business and what you're evaluating. You need to know what it's been historically and what it is becoming. Essentially, loss reserving is taking the patterns of the past and projecting them to the future.

Well, what do you do if the mix changes include new business and you don't have the data? The first idea is to look for alternative sources of data. Are there similar lines of business? In this slide we talk about a line that was formerly comprised of OL&T, owners, landlords, and tenants. But in more recent years, they've added manufacturers and contractors. So, in the example here we talk about using the ISO development patters for M & C to OL & T and modifying your factors accordingly.

Other approaches may be using data for similar lines if the company is actually developing an entire new line of business. At one time I worked for a company developing personal excess policies. Our initial research was to look at the liability side of the standard personal auto coverage, and then recognizing whether we think this new line of excess policies will be a shorter tail or a longer tail line, and expanded the patterns based on that.

Discuss potential impacts with the claims department, underwriting and other actuaries. It's important to look at a change in business. Is it going to affect how long the tail is, how long the claims come in and how they change? Will it affect the number of claims you get? Will it affect the average size of loss? Will it affect your loss ratios?

Scott is now going to take over and talk to you about the specifics on modifications of the Berquist-Sherman technique.

MR. REDDIG: The next two sections of our presentation I'd like to make just a little bit more of a discussion than a lecture. So, today I might throw out some questions and just call on people.

(Laughter)

What we want to talk about in the next few sections, as Andy mentioned, are the Berquist-Sherman methods. This might be an ideal discussion for anyone planning on taking part 7 anytime in the near future since these methods are on that exam. As Andy mentioned, the key issue in any loss reserve analysis is that we're working towards this ideal, the ideal that we can very mechanically use the past to predict the future.

But unfortunately that rarely is the case. Andy gave us one example of a situation where we have changes in our past that will invalidate the assumption that the past can be very mechanically used, namely when you have changes in the mix of business.

There are two more examples, and that's what we want to talk about with respect to the Berquist-Sherman methods. One is when you have changes in payment patterns, or more specifically changes in the rate that claims are closing across accident years. Another example is when you have changes in the level of adequacy of case reserves by accident year. What we're talking about is the need to make comparisons of those patterns from one accident year to the next.

(Slide 12)

We're going to first talk about the Berquist-Sherman closing rate adjustment. Before we get into either of these methods, I want to emphasize up front what the two goals, that I see, of these methods are.

First of all, these Berquist-Sherman methods will attempt to reconstruct history. As we're saying, if we actually use the history that we have to project the future, it's really not applicable because we have changes occurring. So what we're going to try to do is reconstruct the history.

The second goal is, after doing that, we come up with adjusted paid loss or incurred loss estimates from our traditional paid loss and incurred loss methods. The goal is not to get totally "undistorted" or "correct" paid or incurred loss estimates. All we're really trying to do is narrow the range between those two methods when they're applied to the raw unadusted data.

Remember, there are often too many things happening within your development to really ever get "correct" or "undistorted" estimates. So we're really using these methods in tandem to bring the paid and incurred loss estimates closer together.

The first method is the closing rate adjustment. The first step is to try to determine if we even need to make an adjustment. Now how do we do that? We try to detect if there are payment pattern changes occurring. One of the very common tools that an actuary might start with to determine if there is some kind of closing rate pattern change is the ratio of closed claims divided by reported claims found at various stages of your developments.

We're referring to that as the settlement rate. This is an indicator that we use of payment pattern changes. For example, if you look at accident year 1989 at 24 months of development, we show an 80 percent settlement rate. What that means is that, of the reported number of claims as of 24 months of development, 80 percent of them were closed. Note that this is of reported claims, not of the ultimate number of claims that will be reported.

If we compare that to the settlement rate at 24 months of development for accident year 1988 where there was 90 percent closed, it appears that we have some kind of settlement rate slowdown for the more recent years.

If we make a comparison at the 12-month development point between accident year 1989 and 1990, again we see a slowdown from 50 percent to 40 percent. So, this one indicator is suggesting we do have some kind of payment pattern change. Therefore, if we blindly used the paid loss method, we may come up with estimates that are inappropriate because we made the inappropriate assumption that the future is going to be like the past.

For other indicators you might look at in your data: one minor modification would be to take the claims reported in the denominator and exclude closed without payment counts (CWPs), from that. In many lines you will find such volatile activity in the CWPs that it actually distorts your data more than the value of having CWPs there in the first place.

There are a variety of other indicators. Let's say we've looked at a lot of those indicators and the data is telling us that there's something going on here. As

Andy emphasized, one of the most important messages we want to give you is you need to ask questions. Don't just blindly rely on the data.

You should ask: Is the data telling us something meaningful or is it misleading us? What might you ask? Let's go back to slide 11.

(Slide 11)

A change like this could be indicating a mix change, just as Andy talked about. Let's say we're looking at a book of business where you haven't separated your property and liability exposures. In the more recent years, you're getting a larger proportion of liability exposures as compared to property.

Liability claims tend to settle at a slower rate. This could be behind the patterns we saw in slide 12. Another thing you might want to do is look at those settlement rates in another coverage that's handled similarly to the coverage you're looking at. Suppose you looked at a personal auto uninsured motorist coverage (UMC), and you found in your company that the claims department typically handles BI, the bodily injury coverage, in a similar fashion. Then you would expect that if there's a slowdown in UMC, you would see a slowdown in BI.

To effectively ask questions, you really need to go to the claims department since they have a significant impact on closing rates. You might ask about opening and closing practices. Maybe a new claims manager has come in and is more aggressively "opening claims", meaning they are recording reported claims into the system faster than they did in the past, maybe to get investigations on certain coverages started more quickly.

In this case, what will happen to your settlement rates that we looked at? You'll see a spike in the reported counts. They will go higher and that will drop the settlement rates because the reported counts are in the denominator. But that's really not a settlement rate change. That's more of an accounting or a coding change within your claims department.

So that would be very important information to gather because that would tell you that your data is misleading. It would be telling you there's a settlement rate slowdown when that's really not happening.

You might ask about the entire environment that the claims are being handled in. Has that changed? Have there been law changes, economic changes? For example, how many of you are familiar with Act 6 in Pennsylvania? Anyone? Okay, a couple people. First of all, Act 6 was a no-fault law that they put in for personal auto insurance in Pennsylvania last year.

One of the aspects of that law is that medical payments under auto insurance now must be tied to a Medicare fee schedule. What we found at Nationwide is that the claims department is going through a learning process, now having to assess cost on certain injuries against this Medicare fee schedule because they are not used to using it. It's slowing down settlement rates. That type of information would be very important to gather.

Another example might be if you are working with personal auto, BI, and you have been in a non-no-fault environment for a number of years and suddenly the state goes to a very strong New York-type no-fault law. BI payments are now going to be delayed until compensation is collected through the no-fault coverage. So, you're going to see a slowdown in the payment rate of bodily injury.

Another area of inquiry might be asking about the entire organization or management of the claims department. Has it changed? Has staffing changed? An example here might be if you had a large growth in your company where a large volume of business has come in, but you didn't, at the same time, increase the level of staffing within your claims department; now the number of pending claims that each adjuster has to handle has increased dramatically. Now there's a backlog in the claims department and the rate at which claims are being closed is slowing down dramatically. That, again, would be very important information to gather, and would be something that would verify what you were seeing in the data.

Let's say we've gone through this very extensive investigation after asking many, many questions. We've decided yes, the data is telling us something valid. We do have a settlement rate change or a closing rate change. How might we then use that information or how might we adjust our paid loss development technique so that we can then make that very mechanical assumption that the past can be reasonably used to predict the future?

(Slide 13)

The first step in this Berquist-Sherman adjustment is to come up with what we call the "adjusted closed count". We're working here with disposal rates. Let's first of all notice that we have the data that was underlying the settlement rates we had on the other slide. For example, at accident year 1988, at 24 months of development we show 810 closed claims and 900 reported claims. 810 over 900 is the 90 percent settlement rate we saw on the previous slide.

This is a different statistic than the disposal rate. The disposal rate is when you take the closed claims divided by the ultimate reported or ultimate closed claims that you would estimate through some kind of count development technique.

In the case of accident year 1988, we're estimating 1,000 claims will be closed for that year in total.

To get the disposal rate, we take the closed claims of, 810 and divide by 1,000 to get the 81 percent disposal rate. The disposal rate all throughout the triangle is calculated in the same way.

In the oldest year, accident year 1988, the triangle shows 25 percent disposed as of 12 months, and 81 percent disposed as of 24 months. But move down to the 1989 accident year and you see 24.5 percent disposed as of 12 months, then only 71.8 percent disposed as of 24 months.

This seems to be the slowdown as indicated by the settlement rate change. So what we're going to do is impose upon all the accident years the same disposal rate pattern. That pattern will be the most current that we have. Accordingly, we're going to look at the 20 percent disposed for 1990 at 12 months. We're then going to force all the years to have 20 percent disposed of at 12 months, 71.8 percent disposed of as of 24 months, and then be fully mature at 36 months.

How do we do that? Let's go back to the 24 month point of accident year 1988. Rather than 81 percent disposed of, we want to reflect only 71.8 percent disposed of as for accident year 1989. To do that, we simply take the 71.8 percent disposal rate and multiply that by the estimated ultimate number of claims that we estimate for 1988, 1000. That gives us the 718 "adjusted closed counts". We do a similar adjustment for all the different points that need adjusted.

(Slide 14)

That's the first step. Now we have a triangle of adjusted counts. Now we need to adjust our losses, using the adjusted counts that we have. Let's take accident year 1988, for example. We know from actual data that when there were 250 claims paid, we had \$1 million in payments in payments. We know also that when there were 810 claims paid, we had \$4 million in payments. Now we're going to reconstruct the triangle so that we only reflect 718 claims paid as of 24 months. So now we ask if 718 had been paid, how many dollars would have been paid out? To estimate, we use an interpolation technique to derive the answer on the bottom of slide 14, of \$3,507,143.

Now you want to note, especially if you're taking part 7, that Berquist & Sherman's paper actually suggests exponential interpolation. In other words, you would assume that the relationship between losses and counts is modeled by the function $y = a \cdot [\exp(bx)]$.

We've simplified it here for presentation purposes. At Nationwide we've programmed this method. A lot of times in what we do as the first step of this method is to do some fits with your losses against your counts to see what function actually best describes that relationship, and then use that as the basis for the interpolation, not just assuming linear or exponential, since it will vary from coverage to coverage.

(Slide 15)

Now we're going to move to the last step of this method. First of all, you see the adjusted paid losses, now, here in the triangle. You see the \$3,507,000 that we came up with at 24 months of development. You'll also notice that the 12 month points for accident year 1988 and 1989 have also been adjusted.

Now, if you try to do this adjustment afterwards and come up with these numbers to verify this example, you will want to make a note that to come up with the adjusted numbers at 12 months you will need to assume that when there are zero claims paid, there will be zero dollars paid.

Sounds intuitive, but if you have partial payments in your paid loss data, that's not necessarily the case. Here, we've made this simplifying assumption to get these illustrative numbers. With these adjusted paid losses, what we're looking at now is an adjusted triangle that theoretically reflects a common disposal rate pattern in each year.

The triangle now reflects 20 percent disposed of at 12 months, 71.8 percent disposed of at 24 months, and fully disposed at 36 months for every accident year. Now we simply use this adjusted triangle, do our paid loss development method, and get our ultimates. You can compare what we get from the adjusted numbers with what we would have gotten using an unadjusted paid loss triangle, that we have a significant increase in the estimated ultimate losses.

So this adjustment does seem to be important. This example shows significant understatement by the actual paid method. I guess one point I should make here, too is that there are a number of advantages and disadvantages of the method to talk about. If we have time, I'll come back and talk about a few of those disadvantages.

The advantages seem to be clear. This method really does seem to work. At least in practice, we've seen that it dramatically smoothes out your developments on paid and even settled losses.

In the interest of time, let me do the case reserve adequacy method, and we'll come back and talk about some drawbacks if we have some time. Drawbacks are also talked about in the review to this paper, which I would recommend reading.

Are there any questions on what we've done so far?

(No response.)

(Slide 16)

Now we're going to talk about the case reserve adequacy adjustment. This is going to be an adjustment to the incurred loss method. Incurred losses are defined to be paid losses plus case reserves. Hence, if we have changes in the level of case reserve adequacy, it should have an impact on incurred losses.

One of the first places you might start in determining if we even need to make an adjustment, and a point where a lot of loss reserve analyses start, is to compare paid and incurred loss estimates. In the situation illustrated in slide 16 we seem to have a big divergence.

I think if you were to print out the age-to-age factors that go with these developments, you would find that your paid developments are very stable, but your incurred developments are exhibiting a trend in the age-to-age factors. When I see this, the first thing I start thinking about is what's happening to the case reserves because that's what's different between the paid and incurred data.

So let's look a little bit further and see what we can find out from some other indicators. Another thing an actuary might use is to take the ratio of the paid losses to the incurred losses at appropriate development points and see what that might tell us.

(Slide 17)

In this example, we see that we have an increase in this ratio in the more recent points. So our question is: does this tell us if there is case reserve deterioration since, if there was a deterioration we'd expect the incurred amounts in the denominator of this ratio to start dropping, which would cause this ratio to rise.

But on the other hand, this could also be caused if you had an increase in the settlement rate, because you'd have more paid dollars at certain points in time which would also cause this ratio to rise. So unfortunately, this indicator cannot provide us with a strong conclusion because it can be imparted by too many things all at once.

So, one thing you also might want to note, since case reserve adequacy is really a characteristic or a measurement of average case reserves, you might consider also looking at ratios of paid severities versus incurred severities.

(Slide 18)

Even here, we can't really make a conclusion so we need to look further. Now we're looking at an indicator we've already seen before and that's the settlement rate, the number of closed claims to the number of reported claims.

In the past example we saw that settlement rates were decreasing. But in this example they seem to be very steady, almost unbelievably steady. If we take this information and use it with the information we saw in the previous slide, we might be able to make a conclusion, although perhaps tentative, that case reserve adequacy is weakening. This is because the settlement rates indicate that the paids are steady. So when we're looking at paid to incurred ratios, in the previous slide, that are increasing, it would seem to indicate that case reserves may be deteriorating.

(Slide 19)

So we seem to have some evidence in the data that there is case reserve weakening. One thing I want to point out is that what Berquist and Sherman do in detecting changes in case reserve adequacy and is somewhat of a unique method.

I should point out that there is an appendix attached to the back of your handout, that if you want to try to go in detail through the example we went through with this case reserve adequacy adjustment, you can work through the numbers. I know when I tried to redo this example with the data we show on the slide, it gets a little confusing because we don't show the counts very often. So you might want to make a note of that, and reconstruct the example later on your own.

Anyway, the Berquist and Sherman paper compares trends that they can develop from the paid and case reserve triangles, such as average severities. In this example on slide 17, what we see is that paids are exhibiting a severity trend that is unbelievably stable, 25 percent a year with no aberration at all.

But average case reserves are exhibiting a decreasing trend, very different from what we're seeing in the average paids. So once again it appears that we do seem to have case reserve adequacy deterioration or case reserve deterioration.

Does it make sense to anyone why we would conclude that here? We would expect to see that the case reserves which are established to pay for claims similar to what we've already paid for, would show the same kinds of trends.

(Slide 20)

What kind of questions might we ask to make sure that our data is not misleading us? Again, we want to ask about mix changes. We talked about the possibility of analyzing a book of business that has both liability and property exposures. Let's say once again we're talking about an increase in the proportion of liability exposures in your book of business in the more recent years. If that happens and you've tended in the past to note that liability exposures have weaker case reserves, then you might expect what we're seeing in this data, namely weakening in overall case reserve adequacy. You might ask about policy limits, and have policyholders been purchasing policy limits that keep pace with inflation? If they don't, that could actually be the explanation as to why case reserves do not seem to be staying with the paid trends. Maybe the trends are indicating something that you do not want to adjust for.

If you think about it, the average case reserves that we saw in the last slide are really reflecting the claims department estimate of costs on probably the larger claims for those accident years. Those would be the ones still open. So, suppose that policy limits are not rising as fast as they should be to stay with inflation. Policy limits that don't rise with the rate of inflation are going to eventually provide a cap on what can be collected on those larger claims. So if they are providing that cap, that's going to flatten out your severity trends, which is exactly what's happening here in our example.

So that could also be an explanation here. It doesn't necessarily have to be, but that's something you want to investigate. A similar explanation would be if you're looking at net-of-reinsurance data, the retentions could also have a similar impact.

Again, you want to ask questions of the claims department about the organization, or turnover, or any changes in the philosophy of how the claims department sets case reserves in the first place. As an example I've seen at Nationwide's claims department, we have units for personal auto coverage that are solely responsible for handling the larger claims. They set case reserves for the larger claims. They also work on the settlements of those claims. These units are filled with medical and legal specialists that would not necessarily handle every claim. Now what would happen if in the future, after using those units for a number of years, everyone in that unit quit? What would happen to your case reserves?

It would be very likely, at least in the interim until you get new people in there and trained, that you would see some weakening in the case reserves because the expertise would not be there to make a good estimate of what the costs for those larger claims would be. So, you might see patterns like we're seeing in the example.

Let's once again say we've gone through this extensive investigation and we decide that the data is not misleading us. Thus, there really is case reserve deterioration, so we use the incurred loss method.

(Slide 21)

This is a two-step adjustment. What we're going to do is reconstruct the triangle so that all accident years at each given development point reflect the same level of case adequacy. For the level of adequacy that we want all the years to reflect, we're going to use the level of adequacy reflected in the most recent diagonal of the triangle.

We want, for example, at the 24-month development point to have all case reserves throughout the triangle reflect the level of adequacy in the $7,500 average case reserves from accident year 1989, that being the most recent 24-month point.

Now $8,000 is probably more adequate than $7,500 is, judging from the inflation rate moving through the paid triangle. We want to adjust that $8,000 so it reflects the same level of adequacy that $7,500 does in 1989. To do that, we simply deflate $7,500 by the inflation rate that we think should be moving through this triangle of case reserves.

We take $7,500, denoted by the asterisk on the right, and divide by 1.25 to get our adjusted average case reserves. This would now reflect a level of adequacy similar to the $7,500. If the level of adequacy is staying the same, we should expect this increase of 25 percent because we believe that to be the inflation rate based on the paid triangle.

We do that in all the parts of the triangle that need adjustment. Once again, because we're using the most recent diagonal as the basis, we don't have to adjust those numbers. We just adjust everything previous to that.

(Slide 22)

The second to last step of the Berquist-Sherman method for case reserve adequacy is to use those adjusted case reserves to recreate the incurred triangle. For example, let's look on slide 22 at accident year 1989, at 12 months of development. In the actual triangle, we saw $10 million of incurred losses at that point. That was made up of $2,500,000 of paids and another $7,500,000 of pending, or case, reserves.

Those case reserves came about on 4,000 open claims with an average of $1,875. With our adjusted case reserves, we want to recalculate that incurred amount. So, as shown in the example at the bottom, the adjusted averae case reserve of $1,458 times the 4,000 open claims will give you the adjusted case reserves. You add that amount to the actual payments of $2,500,000 to get the $8,332,000 that we show in the triangle as our adjusted incurred losses.

This method would be used to get the 12-month and the 24-month points for accident year 1988 as well. With this adjustment, we now have an adjusted incurred triangle that we can now use with the normal incurred development technique, age-to-age factors and so forth, to develop the "adjusted" incurred loss estimates from the Berquist-Sherman method. These adjusted ultimates are compared here with the estimates we would have gotten from the incurred method without this adjustment. Once again, a pretty significant increase has occurred in our estimates. So this would suggest that, had we not made the Berquist and Sherman adjustment, we would have had a serious understatement of our reserve needs.

You'll also notice that these adjusted ultimates line up perfectly with the paid estimates that you would have gotten using the paid method. That kind of ruins my point from the very beginning which was we're using this method to narrow the range between the paid and incurred loss estimates. Here, for illustration, we've made the range nonexistent since they are exactly the same. Of course, this is an idealized example.

An advantage of this method is that the case reserve adequacy method does tend to smooth out incurred factors. But you have to be careful. There is a review of the Berquist-Sherman paper that warns that this method has one big downfall, and that is that it relies so heavily on the inflation rate.

Concerning the inflation rate that we come up with of 25%: you are rarely going to be able to find that nice, stable, obvious 25 percent inflation rate that should be underlying in the triangle. You may have to look at a number of different sources. The review cautions regarding the method because it found that in experimenting with the method, as the inflation rate swings, the estimates swing as well, and dramatically.

QUESTION: Do you expect the inflation rate to vary by age of development?

MR. REDDIG: That really would be another criticism of the method because it's very possible. In fact, there are a number of papers on Part 7 that suggest you wouldn't expect a common inflation rate to be working in every age of development.

The larger claims that tend to be outstanding at the later development points might have a different inflation rate, so you would want to adjust them with a different inflation rate. That's something you would have to investigate and see what you think is most appropriate through a variety of sources, external data for example.

Another thing you might want to investigate is a paper that appeared in the May 1988 Discussion Paper Program put out by the CAS. The paper is written by Fleming and Mayer.

They point out that incurreds are also affected by settlement rate or closing rate changes. So you really need to adjust incurred losses for settlement rate changes first and then make this case reserve adequacy adjustment. They suggest in a general fashion how you would do that. You might read that for further information on the subject.

We do have a little bit of time. First of all, are there any questions about this method or even the first method that I went through?

(No response.)

One thing I should also point out, let's go back and just quickly talk about advantages and disadvantages of the closing rate adjustment that we went through in the first few slides. Once again you will see in using that method, that you get the intuitive appealing result that the factors and paid loss developments will dramatically smooth out, especially in short and medium tail coverages.

But you have to be careful because there are some drawbacks to that method as well. Remember, in that method we were relying on the counts to give us something on which to base our adjustments. The method's reliance on count developments might sometimes be a little too heavy.

A lot of times you'll have lines of business for which estimating ultimate counts is just as tough as estimating ultimate losses. So you have to really have some confidence in those count estimates or you're going to be indicating disposal rates throughout your triangle that really aren't appropriate. And, then making adjustments that are also inappropriate.

Also we've assumed that it's a paid loss triangle that we should be trying to adjust. by assuming a relationship between paid losses and paid counts at various development points. It might make more sense to use "settled" losses, where you take the paid losses and subtract out the partial payments. Then, the paid counts would need to reflect what's been closed so far.

We have found that you will get a stronger relationship between settled losses and paid counts, than you will between paid losses and paid counts. So you might actually do the Berquist & Sherman adjustment on settled losses instead. Now, that's not always going to work. There are going to be some lines for which settled losses have an unstable pattern.

There's a significant drawback that I want to bring your attention to. It's discussed in the review of the paper. In our example, we saw a slowdown in settlement rates. You saw that on slide 12. Now let's say, for example, that we do indeed have a slowdown in settlement rates.

We go through the method. The adjustment causes us to increase our ultimate losses. Well, let's say there's been a shift in the order in which the claims department is settling claims. Even though only 80 percent of the claims are now settled as of 24 months of development rather than the 90 percent seen previously, we have as a percentage of total loss dollars paid 95 percent because we're now paying larger claims earlier.

So even though only 80 percent of the claims have been paid, 95 percent of the losses have been paid. You would not want to make an adjustment that further increases the age to ultimate factors that you derive in projecting that number to ultimate. But that's what we could do if we blindly used the settlement rate adjustment Berquist and Sherman suggest.

So, if you have a shift in the order in which claims are being paid, with larger losses moving forward in the development so that larger claims are being paid earlier, the percentage of losses paid at any one point in time is now larger than you've seen in the past rather than smaller, even though the closing rate is now lower than for the more recent past years. The method, therefore, will further exaggerate rather than help your paid loss method.

In this situation, the method will furhter exaggerage rather than help the paid loss method. The review of the paper does describe this phenomenon, and gives an example of how that could happen. So you really have to be careful.

In fact, we've seen that in practice. So while this method is worth experimenting with, but you really have to be careful that you don't have situations that will cause the method to further exaggerate already distorted paid loss estimates.

QUESTION: (Inaudible)

MR. REDDIG: He's asking why, if you're seeing these settlement rate changes in the more recent years, why you would also adjust the whole triangle so you're really adjusting your older years as well? Why would you want to do that? The older years don't seem to need an adjustment.

Well, if that's really true and the older years have more stable settlement rate patterns, when you go through this adjustment, they really would not be adjusted. As you work through and do all that interpolation, if they all have similar disposal rate patterns, when you do the interpolation there's really nothing to interpolate because they are at the disposal rate that you want. So it would still work.

MR. RAPOPORT: I'm going to cover two more points before we close. We'll talk about looking at reserves on a gross versus net of reinsurance basis, and then we'll talk a little bit about development factors. Scott spent a lot of time on how to fix the triangle. However, oftentimes you have experience beyond the end of the triangle.

The question is, should the loss reserve analysis be gross or net of reinsurance? Essentially, I've written here a couple advantages of each. Maybe I should start with some definitions. Gross of reinsurance means it's the amount of money paid out by the primary company, as if they did not get anything back from a reinsurer. Net is the amount they'd be paying out after they collect reinsurance.

An advantage of the gross is your data is unaffected by changes in the reinsurance retention. If you're recording net data and you decide to go to a higher retention say from 500,000 to 1 million, you're going to see a lot more losses on your books. The question you may face is whether you're seeing. But a trend in the loss costs may just be a change in your reinsurance. So you have to be, again, sensitive to what's going on.

If you use a gross, you also reflect the total liability which is important, especially if your reinsurance proves uncollectible. That, as you know, is an event that seems to be happening now and then. So it's important to get an assessment of your total liability.

Using the net numbers, you have some stability in your forecasting because the large losses that are protected by your reinsurance could otherwise cause aberrations in your data and you may have spikes or blips in your data from year to year. If you use the net numbers, that smoothes out. Your losses, the big ones, are not included and so you'll have less likelihood that you'll have an extreme year.

In addition, net is needed for schedule P, but you can see in the big print the note, however, that beginning this year you must certify both net and gross reserves. So you actually need to do it both ways for the loss certification for the end of this year.

Questions on this?

(No response.)

To illustrate the need for tail factors, in this example we have data from 1979 and 1980 with the number of reported claims, the dollars of case reserves that are open and the dollars incurred. As you can see, between 132 months and 144 months, which is basically between 1990 and 1991 there was actually one more claim that came in for 1979.

This could be a products liability case. It could be some type of long liability case or perhaps occupational disease case in workers' comp. We can see that there's some evidence that there is still activity going on. We don't have any history from the earlier years because it's so far down the line. We need to take into account that something is going to happen beyond the triangle.

If we look at the dollars of case reserves, we can see that there's a change in the average size from $267,000 down to $258,000 for 1979, and an increase in the number of claims. But there are still 15 claims open as of the end of 144 months. We can also see that the dollars incurred actually went up during 1991 so that whatever settlements we made, they actually were higher than the reserves. So there was some reserve development from $502 million, to $515 million.

If you see activity, if you see open claims at the end of your triangle and the most recent diagonal for the early years, that's a pretty good indication that the loss development will continue beyond the end point of the data.

I'm not going to go into details on how to actually develop tail factors, but we'll mention a couple things. One, if you have a long-tail line, examine broader data sources. We talk about ISO, insurance service organization, National Council on Compensation Insurance, Reinsurance Association of America, and Best's. There's a big warning, a caution, to learn the limitations of such data.

You go to these data sources because you may not have sufficient data in your company. You may not have been in that line of business as long as other companies have. So it's important to at least see what is available. However, the limitations include that the data is probably not precisely the same as the data that you have in your company.

We mention here a "Bondy method." This is sort of what you do when you can't think of anything else to do. Here, we use the factor from the last year available as the loss development factor from the end of your data to the end of time. It's sort of an arbitrary method. But if you can't think of anything else, you can try it.

Another thing mentioned is curve fitting. I won't go into details on how to actually do that. You're going to have to attend a different session. But there are techniques for mathematically fitting a curve to your data points of development, or if you are artistic you could graph the points and try to draw a curve and see from there what you think is reasonable.

When you do fit a curve -- in this example we developed a factor of 10 percent from the end of the tail on. Take a look at it and see if the other factors look reasonable when you multiply that in. You can see that the 10 percent change increases all of the prior factors to ultimate.

Now the question is, how often do you really need a tail factor? Well, you do need one at least for the situations illustrated on slide 26. In this case, on a workers compensation line, you can see tail factors from 15 years to ultimate of 2.06 and from 25 years out still about 30 percent development. General liability is not quite so bad. You have 30 percent development after 15 years. About one percent, though, is still going on after 25 years.

For auto liability, there is three to four percent after 15 years; not very much after 25. The above is based on information from the Reinsurance Association. In this case, it assumes the ultimate was 33 years.

The reason that you see development beyond 10 years is probably the nature of the business. For products liability, the issues are complicated. There may be a long time in terms of litigation and in the courts for determining who is liable, who actually was providing the coverage, was the injury related to the product, what specifically was the date of loss.

Similarly, in workers' compensation, there's coverage for occupational disease. That may take a long time before it's recognized or identified. It may be that once one case is recognized and identified, many other cases may suddenly come in.

In addition in workers' comp, there are life pensions. In some states, particular in my state, Minnesota, there is escalation of indemnity benefits. So a person injured will have an indemnity benefit, a wage replacement that goes up with the change in the state average weekly wage. If that person is out of work for 30 or 40 years, that is a very large escalation.

In addition on workers' comp, you may have a person who receives a brain injury and may require attendant care the rest of their life that may be covered by the medical cost coverage. So if you can think about keeping someone in a home with 24-hour care, it's very likely that they can be kept alive for many, many years today, but those costs will go up.

Medical malpractice: An example here is a child injured at delivery that reaches legal age and then can actually sue on their own. So that may produce cases coming in 18, 21 years later. Or you may have delayed manifestation, and subsequent complex issues. Basically, it takes a while to find out the full extent of the injuries.

I've even seen a case in homeowners where a child was injured and 10, 15, 20 years later that case actually came back. So there are very long tail examples even in lines that you don't expect it.

To summarize what we've covered today or what I'd like you to remember when you leave, let's talk about interpreting the patterns of the past to project the future for loss reserves. I can think, from my section it's important to remember that there are limits to using standard methods of analyzing loss patterns because there may be changes due to mix or processing within the company that affects the patterns.

The actuary needs to be sensitive to these issues and to recognize and interpret them to make the appropriate adjustments to the regular methods. From Scott's talk, you can see that there are specific ways to make those adjustments. Even on very detailed methods, you can adjust them to recognize changes in the patterns.

As we close for discussions, also remember the discussion on gross versus net reviews. It's important to look at both types of loss reserving.

I have a question.

QUESTION: (Inaudible)

MR. RAPOPORT: The comment was that in the example that I used, we looked basically at coverage type changes in terms of mix of business. He mentioned that it's important also to look at other things such as the effect of a large loss that may be in there. That might cause a change. An addition may be growth in one type of business versus another.

Are there other questions?

(No response.)

MR. RAPOPORT: Well, thank you for attending. I think you actually have a few extra minutes. If you'll leave the evaluations, I think there is a box near the door.

(Thunderous applause)

BASIC PRINCIPLE

THE IDEAL SITUATION

LOSS RESERVE DATA SHOULD CONTAIN A LONG, STABLE HISTORY OF HOMOGENEOUS CLAIM EXPERIENCE, WHERE NO SIGNIFICANT OPERATIONAL CHANGES MATERIALLY AFFECT EITHER THE MIX OF BUSINESS OR THE HANDLING OF CLAIMS, AND THERE SHOULD BE A SUFFICIENT NUMBER OF CLAIMS TO PRODUCE CREDIBLE LOSS RESERVE PATTERNS.

SLIDE 1

THE REALITY

VIRTUALLY ALL ELEMENTS OF "THE IDEAL" ARE PERIODICALLY VIOLATED:

1. THE MIX CHANGES.

2. CLAIM HANDLING CHANGES:

   o PAYMENTS ACCELERATE/DECELERATE

   o CASE RESERVES ARE STRENGTHENED/WEAKENED DUE TO TURNOVER, CHANGES IN PROCEDURES, ETC.

3. THE ENVIRONMENT CHANGES:

   o NEW CAUSATIVE AGENTS IMPACT LOSS COSTS

   o SOCIETY'S ATTITUDES CHANGE

   o COURT DECISIONS CHANGE "THE RULES"

   o CHANGES IN THE ECONOMY AFFECT CLAIM INFLATION

SLIDE 2

THIS SESSION WILL DISCUSS:

1. THE POTENTIAL IMPACT OF MIX CHANGES (SLIDES 4-10).

2. RECOGNIZING CHANGES IN CLAIM CLOSING PATTERNS, AND ONE METHOD OF ADJUSTING HISTORICAL DATA (SLIDES 11-15; ADJUSTMENT METHOD TO BE THE BERQUIST & SHERMAN CLAIM CLOSING RATE ADJUSTMENT).

3. RECOGNIZING CHANGES IN CASE RESERVE ADEQUACY, AND ONE METHOD OF ADJUSTING HISTORICAL DATA (SLIDES 16-22; ADJUSTMENT METHOD TO BE THE BERQUIST & SHERMAN CASE RESERVE ADEQUACY ADJUSTMENT).

4. SHOULD THE LOSS RESERVE ANALYSIS BE NET OR GROSS OF REINSURANCE? (SLIDE 23)

5. TAIL FACTOR SELECTION METHODS, FOR FORECASTING BEYOND THE END POINT OF THE DATA (SLIDES 24-27).

SLIDE 3

CUMULATIVE PAID LOSSES BY ACCIDENT YEAR

($ IN MILLIONS)

	Evaluation Month		
Accident Year	12	24	36
1987	$2.0	$4.0	$5.0
1988	$2.0	$4.0	$5.0
1989	$2.0	$4.0	
1990	$2.0		

SLIDE 4

CUMULATIVE PAID LOSSES BY TYPE OF CLAIM

BY ACCIDENT YEAR

($ IN MILLIONS)

	Evaluation Month		
Each Of 1987-1989	12	24	36
Claim Category A	$1.5 (75%)	$1.8	$2.0
Claim Category B	$0.5 (25%)	$2.2	$3.0
TOTAL	$2.0	$4.0	$5.0
1990			
Claim Category A	$0.5 (25%)		
Claim Category B	$1.5 (75%)		
TOTAL	$2.0		

Slide 5

CUMULATIVE PAID LOSSES BY TYPE OF CLAIM
BY ACCIDENT YEAR
($ IN MILLIONS)

	Evaluation Month		
Each Of 1987-1989	12	24	36
Claim Category A	$1.5	$1.8	$2.0
Claim Category B	$0.5	$2.2	$3.0
TOTAL	$2.0	$4.0	$5.0
1990		IF FORECAST BY CLAIM CATEGORY	
Claim Category A	$0.5	$0.6	$0.7
Claim Category B	$1.5	$6.6	$9.0
TOTAL	$2.0	$7.2	$9.7
1990		IF FORECAST IGNORING CLAIM CATEGORY	
TOTAL	$2.0	$4.0	$5.0

Slide 6

KEY PRINCIPLE:

ALWAYS SEARCH FOR SUBDIVISIONS OF DATA RELATED TO POSSIBLE CAUSES OF VARIABLE LOSS DEVELOPMENT.

SLIDE 7

SUGGESTED SUBDIVISIONS OF DATA INCLUDE:

PRIMARY

1. GEOGRAPHIC: LAWS VARY (S.A. VERBAL VS. MONETARY THRESHOLD PIP STATES), REGIONAL OFFICE MAY USE DIFFERENT CLAIMS PERSONNEL, DEGREE OF LITIGIOUSNESS VARIES, ETC.
2. NEW PRODUCTS VERSUS OLD
3. SUBLINE OR COVERAGE
4. DEDUCTIBLES
5. CAUSE OF LOSS, OR TYPE OF LOSS PAYMENT (MEDICAL VERSUS LOST WAGES FOR WORKERS COMPENSATION, FOR EXAMPLE).

REINSURANCE

1. ATTACHMENT POINT
2. PRODUCTION SOURCE
3. LINE OR SUBLINE

SLIDE 8

HOW DO YOU DECIDE?

ASK:

1. Underwriters
2. Controllers
3. Claims Department
4. Actuaries
5. Agents

THE KEY:

Learn as much as possible about the book of business you are evaluating.

- What it has been historically.
- What it is becoming.

Slide 9

WHAT SHOULD BE DONE IF MIX CHANGE INCLUDES NEW BUSINESS FOR WHICH YOU HAVE INSUFFICIENT DATA?

1. SEEK ALTERNATIVE SOURCES OF DATA. For example, perhaps a general liability book formerly was comprised solely of "OL&T" exposures, but in recent years began adding "M&C" risks. POSSIBLE SOLUTION: Relate ISO development patterns for M&C-to-OL&T, and modify development factors for your evaluation.

2. DISCUSS POTENTIAL IMPACTS WITH CLAIMS, UNDERWRITING, AND OTHER ACTUARIES. Discuss how the change might affect:

   - Length of the tail.
   - Frequency
   - Severity
   - Loss Ratios

Slide 10

HOW CAN CHANGES IN PAYMENT PATTERNS BE RECOGNIZED?

- o LOOK AT SETTLEMENT RATES FOR THE 2 TO 3 MOST RECENT ACCIDENT YEARS.

- o ASK THE CLAIMS DEPARTMENT ABOUT ANY CHANGES IN:

  - o OPENING AND CLOSING PRACTICES

  - o THE CLAIMS HANDLING ENVIRONMENT (NEW LAWS, ETC.)

  - o LEVELS OF STAFFING, OR REORGANIZATIONS

SLIDE 11

CUMULATIVE PAID LOSSES, AND NUMBER OF CLAIMS CLOSED AS A PERCENT OF CLAIMS REPORTED

($000)

	Evaluation Month			
Accident Year	12	24	36	Estimated Ultimate
1988 - Paid Loss	$1,000	$4,000	$6,000	$6,000
% Closed	50%	90%	100%	-
1989 - Paid Loss	$1,000	$3,500		$5,250
% Closed	50%	80%*		-
1990 - Paid Loss	$ 750			$4,220
% Closed	40%			

* EXAMPLE: "SETTLEMENT RATE" = (NO. CLOSED AT 24/NO. REPORTED AT 24)

SLIDE 12

BERQUIST & SHERMAN CLOSING RATE ADJUSTMENT

STEP I: CALCULATE "DISPOSAL RATES," AND ADJUST THE CLOSED COUNT DATA.

ACCIDENT YEAR		EVALUATION MONTH 12	24	36	ESTIMATED ULTIMATE NO. CLAIMS
1988	NO. REPORTED	500	900	1,000	1,000
	NO. CLOSED	250	810	1,000	
	% DISPOSED	25.0%	81.0%*	100.0%	
	ADJ. CLOSED COUNT	200	718**	1,000	
1989	NO. REPORTED	480	880		980
	NO. CLOSED	240	704		
	% DISPOSED	24.5%	71.8%		
	ADJ. CLOSED COUNT	196	704		
1990	NO. REPORTED	450			900
	NO. CLOSED	180			
	% DISPOSED	20.0%			
	ADJ. CLOSED COUNT	180			

* EXAMPLE: (NO. CLOSED, 810)/(ULT. NO., 1,000)
** EXAMPLE: (ULT. NO., 1,000)x(MOST RECENT DISPOSAL RATE, .718)

SLIDE 13

BERQUIST & SHERMAN CLOSING RATE ADJUSTMENT

STEP II: ESTIMATE THE PAYMENTS FOR EACH ACCIDENT YEAR AND AGE, AT THE ADJUSTED SETTLEMENT RATES.

EXAMPLE: 1988 AT 24 MONTHS.

ACTUAL DATA SHOWS:

AT 12 MONTHS, 250 PAID CLAIMS TOTALLING $1,000,000 IN PAYMENTS.

AT 24 MONTHS, 810 PAID CLAIMS TOTALLING $4,000,000 IN PAYMENTS.

TO ESTIMATE PAYMENTS FOR THE ADJUSTED NUMBER OF 718 CLOSED CLAIMS, INTERPOLATE USING A CURVE. ONE APPROACH: USE LINEAR INTERPOLATION:

$$\text{LOSSES FOR 718 CLAIMS} = \frac{810 - 718}{810 - 250}\ \$1{,}000{,}000 + \frac{718 - 250}{810 - 250}\ \$4{,}000{,}000 = \$3{,}507{,}143$$

SLIDE 14

BERQUIST & SHERMAN CLOSING RATE ADJUSTMENT

STEP III: COMPUTE THE ADJUSTED PAID TRIANGLE, AND APPLY A STANDARD DEVELOPMENT TECHNIQUE:

ACCIDENT YEAR	($000) ADJUSTED PAIDS BY EVALUATION MONTH 12	24	36	REVISED PAID FORECAST	ORIGINAL PAID FORECAST
1988	$800	$3,507*	$6,000	$ 6,000	$ 6,000
1989	$817	$3,500		$ 5,988	$ 5,250
1990	$750			$ 5,561	$ 4,220
			TOTAL	$17,549	$15,470

*PER SLIDE 14.

SLIDE 15

IS THERE A CHANGE IN CASE RESERVE ADEQUACY?
($000)

ACCIDENT YEAR	INCURRED DATA 12	24	36	ULTIMATE
1988	$10,000	$40,000	$50,000	$ 50,000
1989	$10,000	$45,000		$ 56,250
1990	$10,417			$ 55,340
			TOTAL	$161,590

ACCIDENT YEAR	PAID DATA 12	24	36	ULTIMATE
1988	$ 2,000	$24,000	$50,000	$ 50,000
1989	$ 2,500	$30,000		$ 62,500
1990	$ 3,125			$ 78,125
			TOTAL	$190,625

THE ISSUE: WHAT IS DRIVING THE DIVERGENCE?

SLIDE 16

IS THERE A CHANGE IN CASE RESERVE ADEQUACY?

STEP I:

o LOOK AT $PAID-TO-$INCURRED TRIANGLES:

ACCIDENT YEAR	12	24	36
1988	.20	.60	1.00
1989	.25	.67	
1990	.30		

BUT: DOES THIS PORTRAY A SPEED-UP IN PAYMENTS, A DECREASE IN CASE RESERVE ADEQUACY, OR BOTH?

STEP I: INCONCLUSIVE

SLIDE 17

IS THERE A CHANGE IN CASE RESERVE ADEQUACY?

STEP II: LOOK AT SETTLEMENT RATES (NO. CLOSED/NO. REPORTED)

	SETTLEMENT RATE		
ACCIDENT YEAR	12	24	36
1988	.20	.75	1.00
1989	.20	.75	
1990	.20		

SLIDE 18

IS THERE A CHANGE IN CASE RESERVE ADEQUACY?

STEP III:

o LOOK AT TRENDS IN AVERAGE PAID CLAIMS, VERSUS TRENDS IN AVERAGE CASE RESERVES:

ACCIDENT YEAR	AVERAGE PAIDS 12	AVERAGE PAIDS 24	AVERAGE CASE RESERVES 12	AVERAGE CASE RESERVES 24
1988	\$2,000	\$4,000	\$ 2,000	\$ 8,000
1989	\$2,500	\$5,000	\$ 1,875	\$ 7,500
1990	\$3,125		\$ 1,823	
AVERAGE ANNUAL TREND	25%	25%	(4.5)%	(6.3)%

OBSERVATIONS:

- o THERE DEFINITELY APPEARS TO BE CASE RESERVE DETERIORATION (ASSUMING THE PAID TRENDS ARE REALISTIC).
- o BEFORE PROCEEDING, CONSIDER WHETHER THERE ARE ANY OTHER FORCES THAT COULD BE IMPACTING THE DATA.

SLIDE 19

CONTEMPLATE POTENTIAL REASONS FOR OBSERVED TRENDS:

- o IS THE BOOK SHIFTING TO A LOWER SEVERITY MIX?
- o HAVE POLICY LIMITS AND/OR REINSURANCE RETENTIONS KEPT PACE WITH CLAIMS INFLATION?
- o HAS ANYTHING MATERIAL CHANGED IN THE HANDLING OF CLAIMS?
  - o TURNOVER IN CLAIM DEPARTMENT STAFF
  - o CHANGES IN PHILOSOPHY

IF YOU CONCLUDE THERE HAS BEEN CASE RESERVE WEAKENING (OR STRENGTHENING), THE DATA SHOULD BE ADJUSTED. SLIDES 21-22 GIVE ONE APPROACH.

SLIDE 20

BERQUIST-SHERMAN CASE RESERVE ADEQUACY ADJUSTMENT

ASSUME: 25% IS THE ACTUAL RATE OF CLAIM INFLATION.

STEP I: ADJUST CASE RESERVES AT VALUATIONS PRIOR TO THE 12/90 VALUATION DATE, TO THE EQUIVALENT LEVEL OF ADEQUACY REPRESENTED BY THE 12/90 CASE RESERVES:

ACCIDENT	AVERAGE CASE RESERVES			ADJUSTED AVERAGE	
YEAR	12	24	36	12	24
1988	$2,000	$8,000	$0	$1,167	$6,000*
1989	$1,875	$7,500		$1,458	$7,500
1990	$1,823			$1,823	

***EXAMPLE:** $6,000 = ($7,500/1.25)

SLIDE 21

BERQUIST-SHERMAN CASE RESERVE ADEQUACY ADJUSTMENT

STEP II: RECREATE THE INCURRED TRIANGLE, USING THE ADJUSTED AVERAGE CASE RESERVES, AND RE-FORECAST USING A STANDARD LOSS DEVELOPMENT APPROACH:

($000)

ACCIDENT	ADJUSTED INCURRED				ORIGINAL ESTIMATES OF ULTIMATE	
YEAR	12	24	36	ULTIMATE	INCURRED	PAID
1988	$ 6,667	$36,000	$50,000	$50,000	$50,000	$50,000
1989	$ 8,332*	$45,000		$62,500	$56,250	$62,500
1990	$10,417			$78,125	$55,340	$78,125

***EXAMPLE:** $8,332 = ($PAID TO DATE) + (NO. OPEN X ADJUSTED AVERAGE CASE RESERVE)
= ($2,500,000) + (4,000 x 1,458)
ORIGINAL INCURRED: $10,000 = ($2,500,000) + (4,000 x 1,875)

SLIDE 22

SHOULD THE LOSS RESERVE ANALYSIS BE GROSS OR NET OF CEDED REINSURANCE?

ADVANTAGES OF GROSS:

- o DATA UNAFFECTED BY CHANGE IN REINSURANCE RETENTION
- o REFLECTS TOTAL LIABILITY IF REINSURANCE PROVES UNCOLLECTIBLE

ADVANTAGES OF NET:

- o IMPROVES STABILITY OF FORECAST BY LIMITING LARGE LOSSES
- o NEEDED FOR SCHEDULE P (NOTE HOWEVER: BEGINNING 12/91, MUST CERTIFY BOTH NET AND GROSS!)

SLIDE 23

THE NEED FOR "TAIL FACTORS"

SUPPOSE THE TRIANGLE BELOW REPRESENTS THE EXTENT OF YOUR COMPANY'S EXPERIENCE:

ACCIDENT YEAR	No. OF REPORTED CLAIMS				
	12	24	. . . .	132	144
1979	10	20	. . . .	252	253
1980	11	19	. . . .	264	
(ETC.)					

ACCIDENT YEAR	$ OF CASE RESERVES (NO. OPEN)				
	12	24	. . . . . .	132	144
1979	$10,000 (10)	$45,000 (15)	. . . . . .	$267,000 (25)	$258,000 (15)
1980	$11,000 (11)	$49,000 (16)	. . . . . .	$292,000 (31)	
(ETC.)					

ACCIDENT YEAR	$ INCURRED				
	12	24	. . . . . .	132	144
1979	$10,000	$50,000	. . . . . .	$502,000	$515,000
1980	$11,000	$55,000	. . . . . .	$531,000	
(ETC.)					

THERE APPEARS TO BE EVIDENCE LOSS DEVELOPMENT WILL CONTINUE BEYOND THE ENDPOINT OF THE DATA.

SLIDE 24

TECHNIQUES TO DERIVE TAIL FACTORS

- o EXAMINE BROADER DATA SOURCES: ISO, NCCI, RAA, BEST'S (CAUTION: LEARN THE LIMITATIONS OF SUCH DATA.)
- o "BONDY METHOD": LDF FROM N TO INFINITY = LDF FROM (N - 1) TO N
- o CURVE FITTING

EXAMPLE: FIT A CURVE TO:

96-108 LDF	108-120 LDF	120-132 LDF	132-144 LDF	144-ULT CUMULATIVE EXTRAPOLATED VALUE
1.20	1.15	1.13	1.09	1.10

EXAMINE: RESULTING LDF'S-TO-ULTIMATE FOR REASONABILITY:

96-ULT LDF	108-ULT LDF	120-ULT LDF	132-ULT LDF
1.870	1.558	1.355	1.199

SLIDE 25

HOW MUCH TAIL CAN THERE BE?

(AGE IN YEARS)

DEVELOPMENT IN REINSURED LAYERS

LINE OF BUSINESS	SELECTED CUMULATIVE AGE TO ULTIMATE FACTORS* 15 YEARS TO ULT.	25 YEARS TO ULT.
W.C. TREATY	2.066	1.308
G.L. TREATY	1.305	1.009
A.L. TREATY	1.038	1.000

*BASED ON 1989 RAA DATA. ASSUMES ULTIMATE IS 33 YEARS.

SLIDE 26

SOME EXAMPLES OF WHEN DEVELOPMENT OCCURS BEYOND 10 YEARS

LINE		REASONS
PRODUCTS	o	ISSUES COMPLEX (WHO'S LIABLE? HOW TO PROVE THE INJURY WAS CAUSED BY THE PRODUCT? DATE OF LOSS?).
WORKERS COMP.	o	OCCUPATIONAL DISEASE.
	o	LIFE PENSION CASES, WITH ESCALATION CLAUSES IN SOME STATES' BENEFIT STRUCTURES.
MED. MALPRACTICE	o	CHILD INJURED AT DELIVERY REACHES LEGAL AGE.
	o	DELAYED MANIFESTATION, WITH SUBSEQUENT COMPLEX ISSUES.

SLIDE 27

APPENDIX 1

Accident Year	\$ Paid-to-\$ Incurred 12	24	36	Settlement Rates* 12	24	36
1988	.20	.60	1.00	.20	.75	1.00
1989	.25	.67		.20	.75	
1990	.30			.20		

Accident Year	\$ Open (\$000) 12	24	36	Average Paid 12	24	Average Case Res. 12	24
1988	\$8,000	\$16,000	0	\$2,000	\$4,000	\$2,000	\$8,000
1989	\$7,500	\$15,000		\$2,500	\$5,000	\$1,875	\$7,500
1990	\$7,292			\$3,125		\$1,823	
Approximate Avg. Annual Trend				25%	25%	(4.5%)	(6.3%)

Accident Year	\$ Incurred (\$000) 12	24	36	Unadjusted Ultimate	\$ Paid (\$000) 12	24	36
1988	\$10,000	\$40,000	\$50,000	\$50,000	\$2,000	\$24,000	\$50,000
1989	\$10,000	\$45,000		\$56,250	\$2,500	\$30,000	\$62,500
1990	\$10,417			\$55,340	\$3,125		\$78,125

*Number Closed-To-Number Reported.

APPENDIX 2

Accident Year	Number Reported 12	24	36	Number Closed 12	24	36	Number Open 12	24	36
1988	5,000	8,000	10,000	1,000	6,000	10,000	4,000	2,000	0
1989	5,000	8,000		1,000	6,000		4,000	2,000	
1990	5,000			1,000			4,000		

Accident Year	Adjusted Average Case 12	24	36	Adjusted Open 12	24	36
1988	\$1,166.7	\$6,000.0	\$0.0	\$4,666.8	\$12,000	\$0.0
1989	\$1,458.4	\$7,500.0		\$5,833.6	\$15,000	
1990	\$1,823.0			\$7,292.0		

Accident Year	Adjusted Including Triangle 12	24	36	Adj. Ult.
1988	\$ 6,666.8	\$36,000	\$50,000	\$50,000
1989	\$ 8,333.6	\$45,000		\$62,500
1990	\$10,417.0			\$78,125

1991 CASUALTY LOSS RESERVE SEMINAR

3D: USING THE REVISED SCHEDULE P

Moderator

Gustave A. Krause
Tillinghast/Towers Perrin

Panel

Jeffrey A. Englander
Trenwick America Reinsurance Corporation

Jeffrey P. Kadison
Price Waterhouse

Jeffrey H. Post
St. Paul Fire & Marine Insurance Company

Recorder

Douglas J. Collins
Tillinghast/Towers Perrin

MR. KRAUSE: This is Session 3D, Using the Revised Schedule P. A few administrative details, which you've probably heard three times today. The session is being recorded, so when we get done with the formal part of this panel and you have any questions, if you could and would, please step to the microphone so we can get an accurate description of the question for the transcripts.

There will be the normal ticket collection at the end of the session and would you please take the time to fill out the evaluation on the reverse side of the ticket before turning it in.

If you're not here to hear someone name Jeff speak, you're in big trouble. (Laughter) Actually, one of these Jeff's is really named Bill. (Laughter) And I want you each to select one and then I will tell you that one of the others really isn't Bill. (Laughter) This was contrived and, contrary to the rumor, you will not be entertained at tonight's reception by the rock band "Gus and the Three Jeffs." (Laughter)

The truth is that these panelists will provide some insights into the new Schedule P. That schedule was revised substantially in 1989, and to a lesser extent during each of the last two years. The comments we will offer do not necessarily represent the opinion of the Casualty Actuarial Society, the Academy or the Conference of Consulting Actuaries. In reality, we know whose opinions these do represent, but we are not telling you. (Laughter)

You have a series of handouts. They may be in the right order or not. I assume they are. The annual statement data, the Schedule P exhibits that you have are provided in part by a grant from the Chubb Corporation. (Laughter) They granted me permission to use their annual statement, so you don't all have to scurry back to your office and try to figure out what company this represents. These are real annual statements from the Federal Insurance Company Consolidated Statement of a year ago.

The first portion of our session will cover the recent evolution of Schedule P with the emphasis on the changes that have occurred and will be handled by Jeff Kadison. Jeff is member of the Casualty Actuarial Society and the American Academy of Actuaries. His career began in 1973. He spent about five years with the Mass bureaus. He followed that up with five years at the Hartford Group, four years at Orion Group and the last four years with Price Waterhouse. I, of course, jumped on these numbers to undertake an analysis and concluded that in twelve years Jeff will take early retirement after having had ten jobs. (Laughter) At Price Waterhouse, Jeff is the Senior Manager and Consulting Actuary. He focuses his services primarily in the areas of workers' compensation and municipal self insurance pools. Without any further introduction, I'll let Jeff take over and those of you in back, there are some chairs in the first three or four rows. Please make yourself at home.

MR. KADISON: Thank you, Gus. I'm Jeff, Phase One, of the Three Phase Jeff Session. I'm going to describe the material that is presently in Schedule P and the evolution over the last three years and it all changes in P. Doug, if you can turn on...

MR. COLLINS: You're all set.

(Slide 1)

MR. KADISON: Alright. I'm going to start with the handout. The top says, Data Included in the New Schedule P for 1989. First of all, how many people here have worked with the new Schedule P and are somewhat familiar with it? Pretty much everybody. Anybody who is not familiar with it? Well, we'll rush right through this part then. (Laughter)

Basically, the major change in 1989 in Schedule P was the introduction of direct plus assumed data and ceded data in addition to the net data previously shown. For the premiums earned, as an example, we now show direct plus assumed, ceded, and by subtraction could get the net. In prior Schedule P's only net data was shown. A lot of the problems with the old Schedule P are known by everybody, I would think.

One other major change in Part One is the splitting out of the allocated and the unallocated loss adjustment expense. Previously there was one combined unpaid for allocated plus unallocated.

In addition, there is now a space for providing information about the discounting of reserves. There are certain states, certain lines of business, where discounting is permissible according to statutory accounting principles.

Page 3 of the statutory financial statement, which is the liability side of the balance sheet, and page 10, which is the unpaid loss page, show the losses on a discounted basis. Schedule P must be shown gross to discount, except for tabular workers' comp cases. By having the columns 30-31, which shows the discounting percents, we can reconcile now Schedule P to page 3 and page 10.

Since most people are familiar with Part One we'll skip through and we'll leave more time for someone else named Jeff to talk about how to use this information.

(Slide 2)

Part Two is a major change as well. Previously, the data included in Part Two was for loss plus all loss adjustment expense. Effective 1989, Schedule P, Part Two only shows loss plus allocated. Unallocated is no longer included in doing actuarial analyses of loss reserves. Separate methods are used for loss and allocated as compared to unallocated. So this change allows us to look at the reserve run-off and have a better base of experience to do analyses with.

In addition, the number of accident years for the old Schedule P lines, that are displayed in Part Two was increased from six years to ten years. The ten accident years are now shown as of latest ten fiscal year end points rather than the latest six fiscal year end points that were included in the '88 and prior Schedule P's.

In addition, we now show in the last two columns the one year run-off development test and the two-year development test, which the NAIC uses for their IRIS tests number 9, 10 and 11. For the old Schedule O lines a similar exhibit exists only for the two accident latest years with a "prior to" line.

(Slide 3)

Part Three had similar changes to Part Two. Again, unallocated loss expenses are no longer included. The number of accident years for the Schedule P lines has been increased from six years to ten years and as of ten fiscal year ends rather than six year end points. Several pieces of data have been taken out from the old Schedule P such as historical paid loss ratios, and the current incurred loss ratios, which are easy to calculate and do not have to be displayed. In place, additional information is now provided on the number of closed claims both with payment and without payment. This data allows actuaries to do some additional tests on average paid claim size, which are useful in evaluating loss reserve.

(Slide 4)

Now, unfortunately, we don't have a Part Five slide, but new for 1989 was a Part Five. The exhibit that was handed out shows Part Four. We have a new claims-made exhibit, which is required if claims-made policies issued in the current year have earned premiums greater than $100,000 and also greater than 15% of total earned premium.

From my brief review of quite a few Schedule P's, I didn't see a lot of companies filling out the new Part Five. Part Five is required only as of '89 for CMP, medical malpractice and other liability. In 1991, which we'll mention in a couple of minutes, there is an additional line, product liability.

A new Part Six was also included, which provides us with a triangle of bulk plus IBNR reserves. This data was not previously provided in a single Schedule P. If you wanted to get more than the latest years bulk plus IBNR reserves, you had to gather several different annual statements. Now having a triangle set up, as for Part Two and Part Three, we are able to come up with a case incurred loss triangle excluding bulk and IBNR by taking Part Two, total incurred losses, and subtracting the new Part Six. This allows us to easily calculate this valuable information for use with the loss development method and some other approaches.

In 1989 as well, three exhibits are no longer being filled out. Schedules G, which concerned fidelity and surety, losses, Schedule K, which concerned credit losses and Schedule O, which concerned the short tail lines, are no longer included in Schedule P...excuse me, in the annual statement. If your company is still filling these schedules out, the statement's not quite right.

(Slide 5)

There were quite a few line of business changes as well. The old Schedule P lines have been split up to some degree. Old Schedule O lines now have a Schedule P format to them, although the length of experience that's shown is shorter than for the old P lines.

New parts of Schedule P also show combinations of old Schedule O lines. They've been grouped together where there are similar loss emergence and loss payment patterns. The other major change is in the way that reinsurance is displayed. If we go back perhaps eight or ten years, reinsurance data could be displayed as a single line entry in Schedule O. Through the years, more reinsurance data has been displayed in Schedule P. Now we have better segmentations of reinsurance. The definitions are shown on the sheet that's headed Line of Business Changes. I won't discuss the changes in detail, but it's there for the reading. It's rather easy.

MR. KRAUSE: Do you want to go back to the beginning?

MR. KADISON: Yes, the beginning.

(Slide 6)

In 1990 there were two more changes to the Schedule P. First of all, there's now a separate exhibit for loss portfolio transfers, a new Part Four. In 1990 this data was shown in a Part One format except that Part One also shows direct plus assumed business. Part Four, the loss portfolio transfer, obviously would deal only with assumed business. Part Four is also for all lines combined. There are no splits by line of business.

There was also a change to Part Five, claims-made policies. There was added detail. Direct plus assumed business is now shown. No ceded business or net business is shown. So, 1990 changes were much less traumatic than 1989 changes.

(Slide 7)

In 1991 we've got only one change. This is an easy year. Product liability data are going to be split out this year from other liability data. There will be new parts one, two, three, five and six for products liability data. These parts include the total incurred loss data, paid loss data, claims-made data and the bulk and IBNR data.

In looking through some Schedule P's since 1989 there are a couple of things that stood out to me as perhaps being under-utilized or not used in the proper way. The claims-made exhibits was one. Another one dealt with an interrogatory. Question Number 8 of the interrogatories is an opportunity for an insurance company to provide some valuable information to the reading public. Question 8 says, "the information provided in Schedule P will be used by many persons to estimate the adequacy of the current loss and expense reserves among other things. Are there are especially significant events, coverage, retention or accounting changes which have occurred, which must be considered when making such analyses?" I haven't seen any responses that I can think of...any companies that have provided any answers to Question 8.

(Slide 8)

I am going to discuss several different areas where there may be changes that would affect the reserve analysis and could be mentioned in Question 8. First of all, in the coverage area, there may be changes to insuring agreements, exclusions, limits of liability, deductibles or self insurance retentions. As an example, several years ago the pollution exclusion was changed from being defined as covered if it was sudden and accidental to being a total exclusion. This should change loss emergence and loss payment patterns and may be material to an evaluation of reserves.

In the self insured retention area, there is a trend evident in the insurance industry towards higher self insured retentions. That clearly would change loss emergence and loss payment patterns and definitely should be mentioned if there is a material shift towards higher levels.

(Slide 9)

Book of business changes. Are there any changes to the mix of line of business, subline, state, size of risk or class. As an example, Texas Workers' Comp has been in the news quite a bit lately. The loss emergence and loss payment patterns have lengthened quite substantially. There are several companies that have pulled out of Texas. If this has a material impact in a reserve analysis, Question 8 provides an opportunity to mention that. In terms of class, if there are some auto writers who changed their posture concerning insuring youthful drivers, as an example, that again could have a material impact on a reserve analysis.

(Slide 10)

Claims Operations. Average case load, reserving philosophy, settlement philosophy, use of outside adjusters, method accounting claims, all can affect the evaluation of reserves. In the area of reserving philosophy there are quite a few claims departments that are reevaluating the way they establish case reserves. If an analysis has been done of case reserving changes over time and that yields a change in the way reserves have been established, there would be a clear impact in a reserve evaluation from that change. Again, Question 8 is an opportunity to provide that information.

(Slide 11)

Reinsurance. Treaty versus facultative, excess of loss versus pro rata, portfolio transfers, commutations, retention amounts, aggregate deductibles, aggregate limits, collectibility are all important issues. Collectibility is a clear issue for a lot of insurance companies. Increasingly, a primary company will turn around to recover a loss and the reinsurer is not there having gone insolvent. Also, if there are changing recoverable percentages from the liquidator of the reinsurer, that would affect payment patterns, loss emergence patterns, quite a few things.

Aggregate deductibles. A lot of insurers are opting away from having aggregate deductibles on their reinsurance treaties. That would clearly tend to accelerate the cession rates of claims. Recoveries would be made at early times and, therefore, accelerate payment patterns.

(Slide 12)

And finally external issues. Changes in the legal environment, judicial environment, social perception of insurance companies and economic considerations all could change as well. As an example in the legal area, tort reform and, again, Texas workers' comp Senate bill One would both have material impacts on claim payment patterns. In the case of Senate bill One, in Texas workers' comp, it is intended to effectively eliminate lawsuits in connection with workers' comp claims, which in turn, should shorten payment patterns. If that was to transpire and was not reflected in a reserve evaluation, an actuary would tend to overestimate loss reserves. In the area of judicial changes, the consolidation of asbestos cases could have material impact.

That covers pretty much my changes that have occurred over the last three years. And now we go on to Jeff Phase Two.

MR. KRAUSE: Thank you. The next portion of our session will be devoted to Parts One, Four and Five of Schedule P. This will be handled by Jeff Englander, who is also a member of the American Academy of Actuaries and the Casualty Actuarial Society. Jeff, in the early part of his career, spent some time with Moody's Investor Services, Ernst & Whinney, and Royal Insurance. And he was clever enough not to tell me how long he had been with each of these employers. For the last two and a half years Jeff has been with Trenwick America Reinsurance Corporation in Stanford and he is currently a Vice President there, responsible for providing actuarial services to most of the areas within the Trenwick organization. Jeff.

MR. ENGLANDER: Thanks Gus. Now I was thinking earlier today about how I would start my talk and I tried to come up with something witty or amusing or entertaining about Schedule P. Sorry, I struck out. I'd like to start off by summarizing what I view to be the primary uses of Schedule P.

(Slide 13)

Now the use that comes to people's minds first is measuring the adequacy of a company's loss and loss adjustment expense reserves. That's probably what the regulators had in mind when they designed the schedule, at least in its current format. But, as I've identified, the parts most relevant in that process would be two, three and six, which Jeff Post is going to talk about when I'm done. But I think the other purposes I've identified, even though they may not directly relate to testing the adequacy of loss reserves, still make Schedule P unique in terms of its informational value within the annual statement.

The next purpose I listed is assessing the historical level of underwriting profitability. Now, that's an important one since the only other good source of data within the statement on underwriting profitability is the income statement on page 4, which is reported on a calendar year basis, obviously influenced by reserve changes which can make calendar year operations look different than true incurred year operations which reflect the latest level of profitability.

And as we'll get to later, we'll see that the data organization within P, which is on an incurred year basis, is designed to provide a much better match of revenues and expenses of underwriting operations.

All the changes that took place to Part One and the introduction of Part Four in 1989 gave us the first real good opportunity to measure the effect of a company's reinsurance ceded program on its net results. We'll get to some of the details of that later.

Finally, I've mentioned the calculation of the Schedule P penalty or the excess of statutory over statement reserves. I guess that calculation hasn't really changed much over the last several years, but its usefulness is questionable because I think most analysts tend to view that statutory liability as really equity and disregard it as a true liability.

(Slide 14)

Moving on to the individual parts, we'll start with Part One. As I mentioned earlier, data organization is a key aspect of Schedule P and with the data being organized by incurred year, hopefully we're getting that better match of premiums and expenses. Now most of us are familiar with the concept of accident year and probably the majority of the time when we say incurred year within Schedule P, we are talking about accident year, but if we are looking at a company writing claims made business, the incurred year may represent report year, or for certain other coverages there are other types of exposure periods. Surety comes to mind in the context of discovery year.

Basically the components within Part One are the components you would need to calculate underwriting profitability with the exception of the other underwriting expenses such as commission and overhead. But basically you've got the premiums, paid and outstanding losses and expenses.

As Jeff Kadison pointed out, the fact that these amounts are shown, gross, ceded and net, gives you the opportunity to do some comparison in terms of business that's written on a gross basis versus what's ceded out.

Now I tend to think of Part One as a picture or snapshot of the company's latest assessment of what their history looks like. Now each year, in theory, the company should be updating their estimate, but Part One represents that latest diagonal, their latest estimate.

(Slide 15)

Some other items include claim count data, both reported and outstanding, which we can argue about the usefulness of. Number one, not everyone's reporting claim count data. And number two, there are some real limitations in the use of the claim count data that is actually reported. Also shown is the reconciliation item of the discount in the balance sheet reserves. That is, the reserves that are shown in P are to be shown gross of any discount and the amounts shown for discount are there to enable you to reconcile back to the balance sheet.

Finally, there is a column for intercompany pooling percentage. If you are looking at a subsidiary of a large group that has an intercompany reinsurance pool, it would be useful to know if the company you are looking at is a participant in that pool and to what extent they participate.

An interesting aspect of Part One is that the format varies depending upon the line of business you are looking at. Jeff Kadison referred to the line of business definitions which are in place. Certain lines are reported on what I would refer to as a long format and other lines get a short format. For most uses, the format that is given might be sufficient, but given my bias towards reinsurance, when I go to line 30b, which is supposed to be excess casualty reinsurance, and I see three years of reported experience, I wonder how useful that really is to me. But, I think there clearly is an attempt that for those lines that would be expected to have long report lags there is a long format with ten years of detail versus the two year detail on property and three year on reinsurance. And also as Jeff mentioned earlier for the '91 year, there will be a break-out of products liability from the other liability line.

(Slide 16)

As you can see, I've listed several areas in which I feel Schedule P is of value in analyzing underwriting profitability. Clearly the loss and LAE ratios are of significance. Lower is better, usually, both in absolute levels as well as trends. And I tend to place just as much weight on trends as I do on absolute levels. To understand the true economic profitability of writing certain business, I think you need to see more than what is contained in Schedule P, but I think the trends can be revealing even in the absence of that additional information.

Again, I stress the difference between incurred year and calendar year because that is an important one. Being a publicly traded company, which Trenwick is, there's a lot of care paid in the analysis of reported results...quarterly earnings results. I tend to take those with a grain of salt since I'm aware that they may not truly reflect current operations.

As was mentioned earlier, there is direct plus assumed versus ceded reporting starting in '89, and I think it is particularly interesting to note the difference in loss in LAE ratios of the business that's being written directly versus what is ceded out. It can tell you something about the profitability of the direct business versus whether a company is paying too much or too little for their reinsurance.

In terms of the discounting, the way that the statement is required to be filled out now it is not required that a discount amount be shown for the pension type LTD comp cases that can have a really extended payout, but any non-pension discounting has to be reported. So one has to be careful about the pension type discount.

The claim count data that's provided can be helpful if you are interested in analyzing paid or reported severities over time, giving you an idea about claim cost inflation that the company is experiencing. But I think even beyond that, if one were to take the latest claim count data reported in Part One and collect that over a series of years, triangles of claim counts can be constructed which can then be used in any of the reserving techniques that someone might want to apply to Schedule P.

(Slide 17)

Now in spite of its considerable value, Part One is not without its limitations. And I've listed several here. Jeff earlier mentioned a few others. And you can all probably come up with some of your own. But, obviously, catastrophes and large claims can distort any trend analysis you might be doing. You have to aware of the occurrence of such events.

Also the use of financial covers, which we'll get into a little more later with Part Four. Financial covers are basically reinsurance transactions done where the pricing explicitly reflects that time value of money and that there is some benefit of the time value of money involved. And if a company enters into those kinds of transactions they can have a dramatic effect on their reported results.

If a company chooses to vary its retention over time, obviously, depending upon the relative profitability of gross and ceded rates, that can have an effect on any trend analysis you might try to do.

In the area of claim counts, I can tell you as a reinsurer, we are unable to provide claim counts. The primary reason is that for a large portion of our book, which is quota share, and even on some excess covers, data is reported to us on loss bordereaux without claim count detail, so it's really impossible for us to construct those claims counts.

Another problem with claim counts might be how they are defined. If a company over time changes how they define a reported claim count, or how they treat reopened claims, it may be unreasonable to rely on them for analysis. Claim counts are acceptable to use for analysis if you are comfortable that their method of reporting has been consistent over time.

As I mentioned earlier, there are certain lines of business that have a short reporting format, which in certain cases is probably going to be too limiting to you, especially if you're dealing with a company with long tail business, for example, long tail excess casualty reinsurance. You may be interested in some old exposures where profitability has been on old exposures you're not going to be able to see.

Even on the long form, where you've basically got ten years, it's not uncommon for companies to report adverse development on exposure periods older than ten years. So one would argue that for certain companies and certain situations it would be helpful to see more than ten.

(Slide 18)

Moving to Part Four, which is the part where we're supposed to report loss portfolio transfers. I guess I'd start off by saying that about once a year we at Trenwick do what we call a peer group analysis where we collect the annual statements of, I think, about 25 or 26 companies we deem to be in a peer group of ours, which are basically RAA companies with maybe a few others. And of those 26, one filled out Part Four. So which raises the question, what is a portfolio transfer? And I think the reason so few companies are filling it out is because there seems to be either some vagueness about what kinds of deals should be going into this schedule or maybe the regulators are not really asking for what they want to see. I think what is going on in the market place is that there are lots of deals being written that have similar characteristics or have certain characteristics of portfolio transfers, but maybe have other bells and whistles in them that qualify them as being more than just a portfolio transfer and therefore those deals don't get reported.

But I've tried to list some of what I think, are identifying characteristics of a portfolio transfer. The first would be that premiums must have already been earned. So basically we are talking about a cover that's retrospective in nature. The losses have already been incurred and hopefully reserved for.

Another factor too, is that the premiums again reflect anticipated investment income, and that there's effectively some discontinuing going on in the pricing. Which gets you down to the primary reason these deals are done, that is, the financial effect, which is why the regulators want to know about these deals because they have that financial effect.

Again, because a lot of the financial reinsurance products that are being sold today have prospective characteristics as well as retrospective, that maybe some of these carriers that enter into them don't feel they need to fill this part out.

(Slide 19)

But with that said, just to talk a little bit about the content, it's very similar to the Part One summary, that is the long version, with a few interesting points of comparison. The footnote to Part Four tells you that they only want to see deals done this year, as opposed to Part One, which is a cumulative exhibit and represents experience to date. So in Part Four you'd basically be looking at the activity that took place in the current year. Again, as Jeff mentioned, all deals are treated as assumed or ceded reinsurance, which is what they are, but there is no subdivision by line of business, so to the extent you might be interested in whether a deal is being done on casualty reinsurance or private passenger auto, you don't have that ability.

You should also be aware that from '92 there is a proposal on the table at the NAIC from Vince Laurenzano in New York to eliminate Part Four and add a new interrogatory asking for a lot of similar information, although it's cumulative and I'm not sure it's got all the detail either. I have a copy of his proposal.

(Slide 20)

Now if we move to Part Five, Part Five is the claims made exhibit. There's a two prong test to determine whether Part Five needs to be completed for any particular line of business. The test as it stands now is applied to the three lines of business, medical malpractice, other liability and commercial multi peril. With the addition of products liability as a separate line in '91 that will also be included in the test. And the two tests, basically, are (A) we're testing the absolute level of premium. How much claims-made business did you write? Did you exceed this minimum level of $100,000? And then the second part of the test is, is that number significant to your book? Is it more than 15% of the total for that line that we're talking about? And for each of the lines that meets both tests we complete a section of Part Five.

(Slide 21)

As far as the content of Part Five, also similar to Part One, but it's a subtle point...it's on a direct plus assumed basis only. Again, thinking about reinsurance, one may be interested in looking at the ceded side of things, but you can't do that in its current format. Now, since we're talking about claims made coverages, IBNR is of much less significance so the unpaid loss piece is split between case basis and what they call bulk. Bulk is there to provide for case development and maybe what might represent some form of IBNR, not necessarily pure IBNR, but late reports due to claims in transit, maybe reopenings.

There's no display of the discount, but I don't think you lose much there, since the discount may not be of that much importance to you strictly for the claims made piece and you've got the aggregate of the discount value in Part One. Now there is a split of claims closed between those with pay and those without pay. Having looked at some claims made books, those books of business tend to have a high propensity of claims closed without pay. So one might be interested, if they're going to use the claim count data for analysis, in seeing how that proportion has varied over time.

And then finally there's some counts for extended loss reserves. Just a little bit about what they refer to. If you are writing claims made business, the coverage usually provides that you will respond if a claim is made within the coverage period, but it's not uncommon for a claims-made carrier to offer free tail coverage. For example, for a doctor's practice, if the doctor retires or dies there might be free tail coverage offered. And I guess there's some debate as to what the right way to account for the anticipated cost associated with that free tail coverage. But, regardless of how you account for it, whether you call it an unearned premium reserve or a loss reserve, Part Five requires that you enter those amounts. So if you call it an unearned premium reserve, you may not show it anywhere else in Schedule P, but you do have to report it in Part Five.

That's about all I had to say. I'll hand it over to Gus.

MR. KRAUSE: Thank you, Jeff. The last portion of our prepared remarks will deal with Parts Two, Three and Six of Schedule P. I was going to be nasty and come up here after Jeff Post and tell you that I was only going to talk about the new Part Seven and Eight, but I decided not to do that.

Jeff Post is also a member of the American Academy of Actuaries and the Casualty Actuarial Society. He began his career with Allstate, worked for a time with Zurich, and since then has been employed by St. Paul. For a while, over about a five year period, Jeff was responsible at St. Paul for pricing all of their medical malpractice business and since all the trends went away, they didn't know what else to do with Jeff so they've named him the Loss Reserve Officer. And as Jeff told me, that means that he spent five years determining how to bring it in the front door and now he's going to spend the next five years figuring how to send it out the back. Jeff.

MR. POST: Thank you, Gus. For those of you who don't deal a lot with Schedule P, I have Parts Two, Three and Six, which are really the meat of Schedule P.

(Slide 22)

Schedule P, Part Two, Three and Six, for those of you who are company actuaries, we all know what we can do with Schedule P. My biggest concern, as a Loss Reserve Officer isn't what I or my people in the home office do with Schedule P, my biggest concern is what other people do with my Schedule P. Some good examples of what Schedule P is used for are as follows: The NAIC uses the data included in Schedule P to cross-check other numbers within the annual statement. There are many accounting inconsistencies that can be detected out of Schedule P. Jeff Kadison mentioned earlier, the NAIC uses Part Two of Schedule P for the IRIS test. I'll talk a little bit about that in a minute. There are actuaries out there who are going to use Schedule P to evaluate their competitors. How is my company's reserve position versus theirs? That's a piece of information that I think all of our senior management's would like to know. Schedule P can give one an idea of how the market is performing and how our competitors are performing relative to us and each other.

Another very important user of Schedule P especially for those of us who work for stock companies, is the investment analysts. Investment analysts are going to use Schedule P to find out if, in fact, we are adequately reserved or if we are not adequately reserved. The relatively redundancy or inadequacy in your company's reserve levels is a very important issue for the investment analyst to determine whether or not your stock is going to be appreciating or depreciating in value as time goes forward.

And lastly, your customers may be using your Schedule P. Your customers, especially the larger commercial accounts with a risk manager or other sophisticated insurance buyer will want to make sure that their insurer is adequately reserved and they could, and probably would, be using Schedule P to evaluate the relative adequacy of your company's reserve's.

What I'll do to start out is just give a basic definition of Parts Two, Three and Six. Please bear with me if you use Schedule P because this will be fairly straightforward. Part Two shows incurred loss triangles and the two Jeff's before me said that for the liability lines you have ten years of data plus a prior year row. The old Schedule O lines (the property lines) are going to show two years of data and prior year row. Again, it is important to keep in mind, this is incurred loss data and it's going to include paid losses as well as outstanding case reserves and IBNR. Schedule P also includes the allocated loss adjustment expenses. A change introduced in 1989 means that Schedule P no longer includes unallocated loss adjustment expenses. Unallocated loss adjustment expenses can be found elsewhere in the statement, but no longer in Parts Two, Three nor Six of Schedule P.

Part Two is on a net basis and has two interesting columns all the way to the right. These columns show a one and two year reserve development, which gives you an idea of how accurately your claims people and your loss reserve officer set loss reserves in the past and how those reserves have developed over the past two years.

Part Three is paid loss triangle including allocated loss adjustment expenses. Part Three excludes the unallocated loss adjustment expenses. As with Part Two, it's on a net basis. In addition to the paid loss triangles, Part Three is also going to show you the number of claims both closed with and without a loss payment for the accident years or the notice years that are included within the schedule.

Finally we turn to Part Six. Part Six is where those of us who are loss reserve actuaries live. That's the bulk and IBNR reserves. Again, Part Six is on a net basis. It's going to include the IBNR reserves for loss and allocated loss adjustment expenses, but it excludes any IBNR carried for unallocated loss adjustment expenses. Some examples of what IBNR is meant to cover includes known cases which have inadequate case reserves, true IBNR or new claims emergence as well as any needed reserves for claims which may reopen in the future.

The bulk reserves are dollar entry type of reserves that would cover a catastrophe or something on that order that the company is aware of but doesn't yet have case reserves set up for. Obviously, the bulk reserve would get taken down once the case reserves are established.

That's a basic introduction of the meat of Schedule P, Parts Two, Three, and Six. Now we'll go on and talk a little about the external uses for Schedule P. The external uses are the ones that I'm the most concerned about.

(Slide 23 & 24)

The NAIC has a number of solvency tests. Three of those solvency tests relate to the data shown in Schedule P, specifically which relate to Schedule P, Part Two. IRIS test 9 utilizes the one year reserve development column shown on Part Two and looks at the total reserve development on all prior years that your company has seen in the last year. IRIS test 9 compares the observed one year reserve development to the surplus the company had at the prior year end, and in cases where upward development of more than 25% of prior year end surplus is observed this will result in failure of IRIS test 9. Hopefully you aren't going to lose 25% of your surplus through reserve development in a single year, but it sure can happen.

IRIS test 10 is identical to test 9 with the exception of the fact that it's based on two years of reserve development and it compares those two years of reserve development to the surplus carried two years ago. Think in terms of doubling test 9 reserve development and you get to test 10. Again, the standard for failure is 25% or more of reserve development as compared to the surplus carried two years ago.

IRIS test 11 is difficult to explain. In fact, there are a number of cases where IRIS test 11 will yield some strange results. To try to put test 11 into words, the test evaluates the adequacy of the outstanding loss ratio. In other words, the total claims outstanding relative to the most recent years earned premium. It doesn't take too long thinking about that relationship to realize that you're comparing apples and oranges. You have outstanding losses from all prior years that you are trying to compare to current year premiums. As a result, there's a mismatch of premiums and losses. Thus, NAIC IRIS test 11 is of questionable value anytime you've got a significant change in your mix of business between property and liability lines or anytime the company is growing or shrinking. In the latter case your relative amount of loss reserves outstanding compared to current earned premium is going to be out of a long run average level and it may not give you a true indication of whether or not you have a reserve adequacy problem.

The NAIC's feeling on IRIS test 11 is that the issues noted are not major shortcomings. As a result they continue to use the test. In most cases they will not be major shortcomings, however, do keep in mind that there are some cases where one must be careful in evaluating test 11.

(Slide 25)

Let's go on to the data you can derive from Schedule P. The non-actuaries in the audience are probably thinking Schedule P is already about 40 pages long and now you want to derive data from it? I've already got enough, thank you very much. There are, however, some interesting data that you can derive from Schedule P.

First off, you can derive a paid and case reserve triangle. If a person doesn't care about what the loss reserve officer's opinion is of IBNR they can go ahead and look only at the paid and case reserves. You can do that by simply taking a part two triangle and subtracting the Part Six triangle, giving you another way to do a prospective reserve test. If we only want to look at the outstanding portion of the case reserves we can simply subtract our paid loss triangle, or Part Three. Later on we're going to talk a little bit about the claim counts you can get out of Part One. With the claims counts and the outstanding case reserves, one can also do some interesting analysis.

Claim count triangles can be had from Schedule P, however they must be derived from a number of annual statements. Specifically from Schedule P loss data and claim count data you can get to average outstanding and average paid losses. Again, in the format that Schedule P is in today, you can't get directly to claim count triangles because you only have a single evaluation point. The idea is if you do have a company that you're particularly interested in, and maybe going to work for, or trying to decide what their real reserve position is and you want to do more than four or five different reserve tests, start collecting their annual statements over time, and build claim count triangles. Again, depending on the line of business, you're going to probably be collecting enough annual statements to fill a small closet with at home because many lines that you will be interested in will have a fairly long tail. On the other side of the coin, if you want to go to work for a company with a very heavily weighted personal lines book or other shortail line, you can do this analysis quite quickly. Over what period of time you need to look at depends on how quickly the losses close out.

(Slide 26)

Part Six. Is it useful? Well, it does show carried IBNR. And it does show carried IBNR patterns. It becomes difficult to do any intercompany comparisons on Part Six even if you compare the same line of insurance because different companies have different reserving philosophies. As a result different companies have different levels of case reserve adequacy and hence different needed levels of carried IBNR. The one thing that is interesting, and you can get this directly out of Part Six is take a look at the IBNR release patterns. Are they appropriate? Is a company carrying more IBNR from an older accident year, say, than a current accident year? If that is the case then one of two things is happening. Either that old accident year was extremely fortunate in that it had no adverse reserve development. Or more likely the more recent years shown show more adverse development and they've had to release IBNR to keep up with that development. Not a lot more can be gotten out of Part Six other than just an eyeball test of what is reasonable and what isn't reasonable as it pertains to IBNR patterns.

(Slide 27)

Some pitfalls to avoid in using Schedule P Parts Two, Three, and Six. Your investment analysts, the people that quite frankly I'm the most concerned about, probably are going to use both Part Two and Part Three to determine a company's reserve position. Generally speaking, and this is going to be about as general as it gets, they are going to rely most heavily on Part Three (Paid Loss) simply because Part Three is not subject to company reserving philosophy. The investment analysts are sitting outside the company, very much at arms length, trying to evaluate a company's reserve position. To try to .utilize Part Two for reserve analysis requires an investment analyst to assume consistent patterns of carried reserve adequacy going back in time. I think we can all say that this is a risky assumption to make with any company because year to year the relative reserve adequacy does change.

The investment analyst is also going to try to determine a tail exposure. What's your company's incurred effect going to be after ten years? They are especially interested in the tail in the very long tail lines, like general liability and medical malpractice occurrence. In order to get a handle on this, the investment analyst is probably going to compare Part Two and Part Three to see what kind of losses you believe are still outstanding. After ten years, the analysts are going to be able to do that because they know what the paid amount is from Part Three. They also know what your total incurred amount is from Part Two. Obviously the difference between those two will be your estimate of the outstanding (case plus IBNR) loss. Unfortunately, that's a dangerous thing for that investment analyst to do. We all know, after ten years, one or two claims could make a large difference and dramatically distort what the tail looks like from year to year. Hopefully the analysts are also going to look at some industry data to help determine what the tail should be for the particular line of insurance that they are reviewing.

Moving down to point 2, by company comparisons using Schedule P can be misleading. Again, these can be misleading for a number of different reasons, but the different reserving philosophy discussed earlier is the foremost reason for the possibility of misleading results between company's.

In reviewing Schedule P, one must beware of discounted reserves. One of my counterparts talked about discounted work comp reserves. Just because you have adverse development in Schedule P on an older accident year does not necessarily mean that you are going to have that kind of adverse development on the current year when it gets to the same stage of development. Either changes in reserving philosophy or changes in the approach to discounting of reserves can cause this to happen. There are many companies who discount the work comp reserves and an adverse development showing up in Part Two could very well be just the unraveling of the discount.

Finally, shortcomings of using Part Three data need to be discussed. Utilizing the paid claims data to establish reserve adequacy has a shortcoming when you start talking about long tail lines of business. If you've only got 5% or 10% of ultimate losses paid the first year or two, you're going to have some volatile loss development factors to choose from when trying to determine what your ultimate development factors are. Speaking from a medical malpractice standpoint, it is very difficult to establish what your ultimate loss ratios are going to be say twelve months, or eighteen months after the accident year is over utilizing only paid data simply because such a small percentage of claims are paid at that stage of development. The result is that you've got a very volatile loss development pattern that you must use to select ultimate loss dollars when you rely strictly on the paid loss data.

The other pitfall in using Schedule P data that's not on the slide is one that I think is probably going to increase in importance as we go forward. That is you've got accident year or notice year or policy year data, take your pick. In most cases you have accident year losses and you have calendar year premiums to compare against them. From my company's standpoint, we are writing a lot more workers' compensation these days on retrospective rating plans. As a result, if you have some retrospective rating plans that are generating large additional premiums for instance, what you are going to show in Schedule P is a number of years of very unprofitable results because the calendar year premiums are frozen at the end of the year. The end result is that you are going to see all the losses in the appropriate accident year and you're going to see the premiums rolling in some years later. In these cases one cannot necessarily look at loss ratios in Schedule P and say anything at all about rate level adequacy. If a company's loss ratios have gone down 20 points in the most recent accident years, the real reason for this could be that the company didn't know what was going on three or four years ago and didn't charge enough premium. Only now is the company getting retrospective premiums in the door. The effect of these additional premiums is to decrease the current accident year loss ratio.

To sum it up, Schedule P in its current form is clearly much improved over the old Schedule P. There's a lot more things to look at for the actuaries and nonactuaries. The actuaries can spend a lot of time looking at Schedule P and justify a lot of salary expenditures, but what it really comes down to is much like anything else, it is something that if used correctly can be very beneficial but can also lead to some incorrect conclusions if you're not careful with how you interpret your analysis. Thank you.

MR. KRAUSE: Thank you, Jeff, Jeff and Jeff. And to paraphrase Mr. Post, who just completed his presentation, I just looked at Schedule P and the only thing I could think of, ain't we got fun.

Summarizing briefly what we've covered here, at least as I heard it emphasized, was in '89 there were a lot of changes to this important schedule, not nearly as much in '90 or '91, but nevertheless Schedule P continues to be an evolving schedule. No one uses interrogatory 8, which could probably be successfully used and answered, enabling you to rationalize why no one could analyze your Schedule P. (Laughter)

Part One gives us a historic snapshot of profitability, along with the view of the trends in that profitability. It enables us to look at the extent of discounting, which is becoming more prevalent, and unlike some of the other parts, is fraught with some limitations we must impose on ourselves.

Part Four is not adequately used. I concur with Jeff Englander's observation. It is rarely used. I'm not sure why that is, but that is a fact.

Parts Two, Three and Six are where we attempt to test reserve adequacy by various methods. The data is used in the IRIS tests by the NAIC and, unlike actuarial exams, if you fail these tests often enough you will not get another opportunity. (Laughter)

Then Jeff Post went on to tell us how we could derive a lot of data if we had one or two accumulated boxes full of annual statements over ten years, and reminded us that outside analysts will use this schedule. Yes, they will use it. Some will over use it. Jeff described some of the pitfalls and just like anything else he talked about, you be careful when you compare companies and there are numerous limitations. That reminded me that information has something in common with when we make mistakes. That is that most of us either learn much to much from it or nothing at all.

I want to thank each of the panelists and we have ten to fifteen minutes for some questions from the floor.

Yes, in the back. Please come to the microphone if you would.

QUESTION: Yes, a question for 1991 products liability. Do we have to break out all the other...the past nine years when we prepare that schedule on 1991?

MR. KRAUSE: Jeff?

SPEAKER: ...blow it away from the other liability that was already reported. (Laughter)

MR. KRAUSE: Jeff will handle that one.

SPEAKER: Who knows that. I don't think so, but...

COMMENT FROM AUDIENCE: I think that I do...

SPEAKER: ...you do. Okay. That shows you what I know.

COMMENT FROM AUDIENCE: ...in year one of reporting data, I think the NAIC may not expect to get the most accurate and complete of data.

SPEAKER: Okay. Because they do show all the years blank so it looks like they're expecting it.

QUESTION: Okay. That's what I was afraid of. (Laughter)

MR. KRAUSE: They've expected a lot in the past as well. Someone else? Yes, sir.

QUESTION: I'd like to follow up to that question. The second Jeff talked about products liability being pulled all out of other liability and I've also seen other people thinking that it is to come out of package...CMP as well, is there a clean cut definition of products liability?

MR. KADISON: Typically the instructions that I went through all discuss product liability having been a component of other liability. I suspect there were probably some package writers out there who do include, within the GL component, some product liability coverage. So perhaps there is some that is currently being reported in the CMP section. Again, I would expect that the NAIC is expecting that all of that product liability will be split out whether it has been reported in the other liability section or the CMP section.

QUESTION: Okay. Thanks.

MR. KRAUSE: Yes, sir.

COMMENT FROM THE AUDIENCE: (Inaudible - Not at Microphone)

QUESTION: Are there some...has there been some past statements made about splitting out the other liability section of the CMP policy and reporting it separately?

COMMENT FROM THE AUDIENCE: (Inaudible - Not at Microphone)

MR. KRAUSE: Any other contribution to the answer. If not it will stand as most recently given. (Laughter) Thank you for the contribution. That was good to clear that up.

Questions? Anyone else. Yes, ma'am.

QUESTION: I just had a question about the run-off numbers in Part Two on the one and two year run-off. Some companies, my company is one of them, have pools reported on a one quarter lag basis, so that what we get reported in March primarily has to do with accident years in the prior accounting period and that obviously comes through as run-off, you know, in the subsequent year. Is that understood by analysts? Do they look for that? Do they understand that that is a distortion in those run-off numbers? Or should we be trying to estimate it before closing the books at a year end and book what we expect to have reported to us in the following calendar year?

MR. POST: At St. Paul, the way we approach that is to make an estimate of what we believe the calendar year effect is going to be and then book it as IBNR. Thus when the development comes through in the subsequent year, we take down the IBNR and we have a net zero incurred effect.

QUESTION: Do you also estimate the premiums that would be reported as well or simply...?

MR. POST: You are referring to workers comp pools that will give you premiums and losses. What we would do, is we book what we think the net effect would be.

QUESTION: Okay. I just have one more question too. It is my understanding that in Part Three, the paid losses in ALAE are net of salvage and subrogation...

SPEAKER: That's correct.

QUESTION: ...is that recognized in the development of those paid losses that the reserve you are calculating isn't gross salvage and subrogation, which is what needs to be reported in Schedule P? Is that mismatched?

MR. POST: Part One includes subrogation and salvage in it, it's separately identified but it's going to be shown in Part One. Part Two is net of subrogation and salvage. Also parts Three and Six are net of subrogation and salvage. I think their argument was that really the only part of the statement that is dramatically affected is auto physical damage, since that's the only place there is much salvage. As a result there wasn't a major discrepancy as a result of excluding subrogation and salvage. But, yes, they know it is an inconsistent approach between Parts One, and Two, Three and Six.

QUESTION: Okay. Thank you.

SPEAKER: With regard to your first question also. In the first quarter of '91, the National Council Workers' Comp Pools reported 1.2 or so billion dollar increase in reserves. Any company that did not recognize that increase on their year end '90 statutory blank will have one of those hits during the '91 statement. You may have an opportunity, again, to make comment of that on Question 8 of the interrogatories. It seems like an appropriate topic to discuss there.

MR. KRAUSE: Other questions? Okay. I'm not opposed to ending early. Thank you all.

DATA INCLUDED IN NEW SCHEDULE P FOR 1989
PART I

	Column
PREMIUM EARNED	
Direct plus assumed	2
Ceded	3
Net	4
LOSS PAYMENTS	
Direct plus assumed	5
Ceded	6
ALLOCATED LOSS EXPENSE PAYMENTS	
Direct plus assumed	7
Ceded	8
SALVAGE AND SUBROGATION RECEIVED	
Net	9
UNALLOCATED LOSS EXPENSE PAYMENTS	
Net	10
NUMBER OF CLAIMS REPORTED	
Direct plus assumed	12
LOSSES UNPAID	
Case basis	
Direct plus assumed	13
Ceded	14
Bulk plus IBNR	
Direct plus assumed	15
Ceded	16
ALLOCATED LOSS EXPENSES UNPAID	
Case basis	
Direct plus assumed	17
Ceded	18
Bulk plus IBNR	
Direct plus assumed	19
Ceded	20
UNALLOCATED LOSS EXPENSES UNPAID	
Net	21
DISCOUNT FOR TIME VALUE OF MONEY	
Loss	30
Loss expense	31
INTER-COMPANY POOLING PARTICIPATION PERCENTAGE	32
NET BALANCE SHEET RESERVES AFTER DISCOUNT	
Losses unpaid	33
Loss expenses unpaid	34

(Slide 1)

PART 2 - INCURRED DATA

	1988	**1989**
Data included	**Loss + allocated + unallocated**	**Loss + allocated**
Number of accident years displayed	**6**	**10**
As of how many year-end points	**6**	**10**
Other data included	**Cumulative totals**	**One year development**
	Historical incurred loss ratios	**Two year development**

(Slide 2)

PART 3 - PAID DATA

	1988	1989
Data included	Loss + allocated + unallocated	Loss + allocated
Number of accident years displayed	6	10
As of how many year-end points	6	10
Other data included	Hindsight reserve based on current incurral	Number of claims closed with payment
	Historical paid loss ratios	Number of claims closed without payment
	Current incurred loss ratios	
	Historical hindsight reserve loss ratios	

(Slide 3)

NEW PARTS OF SCHEDULE P FOR 1989

Part 4	Claims-made data Same exhibit as old Schedule P
Part 6	Bulk plus IBNR loss reserves triangle for latest 10 accident years as of latest 10 year-ends

(Slide 4)

LINE OF BUSINESS CHANGES

Old Schedule P, Part 1E lines separated into:
- **Homeowners/Farmowners**
- **Commercial Multiple Peril**
- **Special Liability (Ocean Marine, Aircraft, Boiler and Machinery)**

Automobile Liability separated into:
- **Private Passenger**
- **Commercial**

All old Schedule O lines conform to new Schedule P format showing data for 2 latest accident years separately and all prior accident years combined

New parts of Schedule P show combinations of old Schedule O lines:
- **Special Property (Fire, Allied Lines, Inland Marine, Earthquake, Glass, Burglary and Theft)**
- **Fidelity, Surety, Financial Guaranty, Mortgage Guaranty**
- **Other (Credit, Accident and Health)**

New reinsurance definitions:
- **Reinsurance A includes all 1988 and subsequent non-proportional reinsurance in the following lines: Fire, Allied Lines, Ocean Marine, Inland Marine, Earthquake, Group Accident and Health, Credit Accident and Health, Other Accident and Health, Auto Physical Damage, Glass, Boiler and Machinery, Burglary and Theft, and International (of the foregoing)**
- **Reinsurance B includes all 1988 and subsequent non-proportional reinsurance in the following lines: Farmowners Multiperil, Homeowners Multiperil, Commercial Multiperil, Medical Malpractice, Workers' Compensation, Other Liability, Auto Liability, Aircraft (all peril), and International (of the foregoing)**
- **Reinsurance C includes all 1988 and subsequent non-proportional reinsurance in the following lines: Financial Guaranty, Fidelity, Surety, Credit, and International (of the foregoing)**
- **Reinsurance D includes all 1987 and prior reinsurance previously reported on Line 30 Reinsurance of the old Schedule O**
- **All proportional reinsurance must be allocated to appropriate lines**
- **"Non-proportional reinsurance" means reinsurance in excess of a retention by the ceding company, and "proportional reinsurance" means first dollar pro rata reinsurance**
- **For contracts that afford both proportional and non-proportional reinsurance, allocate premiums and losses to their component parts**

(Slide 5)

CHANGE TO SCHEDULE P FOR 1990

Separate exhibit for Loss Portfolio Transfers - Part 4

- **Part 1 format**

Revised exhibit on Claims-Made Policies - Part 5

- **Added detail**
- **Direct plus assumed—now shown**
  Net—no longer shown

(Slide 6)

CHANGE TO SCHEDULE P FOR 1991

New exhibits for

Product Liability

(Slide 7)

CHANGES THAT MAY AFFECT RESERVE ANALYSES

Coverage

- Insuring agreement
- Exclusions
- Limits of liability
- Deductibles/self-insured retentions

(Slide 8)

CHANGES THAT MAY AFFECT RESERVE ANALYSES

Book of Business

- Line of business
- Subline
- State
- Size of risk
- Class

(Slide 9)

CHANGES THAT MAY AFFECT RESERVE ANALYSES

Claims Operations

- Average caseload
- Reserving philosophy
- Settlement philosophy
- Use of outside adjusters
- Method of counting claims

(Slide 10)

CHANGES THAT MAY AFFECT RESERVE ANALYSES

Reinsurance

- Use of treaty vs. facultative
- Use of excess of loss vs. pro-rata
- Use of portfolio transfers
- Commutations
- Retention amounts
- Aggregate deductible
- Aggregate limit
- Collectibility

(Slide 11)

CHANGES THAT MAY AFFECT RESERVE ANALYSES

External

- **Legal**
- **Judicial**
- **Social**
- **Economic**

(Slide 12)

SCHEDULE P

PRIMARY PURPOSES:

- Measure loss and loss adjustment expense reserve adequacy (Parts 2, 3, and 6)
- Assess historical levels of underwriting profitability (Parts 1, 4, and 5)
- Measure effects of reinsurance ceded (Parts 1 and 4)
- Compute excess statutory reserves over statement reserves (Interrogatories)

(Slide 13)

SCHEDULE P

DATA PRESENTED - PART 1

- Cumulative experience by "incurred year" as of statement date
  - "incurred year" usually accident year
  - could be something else (eg., claim-made year, discovery year)
- Shows earned premiums, paid, outstanding and incurred losses and adjustment expenses
  - latest valuation of ultimate losses and expenses
  - experience displayed for direct plus assumed vs. ceded (ULAE is only net)

(Slide 14)

SCHEDULE P

DATA PRESENTED - PART 1 (con't)

- Other items:
  - Reported and outstanding claim counts (direct plus assumed only)
  - Discount in balance sheet reserves
  - Intercompany pooling percentage
- Shown by line of business & summary
  - Some lines have 10-yr & prior detail (casualty), others have 2-yr & prior (property), or 3-yr (reinsurance)
  - Break out Products from Other Liability in 1991

(Slide 15)

SCHEDULE P

ANALYTICAL INFORMATION - PART 1

- Loss & LAE Ratios
  - Absolute levels
  - Trends
  - Incurred year vs. Calendar year (income statement)
- Direct Plus Assumed vs. Ceded
  - Loss & LAE Ratios
  - Relative volume ceded (trends, recoverability)
- Extent of Discounting
  - Required for non-W.C. pension discounting
  - Optional for pension-type cases
- Claim Counts
  - Can calculate paid and reported severities
  - Compile for several years to get triangles

(Slide 16)

SCHEDULE P

DISTORTIONS & OTHER LIMITATIONS - PART 1

- Catastrophes and large claims
- Use of financial covers
- Varying reinsurance retentions
- Claim counts not always available (eg., reinsurers)
- Fewer experience periods in detail for certain lines of business (property, reinsurance)
- Can't tell much about old exposures

(Slide 17)

SCHEDULE P

PART 4 - LOSS PORTFOLIO TRANSFERS

What is a portfolio transfer?

- Premiums must already have been earned
- Premiums paid usually reflect anticipated investment income
- May be done for the financial effect or other reasons

(Slide 18)

SCHEDULE P

DATA PRESENTED - PART 4

- Very similar to Part 1 Summary
- Differences:
    - Only include deals done during the year (Part 1 is cumulative)
    - All deals treated as assumed or ceded reinsurance
    - No subdivision by line of business

(Slide 19)

SCHEDULE P

PART 5 – CLAIMS-MADE POLICIES

- Two-pronged test applied to Med Mal, Gen'l Liab, CMP and Products (new in 1991):

  a) Current year claims-made earned premium > $100,000

  AND

  b) Current year claims-made earned premium > 15% of total for that line

- Complete Part 4 for each line that meets the two conditions

(Slide 20)

SCHEDULE P

DATA PRESENTED – PART 5

- Similar to Part 1, "direct plus assumed" only
- Unpaid losses divided between "case-basis" and "bulk"
- No display of discount (reconciling item in Part 1)
- Claims closed split between with and without payment
- Shows extended loss and expense reserves
  - For tail coverage
  - Not necessarily reported elsewhere in Schedule P

(Slide 21)

CLRS PRESENTATION
REVISED SCHEDULE P

INTRODUCTION

-PART 2 DEFINED
  INCURRED LOSS TRIANGLE
  INCLUDES IBNR
  INCLUDES ALAE BUT EXCLUDES ULAE

-PART 3 DEFINED
  PAID LOSS TRIANGLE
  INCLUDES ALAE BUT EXCLUDES ULAE

-PART 6 DEFINED
  BULK AND IBNR TRIANGLE
  INCLUDES ALAE BUT EXCLUDES ULAE

(Slide 22)

CLRS PRESENTATION
REVISED SCHEDULE P

EXTERNAL USES OF PARTS 2, 3, AND 6

-IRIS TEST 9
  1 YEAR RETROSPECTIVE RESERVE TEST
  USES DATA IN PART 2

-IRIS TEST 10
  SAME TEST AS TEST 9 EXCEPT USES 2 YEARS OF DEVELOPMENT

-IRIS TEST 11
  EVALUATES THE ADEQUACY OF THE OUTSTANDING LOSS RATIO
  UTILIZES DATA CONTAINED IN PART 2 AS WELL AS OTHER ANNUAL STATEMENT DATA

-EXAMPLES OF IRIS TEST 9, 10, AND 11 CALCULATIONS

(Slide 23)

CLRS PRESENTATION
REVISED SCHEDULE P

EXTERNAL USES OF PARTS 2, 3, AND 6
CONTINUED

- INVESTMENT ANALYST USE
  - TEND TO RELY ON PART 3 PAID LOSS DEVELOPMENT
  - TAIL DERIVED OUT OF PART 2
  - TEND TO DEVELOP OPINIONS OF CURRENT RESERVE ADEQUACY BASED ON PAST PATTERNS
  - WILL NOT GENERALLY GO DEEP ENOUGH INTO PATTERNS TO SEE CHANGES IN RESERVING POSITION
- OTHERS

(Slide 24)

CLRS PRESENTATION
REVISED SCHEDULE P

DERIVED DATA FROM PARTS 2, 3, AND 6

- CASE RESERVE TRIANGLE
  - PAID PLUS OUTSTANDING
  - PART 2 LESS PART 6
- OUTSTANDING CASE RESERVE TRIANGLE
  - PART 2 LESS PART 3 LESS PART 6
- CLAIM COUNT TRIANGLES
  - WHAT CAN BE DERIVED?
  - OVER WHAT PERIOD OF TIME?
  - HOW CAN IT BE USED?

(Slide 25)

CLRS PRESENTATION
REVISED SCHEDULE P

PART 6-- IS IT USEFUL?

-CARRIED IBNR PATTERNS

-IBNR AS IT RELATES TO PAST EARNED PREMIUM

-IBNR RELEASE PATTERNS APPROPRIATE?

(Slide 26)

CLRS PRESENTATION
REVISED SCHEDULE P

SOME PITFALLS TO AVOID

-PART 2 ANALYSIS CAN BE SUBJECT TO COMPANY RESERVING PHILOSOPY

-BY COMPANY COMPARISONS CAN BE MISLEADING

-BEWARE OF DISCOUNTED RESERVES

-PART 3 SHORTCOMINGS FOR LONG TAILED LINES

(Slide 27)

SCHEDULE P - PART 1 - SUMMARY

(000 Omitted)

(1) Years in Which Premiums Were Earned and Losses Were Incurred	PREMIUMS EARNED			LOSS AND LOSS EXPENSE PAYMENTS							(12)
				LOSS PAYMENTS		ALLOCATED LOSS EXPENSE PAYMENT		(9)	(10)	(11)	
	(2) Direct and Assumed	(3) Ceded	(4) Net (2 - 3)	(5) Direct and Assumed	(6) Ceded	(7) Direct and Assumed	(8) Ceded	Salvage and Subrogation Received	Unallocated Loss Expense Payments	Total Net Paid (5-6+7-8+10)	Number of Claims Reported - Direct and Assumed
1. Prior ...	X X X	X X X	X X X	34,295	15,438	24,387	4,972	277	1,516	39,788	X X X
2. 1981	1,406,256	368,616	1,037,640	808,401	199,475	78,137	21,618	27,131	39,947	705,392	X X X
3. 1982	1,481,354	385,120	1,096,234	869,441	223,129	99,719	30,337	39,886	45,357	761,051	X X X
4. 1983	1,584,818	416,055	1,168,763	1,102,881	342,177	138,460	56,125	34,157	51,409	894,448	X X X
5. 1984	1,812,155	474,553	1,337,602	1,259,228	358,638	172,632	69,956	35,078	56,360	1,059,626	X X X
6. 1985	2,241,451	544,281	1,697,170	1,354,005	421,979	147,386	47,131	36,133	62,475	1,094,756	X X X
7. 1986	3,113,919	849,423	2,264,496	1,203,930	417,627	123,083	39,899	28,511	64,402	933,889	X X X
8. 1987	3,547,260	913,955	2,633,305	1,064,058	296,408	78,143	21,115	30,214	69,817	894,495	X X X
9. 1988	3,735,502	1,012,109	2,723,393	1,196,812	307,520	77,733	24,150	27,423	77,843	1,020,718	X X X
10. 1989	3,706,056	1,004,937	2,701,119	1,122,975	292,388	51,279	11,497	22,315	77,385	947,754	X X X
11. 1990	3,740,021	919,291	2,820,730	581,407	125,463	16,051	3,602	9,652	62,597	530,990	X X X
12. TOTALS	X X X	X X X	X X X	10,597,433	3,000,242	1,007,010	330,402	290,777	609,108	8,882,907	X X X

NOTE: For "prior," report amounts paid or received in current year only. Report cumulative amounts paid or received for specific years. Report loss payments net of salvage and subrogation received

SCHEDULE P - PART 1 - SUMMARY

(000 Omitted)

Years in Which Premiums Were Earned and Losses Were Incurred	LOSSES UNPAID				ALLOCATED LOSS EXPENSES UNPAID				(21)	(22)	(23)
	CASE BASIS		BULK + IBNR		CASE BASIS		BULK + IBNR				
	(13) Direct and Assumed	(14) Ceded	(15) Direct and Assumed	(16) Ceded	(17) Direct and Assumed	(18) Ceded	(19) Direct and Assumed	(20) Ceded	Unallocated Loss Expenses Unpaid	Total Net Losses and Expenses Unpaid	Number of Claims Outstanding - Direct and Assumed
1. Prior ...	188,708	23,133	115,879	14,849	56,852	5,094	42,418	5,030	6,684	362,435	X X X
2. 1981	12,913	4,818	29,847	3,659	1,901	499	10,552	1,301	1,105	46,041	X X X
3. 1982	18,253	6,972	56,005	7,639	2,730	891	18,116	2,407	2,170	79,365	X X X
4. 1983	33,159	9,010	99,670	29,568	5,317	1,523	30,166	8,786	3,969	123,394	X X X
5. 1984	78,979	34,787	86,866	47,843	11,492	3,822	29,530	17,122	4,692	107,985	X X X
6. 1985	128,823	39,202	37,231	9,671	52,824	10,022	22,271	6,915	4,278	179,617	X X X
7. 1986	139,983	56,700	158,601	36,184	24,974	9,915	71,146	19,303	5,890	278,492	X X X
8. 1987	158,578	44,836	347,468	76,750	28,334	5,836	139,114	34,309	9,675	521,438	X X X
9. 1988	242,966	69,117	441,762	98,282	59,046	12,558	167,138	42,052	13,544	702,447	X X X
10. 1989	372,855	117,839	522,459	120,977	55,602	13,651	200,065	53,511	17,361	862,364	X X X
11. 1990	446,607	86,086	868,753	204,513	43,817	8,113	328,672	83,951	42,334	1,347,520	X X X
12. TOTALS	1,821,824	492,500	2,764,541	649,935	342,889	71,924	1,059,188	274,687	111,702	4,611,098	X X X

SCHEDULE P - PART 1 - SUMMARY

(000 Omitted)

Years in Which Premiums Were Earned and Losses Were Incurred	TOTAL LOSSES AND LOSS EXPENSES INCURRED (24) Direct and Assumed	(25) Ceded	(26) Net*	LOSS AND LOSS EXPENSE PERCENTAGE (Incurred/Premiums Earned) (27) Direct and Assumed	(28) Ceded	(29) Net	DISCOUNT FOR TIME VALUE OF MONEY (30) Loss	(31) Loss Expense	(32) Inter-Company Pooling Participation Percentage	NET BALANCE SHEET RESERVES AFTER DISCOUNT (33) Losses Unpaid	(34) Loss Expenses Unpaid
1. Prior ...	X X X	X X X	X X X	X X X	X X X	X X X	15,418	5,704	X X X	251,187	90,126
2. 1981	982,803	231,370	751,433	69.9	62.8	72.4	3,348	1,237	0	30,935	10,521
3. 1982	1,111,791	271,375	840,416	75.1	70.5	76.7	6,026	2,228	0	53,621	17,490
4. 1983	1,465,031	447,189	1,017,842	92.4	107.5	87.1	8,538	3,158	0	86,713	25,986
5. 1984	1,699,779	532,168	1,167,611	93.8	112.1	87.3	2,261	836	0	80,954	23,934
6. 1985	1,809,293	534,920	1,274,373	80.7	98.3	75.1	0	0	0	117,181	62,436
7. 1986	1,792,009	579,628	1,212,381	57.5	68.2	53.5	0	0	0	205,700	72,792
8. 1987	1,895,187	479,254	1,415,933	53.4	52.4	53.8	0	0	0	384,460	136,978
9. 1988	2,276,844	553,679	1,723,165	61.0	54.7	63.3	0	0	0	517,329	186,118
10. 1989	2,419,981	609,863	1,810,118	65.3	60.7	67.0	0	0	0	656,498	205,866
11. 1990	2,390,238	511,728	1,878,510	63.9	55.7	66.6	0	0	0	1,024,761	322,759
12. TOTALS	X X X	X X X	X X X	X X X	X X X	X X X	35,591	13,163	X X X	3,408,339	1,154,005

*Net = (24 - 25) = (11 + 22)

SCHEDULE P - PART 2 - SUMMARY

(1) Years in Which Losses Were Incurred	INCURRED LOSSES AND ALLOCATED EXPENSES REPORTED AT YEAR END (000 OMITTED) (2) 1981	(3) 1982	(4) 1983	(5) 1984	(6) 1985	(7) 1986	(8) 1987	(9) 1988	(10) 1989	(11) 1990	DEVELOPMENT** (12) One Year	(13) Two Year
1. Prior	* 512,528	604,717	627,373	700,734	854,388	894,096	976,737	1,014,560	1,093,056	1,158,852	65,796	144,292
2. 1981	666,004	637,521	670,763	658,799	717,243	716,576	711,427	713,314	713,423	710,380	(3,043)	(2,934)
3. 1982	X X X	690,409	682,574	707,118	787,127	796,288	796,014	788,919	787,933	792,891	4,958	3,972
4. 1983	X X X	X X X	761,002	768,324	907,388	938,446	947,603	953,197	960,309	962,464	2,155	9,267
5. 1984	X X X	X X X	X X X	913,385	959,205	1,013,028	1,055,949	1,082,536	1,098,020	1,106,560	8,540	24,024
6. 1985	X X X	X X X	X X X	X X X	1,075,922	1,132,386	1,144,298	1,165,704	1,182,041	1,207,621	25,580	41,917
7. 1986	X X X	X X X	X X X	X X X	X X X	1,323,490	1,268,116	1,217,455	1,209,480	1,142,087	(67,393)	(75,368)
8. 1987	X X X	X X X	X X X	X X X	X X X	X X X	1,563,047	1,472,103	1,400,300	1,336,441	(63,859)	(135,662)
9. 1988	X X X	X X X	X X X	X X X	X X X	X X X	X X X	1,740,735	1,653,969	1,631,779	(22,190)	(108,956)
10. 1989	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	1,727,536	1,715,368	(12,168)	X X X
11. 1990	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	1,773,580	X X X	X X X
										12. TOTALS	(61,624)	(99,448)

* Reported reserves only. Subsequent development relates only to subsequent payments and reserves.
** Current year less first or second prior year, showing (redundant) or adverse.

SCHEDULE P - PART 3 - SUMMARY

(1)	CUMULATIVE PAID LOSSES AND ALLOCATED EXPENSES AT YEAR END (000 OMITTED)										(12)	(13)
Years in Which Losses Were Incurred	(2) 1981	(3) 1982	(4) 1983	(5) 1984	(6) 1985	(7) 1986	(8) 1987	(9) 1988	(10) 1989	(11) 1990	Number of Claims Closed With Loss Payment	Number of Claims Closed Without Loss Payment
1. Prior	0 0 0	188,585	331,620	450,372	543,163	618,602	668,827	714,757	764,829	803,100	X X X	X X X
2. 1981	272,014	447,156	514,660	561,470	600,917	623,298	641,511	652,705	659,651	665,445	X X X	X X X
3. 1982	X X X	297,520	468,724	534,035	596,143	641,305	677,589	690,293	703,898	715,695	X X X	X X X
4. 1983	X X X	X X X	308,141	529,405	628,443	707,309	767,448	803,193	828,068	843,038	X X X	X X X
5. 1984	X X X	X X X	X X X	364,687	642,046	764,702	865,364	927,911	974,493	1,003,266	X X X	X X X
6. 1985	X X X	X X X	X X X	X X X	392,019	687,030	817,605	915,967	979,747	1,032,281	X X X	X X X
7. 1986	X X X	X X X	X X X	X X X	X X X	356,314	603,724	716,218	803,878	869,486	X X X	X X X
8. 1987	X X X	X X X	X X X	X X X	X X X	X X X	353,073	637,719	747,502	824,678	X X X	X X X
9. 1988	X X X	X X X	X X X	X X X	X X X	X X X	X X X	464,587	789,229	942,875	X X X	X X X
10. 1989	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	476,076	870,366	X X X	X X X
11. 1990	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	468,392	X X X	X X X

NOTE: Net of salvage and subrogation received.

SCHEDULE P - PART 6 - SUMMARY

(1)	BULK AND INCURRED BUT NOT REPORTED RESERVES ON LOSSES AND ALLOCATED EXPENSES AT YEAR END (000 OMITTED)									
Years in Which Losses Were Incurred	(2) 1981	(3) 1982	(4) 1983	(5) 1984	(6) 1985	(7) 1986	(8) 1987	(9) 1988	(10) 1989	(11) 1990
1. Prior	156,847	144,701	116,077	109,482	157,016	157,071	169,213	149,592	141,445	138,41
2. 1981	173,278	85,686	59,990	32,425	55,865	57,114	45,611	43,121	40,540	35,43
3. 1982	X X X	186,508	94,204	73,658	86,275	89,872	69,844	67,243	61,109	64,07
4. 1983	X X X	X X X	223,695	100,083	126,970	113,059	94,027	95,670	95,227	91,48
5. 1984	X X X	X X X	X X X	283,630	136,295	67,498	52,995	49,612	46,959	51,43
6. 1985	X X X	X X X	X X X	X X X	365,913	188,923	93,377	73,258	48,734	42,91
7. 1986	X X X	X X X	X X X	X X X	X X X	649,623	427,768	299,087	245,269	174,25
8. 1987	X X X	X X X	X X X	X X X	X X X	X X X	841,725	609,882	467,578	375,52
9. 1988	X X X	X X X	X X X	X X X	X X X	X X X	X X X	877,221	569,088	468,56
10. 1989	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	845,550	548,03
11. 1990	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	908,96

SCHEDULE P - PART 4 - LOSS PORTFOLIO TRANSFERS

Portfolio Reinsurance Ceded or Assumed during the Current Year in which Premiums were Already Earned
(000 Omitted)

(1) Years in Which Premiums Were Earned and Losses Were Incurred	PREMIUMS EARNED			LOSS AND LOSS EXPENSE PAYMENTS							(12)
				LOSS PAYMENTS		ALLOCATED LOSS EXPENSE PAYMENTS		(9)	(10)	(11)	Number of Claims
	(2) Assumed	(3) Ceded	(4) Net (2 - 3)	(5) Assumed	(6) Ceded	(7) Assumed	(8) Ceded	Salvage and Subrogation Received	Unallocated Loss Expense Payments	Total Net Paid (5-6+7-8+10)	Reported - Assumed
1. Prior	X X X	X X X	X X X	0	0	0	0	0	0	0	X X X
2. 1981	0	0	0	0	0	0	0	0	0	0	X X X
3. 1982	0	0	0	0	0	0	0	0	0	0	X X X
4. 1983	0	0	0	0	0	0	0	0	0	0	X X X
5. 1984	0	0	0	0	0	0	0	0	0	0	X X X
6. 1985	0	0	0	0	0	0	0	0	0	0	X X X
7. 1986	0	0	0	0	0	0	0	0	0	0	X X X
8. 1987	0	0	0	0	0	0	0	0	0	0	X X X
9. 1988	0	0	0	0	0	0	0	0	0	0	X X X
10. 1989	0	0	0	0	0	0	0	0	0	0	X X X
11. 1990	0	0	0	0	0	0	0	0	0	0	X X X
12. TOTALS	X X X	X X X	X X X	0	0	0	0	0	0	0	X X X

NOTE: For "prior," report amounts paid or received in current year only. Report cumulative amounts paid or received for specific years. Report loss payments net of salvage and subrogation received.

SCHEDULE P - PART 4 - LOSS PORTFOLIO TRANSFERS

Portfolio Reinsurance Ceded or Assumed during the Current Year in which Premiums were Already Earned
(000 Omitted)

Years in Which Premiums Were Earned and Losses Were Incurred	LOSSES UNPAID				ALLOCATED LOSS EXPENSES UNPAID				(21)	(22)	(23)
	CASE BASIS		BULK + IBNR		CASE BASIS		BULK + IBNR		Unallocated Loss Expenses Unpaid	Total Net Losses and Expenses Unpaid	Number of Claims Outstanding - Assumed
	(13) Assumed	(14) Ceded	(15) Assumed	(16) Ceded	(17) Assumed	(18) Ceded	(19) Assumed	(20) Ceded			
1. Prior	0	0	0	0	0	0	0	0	0	0	X X X
2. 1981	0	0	0	0	0	0	0	0	0	0	X X X
3. 1982	0	0							0	0	X X X
4. 1983	0	0							0	0	X X X
5. 1984	0	0							0	0	X X X
6. 1985	0	0							0	0	X X X
7. 1986	0	0							0	0	X X X
8. 1987	0	0							0	0	X X X
9. 1988	0	0							0	0	X X X
10. 1989	0	0							0	0	X X X
11. 1990	0	0							0	0	X X X
12. TOTALS	0	0	0	0	0	0	0	0	0	0	X X X

NONE

SCHEDULE P - PART 4 - LOSS PORTFOLIO TRANSFERS

Portfolio Reinsurance Ceded or Assumed during the Current Year in which Premiums were Already Earned
(000 Omitted)

Years in Which Premiums Were Earned and Losses Were Incurred	TOTAL LOSSES AND LOSS EXPENSES INCURRED			LOSS AND LOSS EXPENSE PERCENTAGE (Incurred/Premiums Earned)			DISCOUNT FOR TIME VALUE OF MONEY		(32)	NET BALANCE SHEET RESERVES AFTER DISCOUNT	
	(24) Assumed	(25) Ceded	(26) Net*	(27) Assumed	(28) Ceded	(29) Net	(30) Loss	(31) Loss Expense	Inter-Company Pooling Participation Percentage	(33) Losses Unpaid	(34) Loss Expenses Unpaid
1. Prior	X X X	X X X	X X X	X X X	X X X	X X X	0	0	X X X	0	0
2. 1981	0	0	0	0.0	0.0	0.0	0	0	0	0	0
3. 1982	0	0	0	0.0	0.0	0.0	0	0	0	0	0
4. 1983	0	0	0	0.0	0.0	0.0	0	0	0	0	0
5. 1984	0	0	0	0.0	0.0	0.0	0	0	0	0	0
6. 1985	0	0	0	0.0	0.0	0.0	0	0	0	0	0
7. 1986	0	0	0	0.0	0.0	0.0	0	0	0	0	0
8. 1987	0	0	0	0.0	0.0	0.0	0	0	0	0	0
9. 1988	0	0	0	0.0	0.0	0.0	0	0	0	0	0
10. 1989	0	0	0	0.0	0.0	0.0	0	0	0	0	0
11. 1990	0	0	0	0.0	0.0	0.0	0	0	0	0	0
12. TOTALS ..	X X X	X X X	X X X	X X X	X X X	X X X	0	0	X X X	0	0

* Net = (24 - 25) = (11 + 22)

NOTE: Report all loss portfolio transfers, ceded or assumed, included in Schedule P and effected during the current year only, showing the status of the reserves and payments as of year end. Show the consideration paid for losses ceded or consideration received for losses assumed in the premiums earned (ceded or assumed respectively) columns regardless of how the transaction was actually reported on Pages 2, 3 and 4.

SCHEDULE P INTERROGATORIES

1. Computation of excess statutory reserves over statement reserves. See Instructions for explanation and formulas.

(a) Auto Liability (private passenger and commercial)

1990 $ 0 (75.0 %) 1989 $ 0 (75.0 %) 1988 $ 0 (75.0 %) Total $ 0

(b) Other Liability

1990 $ 0 (60.0 %) 1989 $ 0 (60.0 %) 1988 $ 0 (60.0 %) Total $ 0

(c) Medical Malpractice

1990 $ 0 (75.0 %) 1989 $ 0 (75.0 %) 1988 $ 0 (75.0 %) Total $ 0

(d) Workers' Compensation

1990 $ 0 (75.0 %) 1989 $ 0 (75.0 %) 1988 $ 0 (75.0 %) Total $ 0

(e) Credit Total $ 0

(f) All Lines Total (Report here and Page 3) Total $ 0

SCHEDULE P INTERROGATORIES

2. Claims-made policies: Schedule P - Part 5.
State the amount of current year premiums earned on claims-made policies. If this amount is more than $100,000 and greater than 15% of current year premiums earned in that line, then you must complete Schedule P - Part 5: see instructions.

(a) Commercial Multiple Peril	(i) claims-made premiums	$ 13,436,000
	(ii) Part 5 required	Yes ( ) No (X)
(b) Medical Malpractice	(i) claims-made premiums	$ 0
	(ii) Part 5 required	Yes ( ) No (X)
(c) Other Liability	(i) claims-made premiums	$ 440,019,000
	(ii) Part 5 required	Yes (X) No ( )

SCHEDULE P INTERROGATORIES

3. The term "Loss expense" includes all payments for legal expenses, including attorney's and witness fees and court costs, salaries and expenses of investigators, adjustors and field men, rents, stationery, telegraph and telephone charges, postage, salaries and expenses of office employees, home office expenses and all other payments under or on account of such injuries, whether the payments are allocated to specific claims or are unallocated.
Are they so reported in this statement ? Answer: Yes (X) No ( )

4. The unallocated loss expense payments paid during the most recent calendar year should be distributed to the various years in which losses were incurred as follows: (1) 45% to the most recent year, (2) 5% to the next most recent year, and (3) the balance to all years, including the most recent, in proportion to the amount of loss payments paid for each year during the most recent calendar year. If the distribution in (1) or (2) produces an accumulated distribution to such year in excess of 10% of the premiums earned for such year, disregarding all distributions made under (3), such accumulated distribution should be limited to 10% of premiums earned and the balance distributed in accordance with (3).
Are they so reported in this statement ? Answer: Yes (X) No ( )

5. Do any lines in Schedule P include reserves which are reported gross of any discount to present value of future payments, but are reported net of such discounts on Page 10 ? Yes (X) No ( )

If yes, proper reporting must be made in the Notes to Financial Statements, as specified in the Instructions. Also, the discounts must be reported in Schedule P - Part 1, Columns 30 and 31.

Schedule P must be completed gross of non-tabular discounting. Work papers relating to discount calculations must be available for examination upon request.

Discounting is allowed only if expressly permitted by the state insurance department to which this Annual Statement is being filed.

SCHEDULE P INTERROGATORIES

6. What were the net premiums in force at the end of the year for: (in thousands of dollars)

	(a) Fidelity	$	201,236
	(b) Surety	$	85,666
7. Claim count information is reported (check one)	(a) per claim		
	(b) per claimant		X

If not the same in all years, explain in Question 8.

8. The information provided in Schedule P will be used by many persons to estimate the adequacy of the current loss and expenses reserves, among other things. Are there any especially significant events, coverage, retention or accounting changes which have occurred which must be considered when making such analyses (An extended statement may be attached) ?

PRIOR TO 1975, MEDICAL MALPRACTICE (PART 1F) IS INCLUDED IN OTHER LIABILITY (PART 1H).

MEDICAL MALPRACTICE RESERVES PRIOR TO THE 1985 CALENDAR YEAR ARE PRESENTED ON A DISCOUNTED BASIS. FOR THE PERIODS 1985 THROUGH 1988, THE AMOUNT OF DISCOUNT IS REFLECTED IN SCHEDULE P, PART 4 OF THE RESPECTIVE ANNUAL STATEMENTS. SUBSEQUENT TO 1988, THE AMOUNT OF THE DISCOUNT IS REFLECTED IN SCHEDULE P, PART 1.

1991 CASUALTY LOSS RESERVE SEMINAR

3E: REINSURANCE RESERVING II

<u>Moderator</u>

Betty H. Barrow
Reliance Insurance Company

<u>Panel</u>

Ross A. Currie
Tillinghast/Towers Perrin

David J. Grady
Prudential Reinsurance Corporation

MS. BARROW: Good afternoon. Welcome to Session 3E: Reinsurance Reserving II. I'm Betty Barrow with Reliance Insurance Company. Before I introduce our panelists, there are a few things I'm supposed to announce. First, this session will be recorded. We'll have some time for questions at the end. If you are asking a question, please go to the microphone so that your question will be recorded.

The opinions of the panelists are their own and not those of their employers, the Casualty Actuarial Society or the American Academy of Actuaries. Also, there are hand-outs at the back of the room, so please make sure you get a copy of them.

We have two speakers today. The first is Ross Currie, Consulting Actuary with Tillinghast, a Towers Perrin Company. He's a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries.

Ross has been a consultant for eight years and his practice has concentrated on reinsurance issues for the last five. His experience includes: evaluating loss reserves for reinsurance companies; pricing reinsurance coverages; evaluating potential for uncollectible reinsurance, and valuing commutations.

Today, Ross will be speaking to you about IRIS ratios, the use of experience and exposure rating data, and interpreting placement slips and other underwriting information for use in the reserving process.

Our second speaker is Dave Grady, Vice President and Chief Actuary for the Prudential Reinsurance Company. Dave graduated from the University of Connecticut, is a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries, and a Member of the International Actuarial Association.

Dave began his actuarial career in 1965 at Traveler's Insurance Company. He served as Chief Actuary for North American Reinsurance and as Vice President and Senior Actuary for CIGNA. Prior to joining Prudential, he directed the New York Casualty Actuarial Consulting Practice of Coopers and Lybrand.

Dave will be speaking to you about retrocessions, how financial reinsurance contracts affect reserve estimation, new annual statement requirements for net and gross reserving and facultative reinsurance reserving.

Ross.

CLRS - REINSURANCE RESERVING II

As Betty noted, the subject of this panel is advanced concepts in reinsurance reserving. In my portion of today's session, I'll be addressing three topics:

- IRIS Ratios
- Experience vs. Exposure Bases in the Reserving Process
- The Use of Underwriting and Claims Information

IRIS Ratios

The NAIC uses eleven ratios in its Insurance Regulatory Information System. Each of these ratios has a pre-defined tolerance - that is, a maximum and/or minimum acceptable level. These tolerances are the same for both primary insurers and reinsurers; however, reinsurance is significantly different from primary coverage, and the characteristics of reinsurance are such that several of the expected IRIS test results will be quite different for reinsurers. Reinsurance differs from primary coverage in several ways. It is not a standardized product, its prices are more responsive to the forces of competition, and its losses materialize at a slower rate and may be difficult to quantify.

Its diversity can be seen in the variety of coverages, limits, and contract terms available in the market. Reinsurance is not like primary coverage where carriers are writing standard contracts with similar terms and coverages. For example, some reinsurers write mostly pro-rata business; others write excess coverage. Those that write excess coverage may concentrate on low or high layers of exposure. Results are also affected by market orientation - there are distinctions between brokered and direct writers (and some companies write in both markets), and treaty vs. facultative business.

Reinsurance responds to the market, and rate changes can be very large and are usually implemented quickly. For example, we estimate that rates for treaty business decreased in 1983, experienced stratospheric increases in 1985 and 1986, and decreased again in 1988 and 1989 (Bulletin 91-08).

Ironically, even though a company's prices must respond quickly to market forces, losses develop slowly and may be difficult to quantify. A high layer excess contract can be years old before its first losses appear.

These characteristics all have an impact on a reinsurer's results and influence its IRIS ratios. Four ratios in particular are affected by the nature of reinsurance - Premium to Surplus; One Year Reserve Development to Surplus; Two Year Reserve Development to Surplus; and Estimated Current Reserve Deficiency to Surplus.

In 1989, all property/casualty groups (1,193 surveyed by A.M. Best) had a premium to surplus ratio of 156%, while the same statistic for reinsurers was 61%. Other years have similar results.

Reinsurers can successfully operate with such a low degree of premium/surplus leverage because there is a much greater reserve/premium leverage for reinsurers. In 1989 primary companies held $1.30 in loss reserves for each $1.00 of premium while reinsurers held $2.40. Because reinsurance losses are paid out later than primary claims, reinsurers earn significantly more investment income off of each dollar of premium. This means that a reinsurer can afford to write at relatively low premium to surplus ratios and still make a decent rate of return on surplus.

Keeping a low premium to surplus ratio also protects a company against the variability that is inherent in reinsurance results. If a reinsurer were to write at a high premium to surplus ratio, the wide swings in results which are typical for this business could be damaging to its solvency.

The one and two year reserve development to surplus tests have historically covered a wider range for reinsurers than they have for primary insurance companies. The estimated reserve deficiency to surplus test is also affected because it is heavily influenced by historical results. This test, for those of you who are not completely familiar with it, takes developed reserve levels from prior years, compares them to premiums, and then multiplies the result by the current premium base. Therefore, rate adequacy changes can greatly affect the reserve redundancy or deficiency calculation for a reinsurer. Since rate activity for reinsurers is much greater than that of primary companies, distortions in this test's results can occur when looking at a reinsurance company.

The contracts a reinsurer writes can also influence the results of the reserve deficiency test. If a reinsurer's retentions and attachments are changing over time, then the necessary proportion of reserves to premium dollars will also be changing. As a company's attachment points increase, a larger proportion of its losses will be held in reserves because of reporting delays. The appropriate reserve to premium ratio for a high attachment point is not the same as the appropriate reserve to premium ratio for a low attachment point. If a company's attachments are changing over time, it will affect the validity of this IRIS test.

So, if you are looking at a reinsurer's financial position, whether for a merger, acquisition, or if you're trying to decide whether to buy stock in that company yourself, it is important to remember that some of the IRIS ratios for a well managed reinsurance company will be significantly different from those of a well managed primary company. If you use primary company standards to judge a reinsurance company, you may find a poorly managed reinsurance company looking attractive and vice versa.

Now let's turn to the subject of loss reserving.

Because of the characteristics which I described earlier, setting accurate reserves for reinsurance is generally more difficult than determining primary company requirements. Loss ratio-based estimates are difficult to calculate because changing rate adequacy complicates the selection of expected loss ratios. Actuaries using triangulation methods for setting reserves are confronted with the fact that coverages and contracts change over time, hindering the establishment of a homogeneous data base.

Some actuaries believe that assembling a critical mass of data is more important that having a consistent data base. They believe that if a large enough volume of business is assembled, then the effects of coverage and contract changes will even out over time. Other actuaries believe that coverage and contract terms exhibit such significant variation that reserves must be based on a detailed evaluation of the underlying treaties. The conflict between these two schools of thought is well illustrated by the following statements from two Fellows of the Society who specialize in reinsurance as quoted in the 1989 CLRS transcript:

"It makes sense to set reserves on an individual contract only when it's so large and so unique it can't be lumped with the rest of the business."

"One day anything less than a contract by contract reinsurance reserve analysis will not be considered reasonable or appropriate."

Experience-Based Reserving

Assembling a critical mass of data and creating development triangles is an experience-based method of calculation. The advantage of using this type of approach is that it allows the actuary to make use of a data base with credible volume and allows him to determine the size of the reinsurance "forest" without having to look at the individual "trees" represented by each reinsurance treaty. It is generally a less expensive and less time consuming method of analysis.

Of course, even as the actuary accumulates data to form a credible base, he should seek to establish groupings with some degree of homogeneity. Some of the major exposure classes which are appropriate for reinsurance are:

- Treaty vs. Facultative
- Property vs. Casualty
- Quota Share vs. Surplus Share vs. Excess (Per Occurrence, Per Risk, and Aggregate)
- Domestic U.S. vs. International

With regard to development methods, my experiences evaluating reinsurance reserves have caused me to conclude that paid loss development techniques can not be used to accurately evaluate reinsurance losses. The long reporting delays associated with reinsurance coverages mean that paid losses do not accumulate rapidly enough to serve as a basis for meaningful projections.

Therefore, most experience-based analyses will rely on either incurred loss development or Bornhuetter-Ferguson methodologies. Since these methods rely on establishing development patterns to derive their results, I would like to touch on three issues which affect loss development:

1. Claims made vs. Occurrence coverage
2. Accident year vs. Underwriting year statistics
3. Earned/Incurred vs. Written/Paid accounting

Everyone here should understand the development implications of claims made vs. occurrence coverage; however, I would just like to point out the fact that these coverages can be mixed in a reinsurance treaty. If the mix of claims made vs. occurrence policies or if the average claims made age changes over time, then factors derived from historical averages must be adjusted accordingly.

Reinsurance statistics are generally compiled on an underwriting year basis, and even when accident year statistics are available they are often artificial. The maturity of underwriting year experience is generally assumed to lag accident year experience by six months, on the theory that a reinsurer's underwriting year is comparable to a primary writer's policy year. This assumption is correct for January 1 reinsurance contracts written over primary coverage. It is not correct if a given underwriting year contains contracts with different inception dates. Suppose, for example, that your company wrote a 50%-50% mix of January 1 and July 1 contracts in 1986. The average occurrence date for accident year data is July 1, 1986. The average accident date for our defined mix of business is April 1, 1987 - a nine month lag. It is also important to note that this lag applies to reinsurance written over primary coverage. Retrocessional lags are even greater. None of this presents a problem if your company's mix by inception date is relatively constant and if development factors are derived from internal data; however, if your company's timing practices have changed or if you are estimating underwriting year tail factors from external data compiled on an accident year basis (i.e., RAA statistics), estimating appropriate lags can present real complications for the analyst.

Earned/incurred vs. written/paid accounting can also have a profound impact on reserve calculations. Under earned/incurred accounting, premiums are reported when earned and losses are reported as they are incurred. Written/paid accounting works on a cash transaction basis. Under this treatment, premiums are reported as they are written and loss notification is only given for paid losses. This converts any development analysis into a paid loss evaluation. Similarly, the accounting method also affects the calculation of ultimate premiums, which are necessary when using the Bornhuetter-Ferguson methodology. Unfortunately, a reinsurer's treaties are not all recorded on the same basis. This means that the underlying data will not be consistent. Since the reporting of losses is quite different under these two accounting procedures, it is essential for the actuary to understand the terms of his company's business.

Another factor influencing the incurred losses in the data base is the presence of additional case reserves (ACR's). These are reserves established by the reinsurer's claim department which supplement those reported by the cedant. ACR's are set on a claim by claim basis, and may vary considerably by contract and by cedant. In order to perform a proper analysis of a reinsurance portfolio, the actuary must understand the standards and procedures underlying the establishment of ACR's.

Whenever an evaluation is performed which depends on the selection of a loss ratio, it is necessary to use appropriate premium values when arriving at a reserve estimate. Unlike primary insurance premiums, reinsurance premiums can experience significant development after the close of a calendar year. Written premiums on contracts over primary coverage incepting on January 1 may be at only 75% of ultimate levels at year end, while earned premiums will be at slightly more than 25% of ultimate levels. (On a policy year basis, primary insurance is 100% written and 50% earned at December 31.) Premium development becomes more extreme for retrocessional coverage. Depending on the dates of the underlying reinsurance contracts written by the lower layer reinsurers, it is quite common to have less than 10% of a treaty's ultimate premiums reported as earned at 12 months. It is theoretically possible to create a model with infinite premium development for retrocessional business, and it is not unheard of to see excess retrocessional contracts whose first premium reports occur more than 2 years after the contract inception date. You should also realize that this delay is not strictly a function of report lags, but represents an extension of coverage as well. It is possible for a single retrocessional treaty to provide coverage for occurrences taking place far beyond the expiration of the contract.

All of these factors complicate standard, experience-based, methods for estimating loss reserves. So in reinsurance, we often use exposure-based methods for deriving our estimates.

Exposure-Based Reserving

In an exposure-based calculation ultimate losses are estimated by reviewing contract terms and assigning ultimate values based on an assessment of the coverage being provided. The advantages of this method stem from the fact that results are calculated on an individual treaty basis. This means that changes in a company's mix of business are no longer an impediment when performing a reserve analysis. This type of analysis is useful to underwriters because it provides them with feedback on the results of individual programs and can help determine future direction. It is often the only practical method for assessing the results of an immature underwriting period. This approach's drawbacks are that it is expensive because it demands familiarity with many individual treaties; it involves subjective decision making; and its results often have a theoretical, rather than empirical foundation.

Since exposure-based analyses are tailored for each contract or group of contracts under review, it is not possible to describe a comprehensive approach towards performing this type of analysis; however, we can discuss the types of information reviewed in exposure-based studies. This information includes:

- Line of business
- Insured layer

- Report lags
- Rate levels
- Underlying limits

Line of Business. As you all know, reinsurance treaties do not usually fall into neat annual statement line detail. Occasionally, you will find treaties that are, say, 100% auto liability or 100% medical malpractice, but generally contracts cover undefined property risks, casualty risks, or a mixture of property and casualty exposures. Detailed reviews of underwriting data often provid more information on the lines of business being underwritten; however, I would caution you to be very careful when relying on line of business data based on premium volume. It is my experience that treaties have greater casualty exposure than their premium data would indicate. In the absence of information, conservative assumptions should be used.

Before moving on to discuss other types of information, I would like to briefly discuss a subject which influences all reinsurance analyses: Inflation. The impact of inflation with respect to reinsurance can not be overestimated. As you probably know, even low overall cost increases are magnified in excess layers for 2 reasons:

1. Some types of claim which used to fall below the layer now have costs above the attachment point;

2. Inflationary changes on excess claims are felt entirely within the excess layer.

Inflation is the major reason for rate changes, layer changes, and changes in underlying policy limits; and human behavior dictates that it is not recognized equally in each of these areas. Much of the effort expended in an exposure-based reserve analysis is devoted to comparing the actual impact of inflation vs. the inflation recognized in the underlying parameters.

So, as I discuss the next items, keep the concept of inflation in mind.

Insured Layer. When high layers are reinsured, development patterns slow down, particularly for casualty business. We have used models derived from client experience to adjust development patterns based on the layer of business being reinsured. Individual reinsurers can make assumptions regarding loss development and expected loss ratios based on the experience of similar contracts at different layers, or different coverages at similar layers. In building your own reference points you can use a matrix to review the consistencies of your assumptions across your entire book of business. Increased limits tables can also be used in determining expected losses if a reasonably accurate assessment of underlying rate adequacy is possible. But remember - the types of losses appearing in a given layer today may not be the same as the losses found in that same layer five years ago.

Report Lags. Obviously, the layer of coverage being reinsured affects the length of time which elapses between the occurrence of a loss and its date of report to the reinsurer; however, the number of parties in between the loss and the reinsurer is at least as important a factor. Brokered business is reported later than direct business, and if you are reinsuring a layer that has other reinsurance coverage on lower layers, the development process can be slowed considerably. Generally speaking, I have found that each additional party between the original carrier and the reinsurer adds between 3 and 6 months to the development pattern.

Rate Levels. Knowledge of historical rate changes on both the reinsurance contracts and the underlying business is an essential element in any exposure-based calculation. since the reinsurance premium is generally expressed as a rate per unit of premium, rate adequacy is a function of the underlying adequacy as well as the applicable rate per unit. Additional complications are introduced if swing rating is used on a treaty. In fact, the many possible premium variations are one reason that loss ratio based estimates may be best suited for treaty-by-treaty evaluations and may not be effective when evaluating a large book of business.

Underlying Limits. The limits insured on primary policies have a direct bearing on the exposure of an excess reinsurer. Theoretically, at least, a reinsurer has no exposure on a $500K excess of $500K policy if the underlying limits are $500,000. When developing exposure-based reserve estimates, the actuary should attempt to measure exposed premium - that portion of the underlying business providing coverage in the reinsured layer. An analysis of this type will almost certainly reveal what is sometimes referred to as policy limit drift. Underlying policy limits tend to increase over time due to inflation, putting more exposure into the reinsured layer. This affects the appropriate price for the coverage and any expected loss ratios used in your calculations.

The Use of Underwriting and Claims Information

The source for all of the information which you need to perform your analyses will come from your underwriting and claim departments. By this time, it should be obvious that a quality review can not be based on a simple evaluation of development triangles, but requires that the actuary have a complete understanding of the company's portfolio.

Underwriting Data. There are three sources that will provide you with underwriting information for your analysis. First, there are the actual reinsurance contracts. A second source is the contracts' placement slips, which are documentation in outline form that generally precede the issuance of the contracts. Finally, there are underwriting submissions, which are basically promotional information that an underwriter or MGA sends to reinsurers in order to persuade them to take a piece of business.

The reinsurance contract is generally the least useful piece of information of the three items just mentioned. Although it lists retentions, aggregates, and other contract provisions, it does not provide any detailed information about the underlying book of business.

Placement slips are a little more informative and usually give a thumbnail sketch of the underlying book, but the best source of information is most likely to be found in a program's underwriting submission. For example, one of the key items in evaluating a contract is knowing whether it is pro-rata or excess coverage. You have to be very careful because excess contracts are often described as providing pro-rata coverage in contract wording and placement slips when they represent pro-rata shares of excess business. Underwriting submissions will clarify this often ambiguous point.

A good underwriting submission should include premiums, losses, and limit profiles by line of business. This means that in addition to noting the average limit, it should actually show the distribution of limits. For example, the submission might list the percent of policies that have limits of $100,000 or less, $100,001-$250,000 $250-001-$500,000, $500,001-$1 million, etc. Similarly, it should provide an attachment point profile, which will show the underlying distribution of attachment points.

Layer profiles are also valuable when performing an evaluation. As I noted earlier, there were significant differences in development between a $500K excess of $500K contract providing coverage over primary (a first layer excess treaty), and a $500K excess of $500K contract attaching above underlying $100K XS $100K, $200K XS $200K, and $100K XS $400K contracts (a fourth layer excess treaty).

Submissions will also often contain large loss information, so you can decide whether the contract under review is subject to the significant variation in losses which results from the presence or absence of large claims.

A quality underwriting submission will provide you with valuable information that is non-numerical in addition to quantitative data. It will describe production goals and target markets for the business that is being underwritten. It will list the lines and classes of business that are being written and, just as importantly, those being excluded under the proposed contract. It describes underwriting controls - what maximum limits are permitted, and what proportion of the maximum limits are generally being provided on individual risks. It should discuss the primary rating of the program and any deductibles associated with it. It should mention who is providing the claims handling services on the program.

The information which I have described is found in quality underwriting submissions and will not be available in many cases. I have seen contracts and underwriting submissions which indicate that the contract covers all business, property and casualty, both international and domestic, which the MGA chooses to accept on behalf of the reinsurer. In these cases I would urge you to use very conservative loss development factors and initial expected loss ratios in your evaluations, because programs that do not have quality underwriting usually have inadequate rating and controls. The absence of information can be as important as the presence of information in assessing the quality of the underlying business.

The retrocessional protection that your own company has is important as well. Obviously, if a treaty has an aggregate limit or stop loss, this will limit the company's exposure. Losses should not be developed above the maximum net retention of your company.

Claims Data. Of course, claims data is as important as underwriting information in assessing reserve requirements. There are many issues to address here as well. Is the ceding carrier including IBNR reserves in reported losses? Are ACRs (Additional Case Reserves) included in the underlying experience? How are structured settlements being treated? Has your company conducted claim audits?

In reinsurance we see reporting issues that are not present for primary companies. Sometimes losses are not carried in a company's claim system because it is in a contractual dispute with the ceding carrier. Many times when a company has stopped paying losses it files claim notifications without entering them into its data base. Then, when the dispute is resolved, these claims are processed en masse. So from a development standpoint, a company can develop large backlogs of claims when this type of situation exists.

When looking at excess business, precautionary notices (notification of claims that have not yet reached your attachment point) are generally received when claims exceed 50% of the attachment point. Obviously, you can use that information in your loss development studies as well.

Once you've thrown all of this information into your actuarial black box, and perhaps added a bit of intuition as well, you will, hopefully be prepared to produce an accurate appraisal of your company's assumed reinsurance liabilities.

Other Issues. Of course, you should realize that what I have described represents considerations which enter into the evaluation of a portfolio of ordinary assumed reinsurance. Additional items must be considered when looking at special classes of business. Facultative contracts and financial reinsurance arrangements are subject to more creative and original treatments when estimating reserves. I will leave the discussion of these topics to the next creative and original speaker - Dave Grady.

MR. GRADY: Well, I couldn't possibly have gotten more complex, so I'll just have to get simpler. My part of the presentation this afternoon is to discuss apparently unrelated topics. These are things that nobody else wanted to talk about.

The topics I have been assigned are retrocessions; how financial reinsurance contracts, assumed and ceded, affect reserve estimation; new annual statement requirements for net and gross reserving; and facultative reinsurance reserving. You get a prize if you can put these topics in a box and mix them up so they form a pattern.

This is the order in which the topics appear in the seminar brochure and it seems to me to make no sense whatsoever. Our first job, then, is to reorganize these topics so that we can handle them in some logical manner. Our basic thrust will be to examine net and gross reserving, using the ceded reserves as examples of reserving for retrocession, so you've got two things out of the way.

Since facultative contracts represent a special type of reinsurance portfolio, we can introduce a discussion of facultative reserving on our way so that, in this case, we may ground our discussion with a particular example.

Finally, we'll give a brief discussion of financial reinsurance contracts. We'll incorporate a financial cover in our example in order to begin to examine its potential and some of the problems that may be generated by these contracts. A complete discussion of financial covers is more appropriately left for a meeting at some off-shore location, outside of hurricane season.

To the kind person who turned on the lights, now is the time to dim the lights. I'm going to ask you a question while the lights are being dimmed. I'm going to have to change location for this.

The question I am going to ask you is: How many of you are feeling your chair? Raise your hand if you're feeling your chair. I'd like the rest of you to feel your chair now. Have you got that shape down?

Now, many of you were not feeling your chair prior to my question, so the question illustrates a matter of perception.

My discussion here in the next few minutes or half-hour, depending on how much we have, will be concerned with the question of reinsurer and retrocessionaire perception. I'd like you all to do one thing. Get up and when I've got my microphone all attached, sit down again. This is called a stretch break. There will be a question concerning the stretch break, so I want you to pay particular attention.

The ordinary words are, "Am I on?" If you can all hear me, then I'm on. My question for you: What muscles did you use to get up? What muscles did you use to get up that you didn't have to use to get up? The next time you get up, which will be at the end of the session, take a look at that. Many people use, perhaps, a dozen muscles that they don't need to use to get up out of their chairs and they've been using them now for years. This is an example of perception.

So, now you can tell that this session is going to be completely different. My presentation is not going to have pretty slides; instead, we are going to have a few transparencies. We're going to get back to basics like we did in the first session. How many of you were at the first session?

(Show of hands.)

Okay. Great. You came back for round two. Did you come back because there was no time for questions, because there was not a single question asked at the first session. It may be that the hour was noon, the bell had struck, and we were all going to lunch, but still there were no questions.

What Mr. Currie has presented to us is an extraordinarily complex process. I don't know if any one of us can handle that process, given the complexity of the information, so one of the things that we did at Prudential Reinsurance was simplify the process. You will be surprised at how simple it got and how quickly it got complicated again.

(Slide 1)

Let me say a few words about the various components to evaluate. We'll refer briefly to the underlying process, which is similar to experience rating and exposure rating. There are conditions of exposure. There will be an event; the event will occur; it will trigger coverage.

In this case, it will trigger coverage not just at the ceding company or primary insurer level, but it will trigger a sequence of coverage. Each cover will shape what is going on. We look at this in terms of realizations. This is the experience rating part: what the portfolio has actually given to you in terms of a known claim count. That known claim count came out of a possible set of claim counts known as the claim frequency distribution.

Each claim will have a severity, a claim amount, and the collective will be the result of the whole distribution of claim amounts, the claim severity distribution. Together, the claim frequency distribution and the claim severity distribution interact to give us that lovely thing, the distribution of aggregate claims which is so complicated in life insurance and so simple in casualty and property insurance.

(Slide 2)

I'm now going to remind you about the nature of the underlying process, all very elementary. We'll just go over the rules again. We think we have an underlying group of homogeneous risks. For example, we could be dealing with private passenger automobiles and they are all producing claims in perfectly random order.

Do all the events arise from the same process? In our model, we assume they do. We make some adjustments to that process later on. Independence is concerned with the events being related in some way. Is Hugo coming? Will the AIDS epidemic overwhelm us? What is happening to our underlying population? If we can remove contagion from it and get back to independent events, we have a chance of doing something statistically and actuarially sound.

The next item on the slide is stationarity: How stable are the results over time? Stationarity does not mean inert. All you need are trends that you can measure and forecast. If you have erratic social inflation -- court decisions that go one way and then another way -- it is very, very difficult to forecast the future from that particular climate.

Finally, we have completeness. Is the known information partial or incomplete in some way? Ross Currie's whole presentation seemed to indicate that the reverse is true. You will not have complete data as a reinsurance company any more than you have complete data as a primary company. In fact, you're in even worse condition. If you're a retrocessionaire, forget about data at all, because according to Ross' presentation it looks like your exposure can extend well into the future with some retrocession contracts.

(Slide 3)

Let's look at the topic of facultative reinsurance reserving. I want to do the same thing with you that I did a few moments ago when I asked you to stand up. I want to involve you in the discussion. This is anathema to recorders everywhere.

So, here is the test: What is the difference between facultative and treaty? I said there is something different about the information and in terms of detail. What is good about facultative? Look at that response. Would you rather have a facultative certificate or a set of facultative certificates or would you rather have a treaty?

QUESTION: A facultative certificate.

MR. GRADY: Why?

QUESTION: You get more detailed information.

MR. GRADY: Yes, you get more detailed information. I like to think of facultative as having the faculty of seeing what you're doing, the faculty of underwriting. So, you can actually reach through and contact the original exposure. You can actually generate exposure information on a facultative certificate. Many reinsurers code this information. So, facultative is a little bit like primary insurance.

What do we know about the structure of facultative certificates? They're all going to have limits and retentions. The limits are generally going to be huge, and they're going to be fairly high up a lot of the time. What happens the rest of the time? They come down low and they go up and they go down and they're all over the place.

So, you're in contact with the original exposures but you can contact it at various levels at various times, so as you proceed through the years, your connection with that unit of exposure may change.

Therefore, as Ross has so carefully pointed out, your factors may change as you come down into the working layers and go up again into the high excess layers.

How about facultative data versus treaty data in terms of quantity? You get a lot of it (hopefully, not many losses), but you certainly get a lot of certificates, and you will run them through your computer and add them up, and there will be hundreds of thousands of them before you know it, so you have lots and lots of data.

This means we have to group facultative data. How would you group it? Well, limits and retention look pretty good as well as the basic breakdowns of property and casualty and to the extent you can get individual line of business information, that is fantastic. You will group your data to form homogeneous groups, hoping that one group is independent of another group so you can get a good overall reserve estimate.

How stable is facultative? Well, we mentioned "way down low" and "way up high". Why does that happen? I'm going to rely on my expert over here. Why are you low some years and high others?

MR. CURRIE: The marketplace.

MR. GRADY: Yes, you respond to the marketplace. When you are down low, it is because the treaties no longer accept this type of risk. They've been frozen out. When you are up high, the low-layered risks are in the treaties. You don't see them anymore in facultative, but they are there influencing the treaty results. You can be sure of that. So, the cycle is even more exaggerated in facultative than it is in reinsurance in general.

What kind of methodologies do you employ? We can't say we're going to rely on a paid loss methodology now. In facultative, that would be a disaster. Nonetheless, you can certainly run paid loss methodologies, as well as incurred loss and Bornhuetter-Ferguson. For me, it pays to look at everything.

In fact, for those of you who were here for the first session, you saw John Pagliaccio refer to a paid-to-reported exhibit. These things can come in very handy. You can see how much case outstanding is left. You're only looking for rough guidelines as to what's happening and looking at each piece of a problem helps you to decide that.

So, that's what I'm going to say about facultative reserving. It's like every other piece of reserving except there are funny things about it. One of the funny things is auto fac, which is an unbalanced treaty.

(Slide 4)

In our review of facultative we have begun to detect the presence of something called an information filter. There is a reporting lag from client company to reinsurer to retrocessionaire. During the time of this reporting lag, there is an evolution, often concerning social considerations. Things happen to the claim. Things happen to the claimant.

For a large claim, such as one likely to involve a reinsurer, these things can be pretty dramatic. The claimant can get all kinds of information about the legal system, for example, so his claim could go, in terms of structure, from a simple economic loss to encompassing concerns that are more societal in nature. Perhaps he should collect punitive damages. Perhaps this particular incident really should be part of a class action. Things do tend to grow.

On the conditions of the claim, you impose the terms and conditions of the contract, the initial contract (the policy), the reinsurance agreement and the retrocession agreement. These terms and conditions tend to limit coverage and to define coverage, to make it more definite.

Besides time and structure, you have that wonderful element of noise and error, and on top of this, you must interpret what is going on. Your interpretation will be subject to error. As you get a long string of coded data, there are a lot of chances that errors will emerge from coding this data, and there will be a lot of randomness in it.

(Slide 5)

One of the reasons you have such volatile activity at the reinsurance level is this randomness, so we'll take a look at a data string. This is a typical information reporting process. Now, right here, I'd like to tell you a story to wake you up again.

About ten years ago, I was driving in the Swiss Alps and it got dark and it got darker. I turned the headlights on my rental car on and there were no headlights. So, I am somewhere between Italy and Switzerland crossing the Alps on an absolutely moonless night full of clouds, and I am up there without guard rails on a very twisting, narrow road and I can see nothing.

My question to you -- there is always a question to these stories...is how did I get down? I may have to rely on my expert over there. How did I get down from the Alp that my car happened to be sitting on and get to San Moritz in time to party?

QUESTION: Were there lines down the center of the road?

MR. GRADY: There were no lines in the center of the road. There were no guard rails. The road was basically slightly larger than the car.

QUESTION: Parachute.

MR. GRADY: No, no parachute.

QUESTION: You followed a car down.

MR. GRADY: Right, I waited for a car to pass me and I followed his tail lights down. Now, because this is Switzerland and Italy, the person who passed me was driving very fast so I, in turn, had to drive very fast just to keep those tail lights in front of me.

What I want you to consider is that in this case, the primary insurer is the car in front of me. The reinsurer is me without headlights, but I do have parking lights and tail lights. The retrocessionaire is following my tail lights, unaware that I don't have headlights.

(General laughter)

So, I think if you keep that as kind of a simple example of how the game works, we won't even need to talk about level two retrocessionaires.

(Slide 6)

I'd like to bring you back to earth again with types of uncertainty. There is something called process risk, which is what is described by our model. You have a known distribution or set of distributions. Process risk is the risk of an adverse outcome within that set of distributions.

Then you have parameter estimation risk. You've got a known family of distributions. You might know you have log normals but you don't know the parameters of the log normals. Also, you might have the wrong log normal.

Then you might have model specification risk. This refers to selecting a less risky form of distribution than is actually the case, so you might have a log normal as your selected model but it's really gamma-pareto.

So, this is the problem of the real world. What we did in our simple example is just make some assumptions about the real world. Now, let me just do one more slide and then I'll get into the model.

(Slide 7)

This is the scope of the new 1991 Annual Statement Actuarial Opinion: no more Mr. Nice Guys. The reserve for unpaid losses and the separate reserve for unpaid loss adjustment expense are on a net basis, which we're used to but they are also on a direct and assumed basis (they will be gross).

So, whether you're a primary company or a reinsurer or a retrocessionaire, we're going to have to estimate those gross reserves and find out how much IBNR is up there.

Why do we want to do that? This comes under "appropriate relevant topics" in the NAIC design of the Actuarial Opinion. The NAIC is particularly interested in discounting, in salvage and subrogation, in loss portfolio transfers and -- here comes a big one -- financial reinsurance.

Ah, you used to be able to do it net, but no longer with respect to financial reinsurance. If you had a contract of this nature, wouldn't that be an interesting thing for the regulatory authorities to know about? They could make a level playing field between primary companies and also for reinsurers against other, perhaps alien, reinsurance companies.

The same thing is true of reinsurance collectibility. This can also begin to be evaluated once you make a gross estimate of reserves. Finally, as Ross has told you, the actuary must comment on the values of the IRIS tests. So, what we're going to get at here with gross reserves will principally concern two areas, primarily financial reinsurance and the potential uncollectibility of reinsurance.

(Slide 8)

Our model is a simple simulation model. Here, we generate an expected number of claims (400). The count distribution is normal. If it was 14 or less claims, it would have been poisson. So the normal approximation to the poisson is working here. We assume an average claim of $100,000, and we're not going to have any inflation in the first couple of model simulations.

We have a report lag distribution. We've already discussed report lags. As a matter of fact, there is a separate session on loss distributions. You could hear more about them, I believe, at that session. For our purposes, the report lag is when the claim gets reported to you. Our report lag distribution is a long right-hand tailed curve with a hump in it. One version of the log-normal, though, is the exponential which doesn't have a hump. The log-normal tends to behave somewhat like a gamma.

So our $100,000 average claim size comes out of a log normal distribution. We have a claim cap, which you will see relates to a limits profile of $1 million, so no claim is going to be bigger than a million.

The reinsurance layer will be $750,000 excess of $250,000. The retrocession will be $500,000 excess of $250,000. We're going to leave $250,000 in the reinsurer's hands and reinsure with the retrocessionaire for $500,000 in excess of that.

(Slide 9)

Well, now is the time you want to turn to the package you have. I do have a copy of the log normal distribution if you want to look at it. Look at it and doze away. The reason I did that is that I noticed between starting late and Ross Currie talking too long -- let's hear it for Ross Currie talking too long -- that we may not have time for questions unless I hurry up.

My preference with a session like this is to have an interchange, not a monologue, so what I'm going to do is run you quickly through the models and some results. I may just abandon some slides at this point.

Here you see the same old triangles you've been seeing all along. All we've done here is used incurred loss development, age-to-age, weighted average, all years to estimate ultimate losses. Nothing much is happening. This is gross to the reinsurer, no primary company involvement here. This is only what's happening to the reinsurance company.

You can see that things grow, especially from those early years where just a little bit of information has come in. Claims begin to grow quite dramatically after awhile. It's the nature of reinsurance above a quarter of a million dollars.

Why are we not using Bornhuetter-Ferguson in our model? It's a judgment call. If you get a simulation and you can use age to age factors from your simulation, then what you have is a contained process (a very, very simple model).

So, you look at incurred loss development just because it's a simple machine that you can put to work and see what comes out of it. What comes out of it, after we apply the retrocession, is a lovely thing for the reinsurance company. It looks a little better.

You're not seeing the former $10 million numbers down at the end. You're seeing $6 million numbers instead but, regrettably, for the poor retrocessionaire, you see a triangle that seems to be growing quite dramatically and you've got some problems out at the end. Nonetheless, you're still contained. In time, the reinsurer knows about the complete picture.

(Slide 13)

What I want to do is show you what the picture looks like. Members of my staff who will remain anonymous chose to call this DG RE. It's probably better than "made up re." I once regrettably called a company Old Reliable only to find out that there was such a company, so DG RE is probably not too bad.

You can see what happens here is what you expected would happen. The net is reported quicker than the gross is reported which is quicker than the ceded. They tend to merge up toward the top. They do this again and again and again. They get very quick as they contact the top of the distribution. In general, that sort of reporting pattern occurs. This is the result of giving the reinsurer all of your late losses, which generally happens.

(Slide 14)

Let's look at what happens in terms of IBNR. Instead of calculating the IBNR and showing it to you in numbers, we decided to do it in graph form. Over on the left, we have the net IBNR for the ceding company, the ceding reinsurer. Over on the right, you have the actual IBNR, the actual gross.

When you add the ceded reinsurance IBNR to the net IBNR, you get column three which you can see is a little short of the actual gross. Does anybody know why that would occur? It's a mystery. You have a contained situation here but your factors come out short.

I have a conjecture that says this has to do with a bias. The factors tend to come out short even though the universe is known. This is an interesting phenomena. Hans Buhlmann would say it would have to do with the covariance considerations in the triangle. We could talk about that in a whole session.

Your factors are not independent of each other when you do age-to-age, so you tend to come out short. We'll show you a simulation in which when you go gross (gross using gross factors) you come out long. When you partition the portfolio, the tendency is to come up a little short.

This is an interesting thing to know, once you've simplified your example to this level and are dealing with a contained example, that you still can't get the right answer. We have a fourth column, the gross using the net factors. Why would we ever have that? Was it just because we wanted to cover all of the options?

Suppose you had net factors and you were thinking, "This is the year for me to get my gross reserves quickly by simply grossing up." You'll probably come up way short, even given the log normal contained distribution scenario.

(Slide 15)

Let's do Simulation B in which the only change in the assumptions is the average claim size which goes up to $200,000. I will skip all of the triangles and move on to the slide that holds the answers.

(Slide 19 & 20)

We see the actual gross IBNR. Net and ceded now almost add up to it. The gross is now short. Consider what happened, we went from $100,000 average claim size to $200,000 average claim size.

Compare this slide with the slide for $100,000 claims. Look at the net and the ceded. See how small the ceded column is besides the net? Now, using the same distributions but just increasing the average claim size, all of a sudden you lower the IBNRs for the reinsurer (the retrocessionaire in this case).

Moving right along, we'll go to the place you probably don't want to go. It's Simulation C where we begin to utilize some of the power that we threw into this model.

(Slide 21)

The average claim size this time just by random selection is $80,000. We've got a couple of types of inflation, one going down the accident years of the triangle and one tied to report year, so we can invoke alternative patterns and types of inflation.

The claim cap, which sat at $1 million, now varies by year and the claim cap looks like this. In 1971, 90 percent of your policies were at the $100,000 limit and only 2-1/2 percent were at the million dollar limit, but because of the phenomenon that Ross Currie has called limit profile drift by the time 1990 comes along, you have 99.42 percent -- Ivory soap, I think -- of your policies sitting at the $500,000 limit. So you've had drift.

You had a nice reinsurer who would protect you and, indeed, you began to write higher and higher policies over a 20-year period, somewhat similar to the real world, so we invoked the drift for Simulation C.

(Slide 22)

Finally, a real world example. The reinsurance layers vary from 71 to 90 as reinsurance layers are wont to do. Your retention continually increases, perhaps as the reinsurance rate levels become onerous on the client company, and the retrocession for this poor reinsurance company also changes, and you can see those changes.

What does all this come to? I'll avoid the triangles -- You can look at them closely on your own -- and go right to the chase.

(Slide 23)

It doesn't look bad. All the stuff we did and it looks like before. Sure, we're short of the actual gross again. We can't hit the target but we couldn't do that before. Most of the IBNR falls to the poor retrocessionaire but, you know, we're close to the target. This is kind of interesting.

This is, of course, just a simulation. Did all of those things that we threw in there begin to cancel each other out? Yes. You can get your analysis so complex that you can throw up your hands and say, "I can't do this," but the purpose of my discussion here is to take you back to the basics of homogeneity, independence, the completeness of the data you're given, and the relative stationarity of the process.

If you have these things, you can begin to say something. It may not be perfect but you sure can say something and invoke some caveats. Now, one last section because we promised to do this, and here we are, running out of time.

(Slide 29)

It has to do with our friends, the financial reinsurance covers. This is not an exhaustive list of financial reinsurance covers. We ask a question: What is a financial quota share and how does it differ from an ordinary quota share?

(No response.)

No takers. There is no voice from the audience. Let the recorder take note that no one is volunteering on financial quota shares. Financial coverage is the area where people remain terribly silent, either through not knowing or through, "Gee, this is a trade secret. We don't know."

Financial quota share? Well, just discount the loss reserves. It might be seen as the same thing as an ordinary quota share, but with the discount for the time value of money in there. A financial coverage seminar, as I said, is probably a multi-day event which should be held off-shore somewhere. There is a lot of very intricate detail in these things.

The class financial cover is the loss portfolio transfer. You transfer a whole bunch of losses from the ground up to somebody else and that somebody else will charge you only the discounted value of that portfolio. You will have an immediate contribution to surplus.

What is an adverse loss development cover? Well, you know you have your reserves and at a certain level, you don't think they are going to increase any more. You've got your IBNR included in your reserves. You've made a good allocation of your resources and you say, "It's not going to develop, but in case it does, I want to purchase a cover to protect any adverse development in my old years." That's what that is all about.

An aggregate stop loss cover might do this as well as including a loss ratio stabilizer for the current year in case some catastrophic event should hit you and damage this year's loss ratio. So, for purposes of example and example only, we return to our popular log normal model.

(Slide 30)

Here is an adverse loss development cover being put against it. It's going to be effective December 31, 1980 perhaps when the very first financial cover was ever written. It covers accident years 1971 to 1975. The projected ultimate losses for these years is $24,880,000.

The limit of cover will be $5 million in excess of that amount, so it will attach just above where you think the losses are going to be. It could also come in a million dollars higher or a million dollars lower depending on the client's requirements.

(Slide 31)

So, what happens? Well, we have a triangle, a big triangle, and you can see that the gross reinsurance triangle has $10 million items out in the tail. We cut off those $10 million items and for 1975, right about here, we're going to begin to cut. We're going to cut that away and it will begin to attach out here, so let's look at where it begins to attach.

Here are years 1971 through 1975. Some time ticked between December 31, 1980 and the time that the losses appear to the retrocessionaire. There they are in those five years. Does the retrocessionaire show them in those five years? I say not necessarily because his cover is in the one year, 1980, so he would show them as a strip on his annual statement and it would come out something like this.

Now, the question is: How does he get these things into his reserves? How do you reserve for financial covers? Well, the answer given at previous sessions is: You get these financial covers out of your data and you do your reserves on everything but financial covers and you treat them separately according to their terms and conditions, which is a long discussion.

So, in order for us to have any question and answer time, like three minutes of it, I'm going to end right here.

(Slide 1)

DESCRIPTION OF THE UNDERLYING PROCESS

CONDITIONS OF EXPOSURE

- Event
- Structure of Coverage

REALIZATIONS

- Claim Frequency Distribution
- Claim Severity Distribution
- Distribution of Aggregate Claims

(Slide 2)

NATURE OF THE UNDERLYING PROCESS

HOMOGENEITY: Do the events all arise from the same process?

INDEPENDENCE: Are the events interrelated in some way? Is there contagion?

STATIONARITY: How stable are results over time? Does inflation (or social inflation) produce unstable trends?

COMPLETENESS: Is the known information partial or incomplete in some way?

(Slide 3)

FACULTATIVE REINSURANCE RESERVING

INFORMATION

- Detail
  - Exposure
  - Structure
- Quantity

GROUPING CONSIDERATIONS

STABILITY

METHODOLOGIES

(Slide 4)

INFORMATION FILTER

TIME

- Reporting Lag
- Evolution of Considerations

STRUCTURE

- Economic Loss
- Societal Concerns
- Terms and Conditions
  - Policy
  - Reinsurance Agreement
  - Retrocession Agreement

INTERPRETATION

- Error
- Noise

(Slide 5)

INFORMATION REPORTING PROCESS

INSURED

↓

AGENT

↓

PRIMARY INSURER

↓

BROKER

↓

REINSURER

↓

BROKER

↓

RETROCESSIONAIRE (Level I)

↓

BROKER

↓

RETROCESSIONAIRE (Level II)

↓

⋮

(Slide 6)

TYPES OF UNCERTAINTY

PROCESS RISK: For a known distribution the risk of an adverse outcome

PARAMETER ESTIMATION RISK: For a known family of distributions the risk of adversely misspecifying the parameters

MODEL SPECIFICATION RISK: Selecting a less risky form of distribution than is actually the case

(Slide 7)

SCOPE OF 1991 ANNUAL STATEMENT ACTUARIAL OPINION

RESERVE FOR UNPAID LOSSES

Net
Gross

RESERVE FOR UNPAID LOSS ADJUSTMENT EXPENSE

Net
Gross

APPROPRIATE RELEVANT TOPICS

Discounting
Salvage and Subrogation
Loss Portfolio Transfers
Financial Reinsurance
Reinsurance Collectibility
Exceptional Values on IRIS Tests

(Slide 8)

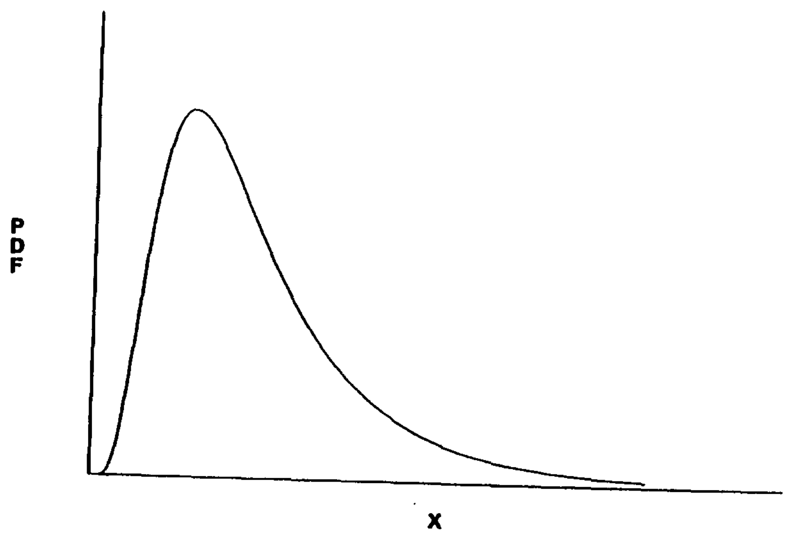
Assumptions for Simulation A

Expected Number of Claims	400 per year
Average Claim Size	$100,000
Accident Year Inflation	0%
Report Year Inflation	0%
Count Distribution	Normal
Report Lag Distribution	Weibull
	b= 57.7
	s=1.23
	Mean=54 months
Loss Distribution	Lognormal
Claim Cap	$1,000,000
Reinsurance Layer	$750,000 XS $250,000
Retro Layer	$500,000 XS $250,000

(Slide 9)

Lognormal Model

CLRS



Parameters: σ, μ i.e., ln(x)-Normal

Mean: $e^{(\mu+\frac{\sigma^2}{2})}$

Variance: $(e^{(\sigma^2-1)}-1)e^{(2\mu+\sigma^2)}$

GROSS REINSURANCE ($100,000 AVG CLAIM SIZE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	559	1,388	2,288	2,812	3,852	5,681	6,101	7,120	8,108	8,576	8,811	9,323	9,391	10,891	10,895	10,911	10,992	10,992	10,992	10,992
1973	105	739	866	1,244	1,973	2,291	3,151	3,261	3,495	4,173	4,400	4,400	4,445	4,445	4,445	4,445	4,445	4,445		4,445
1974	466	2,043	2,810	4,012	4,720	4,801	5,683	5,820	6,060	7,306	7,459	7,612	7,612	7,612	7,612	7,612	7,612			7,612
1975	212	212	502	922	1,246	1,839	2,446	2,630	2,630	2,880	3,125	2,875	2,875	3,157	3,504	3,504				3,504
1976	858	1,447	1,963	3,774	4,291	5,015	5,265	5,449	6,053	6,113	5,902	5,902	6,244	6,169	6,189					6,189
1977	391	1,150	2,269	2,307	3,011	4,117	4,117	4,192	4,273	5,308	4,989	5,292	5,292	5,292						5,292
1978	874	1,785	3,964	4,179	4,575	5,251	5,659	6,587	6,703	8,088	8,508	8,617	8,617							8,617
1979	74	915	1,043	1,628	2,242	2,409	2,409	2,745	2,903	3,415	3,873	3,873								3,873
1980	54	855	1,307	1,913	1,924	2,251	2,251	2,251	2,825	3,660	3,522									3,522
1981	0	638	634	1,312	1,823	1,887	2,334	2,367	2,422	3,243										3,243
1982	321	299	1,693	1,917	2,302	2,342	2,983	3,121	3,628											3,628
1983	104	1,505	2,059	3,448	4,238	4,978	5,361	5,896												5,896
1984	0	250	942	1,516	2,784	3,284	3,368													3,368
1985	107	922	1,417	1,498	1,900	2,506														2,506
1986	73	331	419	1,542	3,705															3,705
1987	0	1,247	1,637	2,213																2,213
1988	138	1,277	1,529																	1,529
1989	445	798																		798
1990	228																			228
																				81,159

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	X	1.282	1.347	1.141	1.211	1.235	1.362	1.226	1.070	1.002	1.045	1.000	1.164	1.002	1.003	1.015	1.000	1.000
1973	7.022	1.172	1.437	1.586	1.161	1.376	1.035	1.072	1.194	1.054	1.000	1.010	1.000	1.000	1.000	1.000	1.000	
1974	4.386	1.375	1.428	1.176	1.017	1.184	1.024	1.041	1.206	1.021	1.021	1.000	1.000	1.000	1.000	1.000		
1975	1.000	2.366	1.837	1.352	1.476	1.330	1.075	1.000	1.095	1.085	0.920	1.000	1.098	1.110	1.000			
1976	1.687	1.356	1.923	1.137	1.169	1.050	1.035	1.111	1.010	0.965	1.000	1.058	0.988	1.003				
1977	2.942	1.973	1.017	1.305	1.367	1.000	1.018	1.019	1.242	0.940	1.061	1.000	1.000					
1978	2.042	2.221	1.054	1.095	1.148	1.078	1.164	1.018	1.207	1.052	1.013	1.000						
1979	12.428	1.140	1.561	1.377	1.074	1.000	1.140	1.058	1.176	1.134	1.000							
1980	15.809	1.529	1.464	1.006	1.170	1.000	1.000	1.255	1.295	0.962								
1981	X	0.994	2.068	1.389	1.035	1.236	1.014	1.023	1.339									
1982	0.931	5.663	1.132	1.201	1.017	1.274	1.046	1.162										
1983	14.467	1.368	1.675	1.229	1.175	1.077	1.100											
1984	X	3.766	1.610	1.837	1.180	1.025												
1985	8.635	1.536	1.058	1.268	1.319													
1986	4.525	1.266	3.677	2.404														
1987	X	1.313	1.352															
1988	9.268	1.197																
1989	1.791																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	3.723	1.608	1.404	1.310	1.190	1.108	1.077	1.078	1.160	1.022	1.018	1.010	1.048	1.012	1.001	1.004	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	3.723	1.608	1.404	1.310	1.190	1.108	1.077	1.078	1.160	1.022	1.018	1.010	1.048	1.012	1.001	1.004	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	21.866	5.873	3.652	2.602	1.985	1.668	1.506	1.398	1.297	1.118	1.094	1.075	1.064	1.016	1.004	1.004	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	21.866	5.873	3.652	2.602	1.985	1.668	1.506	1.398	1.297	1.118	1.094	1.075	1.064	1.016	1.004	1.004	1.000	1.000	1.000

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(Slide 10)

NET REINSURANCE ($100,000 AVG CLAIM SIZE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	257	831	1,730	2,254	2,341	3,413	3,809	4,505	4,993	5,435	5,670	6,097	6,165	6,665	6,669	6,685	6,766	6,766	6,766	6,766
1973	105	739	866	1,034	1,263	1,513	1,854	1,964	2,198	2,874	3,101	3,101	3,146	3,146	3,146	3,146	3,146	3,146		3,146
1974	466	1,543	2,263	2,544	2,752	2,833	3,246	3,301	3,540	4,023	4,175	4,328	4,328	4,328	4,328	4,328	4,328			4,328
1975	212	212	502	922	1,246	1,839	2,221	2,404	2,404	2,654	2,899	2,649	2,649	2,867	3,117	3,117				3,117
1976	520	1,109	1,625	2,427	2,944	3,115	3,365	3,550	3,653	3,714	3,503	3,503	3,660	3,585	3,605					3,605
1977	391	1,150	2,184	2,222	1,926	2,326	2,326	2,401	2,482	3,017	2,698	2,913	2,913	2,913						2,913
1978	874	1,285	1,916	2,131	2,527	2,883	3,257	3,494	3,610	4,227	4,259	4,367	4,367							4,367
1979	74	599	727	1,214	1,791	1,958	1,958	2,294	2,453	2,953	2,995	2,995								2,995
1980	54	355	807	1,059	1,070	1,397	1,397	1,397	1,738	2,564	2,426									2,426
1981	0	638	634	1,312	1,323	1,387	1,834	1,867	1,922	2,434										2,434
1982	314	292	1,186	1,410	1,616	1,656	1,952	2,090	2,298											2,298
1983	104	1,005	1,351	2,572	2,862	3,102	3,247	3,781												3,781
1984	0	250	750	1,324	2,108	2,108	2,191													2,191
1985	107	922	1,417	1,498	1,878	2,445														2,445
1986	73	323	411	1,034	2,002															2,002
1987	0	1,116	1,480	1,737																1,737
1988	138	1,013	1,265																	1,265
1989	445	798																		798
1990	228																			228
																				52,842

INDIVIDUAL ATA FACTORS

374

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	X	1.408	1.457	1.104	1.192	1.285	1.282	1.099	1.093	1.003	1.058	1.000	1.077	1.004	1.004	1.023	1.000	1.000
1973	7.022	1.172	1.194	1.222	1.198	1.226	1.059	1.119	1.308	1.079	1.000	1.015	1.000	1.000	1.000	1.000	1.000	
1974	3.313	1.466	1.124	1.082	1.029	1.146	1.017	1.073	1.136	1.038	1.037	1.000	1.000	1.000	1.000	1.000		
1975	1.000	2.366	1.837	1.352	1.476	1.208	1.083	1.000	1.104	1.092	0.914	1.000	1.082	1.087	1.000			
1976	2.134	1.465	1.494	1.213	1.058	1.080	1.055	1.029	1.017	0.943	1.000	1.045	0.979	1.005				
1977	2.942	1.899	1.018	0.867	1.208	1.000	1.032	1.034	1.216	0.894	1.080	1.000	1.000					
1978	1.470	1.491	1.112	1.186	1.141	1.130	1.073	1.033	1.171	1.008	1.025	1.000						
1979	8.135	1.214	1.670	1.475	1.093	1.000	1.172	1.069	1.204	1.014	1.000							
1980	6.563	2.274	1.313	1.010	1.305	1.000	1.000	1.244	1.476	0.946								
1981	X	0.994	2.068	1.008	1.049	1.322	1.018	1.029	1.266									
1982	0.929	4.061	1.189	1.147	1.025	1.178	1.071	1.100										
1983	9.660	1.344	1.904	1.113	1.084	1.047	1.165											
1984	X	3.000	1.766	1.592	1.000	1.039												
1985	8.635	1.536	1.058	1.253	1.302													
1986	4.416	1.273	2.513	1.937														
1987	X	1.326	1.174															
1988	7.354	1.249																
1989	1.791																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	3.430	1.578	1.345	1.188	1.157	1.106	1.085	1.069	1.169	1.008	1.022	1.010	1.028	1.013	1.001	1.006	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	3.430	1.578	1.345	1.188	1.157	1.106	1.085	1.069	1.169	1.008	1.022	1.010	1.028	1.013	1.001	1.006	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	16.374	4.773	3.026	2.250	1.894	1.637	1.481	1.365	1.277	1.092	1.083	1.059	1.049	1.020	1.007	1.006	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	16.374	4.773	3.026	2.250	1.894	1.637	1.481	1.365	1.277	1.092	1.083	1.059	1.049	1.020	1.007	1.006	1.000	1.000	1.000

RUN DATE 9/19/91 TIME 17:11:23

(Slide 11)

CEDED REINSURANCE ($100,000 AVG CLAIM SIZE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	302	557	557	557	1,512	2,268	2,292	2,615	3,115	3,141	3,141	3,226	3,226	4,226	4,226	4,226	4,226	4,226	4,226	4,226
1973	0	0	0	210	710	778	1,297	1,297	1,297	1,299	1,299	1,299	1,299	1,299	1,299	1,299	1,299	1,299		1,299
1974	0	500	548	1,468	1,968	1,968	2,437	2,519	2,519	3,283	3,283	3,283	3,283	3,283	3,283	3,283	3,283			3,283
1975	0	0	0	0	0	0	225	225	225	225	225	225	225	290	387	387				387
1976	338	338	338	1,347	1,347	1,899	1,899	1,899	2,399	2,399	2,399	2,399	2,584	2,584	2,584					2,584
1977	0	0	85	85	1,085	1,791	1,791	1,791	1,791	2,291	2,291	2,379	2,379	2,379						2,379
1978	0	500	2,048	2,048	2,048	2,368	2,401	3,093	3,093	3,862	4,250	4,250	4,250							4,250
1979	0	316	316	414	450	450	450	450	450	462	879	879								879
1980	0	500	500	854	854	854	854	854	1,087	1,095	1,095									1,095
1981	0	0	0	0	500	500	500	500	500	809										809
1982	7	7	507	507	685	685	1,031	1,031	1,330											1,330
1983	0	500	708	876	1,376	1,876	2,115	2,115												2,115
1984	0	0	192	192	676	1,176	1,176													1,176
1985	0	0	0	0	23	61														61
1986	0	8	8	508	1,703															1,703
1987	0	131	157	476																476
1988	0	264	264																	264
1989	0	0																		0
1990	0																			0
																				28,317

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	X	1.000	1.000	1.311	1.281	1.055	1.714	1.644	1.020	1.000	1.017	1.000	1.378	1.000	1.000	1.000	1.000	1.000
1973	X	X	X	3.376	1.095	1.668	1.000	1.000	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
1974	X	1.096	2.679	1.341	1.000	1.238	1.034	1.000	1.303	1.000	1.000	1.000	1.000	1.000	1.000	1.000		
1975	X	X	X	X	X	X	1.000	1.000	1.000	1.000	1.000	1.000	1.286	1.335	1.000			
1976	1.000	1.000	3.983	1.000	1.410	1.000	1.000	1.263	1.000	1.000	1.000	1.077	1.000	1.000				
1977	X	X	1.000	12.728	1.650	1.000	1.000	1.000	1.279	1.000	1.038	1.000	1.000					
1978	X	4.096	1.000	1.000	1.156	1.014	1.288	1.000	1.248	1.101	1.000	1.000						
1979	X	1.000	1.310	1.087	1.000	1.000	1.000	1.000	1.027	1.901	1.000							
1980	X	1.000	1.708	1.000	1.000	1.000	1.000	1.273	1.007	1.000								
1981	X	X	X	X	1.000	1.000	1.000	1.000	1.618									
1982	1.000	73.180	1.000	1.352	1.000	1.505	1.000	1.290										
1983	X	1.416	1.237	1.571	1.363	1.127	1.000											
1984	X	X	1.000	3.531	1.739	1.000												
1985	X	X	X	X	2.698													
1986	X	1.000	64.010	3.353														
1987	X	1.198	3.039															
1988	X	1.000																
1989	X																	

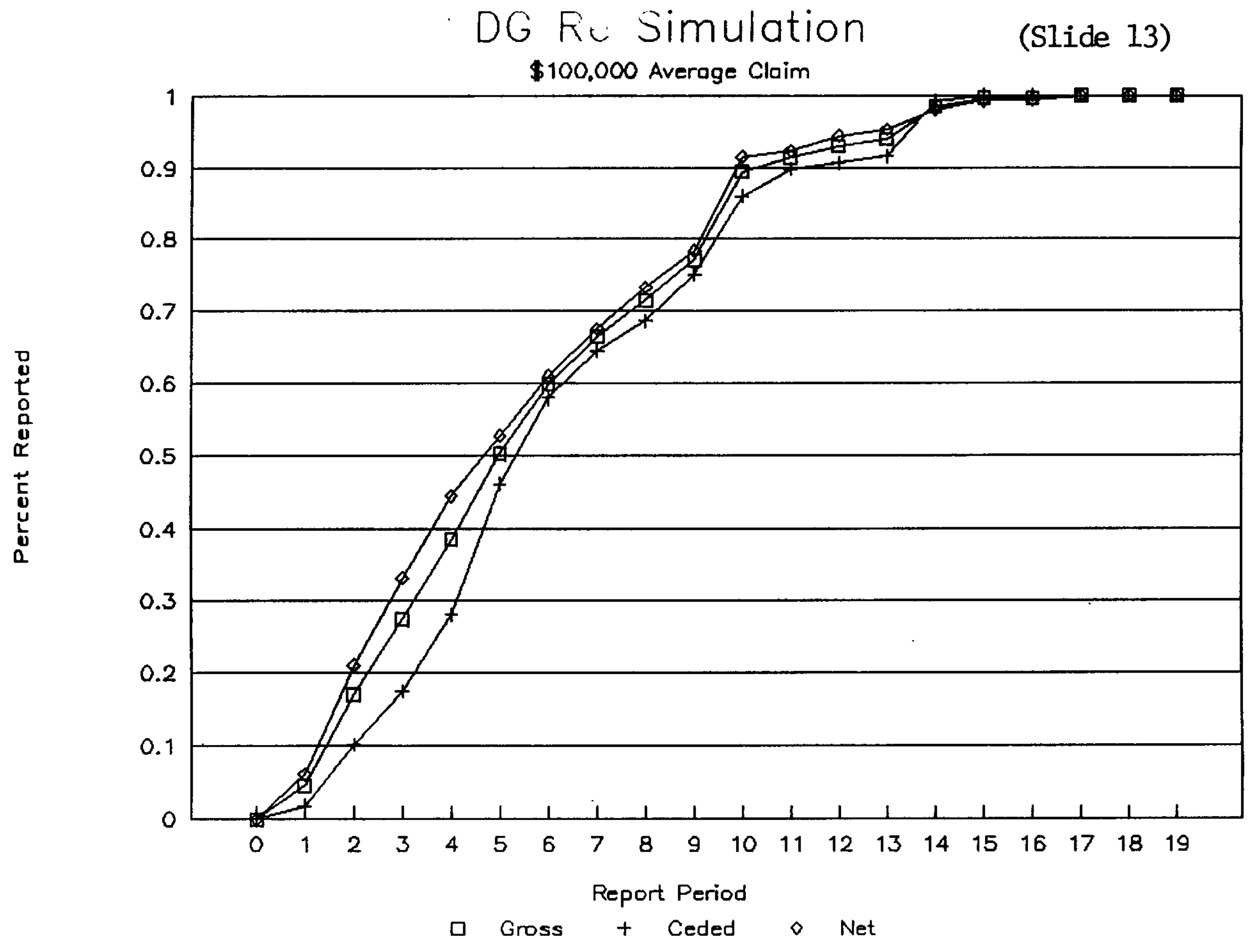
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	5.594	1.720	1.600	1.648	1.260	1.112	1.063	1.094	1.145	1.045	1.010	1.011	1.082	1.008	1.000	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	5.594	1.720	1.600	1.648	1.260	1.112	1.063	1.094	1.145	1.045	1.010	1.011	1.082	1.008	1.000	1.000	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	55.050	9.840	5.721	3.576	2.170	1.723	1.550	1.457	1.332	1.163	1.113	1.103	1.091	1.008	1.000	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	55.050	9.840	5.721	3.576	2.170	1.723	1.550	1.457	1.332	1.163	1.113	1.103	1.091	1.008	1.000	1.000	1.000	1.000	1.000

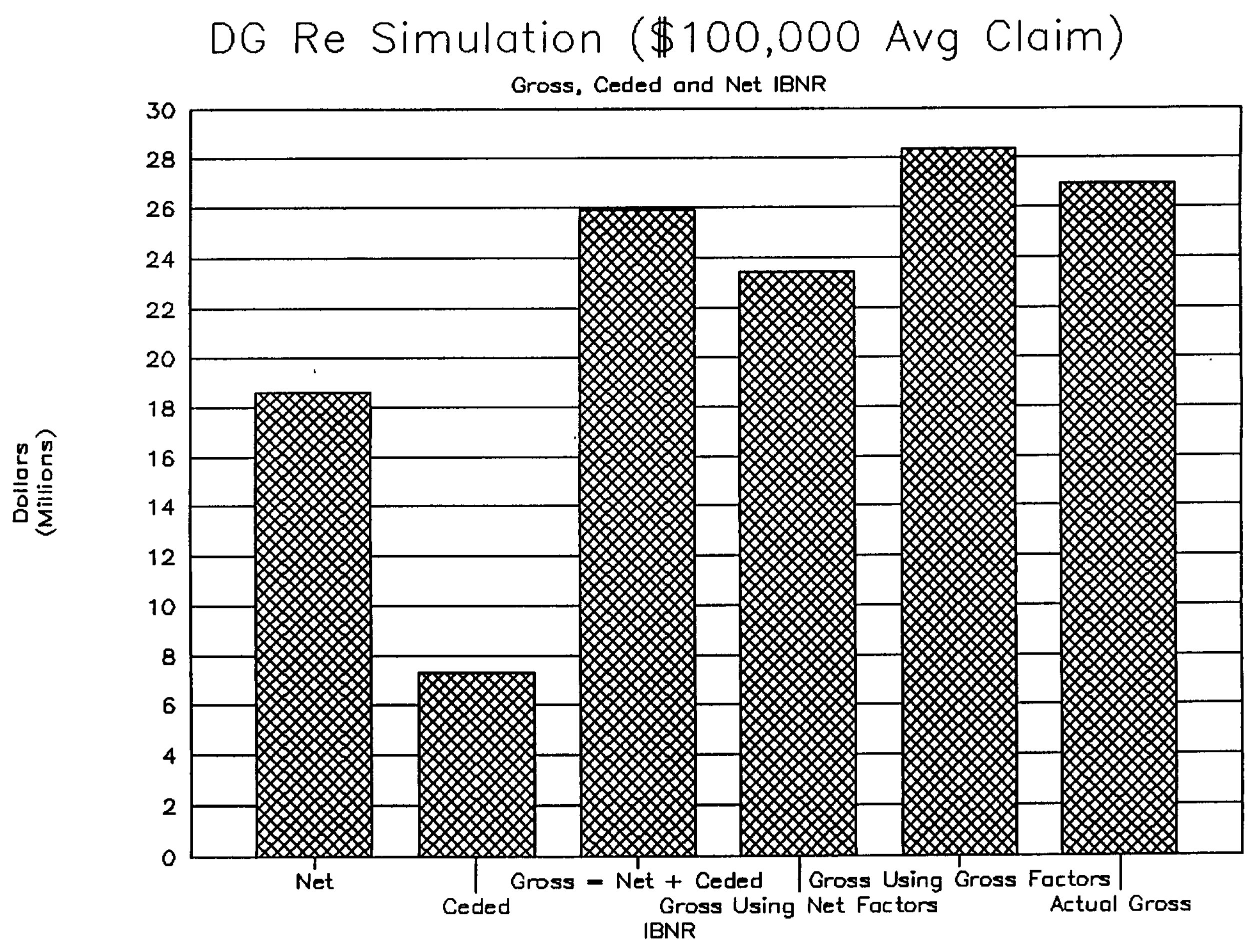
RUN DATE 9/19/91 TIME 17:11:1

(Slide 12)

(Slide 13)



(Slide 14)



Assumptions for Simulation B

Expected Number of Claims	400 per year
Average Claim Size	$200,000
Accident Year Inflation	0%
Report Year Inflation	0%
Count Distribution	Normal
Report Lag Distribution	Weibull
	b= 57.7
	s=1.23
	Mean=54 months
Loss Distribution	Lognormal
Claim Cap	$1,000,000
Reinsurance Layer	$750,000 XS $250,000
Retro Layer	$500,000 XS $250,000

GROSS REINSURANCE ($200,000 AVG CLAIM SIZE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	2,346	7,162	9,374	12,671	15,578	19,184	21,180	24,284	26,073	29,989	30,201	31,551	31,602	32,060	33,265	33,479	33,902	33,902	33,902	33,902
1973	541	4,148	7,302	11,632	13,681	14,055	15,451	16,353	17,235	18,235	18,327	18,428	18,212	18,363	18,363	18,363	18,363	18,517		18,517
1974	524	3,471	5,889	8,665	9,536	11,005	11,032	11,606	13,021	14,027	13,777	14,316	14,316	15,098	15,055	15,228	15,228			15,228
1975	1,055	4,731	7,421	11,500	11,682	14,496	15,262	16,042	17,800	17,631	17,421	17,859	17,922	17,922	17,922	17,943				17,943
1976	1,535	3,048	5,548	7,387	9,265	11,164	11,066	12,765	13,409	14,710	15,043	16,295	16,362	16,362	16,362					16,362
1977	1,302	1,837	4,105	5,672	6,722	7,718	8,779	10,063	10,810	11,221	11,441	11,441	11,278	11,028						11,028
1978	1,085	2,205	5,656	7,581	9,380	12,220	14,161	14,960	15,826	17,728	17,883	18,062	18,135							18,135
1979	298	1,544	4,056	5,025	7,926	9,245	10,806	11,554	12,701	14,376	14,376	15,719								15,719
1980	2,538	3,319	5,735	9,636	11,159	11,939	13,136	14,185	14,651	16,621	16,421									16,421
1981	220	1,815	3,032	6,854	7,465	7,598	7,975	8,648	10,144	10,612										10,612
1982	1,937	4,302	6,909	8,284	10,274	11,588	13,301	14,284	15,571											15,571
1983	603	946	3,035	3,706	4,730	5,755	7,545	7,045												7,045
1984	797	2,096	3,821	6,395	7,253	8,649	9,696													9,696
1985	657	1,352	1,331	2,250	3,666	4,735														4,735
1986	1,396	3,100	4,025	5,851	6,449															6,449
1987	755	2,237	2,984	4,489																4,489
1988	1,852	4,849	8,007																	8,007
1989	1,046	1,375																		1,375
1990	816																			816
																				232,052

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	1.757	1.311	1.246	1.331	1.152	1.094	1.097	1.103	1.042	0.982	1.029	1.000	0.994	1.042	1.016	1.000	1.000	1.000
1973	7.663	1.761	1.593	1.176	1.027	1.099	1.058	1.054	1.058	1.005	1.006	0.988	1.008	1.000	1.000	1.000	1.008	
1974	6.626	1.697	1.471	1.101	1.154	1.002	1.052	1.122	1.077	0.982	1.039	1.000	1.055	0.997	1.012	1.000		
1975	4.485	1.569	1.550	1.016	1.241	1.053	1.051	1.110	0.990	0.988	1.025	1.003	1.000	1.000	1.001			
1976	1.986	1.820	1.331	1.254	1.205	0.991	1.154	1.050	1.097	1.023	1.083	1.004	1.000	1.000				
1977	1.412	2.234	1.382	1.185	1.148	1.137	1.146	1.074	1.038	1.020	1.000	0.986	0.978					
1978	2.032	2.565	1.340	1.237	1.303	1.159	1.056	1.058	1.120	1.009	1.010	1.004						
1979	5.184	2.627	1.239	1.577	1.166	1.169	1.069	1.099	1.132	1.000	1.093							
1980	1.307	1.728	1.680	1.158	1.070	1.100	1.080	1.033	1.135	0.988								
1981	8.248	1.670	2.261	1.089	1.018	1.050	1.084	1.173	1.046									
1982	2.222	1.606	1.199	1.240	1.128	1.148	1.074	1.090										
1983	1.569	3.207	1.221	1.276	1.217	1.311	0.934											
1984	2.630	1.823	1.674	1.134	1.192	1.121												
1985	2.059	0.984	1.690	1.629	1.292													
1986	2.221	1.299	1.454	1.102														
1987	2.964	1.334	1.504															
1988	2.619	1.651																
1989	1.315																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	2.613	1.691	1.466	1.191	1.164	1.102	1.081	1.081	1.089	1.002	1.038	0.999	1.010	1.012	1.005	1.006	1.003	1.000	1.000
WEIGHTED ALL YEAR ATA	2.613	1.691	1.466	1.191	1.164	1.102	1.081	1.081	1.089	1.002	1.038	0.999	1.010	1.012	1.005	1.006	1.003	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	13.567	5.191	3.069	2.094	1.757	1.510	1.370	1.267	1.173	1.077	1.075	1.036	1.037	1.026	1.014	1.009	1.003	1.000	1.000
WEIGHTED ALL YEAR ATU	13.567	5.191	3.069	2.094	1.757	1.510	1.370	1.267	1.173	1.077	1.075	1.036	1.037	1.026	1.014	1.009	1.003	1.000	1.000

RUN DATE 9/19/91 TIME 17:16:21

(Slide 16)

NET REINSURANCE ($200,000 AVG CLAIM SIZE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	1,281	4,656	6,144	8,700	10,006	12,113	14,070	15,540	15,969	18,095	18,307	19,051	19,102	19,060	19,219	19,419	19,496	19,496	19,496	19,496
1973	541	2,422	4,329	7,307	7,856	8,230	9,060	9,047	9,616	9,616	9,707	9,809	9,592	9,743	9,743	9,743	9,743	9,898		9,898
1974	524	2,124	4,165	5,689	6,047	6,851	6,879	6,952	7,657	8,291	8,041	8,081	8,081	8,298	8,255	8,274	8,274			8,274
1975	1,018	3,388	5,107	6,816	6,998	8,458	8,700	8,979	9,025	8,855	8,645	8,936	8,998	8,998	8,998	9,020				9,020
1976	1,392	1,905	3,408	4,457	5,606	6,849	6,751	7,650	7,794	8,537	8,859	9,107	9,134	9,134	9,134					9,134
1977	986	1,522	2,256	3,804	4,353	4,800	5,361	6,502	7,073	7,484	7,704	7,704	7,541	7,291						7,291
1978	585	1,583	3,468	4,116	5,209	6,609	7,755	8,128	8,827	9,672	9,357	9,536	9,609							9,609
1979	298	1,544	3,608	4,078	5,437	6,051	7,111	7,382	8,029	8,822	8,822	9,331								9,331
1980	1,637	2,411	4,602	6,595	7,048	7,768	8,779	9,266	9,731	11,008	10,758									10,758
1981	220	1,557	2,430	4,662	5,135	5,268	5,418	6,091	6,606	6,683										6,683
1982	1,141	2,670	3,935	4,693	5,708	6,406	7,707	8,190	8,737											8,737
1983	500	843	1,823	2,494	3,383	3,869	5,040	4,540												4,540
1984	336	1,507	2,982	4,402	4,760	6,077	6,948													6,948
1985	657	1,352	1,331	1,952	2,367	3,070														3,070
1986	1,298	2,317	3,242	3,771	3,869															3,869
1987	755	1,737	2,474	3,311																3,311
1988	1,107	3,103	4,862																	4,862
1989	546	875																		875
1990	316																			316
																				136,021

INDIVIDUAL ATA FACTORS

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PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	2.009	1.419	1.292	1.199	1.174	1.149	1.092	1.037	1.035	0.971	1.031	1.000	0.990	1.005	1.026	1.000	1.000	1.000
1973	4.474	1.787	1.688	1.075	1.048	1.101	0.998	1.063	1.000	1.010	1.010	0.978	1.016	1.000	1.000	1.000	1.016	
1974	4.055	1.961	1.366	1.063	1.133	1.004	1.011	1.101	1.083	0.970	1.005	1.000	1.027	0.995	1.002	1.000		
1975	3.327	1.507	1.335	1.027	1.209	1.029	1.032	1.005	0.981	0.976	1.034	1.007	1.000	1.000	1.002			
1976	1.368	1.789	1.308	1.258	1.222	0.986	1.133	1.019	1.095	1.038	1.028	1.003	1.000	1.000				
1977	1.544	1.482	1.686	1.144	1.103	1.117	1.213	1.088	1.058	1.029	1.000	0.979	0.967					
1978	2.707	2.191	1.187	1.266	1.269	1.174	1.048	1.086	1.096	0.967	1.019	1.008						
1979	5.184	2.338	1.130	1.333	1.113	1.175	1.038	1.088	1.099	1.000	1.058							
1980	1.473	1.908	1.433	1.069	1.102	1.130	1.055	1.050	1.131	0.977								
1981	7.077	1.560	1.919	1.101	1.026	1.028	1.124	1.085	1.012									
1982	2.339	1.474	1.193	1.216	1.122	1.203	1.063	1.067										
1983	1.686	2.163	1.368	1.356	1.144	1.303	0.901											
1984	4.488	1.980	1.476	1.081	1.277	1.143												
1985	2.059	0.984	1.466	1.213	1.297													
1986	1.784	1.400	1.163	1.026														
1987	2.302	1.424	1.338															
1988	2.804	1.567																
1989	1.602																	

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	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	2.531	1.642	1.390	1.139	1.156	1.114	1.061	1.057	1.075	0.998	1.027	0.998	1.001	1.002	1.005	1.002	1.005	1.000	1.000
WEIGHTED ALL YEAR ATA	2.531	1.642	1.390	1.139	1.156	1.114	1.061	1.057	1.075	0.998	1.027	0.998	1.001	1.002	1.005	1.002	1.005	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	10.612	4.193	2.553	1.837	1.613	1.395	1.251	1.179	1.116	1.038	1.041	1.014	1.016	1.015	1.013	1.007	1.005	1.000	1.000
WEIGHTED ALL YEAR ATU	10.612	4.193	2.553	1.837	1.613	1.395	1.251	1.179	1.116	1.038	1.041	1.014	1.016	1.015	1.013	1.007	1.005	1.000	1.000

RUN DATE 9/19/91 TIME 17:17:5

CEDED REINSURANCE ($200,000 AVG CLAIM SIZE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	1,065	2,507	3,230	3,971	5,572	7,071	7,110	8,744	10,104	11,894	11,894	12,500	12,500	13,000	14,046	14,060	14,406	14,406	14,406	14,406
1973	0	1,726	2,974	4,325	5,825	5,825	6,391	7,306	7,620	8,620	8,620	8,620	8,620	8,620	8,620	8,620	8,620	8,620		8,620
1974	0	1,347	1,724	2,976	3,489	4,154	4,154	4,654	5,365	5,735	5,735	6,235	6,235	6,800	6,800	6,954	6,954			6,954
1975	36	1,342	2,314	4,684	4,684	6,039	6,562	7,062	8,776	8,776	8,776	8,923	8,923	8,923	8,923	8,923				8,923
1976	143	1,143	2,139	2,930	3,658	4,315	4,315	5,115	5,615	6,173	6,184	7,188	7,229	7,229	7,229					7,229
1977	316	316	1,850	1,869	2,369	2,919	3,419	3,562	3,737	3,737	3,737	3,737	3,737	3,737						3,737
1978	500	622	2,187	3,465	4,170	5,611	6,406	6,832	6,999	8,056	8,526	8,526	8,526							8,526
1979	0	0	447	947	2,490	3,195	3,695	4,172	4,672	5,555	5,555	6,388								6,388
1980	901	907	1,133	3,041	4,111	4,171	4,358	4,920	4,920	5,614	5,663									5,663
1981	0	258	602	2,192	2,330	2,330	2,557	2,557	3,538	3,929										3,929
1982	795	1,633	2,973	3,591	4,565	5,182	5,594	6,094	6,834											6,834
1983	103	103	1,211	1,211	1,347	1,886	2,505	2,505												2,505
1984	461	589	839	1,994	2,494	2,571	2,748													2,748
1985	0	0	0	298	1,298	1,665														1,665
1986	97	783	783	2,080	2,580															2,580
1987	0	500	510	1,178																1,178
1988	745	1,747	3,145																	3,145
1989	500	500																		500
1990	500																			500
																				96,031

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	1.470	1.143	1.157	1.617	1.116	1.000	1.105	1.229	1.053	1.000	1.026	1.000	1.000	1.100	1.002	1.000	1.000	1.000
1973	X	1.723	1.454	1.347	1.000	1.097	1.143	1.043	1.131	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
1974	X	1.280	1.726	1.173	1.190	1.000	1.120	1.153	1.069	1.000	1.087	1.000	1.091	1.000	1.023	1.000		
1975	37.034	1.724	2.024	1.000	1.289	1.087	1.076	1.243	1.000	1.000	1.017	1.000	1.000	1.000	1.000			
1976	7.994	1.872	1.369	1.249	1.180	1.000	1.185	1.098	1.099	1.002	1.162	1.006	1.000	1.000				
1977	1.000	5.858	1.010	1.268	1.232	1.171	1.042	1.049	1.000	1.000	1.000	1.000	1.000					
1978	1.243	3.518	1.584	1.203	1.345	1.142	1.067	1.024	1.151	1.058	1.000	1.000						
1979	X	X	2.118	2.628	1.283	1.157	1.129	1.120	1.189	1.000	1.150							
1980	1.007	1.249	2.684	1.352	1.014	1.045	1.129	1.000	1.141	1.009								
1981	X	2.336	3.642	1.063	1.000	1.097	1.000	1.384	1.110									
1982	2.052	1.821	1.208	1.271	1.135	1.079	1.089	1.121										
1983	1.000	11.727	1.000	1.112	1.401	1.328	1.000											
1984	1.277	1.424	2.376	1.251	1.031	1.069												
1985	X	X	X	4.351	1.282													
1986	8.039	1.000	2.657	1.240														
1987	X	1.021	2.309															
1988	2.344	1.801																
1989	1.000																	

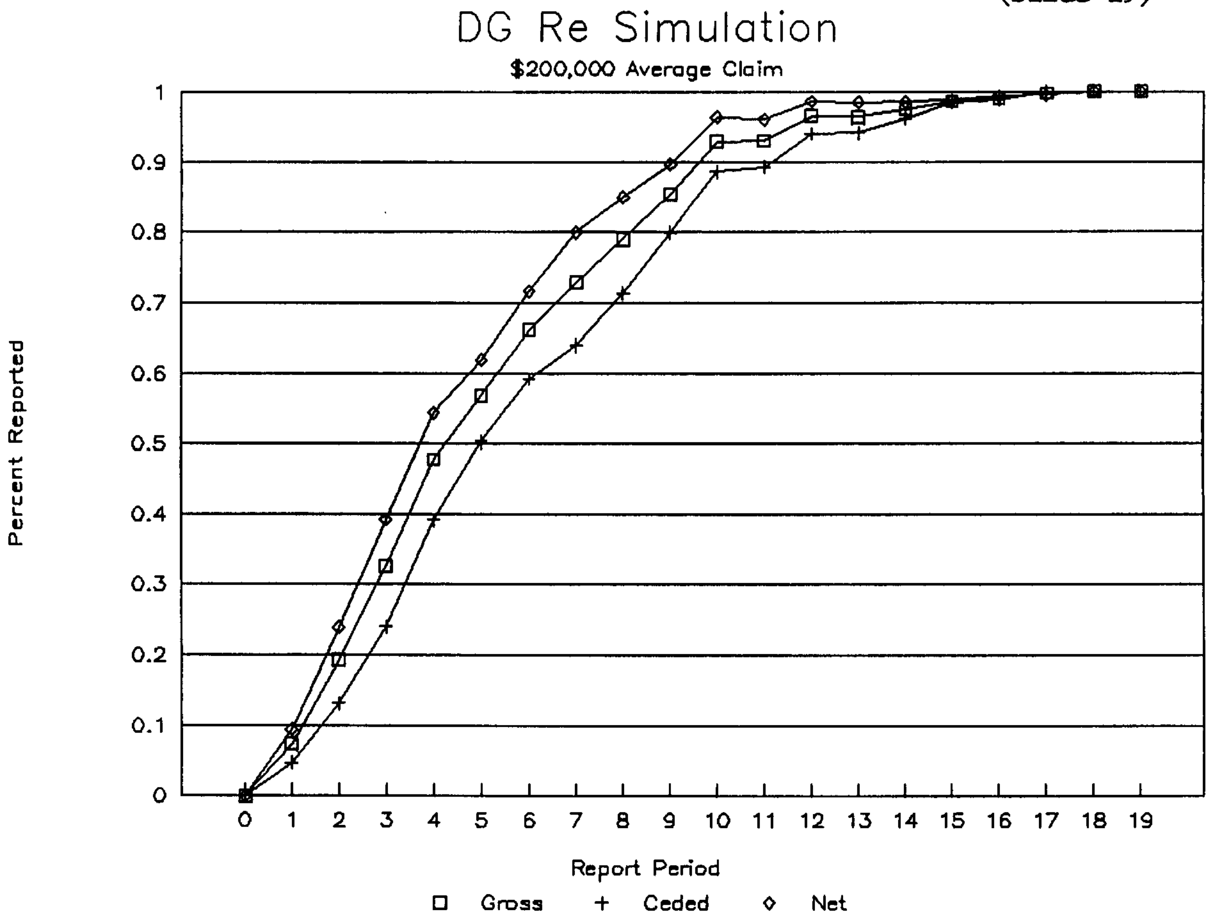
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	2.829	1.808	1.636	1.288	1.176	1.082	1.113	1.117	1.110	1.008	1.052	1.001	1.023	1.023	1.004	1.012	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	2.829	1.808	1.636	1.288	1.176	1.082	1.113	1.117	1.110	1.008	1.052	1.001	1.023	1.023	1.004	1.012	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	21.386	7.559	4.181	2.556	1.984	1.687	1.559	1.400	1.253	1.129	1.120	1.064	1.063	1.040	1.016	1.012	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	21.386	7.559	4.181	2.556	1.984	1.687	1.559	1.400	1.253	1.129	1.120	1.064	1.063	1.040	1.016	1.012	1.000	1.000	1.000

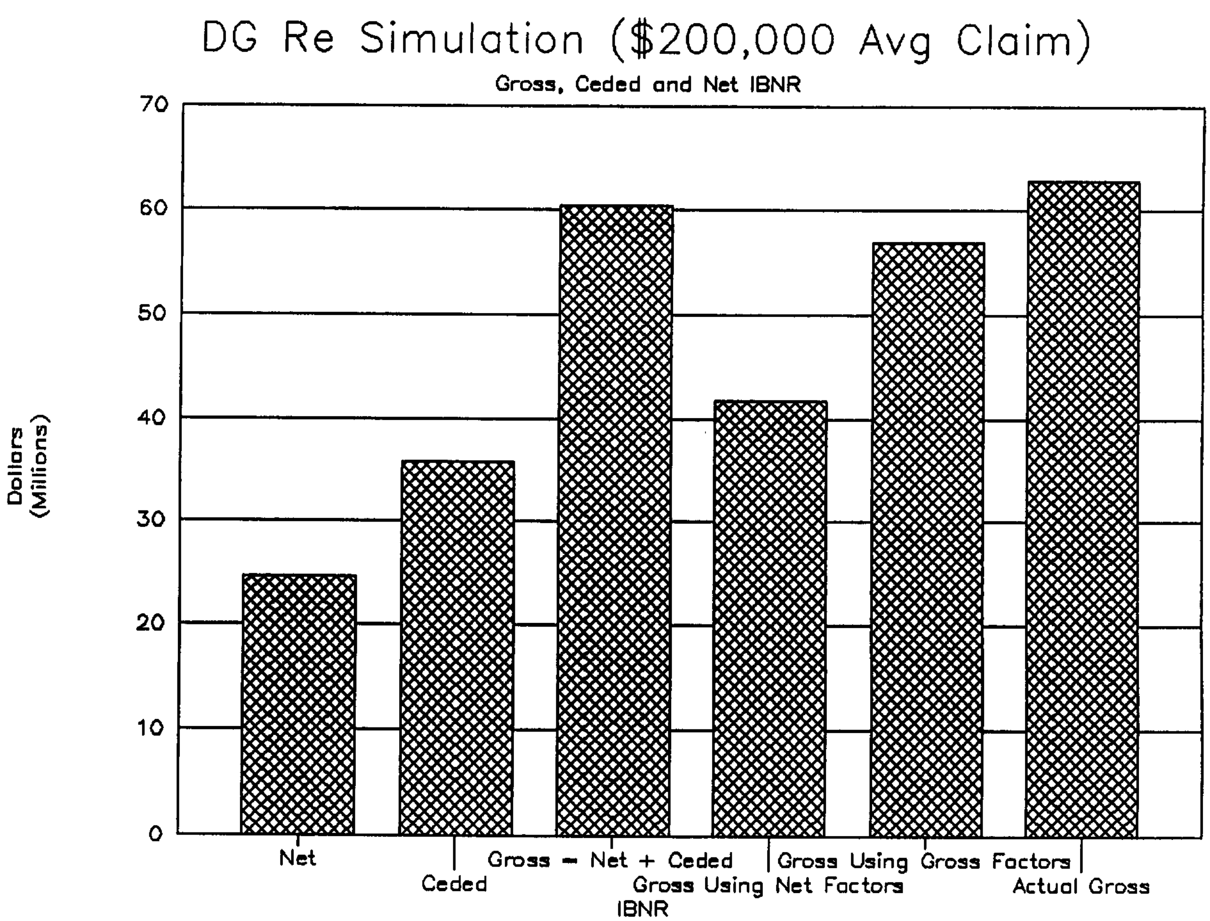
RUN DATE 9/19/91 TIME 17:16:43

(Slide 18)

(Slide 19)



(Slide 20)



(Slide 21)

Assumptions for Simulation C

Expected Number of Claims	400 per year
Average Claim Size	$80,000
Accident Year Inflation	6%
Report Year Inflation	4%
Count Distribution	Normal
Report Lag Distribution	Weibull b= 57.7 s=1.23 Mean=54 months
Loss Distribution	Lognormal
Claim Cap	Varies by year
Reinsurance Layer	Varies by year
Retro Layer	Varies by year

(Slide 22)

Assumptions for Simulation C

Distribution for Claim Caps
Change for Each Accident Year

Claim Cap	1971	1990
$100,000	90.00%	0.00%
$300,000	5.00%	0.07%
$500,000	2.50%	99.42%
$1,000,000	2.50%	0.51%

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Assumptions for Simulation C

Reinsurance Layers

Year	Limit		Retention
71–74	$250,000	XS	$50,000
75–79	$425,000	XS	$75,000
80–85	$650,000	XS	$100,000
86–90	$850,000	XS	$150,000

Retrocession Layers

Year	Limit		Retention
71–75	$400,000	XS	$50,000
76–79	$400,000	XS	$75,000
80–86	$800,000	XS	$100,000
87–90	$700,000	XS	$150,000

GROSS REINSURANCE (INFLATION EXAMPLE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	44	223	278	376	525	723	750	890	966	1,323	1,566	1,711	1,860	1,942	2,010	1,990	1,972	1,972	1,972	1,972
1973	0	54	184	161	385	400	686	737	1,160	1,177	1,280	1,330	1,330	1,390	1,390	1,454	1,454	1,454		1,454
1974	4	281	577	941	1,284	1,405	1,797	1,992	2,406	2,595	2,820	2,989	3,113	3,113	3,169	3,186	3,206			3,206
1975	0	234	414	645	673	790	1,238	1,607	1,954	2,262	2,549	2,684	2,688	2,688	2,834	2,834				2,834
1976	165	243	416	581	1,297	1,741	1,866	1,998	2,490	3,049	3,049	3,049	3,182	3,357	3,357					3,357
1977	36	165	396	390	556	849	863	1,000	1,183	1,977	2,110	2,088	2,090	2,133						2,133
1978	152	358	791	968	1,279	1,485	1,690	1,876	1,979	2,454	2,299	2,334	2,338							2,338
1979	87	417	903	1,756	2,312	2,418	2,481	2,984	3,112	4,159	4,208	4,095								4,095
1980	182	557	626	777	1,506	1,349	1,416	1,556	1,733	2,202	2,202									2,202
1981	0	385	624	1,041	1,460	1,815	2,361	2,394	2,574	3,739										3,739
1982	7	231	469	1,185	1,618	1,850	2,167	2,475	2,475											2,475
1983	72	512	670	672	1,083	1,524	1,915	2,315												2,315
1984	0	481	673	1,116	1,331	1,959	2,058													2,058
1985	497	608	1,108	2,086	3,120	3,827														3,827
1986	235	392	410	356	1,016															1,016
1987	283	690	1,792	2,380																2,380
1988	621	699	1,030																	1,030
1989	314	431																		431
1990	47																			47
																				42,907

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	5.184	1.128	1.124	1.230	1.292	1.031	1.175	1.003	1.179	1.267	1.162	1.103	1.048	1.063	0.993	1.000	1.000	1.000
1973	X	3.374	0.877	2.389	1.039	1.714	1.074	1.574	1.014	1.087	1.039	1.000	1.045	1.000	1.046	1.000	1.000	
1974	77.081	2.055	1.630	1.365	1.094	1.279	1.109	1.207	1.079	1.087	1.060	1.041	1.000	1.018	1.005	1.006		
1975	X	1.769	1.556	1.044	1.174	1.568	1.297	1.217	1.157	1.127	1.053	1.002	1.000	1.054	1.000			
1976	1.474	1.711	1.398	2.231	1.342	1.072	1.070	1.247	1.224	1.000	1.000	1.044	1.055	1.000				
1977	4.596	2.400	0.984	1.427	1.526	1.017	1.159	1.183	1.671	1.067	0.990	1.001	1.020					
1978	2.346	2.212	1.224	1.322	1.161	1.138	1.110	1.055	1.240	0.937	1.015	1.002						
1979	4.815	2.163	1.945	1.317	1.046	1.026	1.203	1.043	1.337	1.012	0.973							
1980	3.054	1.123	1.241	1.939	0.896	1.049	1.099	1.114	1.271	1.000								
1981	X	1.620	1.667	1.403	1.243	1.301	1.014	1.075	1.453									
1982	34.920	2.032	2.526	1.365	1.144	1.171	1.142	1.000										
1983	7.124	1.307	1.003	1.612	1.407	1.257	1.209											
1984	X	1.400	1.659	1.192	1.472	1.050												
1985	1.224	1.822	1.882	1.495	1.227													
1986	1.664	1.047	0.869	2.855														
1987	2.436	2.599	1.328															
1988	1.125	1.474																
1989	1.373																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	2.579	1.740	1.494	1.490	1.201	1.163	1.135	1.129	1.275	1.042	1.020	1.026	1.025	1.022	1.007	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	2.579	1.740	1.494	1.490	1.201	1.163	1.135	1.129	1.275	1.042	1.020	1.026	1.025	1.022	1.007	1.000	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	26.190	10.156	5.837	3.908	2.623	2.184	1.878	1.655	1.465	1.149	1.103	1.082	1.054	1.028	1.007	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	26.190	10.156	5.837	3.908	2.623	2.184	1.878	1.655	1.465	1.149	1.103	1.082	1.054	1.028	1.007	1.000	1.000	1.000	1.000

RUN DATE 9/20/91 TIME 12:49:7

NET REINSURANCE (INFLATION EXAMPLE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	44	215	270	368	517	693	720	843	888	1,191	1,338	1,431	1,572	1,655	1,680	1,660	1,641	1,641	1,641	1,641
1973	0	54	153	158	325	340	476	519	725	776	818	868	868	908	908	944	944	944		944
1974	4	164	383	553	817	851	989	1,134	1,406	1,514	1,604	1,715	1,779	1,779	1,823	1,840	1,860			1,860
1975	0	100	188	363	392	476	619	677	850	1,000	1,049	1,149	1,153	1,153	1,153	1,153				1,153
1976	165	243	308	454	628	928	1,021	1,104	1,143	1,251	1,251	1,251	1,315	1,403	1,403					1,403
1977	36	165	262	256	397	529	544	657	812	1,217	1,211	1,197	1,199	1,242						1,242
1978	152	300	503	680	833	982	1,187	1,332	1,416	1,704	1,568	1,531	1,534							1,534
1979	78	298	628	1,038	1,271	1,313	1,331	1,568	1,683	2,017	2,063	1,950								1,950
1980	132	372	441	511	763	632	698	838	1,015	1,183	1,183									1,183
1981	0	142	342	674	982	1,338	1,451	1,483	1,638	2,163										2,163
1982	7	171	294	857	912	1,118	1,289	1,495	1,495											1,495
1983	72	378	535	538	764	900	1,147	1,275												1,275
1984	0	161	353	668	859	937	1,036													1,036
1985	357	468	524	978	1,345	1,792														1,792
1986	100	246	265	221	504															504
1987	283	552	1,127	1,515																1,515
1988	421	499	651																	651
1989	246	363																		363
1990	47																			47
																				23,752

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	4.995	1.133	1.128	1.237	1.234	1.033	1.147	1.003	1.196	1.171	1.113	1.122	1.058	1.028	0.991	1.000	1.000	1.000
1973	X	2.808	1.033	2.054	1.047	1.400	1.090	1.398	1.070	1.054	1.061	1.000	1.046	1.000	1.039	1.000	1.000	
1974	44.975	2.336	1.443	1.478	1.042	1.162	1.147	1.240	1.077	1.059	1.069	1.037	1.000	1.025	1.009	1.011		
1975	X	1.882	1.931	1.078	1.215	1.301	1.093	1.255	1.177	1.049	1.095	1.004	1.000	1.000	1.000			
1976	1.474	1.266	1.477	1.382	1.477	1.100	1.082	1.035	1.094	1.000	1.000	1.052	1.067	1.000				
1977	4.596	1.587	0.976	1.552	1.334	1.027	1.209	1.235	1.499	0.995	0.988	1.002	1.036					
1978	1.969	1.676	1.352	1.226	1.179	1.209	1.121	1.063	1.203	0.921	0.976	1.002						
1979	3.838	2.104	1.654	1.224	1.033	1.014	1.178	1.073	1.198	1.023	0.945							
1980	2.811	1.185	1.158	1.494	0.829	1.105	1.201	1.211	1.165	1.000								
1981	X	2.405	1.969	1.457	1.362	1.085	1.022	1.105	1.320									
1982	25.848	1.722	2.909	1.064	1.226	1.153	1.160	1.000										
1983	5.258	1.416	1.004	1.421	1.178	1.275	1.111											
1984	X	2.195	1.893	1.287	1.091	1.105												
1985	1.311	1.120	1.864	1.375	1.333													
1986	2.463	1.074	0.834	2.282														
1987	1.950	2.041	1.344															
1988	1.184	1.305																
1989	1.475																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	2.333	1.596	1.495	1.360	1.187	1.133	1.127	1.122	1.211	1.020	1.017	1.031	1.032	1.010	1.006	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	2.333	1.596	1.495	1.360	1.187	1.133	1.127	1.122	1.211	1.020	1.017	1.031	1.032	1.010	1.006	1.000	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	17.474	7.491	4.695	3.141	2.310	1.945	1.716	1.523	1.358	1.122	1.100	1.081	1.049	1.016	1.006	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	17.474	7.491	4.695	3.141	2.310	1.945	1.716	1.523	1.358	1.122	1.100	1.081	1.049	1.016	1.006	1.000	1.000	1.000	1.000

RUN DATE 9/20/91 TIME 12:49:53

(Slide 25)

CEDED REINSURANCE (INFLATION EXAMPLE) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	0	8	8	8	8	30	30	47	78	132	228	280	288	288	330	330	330	330	330	330
1973	0	0	31	3	61	61	211	219	435	401	462	462	462	481	481	510	510	510		510
1974	0	117	195	388	467	554	808	859	1,000	1,081	1,216	1,274	1,334	1,334	1,346	1,346	1,346			1,346
1975	0	134	226	281	281	314	619	930	1,105	1,262	1,500	1,535	1,535	1,535	1,680	1,680				1,680
1976	0	0	108	127	669	813	846	893	1,347	1,798	1,798	1,798	1,867	1,955	1,955					1,955
1977	0	0	134	134	159	320	320	343	372	760	899	891	891	891						891
1978	0	57	288	288	446	503	503	544	563	751	730	803	803							803
1979	9	119	275	718	1,041	1,105	1,150	1,416	1,428	2,142	2,145	2,145								2,145
1980	50	185	185	266	744	717	717	717	717	1,019	1,019									1,019
1981	0	243	282	367	478	478	911	911	935	1,576										1,576
1982	0	60	175	329	706	732	878	979	979											979
1983	0	134	134	134	319	624	768	1,041												1,041
1984	0	320	320	449	472	1,022	1,022													1,022
1985	140	140	584	1,109	1,775	2,035														2,035
1986	135	145	145	135	513															513
1987	0	138	665	865																865
1988	200	200	379																	379
1989	68	68																		68
1990	0																			0
																				19,156

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	X	1.000	1.000	1.000	3.708	1.000	1.573	1.000	1.000	2.474	1.453	1.019	1.000	1.248	1.000	1.000	1.000	1.000
1973	X	X	0.103	19.118	1.000	3.472	1.039	1.990	0.921	1.152	1.000	1.000	1.042	1.000	1.060	1.000	1.000	
1974	X	1.662	1.997	1.203	1.186	1.459	1.062	1.164	1.081	1.125	1.047	1.047	1.000	1.009	1.000	1.000		
1975	X	1.686	1.244	1.000	1.116	1.972	1.501	1.188	1.142	1.189	1.023	1.000	1.000	1.095	1.000			
1976	X	X	1.173	5.267	1.215	1.040	1.056	1.509	1.335	1.000	1.000	1.038	1.047	1.000				
1977	X	X	1.000	1.188	2.004	1.000	1.074	1.083	2.045	1.183	0.991	1.000	1.000					
1978	X	5.008	1.000	1.549	1.127	1.000	1.083	1.034	1.332	0.973	1.100	1.000						
1979	13.295	2.313	2.608	1.451	1.061	1.040	1.232	1.009	1.500	1.001	1.000							
1980	3.698	1.000	1.439	2.794	0.965	1.000	1.000	1.000	1.420	1.000								
1981	X	1.160	1.301	1.304	1.000	1.905	1.000	1.027	1.685									
1982	X	2.913	1.880	2.148	1.038	1.198	1.116	1.000										
1983	X	1.000	1.000	2.378	1.956	1.230	1.355											
1984	X	1.000	1.402	1.052	2.166	1.000												
1985	1.000	4.169	1.899	1.601	1.146													
1986	1.074	1.000	0.931	3.790														
1987	X	4.836	1.301															
1988	1.000	1.894																
1989	1.000																	

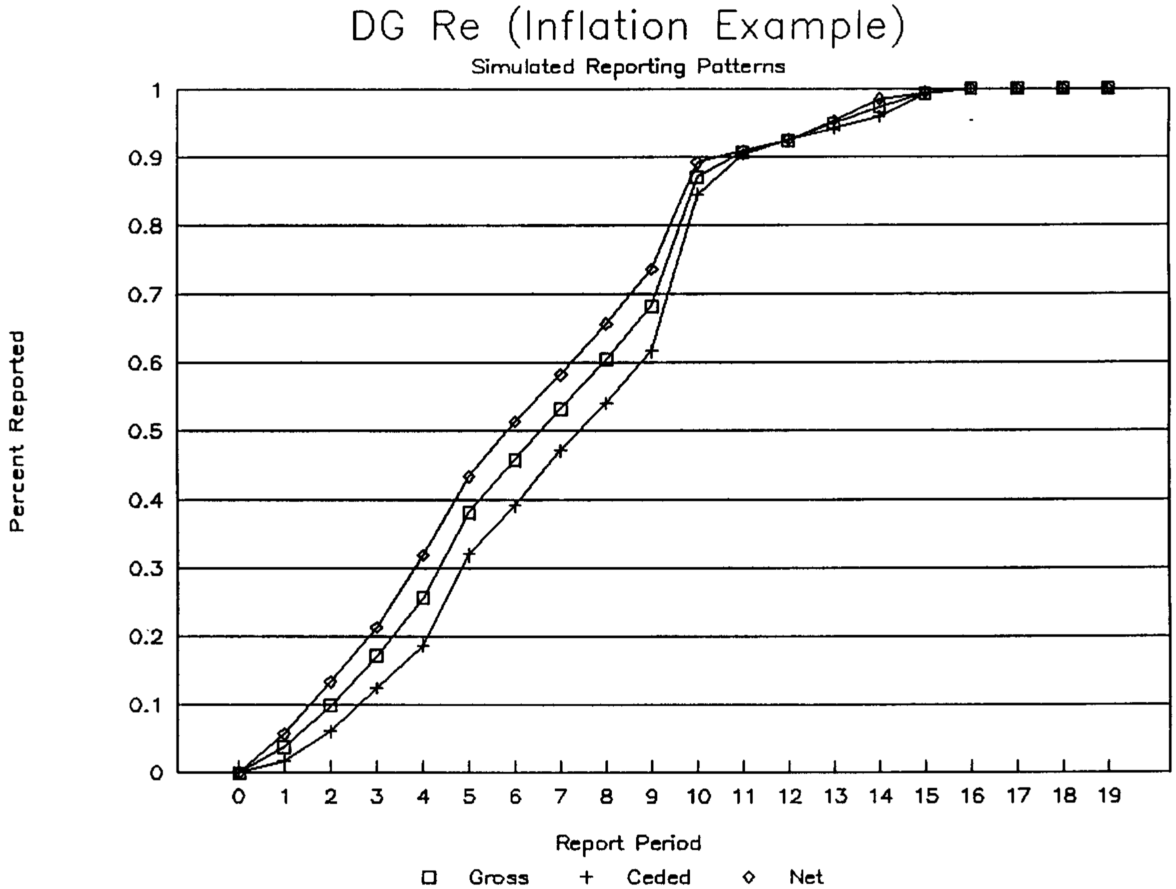
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	3.437	2.066	1.492	1.719	1.220	1.207	1.147	1.140	1.369	1.070	1.023	1.019	1.017	1.036	1.008	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	3.437	2.066	1.492	1.719	1.220	1.207	1.147	1.140	1.369	1.070	1.023	1.019	1.017	1.036	1.008	1.000	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	56.840	16.540	8.004	5.366	3.123	2.558	2.119	1.848	1.620	1.184	1.107	1.082	1.061	1.043	1.008	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	56.840	16.540	8.004	5.366	3.123	2.558	2.119	1.848	1.620	1.184	1.107	1.082	1.061	1.043	1.008	1.000	1.000	1.000	1.000

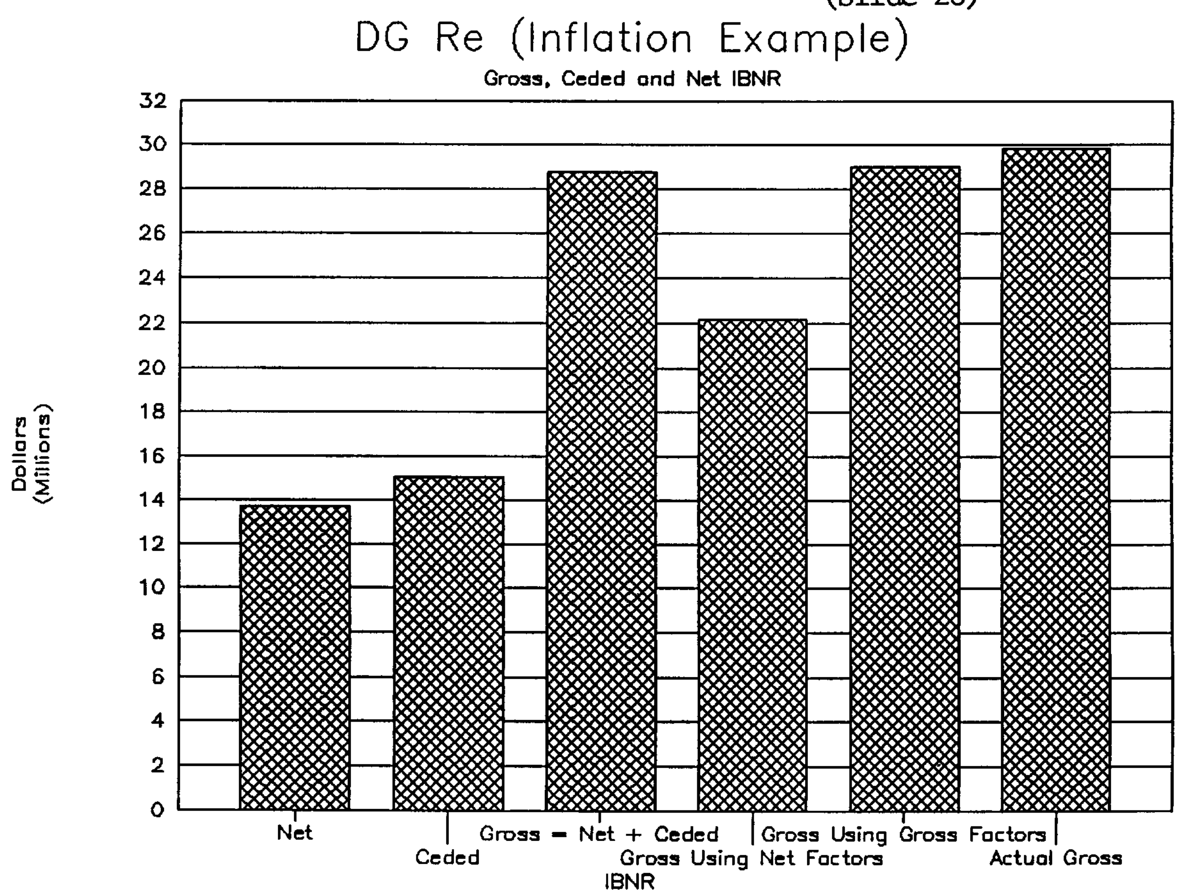
RUN DATE 9/20/91 TIME 12:49:30

(Slide 26)

(Slide 27)



(Slide 28)



(Slide 29)

EXAMPLES OF FINANCIAL REINSURANCE COVERS

FINANCIAL QUOTA SHARE

LOSS PORTFOLIO TRANSFER

ADVERSE LOSS DEVELOPMENT COVER

AGGREGATE STOP - LOSS COVER

(Slide 30)

DETAILS OF ADVERSE LOSS DEVELOPMENT COVER

EFFECTIVE	DECEMBER 31, 1980
COVERS ACCIDENT YEARS	1971 to 1975
PROJECTED ULTIMATE FOR THESE YEARS AT DECEMBER 31, 1980 *	$24,880,000
LIMIT OF COVER	$5,000,000

* COVER ATTACHES ABOVE THIS AMOUNT

GROSS REINSURANCE ($100,000 AVG CLAIM SIZE, FINANCIAL COVER) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	559	1,388	2,288	2,812	3,852	5,681	6,101	7,120	8,108	8,576	8,811	9,323	9,391	10,891	10,895	10,911	10,992	10,992	10,992	10,992
1973	105	739	866	1,244	1,973	2,291	3,151	3,261	3,495	4,173	4,400	4,400	4,445	4,445	4,445	4,445	4,445	4,445		4,445
1974	466	2,043	2,810	4,012	4,720	4,801	5,683	5,820	6,060	7,306	7,459	7,612	7,612	7,612	7,612	7,612	7,612			7,612
1975	212	212	502	922	1,246	1,839	2,446	2,630	2,630	2,880	3,125	2,875	2,875	3,157	3,504	3,504				3,504
1976	858	1,447	1,963	3,774	4,291	5,015	5,265	5,449	6,053	6,113	5,902	5,902	6,244	6,169	6,189					6,189
1977	391	1,150	2,269	2,307	3,011	4,117	4,117	4,192	4,273	5,308	4,989	5,292	5,292	5,292						5,292
1978	874	1,785	3,964	4,179	4,575	5,251	5,659	6,587	6,703	8,088	8,508	8,617	8,617							8,617
1979	74	915	1,043	1,628	2,242	2,409	2,409	2,745	2,903	3,415	3,873	3,873								3,873
1980	54	855	1,307	1,913	1,924	2,251	2,251	2,251	2,825	3,660	3,522									3,522
1981	0	638	634	1,312	1,823	1,887	2,334	2,367	2,422	3,243										3,243
1982	321	299	1,693	1,917	2,302	2,342	2,983	3,121	3,628											3,628
1983	104	1,505	2,059	3,448	4,238	4,978	5,361	5,896												5,896
1984	0	250	942	1,516	2,784	3,284	3,368													3,368
1985	107	922	1,417	1,498	1,900	2,506														2,506
1986	73	331	419	1,542	3,705															3,705
1987	0	1,247	1,637	2,213																2,213
1988	138	1,277	1,529																	1,529
1989	445	798																		798
1990	228																			228
																				81,159

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	X	1.282	1.347	1.141	1.211	1.235	1.362	1.226	1.070	1.002	1.045	1.000	1.164	1.002	1.003	1.015	1.000	1.000
1973	7.022	1.172	1.437	1.586	1.161	1.376	1.035	1.072	1.194	1.054	1.000	1.010	1.000	1.000	1.000	1.000	1.000	
1974	4.386	1.375	1.428	1.176	1.017	1.184	1.024	1.041	1.206	1.021	1.021	1.000	1.000	1.000	1.000	1.000		
1975	1.000	2.366	1.837	1.352	1.476	1.330	1.075	1.000	1.095	1.085	0.920	1.000	1.098	1.110	1.000			
1976	1.687	1.356	1.923	1.137	1.169	1.050	1.035	1.111	1.010	0.965	1.000	1.058	0.988	1.003				
1977	2.942	1.973	1.017	1.305	1.367	1.000	1.018	1.019	1.242	0.940	1.061	1.000	1.000					
1978	2.042	2.221	1.054	1.095	1.148	1.078	1.164	1.018	1.207	1.052	1.013	1.000						
1979	12.428	1.140	1.561	1.377	1.074	1.000	1.140	1.058	1.176	1.134	1.000							
1980	15.809	1.529	1.464	1.006	1.170	1.000	1.000	1.255	1.295	0.962								
1981	X	0.994	2.068	1.389	1.035	1.236	1.014	1.023	1.339									
1982	0.931	5.663	1.132	1.201	1.017	1.274	1.046	1.162										
1983	14.467	1.368	1.675	1.229	1.175	1.077	1.100											
1984	X	3.766	1.610	1.837	1.180	1.025												
1985	8.635	1.536	1.058	1.268	1.319													
1986	4.525	1.266	3.677	2.404														
1987	X	1.313	1.352															
1988	9.268	1.197																
1989	1.791																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	3.723	1.608	1.404	1.310	1.190	1.108	1.077	1.078	1.160	1.022	1.018	1.010	1.048	1.012	1.001	1.004	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	3.723	1.608	1.404	1.310	1.190	1.108	1.077	1.078	1.160	1.022	1.018	1.010	1.048	1.012	1.001	1.004	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	21.866	5.873	3.652	2.602	1.985	1.668	1.506	1.398	1.297	1.118	1.094	1.075	1.064	1.016	1.004	1.004	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	21.866	5.873	3.652	2.602	1.985	1.668	1.506	1.398	1.297	1.118	1.094	1.075	1.064	1.016	1.004	1.004	1.000	1.000	1.000

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(Slide 31)

NET REINSURANCE ($100,000 AVG CLAIM SIZE, FINANCIAL COVER) as of 12\31\90

DEVELOPMENT TRIANGLE OF INCURREDS (IN THOUSANDS) BY ACCIDENT YEAR DEVELOPED YEARLY

INCURREDS (IN THOUSANDS) X YEARS AFTER INCEPTION OF PERIOD

PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CURRENT
1972&prior	559	1,388	2,288	2,812	3,852	5,681	6,101	7,120	8,108	8,576	8,811	9,323	9,391	10,141	10,141	10,141	10,141	10,141	10,141	10,141
1973	105	739	866	1,244	1,973	2,291	3,151	3,261	3,495	4,173	4,400	4,400	4,400	4,400	4,400	4,400	4,400	4,400		4,400
1974	466	2,043	2,810	4,012	4,720	4,801	5,683	5,820	6,060	7,306	7,459	7,459	7,459	7,459	7,459	7,459	7,459			7,459
1975	212	212	502	922	1,246	1,839	2,446	2,630	2,630	2,880	2,880	2,880	2,880	2,880	2,880	2,880				2,880
1976	858	1,447	1,963	3,774	4,291	5,015	5,265	5,449	6,053	6,113	5,902	5,902	6,244	6,169	6,189					6,189
1977	391	1,150	2,269	2,307	3,011	4,117	4,117	4,192	4,273	5,308	4,989	5,292	5,292	5,292						5,292
1978	874	1,785	3,964	4,179	4,575	5,251	5,659	6,587	6,703	8,088	8,508	8,617	8,617							8,617
1979	74	915	1,043	1,628	2,242	2,409	2,409	2,745	2,903	3,415	3,873	3,873								3,873
1980	54	855	1,307	1,913	1,924	2,251	2,251	2,251	2,825	3,660	3,522									3,522
1981	0	638	634	1,312	1,823	1,887	2,334	2,367	2,422	3,243										3,243
1982	321	299	1,693	1,917	2,302	2,342	2,983	3,121	3,628											3,628
1983	104	1,505	2,059	3,448	4,238	4,978	5,361	5,896												5,896
1984	0	250	942	1,516	2,784	3,284	3,368													3,368
1985	107	922	1,417	1,498	1,900	2,506														2,506
1986	73	331	419	1,542	3,705															3,705
1987	0	1,247	1,637	2,213																2,213
1988	138	1,277	1,529																	1,529
1989	445	798																		798
1990	228																			228
																				79,485

INDIVIDUAL ATA FACTORS

PERIOD	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19
1972	X	1.282	1.347	1.141	1.211	1.235	1.362	1.226	1.070	1.002	1.045	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1973	7.022	1.172	1.437	1.586	1.161	1.376	1.035	1.072	1.194	1.054	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
1974	4.386	1.375	1.428	1.176	1.017	1.184	1.024	1.041	1.206	1.021	1.000	1.000	1.000	1.000	1.000	1.000		
1975	1.000	2.366	1.837	1.352	1.476	1.330	1.075	1.000	1.095	1.000	1.000	1.000	1.000	1.000	1.000			
1976	1.687	1.356	1.923	1.137	1.169	1.050	1.035	1.111	1.010	0.965	1.000	1.058	0.988	1.003				
1977	2.942	1.973	1.017	1.305	1.367	1.000	1.018	1.019	1.242	0.940	1.061	1.000	1.000					
1978	2.042	2.221	1.054	1.095	1.148	1.078	1.164	1.018	1.207	1.052	1.013	1.000						
1979	12.428	1.140	1.561	1.377	1.074	1.000	1.140	1.058	1.176	1.134	1.000							
1980	15.809	1.529	1.464	1.006	1.170	1.000	1.000	1.255	1.295	0.962								
1981	X	0.994	2.068	1.389	1.035	1.236	1.014	1.023	1.339									
1982	0.931	5.663	1.132	1.201	1.017	1.274	1.046	1.162										
1983	14.467	1.368	1.675	1.229	1.175	1.077	1.100											
1984	X	3.766	1.610	1.837	1.180	1.025												
1985	8.635	1.536	1.058	1.268	1.319													
1986	4.525	1.266	3.677	2.404														
1987	X	1.313	1.352															
1988	9.268	1.197																
1989	1.791																	

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-ULT
SELECTED ATA	3.723	1.608	1.404	1.310	1.190	1.108	1.077	1.078	1.160	1.017	1.020	1.009	1.019	1.001	1.000	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATA	3.723	1.608	1.404	1.310	1.190	1.108	1.077	1.078	1.160	1.017	1.020	1.009	1.019	1.001	1.000	1.000	1.000	1.000	1.000

	1-ULT	2-ULT	3-ULT	4-ULT	5-ULT	6-ULT	7-ULT	8-ULT	9-ULT	10-ULT	11-ULT	12-ULT	13-ULT	14-ULT	15-ULT	16-ULT	17-ULT	18-ULT	19-ULT
SELECTED ATU	20.874	5.606	3.487	2.484	1.895	1.593	1.437	1.335	1.238	1.067	1.049	1.029	1.020	1.001	1.000	1.000	1.000	1.000	1.000
WEIGHTED ALL YEAR ATU	20.874	5.606	3.487	2.484	1.895	1.593	1.437	1.335	1.238	1.067	1.049	1.029	1.020	1.001	1.000	1.000	1.000	1.000	1.000

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(Slide 32)

(Slide 33)

Ceded Reinsurance ($100,000 Avg Claim Size, Financial Cover) as of 12/31/90
Actual Ceded Losses

Year	1	....	9	10	11	12	13	14	15	16	17	18	19	20
1971	0	0	0	0	0	0	0	0	(8)	(8)	(8)	(8)	(8)	(8)
1972	0	0	0	0	0	0	0	750	763	779	859	859	859	
1973	0	0	0	0	0	0	46	46	46	46	46	46		
1974	0	0	0	0	0	153	153	153	153	153	153			
1975	0	0	0	0	245	(5)	(5)	277	625	625				

(Slide 34)

Ceded Reinsurance ($100,000 Avg Claim Size, Financial Cover) as of 12/31/90
Retrocessionaire's Annual Statement

Incurred (in Thousands) x Years After Inception of Period

Year	0	1	2	3	4	5	6	7	8	9	10	11	12
1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	1,186	949	964	1,327	1,674	1,674	
1981	0	0	0	0	0	0	0	0	0	0	0		

1991 CASUALTY LOSS RESERVE SEMINAR

3G: LOSS DISTRIBUTIONS

Moderator

Spencer M. Gluck
Milliman & Robertson, Inc.

Panel

Clive L. Keatinge
Insurance Services Office, Inc.

Stuart A. Klugman
Drake University

MR. GLUCK: I'll be introducing panelists here who are going to show you a few different things in loss distributions that are going to be not only theoretical but also I think will give you some help on the practical side. We're also going to see some applications of loss distribution specifically applicable to loss reserving issues.

I have Stuart Klugman of Drake University here, and Clive Keatinge of Insurance Services Office. Stuart's presentation is going to be about fitting loss distributions using the limited expected values and fitting to those limited expected values as opposed to maximum likelihood estimation using distributions of individual claim count data.

I think that that's number one on the practical side, important to many practitioners, because most of us don't have listings of individual claims available to us when we're dealing with size of loss distributions and it also has to do with the practical way many actuaries look at the maximum likelihood estimation result and see if they really think it fits by comparing what it predicts as limited expected values to what we see. So, he's going to show you how those approaches compare.

Then Clive is going to show you some ways to use size of loss distributions to measure the effects of loss limits on loss development patterns. He will use some things that are already published and a lot of stuff that isn't.

So, with no more elaboration, first I'd like to introduce to you Stuart Klugman. Stuart is the Principal Financial Group Professor of Actuarial Science at Drake University. He has held that position since 1988. For the previous 14 years, he taught actuarial science at the University of Iowa. He's a Fellow of the Society of Actuaries and a co-author of Loss Distributions, a book that many of you are familiar with. He also spoke on loss distributions at the 1988 Loss Reserve Seminar and here he is, Stuart Klugman.

Abstract

Loss distributions have a number of uses in the pricing and reserving of casualty insurances. Many authors, including this one, have recommended maximum likelihood for the estimation of the parameters. It has the advantages of asymptotic optimality (in the sense of mean square error) and applicability (the likelihood function can always be written). As well, it is possible to estimate the variance of the estimate, a useful tool in assessing the accuracy of any results. The only disadvantage of maximum likelihood is that the objective function does not relate to the actuarial problem being investigated. Minimum distance estimates can be tailored to reflect the goals of the analysis and as such should give more appropriate answers. The purpose of this paper is to demonstrate that these estimates share the second and third desirable qualities with maximum likelihood. A small simulation study will indicate that these procedures are not so sub-optimal that they should be ignored.

1. Definitions, notation, and agenda

We start with a definition of a minimum distance estimate. Let $G(c;\, \boldsymbol{\theta})$ be any function of c that is uniquely related to $f(c;\, \boldsymbol{\theta})$, the *pdf* of the population. By uniquely related I mean that if you know f you can obtain G and vice-versa. Call G the model functional. Let $f_n(c)$ be the empirical density. It assigns probability $1/n$ to each of the n observations in the sample. Let $G_n(c)$ be found from f_n in the same way that G is from f. Call G_n the empirical functional. The objective function is

$$Q(\boldsymbol{\theta}) = \sum_{i=1}^{k} w_i [G(c_i;\, \boldsymbol{\theta}) - G_n(c_i)]^2 \tag{1}$$

where $c_1 < c_2 < \cdots < c_k$ are arbitrarily selected values and $w_1, w_2, \ldots, w_k > 0$ are arbitrarily selected weights. The weights can either be selected to minimize the variance of the estimate or to place emphasis on those values where a close fit is desired. The c_i will almost certainly be the class boundaries for whatever grouping was used in the initial presentation of the data. The minimum distance estimate is the value of $\boldsymbol{\theta}$ that minimizes $Q(\boldsymbol{\theta})$.

There are two functionals that appear to be appropriate for casualty work. The first is the limited expected value (LEV) which is useful in rate making. It is the expected loss when losses are capped at a specified value. This quantity is fundamental for calculating deductibles, limits, layers, increased limits, or the effects of inflation. This quantity is also useful for reserving if information about the distribution of outstanding claims is desired. Many practitioners make it a point to verify that the model LEVs (after estimating the parameters by maximum likelihood) and the empirical LEV match. Using the LEV as a distance measure makes sure this will happen.

The specific relationships are (when dealing with the LEV I will use L in place of G):

$$L(c;\,\boldsymbol{\theta}) = \int_0^c x f(x;\,\boldsymbol{\theta})dx + c\int_c^\infty f(x;\,\boldsymbol{\theta})dx \tag{2}$$

and

$$L_n(c) = \frac{1}{n}\sum_{i=1}^{n} min(x_i,\,c). \tag{3}$$

It should be noted that to compute $L_n(c_i)$ all that is needed is the number of observations, n_i that are between c_{i-1} and c_i (where $c_0 = 0$) and the average a_i of these observations. Then

$$L_n(c_i) = [\sum_{j=1}^{i} n_j a_j + c_i(n - \sum_{j=1}^{i} n_j)]/n = c_i + \sum_{j=1}^{i} n_j(a_j - c_i)/n. \tag{4}$$

A second functional, one that makes sense for loss reserving, is the distribution function. As will be seen in the second example, loss distributions can be used to estimate the number of incurred but not reported claims. The key to the calculation is the distribution function evaluated at the highest lag for which losses have been reported. Using F for G we have

$$F(c;\,\boldsymbol{\theta}) = \int_0^c f(x;\,\boldsymbol{\theta})dx \tag{5}$$

and

$$F_n(c) = \frac{1}{n}(\text{number of } x_i \le c). \tag{6}$$

There are a number of steps that need to be taken to make this method practical.

1. Techniques for minimizing Q.

2. Verification that the solution possesses desirable statistical properties. This would include being unbiased, consistent, and if not minimum variance at least the provision for calculation of the variance.

3. A demonstration that estimators obtained from this method are not unlike those obtained by maximum likelihood.

4. Construction of a hypothesis test based on Q. This would allow for the verification that the model selected is reasonable as well as the comparison of competing models.

In this paper I address issues 1 and 2 in full. The demonstration requires a fairly large simulation; this will be done in the future. Here there will be two examples and a small simulation to illustrate the feasibility of the method. The fourth item is being studied by one of my colleagues, although an alternative is presented here.

2. Minimization of Q

There are three reasonable approaches to finding the minimum. The first is the simplex method. It has been discussed in several other places; the original reference is "A Simplex Method for Function Minimization," by Nelder and Mead in *The Computer Journal*, 1965. The only input required is the function to be minimized and a starting value. It proceeds cautiously and slowly but is most always successful in finding the minimum. The second approach is to use a packaged minimization routine. They sometimes require that partial derivatives of the function be available. The third approach is to obtain a set of equations by equating the partial derivatives to zero. The multivariate version of the Newton-Raphson method could then be used to find the solution. When derivatives are needed they can be obtained by differentiating either (2) or (5). The examples in this paper were done using the simplex method.

For the second and third approaches it is easy to write the partial derivative of Q.

$$\partial Q/\partial\theta_j = 2\sum_{i=1}^{k} w_i[G(c_i;\,\boldsymbol{\theta}) - G_n(c_i)]G^{(j)}(c_i;\,\boldsymbol{\theta}) \tag{7}$$

where the last term is the partial derivative of the LEV with respect to θ_j. To simplify the notation, the model functional evaluated at c_i will be written G_i, the reference to $\boldsymbol{\theta}$ being implicit and the dependence on c_i being reflected by the subscript. Similarly, the empirical functional will be written $G_{n,i}$. Equations (1) and (7) become

$$Q = \sum_{i=1}^{k} w_i(G_i - G_{n,i})^2 \text{ and } \partial Q/\partial\theta_j = 2\sum_{i=1}^{k} w_i(G_i - G_{n,i})G_i^{(j)}. \tag{8}$$

3. Statistical Properties of minimum distance estimates

The minimum distance estimate is an implicit function (as given in (7)) of $\mathbf{G}_n$, the vector of empirical functionals. The properties of such an estimator can be obtained by using Theorem 2 and Corollary 1 from "A Delta Method for Implicitly Defined Random Variables," by J. Benichou and M. Gail (*The American Statistician*, 1989, **43**, 41-44). The Theorem requires that the estimator be an implicit function of random variables to which the Central Limit Theorem can be applied. This is true for both situations. The LEV is a sample average of independent observations and the empirical distribution function is a binomial proportion. We have

$$\sqrt{n}(\mathbf{G}_n - \boldsymbol{\mu}) \to N(\mathbf{0}, \Sigma). \tag{9}$$

The ith element of $\boldsymbol{\mu}$ is $\mu_i = E(G_{n,i}) = G_i$ (at least for the two functionals used in this paper). Let the ijth element of Σ be σ_{ij}.

The next item to be satisfied is that the k functions in (7) have continuous first partial derivatives with respect to the elements of $\boldsymbol{\theta}$. These form a $k \times k$ matrix A. The jlth element is

$$a_{jl} = \partial^2 Q/\partial\theta_j\theta_l = 2\sum_{i=1}^{k} w_i G_i^{(j)} G_i^{(l)} + 2\sum_{i=1}^{k} w_i(G_i - G_{n,i})G_i^{(j,l)}. \tag{10}$$

So to satisfy the conditions of the Theorem the model functional must have continuous second partial derivatives with respect to the parameters. This is true for most all distribution in common use for insurance losses. It is also necessary that A have a non-zero determinant when evaluated at the true parameter value. All that is necessary to complete this analysis is that it be non-zero at the estimated value of $\boldsymbol{\theta}$.

The next matrix, B, has jlth element

$$b_{jl} = \partial^2 Q/\partial\theta_j G_{n,l} = -2w_l G_l^{(j)}. \tag{11}$$

It is necessary that $A^{-1}B$ have at least one non-zero element.

The Theorem then states that as the sample size goes to infinity there will be a unique solution, $\tilde{\boldsymbol{\theta}}$ to the equations and

$$\sqrt{n}(\tilde{\boldsymbol{\theta}}-\boldsymbol{\theta}) \rightarrow N(\mathbf{0},\ A^{-1}B\Sigma B'A^{-1}). \tag{12}$$

This verifies that the minimum LEV estimator is consistent and asymptotically unbiased and even though it is not likely to have minimum variance, at least we will be able to estimate it.

4. Examples

The first example consists of losses from the ISO increased limits project and were from general liability (Table 2) coverage. The accident year is 1986 and the losses are those reported at lag 1. The actual losses are given in Table 1. I have elected to use fewer classes. For simplification, the average loss in each interval was taken as the midpoint. An additional problem is the existence of multiple policy limits in the ISO data set. These are difficult to deal with as it is unlikely that the actual losses for those cases that exceeded the upper limit will ever be known. There were two such cases; for one the loss is known to exceed 25,000 and the other exceeded 500,000. The easiest thing to do is use the conditional median (as the mean may not exist) from a rough guess at the final model. For this illustration the values 38,865 and 769,061 were used. These were incorporated in the calculation of the empirical LEVs in Table 1.

For the purposes of this illustration, the only distribution being considered is the Pareto distribution. The ISO rejected it as a useful model (opting for a mixture of two Pareto distributions) but it will serve as a good example mostly because all the required derivatives are easy to compute. About the only other distributions that have this property are the lognormal and inverse Gaussian. Should analytical derivatives not be available, approximate differentiation must be employed. This example also proves to be somewhat simple as there is no deductible involved. The relevant quantities for the Pareto distribution are (where $\boldsymbol{\theta}=(\alpha,\ \lambda)'$):

Table 1 -- ISO loss data

Limits		Losses	LEV (at upper limit)
0	50	482	48.19
50	100	574	92.41
100	150	478	132.68
150	200	431	169.54
200	250	343	203.49
250	300	337	234.89
300	400	616	290.52
400	500	518	337.64
500	600	311	378.53
600	700	263	415.10
700	800	256	447.78
800	900	170	477.26
900	1,000	212	503.86
1,000	1,500	501	610.12
1,500	2,000	297	686.41
2,000	2,500	181	744.74
2,500	3,000	116	791.91
3,000	3,500	93	831.24
3,500	4,000	72	864.37
4,000	4,500	40	893.29
4,500	4,999	32	919.45
4,999	5,000	18	919.50
5,000	6,000	59	962.39
6,000	7,500	53	1,014.12
7,500	9,999	60	1,079.07
9,999	10,000	6	1,079.09
10,000	12,000	21	1,117.10
12,000	15,000	27	1,163.30
15,000	20,000	22	1,221.89
20,000	25,000	23	1,263.58
25,000	35,000	15	1,318.42
35,000	50,000	15	1,366.87
50,000	75,000	6	1,408.19
75,000	100,000	3	1,432.60
100,000	250,000	3	1,511.48
250,000	500,000	0	1,586.60
500,000	1,000,000	2	1,661.72
1,000,000	∞	0	1,661.72

For the Pareto distribution the relevant quantities are:

$$F(x;\, \boldsymbol{\theta}) = 1 - \left(\frac{\lambda}{\lambda + x}\right)^{\alpha},\ x,\ \alpha,\ \lambda > 0$$

$$L(c;\, \boldsymbol{\theta}) = \frac{\lambda}{\alpha - 1}\left[1 - \left(\frac{\lambda}{\lambda + c}\right)^{\alpha - 1}\right]$$

$$L^{(1)}(c;\, \boldsymbol{\theta}) = -\frac{L(c;\, \boldsymbol{\theta})}{\alpha - 1} - \frac{\lambda}{\alpha - 1}\left(\frac{\lambda}{\lambda + c}\right)^{\alpha - 1} ln\left(\frac{\lambda}{\lambda + c}\right)$$

$$L^{(2)}(c;\, \boldsymbol{\theta}) = \frac{L(c;\, \boldsymbol{\theta})}{\lambda} - \frac{c\lambda^{\alpha - 1}}{(\lambda + c)^{\alpha}}. \tag{13}$$

Maximum likelihood estimation produced the estimates $\hat{\alpha} = 1.482595$ and $\hat{\lambda} = 705.785$. The estimated covariance matrix of these estimators is

$$\begin{bmatrix} .0020473 & 1.3680 \\ 1.3680 & 1090.5 \end{bmatrix}.$$

Minimization of Q using weights of 1 at all endpoints (the value 10,000,000 was arbitrarily selected to replace ∞) produced the minimum LEV estimates of $\tilde{\alpha} = 1.3388257$ and $\tilde{\lambda} = 590.32670$. The value of Q at the minimum is 8619 compared to a value of 196,244 using the maximum likelihood estimates (which were used as a starting point for the simplex method). Table 2 shows the LEVs for both maximum likelihood and minimum LEV estimation. The wide discrepancy between these two estimators may well indicate that the Pareto model is not suitable for these data.

Table 2 -- LEVs

Limit	empirical LEV	mle LEV	minLEV LEV
50	48.19	47.58	47.34
100	92.41	90.59	89.97
150	132.68	129.88	128.66
200	169.54	165.90	164.00
250	203.49	199.09	196.47
300	234.89	229.80	226.44
400	290.52	284.92	280.14
500	337.64	333.10	327.03
600	378.53	375.70	368.49
700	415.10	413.72	405.53
800	447.78	447.93	438.91
900	477.26	478.93	469.23
1,000	503.86	507.19	496.93
1,500	610.12	618.64	607.11
2,000	686.41	697.87	686.67
2,500	744.74	757.95	747.94
3,000	791.91	805.55	797.21
3,500	831.24	844.47	838.05
4,000	864.37	877.08	872.70
4,500	893.29	904.92	902.63
4,999	919.45	929.02	928.82
5,000	919.50	929.06	928.87
6,000	962.39	969.06	972.98
7,500	1,014.12	1,014.86	1,024.62
9,999	1,079.07	1,068.76	1,087.18
10,000	1,079.09	1,058.77	1,087.20
12,000	1,117.10	1,100.01	1,124.49
15,000	1,163.30	1,135.25	1,167.65
20,000	1,221.89	1,176.11	1,219.33
25,000	1,263.58	1,201.50	1,256.47
35,000	1,318.42	1,242.33	1,307.84
50,000	1,366.87	1,276.61	1,356.64
75,000	1,408.19	1,309.30	1,405.70
100,000	1,432.60	1,329.01	1,436.75
250,000	1,511.48	1,376.53	1,518.03
500,000	1,586.60	1,400.93	1,564.89
1,000,000	1,661.72	1,418.41	1,601.99
10,000,000	1,661.72	1,457.70	1,712.80

To estimate the asymptotic variance we need the variance of the empirical LEVs. They are

$$\sigma_{ii} = Var(min(X,\, c_i)) = \int_d^{c_i} x^2 f_d(x;\, \boldsymbol{\theta})dx + c_i^2[1 - F_d(c_i;\, \boldsymbol{\theta})] - L_i^2 = {}_2L_{ii} - L_i^2$$

$$\sigma_{ij} = Cov(min(X,\, c_i),\, min(X,\, c_j))$$

$$= \int_d^{c_i} x^2 f_d(x;\, \boldsymbol{\theta})dx + \int_{c_i}^{c_j} c_i x f_d(x;\, \boldsymbol{\theta})dx + c_i c_j[1 - F_d(c_j;\, \boldsymbol{\theta})] - L_i L_j$$

$$= {}_2L_{ij} - L_i L_j, \text{ for } i < j. \tag{14}$$

For the Pareto distribution, with $i \le j$,

$${}_2L_{ij} = \frac{2\lambda^2}{(\alpha-2)(\alpha-1)} - \frac{\lambda^\alpha(\lambda+c_i)^{-\alpha+1}(\alpha c_i + 2\lambda)}{(\alpha-2)(\alpha-1)} - \frac{\lambda^\alpha(\lambda+c_j)^{-\alpha+1}c_i}{(\alpha-1)}. \tag{15}$$

Using the estimated parameters produces a 38×38 matrix, which will not be presented here. The square root of the diagonal elements measures the standard deviation of the empirical LEVs based on a single observation. The estimated standard deviation of the actual empirical LEVs can be estimated by dividing these values by the square root of the sample size (81.58). In Table 3 these are presented for selected values.

Table 3 -- Standard Deviations of empirical LEVs

Limit	LEV	SD
100	92	0.3
250	203	1.0
500	338	2.3
1,000	504	4.6
2,500	745	9.9
5,000	920	15.7
10,000	1,079	23.2
25,000	1,264	36.0
50,000	1,367	48.3
100,000	1,433	63.3
500,000	1,587	113.4
1,000,000	1,662	144.2

Calculation of the matrix B is relatively simple as (11) requires only the first partial derivatives of the model LEVs. These were given in (13). This matrix is not presented here.

Calculation of A requires the second partial derivatives of the model LEV. They are

$$L_i^{(1,1)} = -2\frac{L_i^{(1)}}{(\alpha-1)} - \frac{\lambda}{(\alpha-1)}\left(\frac{\lambda}{\lambda+c_i}\right)^{\alpha-1}\left[ln\left(\frac{\lambda}{\lambda+c_i}\right)\right]^2$$

$$L_i^{(1,2)} = L_i^{(2,1)} = \frac{L_i^{(1)}}{\lambda} - \frac{c_i}{\lambda+c_i}\left(\frac{\lambda}{\lambda+c_i}\right)^{\alpha-1} ln\left(\frac{\lambda}{\lambda+c_i}\right)$$

$$L_i^{(2,2)} = \frac{L_i^{(2)}}{\lambda} - \frac{L_i}{\lambda^2} + \frac{c_i\lambda^{\alpha-2}(\lambda+c_i-\alpha c_i)}{(\lambda+c_i)^{\alpha+1}}. \tag{16}$$

For the data of the example the matrix is

$$A = \begin{bmatrix} 204{,}021{,}910 & -169{,}261.81 \\ -169{,}261.81 & 148.34278 \end{bmatrix}.$$

The estimated covariance matrix, $A^{-1}B\Sigma B'A^{-1}/6{,}656$ (the denominator is the sample size for this problem), is

$$\begin{bmatrix} .034751 & 33.571 \\ 33.571 & 32765 \end{bmatrix}.$$

As expected, the minimum LEV estimator is inferior to maximum likelihood.

The second example concerns medical malpractice loss development. The data were presented at the 1988 Casualty Loss Reserve Seminar (Accomando, F.W. and Weissner, E.W., "Report Lag Distributions: Estimation and Application to IBNR Counts," *Transcripts*, pp. 1038-1133). Losses were recorded at intervals of 6 months through 168 months. The data are presented in Table 4.

Maximum likelihood estimation revealed that the Burr distribution provides a good fit. The distribution function is

$$F(x) = \frac{1-\left(\frac{\lambda^\tau}{\lambda^\tau+x^\tau}\right)^\alpha}{1-\left(\frac{\lambda^\tau}{\lambda^\tau+168^\tau}\right)^\alpha}. \tag{17}$$

The denominator is required to reflect the truncation of the data at 168 months. The maximum likelihood estimates of the parameters are $\hat{\alpha} = 0.40274$, $\hat{\lambda} = 34.224$, and $\hat{\tau} = 3.1181$. The values of $F(x)$ for this model are presented in Table 4.

Table 4 -- Medical Malpractice Loss Development

Lag	Losses	F_n	F-*mle*	F-*minF*
6	4	0.0086	0.0020	0.0026
12	10	0.0216	0.0173	0.0194
18	18	0.0389	0.0574	0.0604
24	56	0.1210	0.1257	0.1276
30	101	0.2181	0.2142	0.2139
36	137	0.2959	0.3101	0.3079
42	199	0.4298	0.4025	0.3998
48	232	0.5011	0.4860	0.4838
54	261	0.5637	0.5585	0.5576
60	285	0.6156	0.6207	0.6212
66	307	0.6631	0.6736	0.6754
72	331	0.7149	0.7188	0.7216
78	352	0.7603	0.7574	0.7611
84	369	0.7970	0.7907	0.7949
90	380	0.8207	0.8195	0.8241
96	389	0.8402	0.8447	0.8493
102	396	0.8553	0.8668	0.8714
108	409	0.8834	0.8863	0.8907
114	414	0.8942	0.9036	0.9077
120	416	0.8985	0.9190	0.9229
126	423	0.9136	0.9329	0.9363
132	440	0.9503	0.9454	0.9484
138	445	0.9611	0.9567	0.9592
144	453	0.9784	0.9669	0.9690
150	455	0.9827	0.9763	0.9778
156	461	0.9957	0.9849	0.9859
162	463	1.0000	0.9927	0.9933
168	463	1.0000	1.0000	1.0000

The asymptotic covariance matrix of the maximum likelihood estimates is

$$\begin{bmatrix} 0.017336 & 0.57018 & -0.035566 \\ 0.57018 & 20.656 & -1.2135 \\ -0.035566 & -1.2135 & 0.10703 \end{bmatrix}.$$

For minimum distance estimation the weights were selected as follows: If $F_{n,i} < 0.5$ the weight is 4 while if $F_{n,i} \geq 0.5$ the weight is $1/[F_{n,i}(1 - F_{n,i})]$. This places the smallest emphasis on the early durations and makes the weights be proportional to the reciprocal of the variance at later durations. Because the value of F_n at the last duration (162) is 1, the weight here is set equal to the one at duration 156. An alternative is to use the model distribution for the weights, changing them at each iteration as the parameters change. The minimum distance estimates are $\hat{\alpha} = 0.48798$, $\hat{\lambda} = 36\,989$, and $\hat{\tau} = 2.9496$. These turn out to be very similar to the maximum likelihood estimates. A look at the distribution function in Table 4 verifies that this model does do a better job of matching the distribution function, especially at the later lags.

Estimation of the variance is messier than for the previous example due to existence of three parameters as well as the complexity added by the denominator in (17). For this illustration, the elements of A and B were obtained by numerical differentiation. When this approximation was applied to the previous example, the answers matched to two significant digits. The elements of Σ are much easier to obtain. The ijth element is

$$\sigma_{ij} = F_i(1 - F_j), \quad i \leq j. \tag{18}$$

The estimated covariance matrix is

$$\begin{bmatrix} 0.081077 & 2.6655 & -0.16625 \\ 2.6655 & 89.507 & -5.5313 \\ -0.16625 & -5.5313 & 0.33525 \end{bmatrix}.$$

This is about four to five times greater than the variances for the maximum likelihood estimate.

The goal of this application is to forecast the number of claims that will be reported after lag 168. Using the Burr distribution it can be estimated as

$$\hat{\rho} = 463[1/F(168;\, \hat{\boldsymbol{\theta}}) - 1] = \frac{463}{\left[1 + \left(\frac{168}{\lambda}\right)^{\tau}\right]^{\alpha} - 1} \tag{19}$$

where F is the untruncated Burr distribution. Inserting the maximum likelihood estimates yields $\hat{\rho} = 72.3998$ while doing the same for the minimum distance estimates yields $\hat{\rho} = 58.7556$. An estimate of the variance of these estimators can be obtained finding the vector of partial derivatives (with respect to the parameters) of $\hat{\rho}$, say $\boldsymbol{\delta}$ and then computing $\boldsymbol{\delta}'\Sigma\boldsymbol{\delta}$ where Σ is the covariance matrix of the parameter estimates. For the maximum likelihood estimate the variance is 60.703 while for the minimum distance estimate it is 103.09. In the latter case we can be about 95% confident that there are between 39 and 79 unreported claims.

5. A goodness-of-fit test

If the model selected is correct, the empirical $G_{n,i}$'s will have an approximate multivariate normal distribution with a mean equal to the model G's and a covariance matrix given by Σ/n. If the true parameters were known,

$$n(\boldsymbol{G}_n - \boldsymbol{G})'\Sigma^{-1}(\boldsymbol{G}_n - \boldsymbol{G}) \tag{18}$$

where $\boldsymbol{G}$ is the vector of functionals at the true parameter value, would have a Chi-square distribution with k degrees of freedom. With the parameters being estimated, $k - p$ (where p is the number of parameters) degrees of freedom is not an unreasonable choice. For the first example, the value is 162.75, which clearly exceeds the 5% critical value for 36 degrees of freedom (51.00). For the second example it is 70.53, which also exceeds the 5% critical value (36.42 with 24 degrees of freedom).

This test indicates that a better choice of weights would have been appropriate. One such choice, from pure statistical (as opposed to actuarial) considerations, would be the reciprocals of the diagonal elements of Σ. Aside from being an advance attempt to pass the hypothesis test using (18) it makes sense in that the expected value of each term of Q is $1/n$. Thus each term is making an approximately equal contribution to the criterion. For the Pareto example a look at Table 3 shows that the weights would be decreasing with c_i. Again, this makes statistical sense as for low limits virtually any reasonable model will produce an LEV that is just a little bit below c_i and the empirical LEV will also be in that range. At the larger limits there is likely to be much more sampling error and therefore wider variations should be tolerated. However, for actuarial purposes one might come to the opposite conclusion. Once put to use, the model will be evaluated only at the larger limits and so it is there where deviations from the sample should be small.

A more direct form of hypothesis test would be one based on Q. This would be similar to the Cramer-von Mises test for comparing a model *cdf* to the empirical *cdf*. It has the advantage of being independent of the weights in the sense that the parameter estimate is by definition the one that minimizes the test statistic. However, this involves extra work as the distribution of Q under the null hypothesis is not so easy to obtain.

6. Simulation

The Theorem and hypothesis test are both asymptotic results. As well, both employ the replacement of the true parameter value by the estimate to complete the calculations. In this section, a simulation study is conducted to provide some feel for the accuracy of the method.

The true model selected for the study is Pareto with $\alpha = 1.5$ and $\lambda = 500$. The empirical LEV is obtained at 13 points: 50, 100, 200, 300, 500, 750, 1000, 1500, 2500, 5000, 10,000, 100,000, and 1,000,000. At each simulation, m observations are generated. The parameters are then estimated by the minimum LEV method. The covariance matrix is also estimated, using (12). Finally, the chi-square goodness-of-fit test statistic is computed. If the results in Sections 3 and 5 hold, the following should be observed:

1. The sample mean of the parameter estimates should be close to the true value. This will indicate that the estimator is unbiased.

2. The sample covariance matrix of the parameter estimates should be close the matrix given by (12) using the true parameter values. This will indicate that the Theorem gives reasonable results for samples of size m.

3. The estimated covariance matrices should have an average that is close to the matrix given by (12) using the true parameter values. This will indicate that the replacement of the true values by the estimates does not distort the covariance estimation (on the average).

4. The goodness-of-fit test statistics should have a sample mean of 11 and a sample variance of 22. This will indicate that the chi-square distribution with 11 degrees is reasonable. As well, 95% of the time the test statistic should be less than 19.675 and 99% of the time it should be less than 24.725. This will confirm that the significance level is as advertised.

A run of 1000 simulations using a sample size of 1000 was conducted. The true model is a Pareto distribution with $\alpha = 1.5$ and $\lambda = 500$. The asymptotic covariance matrix for maximum likelihood estimation is

$$\begin{bmatrix} .01496 & 6.993 \\ 6.993 & 3{,}857.9 \end{bmatrix}.$$

The asymptotic covariance matrix for minimum LEV estimation is

$$\begin{bmatrix} .0610 & 35.314 \\ 35.314 & 21{,}257 \end{bmatrix}.$$

The sample means of the minimum LEV estimates were 1.548 for α and 530.047 for λ indicating that the bias, if any, is small. The sample variances were 0.04354 for α and 14,495.41 for λ and the sample covariance was 447,110. The standard errors for α and λ are .0066 and 3.8 respectively, indicating that for a sample size of 1000 there is some bias in these estimates. With both estimates having a positive bias, there is some cancellation of error. For example, the true mean is 1000 while the mean of the Pareto distribution using the sample means is $530.047/.548 = 967.24$. Using the approximation for the covariance matrix yielded average variances of .09534 and 48,152. These considerably overstate the true values. Finally, the chi-square test accepted the model 85.5% of the time when a 5% significance level was used and 92.4% when a 1% level was used.

MR. GLUCK: Thank you, Stuart. Our next presenter is Clive Keatinge who currently works for Insurance Services Office, previously worked at Prudential Reinsurance and a long time ago at Fireman's Fund. He has a BA in Mathematics and Statistics from the University of California at Berkeley and an MA in Sports Administration from Ohio State University. He is a Fellow of the Casualty Actuarial Society, a CPCU and has published the Proceedings the paper "The Effect of Trend on Excess of Loss Coverages." Clive Keatinge.

MR. KEATINGE: I've given you a big thick handout and I'm not going to go through all the pages in the handout, but I did want you to have a copy because some of the tables that I put up may not be that visible from where you are. I'll try to point to where I'm referring and you can look down at your handout if you have it, and I'll try to keep you apprised of what page number we're on as we go along.

A lot of the text I'm going to skip, but I put it in there so that when you're looking at this, after the presentation or in the transcript, you can follow along. During the presentation, a lot of the text comments I'm going to make verbally up here, so you won't have to read them. I won't put them up on the screen for you to read.

(Page 1)

Before I start into the presentation, I'll give just a brief overview of what I'm going to talk about. As most of you are probably aware, when you're dealing with large losses and excess layers, especially in reinsurance situations, losses tend to develop slower than they do when you're dealing with ground-up losses.

So, it's generally not appropriate when you're dealing with excess losses to use development factors derived from ground-up data. So, the question becomes: Well, you can't use development factors based just on ground-up data. Where are you going to get development factors to use on these excess losses?

As most of you -- especially those of you who deal in reinsurance -- are aware, one of the most popular sources is the Reinsurance Association of America data. They do a loss development study that's published every couple of years and there's a session tomorrow morning discussing the latest edition of that study.

The big problem that there is with that study is it's not specific by layer. If you have a specific layer that you're dealing with, then you want some loss development factors that are specific to that layer. The RAA data really doesn't help you because you don't really know exactly what layers that the data is coming from or what the average retention is or anything like that.

So, what can you do? How can you get some layer development factors that are specific to a particular layer you're interested in? I'm going to give a brief overview of three different methods.

The first thing I'm going to talk about is the Pinto and Gogol method. Many of you are probably familiar with the paper that Pinto and Gogol wrote in the 1987 Proceedings, "An Analysis of Excess Loss Development." I'm not going to go through a whole lot of it. It's fairly clear. I would suggest if you haven't read it already and are interested in this subject that you take a look at it. I also have some additional material that I'm not going to go into in the handout that may help in understanding what they did.

The second thing that I'm going to talk about is the Pareto Distribution method. The example is going to be based on the current ISO increased limits procedure. It takes information that you would have if you have access to the agendas and minutes of the ISO Commercial Casualty Actuarial Committee, and I suspect that some of you may have tried this type of method before.

The third thing that I'm going to talk about is the Pareto soup method. This example is going to be based on the proposal for the new ISO increased limits procedure, which is currently under development, and will probably replace the current procedure in the next year or two. You'll see that we get some nice results using that method.

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A few things to note about what Pinto and Gogol did. They derived incurred development factors from ISO OL&T BI, M&C BI, and Products BI data. We'll take a look at the Products BI data just as an example of what they did. They basically went through the same procedure with each of those three GL sub-lines. They also did some work with some paid data but I'm not going to get into that.

Data from policy years '72 to '82 was used. Retentions were adjusted to a 1982 price level so essentially there was a trend adjustment to put all the losses on the same price or cost level. Data 27 through 99 months of development was used; beyond 99 months, they had to do an extrapolation to get development factors beyond 99 months.

No adjustment was made for the capping of claims by policy limits. They discuss this a little bit in their paper and conclude that it may not be as significant a problem as it first might appear.

Finally, ALAE was combined with indemnity for purposes of the analysis. They also looked at data where the ALAE was completely excluded and also they looked at data where they had allocated ALAE pro rata to layer, as is done in many reinsurance situations. They didn't really find major differences in looking at the data in those three ways, so for the bulk of their analysis they just combined the ALAE with the indemnity.

I'm going to jump to page 4 now.

(Page 4)

This is a table that's taken directly from their paper. I just want to briefly go over it so you can see what they did. The first thing I want to look at is down here, the actual factors. These are factors actually derived from ISO data. They have 27 to 39, 39 to 51 and so on, up to 99 months. It's policy year data. They looked at the actual factors for losses excess of various retentions.

So, for example, in this column right here, these are the development factors from the data excess of 10,000 and then these are the development factor excess of 25,000 and so on down the line up to factors excess of a million. As you might expect, in general, as you get to higher and higher retentions, the factors tend to increase.

This factor is 1.80 for excess of a million whereas the 500,000 factor is 2.39. That's just because there is sparse data up there and you get some randomness involved. Also, for 87 to 99, you can see there are a couple of factors below one, excess of 500,000 and excess of a million, which is not in line with what we would intuitively expect. Again, there is randomness in the data.

Even at ISO, where we're dealing with lots and lots of data, we still have to deal with these aberrations in the data. We still, with all the data we have, don't have enough data up there to really smooth out the randomness that's involved there.

So, they computed the actual factors and they did have these aberrations that they wanted to smooth out, so they came up with a model to smooth those out and get nice relationships among the development factors. The first thing they did was to look at each development interval, which is each row up here, individually.

They looked at the 27 to 39, 39 to 51, 51 to 63 intervals separately first, and they basically just fit a curve across here that would give you the development factors excess of 10,000, 25, 50 on up, so it gave a smooth curve that had the progression of development factors increasing as you got to higher and higher retentions.

I don't want to get into too much detail on the math behind it but I do want to point out that the curve that they used was of the form "AX" to the "B." Now, in that formula, "AX" raised to the "B" power, the "A" and the "B" are the parameters that they estimated. "X" is the retention divided by 10,000.

So, if they were looking at "X" equals 10,000, they'd take 10,000, divide by 10,000 and get one, and one raised to the "B" power is simply going to be one, so that means that this column of factors here is simply the "A" parameter.

Then they also estimated the "B" parameter to give this curve a smooth progression to higher and higher retentions, and the interesting thing that they point out about their model is that if you were to assume that the development at 27 months, 39 months and so on fits a Single Parameter Pareto distribution with a certain "Q," this "B" becomes simply the difference between the two "Q" parameters.

For example, suppose you assume that at 27 months, the data fits a Single Paramete. Pareto with a "Q" of 1.5. Well, then, if you have this particular parameter in this curve, then you would assume basically that the data at 39 months fits a Single Parameter Pareto with a "Q" equal to 1.5 minus .04877, which is this parameter up here.

What they are saying is that the curve that they use does have some theoretical justification if you do assume that the losses fit a Single Parameter Pareto distribution at each stage of development.

After they did that for each particular row, then they took the "A" parameters, which are here, the "B" parameters which are here, and fit a curve down the column so that there were reasonable relationships among the "A" and the "B" values at the various development intervals. They used techniques from Sherman's paper on extrapolating and smoothing development factors in the 1984 Proceedings. Again, that's detailed in the paper if you're interested in further information on that.

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We're jumping to page 9 now. This is a graph, and I'm sure many of you have seen this type of graph before. The x-axis is months of development, 27, 39 and so on up to ultimate. Note that between 99 and ultimate is not to scale, so you can pretty much ignore the graph between 99 and ultimate. I just wanted it to end up at the upper right-hand corner there.

Then on the y-axis, we have percent reported from zero on up to 100 percent. Then each of these curves represents development excess of a retention, so everything is going to start at the origin here, and is going to end up at the upper right-hand corner, 100 percent reported at ultimate.

You can see that the faster the curve gets up to the top, the quicker the development is. So, as you might expect, the top curve is development excess of $25,000, whereas, the bottom curve is development excess of a million dollars, so the losses excess of $25,000 develop quicker than losses excess of a million dollars. There is no real surprise there.

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On the next page, there is a graph of the layer development. They have a technique which I'm not going to get into of deriving development factors by layer, because that's what we're really interested in. Once we have development factors excess of various retentions, we want to convert those to development factors in various layers, so they go through that and come up with this result.

The lowest layer here, between 25 and 100,000 is on the top, meaning it develops the quickest. The highest layer, 500,000 to a million, is on the bottom, showing that it develops the slowest there's nothing that we wouldn't expect from that graph.

So, that's all I want to say right now about the Pinto and Gogol method. I want to move on to page 19 now. There's a lot of stuff in there that you can read if you're interested in Pinto and Gogol.

(Page 19)

The Pareto distribution method. In this case, instead of computing development factors from empirical data directly, as did Pinto and Gogol, an alternative is to first fit the distributions to the empirical data, similar to what Stuart was talking about, getting distributions to fit the data, and then to calculate the layer development factors that fall out of those distributions, so it's a little bit of a different approach. We're going to first get the distributions and then get the development factors rather than going to the development factors directly from the data.

As part of the current ISO increased limits procedure, a triangle of loss distributions is generated and a separate Pareto distribution is fit to the data within each cell of the triangle. I want to show a sample triangle which is on the next page.

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I do want to say that this is not real data but it is similar to what we might see in a general liability type of situation, and as I say, you would have access to this if you have access to ISO materials. You would get this in one of the circulars.

So, what we have here is basically a triangle and in each cell of the triangle there are five parameters which correspond to the Pareto distribution. We have policy years down the left-hand side here, months of development across the top. Each cell contains the parameters of the Pareto.

I'm not going to go into detail on what each of those means, but I'll just review each of the parameters as a refresher on what each of them does do. The "B" and the "Q", the top two in each cell, are simply parameters of a Pareto distribution. We are using the two parameter Pareto distribution here. The bottom factor, "T", is a truncation point, in this case, $11,000 for the '82 policy year, at 63 months.

We find that small losses don't fit the same Pareto distribution that large losses do, so we have to pick a point beyond which we fit the Pareto, so we pick $11,000 and we're only going to fit the Pareto excess of 11,000. Below 11,000, we're going to use an exponential distribution. We are not really too concerned about this in this case because we are worried about the excess layer development factors.

The "S" parameter is the average value of a claim less than 11,000 so if we do have a claim below $11,000, we would expect an average size of $1430 for policy year 82 at 63 months. The "P" is the probability of a claim being less than the truncation point, in this case, $11,000, so in this case in that particular cell, '82 policy year at 63 months, there is a 90 percent probability of a claim being less than 11,000; ten percent of being above 11,000.

So, basically, we've taken each cell's data individually and fit a distribution to it. We've assumed no relationship among the different cells. Now, there is a procedure in the increased limits procedure to get to an ultimate distribution which I'm not going to get into, but I do show some sample ultimate distributions on the right-hand side there for each policy year.

(Page 21)

Here is part of page 21. Limited average severities may be computed from the triangle of Pareto distributions. Stuart talked about limited average severities or limited expected values, depending on your terminology. There is the formula. You just run it through and you come out with the next page.

(Page 22)

So here, what I've done is for each cell of the triangle, I've picked several different limits and computed limited average severities. I've also shown the unlimited average severity which means I don't cap my claims at all. These, as I say, are computed directly from those parameters that I showed previously.

So, you can see that as we get to higher and higher limits within a particular cell, the limited average severity gets bigger. That's obvious. That has to be true. Then we also have an unlimited average severity if we don't cap at all.

One thing to note is that we don't have unlimited average severities over on the right-hand side for the ultimate distributions except for 1988. That's because with the Pareto, if the "Q" is less than or equal to 1, as it is with these ultimate distributions over here, the mean is infinite, so you cannot calculate an unlimited average severity. That's just a reminder that you have to cut things off at a certain point with the Pareto.

When you have a Pareto with the "Q" less or equal to 1 or even close to 1, you must be careful. For 1988, we have a "Q" of 1.02 and we get this unlimited average severity that's rather unreasonable compared to the other numbers.

You have to remember that the Pareto is only good up to a certain level. Once you try to extrapolate too far beyond the data that your parameters are based on, you're going to get answers that are not very reasonable, so I just left this in here as a reminder that that's a problem that you have to Keep in mind.

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Now, we also get, as part of the circular, and thus part of the increased limits procedure, a triangle of occurrence counts. This is just a simple count triangle. This is ground-up counts. There is nothing fancy about it. Again, there's a procedure to get to an ultimate number of counts which I'm not going to get into, which is part of the procedure.

(Page 26)

Now what I want to do is to just take the limited average severities that I had from the limited average severity exhibit, multiply through by the ground-up occurrence counts in each cell of the triangle and I get overall losses, limited at various policy limits, and I also get the unlimited losses in each cell of the triangle except, as I say, where we have a Pareto "Q" less than or equal to 1 in which case we can't calculate it. So that's just a straight multiplication of two triangles.

(Page 28)

Now, I just get development factors from that previous triangle, so I have development factors for each limit, for each policy year and development interval. What I want to note here is that we have factors that generally tend to increase with higher limits, so as I limit my losses at a higher and higher amount, I get some higher development factors.

So, this might be useful for an individual risk situation where you want to develop losses capped at a certain amount for a particular risk. Then, you'd like to have a development factor that is specific to the limit that's involved, so you can get a development factor out of here specific to the limit at which you're capping your losses.

Now, down at the bottom, I have done some weighted averaging. We did have some aberrations in the data, so we did some weighted averages to smooth things out.

(Page 30)

This is just another graph of the same type I've shown before. We show losses limited at various limits, so the top curve here is losses limited at $25,000. The bottom curve is losses limited at $5 million. Recall that the quicker the curve gets up to the top, the faster the development pattern, so as we expect, the lower the limit, the faster the development. You can see that there are quite substantial differences depending on what limit that you're dealing with.

(Page 32)

Now, I'm up to page 32, limited average severity differences. This exhibit simply takes differences of limited average severities, so I picked a few layers that I'm interested in, for example, 25 to 100,000, and I take the difference between the limited average severity at 25,000 and the limited average severity at 100,000 and I do that for each cell of the triangle for each layer that I'm interested in. You'll see where I'm going when I get to the next slide.

(Page 33)

Now, I take those ground-up occurrence counts from the occurrence count triangle that I had previously and I multiply that by the triangle of limited average severity differences, and that gives me the losses in each particular layer. That works out because if you think about it, when I'm looking for losses, say, in the 25 to 100,000 dollar layer, I'm really looking for the difference between the losses limited at 25,000 and the losses limited at 100,000.

So, if I just take those ground-up occurrence counts, multiply by the difference in the limited average severities, by the distributive law, I'm going to come out with the losses in the layer that I'm interested in, so I've just done another multiplication here to get losses in each particular layer.

(Page 35)

Now, on to page 35, I just take development factors from the previous exhibit and now I have development factors that are specific to each layer that I'm dealing with. In general, as you might expect, as you get to higher and higher layers, the development factors are bigger and bigger, because development tends to be slower for the larger claims.

There are some things that come out here that lead us to believe that there might be some problems. There is quite a bit of volatility in the data, especially at the high layers. It's not that evident in the low layers. Let's look at the 51 to 63 month factors, 25 to 100,000. In 1983, we have 1.063; '84, 1.069; '85, 1.024.

Now, that's not that bad, but then let's go to 1 million to 5 million. We have 1.161, 1.391, 1.163. That's getting a little bit volatile there. At 5 million to infinity, if we look at the unlimited amounts, 1.269, 1.888, 1.35, we see big differences in development factors.

In fact, if we go up to 87 to 99 months, the development factors are moving in the wrong direction. We would expect them to be going up as we get to higher and higher layers, but they're going down, and that's because the 99-month Pareto distribution had a "Q" that was slightly higher than the "Q" parameter at 87 months.

The "Q" parameter was going in the wrong direction, just slightly, by .01, I think, and that caused the factors to start going in the wrong direction, so if we look at this, we are going to be a little bit skeptical about using this in actual practice, because things didn't seem to work out as we might have expected. So, we have to take some weighted averages if we want to attempt to use these factors, to try to smooth things out and hope that that gives us some reasonable results.

(Page 37)

Finally, on the Pareto distribution method, some layer development curves just to show that 25 to 100,000 dollars is the highest curve, with the fastest development; 1 million to 5 million is the lowest curve on the graph, meaning it has the slowest development. This is the same situation that we observed with Pinto and Gogol in that the higher layers in general tend to develop slower than the lower layers.

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Now, finally, I want to talk about the Pareto soup method. As I mentioned, the Pareto Soup method is based on the Pareto Soup increased limits model which is under development at ISO and is scheduled to replace the current model sometime within the next couple of years.

As with the current procedure, a triangle of loss distributions is generated but there are a few key differences that I want to highlight here. First, incremental paid data is used in each cell of the triangle instead of cumulative incurred data, so this is not what you're generally used to dealing with.

Each cell only contains occurrences paid at a particular point in the triangle, so lag one contains occurrences paid at lag one; lag two, just occurrences paid at lag two and so on. If there were partial payments involved, we just take an average payment date and slot it to the appropriate lag.

Two, the parameters within the triangle are all calculated at the same time by a maximum likelihood procedure. This ensures that there are logical relationships among the parameters within the triangle. This solves the problem we observed with the development factors in the previous method, where we looked at each cell individually, just fit a distribution to each cell, and we got some randomness involved and the parameters didn't quite have reasonable relationships in all cases, and that gave us weird development factors.

So, in an effort to try to put a little more structure in our model to make sure that we have reasonable relationships, we're going to force some relationships. I'm not going to get into all the details of the model. Further details are in the agendas and minutes of the ISO Ad Hoc Increased Limits Subcommittee, if you have access to that information.

Point number three, a mixture of two Pareto distributions is used instead of a truncated Pareto. Recall that with the current model we have a truncation point. Below the truncation point, we use an exponential distribution. Above the truncation point, we use a Pareto.

Well, with this new model, we are going to use two Paretos. We are going to use a thin-tailed Pareto for the smaller claims and a thicker-tailed Pareto for the bigger claims.

(Page 44)

This is a triangle that I would get out of the model and it's pretty similar to the previous triangle except there are a few changes that are in there because of the three points that I mentioned. You can see in each cell of the triangle, we have a B1, a Q1, a B2 and a Q2. Those are the four parameters corresponding to the two Pareto distributions we're dealing with.

There are a couple of things you can note here. Note that there's always a difference of 2 between the Q1 and the Q2. The Q1 is the thicker-tailed Pareto, the lower Q parameter; Q2 is 2 greater than that. The 2 is just something that seems to work out in practice, and we found that it's a reasonable assumption. So, we've made sure that that happens.

The Q tends to decrease as we get to later and later lags. We make sure that that happens, so the tail tends to get thicker because the large claims are settled at a later point, and then as you go down the column here, you can see that the "B" parameters tend to trend up from accident year to accident year.

Remember that the Pareto trends by simply trending the "B" parameter and the gradual increase in the "B" parameters here in the triangle is to reflect that. Then the "P" parameter is the weight given to the second or thin-tailed Pareto, and as you go to subsequent lags, the "P" parameter, or the weight given to the thin-tailed Pareto, gets less and less, and so more emphasis is on the thick-tailed Pareto, and that's what you would expect, because the larger claims take longer to settle.

Now, basically I take this and I go through a procedure very similar to what I did previously with the last method I showed, with the current increased limits model. I have a little different formula for the limited average severity just because we're using two Paretos instead of just a Pareto above the truncation point and an exponential below, so the formula is a little bit different but everything else is pretty much the same.

(Page 50)

I eventually end up with a triangle of incremental limited losses. These are losses limited at each particular limit for each particular lag. Now, that's incremental data which is different than the cumulative data, so the one step that I have to do here that I didn't have to do before is I have to cumulate across each row. I have to convert this incremental triangle into a cumulative triangle.

(Page 52)

So, lag one of this cumulative triangle is the same as lag one of the incremental triangle. Lag two is lag one of the incremental triangle plus lag two of the incremental triangle; lag three of the cumulative is just lag one plus lag two plus lag three of the incremental. I just cumulate across each row to get a triangle that you're more familiar dealing with.

(Page 54)

Then I get some development factors out of that triangle and a couple of things happen that you would expect to happen. You get development factors decreasing as you get to subsequent development intervals. No surprise there. You get development factors that increase as you get to higher and higher limits. These are limited development factors, so these are factors for losses limited at various amounts.

There is a nice thing about this model that we didn't see before. Note that as you go from -- for example, down the column here for a given limit, 2.457 is the factor with the $25,000 limit; at 82, it's 2.444; 2.43, 2.417 and so on, so there's a gradual decrease in the development factors for the $25,000 limit as we go down the column.

If you think about it, that's reasonable because as losses trend from year to year, a limit becomes a lower and lower percentile of the loss distribution, so we would expect the development factors for a given limit to become smaller and smaller as time goes on.

We've got that relationship because we've enforced some structure in the model to ensure that we have reasonable relationships among parameters. If you want to project, say, a 1986 factor for the five to six development interval, we don't need to take weighted averages.

We can just use this model to project, using, say, this column in the model down to a factor for 1986. For example, for the $25,000 limit, we have 1.188 for '81, 1.184 for '82. Maybe we'd project down here and get perhaps a 1.17 using the model. We're not going to just take averages.

The differences don't look that big, but remember, these are age-to-age factors. When you start multiplying age-to-age factors together to get age-to-ultimate factors, you can get pretty substantial differences.

We pretty much do the same thing to get layer development factors, so I'm not going to go through that, and I'm going to skip to the end here, page 66.

(Page 66)

If the distribution of unpaid occurrences is available corresponding to each cell of the incremental paid triangle, it would be possible to generate incurred development factors using the Pareto Soup model, and it's anticipated we'll do this in the future, so we're not just limited to paid data. We'll be able to do this for incurred data.

(Page 67)

Finally, just to summarize what I've shown here, Pinto and Gogol used cumulative incurred data. They got some development factors out of it, then came up with a model that gave smoothed out development factors which did have some theoretical justification based on the Pareto distribution.

The Pareto distribution method used some cumulative incurred data, fit an unstructured loss distribution model, just looked at each cell in the triangle individually, didn't enforce good relationships among the cells, got development factors, and then we had to take some weighted averages because we had to smooth things out.

Finally, for the Pareto Soup method, we used incremental paid data. We enforced structure in the model and that yielded nice development factors that gave us reasonable relationships among the parameters, so we can see that with that model, we got some nice results.

So, I think I'm out of time and I'm going to turn it over to Spencer now for any questions.

MR. GLUCK: Thank you, Clive. We have about 10 minutes left and I'd like to entertain any questions or discussions from the floor. If you have something to say, I'd appreciate it if you'd step up to the microphone so that we can get it on the tape recorder.

(No response.)

MR. GLUCK: Does that mean everything was entirely clear?

QUESTION: I have a question for Stuart. One of the things I've noticed with the minimum distance function -- and maybe there is an easy way to do this, but when we fit the Pareto, we often like to truncate the data, and also because, you know, we say that, you know, we're not sure we believe the claims below a certain point are done with the Pareto.

Do you have any suggestions as to how you would adapt that sort of a thing to your minimum distance?

MR. KLUGMAN: It really shouldn't be all that difficult. You do the same sort of adaptation that was done for the upper limit in that Burr distribution example. What you need to do is take your model distribution out and adjust it for the conditional distribution based on your truncation point and then take your empirical data, which is already truncated there so you don't have to do anything for that.

The key is that your model has to be on the same terms as your data and as long as you can manipulate the model that you're using in your distribution to make it be the model for the data as collected or as interesting as you would do, even though you didn't collect it with the truncation point, if you force the truncation point afterwards, you force it on your data and force it on your model, and then you're comparing the same things, and you should be able to get a workable result.

MR. GLUCK: I'd like to raise a point on Stuart's presentation on this value judgment between being right and looking good. A lot of times, as I said, in practice, you might be in a situation where you have nothing available to you but a few readings of the limited expected values and that gets easy to decide which way to do it but let's say you do have a lot of individual readings.

I think in Stuart's presentation, he showed that we had some standard errors that were a lot larger by going directly to the limited expected value. I guess my observation is that being right is a function of a major assumption which is always model validity; that is to say that the model has the correct form and expect for possible mis-estimation of the parameters, that the data really fits that model.

Since there is always doubt about that assumption and there is always error associated with that assumption, one of the advantages to looking good and focusing on specifically the error as it is specifically important to you, is that you are relying less on the assumption of model validity. So the maximum likelihood estimation is by definition the best estimate if the model is right, but getting close to the data on the values that are important to you is perhaps a better estimate to the extent that you may doubt that the model is right.

MR. KLUGMAN: You've raised an interesting point that would actually be Number 4 on my opening list of sources of error. There is a fourth source of error and that's the error for having the wrong model, and that's the hardest one to measure because the only way you can measure it is to have some idea of what the right model is and, of course, if you know what the right model is, then you're not going to make that error.

So, I don't like to talk about that kind of error because I don't think anyone knows what to do about it, but I like your argument there, since it was so friendly to my argument that, again, you're less concerned about that if you like what you're looking at.

QUESTION: Stuart again. You didn't really say why you use square error but is absolute error just as good, or is there something in what you were saying later about normal distributions? What makes square error the right thing to use?

MR. KLUGMAN: In order to use that theorem, the "Q" function has to have continuous mixed partial second derivatives with respect to the parameter, and if you have the absolute value function inside, you won't have that property, so you will lose the ability to get asymptotic variances, at least according to the only theorem I know for use in this case.

If you don't care -- which my belief is you aren't allowed to not care. If you don't care about asymptotic calculations, then clearly you're freely to use any loss function that you like, including absolute error, which obviously does have a lot better intuitive appeal with regard to the way you would measure the difference.

When you eyeball the two columns of model and fitted, what you're surely thinking about as you look with the absolute differences is you make your value judgment and not squared differences, but I don't know what to do about the asymptotics then.

MR. GLUCK: Before I let you go, I have a question or two for Clive. First, I just wanted to verify that in the data you showed us both on the original Pareto and the Pareto Soup, was any of that real data?

MR. KEATINGE: No, it wasn't real data. It was supposed to be representative of what we might see, but we didn't want to reveal real data.

MR. GLUCK: Don't anybody go grabbing those development factors.

MR. KEATINGE: No, they are not based on real data.

MR. GLUCK: You didn't, in this presentation, specify the functional relationship between the "Q" parameters over time. You said in the structure, again, in the Pareto Soup model, I noticed the "Q"s -- I shouldn't say over time; I meant, over the development period, the "Q"s in any column were forced to be identical.

MR. KEATINGE: Right.

MR. GLUCK: And the "B"s were forced to trend.

MR. KEATINGE: Right.

MR. GLUCK: I assume with an exponential trend?

MR. KEATINGE: Yes.

MR. GLUCK: But you didn't specify the relationships between the "Q"s across the development period or the "P"s across the development period.

MR. KEATINGE: Well, that's an exponential type of decay. It asymptotically will approach a limit as you get to later and later lags.

MR. GLUCK: So, that's also some kind of exponential change on that model?

MR. KEATINGE: Yes.

MR. GLUCK: But did you specify within the handout the specific model for how the "Q"s and "P"s are related?

MR. KEATINGE: No, I didn't get into a lot of the details of the model and that's why I put in there that you can refer to the agenda and minutes of the Increased Limits Subcommittee if you're interested in that, and there have been sessions before discussing the particular model, and I didn't want to get too much into it in this session.

I wanted to concentrate on what comes out of the model, the development factors that you can get out of the model rather than the model itself, but the model is certainly an interesting subject and can be discussed in another session at some point.

QUESTION: As you move from the Pinto and Gogol model to the Pareto model to the Pareto Soup model, you get better and better looking models, but to some extent, they are further and further from the data. What would you say about the tradeoff between getting a better model and looking less closely at the data when you make the model?

MR. KEATINGE: What do you mean by further and further from the data?

QUESTION: Things that happen in the data show up very clearly in Pinto and Gogol's model. In fact, what your commenting is that that's a disadvantage to some extent. The data can't affect the Pareto Soup model quite as freely and do you see that as an unmitigated advantage or are there disadvantages associated with it, as well?

MR. KEATINGE: Well, I guess that's the whole question of how much variability you're going to allow in your parameters. How many parameters are you going to put in? It really comes down to a judgment call. I don't consider myself an expert on modeling but I've been getting into it more in the last few months.

It is a tradeoff. I don't think there are any statistics that you can definitely point to and say, "Gee, this is the best model." It's just that when you get results that are intuitively unreasonable, you figure maybe there is something wrong. Maybe I don't have enough data to use the model that I'm dealing with and I've got to cut down the number of parameters and make some more assumptions to make sure that I get a more reasonable model.

So, what it comes down to is a judgment call. If, in your judgment, the results are unreasonable, then you had better do something about it.

MR. KLUGMAN: I'd like to hop into this one just one second. The Pareto Soup model, I would like to consider as being very close to the data in the sense that what we do is we look at the limited average severity for every one of those cells in that triangle, okay? So, it's true it's not close to the data in terms of excess loss development factors, but it is very close to the data for the limited average severity.

MR. GLUCK: I guess that's it. Our time is up. Thank you very much for your attention and thanks to our panelists.

We will look at three methods for deriving development factors by layer:

1. Pinto and Gogol Method - example will be taken from Emanuel Pinto and Daniel F. Gogol, "An Analysis of Excess Loss Development," PCAS LXXIV, 1987, p. 227.

2. Pareto Distribution Method - example will be based on current ISO increased limits procedure.

3. Pareto Soup Method - example will be based on proposal for new ISO increased limits procedure currently under development.

PINTO AND GOGOL METHOD

- Pinto and Gogol derived incurred development factors from ISO OL&T BI, M&C BI and Products BI data. We will examine the Products BI data.

- Data from policy years 1972-82 was used. Retentions were adjusted to a 1982 price level.

- Data from 27 months through 99 months of development was used.

- No adjustment was made for capping of claims by policy limits.

- ALAE was combined with indemnity for purposes of the analysis. Significant differences were not observed when ALAE was excluded or allocated pro rata to layer.

- The following exhibit is taken directly from the paper by Pinto and Gogol.

- Development factors were calculated from the data excess of various retentions. These factors are shown near the bottom of the exhibit.

- A curve of the form ax^b was fit to the factors within each development interval, where x equals the retention divided by 10,000. For example, within the 27-39 development interval:

$$1.80564 = 1.80564 \times \left(\frac{10{,}000}{10{,}000}\right)^{.04877}$$
$$1.88815 = 1.80564 \times \left(\frac{25{,}000}{10{,}000}\right)^{.04877}$$
$$2.02022 = 1.80564 \times \left(\frac{100{,}000}{10{,}000}\right)^{.04877}$$
$$2.18517 = 1.80564 \times \left(\frac{500{,}000}{10{,}000}\right)^{.04877}$$
$$2.26030 = 1.80564 \times \left(\frac{1{,}000{,}000}{10{,}000}\right)^{.04877}$$

- Smooth curves were fit to both the a and b parameters. This resulted in the ability to extrapolate beyond 99 months of development.

EXHIBIT 7

PRODUCTS BI EXCESS LOSS & ALAE DEVELOPMENT FACTORS

Fitted Factors

DEVELOPMENT INTERVAL	FITTED *b* VALUES	RETENTION 10,000*	25,000	50,000	100,000	250,000	500,000	1,000,000
27– 39	.04877	1.80564	1.88815	1.95307	2.02022	2.11254	2.18517	2.26030
39– 51	.04373	1.27527	1.32740	1.36825	1.41036	1.46802	1.51320	1.55977
51– 63	.02738	1.13277	1.16155	1.18381	1.20649	1.23715	1.26086	1.28502
63– 75	.01617	1.07914	1.09525	1.10759	1.12007	1.36791	1.14960	1.16256
75– 87	.00997	1.05298	1.06265	1.07002	1.07744	1.08733	1.09487	1.10246
87– 99	.00650	1.03817	1.04438	1.04909	1.05383	1.06013	1.06492	1.06973
99–111	.00446	1.02893	1.03314	1.03634	1.03954	1.04380	1.04703	1.05027
111–123	.00318	1.02275	1.02574	1.02801	1.03028	1.03329	1.03557	1.03786
123–135	.00235	1.01841	1.02061	1.02228	1.02395	1.02616	1.02784	1.02951
135–147	.00179	1.01523	1.01690	1.01816	1.01943	1.02110	1.02237	1.02364
147–159	.00140	1.01283	1.01413	1.01511	1.01609	1.01739	1.01838	1.01937
159–171	.00111	1.01097	1.01200	1.01278	1.01356	1.01459	1.01537	1.01616
171–183	.00090	1.00950	1.01033	1.01096	1.01159	1.01242	1.01306	1.01369
183–195	.00074	1.00832	1.00900	1.00951	1.01003	1.01071	1.01123	1.01175
195–207	.00061	1.00735	1.00791	1.00834	1.00877	1.00934	1.00977	1.01020
207–219	.00052	1.00654	1.00702	1.00738	1.00774	1.00821	1.00858	1.00894
219–231	.00044	1.00587	1.00627	1.00658	1.00688	1.00729	1.00759	1.00790
231–243	.00038	1.00529	1.00564	1.00590	1.00616	1.00651	1.00677	1.00704
243–255	.00033	1.00480	1.00510	1.00533	1.00556	1.00585	1.00608	1.00631
255–267	.00028	1.00438	1.00464	1.00484	1.00503	1.00530	1.00549	1.00569
267–279	.00025	1.00401	1.00424	1.00441	1.00459	1.00481	1.00499	1.00516
279–291	.00022	1.00369	1.00389	1.00404	1.00420	1.00440	1.00455	1.00470
291–303	.00019	1.00341	1.00358	1.00372	1.00385	1.00403	1.00417	1.00430
303–315	.00017	1.00316	1.00331	1.00343	1.00355	1.00371	1.00383	1.00395
315–327	.00015	1.00293	1.00307	1.00318	1.00329	1.00343	1.00354	1.00365
327–339	.00014	1.00273	1.00286	1.00296	1.00305	1.00318	1.00328	1.00338
339–351	.00013	1.00255	1.00267	1.00276	1.00284	1.00296	1.00305	1.00313
351–363	.00011	1.00239	1.00250	1.00258	1.00265	1.00276	1.00284	1.00292
		ACTUAL FACTORS						
27– 39		1.78910	1.90890	1.95630	2.02070	2.10530	2.39360	1.80260
39– 51		1.29060	1.35610	1.38440	1.42210	1.47900	1.50980	1.58470
51– 63		1.12670	1.15010	1.17360	1.19930	1.23010	1.40730	1.91410
63– 75		1.06320	1.07760	1.09280	1.11650	1.14530	1.16600	1.20740
75– 87		1.08000	1.09320	1.10580	1.11650	1.09440	1.11800	1.22710
87– 99		1.02930	1.03690	1.04050	1.04210	1.04400	.96050	.76570
		CUMULATIVE COMPARISON						
27– 99 Actual		3.07700	3.63700	3.99600	4.47700	5.01200	6.36800	6.20300
27– 99 Fitted		3.07700	3.53900	3.93300	4.37200	5.02800	5.58800	6.21100

* These equal the fitted *a* values.

- Pinto and Gogol note that the fitted factors from 27-99 months of development are close to RAA factors (as of 12/84) if the following assumptions are made:

1. A retention of $250,000 is used to reflect the development characteristics of the various retentions and limits underlying the RAA experience.

2. An equal weighting of the excess loss development factors for OL&T, M&C and Products is used to approximate the subline mix of the RAA data.

3. A weighting of 25% of the accident year factor from 12 + 12 k months to 12 + 12 (k+1) months and 75% of the accident year factor from 12 + 12 (k + 1) months to 12 + 12 (k+2) months is used to estimate the policy year factor from 27 + 12 k months to 27 + 12 (k+ 1) months.

4. Dollar weighted factors are derived using the most recent five years of RAA experience.

- The RAA data shows higher development factors than the fitted ISO data extrapolated beyond 99 months.

- If the ultimate loss distribution is known, development factors by layer may be calculated from the factors shown in Pinto and Gogol's Exhibit 7.

$$\text{ATU}_{\text{LAYER}} = \frac{\text{RATIO}_{\text{Ret}} - \text{RATIO}_{\text{Ret + Limit}}}{\dfrac{\text{RATIO}_{\text{Ret}}}{\text{ATU}_{\text{Ret}}} - \dfrac{\text{RATIO}_{\text{Ret + Limit}}}{\text{ATU}_{\text{Ret + Limit}}}}$$

RATIO = ratio of ultimate excess losses to ultimate ground up losses.

- Age-to-age factors can then be calculated by taking ratios of successive age-to-ultimate factors.

- The following exhibit shows development factors for three different layers. For example:

$$(27\text{-ULT})_{25\text{-}100} = 3.183 = \frac{.735 - .463}{\dfrac{.735}{4.335} - \dfrac{.463}{5.505}}$$

$$(27\text{-}39)_{25\text{-}100} = 1.758 = \frac{3.183}{1.811}$$

- For a given set of development factors excess of various retentions, the lighter the tail of the ultimate loss distribution, the larger the resulting layer development factors will be.

PINTO AND GOGOL PRODUCTS BI LOSS & ALAE

Incurred Age-to-Ultimate Excess Development Factors
(from Pinto and Gogol—page 238)

Retention	27-Ult	39-Ult	51-Ult	63-Ult	75-Ult	87-Ult	99-Ult
25,000	4.335	2.296	1.730	1.489	1.359	1.279	1.225
100,000	5.505	2.725	1.932	1.601	1.430	1.327	1.259
500,000	7.265	3.325	2.197	1.743	1.516	1.384	1.300
1,000,000	8.187	3.622	2.322	1.807	1.554	1.410	1.318

Incurred Age-to-Ultimate Layer Development Factors

Layer(000)	27-Ult	39-Ult	51-Ult	63-Ult	75-Ult	87-Ult	99-Ult
25-100	3.183	1.810	1.468	1.330	1.255	1.206	1.171
100-500	5.052	2.554	1.849	1.555	1.400	1.307	1.245
500-1000	6.994	3.233	2.157	1.721	1.503	1.376	1.294

Incurred Age-to-Age Layer Development Factors

Layer(000)	27-39	39-51	51-63	63-75	75-87	87-99	99-Ult
25-100	1.758	1.234	1.103	1.060	1.041	1.030	1.171
100-500	1.978	1.381	1.190	1.110	1.071	1.050	1.245
500-1000	2.163	1.499	1.253	1.145	1.092	1.063	1.294

Ratio of Ultimate Excess Losses to
Ultimate Ground Up Losses
(from Pinto and Gogol—page 248)

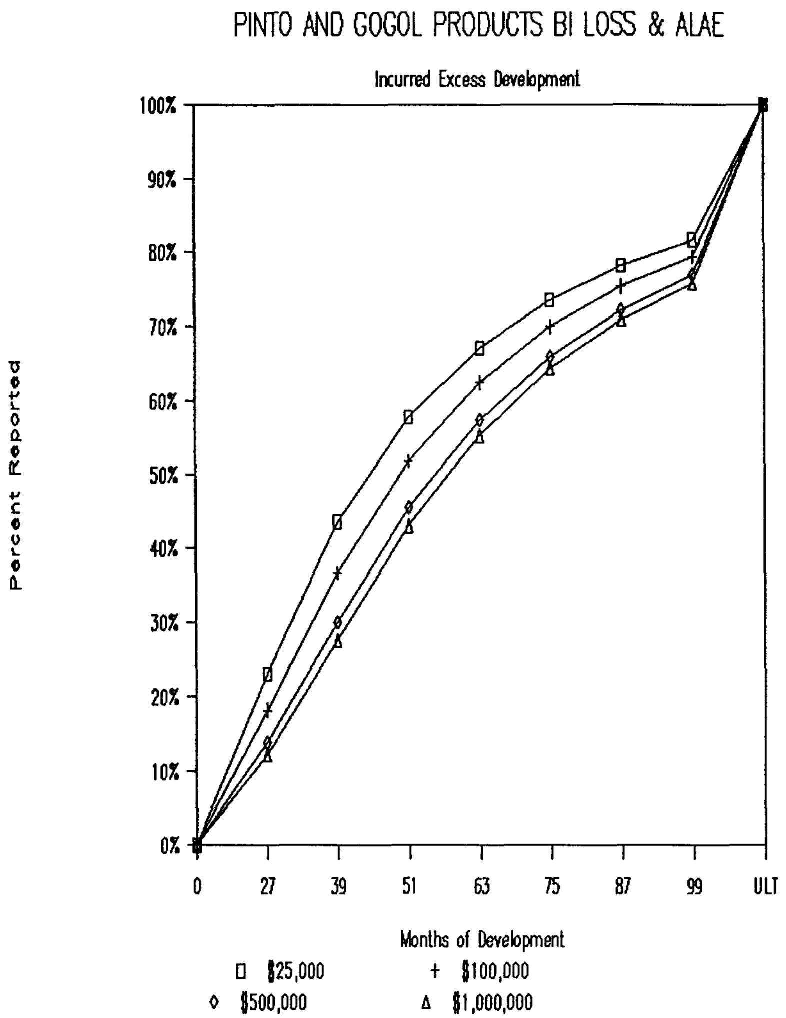
Retention	Ratio
25,000	0.735
100,000	0.463
500,000	0.125
1,000,000	0.032

- The following two exhibits show the development patterns graphically.

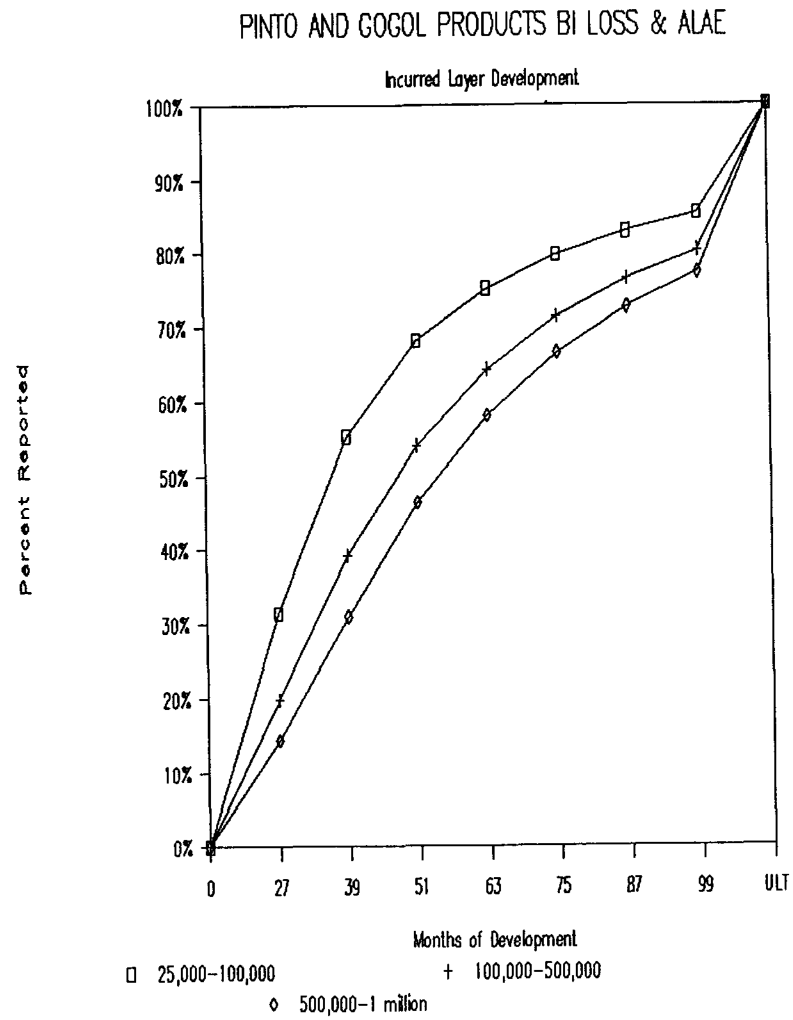
- The first exhibit shows development patterns excess of various retentions.

- The second exhibit shows development patterns for various layers.

- Note that the horizontal axis is not to scale between 0 and 27 months, and between 99 months and ultimate.


PINTO AND GOGOL PRODUCTS BI LOSS & ALAE
Incurred Excess Development
Percent Reported
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
27
39
51
63
75
87
99
ULT
Months of Development
$25,000
$100,000
$500,000
$1,000,000

9


PINTO AND GOGOL PRODUCTS BI LOSS & ALAE
Incurred Layer Development
Percent Reported
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
27
39
51
63
75
87
99
ULT
Months of Development
25,000-100,000
100,000-500,000
500,000-1 million

10

- Pinto and Gogol note that if we assume that the losses excess of a certain amount fit a Single Parameter Pareto distribution at each stage of development, the formula ax^b can be used to describe development factors excess of a retention as follows:

$$ATA_{I-J} = \left(\frac{N_J}{N_I}\right)\left(\frac{Q_I - 1}{Q_J - 1}\right)\left(\frac{\text{Retention}}{10{,}000}\right)^{Q_I - Q_J}$$

N_I = Number of losses at time I excess of \$10,000
N_J = Number of losses at time J excess of \$10,000
Q_I = Q parameter at time I
Q_J = Q parameter at time J

- Thus the b parameter is simply the difference between the Q's at the two stages of development under consideration. Note that the Q parameter decreases (and thus the tail gets thicker) at each succeeding stage of development.

- To illustrate this point, I have constructed some hypothetical data on which Pinto and Gogol's development factors might have been based. I have arbitrarily selected 1.30 for the ultimate value of Q.

- The data is shown on the following page. An example of the operation of the formula above is, for a retention of \$100,000 for the 27-39 development interval:

$$2.02022 = \left(\frac{689}{425}\right)\left(\frac{1.47237-1}{1.42360-1}\right)\left(\frac{100{,}000}{10{,}000}\right)^{1.47237-1.42360}$$

PINTO AND GOGOL PRODUCTS BI LOSS & ALAE

Hypothetical Incurred Excess Losses(000)

Retention	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
10,000	9,005	16,261	20,737	23,490	25,349	26,692	27,711	33,333
25,000	5,842	11,030	14,641	17,006	18,626	19,793	20,671	25,322
100,000	3,056	6,174	8,707	10,505	11,766	12,590	13,268	16,706
500,000	1,419	3,101	4,692	5,916	6,801	7,446	7,929	10,308
1,000,000	1,023	2,312	3,606	4,633	5,386	5,938	6,352	8,373
5,000,000	478	1,169	1,956	2,627	3,135	3,512	3,797	5,166

Incurred Age-to-Age Excess Development Factors

Retention	27-39	39-51	51-63	63-75	75-87	87-99	99-Ult
10,000	1.80564	1.27527	1.13277	1.07914	1.05298	1.03817	1.20290
25,000	1.88815	1.32740	1.16155	1.09525	1.06265	1.04438	1.22497
100,000	2.02022	1.41036	1.20649	1.12007	1.07002	1.05383	1.25914
500,000	2.18517	1.51320	1.26086	1.14960	1.09487	1.06492	1.30005
1,000,000	2.26030	1.55977	1.28502	1.16256	1.10246	1.06973	1.31808
5,000,000	2.44489	1.67351	1.34289	1.19322	1.12029	1.08097	1.36083

Hypothetical Incurred Number of Losses
Excess of \$10,000

27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
425	689	788	828	853	871	886	1000

Hypothetical Single Parameter Pareto Q
Excess of \$10,000

27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1.47237	1.42360	1.37987	1.35249	1.33632	1.32635	1.31985	1.30000

- Limited Average Severities may be computed from the Pareto distributions conditional on a loss being greater than \$10,000. The formula is:

$$\left[\left[\frac{1-\left(\frac{\text{Limit}}{10{,}000}\right)^{1-Q}}{Q-1}\right]\times 10{,}000\right]+10{,}000$$

- Conditional Limited Average Severities are shown on the following page. For example, for a limit of \$100,000 at 27 months:

$$24{,}036=\left[\left[\frac{1-\left(\frac{100{,}000}{10{,}000}\right)^{1-1.47237}}{1.47237-1}\right]\times 10{,}000\right]+10{,}000$$

- Conditional Excess Average Severities are then computed by subtracting conditional limited average severities from the conditional unlimited average severity. For example, for a retention of \$100,000 at 27 months:

$$7{,}134 = 31{,}170 - 24{,}036$$

- Note that the aggregate excess losses from the previous exhibit can be generated (with some rounding error) by multiplying the number of losses excess of \$10,000 by the conditional excess average severity. For example, for a retention of \$100,000 at 27 months:

$$3{,}056{,}000 = 425 \times 7{,}134$$

Hypothetical Conditional Incurred Limited Average Severities
Excess of \$10,000

Limit	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
25,000	17,438	17,594	17,738	17,830	17,886	17,920	17,942	18,011
100,000	24,036	24,706	25,348	25,770	26,027	26,189	26,295	26,627
500,000	27,834	29,106	30,368	31,225	31,756	32,094	32,318	33,025
1,000,000	28,766	30,251	31,747	32,774	33,415	33,825	34,097	34,960
5,000,000	30,046	31,910	33,841	35,196	36,056	36,610	36,981	38,167
INFINITY	31,170	33,607	36,325	38,370	39,734	40,642	41,265	43,333

Hypothetical Conditional Excess Average Severities
Excess of \$10,000

Retention	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
10,000	21,170	23,607	26,325	28,370	29,734	30,642	31,265	33,333
25,000	13,732	16,013	18,587	20,539	21,848	22,722	23,322	25,322
100,000	7,134	8,901	10,977	12,600	13,707	14,453	14,969	16,706
500,000	3,336	4,502	5,956	7,145	7,977	8,548	8,946	10,308
1,000,000	2,404	3,356	4,577	5,596	6,318	6,817	7,167	8,373
5,000,000	1,124	1,697	2,484	3,173	3,677	4,032	4,283	5,166

- Layer losses may then be generated by multiplying the number of losses excess of \$10,000 by differences in limited average severities. This is shown on the following page.

- Note that since the ultimate distribution in this hypothetical data (Q = 1.3) has a thicker tail than the ultimate distribution calculated by Pinto and Gogol, the layer development factors constructed from this hypothetical data are smaller than the layer development factors generated by Pinto and Gogol.

PINTO AND GOGOL PRODUCTS BI LOSS & ALAE

Hypothetical Incurred Number of Losses
Excess of \$10,000

27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
425	689	788	828	853	871	886	1000

Hypothetical Conditional Incurred Limited Average Severity Differences
Excess of \$10,000

Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
25-100	6,598	7,112	7,609	7,939	8,141	8,269	8,353	8,616
100-500	3,799	4,400	5,021	5,455	5,729	5,905	6,023	6,398
500-1000	931	1,145	1,379	1,549	1,659	1,730	1,779	1,935
1000-5000	1,280	1,659	2,094	2,423	2,641	2,785	2,884	3,207
5000-INFIN	1,124	1,697	2,484	3,173	3,677	4,032	4,283	5,166

Hypothetical Incurred Layer Losses(000)

Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
25-100	2,807	4,899	5,994	6,574	6,941	7,203	7,404	8,616
100-500	1,616	3,030	3,955	4,517	4,884	5,144	5,339	6,398
500-1000	396	789	1,086	1,282	1,414	1,507	1,577	1,935
1000-5000	545	1,143	1,649	2,006	2,252	2,426	2,556	3,207
5000-INFIN	478	1,169	1,957	2,627	3,135	3,512	3,797	5,166

Incurred Age-to-Age Layer Development Factors

Layer(000)	27-39	39-51	51-63	63-75	75-87	87-99	99-Ult
25-100	1.745	1.224	1.097	1.056	1.038	1.028	1.164
100-500	1.875	1.305	1.142	1.081	1.053	1.038	1.198
500-1000	1.991	1.377	1.181	1.103	1.066	1.046	1.227
1000-5000	2.098	1.443	1.216	1.122	1.078	1.053	1.254
5000-INFIN	2.445	1.674	1.343	1.193	1.120	1.081	1.361

- An alternative way to look at the losses in a layer is to compute the number of losses expected to penetrate the retention and then to compute the expected severity in the layer given that a loss has penetrated the retention.

$$P\,(\text{Loss} > \text{Retention} \mid \text{Loss} > 10{,}000) = \left(\frac{\text{Retention}}{10{,}000}\right)^{-Q}$$

$$\text{Expected Number of Losses} > \text{Retention} = \text{Expected Number of Losses} > 10{,}000 \times P\,(\text{Loss} > \text{Retention} \mid \text{Loss} > 10{,}000)$$

$$\text{Expected Layer Severity} = \frac{\text{Layer Losses}}{\text{Expected Number of Losses} > \text{Retention}}$$

- This breakdown of the layer losses is shown on the following page. For example, for the layer from \$100,000 - \$500,000 at 27 months:

$$.03370 = \left(\frac{100{,}000}{10{,}000}\right)^{-1.47237}$$

$$14.34 = 425 \times .03370$$

$$112{,}719 = \frac{1{,}616{,}000}{14.34}$$

PINTO AND GOGOL PRODUCTS BI LOSS & ALAE

Hypothetical Incurred Number of Losses
Excess of \$10,000

27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
425	689	788	828	853	871	886	1000

Prob (Loss>Retention | Loss>\$10,000)

Retention	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
25,000	0.25947	0.27133	0.28242	0.28959	0.29392	0.29661	0.29839	0.30386
100,000	0.03370	0.03771	0.04170	0.04441	0.04610	0.04717	0.04788	0.05012
500,000	0.00315	0.00381	0.00453	0.00504	0.00537	0.00558	0.00572	0.00618
1,000,000	0.00114	0.00142	0.00174	0.00197	0.00213	0.00222	0.00229	0.00251
5,000,000	0.00011	0.00014	0.00019	0.00022	0.00025	0.00026	0.00027	0.00031

Expected Number of Incurred Losses in Layer

Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
25-100	110.38	186.89	222.47	239.78	250.58	258.38	264.47	303.86
100-500	14.34	25.97	32.85	36.77	39.30	41.09	42.44	50.12
500-1000	1.34	2.63	3.56	4.17	4.57	4.86	5.07	6.18
1000-5000	0.48	0.98	1.37	1.63	1.81	1.94	2.03	2.51
5000-INFIN	0.05	0.10	0.15	0.19	0.21	0.23	0.24	0.31

Incurred Layer Severity

Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
25-100	25,429	26,212	26,943	27,416	27,700	27,877	27,994	28,354
100-500	112,719	116,684	120,409	122,827	124,287	125,199	125,799	127,655
500-1000	295,553	300,328	304,701	307,482	309,141	310,170	310,844	312,913
1000-5000	1,127,190	1,166,839	1,204,088	1,228,267	1,242,866	1,251,989	1,257,987	1,276,554
5000-INFIN	10584923	11803588	13162398	14184800	14866794	15320974	15632328	16666667

PARETO DISTRIBUTION METHOD

- Instead of computing development factors from empirical data directly as did Pinto and Gogol, an alternative is to fit distributions to the empirical data and then calculate layer development factors based on these distributions.

- As part of the current ISO increased limits procedure, a triangle of loss distributions is generated. A separate Pareto distribution is fit to the data within each cell of the triangle.

- A policy year incurred triangle with some hypothetical general liability data is shown on the following page. The procedure used to generate the ultimate distribution for each policy year will not be described here.

- Note that, as expected, the Q parameter almost always decreases at each succeeding stage of development.

PARETO DISTRIBUTION METHOD

Untrended Pareto Parameters

Policy Year	Parameter	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	B				15500	13500	13000	13500	8500
	Q				1.27	1.20	1.17	1.18	0.96
	P				0.90	0.90	0.90	0.90	0.88
	S				1430	1440	1420	1410	1400
	T				11000	11000	11000	11000	10500
1983	B			15500	16500	15500	14000		8000
	Q			1.29	1.27	1.21	1.17		0.93
	P			0.90	0.90	0.90	0.90		0.89
	S			1420	1380	1360	1340		1340
	T			11000	11000	11000	11000		11000
1984	B		16000	18500	18000	17000			8000
	Q		1.42	1.38	1.30	1.24			0.94
	P		0.90	0.89	0.89	0.89			0.89
	S		1590	1570	1550	1500			1610
	T		11000	11000	11000	11000			13500
1985	B	15500	17000	18000	17500				7000
	Q	1.56	1.45	1.37	1.33				0.95
	P	0.92	0.89	0.88	0.88				0.88
	S	1540	1580	1570	1520				1660
	T	11000	11000	11000	11000				14000
1986	B	11500	16000	17500					7000
	Q	1.37	1.36	1.29					0.92
	P	0.91	0.89	0.87					0.89
	S	1570	1650	1700					1910
	T	11000	11000	11000					15500
1987	B	17000	18500						8000
	Q	1.62	1.45						0.93
	P	0.91	0.88						0.88
	S	1620	1640						1900
	T	11000	11000						16000
1988	B	16500							8500
	Q	1.67							1.02
	P	0.91							0.88
	S	1660							1990
	T	11000							16500

- Limited Average Severities may be computed from the triangle of Pareto distributions. The formula is:

$$PS + \left(\frac{1-P}{Q-1}\right)\left[(B+QT)-(B+\text{Limit})\left(\frac{B+T}{(B+\text{Limit})}\right)^{Q}\right]$$

- Limited Average Severities are shown on the following page. For example, for a limit of $100,000 for policy year 1985 at 27 months:

$$4422 = (.92)(1540) +$$

$$\left(\frac{1-.92}{1.56-1}\right)\left[\left(15{,}500 + (1.56)(11{,}000)\right) - (15{,}500+100{,}000)\left(\frac{15{,}500 + 11{,}000}{15{,}500 + 100{,}000}\right)^{1.56}\right]$$

- Unlimited Average Severities do not exist for the ultimate distributions (other than for 1988) since these have Q parameters less than 1. The mean does not exist for Paret distributions with a Q parameter less than or equal to 1.

- Note that the ultimate unlimited average severity for 1988 is unreasonably high. This is because the Q of 1.02 is so close to 1.

PARETO DISTRIBUTION METHOD

Incurred Limited Average Severities

Policy Year	Limit	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25,000				3,449	3,455	3,439	3,433	3,800
	100,000				5,606	5,631	5,647	5,651	6,606
	500,000				7,798	7,980	8,107	8,109	10,501
	1,000,000				8,534	8,828	9,024	9,016	12,307
	5,000,000				9,819	10,420	10,802	10,757	16,730
	UNLIMITED				12,202	14,646	16,496	15,980	
1983	25,000			3,436	3,413	3,399	3,377		3,579
	100,000			5,553	5,630	5,680	5,650		6,264
	500,000			7,652	7,913	8,177	8,216		10,125
	1,000,000			8,342	8,684	9,075	9,176		11,971
	5,000,000			9,518	10,030	10,747	11,040		16,653
	UNLIMITED			11,516	12,527	14,943	17,012		
1984	25,000		3,565	3,779	3,775	3,735			3,944
	100,000		5,474	6,112	6,243	6,273			6,926
	500,000		7,098	8,274	8,745	9,004			11,154
	1,000,000		7,559	8,924	9,566	9,960			13,154
	5,000,000		8,243	9,934	10,957	11,684			18,167
	UNLIMITED		8,960	11,147	13,223	15,378			
1985	25,000	3,097	3,758	3,977	3,938				4,214
	100,000	4,422	5,864	6,511	6,527				7,416
	500,000	5,364	7,618	8,870	9,040				11,838
	1,000,000	5,591	8,102	9,586	9,836				13,901
	5,000,000	5,882	8,798	10,710	11,140				19,008
	UNLIMITED	6,083	9,461	12,107	13,021				
1986	25,000	3,316	3,830	4,307					4,289
	100,000	4,864	6,047	7,213					7,515
	500,000	6,169	8,076	10,173					12,160
	1,000,000	6,553	8,694	11,155					14,400
	5,000,000	7,151	9,671	12,833					20,141
	UNLIMITED	7,892	10,928	15,685					
1987	25,000	3,368	4,025						4,519
	100,000	4,854	6,422						8,160
	500,000	5,862	8,464						13,393
	1,000,000	6,090	9,032						15,896
	5,000,000	6,366	9,850						22,243
	UNLIMITED	6,529	10,630						
1988	25,000	3,391							4,607
	100,000	4,790							8,071
	500,000	5,677							12,502
	1,000,000	5,866							14,423
	5,000,000	6,082							18,818
	UNLIMITED	6,195							153,731

- A ground up occurrence count triangle is generated as part of the current ISO increased limits procedure.

- A triangle with some hypothetical general liability data is shown on the following page. The procedure used to generate the ultimate occurrence count for each policy year will not be described here.

PARETO DISTRIBUTION METHOD

Incurred Number of Losses

Policy Year	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982				47,200	47,700	47,700	48,100	47,700
1983			52,000	52,800	52,000	52,000		52,000
1984		47,700	48,500	49,000	49,300			49,400
1985	40,000	42,000	43,000	43,100				43,100
1986	32,200	33,800	35,300					35,700
1987	41,100	43,200						44,900
1988	55,100							60,100

- Limited losses may be computed for various limits within each cell of the triangle. Occurrence counts are simply multiplied by limited average severities.

- The triangle of limited losses is shown on the following page. For example, for a limit of $100,000 for policy year 1985 at 27 months:

$$176{,}899{,}000 = 40{,}000 \times 4{,}422$$

PARETO DISTRIBUTION METHOD

Incurred Limited Losses(000)

Policy Year	Limit	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25,000				162,795	164,793	164,035	165,104	181,249
	100,000				264,608	268,594	269,363	271,835	315,114
	500,000				368,052	380,649	386,716	390,034	500,918
	1,000,000				402,826	421,076	430,422	433,647	587,028
	5,000,000				463,461	497,029	515,261	517,418	798,031
	UNLIMITED				575,926	698,614	786,842	768,643	
1983	25,000			178,653	180,209	176,769	175,590		186,108
	100,000			288,770	297,257	295,347	293,777		325,754
	500,000			397,898	417,826	425,200	427,234		526,475
	1,000,000			433,763	458,525	471,892	477,127		622,492
	5,000,000			494,956	529,575	558,843	574,081		865,951
	UNLIMITED			598,828	661,435	777,038	884,618		
1984	25,000		170,074	183,280	184,958	184,135			194,850
	100,000		261,132	296,449	305,923	309,262			342,152
	500,000		338,555	401,271	428,494	443,908			550,993
	1,000,000		360,551	432,803	468,751	491,007			649,795
	5,000,000		393,201	481,804	536,893	576,015			897,437
	UNLIMITED		427,372	540,619	647,919	758,152			
1985	25,000	123,888	157,825	171,019	169,726				181,602
	100,000	176,899	246,296	279,978	281,333				319,621
	500,000	214,568	319,948	381,404	389,623				510,236
	1,000,000	223,645	340,263	412,192	423,937				599,146
	5,000,000	235,264	369,511	460,520	480,133				819,244
	UNLIMITED	243,301	397,347	520,601	561,215				
1986	25,000	106,766	129,467	152,035					153,119
	100,000	156,636	204,394	254,615					268,294
	500,000	198,635	272,976	359,124					434,118
	1,000,000	211,005	293,843	393,762					514,084
	5,000,000	230,267	326,869	452,999					719,029
	UNLIMITED	254,112	369,383	553,676					
1987	25,000	138,411	173,863						202,923
	100,000	199,495	277,441						366,384
	500,000	240,932	365,657						601,337
	1,000,000	250,319	390,168						713,729
	5,000,000	261,634	425,525						998,708
	UNLIMITED	268,330	459,210						
1988	25,000	186,830							276,859
	100,000	263,955							485,056
	500,000	312,798							751,375
	1,000,000	323,201							866,825
	5,000,000	335,105							1130934
	UNLIMITED	341,324							9239245

- Development factors for losses limited at various amounts may be calculated from the triangle of limited losses. These are shown on the following page.

- The factors in the "To Ult" column are obtained by taking losses at ultimate and dividing by losses on the last diagonal.

- Note that, as expected, the development factors increase as the limit increases.

PARETO DISTRIBUTION METHOD

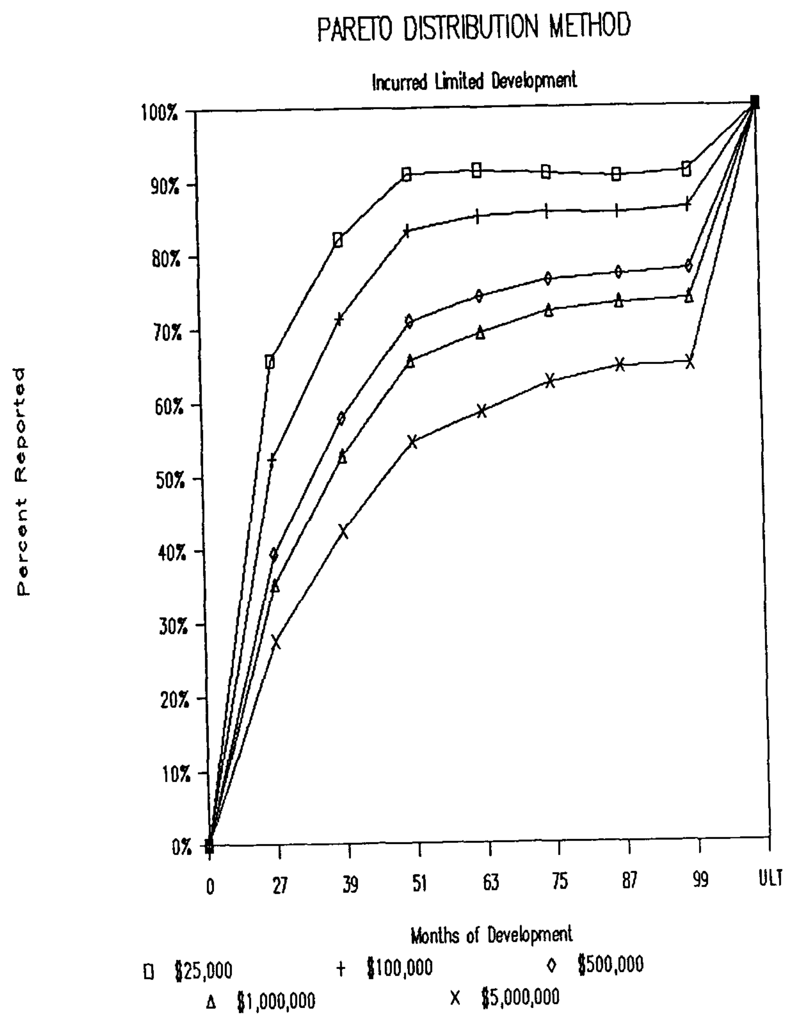
Incurred Age-to-Age Limited Development Factors

Policy Year	Limit	27-39	39-51	51-63	63-75	75-87	87-99		To Ult
1982	25,000				1.012	0.995	1.007		1.098
	100,000				1.015	1.003	1.009		1.159
	500,000				1.034	1.016	1.009		1.284
	1,000,000				1.045	1.022	1.007		1.354
	5,000,000				1.072	1.037	1.004		1.542
	UNLIMITED				1.213	1.126	0.977		
1983	25,000			1.009	0.981	0.993			1.060
	100,000			1.029	0.994	0.995			1.109
	500,000			1.050	1.018	1.005			1.232
	1,000,000			1.057	1.029	1.011			1.305
	5,000,000			1.070	1.055	1.027			1.508
	UNLIMITED			1.105	1.175	1.138			
1984	25,000		1.078	1.009	0.996				1.058
	100,000		1.135	1.032	1.011				1.106
	500,000		1.185	1.068	1.036				1.241
	1,000,000		1.200	1.083	1.047				1.323
	5,000,000		1.225	1.114	1.073				1.558
	UNLIMITED		1.265	1.198	1.170				
1985	25,000	1.274	1.084	0.992					1.070
	100,000	1.392	1.137	1.005					1.136
	500,000	1.491	1.192	1.022					1.310
	1,000,000	1.521	1.211	1.028					1.413
	5,000,000	1.571	1.246	1.043					1.706
	UNLIMITED	1.633	1.310	1.078					
1986	25,000	1.213	1.174						1.007
	100,000	1.305	1.246						1.054
	500,000	1.374	1.316						1.209
	1,000,000	1.393	1.340						1.306
	5,000,000	1.420	1.386						1.587
	UNLIMITED	1.454	1.499						
1987	25,000	1.256							1.167
	100,000	1.391							1.321
	500,000	1.518							1.645
	1,000,000	1.559							1.829
	5,000,000	1.626							2.347
	UNLIMITED	1.711							
Wtd	25,000	1.250	1.107	1.004	0.996	0.994	1.007	1988	1.482
Avg	100,000	1.366	1.167	1.022	1.006	0.999	1.009		1.838
	500,000	1.465	1.226	1.047	1.029	1.010	1.009		2.402
	1,000,000	1.495	1.245	1.057	1.041	1.016	1.007		2.682
	5,000,000	1.543	1.281	1.076	1.067	1.032	1.004		3.375
	UNLIMITED	1.601	1.352	1.127	1.185	1.133	0.977		27.069

- The following exhibit shows the development pattern graphically for various limits.

- The weighted averages are used for development intervals through 99 months. The 99 month to ultimate factors are taken from the 1982 year.

- Note that the horizontal axis is not to scale between 0 and 27 months, and between 99 months and ultimate.



- Layer losses may be generated by multiplying the number of ground up losses by differences in limited average severities.

- Limited average severity differences and layer losses are shown on the following two pages.

PARETO DISTRIBUTION METHOD

Incurred Limited Average Severity Differences

Policy Year	Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25-100				2,157	2,176	2,208	2,219	2,806
	100-500				2,192	2,349	2,460	2,457	3,895
	500-1000				737	848	916	907	1,805
	1000-5000				1,285	1,592	1,779	1,742	4,424
	5000-INFIN				2,383	4,226	5,694	5,223	
1983	25-100			2,118	2,217	2,280	2,273		2,685
	100-500			2,099	2,284	2,497	2,566		3,860
	500-1000			690	771	898	959		1,846
	1000-5000			1,177	1,346	1,672	1,865		4,682
	5000-INFIN			1,998	2,497	4,196	5,972		
1984	25-100		1,909	2,333	2,469	2,538			2,982
	100-500		1,623	2,161	2,501	2,731			4,228
	500-1000		461	650	822	955			2,000
	1000-5000		684	1,010	1,391	1,724			5,013
	5000-INFIN		716	1,213	2,266	3,694			
1985	25-100	1,325	2,106	2,534	2,589				3,202
	100-500	942	1,754	2,359	2,513				4,423
	500-1000	227	484	716	796				2,063
	1000-5000	290	696	1,124	1,304				5,107
	5000-INFIN	201	663	1,397	1,881				
1986	25-100	1,549	2,217	2,906					3,226
	100-500	1,304	2,029	2,961					4,645
	500-1000	384	617	981					2,240
	1000-5000	598	977	1,678					5,741
	5000-INFIN	741	1,258	2,852					
1987	25-100	1,486	2,398						3,641
	100-500	1,008	2,042						5,233
	500-1000	228	567						2,503
	1000-5000	275	818						6,347
	5000-INFIN	163	780						
1988	25-100	1,400							3,464
	100-500	886							4,431
	500-1000	189							1,921
	1000-5000	216							4,395
	5000-INFIN	113							134,914

PARETO DISTRIBUTION METHOD

Incurred Layer Losses(000)

Policy Year	Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25-100				101,813	103,801	105,327	106,731	133,865
	100-500				103,444	112,055	117,354	118,200	185,804
	500-1000				34,773	40,427	43,705	43,613	86,109
	1000-5000				60,635	75,953	84,839	83,771	211,004
	5000-INFIN				112,465	201,586	271,581	251,225	
1983	25-100			110,117	117,048	118,577	118,187		139,645
	100-500			109,128	120,570	129,853	133,457		200,721
	500-1000			35,866	40,699	46,692	49,893		96,017
	1000-5000			61,192	71,050	86,951	96,954		243,459
	5000-INFIN			103,873	131,860	218,195	310,537		
1984	25-100		91,059	113,168	120,966	125,127			147,302
	100-500		77,423	104,822	122,570	134,646			208,841
	500-1000		21,996	31,533	40,257	47,099			98,802
	1000-5000		32,650	49,000	68,142	85,008			247,642
	5000-INFIN		34,171	58,815	111,026	182,137			
1985	25-100	53,011	88,471	108,960	111,607				138,018
	100-500	37,669	73,652	101,425	108,290				190,615
	500-1000	9,077	20,315	30,788	34,314				88,910
	1000-5000	11,619	29,248	48,328	56,196				220,098
	5000-INFIN	8,036	27,836	60,081	81,083				
1986	25-100	49,871	74,926	102,580					115,175
	100-500	41,998	68,583	104,508					165,823
	500-1000	12,370	20,866	34,639					79,967
	1000-5000	19,262	33,026	59,237					204,945
	5000-INFIN	23,845	42,514	100,677					
1987	25-100	61,084	103,578						163,461
	100-500	41,437	88,217						234,953
	500-1000	9,387	24,511						112,392
	1000-5000	11,316	35,357						284,979
	5000-INFIN	6,696	33,685						
1988	25-100	77,125							208,196
	100-500	48,842							266,320
	500-1000	10,403							115,450
	1000-5000	11,904							264,110
	5000-INFIN	6,219							8108311

- Layer development factors may be calculated from the triangle of layer losses. These are shown on the following page.

- The factors in the "To Ult" column are obtained by taking losses at ultimate and dividing by losses on the last diagonal.

- Note that, as expected, the development factors are larger in higher layers.

- The development factors are rather volatile in higher layers. This is due to their sensitivity to changes in the Q parameter.

PARETO DISTRIBUTION METHOD

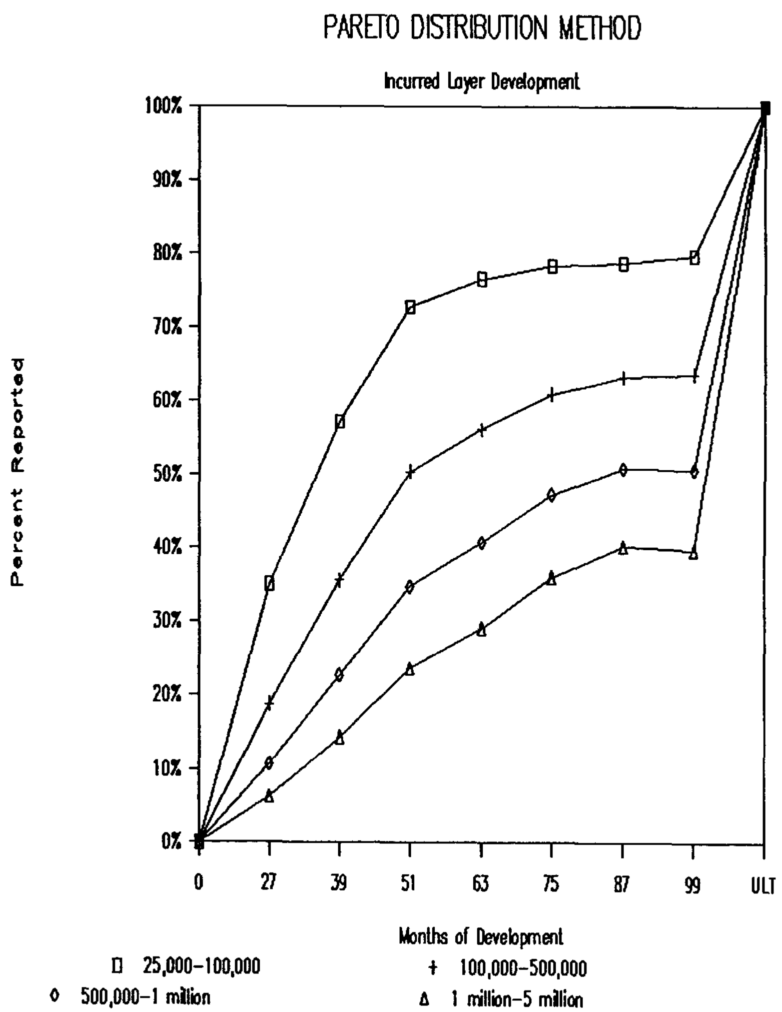
Incurred Age-to-Age Layer Development Factors

Policy Year	Layer(000)	27-39	39-51	51-63	63-75	75-87	87-99		To Ult
1982	25-100				1.020	1.015	1.013		1.254
	100-500				1.083	1.047	1.007		1.572
	500-1000				1.163	1.081	0.998		1.974
	1000-5000				1.253	1.117	0.987		2.519
	5000-INFIN				1.792	1.347	0.925		
1983	25-100			1.063	1.013	0.997			1.182
	100-500			1.105	1.077	1.028			1.504
	500-1000			1.135	1.147	1.069			1.924
	1000-5000			1.161	1.224	1.115			2.511
	5000-INFIN			1.269	1.655	1.423			
1984	25-100		1.243	1.069	1.034				1.177
	100-500		1.354	1.169	1.099				1.551
	500-1000		1.434	1.277	1.170				2.098
	1000-5000		1.501	1.391	1.248				2.913
	5000-INFIN		1.721	1.888	1.640				
1985	25-100	1.669	1.232	1.024					1.237
	100-500	1.955	1.377	1.068					1.760
	500-1000	2.238	1.516	1.115					2.591
	1000-5000	2.517	1.652	1.163					3.917
	5000-INFIN	3.464	2.158	1.350					
1986	25-100	1.502	1.369						1.123
	100-500	1.633	1.524						1.587
	500-1000	1.687	1.660						2.309
	1000-5000	1.715	1.794						3.460
	5000-INFIN	1.783	2.368						
1987	25-100	1.696							1.578
	100-500	2.129							2.663
	500-1000	2.611							4.585
	1000-5000	3.125							8.060
	5000-INFIN	5.031							
Wtd Avg	25-100	1.628	1.276	1.052	1.023	1.005	1.013	1988	2.699
	100-500	1.903	1.415	1.114	1.086	1.037	1.007		5.453
	500-1000	2.131	1.535	1.174	1.160	1.074	0.998		11.098
	1000-5000	2.314	1.649	1.233	1.241	1.116	0.987		22.186
	5000-INFIN	2.697	2.101	1.454	1.694	1.387	0.925		1303.749

- The following exhibit shows the development pattern graphically for various layers.

- The weighted averages are used for development intervals through 99 months. The 99 month to ultimate factors are taken from the 1982 year.

- Note that the horizontal axis is not to scale between 0 and 27 months, and between 99 months and ultimate.



- An alternative way to look at the losses in a layer is to compute the number of losses expected to penetrate the retention and then to compute the expected severity in the layer given that a loss has penetrated the retention.

$$P\,(\text{Loss} > \text{Retention}) = (1-P)\left(\frac{T+B}{\text{Retention}+B}\right)^{Q}$$

Expected Number of Losses > Retention = Ground up Number of Losses x P(Loss > Retention)

$$\textbf{Expected Layer Severity} = \frac{\textbf{Layer Losses}}{\textbf{Expected Number of Losses > Retention}}$$

- This breakdown of the layer losses is shown on the following three pages. For example, for the layer from \$100,000 to \$500,000 at 27 months:

$$.00805 = (1-.92)\left(\frac{11{,}000+15{,}500}{100{,}000+15{,}500}\right)^{1.56}$$

$$322 = 40{,}000 \times .00805$$

$$117{,}003 = \frac{37{,}669{,}000}{322}$$

PARETO DISTRIBUTION METHOD

Prob(Loss>Retention)

Policy Year	Retention	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25,000				0.05835	0.05814	0.05841	0.05866	0.06962
	100,000				0.01542	0.01589	0.01632	0.01638	0.02253
	500,000				0.00231	0.00260	0.00278	0.00276	0.00511
	1,000,000				0.00098	0.00115	0.00125	0.00124	0.00265
	5,000,000				0.00013	0.00017	0.00019	0.00019	0.00057
1983	25,000			0.05786	0.05930	0.05986	0.05944		0.06583
	100,000			0.01497	0.01599	0.01684	0.01694		0.02185
	500,000			0.00217	0.00241	0.00276	0.00291		0.00518
	1,000,000			0.00091	0.00102	0.00121	0.00131		0.00274
	5,000,000			0.00012	0.00013	0.00018	0.00020		0.00062
1984	25,000		0.05526	0.06436	0.06592	0.06653			0.07353
	100,000		0.01262	0.01614	0.01774	0.01868			0.02412
	500,000		0.00152	0.00211	0.00259	0.00296			0.00563
	1,000,000		0.00058	0.00083	0.00108	0.00128			0.00296
	5,000,000		0.00006	0.00009	0.00014	0.00018			0.00065
1985	25,000	0.04128	0.06110	0.06995	0.07053				0.08043
	100,000	0.00805	0.01383	0.01755	0.01824				0.02555
	500,000	0.00078	0.00160	0.00231	0.00254				0.00583
	1,000,000	0.00027	0.00060	0.00092	0.00103				0.00304
	5,000,000	0.00002	0.00006	0.00010	0.00012				0.00066
1986	25,000	0.04639	0.06232	0.07764					0.07955
	100,000	0.01005	0.01515	0.02091					0.02620
	500,000	0.00125	0.00199	0.00309					0.00626
	1,000,000	0.00049	0.00079	0.00129					0.00333
	5,000,000	0.00005	0.00009	0.00016					0.00076
1987	25,000	0.04666	0.06833						0.08924
	100,000	0.00888	0.01598						0.02963
	500,000	0.00080	0.00188						0.00702
	1,000,000	0.00027	0.00071						0.00371
	5,000,000	0.00002	0.00007						0.00084
1988	25,000	0.04527							0.08903
	100,000	0.00808							0.02685
	500,000	0.00067							0.00555
	1,000,000	0.00022							0.00276
	5,000,000	0.00002							0.00054

PARETO DISTRIBUTION METHOD

Expected Number of Incurred Losses in Layer

Policy Year	Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25-100				2,754	2,773	2,786	2,822	3,321
	100-500				728	758	779	788	1,075
	500-1000				109	124	133	133	244
	1000-5000				46	55	60	59	126
	5000-INFIN				6	8	9	9	27
1983	25-100			3,009	3,131	3,113	3,091		3,423
	100-500			779	844	876	881		1,136
	500-1000			113	127	143	151		269
	1000-5000			47	54	63	68		142
	5000-INFIN			6	7	9	11		32
1984	25-100		2,636	3,122	3,230	3,280			3,633
	100-500		602	783	869	921			1,192
	500-1000		72	102	127	146			278
	1000-5000		28	40	53	63			146
	5000-INFIN		3	4	7	9			32
1985	25-100	1,651	2,566	3,008	3,040				3,466
	100-500	322	581	754	786				1,101
	500-1000	31	67	99	109				251
	1000-5000	11	25	39	45				131
	5000-INFIN	1	2	4	5				29
1986	25-100	1,494	2,107	2,741					2,840
	100-500	323	512	738					935
	500-1000	40	67	109					224
	1000-5000	16	27	46					119
	5000-INFIN	2	3	6					27
1987	25-100	1,918	2,952						4,007
	100-500	365	690						1,330
	500-1000	33	81						315
	1000-5000	11	31						167
	5000-INFIN	1	3						38
1988	25-100	2,494							5,351
	100-500	445							1,614
	500-1000	37							334
	1000-5000	12							166
	5000-INFIN	1							32

PARETO DISTRIBUTION METHOD

Incurred Layer Severity

Policy Year	Layer(000)	27 Mos	39 Mos	51 Mos	63 Mos	75 Mos	87 Mos	99 Mos	Ultimate
1982	25-100				36,967	37,431	37,803	37,824	40,309
	100-500				142,141	147,879	150,742	150,020	172,888
	500-1000				319,384	326,438	329,613	328,617	353,010
	1000-5000				1317484	1386801	1418388	1408012	1669228
	5000-INFIN				18575926	25067500	29488235	27852778	
1983	25-100			36,600	37,385	38,097	38,240		40,795
	100-500			140,177	142,852	148,268	151,470		176,620
	500-1000			317,294	319,593	325,767	329,815		356,587
	1000-5000			1298148	1318263	1377934	1419180		1710045
	5000-INFIN			17294828	18579630	23883333	29494118		
1984	25-100		34,548	36,254	37,451	38,147			40,551
	100-500		128,631	133,874	140,970	146,227			175,236
	500-1000		304,261	308,764	316,784	322,865			355,358
	1000-5000		1181991	1218138	1290564	1348416			1696157
	5000-INFIN		11942857	13206579	16726667	20904167			
1985	25-100	32,106	34,474	36,223	36,715				39,816
	100-500	117,003	126,775	134,428	137,764				173,103
	500-1000	290,815	301,555	309,656	313,596				353,951
	1000-5000	1071986	1157946	1226539	1262182				1681614
	5000-INFIN	8956250	11148889	13562162	15204545				
1986	25-100	33,389	35,568	37,430					40,554
	100-500	129,840	133,941	141,590					177,260
	500-1000	308,247	310,231	317,715					357,640
	1000-5000	1221569	1233879	1299700					1723281
	5000-INFIN	13544595	13933333	17301724					
1987	25-100	31,850	35,089						40,795
	100-500	113,598	127,801						176,620
	500-1000	285,690	301,886						356,587
	1000-5000	1030515	1159070						1710045
	5000-INFIN	8091935	11152222						
1988	25-100	30,921							38,910
	100-500	109,770							165,039
	500-1000	281,127							345,824
	1000-5000	996,538							1590666
	5000-INFIN	7487313							2.5E+08

PARETO SOUP METHOD

- The Pareto Soup increased limits model is under development at ISO and is scheduled to replace the current model sometime within the next couple of years.

- As with the current increased limits procedure, a triangle of loss distributions is generated. However, there are a few key differences:

  1. Incremental paid data is used in each cell of the triangle instead of cumulative incurred data. Thus, each cell only contains occurrences paid in that particular time period.

  2. The parameters within the triangle are calculated all at the same time via a maximum likelihood procedure. This ensures that there are logical relationships among the parameters within the triangle.

  3. A mixture of two Pareto distributions instead of a truncated Pareto is used within each cell of the triangle.

- Further details of the Pareto Soup model may be found in the agendas and minutes of the ISO Ad Hoc Increased Limits Subcommittee.

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- An accident year triangle based on some hypothetical general liability data is shown on the following page. Keep in mind that the distributions are based on incremental paid data.

- The P parameter indicates the weight given to the second Pareto distribution.

- Distributions are only shown up to seven payment lags. The final model will contain distributions for subsequent lags so that ultimate loss distributions may be calculated.

PARETO SOUP METHOD

Pareto Soup Parameters

Accident Year	Parameter	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	B1	2572.02	3240.74	13500.00	21600.00	30326.40	40310.78	48977.60
	Q1	1.86000	1.42811	1.36764	1.35918	1.35799	1.35783	1.35780
	B2	1028.81	1481.48	4800.00	7560.00	10964.16	11841.29	9523.42
	Q2	3.86000	3.42811	3.36764	3.35918	3.35799	3.35783	3.35780
	P	0.82000	0.71094	0.64332	0.60140	0.57541	0.55929	0.54930
1982	B1	2777.78	3500.00	14580.00	23328.00	32752.51	43535.65	
	Q1	1.86000	1.42811	1.36764	1.35918	1.35799	1.35783	
	B2	1111.11	1600.00	5184.00	8164.80	11841.29	12788.60	
	Q2	3.86000	3.42811	3.36764	3.35918	3.35799	3.35783	
	P	0.82000	0.71094	0.64332	0.60140	0.57541	0.55929	
1983	B1	3000.00	3780.00	15746.40	25194.24	35372.71		
	Q1	1.86000	1.42811	1.36764	1.35918	1.35799		
	B2	1200.00	1728.00	5598.72	8817.98	12788.60		
	Q2	3.86000	3.42811	3.36764	3.35918	3.35799		
	P	0.82000	0.71094	0.64332	0.60140	0.57541		
1984	B1	3240.00	4082.40	17006.11	27209.78			
	Q1	1.86000	1.42811	1.36764	1.35918			
	B2	1296.00	1866.24	6046.62	9523.42			
	Q2	3.86000	3.42811	3.36764	3.35918			
	P	0.82000	0.71094	0.64332	0.60140			
1985	B1	3499.20	4408.99	18366.60				
	Q1	1.86000	1.42811	1.36764				
	B2	1399.68	2015.54	6530.35				
	Q2	3.86000	3.42811	3.36764				
	P	0.82000	0.71094	0.64332				
1986	B1	3779.14	4761.71					
	Q1	1.86000	1.42811					
	B2	1511.65	2176.78					
	Q2	3.86000	3.42811					
	P	0.82000	0.71094					
1987	B1	4081.47						
	Q1	1.86000						
	B2	1632.59						
	Q2	3.86000						
	P	0.82000						

- Limited Average Severities may be computed from the triangle of Pareto distributions. The formula is:

$$(1-P)\left(\frac{1}{Q_1-1}\left[B_1-(B_1+\text{Limit})\left(\frac{B_1}{B_1+\text{Limit}}\right)^{Q_1}\right]\right)+$$

$$P\left(\frac{1}{Q_2-1}\left[B_2-(B_2+\text{Limit})\left(\frac{B_2}{B_2+\text{Limit}}\right)^{Q_2}\right]\right)$$

- Limited Average Severities are shown on the following page. For example, for a limit of $100,000 for accident year 1985 for payment lag 1:

$$1{,}094 = (1-.82)\left(\frac{1}{1.86-1}\left[3499.20 - (3499.20+100{,}000)\left(\frac{3499.20}{3499.20+100{,}000}\right)^{1.86}\right]\right)$$

$$+\ .82\left(\frac{1}{3.86-1}\left[1399.68 - (1399.68+100{,}000)\left(\frac{1399.68}{1399.68+100{,}000}\right)^{3.86}\right]\right)$$

PARETO SOUP METHOD

Incremental Paid Limited Average Severities

Accident Year	Limit	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25,000	763	1,755	5,475	7,650	9,478	10,489	10,576
	100,000	811	2,125	8,413	13,008	17,290	20,668	22,469
	500,000	828	2,370	10,964	18,260	25,730	32,843	37,928
	1,000,000	830	2,434	11,724	19,898	28,463	36,942	43,302
	5,000,000	833	2,528	12,914	22,512	32,873	43,635	52,166
	UNLIMITED	833	2,622	14,402	25,898	38,644	52,456	63,912
1982	25,000	820	1,868	5,734	7,964	9,829	10,834	
	100,000	874	2,277	8,924	13,730	18,183	21,646	
	500,000	893	2,550	11,738	19,499	27,422	34,925	
	1,000,000	896	2,622	12,581	21,313	30,442	39,448	
	5,000,000	899	2,726	13,901	24,210	35,329	46,862	
	UNLIMITED	900	2,832	15,554	27,970	41,735	56,653	
1983	25,000	880	1,987	6,000	8,285	10,186		
	100,000	942	2,440	9,459	14,482	19,108		
	500,000	964	2,744	12,562	20,815	29,212		
	1,000,000	968	2,824	13,496	22,821	32,548		
	5,000,000	971	2,941	14,962	26,034	37,964		
	UNLIMITED	972	3,058	16,798	30,207	45,074		
1984	25,000	944	2,113	6,275	8,613			
	100,000	1,015	2,614	10,021	15,263			
	500,000	1,041	2,952	13,440	22,210			
	1,000,000	1,045	3,042	14,475	24,429			
	5,000,000	1,048	3,172	16,103	27,991			
	UNLIMITED	1,050	3,303	18,142	32,624			
1985	25,000	1,013	2,245	6,558				
	100,000	1,094	2,799	10,609				
	500,000	1,123	3,176	14,374				
	1,000,000	1,128	3,276	15,522				
	5,000,000	1,132	3,421	17,328				
	UNLIMITED	1,134	3,567	19,593				
1986	25,000	1,086	2,384					
	100,000	1,179	2,996					
	500,000	1,213	3,416					
	1,000,000	1,218	3,527					
	5,000,000	1,223	3,689					
	UNLIMITED	1,224	3,852					
1987	25,000	1,164						
	100,000	1,270						
	500,000	1,309						
	1,000,000	1,315						
	5,000,000	1,320						
	UNLIMITED	1,322						

- A triangle of occurrence counts by payment lag is needed in order to properly weight the different payment lag distributions.

- The Pareto Soup Model uses a maximum likelihood technique to allocate counts to payment lag.

- A fitted triangle of occurrence counts based on some hypothetical general liability data is shown on the following page.

PARETO SOUP METHOD

Incremental Paid Number of Losses

Accident Year	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	9,490	6,011	1,614	1,244	1,006	817	621
1982	10,363	6,564	1,762	1,359	1,098	892	
1983	11,587	7,339	1,971	1,519	1,228		
1984	10,584	6,704	1,800	1,388			
1985	10,028	6,351	1,705				
1986	6,993	4,429					
1987	6,809						

- Limited losses may be computed for various limits within each cell of the triangle. Occurrence counts are simply multiplied by limited average severities.

- The triangle of limited losses is shown on the following page. For example, for a limit of $100,000 for accident year 1985 for payment lag 1:

$$10{,}969{,}000 = 10{,}028 \times 1{,}094$$

PARETO SOUP METHOD

Incremental Paid Limited Losses(000)

Accident Year	Limit	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25,000	7,243	10,551	8,836	9,519	9,530	8,569	6,566
	100,000	7,693	12,771	13,578	16,186	17,385	16,886	13,951
	500,000	7,853	14,242	17,695	22,721	25,872	26,833	23,550
	1,000,000	7,878	14,630	18,922	24,759	28,620	30,181	26,886
	5,000,000	7,900	15,192	20,842	28,011	33,053	35,650	32,390
	UNLIMITED	7,908	15,759	23,243	32,225	38,856	42,857	39,683
1982	25,000	8,494	12,262	10,105	10,822	10,793	9,666	
	100,000	9,056	14,947	15,727	18,657	19,967	19,313	
	500,000	9,257	16,738	20,686	26,496	30,113	31,160	
	1,000,000	9,288	17,210	22,172	28,960	33,429	35,196	
	5,000,000	9,317	17,894	24,500	32,897	38,795	41,811	
	UNLIMITED	9,326	18,586	27,412	38,005	45,829	50,546	
1983	25,000	10,196	14,585	11,824	12,589	12,506		
	100,000	10,915	17,908	18,641	22,004	23,460		
	500,000	11,173	20,138	24,755	31,626	35,867		
	1,000,000	11,213	20,728	26,596	34,674	39,963		
	5,000,000	11,250	21,581	29,485	39,556	46,612		
	UNLIMITED	11,262	22,445	33,102	45,897	55,342		
1984	25,000	9,995	14,163	11,295	11,954			
	100,000	10,745	17,523	18,037	21,184			
	500,000	11,017	19,791	24,192	30,826			
	1,000,000	11,059	20,391	26,055	33,905			
	5,000,000	11,098	21,262	28,985	38,849			
	UNLIMITED	11,111	22,142	32,655	45,279			
1985	25,000	10,158	14,258	11,183				
	100,000	10,969	17,777	18,091				
	500,000	11,266	20,170	24,512				
	1,000,000	11,312	20,805	26,469				
	5,000,000	11,354	21,725	29,549				
	UNLIMITED	11,368	22,655	33,412				
1986	25,000	7,596	10,559					
	100,000	8,242	13,271					
	500,000	8,480	15,129					
	1,000,000	8,517	15,623					
	5,000,000	8,551	16,339					
	UNLIMITED	8,562	17,063					
1987	25,000	7,928						
	100,000	8,645						
	500,000	8,911						
	1,000,000	8,953						
	5,000,000	8,991						
	UNLIMITED	9,004						

- Each row of the triangle on the previous page may be cumulated to generate a cumulative paid development triangle.

- This triangle is shown on the following page. For example, for a limit of \$100,000 for accident year 1985 for payment lag 3:

$$46{,}837 = 10{,}969 + 17{,}777 + 18{,}091$$

PARETO SOUP METHOD

Cumulative Paid Limited Losses(000)

Accident Year	Limit	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25,000	7,243	17,795	26,630	36,149	45,680	54,249	60,815
	100,000	7,693	20,464	34,042	50,228	67,613	84,499	98,451
	500,000	7,853	22,096	39,791	62,511	88,383	115,216	138,765
	1,000,000	7,878	22,508	41,430	66,189	94,809	124,990	151,876
	5,000,000	7,900	23,092	43,934	71,946	104,999	140,649	173,039
	UNLIMITED	7,908	23,667	46,910	79,135	117,991	160,848	200,531
1982	25,000	8,494	20,757	30,862	41,683	52,477	62,143	
	100,000	9,056	24,003	39,731	58,387	78,355	97,667	
	500,000	9,257	25,995	46,681	73,177	103,290	134,450	
	1,000,000	9,288	26,498	48,670	77,630	111,059	146,254	
	5,000,000	9,317	27,211	51,711	84,608	123,403	165,214	
	UNLIMITED	9,326	27,912	55,324	93,329	139,159	189,705	
1983	25,000	10,196	24,781	36,605	49,194	61,700		
	100,000	10,915	28,823	47,463	69,467	92,927		
	500,000	11,173	31,312	56,066	87,692	123,559		
	1,000,000	11,213	31,941	58,536	93,211	133,174		
	5,000,000	11,250	32,831	62,316	101,873	148,485		
	UNLIMITED	11,262	33,707	66,809	112,706	168,048		
1984	25,000	9,995	24,158	35,453	47,408			
	100,000	10,745	28,267	46,305	67,488			
	500,000	11,017	30,808	54,999	85,825			
	1,000,000	11,059	31,450	57,506	91,411			
	5,000,000	11,098	32,359	61,344	100,193			
	UNLIMITED	11,111	33,252	65,908	111,186			
1985	25,000	10,158	24,415	35,598				
	100,000	10,969	28,746	46,837				
	500,000	11,266	31,436	55,948				
	1,000,000	11,312	32,116	58,585				
	5,000,000	11,354	33,079	62,628				
	UNLIMITED	11,368	34,024	67,436				
1986	25,000	7,596	18,155					
	100,000	8,242	21,513					
	500,000	8,480	23,609					
	1,000,000	8,517	24,139					
	5,000,000	8,551	24,889					
	UNLIMITED	8,562	25,625					
1987	25,000	7,928						
	100,000	8,645						
	500,000	8,911						
	1,000,000	8,953						
	5,000,000	8,991						
	UNLIMITED	9,004						

- Development factors for losses limited at various amounts may be calculated from the triangle of limited losses. These are shown on the following page.

- Note that, as expected, the development factors increase as the limit increases.

- Note also that, for a given limit, the development factors are smaller for more recent accident years. This is due to the fact that, as losses trend from year to year, a given limit becomes "lower" in the loss distribution. The model allows projections to be made for development factors in future accident years.

PARETO SOUP METHOD

Paid Age-to-Age Limited Development Factors

Accident Year	Limit	1-2	2-3	3-4	4-5	5-6	6-7
1981	25,000	2.457	1.497	1.357	1.264	1.188	1.121
	100,000	2.660	1.664	1.475	1.346	1.250	1.165
	500,000	2.814	1.801	1.571	1.414	1.304	1.204
	1,000,000	2.857	1.841	1.598	1.432	1.318	1.215
	5,000,000	2.923	1.903	1.638	1.459	1.340	1.230
	UNLIMITED	2.993	1.982	1.687	1.491	1.363	1.247
1982	25,000	2.444	1.487	1.351	1.259	1.184	
	100,000	2.650	1.655	1.470	1.342	1.246	
	500,000	2.808	1.796	1.568	1.412	1.302	
	1,000,000	2.853	1.837	1.595	1.431	1.317	
	5,000,000	2.921	1.900	1.636	1.459	1.339	
	UNLIMITED	2.993	1.982	1.687	1.491	1.363	
1983	25,000	2.430	1.477	1.344	1.254		
	100,000	2.641	1.647	1.464	1.338		
	500,000	2.802	1.791	1.564	1.409		
	1,000,000	2.848	1.833	1.592	1.429		
	5,000,000	2.918	1.898	1.635	1.458		
	UNLIMITED	2.993	1.982	1.687	1.491		
1984	25,000	2.417	1.468	1.337			
	100,000	2.631	1.638	1.457			
	500,000	2.796	1.785	1.560			
	1,000,000	2.844	1.828	1.590			
	5,000,000	2.916	1.896	1.633			
	UNLIMITED	2.993	1.982	1.687			
1985	25,000	2.404	1.458				
	100,000	2.621	1.629				
	500,000	2.790	1.780				
	1,000,000	2.839	1.824				
	5,000,000	2.913	1.893				
	UNLIMITED	2.993	1.982				
1986	25,000	2.390					
	100,000	2.610					
	500,000	2.784					
	1,000,000	2.834					
	5,000,000	2.911					
	UNLIMITED	2.993					

- Layer losses may be generated by multiplying the number of ground up looses by differences in limited average severities.

- Limited average severity differences and layer losses are shown on the following two pages.

PARETO SOUP METHOD

Incremental Paid Limited Average Severity Differences

Accident Year	Layer(000)	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25-100	47	369	2,939	5,358	7,812	10,179	11,894
	100-500	17	245	2,551	5,252	8,440	12,175	15,459
	500-1000	3	65	760	1,639	2,733	4,099	5,374
	1000-5000	2	93	1,190	2,613	4,410	6,694	8,864
	5000-INFIN	1	94	1,487	3,386	5,771	8,821	11,746
1982	25-100	54	409	3,190	5,766	8,354	10,812	
	100-500	19	273	2,814	5,769	9,239	13,279	
	500-1000	3	72	843	1,813	3,020	4,523	
	1000-5000	3	104	1,321	2,898	4,887	7,414	
	5000-INFIN	1	105	1,652	3,759	6,406	9,791	
1983	25-100	62	453	3,459	6,196	8,922		
	100-500	22	304	3,103	6,333	10,105		
	500-1000	3	80	934	2,006	3,336		
	1000-5000	3	116	1,466	3,213	5,415		
	5000-INFIN	1	118	1,836	4,173	7,110		
1984	25-100	71	501	3,746	6,650			
	100-500	26	338	3,419	6,947			
	500-1000	4	90	1,035	2,219			
	1000-5000	4	130	1,627	3,562			
	5000-INFIN	1	131	2,039	4,633			
1985	25-100	81	554	4,051				
	100-500	30	377	3,766				
	500-1000	5	100	1,147				
	1000-5000	4	145	1,806				
	5000-INFIN	1	147	2,265				
1986	25-100	92	612					
	100-500	34	419					
	500-1000	5	111					
	1000-5000	5	162					
	5000-INFIN	2	164					
1987	25-100	105						
	100-500	39						
	500-1000	6						
	1000-5000	6						
	5000-INFIN	2						

PARETO SOUP METHOD

Incremental Paid Layer Losses(000)

Accident Year	Layer(000)	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25–100	450	2,219	4,743	6,667	7,855	8,317	7,385
	100–500	160	1,472	4,117	6,535	8,486	9,947	9,598
	500–1000	25	388	1,227	2,039	2,748	3,349	3,337
	1000–5000	23	562	1,920	3,252	4,434	5,469	5,504
	5000–INFIN	8	567	2,400	4,214	5,803	7,207	7,293
1982	25–100	562	2,685	5,622	7,835	9,174	9,647	
	100–500	201	1,790	4,959	7,839	10,145	11,847	
	500–1000	31	473	1,485	2,464	3,316	4,036	
	1000–5000	29	684	2,328	3,938	5,367	6,615	
	5000–INFIN	10	692	2,912	5,108	7,034	8,735	
1983	25–100	719	3,324	6,816	9,415	10,954		
	100–500	259	2,230	6,114	9,623	12,407		
	500–1000	40	589	1,841	3,048	4,096		
	1000–5000	37	854	2,889	4,882	6,649		
	5000–INFIN	12	863	3,617	6,341	8,730		
1984	25–100	750	3,359	6,742	9,229			
	100–500	272	2,268	6,154	9,642			
	500–1000	42	601	1,864	3,079			
	1000–5000	39	870	2,929	4,944			
	5000–INFIN	13	880	3,670	6,430			
1985	25–100	811	3,520	6,908				
	100–500	297	2,393	6,422				
	500–1000	46	635	1,957				
	1000–5000	42	920	3,080				
	5000–INFIN	14	931	3,863				
1986	25–100	646	2,713					
	100–500	238	1,858					
	500–1000	37	494					
	1000–5000	34	716					
	5000–INFIN	11	724					
1987	25–100	717						
	100–500	267						
	500–1000	41						
	1000–5000	38						
	5000–INFIN	13						

- Each row of the triangle on the previous page may be cumulated to generate a cumulative paid development triangle.

- The triangle is shown on the following page. For example, for the layer from $100,000 to $500,000 for accident year 1985 for payment lag 3:

$$9{,}111 = 297 + 2{,}393 + 6{,}422$$

PARETO SOUP METHOD

Cumulative Paid Layer Losses(000)

Accident Year	Layer(000)	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25-100	450	2,669	7,412	14,079	21,934	30,250	37,635
	100-500	160	1,632	5,748	12,283	20,769	30,716	40,315
	500-1000	25	412	1,639	3,678	6,426	9,775	13,111
	1000-5000	23	584	2,504	5,756	10,190	15,659	21,162
	5000-INFIN	8	575	2,975	7,189	12,992	20,199	27,492
1982	25-100	562	3,247	8,869	16,704	25,878	35,525	
	100-500	201	1,991	6,951	14,790	24,935	36,782	
	500-1000	31	503	1,989	4,453	7,769	11,805	
	1000-5000	29	713	3,041	6,978	12,345	18,960	
	5000-INFIN	10	701	3,613	8,721	15,755	24,491	
1983	25-100	719	4,042	10,858	20,273	31,227		
	100-500	259	2,489	8,603	18,225	30,632		
	500-1000	40	629	2,470	5,518	9,614		
	1000-5000	37	891	3,780	8,662	15,311		
	5000-INFIN	12	876	4,493	10,833	19,563		
1984	25-100	750	4,109	10,851	20,081			
	100-500	272	2,540	8,695	18,336			
	500-1000	42	643	2,506	5,586			
	1000-5000	39	909	3,839	8,783			
	5000-INFIN	13	893	4,563	10,993			
1985	25-100	811	4,331	11,239				
	100-500	297	2,689	9,111				
	500-1000	46	680	2,637				
	1000-5000	42	962	4,043				
	5000-INFIN	14	945	4,808				
1986	25-100	646	3,358					
	100-500	238	2,096					
	500-1000	37	530					
	1000-5000	34	750					
	5000-INFIN	11	736					
1987	25-100	717						
	100-500	267						
	500-1000	41						
	1000-5000	38						
	5000-INFIN	13						

- Layer development factors may be calculated from the triangle of layer losses. These are shown on the following page.

- Note that, as expected, the development factors are larger in higher layers.

- Also, for a given layer, the development factors are smaller for more recent accident years. This is due to the fact that, as losses trend from year to year, a given layer becomes "lower" in the loss distribution. The model allows projections to be made for development factors in future accident years.

PARETO SOUP METHOD

Paid Age-to-Age Layer Development Factors

Accident Year	Layer(000)	1-2	2-3	3-4	4-5	5-6	6-7
1981	25-100	5.933	2.777	1.899	1.558	1.379	1.244
	100-500	10.204	3.523	2.137	1.691	1.479	1.312
	500-1000	16.832	3.975	2.244	1.747	1.521	1.341
	1000-5000	25.814	4.287	2.298	1.770	1.537	1.351
	5000-INFIN	75.834	5.174	2.416	1.807	1.555	1.361
1982	25-100	5.776	2.732	1.883	1.549	1.373	
	100-500	9.905	3.490	2.128	1.686	1.475	
	500-1000	16.314	3.951	2.239	1.745	1.519	
	1000-5000	25.003	4.266	2.295	1.769	1.536	
	5000-INFIN	73.388	5.153	2.414	1.807	1.554	
1983	25-100	5.625	2.686	1.867	1.540		
	100-500	9.617	3.457	2.119	1.681		
	500-1000	15.814	3.926	2.234	1.742		
	1000-5000	24.219	4.244	2.292	1.768		
	5000-INFIN	71.023	5.131	2.411	1.806		
1984	25-100	5.479	2.641	1.851			
	100-500	9.337	3.423	2.109			
	500-1000	15.330	3.901	2.229			
	1000-5000	23.461	4.222	2.288			
	5000-INFIN	68.734	5.110	2.409			
1985	25-100	5.338	2.595				
	100-500	9.067	3.388				
	500-1000	14.863	3.875				
	1000-5000	22.727	4.200				
	5000-INFIN	66.521	5.089				
1986	25-100	5.201					
	100-500	8.806					
	500-1000	14.410					
	1000-5000	22.017					
	5000-INFIN	64.379					

- An alternative way to look at the losses in a layer is to compute the number of losses expected to penetrate the retention and then to compute the expected severity in the layer given that a loss has penetrated the retention.

$$P(\text{Loss} > \text{Retention}) = (1-P)\left(\frac{B_1}{\text{Retention} + B_1}\right)^{Q_1} + P\left(\frac{B_2}{\text{Retention} + B_2}\right)^{Q_2}$$

$$\text{Expected Number of Losses} > \text{Retention} = \text{Ground up Number of Losses} \times P(\text{Loss} > \text{Retention})$$

$$\text{Expected Layer Severity} = \frac{\text{Layer Losses}}{\text{Expected Number of Losses} > \text{Retention}}$$

- This breakdown of layer losses is shown on the following three pages. For example, for the layer from \$100,000 to \$500,000 for accident year 1985 for payment lag 1:

$$.00033 = (1 - .82)\left(\frac{3499.20}{100{,}000 + 3499.20}\right)^{1.86} + .82\left(\frac{1399.68}{100{,}000 + 1399.68}\right)^{3.86}$$

$$3.3 = 10{,}028 \times .00033$$

$$89{,}467 = \frac{297{,}000}{3.3}$$

PARETO SOUP METHOD

Prob(Loss>Retention)

Accident Year	Retention	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25,000	0.00219	0.01317	0.08645	0.14463	0.19832	0.24125	0.26473
	100,000	0.00019	0.00206	0.01941	0.03814	0.05887	0.08133	0.09967
	500,000	0.00001	0.00021	0.00246	0.00526	0.00872	0.01299	0.01694
	1,000,000	0.00000	0.00008	0.00097	0.00211	0.00354	0.00534	0.00703
	5,000,000	0.00000	0.00001	0.00011	0.00024	0.00041	0.00063	0.00083
1982	25,000	0.00249	0.01451	0.09272	0.15354	0.20927	0.25270	
	100,000	0.00022	0.00229	0.02129	0.04156	0.06378	0.08760	
	500,000	0.00001	0.00024	0.00273	0.00581	0.00962	0.01431	
	1,000,000	0.00000	0.00009	0.00108	0.00234	0.00391	0.00590	
	5,000,000	0.00000	0.00001	0.00012	0.00027	0.00046	0.00069	
1983	25,000	0.00283	0.01598	0.09929	0.16277	0.22057		
	100,000	0.00025	0.00255	0.02334	0.04523	0.06900		
	500,000	0.00001	0.00027	0.00302	0.00642	0.01061		
	1,000,000	0.00000	0.00010	0.00120	0.00259	0.00433		
	5,000,000	0.00000	0.00001	0.00013	0.00030	0.00051		
1984	25,000	0.00322	0.01758	0.10616	0.17233			
	100,000	0.00029	0.00283	0.02555	0.04916			
	500,000	0.00002	0.00030	0.00334	0.00710			
	1,000,000	0.00000	0.00011	0.00133	0.00287			
	5,000,000	0.00000	0.00001	0.00015	0.00033			
1985	25,000	0.00365	0.01933	0.11335				
	100,000	0.00033	0.00315	0.02795				
	500,000	0.00002	0.00033	0.00370				
	1,000,000	0.00000	0.00012	0.00147				
	5,000,000	0.00000	0.00001	0.00017				
1986	25,000	0.00414	0.02123					
	100,000	0.00038	0.00350					
	500,000	0.00002	0.00037					
	1,000,000	0.00001	0.00014					
	5,000,000	0.00000	0.00001					
1987	25,000	0.00468						
	100,000	0.00044						
	500,000	0.00002						
	1,000,000	0.00001						
	5,000,000	0.00000						

PARETO SOUP METHOD

Expected Number of Incremental Paid Losses in Layer

Accident Year	Layer(000)	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25-100	20.7	79.1	139.5	180.0	199.4	197.1	164.4
	100-500	1.8	12.4	31.3	47.5	59.2	66.4	61.9
	500-1000	0.1	1.3	4.0	6.5	8.8	10.6	10.5
	1000-5000	0.0	0.5	1.6	2.6	3.6	4.4	4.4
	5000-INFIN	0.0	0.0	0.2	0.3	0.4	0.5	0.5
1982	25-100	25.8	95.2	163.4	208.6	229.8	225.5	
	100-500	2.3	15.1	37.5	56.5	70.0	78.2	
	500-1000	0.1	1.6	4.8	7.9	10.6	12.8	
	1000-5000	0.0	0.6	1.9	3.2	4.3	5.3	
	5000-INFIN	0.0	0.1	0.2	0.4	0.5	0.6	
1983	25-100	32.8	117.3	195.7	247.3	270.8		
	100-500	2.9	18.7	46.0	68.7	84.7		
	500-1000	0.2	2.0	6.0	9.8	13.0		
	1000-5000	0.0	0.7	2.4	3.9	5.3		
	5000-INFIN	0.0	0.1	0.3	0.5	0.6		
1984	25-100	34.0	117.9	191.1	239.2			
	100-500	3.0	19.0	46.0	68.2			
	500-1000	0.2	2.0	6.0	9.8			
	1000-5000	0.0	0.7	2.4	4.0			
	5000-INFIN	0.0	0.1	0.3	0.5			
1985	25-100	36.6	122.8	193.3				
	100-500	3.3	20.0	47.7				
	500-1000	0.2	2.1	6.3				
	1000-5000	0.0	0.8	2.5				
	5000-INFIN	0.0	0.1	0.3				
1986	25-100	28.9	94.0					
	100-500	2.7	15.5					
	500-1000	0.1	1.6					
	1000-5000	0.0	0.6					
	5000-INFIN	0.0	0.1					
1987	25-100	31.9						
	100-500	3.0						
	500-1000	0.2						
	1000-5000	0.0						
	5000-INFIN	0.0						

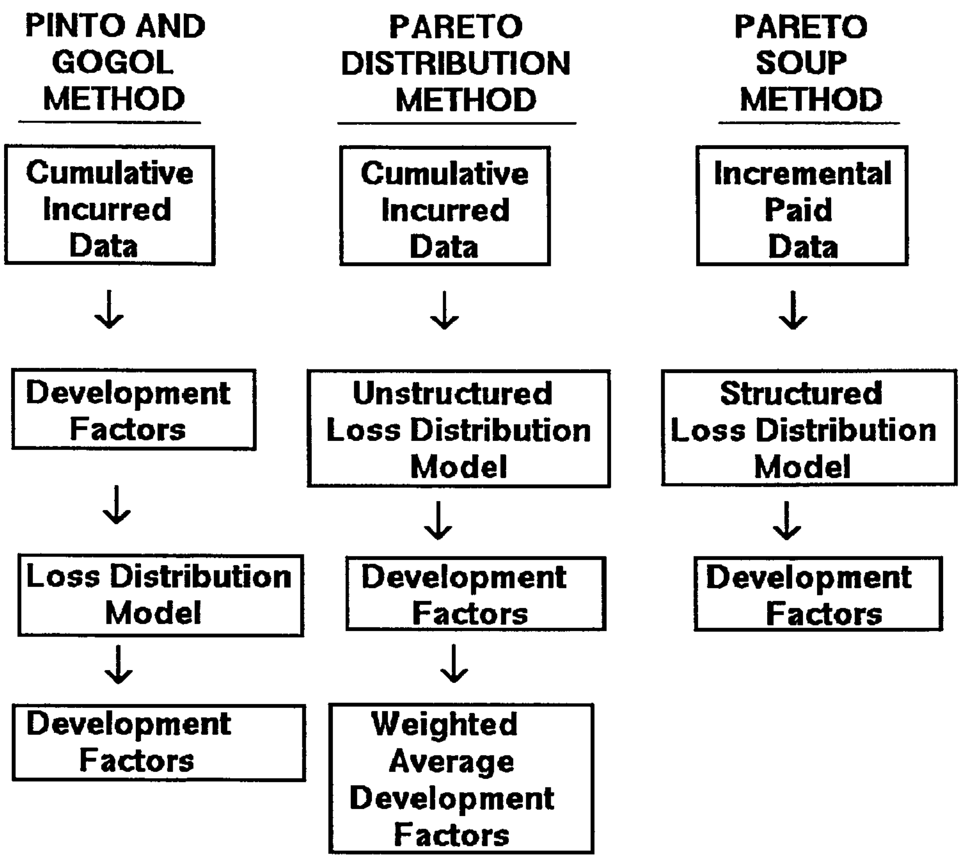
PARETO SOUP METHOD

Incremental Paid Layer Severity

Accident Year	Layer(000)	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7
1981	25-100	21,684	28,047	33,991	37,045	39,391	42,195	44,928
	100-500	88,857	118,739	131,392	137,686	143,373	149,697	155,102
	500-1000	261,706	300,618	308,914	311,502	313,447	315,525	317,289
	1000-5000	873,184	1,165,555	1,225,173	1,238,876	1,246,561	1,254,271	1,260,831
	5000-INFIN	5816944	11686865	13636861	13980800	14051449	14085871	14111018
1982	25-100	21,794	28,188	34,407	37,553	39,921	42,787	
	100-500	88,993	118,930	132,142	138,819	144,860	151,585	
	500-1000	261,757	300,677	309,148	311,867	313,947	316,177	
	1000-5000	873,322	1,165,752	1,225,998	1,240,191	1,248,395	1,256,697	
	5000-INFIN	5817183	11687471	13639798	13985610	14058223	14094880	
1983	25-100	21,911	28,338	34,837	38,068	40,448		
	100-500	89,139	119,136	132,945	140,026	146,435		
	500-1000	261,811	300,740	309,399	312,259	314,484		
	1000-5000	873,470	1,165,965	1,226,889	1,241,610	1,250,373		
	5000-INFIN	5817442	11688125	13642970	13990804	14065538		
1984	25-100	22,038	28,499	35,281	38,588			
	100-500	89,297	119,358	133,804	141,311			
	500-1000	261,870	300,808	309,670	312,681			
	1000-5000	873,631	1,166,194	1,227,850	1,243,139			
	5000-INFIN	5817721	11688831	13646395	13996413			
1985	25-100	22,173	28,669	35,737				
	100-500	89,467	119,597	134,722				
	500-1000	261,933	300,881	309,961				
	1000-5000	873,805	1,166,442	1,228,886				
	5000-INFIN	5818022	11689593	13650095				
1986	25-100	22,317	28,850					
	100-500	89,650	119,854					
	500-1000	262,002	300,961					
	1000-5000	873,992	1,166,709					
	5000-INFIN	5818348	11690417					
1987	25-100	22,472						
	100-500	89,848						
	500-1000	262,076						
	1000-5000	874,194						
	5000-INFIN	5818699						

- If the distribution of unpaid occurrences is available corresponding to each cell of the incremental paid triangle, it would be possible to generate incurred development factors using the Pareto Soup Model. It is anticipated that this will be done in the future.

SUMMARY


PINTO AND GOGOL METHOD
Cumulative Incurred Data
Development Factors
Loss Distribution Model
Development Factors
PARETO DISTRIBUTION METHOD
Cumulative Incurred Data
Unstructured Loss Distribution Model
Development Factors
Weighted Average Development Factors
PARETO SOUP METHOD
Incremental Paid Data
Structured Loss Distribution Model
Development Factors

1991 CASUALTY LOSS RESERVE SEMINAR

4A-1/4A-2/4B: BASIC TECHNIQUES II

Panel

Jane E. Jasper
St. Paul Fire & Marine Insurance Company

Jonathan Norton
Guy Carpenter & Company

MS. JASPER: Welcome! This is Basic Techniques II. This session assumes that you have been to Basic Techniques I, and are acquainted with the Paid and Incurred loss development techniques as well as the Counts and Averages development methods.

I am going to be making some references to Basic Techniques I. If you are familiar with loss development, I don't think it will take long to catch up. Obtaining a handout for the Basic Techniques I would be helpful.

I am Jane Jasper. I am an actuary for the St. Paul Companies. I work in the subsidiary that is called St. Paul Specialty Underwriting in the Large Accounts area.

MR. NORTON: My name is Jonathan Norton. I am a vice president with Guy Carpenter and Company in New York. Guy Carpenter is a subsidiary of Marsh McClennan and is in the reinsurance business, a reinsurance intermediary.

INTRODUCTION TO BASIC TECHNIQUES II

MS. JASPER: This is Basic Techniques II, and you should have a handout. Most of the handouts follow very closely along with the overheads. Not quite. In fact, the first one is the first exception. Your outline is a little bit more detailed than this. I like this one because it outlines the six things that we are going to discuss today:

1) Analysis of Loss Development Factors
2) Evaluating the Current Year
3) Other Methods
4) Tail Factors
5) Related Topics
6) Monitoring Results

(Exhibit: Outline)

Let me explain very briefly. The first topic we are going to discuss is called 1) "Analysis of Loss Development Factors." This is the first example of something that is going to follow directly from what we did in Basic Techniques I. It is going to say, "Let's see what happens if we would have chosen a <u>different</u> set of loss development factors, and then let us compare results." Sensitivity analysis is another word for that comparison.

The second topic is 2) "Evaluating the Current Year." By current year we are talking about 1990. That was the accident year that had only one point. Therefore, we used just one observation to try to tell us what is going to happen ultimately, or at the end, after all claims are closed. That is what that current year is talking about.

3) "Other Methods." There are two of them. There's a loss ratio additive method, which I will be discussing, and another method, which deals with frequency and severity again, which will be discussed by Jonathan.

Jonathan is going to end the discussion talking about 4) "Tail Factors", giving you some additional information. There will also be additional discussion of tail factors in Basic Techniques III.

The fifth topic is 5) "Related Topics." These topics are pure premium and the payout pattern. The last item in Basic Techniques II is 6) "Monitoring Results." Actually, I like to call that section "Monitoring and Forecasting of Results." That last topic is the point at which you actually get to square the loss development triangle. I know you are all really excited about that, so hang onto your hats.

1) Analysis of Loss Development Factors

As I promised, we are going to start out with a sensitivity analysis, but we are first going to remind ourselves what we did in the last session. This is a recap of Basic Techniques I, and it compares the answers that we got from the three different methods. We had the paid development, the incurred development, and the counts and averages. We are comparing the estimated required reserves. See the top section of Exhibit II.1, page 1 of 2.

(See Flip Chart Exhibit)

One thing that will help is if we remind ourselves, what we calculated for 1990 as the reserve amount. For our paid method we had $14,822,000.

For the incurred, we calculated $13,226,000, for 1990. Lastly, our $11,444,000 for the counts and averages method. Those are the reserve amounts for 1990 alone.

In total, the differences are significant. We are recommending a reserve of either 35 million (Paid) or 28 million (Incurred) or 33 million (Counts/Averages). When you are talking about millions of dollars, that is a lot of difference. What we want to do in this session is move you toward more of a concise way of reaching a conclusion as to what reserve amount we might recommend to the board.

Unfortunately, when you leave here you still won't have the definitive answer, but we are going to move you a lot further towards a conclusion than you are now.

(Exhibit II.1, page 1)

At the bottom of Exhibit II.1, page 1 is an estimate of the required IBNR. The difference between the top and the bottom in this exhibit are the case reserves. Those are the amount of dollars that the company has in reserve for specific claims. The claims adjusters have gone in and said, "We think this claim is going to cost us $10,000." That would be an example of a case reserve.

Case reserves are part of the total reserve, but we want to separate those out and get the leftover, which is what we call IBNR. It stands for Incurred But Not Reported.

The actuarial projections of IBNR are the 12 million (Paid), 5 million (Incurred), and 10 million (Counts/Averages). Again, quite a big difference. You want to find out which one is more right than the other ones.

We are going to start out with a paid loss development example, and I'm going to go through this example and tell you what we did last time, and then tell you what we are going to do. This is the sensitivity analysis that I mentioned earlier.

(Exhibit II.1, page 2 of 2)

In our first column we've got losses paid-to-date. Those are the losses on the diagonal, of the loss triangle. $6,962 is the paid-to-date for accident year 1990. It is the number we used on the Flip Chart Exhibit for the paid example to multiply by our paid loss development factor.

In our first example (paid method) we picked loss development factors based on a simple average for the first 12 to 24-month time period. We took six numbers. We added them up and divided by six. The question that this exhibit is trying to answer is, "What would happen if we chose a different set of factors?" In this case, what if we took the four-point averages, which, instead of taking all the numbers, just took the last four?

We accumulate (multiply) our age-to-age factors and get our age-to-ultimate factors by year. We've got a little bit of rounding error in this exhibit. The 1990 factor is 3.128. You'll remember previously we used 3.129. You are going to get a little bit different numbers on your exhibits. It is due only to rounding.

We are going to compare two different results. We are going to get ultimate losses based on either using the first set of loss development factors or the second set. The ultimate losses from using the straight averages are numbers that look familiar to us by this time. The $21,777,000 is pretty close to the $21,784,000 we had on the Flip Chart Exhibit. It is the same number, save for rounding.

We are going to compare the $21,777,000 with what we get under our new method, which is $21,958,000. You will also notice that after the first few years we end up getting the same result because the difference between the simple average and the most recent four years disappears after a certain number of years.

These are the estimated ultimate dollars. Next are the indicated IBNR reserves. We are going to jump -- kind of take a new route. It is kind of a shortcut. Before, whenever we had this ultimate loss we subtracted the paid amount and got the total required reserve. Then we got that required reserve and we took out the case reserves and got what we called the IBNR.

The shortcut is to take out the paid and the case all at once. Then we can get directly to the IBNR reserve amounts. These are the numbers in the lower right hand corner of Exhibit II.1, page 2. We've got ultimate losses for these two examples, we subtract out our paid plus our case, and this is what our indicated IBNR reserve is. These are both paid loss development factors, just two different sets. We compare our IBNR reserves here of $11.7 million to $11.9 million. In my opinion not a real big difference.

In my work, if this is the kind of answers I would get, I would be convinced that it didn't matter which of those two sets of factors I chose.

That is very consistent with the fact that those historical factors themselves were very stable. When factors are stable, you get similar answers whether you do one technique or the other.

What I want to caution you about is the fact that this does not always happen. In fact, this stability is probably rare. You rarely see this kind of thing in real life. When you do things in your work, you're going to find sometimes very, very different answers, so I don't want to minimize the importance of what is going on here.

When you get very, very different answers for IBNR, that's the time when you've got a lot of work to do. You've got to visit your claims people. You've got to revisit what you did. You've got to ask why your last four factors are giving you so much different numbers than all of the factors put together. And you've got to keep asking questions until the direction to go is clear.

This is the end of our discussion of the sensitivity of selected loss development factors.

2) Evaluating the Current Year

Now we are going to evaluate the current year. Before I go on I want to remind ourselves of a couple things that maybe we have forgotten.

(Exhibit I.19)

This is an exhibit from our last presentation, Basic Techniques I. This is Exhibit I.19, and if you recall, we walked us through this exhibit comparing the results from the paid, the incurred, and the counts/averages methods.

In the top section of this exhibit, we calculated loss ratios for each method. Note how low the 1990 loss ratio is. The 1990 number is always lower than all the other years before it. This is true of all 3 methods.

First, the paid development method gave us a 57%, and historically we have seen somewhere up from 60% to 70%. For incurred, we are looking at a 52% loss ratio for 1990, when historically the lowest we have ever seen was 56% on up to 62%, 64%. Similarly, in the third method we are looking at a current year of around 48%. That's the all-time low for all methods.

So, in this next section I'm going to ask some questions, like why is 1990 so low? How can we get a good answer for that 1990 year?

(Exhibit II.2, page 1 of 6)

There are several possible reasons why the loss ratio might look like it is improving in the current year. We have five reasons displayed on Exhibit II.2, page 1 of 6. One might be that you raised the rates as a company. Higher rates will give you a higher premium amount. The loss ratio is calculated by dividing ultimate losses by the premium. If you raise your rates, you are going to get more premium, and that is going to give you a lower loss ratio. If that is what is happening, then you are going to want to believe the fact that your loss ratio is getting better.

A second reason could be lower frequency. Frequency is, the number of claims that we have per 1,000 cars. It is a measure of how many claims we get. Frequency might be going down for some very real reasons. One real reason might be speed limit laws. When the President said the speed limit will be 55 instead of 70, that could be one reason why frequency all over the United States would go down.

Thirdly, you might have lower severity. Severity is the amount that it costs us to pay a claim. An example of what might happen and make a real improvement there is seat belt laws. A lot of states now have mandatory seat belt laws. I am not sure that is going to cut down on how many accidents happen, but when they happen, we don't expect as many people to get killed. Therefore, we might see a real improvement in severity.

Those first three possible reasons are things that can happen and really can improve your loss ratio. The last two things are things that can happen and can make you think you have got a better loss ratio when, in fact, it is maybe not really getting any better.

The first of those two things are slower claim payments. Maybe you've got a lot of turnover in your claims department; maybe your computer broke down, or maybe your claims are being paid slower than they were in the past. In these cases, you are looking at a smaller number for your first payment amount. That would be 6962 for 1990. Maybe that amount is smaller only because you haven't gotten it all in yet. If you use our normal methods, it is going to appear like you've got a good year when in fact you don't.

The final thing is that you might have case reserves that are less adequate than they were before. The amount of outstanding that you have might be lower just because the claims department has said, "We have been really conservative in the past. We don't want to be that conservative anymore because we want to release some of that cash, and we are not going to set reserves as high as we did before."

Well, nothing has really changed about your company. Nothing is going to happen to make things be better in the end, but it is going to look like you have a better loss ratio. That's a very dangerous situation.

QUESTION: When you said improved loss ratio, are you saying that 50% is pretty much the ratio they want?

MS. JASPER: Actually, that is a question I am not prepared to answer. What I mean by "improved" is improved over what it was before. Every company is going to have a different target loss ratio. The level of your target loss ratio is going to depend on how much it costs your company to run the company. For example, the commissions you pay, general expenses and so on.

I'm going to address those five questions from Exhibit II.2 page 1, one at a time and we'll ask some questions. The first question, or the first possibility of why that loss ratio might be lower in the current year, is, "Has there been a change in the rate level adequacy?"

(Exhibit II.2, page 2 of 6)

One of the ways to do this is to look at the data that we have. In the first column here we have the earned premium. Those are numbers you have seen before. These are the earned dollars of premium that we have for the cars that we have ensured over those years.

Column 2 is a new number that you haven't seen before, and that's called the insured car years. We are going to define a car year as one car insured for a whole year. That means, if you write a policy effective July 1 and it goes from July until the end of the year you are only going to get a half a car year. The car years in Column (2) are in thousands.

This is the first time you really get to see how much the company has been growing since 1984. Remember, we said we started writing in 1984? Okay, in 1984 we had 100,000 car years, and now we are up to 118,000. So the company, in terms of exposure, has grown 18 percent.

You can't identify exposure growth from premium, because we don't know how much of that premium increase is due to the fact that we are charging more, or conversely, the fact that we are insuring more autos. So we are growing.

In Column (3), we are going to calculate average premium per car year, which is simply Column 1 divided by Column 2. We do see that average premium is growing. In 1984 we charged $172 per car, and now we are charging $326.

In Column 4, we look at the change from year to year. You can see in 1985 we increased rates 4 percent, then 26 percent, 5 percent, 4 percent, 18 percent, and 13 percent. The significant point here is that the rates have been increasing every year. We do see some rate increase here in 1990, but remember, we are looking for a very significant change as to why that loss ratio is improving.

If these rate increases are real, the 18% and the 13% -- those, in my mind, are pretty big rate increases, and they could very well be the reason why the loss ratio is improving. You are going to want to be sure about that before you go on.

That is one way of answering the very first question, "Is there a change in the rate level?"

(Exhibit II.2, page 3 of 6)

The second question is, "Has the frequency changed?" Is there a reason to think that the number of accidents that we are having is less now than it was before?

To look at that we are going to revisit our reported claim triangle. We are going to divide our claim triangle by our insured car years.

For example, at 12 months we have 1,604 claims, and 118,000 car years, and we are going to calculate a frequency. This is also another new term, because we are measuring the number of claims per 1,000 car years. By dividing -- each of the claim counts are getting divided by the insured car years for the appropriate accident year.

The result 13.6 is achieved by taking the 1,604 divided by the 118. One of the things we might have a look at is, even at 12 months, we used to have 14, 17, 13, 14, now we are at 13.7, 13.6. We might want to ask ourselves, does that look like a real improvement, or is that just random fluctuation?

At 12 months we might have an inkling that frequency is showing some change, but it is most important to look at estimates of ultimate frequency.

We are going to calculate our age to age factors, and get age to ultimate factors, and get ultimate claim counts, and then divide them by our car years. I am assuming you are familiar with those steps at this point. We get ultimate frequency. In my opinion, we do see some indication that the ultimate frequencies for these three years (1988-1990) do look somewhat lower than what they did for 1984-1987.

You can't stop there. You've got to find out for sure if the improvement is real and there is something happening. However, this method is a very good way to approach that question.

(Exhibit II.2, page 4 of 6)

The third question is, "Is there any change in severity?" To look at possible changes in severity, we are going to go back to our answers from our three different methods. We have our paid development, our incurred development, and our counts and averages. We are going to take our ultimate dollars from each of those three methods and compare them to our ultimate claim count for each accident year.

Ultimate claim counts are the numbers that Jonathan gave you before. In fact, the 3078 for 1990 is the one that we calculated for frequency on the Flip Chart Exhibit. We took our reported 1990 claims of 1604 times 1.919. We got 3078 for the ultimate claim count for 1990.

We are going to take all our ultimate dollar amounts and compare them to our ultimate claim counts. We are going to come up with severities; three sets of severities for three different methods. Then we are going to look at the changes. Do they go up and down? We see a few big bumps. Severity has gone up over 1984 to 1989.

What is happening on the current year? All these questions are trying to answer what is going on in that current year. The paid loss development says not much is going on in the current year. The incurred result says maybe 2 percent up. The counts and average method looks really weird. The decrease of 18 percent in the current year looks really funny. It really looks out of line here. That is something you want to look at further. It calls this method into question.

One of the things that we know about severity is that we really do expect it to increase. We expect it to increase as we go, for example from accident year '84 to 1990, simply because of inflation.

There is another typo on your handouts. In the third paragraph it says, "The decrease in frequency." That really should be, "The decrease in severity being forecast for the current year..." Finally, the last paragraph rightly talks about frequency but this statement belongs on the previous exhibit, Exhibit II.2, page 3.

(Exhibit II.2, page 5 of 6)

We are up to our fourth question, which is, "Has there been a change in the rate at which the claims close?"

The way we are going to investigate this question is by looking at the number of claims closed by age of development. Now, this is actually new information. You haven't seen a triangle before that shows exactly the claims that have been closed. You saw claims that were reported, which are these claims in addition to the ones that are still open.

Now we're looking at the ones that are closed, and we have the ultimate number of claims which are based on the projection of reported claims. So, 3078 is our key number again. That is the one we have seen all along as the ultimate claim count for accident year 1990.

As our ultimate estimate we are going to use the numbers we had before. But we are going to look at how many claims closed in relationship to that. Simply divide the two and get a percentage.

Let's look at the 12-month numbers. As you can see, the numbers through 1987 were in the twenties, so somewhere between 25, 30 percent were closed in the first 12 months in those early years. Now, if our projections of these claim counts are right, it looks like in the more recent years we are observing that 33, 34, 36 percent are closed already in the first year. That would be a warning to us that things are changing. It would also be a warning to us that if they are changing that dramatically, then our paid factors might be too high. If claims are closing faster now than they were before, and we base loss development factors on historical data where they were closing slower, we are going to look at that number at 12 months and say, "Boy, we've really got to bump that number up," when in fact we don't have to bump it up as much as we used to.

(Exhibit I.22, graph)

I am going to give you one more reminder before we go on. This is the graph of loss ratios that Jonathan showed you in Basic Techniques I. The Counts and Averages ultimate loss ratios are on top. The next line below it are the paid loss development results for ultimate loss ratios. The bottom line represents the incurred loss ratios. So, we can take a look at those two bottom lines. The paid loss development factor always gives us a higher result than the incurred loss development factors. And now we just got some new information that says there's real reason to believe that those paid losses development factors are probably too high. You have already made some progress towards concluding that between the two methods, there are reasons to believe the paid method is too high. Therefore, we want to come down in our estimate.

This conclusion doesn't mean you've got the final answer, but at least you've got some reasons to know which one is more right than the other.

(Exhibit II.2, page 6 of 6)

We are up to our last question that we are asking about the current year, and that is, "Has the adequacy of the case reserves changed over time?" We are going to look at some more triangles to get to the bottom of that question. In the top one we see outstanding case reserves. This is another triangle that you haven't seen before.

You have seen the outstanding reserves number, along that last diagonal, but now all they are showing here the numbers that you see at those different snapshots (evaluating points), and what the outstanding reserves are. So, no paid dollars in here. These are just case reserves.

We are going to compare the case reserve dollars to the number of open claims. Open claims are another triangle you have not seen before. The closed claims plus these open claims give the total reported claims.

Dividing the outstanding case reserves by the number of open claims, gives rise to the average case reserve by accident year and month of development.

This is an interesting number to know about. The average case reserve tells us what the claims department says we are going to have to pay on the claims that we know about, but which have not yet been paid.

There are a couple of things we expect about this triangle. And this one actually behaves very nicely for us. We expect these case reserves to get higher as we go across the top (horizontally). That is because normally our smaller claims are going to settle first and our larger claims are going to be the ones that hang on, go through court, and lots of litigation. This triangle looks reasonable.

The other thing that looks reasonable about these numbers is that we expect claim reserves to be bigger as we go down the accident year column (vertically). We expect claim reserves for open claims to be higher for 1990 than they were for 1984. And that is, in fact, pretty much what is happening here.

(Exhibit II.2, page 6A)

Just like you can't stop actuaries from taking averages, you can't stop actuaries from making graphs, so we made a graph for you just to show how nice that works. This is simply a graph of the numbers that you saw in the previous exhibit at 12 months. The jagged line represents the actual numbers of the average case reserves, and the authors of this paper put a fitted line through the historical points. You can see that the fitted line predicts fairly well where those average case values are going. The point of this exhibit is really that those average case reserves are behaving pretty much as we would expect.

Now, let's relate our conclusion to the question we are asking. We are asking, "What is different about the current year? Are the case reserves less adequate than they were before?"

In my opinion, our conclusion would tell us that that answer is no. That is not the reason why that current year looks better than the other years, because the case reserves here seem to be behaving as we expect them to.

(Exhibit II.3)

Before we leave this section, we have one more surprise to wake you up. This is a man probably talking to actuaries, and he is saying we always engage in a little give and take with our claims department. They take down the reserves, and then we will give them back in bulk. So, he is implying here that as soon as they take things down, we'll increase them. Of course that depends on if "increasing" is the right answer.

(Exhibit: Outline)

Refer once again to our outline. We are now done with the first two topics of discussion. We have analyzed loss development factors and we have evaluated the current year. The third topic is "Other Methods."

3) OTHER METHODS

The other methods that are provided here are methods to use when you are having trouble with your data. Trouble could be in the form of having a very small volume of data. You might also have a very long tail line. What I mean by a long tail line are lines of insurance for which it is typical for claims not to be known about at the end of the first, second, maybe even the third evaluation.

Medical malpractice is the typical case of a long tail line. In fact, the standard example is probably the best one to use, about a doctor who does surgery and leaves the sponge inside the patient. That sponge stays in there for seven years and doesn't cause the patient any problem at all. After seven years it starts to fester, and then we find out that we have a claim. That kind of situation is indicative of a long tail line. With a long tail line or a small volume of data, you can't always use the data that you have historically to predict what you are going to have to pay in the future, at ultimate.

The first "other method" that we are going to talk about is called the loss ratio additive method. This is a new one for me. When I got this material I had to learn what this was, so I will give you my reactions to the method. I will give you what I see as the pros and cons. I do think it is a very good method to use when the conditions are right.

(Exhibit II.4, page 1 of 2)

At the top of this exhibit we have incurred losses on an incremental basis. All the triangles you have seen up until now, have had the incurred dollars at 12 months. Then we added in what happened the next year, and then we added in what happened the next year, etc. We have always been giving you cumulative amounts.

For this particular triangle, we change. We give you incremental amounts. All that means is that up there in the top of the triangle, the 8,382,000, would be the same number you saw before, but the number you see at the 24 months is simply how much got added in that next year from 12 to 24.

In this case, to get the number that you've got right now or at the end of '90, when we took our snapshot, you're going to add the top row, add them up and get the total. The earned premiums in that left-hand column are the same numbers we saw before.

Next we're going to calculate some incurred loss ratios and do these on an incremental basis. What they are simply doing there is taking the losses divided by the premium and showing you the incremental results. So, to get the loss ratio for 1984 as it stands today, (no IBNR) you'd have to add the .489, the .082, the .019, the .006, the .003 and the two .001's. Adding those all up, you'd get a total of where things stand today.

We're going to take averages of the 12-month column, the 24-month, etc. We're going to play around with a few other things, four-point average, average without the high and low, and then we're going to select some. In this case, the simple average was selected. For these examples today, we are trying to make things very simple and straightforward. That does not mean that you always pick the average. But for these examples, that's what they picked.

Now we will proceed to estimate the IBNR. We're going to use these incremental numbers, and we've got to remember that they're loss ratios. So, take the .431 for 1990. We want to add a number to that that gets us to what we think the final ultimate loss ratio is going to be. We're going to add to it the amount that we need to add from the 12-month mark to the 24-month mark.

So, to .431 for 1990 we're going to add .08, and also .017, .006, .002, .001 and the last .001. Our total is .538. This is an additive method as opposed to a multiplicative method.

(Exhibit II.4, page 2 of 2)

This is the exhibit where we put them all together. In Column 1 we have the earned premium. In Column 2 we have the incurred to date. That's simply our numbers that were along the last diagonal. In Column 3, we've got the paid to date. Those are familiar numbers now, especially this 6,962,000 for 1990.

Column 4 is the incurred-to-date loss ratio. These are the loss ratios I discussed earlier. If you added the increments vertically, these are the resulting cumulative los ratios. In 1984 if you had added all the numbers across you would have gotten .6 or 60 percent. For 1990, you remember we only had one number. The 43.1 is the single number for 1990.

Column 4 is repeated on the second line for convenience. In column 5 are the numbers we are going to add to them. The 10.7 is the result of adding up our selected incremental loss ratios on the previous exhibit.

If we go back to the numbers we selected, and we add up these six numbers, we are going to get .107 or 10.7 percent. You don't have to add anything for the zero to 12, because we've got those observations for each of the years.

Therefore, the very first number we need is 10.7. The last number we need is .001. Those are the numbers that show up in column 5. In fact, for 1984 we're not going to add anything.

From here we simply add these two together (Columns 4 and 5) and get our ultimate loss ratio (Column 6). Then we're going to calculate our indicated reserve (Column 7). I need to point out another typo, because we are going to use our ultimate loss ratio and multiply it by our earned premium. The last column here, Column 7, should be Column 1 times Column 6 minus the paid. Your handouts erroroneously say the calculation is Column 1 times Column 5 minus the paid.

So we're going to take our earned premium and multiply that by our ultimate loss ratio. That gives us our ultimate dollars. And then we are going to once again subtract out our paid, so that we get our indicated reserve amount. (Column 7)

Now we can take this number, the 13,700,000, and compare it to the three we had before. This is the 1990 number. Remember, that before, we had a 14,800,000, 13,200,000, and 11,400,000. The 13,700,000 is a comparable number to those, for all years, this loss ratio additive method produces a recommended reserve of $28 million.

I want to tell you a couple of good things and bad things about this method. The one good thing is that the numbers here can be selected incrementally and you can just tack them on to anything that happens beforehand. That might be really nice if you've got a long tail line when, as I said before, you don't really believe the historical data. Just because you've gotten $1 million in or $100 million in, doesn't necessarily tell you how much you are going to get in over the next ten years. That's the good thing about this method.

There are two things that really concern me. The first one is just the opposite of the "good thing". This method does ignore how much came in already. When you priced this product you had an idea how it was going to behave, and by adding in 10.7% you are basically ignoring what has happened already. That can be a pretty dangerous thing, because if it is behaving very differently than you thought, you need to pay attention to that and possibly recalculate what you expect to happen in the next ten years.

The other concern that I have about this method, is that it's using loss ratios. The method is assuming that your rate adequacy stays the same throughout. For the loss ratio you divide your losses by your premium. The method thus depends on your level of premium, and it assumes that your rates have had a consistent level of adequacy (or inadequacy) throughout time.

The thing that I think is so ironic about the example that we are using here is that we have concerns about our current year. We see it improving, and after asking those five questions from the last section, we were strongly suspecting that we've got higher rates. We do believe that there's some improvement in our current year. When you've got improvement in your rates (a higher rate level), you are not going to want to go in and add the 10.7 percent that's based on years when you didn't have rate level adequacy. So be very careful with this method.

I'm going to turn it over to Jonathan, and once again remind you where we are. We are in the middle of the other methods. Jonathan is going to describe another other method, and also a few other special items.

MR. NORTON: We are still talking about alternative or other methods, and I think when we are talking about other methods in this case, we will be focusing in on the most current accident year, in this case 1990. I will put up this slide once again.

(Slide)

And that will be the year which, always has the least amount of historical development information. Therefore it's the most subject to question on what the accident year ultimate loss is going to be.

If we go back to our comparison of the three methods that we have been using, we see a wide disparity of loss ratios from 57 all the way down to 48 using counts and averages. Counts and averages is a method where we added more information to our analysis. We started thinking about claim counts or frequency. We obtain a split for a detailed analysis of what is making up the losses, frequency of losses and the severity of those losses.

But here, with the counts and averages method, we see 1990 is at 48 percent. It seems to not fit in with any of the historical experience, and is considerably below our other indications when using the incurred development method. It seems to call into question of what happened in 1990 with the counts and averages method that caused us to get such a low result.

One of the things that we see in 1990 is a fewer amount of reported claims. We are basing the claim severity off of just the 12-month figure that we have times the age to ultimate factor. For whatever reason, something has happened in 1990 that is dissimilar to the other years, and our result in the counts and averages is significantly different than what is indicated for other accident years.

Is there another way we can use claim counts and loss information to get a better handle of where things might be going for the most current accident year? This next technique again focuses on frequency and severity, and it is used to predict on another basis where 1990 might be going in those two areas.

(Slide)

So, once again, as with counts and averages I am going to start with frequency, and again, some of these numbers are from a previous exhibit. I am going to use this technique using the estimated ultimate frequencies that were developed in previous exhibits 28.6 for 1984 all the way down to the 25.2 for 1989 from Exhibit II.2, Page 3 of 6.

Now, this is the question: how have things changed in the terms of claim frequency within the most current accident year? Is there a historical trend to the frequency? Recall that the frequency here is measure of claim count per 1,000 insured car years.

We look at the ultimate claim frequency estimates and we see it bouncing around. We go up to 28.6, down to 28.3, and up to 31.9. Then we see down to 29.4, then two years with low frequencies, 25.7 and 25.2.

Is there any technique that we could use to try to determine if there is any sort of trend to these estimates, just based on a time series progression? Well, what we are doing here, first, is taking a look at the averages, and we see averages that look stable, 28.2, 28.1, and 28. Should we select 28?

Well we can't really do that because things look better in '88 and '89, which would call into question the use of an average. Alternatively, we can use two types of projection techniques using the sum of the least squares criteria.

(Slide)

I think sum of the least squares is talked about in another session. But what we are really doing is trying to fit a line or curve to the historical data. In one case we are going to fit a line and in the other a curve.

In estimating a linear trend we are going to fit a line with a constant slope, which means that the increment or the change in frequency from year to year is a constant.

In this case, we use the sum of the least squares technique, and we develop various factors, one being a slope, one being the intercept, and another a measure of the degree of predictive value in this line that we have, a figure called an R squared.

The result shown for R squared is misleading and is actually incorrect. It shows a negative .6. If you learn a little bit more about the sum of the least squares method, you will know that R squared can't be a negative number. It has to be a positive number. So I think the number there should be .6.

The R squared can be thought of in terms of how much predictive value does this line have and does the accident year or just how much value does the time series data alone have in predicting what the next year's frequency is going to be. And this .6 basically says that the time series of the accident year ultimates just gives me 60 percent of an explanation of why the frequency changes from year to year.

Obviously, frequency can change for various reasons, not only in terms of time considerations, but other, more fine elements such as, the nature of the social environment, such as more people wanting to get money back from their insurance companies and thus filing claims.

With this method we obtain a slope of negative .8, and an intercept of 30.9. We could think of the intercept as the frequency predicted at year zero, or in this case 1983, and the slope is the incremental change from year to year.

So if you will look at this column here, starting at 30.9, reducing it by.8 to get the 30.1, and then each difference between there and the next accident year is a negative .8. So, we are trending downwards from 30.1, or actually 30.9 if you can count a year zero, down to 25.5 for 1990.

But R squared is an indication that maybe initially we were right. There is not really much of a discernible trend here. But we will try another fit of another type of line or curve. What we are going to use here is an exponential fit. We use the same type of methodology to fit the curve, I mean, use the same sort of mechanics to select the parameters of the curve, but now, instead of a line, we are dealing with an exponential curve. Actually, if it is a positive trend it would be going up. In this case it's a negative trend. We are going down.

So, in this case the predicted value of change year to year is a negative 2.8 percent. We also have another intercept value. In this case it is 31.1. Again, the intercept can be treated the same way as the value in the year zero. To make a projected value for 1990, we just keep reducing 31.1 by a factor of negative 2.8 percent, so we reduce 31.1 by 2.8 percent, and it goes down to 30.2, and so on, 29.3, 25.4.

There is not a very significant difference between the two fits in terms of the values predicted for 1990, but there is a difference in the R squared. We are only getting a 40 percent explanation of the frequency statistic from this type of curve fitting.

So, we look at this and say, well, we are getting 25.5, and 25.4, using techniques that don't really give a good prediction either intuitively or mathematically of what our next year is going to be, so I guess in this case we went back to Exhibit 2.2, Page 3 of 6, and just used the frequency that we got using the development techniques, which was 26.1. The development techniques are basically the selection of an age to age development factor, and then computing age to ultimate factor.

(Slide)

To give you a handle of what the curve fit or the line fit look like against the actual data is, we use a graph of the frequency. You can see that actual data is jumping all over the place, and thus trying to fit a straight line through there is really not meaningful.

There's got to be something going on here, and down here. We could get some more information or we could do some further research, so we might get a better idea of where the frequency is heading. For right now we are just going back to the projection technique that we used earlier and use 26.1.

I think we are going to have a little bit more luck with severity, being that this type of technique of fitting a line or a curve of some sort to predict the most current accident year's estimated ultimate severity is going to be more successful, and more mathematically and intuitively better than the average ultimate severity that we selected from our development techniques used earlier.

(Slide)

So, again, these estimated average ultimate severities are from previous exhibits, where we used development techniques to get severity that seems to be consistently increasing year to year. We do the same type of linear fit and exponential fit for these years as we did with the frequency data. Again, there is forewarning that especially on severity, using simple averages over the last couple of years, when you have a pattern such as this. This is certainly a big mistake and, in this case, using averages results in very deficient estimates of the ultimate.

Same type of values are obtained from the sum of the least squares method, and in this case our slope or our change from year to year incrementally is 786. The initial value in year zero is 2445. And the R squared this time -- again, the optimum R squared would be one -- is .931, and therefore the thinking is that we have a 93 percent of the prediction criteria using this technique.

The R squared can be misleading, but certainly in this case it is certainly much better, and the result seems to give us a good feel of where things are going.

So, we look at 2445, the intercept and the value 786, the slope, to obtain these values down the line. We predict in 1990 that our severity is 7950, considerably different than 6295 that we obtained from the development techniques used in our first class.

Now, we look at the exponential fit. We think of an exponentially increasing pattern curving up with a constant percentage increase year to year as opposed to an absolute dollar incremental increase. We are going to predict a higher value using the exponential curve.

And that's the case here. And we come up with a percent change of 16.2. Now, that number is of value, because then you can start comparing it to industry-wide and just general economic conditions for this line of business. Has severity or average claim size been increasing at that 16 percent per year?

So, this is a good number to get a reasonability check on. As with the same type of calculation as before, we take the intercept value and just start increasing it 16.2 percent each year, so 2970 times 1.162 would get us to the 1984 exponential fit value, and so on to 8484.

Certainly the result is higher than our linear fit, and certainly much more than what we had in the first class. We also have a better R squared of .955. One might say the exponentials fit here seems better, although it is marginally better. You might start thinking, well, which side I am going to be on, the conservative or exponential side or am I going to just simply take the average. That's what we're going to do here and use a selected severity that is the average of those two figures or 8217.

(Slide)

To give you a better idea visually that we are coming up with a better so-called curve fit than we did in frequency, we plotted the actual as dash dotted lines against the fitted. You can see our actual is staying pretty close to that fitted line. We have some degree of comfort that this technique is a good predictive value for 1990. Now let's put it together this time for 1990 and see where we stand.

(Slide)

Here are the three elements that we are going to use to calculate total ultimate loss per accident year. We start with insured car years.

Then we're going to use the number of claims per insured car years, which is the ultimate frequency in Column 2, and then we use the loss per claim in Column 3 or the ultimate severity.

I should point out a typographical error, and actually it flows through the rest of the exhibit we have discovered. In 1989, the insured car year shown here is 105; in 1990 the same number, 105. To be consistent with the rest of the exhibits, those numbers should be 109 in 1989 and 118 in 1990. For the ultimate frequencies everything is the same from our counts and averages technique done in Basic Techniques I, except in 1990 the value has been changed to the 8217, obtained from the trending methods.

Again this is substantially higher than the figure we had in the first class, and we get the ultimate losses that are shown. However, the 1989 figure for ultimate loss shows 19,311 here. It should be around 20044, again, to fit the previous exhibits. None of these numbers have changed from our counts and averages except for this one, 1990. Instead of 22,481, that number should be around 25,307.

So, obviously, with that number changing and these numbers changing, all this is going to flow through and instead of 36,039, shown here for loss reserves, it comes out to 37,598.

(Slide)

We go back to, what have we done here for 1990, because that's the year we are trying to evaluate and the year we are having the most difficulty with, and as I pointed out, the 47.8 loss ratio stuck out. Using the loss ratio additive approach the result is 53.8, which seemed to be more in line or right between the paid and incurred losses development results.

With the frequency and severity modification that we made here for 1990, this is not 58.4 any more. It is 65.8. Now, that 58.4 seems to indicate that we are on the high side of the incurred. We would have to get more information to evaluate the various methods, but conservatism might play a part here and might bring our loss ratio further up, and more in line with our past loss ratios. I think the loss ratio for 1989 was between 64 and 56, and in 1988, between 64 and 72.

(Slide)

We might even be in the sixties, here, and these other development techniques for whatever reason did not pick that up. Again, it goes back to thinking about is the loss ratio in line with the time period we are within the underwriting cycle? Does it make sense with the price increases that we have made in the recent past? Does it make sense with changes in underwriting guidelines that we might have done?

So, with that, background and with just numbers, I am not going to make a stab at what 1990 should be, but these are the types of things that we need to consider.

(Slide)

That basically wraps up for the alternative or other methods in this section. If there are not any questions we will go into a few other elements that are quite important.

(Slide)

We have talked about this a little bit as tail factors. We only have a certain amount of historical information. In this case the data we have had at most 84 months of development.

Are we saying that there is no further development in our case reserves after 84 months? Is there any way we can be sure of that? How valuable, or how significant are tail factors? This is not really a new technique here, but it is designed to show you the significance of tail factors.

What if we assume down here, we had just 2 percent additional development in incurred losses after 84 months? What does that mean to our overall loss reserve that we are going to recommend to our management? What does that mean to our reserves, and what does that mean to our surplus?

So, everything here is from previous exhibits. What we are going to do is go through the incurred loss development analysis with a tail factor of 1.000. The 27,718 reserve figures, I believe, is what we used earlier for the indicated reserve.

What happens if we consider other companies or industry data. Data at another company showed, auto liability claims still developing after 84 months. Say there is a change of an additional 2 percent development after 84 months.

We would look at a specific accident year and ask, are all the claims closed, or are there still some open claims? How many open claims are there? Is t here some room for development? Of all the claims that are open, are they all booked at the limit of the policy anyway? But let's use the 2 percent here just for getting an idea of the impact. Basically all the factors are increased by multiplying it by 1.02, and all the estimated ultimates are increased by multiplying by 1.02.

So, we jump up $2 million, from 102,812 to 104,873 for a total ultimate loss. On an ultimate basis that is not that much, and the loss ratio only increases by a point. But what does it mean to our loss reserves?

Now, that $2 million all flows through to our loss reserves. We are not changing paid losses; we are just changing our estimate of our ultimate. So any $2 million in our ultimate really flows through to our loss reserves. When we are talking about loss reserves we are talking about a significantly higher amount.

So, the 29,779 resulting loss reserve is actually 7 percent greater than 27,718. Further, looking in terms of this company's surplus, this might be a significant amount depending on the total portfolio. So, we might have to focus in on what a reasonable tail factor is and maybe try to get some further information. There are also some other techniques to project a tail factor, which would be discussed more in depth in other sections.

(Slide)

Okay, these are the type of specific questions we might ask ourselves. Is this the best estimate for the case reserve, the current case reserve, meaning how confident are we in those case reserves? Again, are we booking a case reserve for open claims that are all near or at the limit? Or is there some room for development; is there some information still waiting to be obtained for these case reserves?

Is there more data available, for example, from last year's report? Is there more historical information available? Certainly, if this company was in business prior to '84 you would look at what those years had happen to them after 84 months. Even if it was a small amount of business, there might be something that will give you a greater feel of what might have happened after 84 months.

Are there external data sources such as industry data? Certainly there are -- I don't know specifically, not being involved directly in auto liability, what exactly ISO might have, or what Best might have past 84 months, but certainly there are avenues to get some additional information outside of what you have within your own shop.

Okay, fourth is basically what happens if we start looking at different development factors for the paid development technique. I am not exactly sure if this is the right direction or not, but it gives you an idea of the value of more historical information. What if we stopped using the paid loss development factors that we had and instead started using the relationship between paid and incurred at 60 months instead of the 84.

Remember, the development factor that we used for the paid technique at 84 months was the relationship between our cumulative paid losses divided by our cumulative incurred losses. What if we started using that relationship in the paid development technique at 60 months? What types of things would happen there?

Let's look further at this one method that they mention here. What if we start assuming that there was no effective tail in the incurred loss after 60 months, and we started assuming that a good paid development factor is the relationship between cumulative incurred losses to the cumulative paid at 60 months to predict on a paid basis what our ultimate loss is going to be.

(Slide)

These triangles are those shown in the first couple of presentations in Basic Techniques I. We are just simply dividing the incurred values by the paid value to get these ratios, incurred to paid losses. What we are focusing in on here is the development from 60 months through 84.

Remember that 1.055 is the tail factor that we used for paid in our first session. But now instead of using the averaging technique on paid loss development factors, let's look at the incurred to paid relationship and start assuming that this is our age to ultimate factor for 72 months to ultimate.

(Slide)

This result is the simple average between these two factors 1.093 and 1.071. 1.093 is just the result of dividing 10,280 by 9408. We have 1.082 for 72 months and 1.126 for 60 months. Now, these are assumed age to ultimate factors. Our underlying assumption is that these incurred values in the 60-month category have reached ultimate themselves.

And therefore, my initial thought on using these age to ultimate factors was that they will result in a lower ultimate value. I think the bias is to a deficient ultimate value because of the fact that it ignores what is going on with incurred losses after 60 months. So, I think we should question the basis for cutting development off at '84 months, which we did in our discussions in Basic Techniques I.

(Slide)

What does it mean if we cut it off at 60 months for incurred losses when doing these techniques? So, we slip, a number of these values, 1.126. 1.082, and 1.055 into our paid age to ultimate column.

Right here. These were the age to ultimate factors that we had used earlier, the 1.055 hasn't changed, but for '85 and '86, as I thought, we go down from 1.094 to 1.082, and from 1.153 to 1.126. Everything else would also decrease, since we use these factors subsequently in the more recent accident years, and instead of 3.155 that we previously used, we are now down to 3.082 for the 1990 accident year.

Again, the change in ultimate on a percentage basis is relatively small. Our loss ratio overall changes about one point per year. But our estimate has changed by about $2 million, and this flows through into our indicated reserve. Therefore with basically cutting off the fact that we have additional incurred development after 60 months, we have reduced our reserve indication using the paid loss development technique by something again around 7 percent.

(Slide)

Again, the focus here is on -- this so-called tail. We don't have a lot of information and we might use some other curve fitting techniques to fit these development factors and predict how the development will continue in the future.

That takes care of all we are going to cover here on tail factors, and we will finish up with some related topics, and monitoring the results.

(Slide)

We question exactly how this next topic fits into the overall presentation, but it does give you a valuable tool in maybe other circumstances such as the topic is the evaluation of the pure premium.

Pure premium is simply an incurred loss figure. For pricing we use an ultimate incurred loss figure divided by an exposure measure of some sort. In this case we are using insured car years. We want to get an idea for our overall portfolio how much in expected loss dollars is it costing us for insuring for one exposure year?

It could be -- if we are doing professional liability, a doctor for an insured year. In this case it is a car.

We jump back to the insured car years in other exhibits, 109, 118, and we look at our incurred loss value at 12 months, and what is our pure premium at 12 months? The incurred loss figures are basically from the development triangle. 16,561 is the figure for accident year 1990, the last figure that we had. The data is all at 12 months. This information is found going down a column. It is not the diagonal. This is the first column of the incurred development triangle.

We are dividing losses by insured car years, and our pure premium valued at 12 months are these figures here. I think what we might look at is what percent change is shown from year to year, again looking at any sort of trend or other pattern within this type of data that might lead us to some guesses of where ultimates might be going.

Pure premiums are increasing, but jumping a large chunk here and kind of tailing off in small percentages here in '89 and '90.

Now, we do the same sort of calculation using our ultimate values predicted using an incurred development technique. We come up with, of course, higher pure premiums, because we are going to have higher incurred losses.

And again, we take a look at the percent change from year to year, and what is interesting here to me and what might give some value to our incurred development technique is that these percentage changes between accident years at the 12-month evaluation are pretty similar to the percentage change at ultimate. It might also be an indication that things haven't changed too much in our case reserving or our claims reporting processes.

Now, you might give that some more thought. Does that mean consistency, or does that mean that the two values are related in some other way? But again, the pure premium here is a factor used in pricing. It is a measure of pure loss cost divided by an exposure of some sort. It doesn't really fit into any other techniques directly that we have done today.

(Slide)

Payout patterns. Payout patterns are a spinoff of the paid loss development techniques that we used earlier today, and it is very simple. A payout pattern can be used in various parts of the pricing and reserving function.

All we do is use our selected paid age-to-ultimate loss development factors from our previous discussion. We just take the reciprocal or one divided by the age-to-ultimate loss development factor to get the predicted value of the cumulative percentage paid at a certain point within the payout of accident year ultimate losses.

So, what these percentages tell me is that I expect, using my analysis of paid loss information, that 32 percent of my total ultimate accident year losses will be paid after 12 months; 57 percent of my ultimate accident year losses will be paid after 24 months; and so on down the line. And again, we are at 95 percent, and exactly how that tails off gets back into a discussion of the tail factor.

So, incrementally this translates into 32 percent paid in zero to 12 months, 25 percent paid between 12 and 24 months, etcetera, down the line.

Where are payment patterns required? They are very important for the analysis of cash flow. Where do we need cash flow? If you are working on pricing, investment income, of course, is an inherent part of -- or could be a substantial part of pricing.

This is the type of payout pattern that you might use to determine what is the investment income inherent in the business that I am trying to price? I won't take that a step further, but again, it is used in the projection of investment income inherent in the underwriting of a particular line of business.

Number Two here is corporate cash needs. If you are projecting cash flow, you would certainly want to use a payout pattern for each line of business.

And thirdly, not mentioned up here, is certainly taxation, federal income taxation. Discounting of loss reserves, is now a part of that tax Computing the discount in the loss reserve requires the application of a payout pattern. That would probably take another hour-and-a-half session just to go through how to recalculate that especially for income tax purposes.

All right. Last, but not least, the moment we have been waiting for. We have talked about some related topics, but now let's just talk about monitoring results and the so-called squaring of the triangle.

(Slide)

Nothing new is up here with the triangle you see. We have, along with age to ultimate factors, the calculated age to age factors. How do we use those age to age factors to monitor our results? First, we will look at the second triangle back here, and this is where we get to the phrase, squaring the triangle.

We are going to predict for the future what the value is for each of these spots on this grid here are going to be. And we use those predicted values to compare in the future, how close are we, how good a job did we do in the last year?

What we are going to do is apply these selected age to age factors to the last diagonal here, and see what the predicted values are in each of those boxes, and the rest of this grid.

(Slide)

Using the last diagonal and the age to age factors, these are the expected cumulative incurred losses at the various points within the accident year evaluation. Again, if we are looking at this at 12/31/1990, these are all predicted values and would be used later on to determine how close are the predicted value at that point in time to where we actually are at, say, 12/31/1991.

For instance, 19,263 I believe should just be the result of multiplying 16,561 by 1.163. And then 19,850 should be the result of multiplying 19,263 by 1.03.

1991 CASUALTY LOSS RESERVE SEMINAR

BASIC TECHNIQUES II

- Analysis of Loss Development Factors
- Evaluating the Current Year
- Other Methods
- Tail Factors
- Related Topics
- Monitoring Results

Flip Chart Exhibit

Results from Basic Techniques I
Accident Year 1990 Only
(000's)

	Ultimate Loss	Required Reserve
1. Paid Development Method	6962 × 3.129 = 21,784	21,784 − 6,962 = \$14,822
2. Incurred Development Method	16,561 × 1.219 = 20,188	20,188 − 6,962 = \$13,226
3. Counts & Averages Method	= 18,406	18,406 − 6962 = \$11,444

Freq: 1604 × 1.919 = 3078 Claims
Severity: 6295 × 0.950 = 5980 average claim
Loss: $\frac{3078 \times 5980}{1000}$

= 18,406

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A COMPARISON OF RESERVES ESTIMATES
USING THREE METHODS

Accident Year	....Estimated Required Reserves.... Paid Development	Incurred Development	Counts & Averages
1984	537	533	661
1985	988	753	1,076
1986	1,765	1,214	1,759
1987	3,102	2,041	3,310
1988	5,245	3,640	5,575
1989	8,290	6,409	8,875
1990	14,822	13,226	11,444
	34,748	27,817	32,700

Accident Year	......Estimated Required IBNR...... Paid Development	Incurred Development	Counts & Averages
1984	4	0	128
1985	246	11	334
1986	576	25	570
1987	1,147	86	1,355
1988	1,878	273	2,208
1989	2,686	805	3,271
1990	5,223	3,627	1,845
	11,759	4,828	9,711

The three methods have produced very different estimates for required reserves.

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AUTOMOBILE LIABILITY

SENSITIVITY - HOW DO THE RESERVES CHANGE WHEN THE LDF'S CHANGE?

ESTIMATING ULTIMATE LOSSES using PAID LOSS DEVELOPMENT
with TWO DIFFERENT SETS of LOSS DEVELOPMENT FACTORS
(dollars in thousands)

Accident Year	Losses Paid to Date	Age-to-Age LDF's Based on Average	Based on 4-pt Avg	Age-to-Ultimate LDF's Based on Average	Based on 4-pt Avg
1984	9,759	1.055	1.055	1.055	1.055
1985	10,508	1.037	1.037	1.094	1.094
1986	11,536	1.054	1.054	1.153	1.153
1987	12,458	1.083	1.083	1.249	1.249
1988	12,699	1.131	1.131	1.412	1.412
1989	11,172	1.233	1.235	1.742	1.744
1990	6,962	1.796	1.808	3.128	3.154
	75,094				

Accident Year	Estimated Ultimate Loss using Average	using 4-pt Avg	Paid +Case to Date	Indicated IBNR Reserve using Average	using 4-pt Avg
1984	10,296	10,296	10,292	4	4
1985	11,496	11,496	11,250	246	246
1986	13,301	13,301	12,725	576	576
1987	15,560	15,560	14,413	1,147	1,147
1988	17,931	17,931	16,066	1,865	1,865
1989	19,462	19,484	16,776	2,686	2,708
1990	21,777	21,958	16,561	5,216	5,397
	109,822	110,026	98,083	11.739	11.943

BASIC TECHNIQUES II

Improved loss ratio may be indicated due to:

- Higher rates
- Lower frequency
- Lower severity
- Slower claims payment
- Less adequate case reserves

CURRENT YEAR ANALYSIS

HAS THERE BEEN A CHANGE IN RATE LEVEL ADEQUACY?

Accident Year	(1) Earned Premium (000)	(2) Insured Car Years (000)	(3) Average Premium (1)/(2)	(4) Change from Prior Year
1984	17,153	100	172	
1985	18,168	102	178	4%
1986	21,995	98	224	26%
1987	24,173	103	235	5%
1988	25,534	105	243	4%
1989	31,341	109	288	18%
1990	38,469	118	326	13%

	176,833			

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AUTOMOBILE LIABILITY — Page 3 of 6

CURRENT YEAR ANALYSIS

HAS THE FREQUENCY CHANGED?

Accident Year	Insured Car Years (000)	Cumulative Reported Claims — Development Stage in Months: 12	24	36	48	60	72	84
1984	100	1,432	2,724	2,800	2,832	2,844	2,858	2,858
1985	102	1,428	2,772	2,850	2,866	2,870	2,888	
1986	98	1,710	3,032	3,086	3,094	3,110		
1987	103	1,358	2,780	2,990	3,000			
1988	105	1,510	2,588	2,656				
1989	109	1,488	2,604					
1990	118	1,604						

Accident Year	Frequency per 1000 Insured Car Years — Development Stage in Months: 12	24	36	48	60	Ultimate Frequency	Change in Freq
1984	14.3	27.2	28.0	28.3	28.4	28.6	
1985	14.0	27.2	27.9	28.1	28.1	28.3	-1%
1986	17.4	30.9	31.5	31.6	31.7	31.9	13%
1987	13.2	27.0	29.0	29.1		29.4	-8%
1988	14.4	24.6	25.3			25.7	-13%
1989	13.7	23.9				25.2	-2%
1990	13.6					26.1	4%

EZ INSURANCE COMPANY — Exhibit II.2
AUTOMOBILE LIABILITY — Page 4 of 6

CURRENT YEAR ANALYSIS

HAS THE SEVERITY CHANGED?

Accident Year	Estimated Ultimate Claim Count	Estimated Ultimate Losses: Paid Dev'l	Incurred Dev'l	Counts & Averages
1984	2,858	10,296	10,292	10,420
1985	2,888	11,496	11,261	11,584
1986	3,129	13,301	12,750	13,295
1987	3,030	15,560	14,499	15,768
1988	2,698	17,944	16,339	18,274
1989	2,745	19,462	17,581	20,047
1990	3,078	21,784	20,188	18,406

Accident Year	Estimated Ultimate Severity: Paid Loss Dev'l	Incurred Dev'l	Counts & Averages	Change in Severity: Paid Loss Dev'l	Incurred Dev'l	Counts & Averages
1984	3,602	3,601	3,646			
1985	3,981	3,899	4,011	10%	8%	10%
1986	4,251	4,075	4,249	7%	5%	6%
1987	5,135	4,785	5,204	21%	17%	22%
1988	6,651	6,056	6,773	30%	27%	30%
1989	7,090	6,405	7,303	7%	6%	8%
1990	7,077	6,559	5,980	-0%	2%	-18%

CURRENT YEAR ANALYSIS

HAS THERE BEEN A CHANGE IN THE RATE AT WHICH CLAIMS CLOSE?

Accident Year	.......The Number of Claims Closed by Age of Development......... 12	24	36	48	60	72	84	ultimate
1984	658	2,250	2,585	2,687	2,745	2,802	2,824	2,858
1985	826	2,131	2,559	2,706	2,795	2,845		2,888
1986	782	2,308	2,738	2,957	3,049			3,129
1987	780	2,146	2,665	2,832				3,030
1988	917	1,980	2,368					2,698
1989	911	1,978						2,745
1990	1,106							3,078

The ultimate number of claims is based on the projection of reported claims.

Accident Year	.......Percentage of Claims Closed by Age of Development......... 12	24	36	48	60	72	84
1984	23%	79%	90%	94%	96%	98%	99%
1985	29%	74%	89%	94%	97%	99%	
1986	25%	74%	88%	95%	97%		
1987	26%	71%	88%	93%			
1988	34%	73%	88%				
1989	33%	72%					
1990	36%						

CURRENT YEAR ANALYSIS

HAS THE ADEQUACY OF THE CASE RESERVES CHANGED?

Accident Year	.........Outstanding Case Reserves - (000) omitted......... 12	24	36	48	60	72	84
1984	5,021	3,790	2,769	1,960	1,352	872	533
1985	5,557	4,176	2,936	1,987	1,245	742	
1986	6,328	4,664	3,200	2,051	1,189		
1987	6,974	4,968	3,251	1,955			
1988	7,635	5,274	3,367				
1989	8,376	5,604					
1990	9,599						

Accident Year	.......................Open Claims....................... 12	24	36	48	60	72	84
1984	774	474	215	145	99	56	34
1985	602	641	291	160	75	43	
1986	928	724	348	137	61		
1987	578	634	325	168			
1988	593	608	288				
1989	577	626					
1990	498						

Accident Year	....................Average Case Reserve.................... 12	24	36	48	60	72	84
1984	6,487	7,996	12,879	13,517	13,657	15,571	15,676
1985	9,231	6,515	10,089	12,419	16,600	17,256	
1986	6,819	6,442	9,195	14,971	19,492		
1987	12,066	7,836	10,003	11,637			
1988	12,875	8,674	11,691				
1989	14,516	8,952					
1990	19,275						

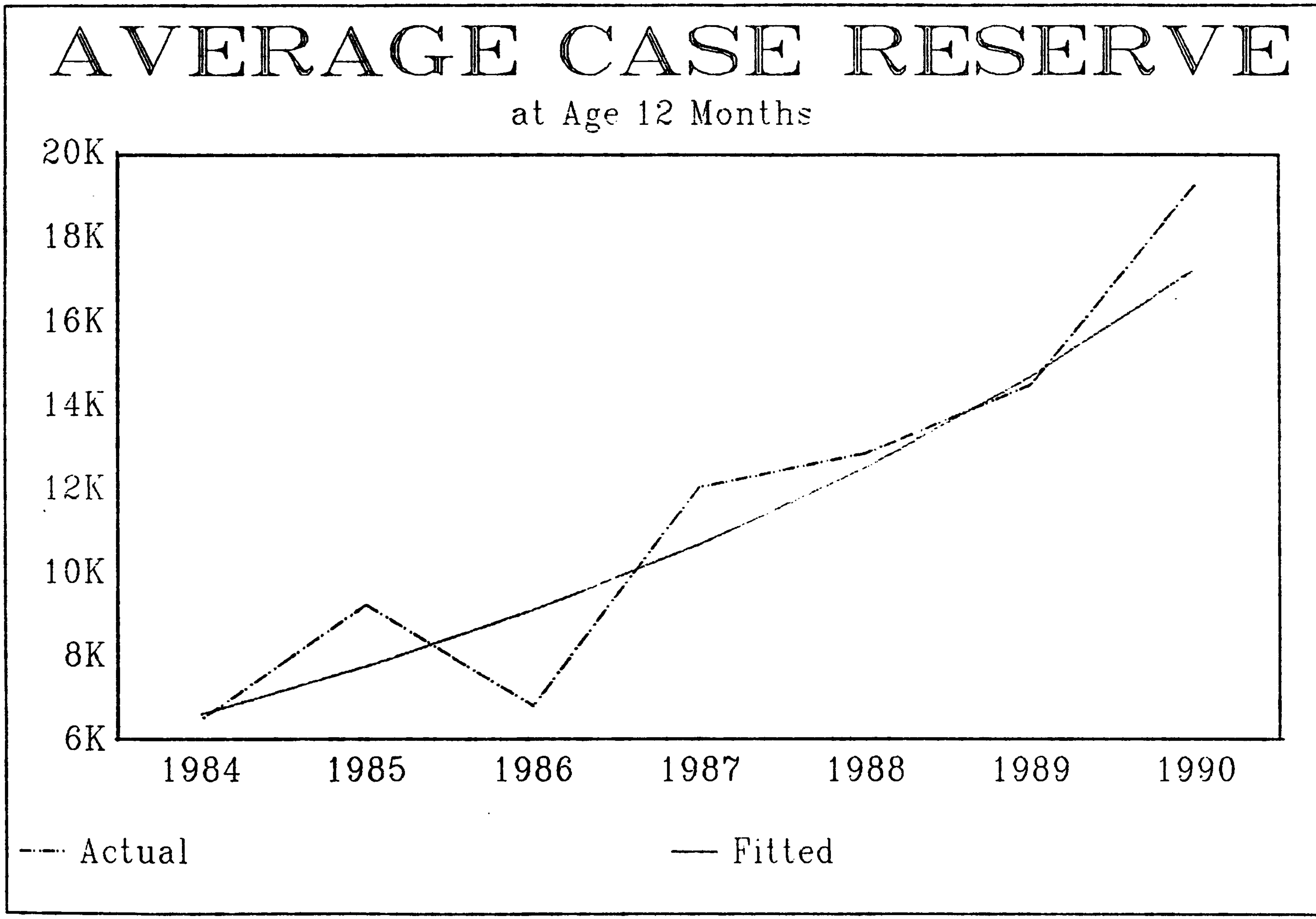

Exhibit II.2
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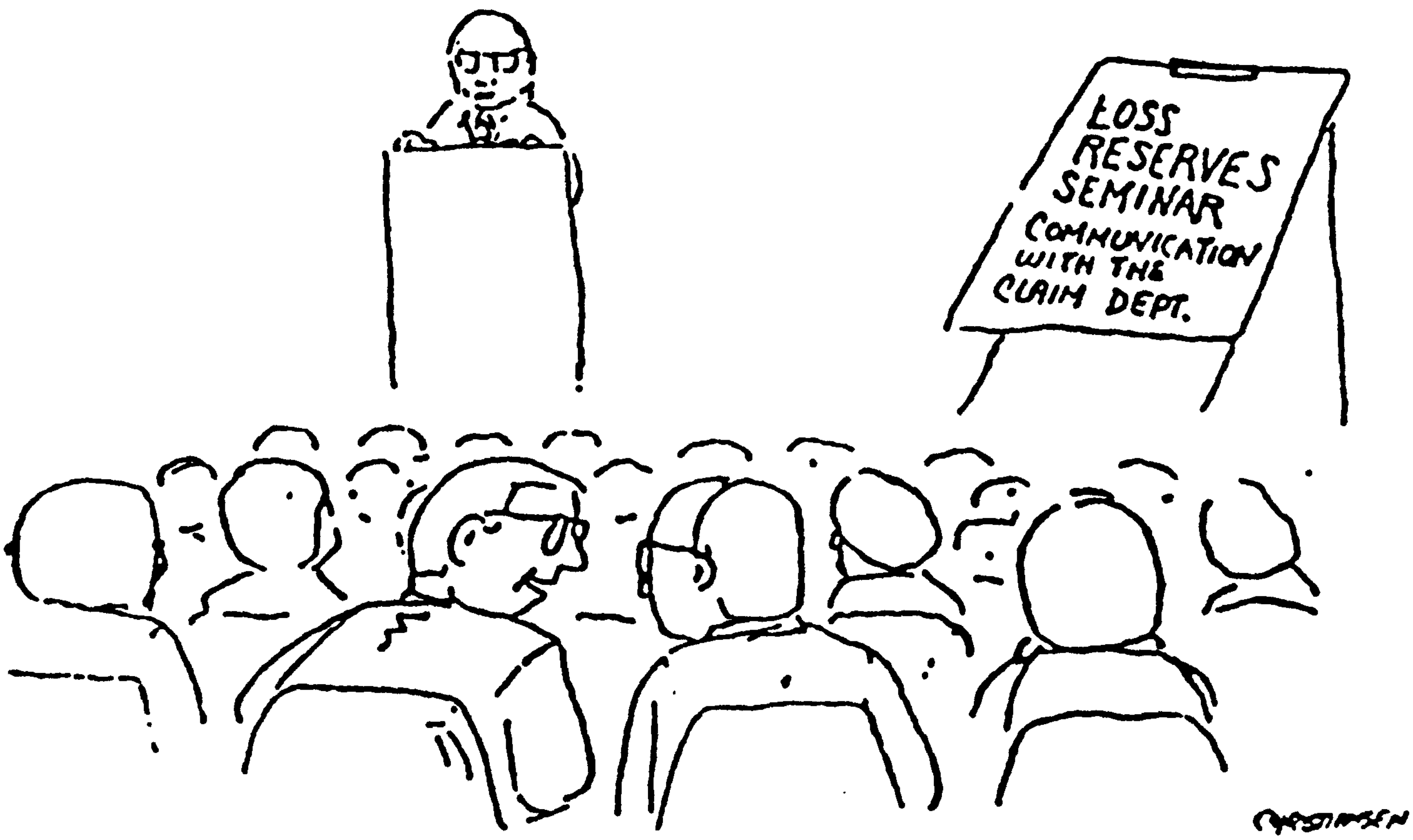
Exhibit II.3



"We always engage in a give-and-take with our claims department. They take down the reserves and we give them back in bulk."

Reprinted from the Actuarial Review.

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AUTOMOBILE LIABILITY

ALTERNATIVE METHODS FOR ESTIMATING RESERVES for the CURRENT YEAR

LOSS RATIO ADDITIVE PROJECTIONS

INCURRED LOSSES on an INCREMENTAL BASIS

Accident Year	Earned Premium	............Development Stage in Months................ 12	24	36	48	60	72	84
1984	17,153	8,382	1,399	329	109	49	12	12
1985	18,168	9,337	1,510	245	100	43	15	
1986	21,995	10,540	1,665	346	139	35		
1987	24,173	11,875	1,957	406	175			
1988	25,534	13,343	2,199	524				
1989	31,341	14,469	2,307					
1990	38,469	16,561						

INCURRED LOSS RATIOS - INCREMENTAL BASIS

Accident Year	............Development Stage in Months................ 12	24	36	48	60	72	84
1984	0.489	0.082	0.019	0.006	0.003	0.001	0.001
1985	0.514	0.083	0.013	0.006	0.002	0.001	
1986	0.479	0.076	0.016	0.006	0.002		
1987	0.491	0.081	0.017	0.007			
1988	0.523	0.086	0.021				
1989	0.462	0.074					
1990	0.431						
Average	0.484	0.080	0.017	0.006	0.002	0.001	0.001
4 Pt Avg	0.476	0.080	0.017				
Avg w/o high/low	0.487	0.080	0.017				
Selected	0.484	0.080	0.017	0.006	0.002	0.001	0.001

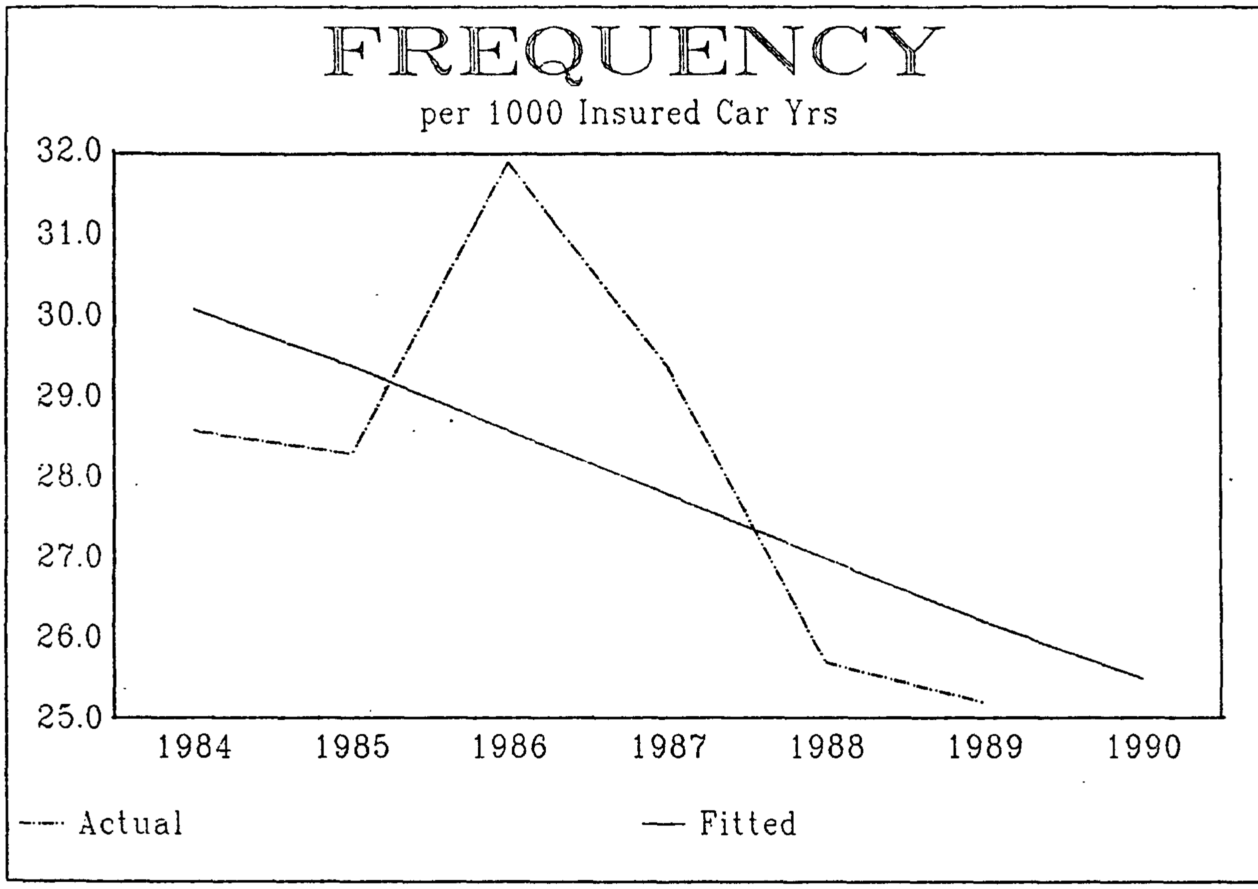
EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

ALTERNATIVE METHODS FOR ESTIMATING RESERVES for the CURRENT YEAR

LOSS RATIO ADDITIVE PROJECTIONS

Accident Year	(1) Earned Premium (000)	(2) Incurred to Date (000)	(3) Paid to Date (000)	(4) Inc-to-Date Loss Ratio (2)/(1)
1984	17,153	10,292	9,759	60.0%
1985	18,168	11,250	10,508	61.9%
1986	21,995	12,725	11,536	57.9%
1987	24,173	14,413	12,458	59.6%
1988	25,534	16,066	12,699	62.9%
1989	31,341	16,776	11,172	53.5%
1990	38,469	16,561	6,962	43.1%
	176,833	98,083	75,094	

Accident Year	(4) Inc-to-Date Loss Ratio (2)/(1)	(5) Loss Ratio Additive Development (Ex4;Pg1)	(6) Ultimate Loss Ratio (4)+(5)	(7) Indicated Reserve (000) (1)*(5)-Paid
1984	60.0%	0.0%	60.0%	533
1985	61.9%	0.1%	62.0%	760
1986	57.9%	0.2%	58.1%	1,233
1987	59.6%	0.4%	60.0%	2,052
1988	62.9%	1.0%	63.9%	3,622
1989	53.5%	2.7%	56.2%	6,450
1990	43.1%	10.7%	53.8%	13,715
				28,366



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ALTERNATIVE METHODS FOR ESTIMATING RESERVES for the CURRENT YEAR

USING FREQUENCY AND SEVERITY TO PREDICT ULTIMATE LOSSES

Comparison of Actual & Fitted Values for Frequency

Accident Year	Estimated Ultimate Frequency	Linear Fit	Exponential Fit
1984	28.6	30.1	30.2
1985	28.3	29.4	29.3
1986	31.9	28.6	28.5
1987	29.4	27.8	27.7
1988	25.7	27.0	26.9
1989	25.2	26.2	26.1
1990	?	25.5	25.4

Average of prior years	28.2
Average of most recent 4 points	28.1
Average excluding High/Low	28.0
Linear Trend projection 1990	25.5
Exponential Trend projection 1990	25.4
Selected Frequency for 1990	26.1

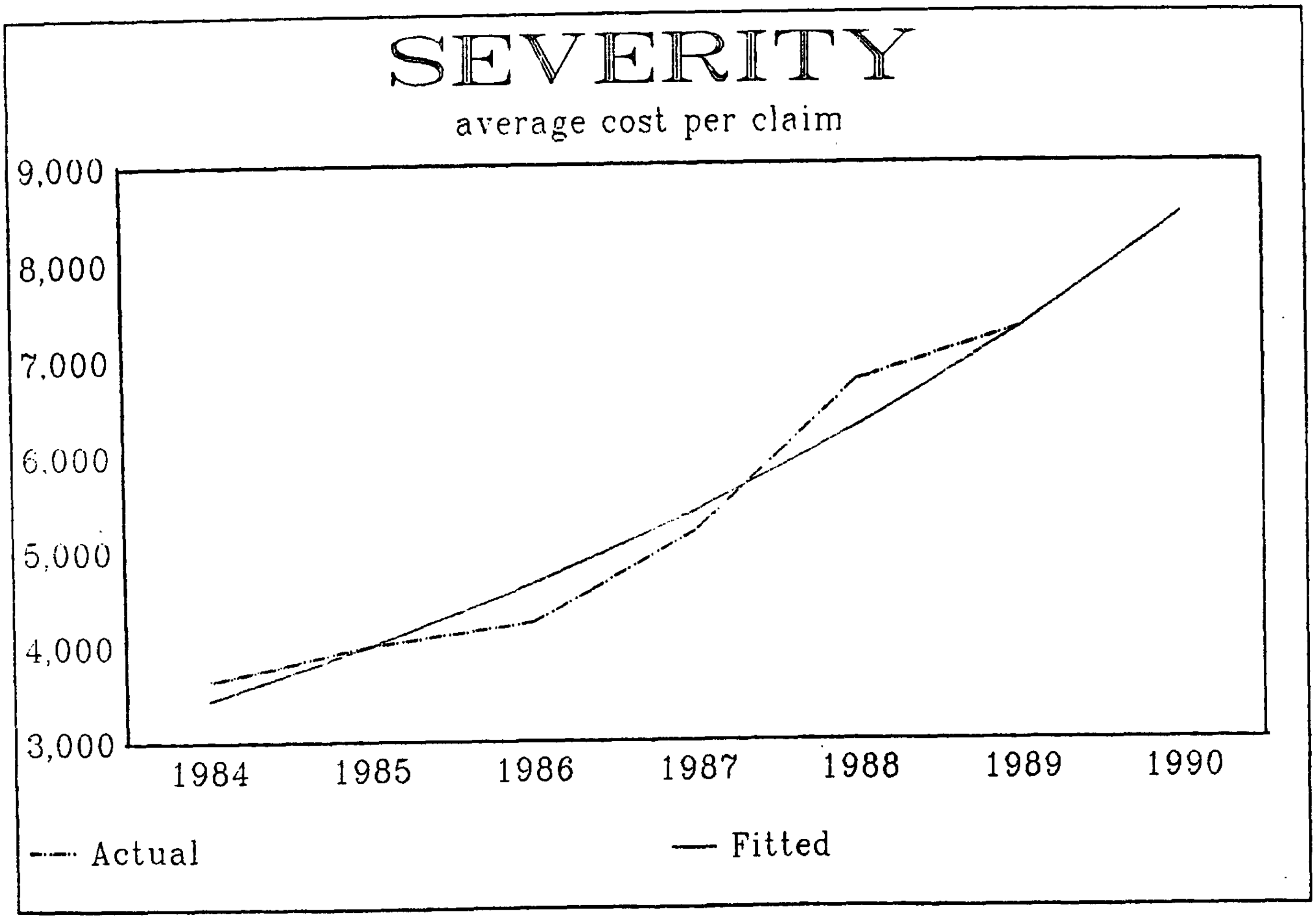
Linear Trend	
slope	-0.8
intercept	30.9
r squared	-0.6
projected	25.5

Exponential Trend	
% chng	-2.8%
intercept	31.1
r squared	0.4
projected	25.4

Suppose the current year has very few reported losses.

With this method, the first step is to estimate ultimate frequencies for earlier years.

A line can be fitted through these points. The fitted point for the current year can be used as the estimate for the ultimate frequency.



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AUTOMOBILE LIABILITY

ALTERNATIVE METHODS FOR ESTIMATING RESERVES for the CURRENT YEAR

USING FREQUENCY AND SEVERITY TO PREDICT ULTIMATE LOSSES

Comparison of Actual & Fitted Values for Severity

Accident Year	Estimated Ultimate Severity	Linear Fit	Exponential Fit
1984	3,646	3,231	3,450
1985	4,011	4,018	4,009
1986	4,249	4,804	4,657
1987	5,204	5,591	5,410
1988	6,773	6,377	6,286
1989	7,303	7,164	7,302
1990	?	7,950	8,484

Average of prior years	5,198
Average of most recent 4 points	5,882
Average excluding High/Low	5,059
Linear Trend projection 1990	7,950
Exponential Trend projection 1990	8,484
Selected Severity for 1990	8,217

Linear Trend		Exponential Trend	
slope	786	% chng	16.2%
intercept	2,445	intercept	2,970
r squared	0.931	r squared	0.955
projected	7,950	projected	8,484

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

ALTERNATIVE METHODS FOR ESTIMATING RESERVES for the CURRENT YEAR

USING FREQUENCY AND SEVERITY TO PREDICT ULTIMATE LOSSES for the CURRENT ACCIDENT YEAR

Accident Year	(1) Insured Car Years (000)	(2) Ultimate Frequency (Ex5;pg1)	(3) Ultimate Severity (Ex5;pg2)	(4) Ultimate Losses (1)*(2)*(3)	(5) Loss Reserves (4)-Paid
1984	100	28.6	3,646	10,420	661
1985	102	28.3	4,011	11,584	1,076
1986	'98	31.9	4,249	13,295	1,759
1987	103	29.4	5,204	15,768	3,310
1988	105	25.7	6,773	18,274	5,575
1989	105	25.2	7,303	19,311	8,139
1990	105	26.1	8,217	22,481	15,519
				111,133	36,039

A COMPARISON OF LOSS RATIO ESTIMATES for 1990

Paid Loss Development	56.6%
Incurred Loss Development	52.5%
Counts and Averages	47.8%
Loss Ratio Additive Projection	53.8%
Frequency and Severity	58.4%

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TAIL FACTORS - HOW MUCH DIFFERENCE DOES THE TAIL FACTOR MAKE?

INCURRED LOSS DEVELOPMENT ESTIMATES with TAIL FACTOR = 1.000

Accident Year	(1) Incurred to Date (000)	(2) ..Selected age-to-age	(3) LDF'S.. age-to-ultimate	(4) Estimated Ultimate (1)*(3)	(5) Loss Ratio	(6) Indicated Reserve (4)-Paid
1984	10,292	1.000	1.000	10,292	60%	533
1985	11,250	1.001	1.001	11,261	62%	753
1986	12,725	1.001	1.002	12,750	58%	1,214
1987	14,413	1.004	1.006	14,499	60%	2,041
1988	16,066	1.011	1.017	16,339	64%	3,640
1989	16,776	1.029	1.046	17,548	56%	6,376
1990	16,561	1.162	1.215	20,122	52%	13,160
	98,083			102,812	58%	27,718

THE EFFECT ON THE RESERVES OF A 2% CHANGE IN THE TAIL

Accident Year	(1) Incurred to Date (000)	(2) ..Selected age-to-age	(3) LDF'S.. age-to-ultimate	(4) Estimated Ultimate (1)*(3)	(5) Loss Ratio	(6) Indicated Reserve (4)-Paid
1984	10,292	1.020	1.020	10,498	61%	739
1985	11,250	1.001	1.021	11,486	63%	978
1986	12,725	1.001	1.022	13,005	59%	1,469
1987	14,413	1.004	1.026	14,788	61%	2,330
1988	16,066	1.011	1.037	16,660	65%	3,961
1989	16,776	1.029	1.067	17,900	57%	6,728
1990	16,561	1.162	1.240	20,536	53%	13,574
	98,083			104,873	59%	29,779

EZ INSURANCE COMPANY
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TAIL FACTORS

1. Is the best estimate the current case reserve?

2. Is there more data available, say, for example, from last year's report?

3. Are there external data sources such as industry data?

4. For paid LDF's, would the results be more reliable if paid data was converted to incurred at, say, 60 months instead of 84? (see Exhibit II.6, pages 3 & 4)

Tail factors are discussed in more detail in Techniques III.

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TAIL FACTORS for PAID LDF's

CUMULATIVE PAID LOSSES (000 omitted)

accident year	12	24	36	48	60	72	84
	................Development Stage in Months.................						
1984	3,361	5,991	7,341	8,259	8,916	9,408	9,759
1985	3,780	6,671	8,156	9,205	9,990	10,508	
1986	4,212	7,541	9,351	10,639	11,536		
1987	4,901	8,864	10,987	12,458			
1988	5,708	10,268	12,699				
1989	6,093	11,172					
1990	6,962						

CUMULATIVE INCURRED LOSSES (000 omitted)
(paid losses + reserves for reported claims)

accident year	12	24	36	48	60	72	84
	................Development Stage in Months.................						
1984	8,382	9,781	10,110	10,219	10,268	10,280	10,292
1985	9,337	10,847	11,092	11,192	11,235	11,250	
1986	10,540	12,205	12,551	12,690	12,725		
1987	11,875	13,832	14,238	14,413			
1988	13,343	15,542	16,066				
1989	14,469	16,776					
1990	16,561						

RATIO OF INCURRED TO PAID LOSSES

accident year	12	24	36	48	60	72	84
	................Development Stage in Months.................						
1984	2.494	1.633	1.377	1.237	1.152	1.093	1.055
1985	2.470	1.626	1.360	1.216	1.125	1.071	
1986	2.502	1.618	1.342	1.193	1.103		
1987	2.423	1.560	1.296	1.157			
1988	2.338	1.514	1.265				
1989	2.375	1.502					
1990	2.379						
average	2.426	1.575	1.328	1.201	1.126	1.082	1.055

Exhibit II.6
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AUTOMOBILE LIABILITY

TAIL FACTORS for PAID LDF's
Paid to Incurred Ratio at Age 84 only

Accident Year	(1) Earned Premium (000)	(2) Paid to Date (000)	(3) Selected Factors age-age	(4) age-ult	(5) Estimated Ultimate (2)*(4)	(6) Loss Ratio (5)/(1)	(7) Indicated Reserve (5)-(2)
1984	17,153	9,759	-	1.055	10,296	60%	537
1985	18,168	10,508	1.037	1.094	11,496	63%	988
1986	21,995	11,536	1.054	1.153	13,301	60%	1,765
1987	24,173	12,458	1.083	1.249	15,560	64%	3,102
1988	25,534	12,699	1.133	1.415	17,969	70%	5,270
1989	31,341	11,172	1.235	1.748	19,529	62%	8,357
1990	38,469	6,962	1.805	3.155	21,965	57%	15,003
	176,833	75,094			110,115	62%	35,021

TAIL FACTORS for PAID LDF's
Paid to Incurred Ratios at Ages 60, 72, and 84

Accident Year	(1) Earned Premium (000)	(2) Paid to Date (000)	(3) Selected Factors age-age	(4) age-ult	(5) Estimated Ultimate (2)*(4)	(6) Loss Ratio (5)/(1)	(7) Indicated Reserve (5)-(2)
1984	17,153	9,759		1.055	10,296	60%	537
1985	18,168	10,508		1.082	11,366	63%	858
1986	21,995	11,536		1.126	12,995	59%	1,459
1987	24,173	12,458	1.083	1.220	15,202	63%	2,744
1988	25,534	12,699	1.133	1.382	17,555	69%	4,856
1989	31,341	11,172	1.235	1.708	19,079	61%	7,907
1990	38,469	6,962	1.805	3.082	21,459	56%	14,497
	176,833	75,094			107,951	61%	32,857

Exhibit II.7
page 1 of 2

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

RELATED TOPICS - PURE PREMIUM

Pure Premium = the loss cost of 1 car for 1 year

Accident Year	Insured Car Years (000)	Values @ 12 Months Incurred Loss	Pure Premium	Percentage Change
1984	100	8,382	84	
1985	102	9,337	92	9%
1986	98	10,540	108	17%
1987	103	11,875	115	7%
1988	105	13,343	127	10%
1989	109	14,469	133	4%
1990	118	16,561	140	6%

Accident Year	Insured Car Years (000)	Ultimate Values Incurred Dev'l	Pure Premium	Percentage Change
1984	100	10,292	103	
1985	102	11,261	110	7%
1986	98	12,750	130	18%
1987	103	14,499	141	8%
1988	105	16,339	156	11%
1989	109	17,581	161	4%
1990	118	20,188	171	6%

Exhibit II.7
page 2 of 2

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

RELATED TOPICS - PAYOUT PATTERNS

Payout Pattern = the percentage of losses paid by year

Accident Year	PAID LDF's	cumulative % paid (1/LDF)	Year in which loss is paid	Payout Pattern
			8 & later	5%
1984	1.055	95%	7	4%
1985	1.094	91%	6	4%
1986	1.153	87%	5	7%
1987	1.249	80%	4	9%
1988	1.413	71%	3	14%
1989	1.742	57%	2	25%
1990	3.129	32%	1	32%
			Total	100%

Payout Patterns are required for analyses involving cash flow.

For example,

- the projection of prospective investment income.

- the determination of corporate cash needs during the coming year.

Exhibit II.8
page 1 of 2

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

MONITORING RESULTS - COMPLETING THE SQUARE

CUMULATIVE INCURRED LOSSES (000 omitted)

Accident Year	..........Development	Stage in	Months..........				
	12	24	36	48	60	72	84
1984	8,382	9,781	10,110	10,219	10,268	10,280	10,292
1985	9,337	10,847	11,092	11,192	11,235	11,250	
1986	10,540	12,205	12,551	12,690	12,725		
1987	11,875	13,832	14,238	14,413			
1988	13,343	15,542	16,066				
1989	14,469	16,776					
1990	16,561						

Accident Year	......Selected Age to Age	Development Factors......					
	12-24	24-36	36-48	48-60	60-72	72-84	84-ult
1984							1.000
1985						1.001	1.000
1986					1.001	1.001	1.000
1987				1.004	1.001	1.001	1.000
1988			1.011	1.004	1.001	1.001	1.000
1989		1.030	1.011	1.004	1.001	1.001	1.000
1990	1.163	1.030	1.011	1.004	1.001	1.001	1.000

EZ INSURANCE COMPANY
AUTOMOBILE LIABILITY

MONITORING RESULTS - COMPLETING THE SQUARE

EXPECTED CUMULATIVE INCURRED LOSSES by REPORT PERIOD

Accident Year	24	36	48	60	72	84	Ultimate Losses
1984							10,292
1985						11,261	11,261
1986					12,738	12,750	12,750
1987				14,471	14,485	14,499	14,499
1988			16,242	16,307	16,323	16,339	16,339
1989		17,287	17,476	17,546	17,564	17,581	17,581
1990	19,263	19,850	20,067	20,148	20,168	20,188	20,188
							=======
							102,911

EXPECTED INCREMENTAL INCURRED LOSSES by REPORT PERIOD

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-ult
1984							0
1985						11	0
1986					13	13	0
1987				58	14	14	0
1988			176	65	16	16	0
1989		511	189	70	18	18	0
1990	2,702	587	217	80	20	20	0
	======	======	======	======	======	======	======
	2,702	1,099	582	272	81	93	0

EXPECTED ADDITIONAL INCURRED LOSSES by CALENDAR YEAR

Accident Year	1991	1992	1993	1994	1995	1996
1984	0					
1985	11	0				
1986	13	13	0			
1987	58	14	14	0		
1988	176	65	16	16	0	
1989	511	189	70	18	18	0
1990	2,702	587	217	80	20	20
	=====	====	====	====	====	====
	3,471	868	318	114	38	20

Exhibit II.9

Reprinted from the Actuarial Review.

1991 CASUALTY LOSS RESERVE SEMINAR

4C: INTERNATIONAL INSURANCE/REINSURANCE EXPOSURE

Moderator

Mark Allen
Coopers & Lybrand

Panel

Frederick Duncan
Sphere Drake Underwriting Management Ltd.

John P. Ryan
Tillinghast/Towers Perrin

David E. Sanders
Eagle Star Insurance Company, Ltd.

MR. ALLEN: Good afternoon. This is session 4C on International Insurance and Reinsurance Exposure. My name is Mark Allen. I'm an actuary in the London office of Coopers & Lybrand. And to begin with I'd like to introduce the panel, who like myself are all actuaries from the U.K.

To save me jumping up and down in between each of the presentations, I'm going to introduce each of them now and also briefly describe what they're going to talk about.

Firstly, I would just like to make it clear that all of us make work in or around the London market, which as you all know is one of the largest international insurance markets in the world. The presentations are therefore inevitably going to be affected by the fact that we all work out of London, even if many of the problems we consider actually relate to claims coming from this country.

And in talking about the London market, I'd like to make one definition up front, which is when we're talking about the London market we'll be talking about the insurance and reinsurance companies that operate in that market, but Lloyd syndicates as well. And we'll use the London market to include both of those.

The first presentation will be given by John Ryan from the London office of Tillinghast. He's going to consider some of the major issues currently affecting London and will highlight the ways in which the different sorts of claims which we see there will arise in maybe different ways to the way that you will see them in the U.S. And in particular he'll be considering the problems which we as actuaries in London have in dealing with data on claims that you may have from the ground up, but we may see (inaudible) later on. Also looking at the London market as a whole, John should look at some of the peculiar problems that will affect Lloyd syndicates because of the structure. You will already have a good knowledge of some of the issues that John will address.

The second presentation, which will be given by Fred Duncan of the Sphere Drake Insurance Company will address a different sort of claim, not one that is unique to London, but one which has had a particularly violent effect on some of the insurers operating there, and that's the reinsurance spiral. Fred will consider the spiral itself, the way it occurs, how it happens, and hopefully some idea of how you might start to reserve for it.

And finally, after two presentations that will have considered very little else other than problems and just in case you go away thinking that the London market has nothing but problems at the moment, the third presentation will be given by David Sanders of the Eagle Star Insurance Company. He will outline the way in which the London markets actually reacted to the difficulties it has faced over the past few years, how this reaction may have affected the sorts of insurance is it writing now and how it may affect insurance companies in the U.S. when they seek reinsurance cover, which they may find is no longer available out of London. He will also give some thoughts to the future and hopefully paint a slightly rosy picture than you might have heard in the first two parts of the session.

Thank you very much. I'd like to hand over to John. Could we have the lights down in the back?

MR. RYAN: Thank you, Mark. I'd like to start off saying that in some ways I'm quite well suited to make this presentation, mainly because I'm actually a living disaster. I started my actuarial career in the month of Hurricane Betsy. Nine years after that I ended up as a partner in a stock working firm with unlimited liability for the '74 crash. Nine years after that I was dealing with Lloyd syndicates and insurance companies that were going insolvent left, right and center. And on the nine year cycle 1992 with asbestos and pollution coming around, there's all the signs that the cycle is continuing.

I'd like to start off with a brief description of the London market. It's an extremely complicated slide. You probably can't understand it, which probably shows that I've actually got the explanation done quite well. Nobody fully understands the market. I'm not going to go into any great detail, but just to emphasize that much business comes from North America, getting on for around half and certainly a lot more than half the problems. It's international market and much business comes from overseas. U.K. business is relatively small and the London market wouldn't be featuring in this program if it was to survive off the U.K. economy.

I would now like to talk a little bit about some of the fundamental problems of claims reserving in the London market. I'm assuming that everybody here is active and fully conversional with loss reserving techniques and so I'm only going to talk about the differences, as I perceive them, between the problems we face in London and the approaches and the problems that you face over here. And, again, I'm going to emphasize very much on the U.S. lines of business, particularly casualty lines of business which actually provide us with most of our major problems and headaches.

The first problem is that the data is invariably subdivided in insufficient detail. The very rapid growth in actuarial involvement in the '80s in the London market has improved this, but it takes time because many companies and syndicates operated on manual systems and it is virtually impossible to go back and recreate detailed triangles.

Very often one will see just a general liability triangle. This may not even be split between U.S. and other liability classes; well, it's about 60% U.S. casualty. Clearly this is less than satisfactory and clearly one has to encourage the market to break down data into more and more detail. The Lloyd's audit codes are now beginning to be broken down into more detail. Again the history isn't there. The Lloyd's market also has this famous "Non-Marine All Other" code, which contains everything from Bankers blanket bonds to the longest high tail excess coverages. It's now subdivided into short, medium and long tail, but this still leaves much to be desired.

I have discovered in my consulting career, one interesting technique to tackle this problem. If you go into the client and say, well, can we split this out into more detail, to which the client almost always says no. The reply is: We might be able to reduce the required reserves if you could give us the information. It is then surprising how rapidly the information materializes.

Teaching companies and syndicates how to do group data is probably one of the major services the actuarial profession is currently providing to the London market.

It is extremely important to have a knowledge of the market. U.S. lines of business are usually clearly defined but it is important to directly understand the business. This is particularly true in London where different syndicates, different companies do things differently. An interesting example is the questions of what a paid to claim means. Clearly there were different points where the check clears, etc., but you find that a number of syndicates or companies will classify a paid claim as being paid when an LOC is put up on an outstanding claim. Actually they often have to find the cash for Citibank. Clearly you will get very different development patterns according to the definition enrolled. So ask obvious questions and work your way through to the answers.

Problems with aggregate limits, the way the reinsurance programs work need to be researched in some detail. It is important to also realize that one is not always given the right answers. Underwriters are not always correct in their understanding of an account and therefore some experience is required in questioning them.

It is important to realize that London is an entrepreneurial market. The entrepreneurial approach to underwriting is one of the successes of the London market. It's the historical basis on which London has built up its business. Its flexibility is one of the reasons why it will survive in the future and why it will throw off some of the current difficulties. It is a market with a lot of entrepreneurs out there. This is, of course, great for the market and its future. It's hell for the actuary trying to do reserving, because no one year, no one development pattern is going to continue in the same way in the future. The actuarial analyst needs to understand how that it has changed and also how the market conditions have changed. In some cases, of course, you get quite dramatic changes of mix of business, not because the underwriters suddenly wanted to write a lot more of this particular thing or a lot less of that, but simply competitive conditions vis a vis the U.S. and London changed. This which meant that some business came across the Atlantic but previously hadn't or visa versa.

Complexity of reinsurance arrangements is a function of the London market, aided, no doubt, by brokers hungary for commission. This may mean that sometimes it is appropriate to reserve gross and look at the way the reinsurance program impacts. In some cases the reinsurance program may not be all that significant anyway and one doesn't need to worry too much about it. In other cases you actually have to reserve net because the gross may be very difficult to follow if the underwriter has been chopping and changing his gross writings to make it fit the reinsurance program.

Many of these complex reinsurance arrangements have been put together on an ad hoc basis. In some cases they've been deliberately put together to make the account particularly complicated. The underwriter may then feel he can get a particularly good deal, because the people who write on his program won't understand it and therefore will hopefully underprice it. Conversely, you will also see underwriters who have been sold incredibly complicated programs, and don't understand it. They fail to underwrite to the program and fail to make any reinsurance recoveries at all. So you can actually see some quite good results at the gross level but diabolical results at the net level. As I said before, much of the business is U.S., where problems by and large tend to be magnified.

Much of the business written in London is reinsurance or umbrella. In general, the legal distinctions between reinsurance and direct business or umbrella business is not material. Most of the characteristics of it are reinsurance, notwithstanding the actual legal situation. It tends to be a market of last resort for high risks. Because of the expenses of operating across the Atlantic, there is relatively little direct business written in London market except by way of binders and line slips. These have led to the same sort of problems in the London market as you have had with the MGAs.

In terms of case reserves, the London market makes extensively use of U.S. attorneys for U.S. business, which tends to mean that the case reserves are consistent throughout the market. Of course, they are expensive to maintain as U.S. lawyers, as you know, are not cheap. They are even more expensive than actuaries. Some syndicates or companies will put in additional case reserves, ACRs. These will vary to some extent from syndicate to syndicate or company to company. So care is required there.

It's important to realize that the triangles may be misleading, including factors that I mentioned earlier. The way reinsurance programs impact can produce funny answers as can aggregate deductibles. Policy limits may distort e.g. stop triangles dead in their tracks. You can get different shapes from one year to the other. So some care needs to be taken.

The majority of business is written on a slip system. Thus average claim size methods have to be handled very carefully as the average claim size is a function of the line size. One syndicate may be writing excess of $25,000. Another Lloyd syndicate may actually be writing very high layer excess covers. The latter may but had a smaller line and lower average claim size.

I'd like to say, now, a little bit about reserving at Lloyd's, which is in fact a misnomer except for open years. It's reinsurance premium, which is actually paid from one set of names to another. The Inland Revenue, which is our equivalent to the IRS, has determined the right to reopen that reserve and not allow some of it for tax purposes. Essentially, no margins are meant to be put into it. You are meant to get the estimates exactly right, except you are not allowed to discount for interest. You are allowed to take out what is known as a time and distance, or in U.S. terminology financial reinsurance. There's no need to introduce any timing risks or other items here. It's usually a straight fixed payment schedule. The Inland Revenue has no problems with this. It is regulated by the Lloyd's authorities who are probably happy with it although this may be something that changes in the future. There is a clear lack of logic in that in that the only purpose these contracts serve is to get round the discounting rules. The only argument that has any real validity is that this provides an objective means of setting the discount rate. It is, of course, also extremely good business for the brokers and the people who underwrite it. This may have much to do with the rules because most people could come up with a reasonable discount rate without paying many millions of dollars in terms of brokerage income.

Lloyd's percentages are used as a basis of minimum reserving and used by Lloyd's as a means of testing syndicate reserves. Some syndicates use them as a basis of setting their reserves. In most cases they are based on percentages of premium. Essentially you can regard them as a variant on the Bornhuetter-Ferguson method, i.e., an expected loss ratio times an unreported percentage applied to a premium. These percentages have been in operation for very many years, though the amounts change according to market conditions. They provide an interesting example of how English technology was well ahead of the field, but we subsequently failed to develop and capitalize on it.

Now I'd like to say something about asbestos. We have many problems reinsuring U.S. companies and writing umbrella coverages. As with yourselves, the first things that we actually have to do is to identify the exposures. It is easier to say that than to actually do it. Many syndicates and companies, particularly in the older days of the market, used to rely heavily on the brokers to maintain their records. Consequently they do not have the files in-house and are heavily reliant on brokers producing information for them.

The market has now tackled this problem centrally. An organization, that's gone through a variety of name changes, but is now known London Market Claim Services (LMCS), effectively provides a clearing house facility in this area. It collects details of all the various slips with asbestos insureds when ABC syndicate notifies an asbestos claim. The stamp will often show the shares of the other participants on the slip. Therefore LMCS are able to build up a database in this area, which they then pass on to the other members, who are the vast majority of the London market. This provides a means of actually identifying the policy records of the major asbestos insureds. And if you are involved in doing any reserving in this area on asbestos, LMCS one of the first sources of information that you should go to.

The way that policy limits impact is important. Now clearly you have this problem as well, but there are some subtle variations between London and the U.S. In particular the combined single limits between bodily injury and property damage liability were combined into one limit very much earlier in London and are common on umbrella coverages. It came in very, very much later in the United States. In many cases, in London, the property damage limit and the property damage claims will be amalgamated with the bodily injury claims.

The excess of loss coverages are usually a function, and I emphasize the word usually, a function of the underlying form. Again, the wordings differ and there was an earlier use of combined single limits, but in many cases there will be two limits if the U.S./domestic carrier has two limits. Thus there will be a bigger exposure to bodily injury and property damage. Largely because of the widespread impact of the combined single limit the property damage claims are, in general, less of a serious problem in London. The three G's grace and the two gyperuns are big claims in that area and have less bodily injury to come through than the other claims.

There is an interesting byproduct of having the combined single limits and possibly bodily injury and property damage limits separately for different types contract. If the outwards reinsurance program covers them it is conceivable that a company or syndicate could have three retentions: One in respect to its combined single limit; One in respect of bodily injury; And one in respect of property damage. It is not terribly common, but it does need to be thought through, particularly as there is still some considerable uncertainty as the way the legal mechanisms work.

Property damage is, therefore, less likely to be a problem in London because the major manufacturers combined single limits will be exhausted by bodily injury claims. To the extent that new insureds come in to the market, there is going to be a problem. The removal of asbestos from buildings is likely to come in on the general liability policy in much smaller amounts and unless there is some peculiarity in the reinsurance program, they will come through to London as single claims. They won't be able to be aggregated. However, with all of these issues, some enterprising U.S. lawyer may well find some way round this.

New insureds coming into the market as the major manufacturers run out of cover is always a problem for us as it is for you. The Owens-Corning initiative, whereby they are going around sending brochures out to all the plaintiff lawyers identifying smaller manufacturers is likely to be less predjudicial to London because although it is likely to bring more claimants in, it will increase the number of retentions in the U.S. It will, of course, encourage new policies and we will have new limits to pay. Expenses are obviously important. Some policies have all inclusive limits and some exclusive. This is something that needs to be handled with care because of the high levels of expenses.

The Wellington agreement has much the same effect on London as it does with you. The facility was a byproduct that got tacked on the back. It cleared the log-jam of the legal disagreements over how the reinsurance worked, put some caps on the excess of loss coverage where there could otherwise have been unlimited reinstatements. In effect, it allowed the triple trigger coverage. However, there's been a very nasty shock to the reinsurance of the facility because the facility was put together by an agreement of London insurers and not everybody feels that the London insurers and reinsurers were entitled to do that. There has been an arbitration ruling which suggests that facility payments may not be eligible for reinsurance recoveries, which has sent the market into a flat spin. We're promised a letter from the various authorities that will provide some clearer indication of what is going on later in September, but undoubtly this is going to create some less than pleasant problems for us all this year end. It is certainly something that you need to consider if you are considering reinsurance recoveries and the impact of facility payments. Finally, where reinsurance exists an aggregate extension clause is normally necessary to ensure a recovery.

Pollution. Clearly this exercises your minds as well as ours. London has introduced the concept of reserve potential to avoid any legal complications, but to provide a basis for underwriters to set reserves and pass information around the market. Essentially, it is the amount required to clean up the site, pay legal costs, various other liabilities and costs, on the assumption that liability is found against insurers. No discount is made in the reserve potential for the coverage issues for, i.e., coverage not being found. The only exception being cases where, you know, there may be an argument as whether a policy existed on something like that, i.e., nothing to do with a normal argument about pollution. This allows information to flow much more freely around the market. The pollution claims are effectively handled by nine law firms in the states to concentrate expertise in the handling of pollution claims. The lawyers tend to specialize with particular insureds, which does mean that you do get different lawyers on the same site if you have more than one insured on that site.

They have built up quite a lot of expertise, which is readily available. This circulates in the market in the attachments A thru D. A, B and C provide a lot of the background information on the sites and the coverage details. Attachment D contains the detailed defense cases, arguments in the particular case, and are highly privileged. Therefore they are not readily available to any outside of the company or syndicate. Technically items A to C are subject to privilege, but most of the information is relatively factual, that anybody could put together provided they had enough time and money.

London Market Claims Services also provide a pollution clearing house and that should be your first port to call if you want to identify the exposure of a company in the London market. They should be able to provide most of the policy limits and background information.

Reinsurance issues may be relatively straight forward, but not having been tested in the courts are not entirely clear. It is probably going to be more straightforward than with asbestos. Most of the events, given that coverage is found, are likely to be relatively clearly defined.

Pollution is probably the biggest cause of years being kept open at Lloyd's. Some syndicates have closed because they felt that the numbers are not that material in relation to the total. Believe it or not, there was even a very limited amount of reinsurance cover. It is also important to realize that probably, and I emphasize probably, pollution will tend to be a horizontal coverage as far as London is concerned and not a vertical coverage. Each dump site will likely constitute a separate claim. There will therefore be many claims. A discovery basis would produce everything as a vertical claim, but this is probably unlikely to be prevalent. No doubt everybody is looking at the relative merits for what they are doing. I would expect you to be in a much stronger position to argue something favorable to yourselves than London simply because you are more likely to be united in the approach that you want to take. There are some companies and syndicates that have rarely got exposures in the '50s and '60s usually they are fairly strongly in favor of having some form of discovery basis, because they would not have any liability, whereas the people with exposures in the later years very much want to push it back to the earlier years. Consequently, we may see some disputes. Obviously, much of what I've been talking about applies to the direct business rather than to reinsurance or LMX business. There's been very little reporting of reinsurance claims. There are a few. Most of the major domestics have produced some very large computer printouts, for which I'm sure many of you here are responsible. If you are, I can congratulate you on having produced documents that are almost meaningless, which was presumably the object of the exercise. There is some information that suggests that there might be many claims coming through, on the reinsurance side for issues of loss business. If you go back to the early '80s, the correct multiple in the relation of asbestos outstandings, was somewhere between 100 and 200. I guess one might see a similar sort of multiplier on the pollution outstandings. This produces some quite horrifying numbers.

Let's talk a little bit about some of the methodology that you can apply in London. There are variants on this that can be applied in the States, but because of the existence of the reserve potentials some techniques are currently unique to London. The first source of information is insured of notified and quantified sites, where the lawyers have put up reserve potentials. In the various attachments, A and C, you also get a lot of information of notified sites, but not quantified. These vary from..."and we have 25 other sites" or "we have 200 other sites, some of which may or may not be material" to the ones where it is quite clear that there could well be some substantial liability. In the latter case the lawyers haven't as yet finished their assessment. You can get some indication as to whether there is any groundwater pollution or what type of claim it is and so on and so forth. Obviously some modeling and interpretation is required. The notified but not quantified sites are ultimately likely to be a larger problem than the notified/quantified site.

New insureds on notified sites are probably not likely to be that material an issue. Where there are other PRPs, it is likely to be a matter of robbing Peter to pay Paul, i.e., a liability to one insured will be substituted for another. Where we have new insureds and new sites, than obviously there will be a much larger problems and they will give rise to a substantial increase in liability. As I'm sure you're aware, companies like Exxon and Chevron have not notified the market, at least in London, of claims. From what I know of U.S. oil companies, I find it hard to believe that they've not done any pollution, but maybe you know more about that than I do.

Obviously, all insureds send new EPA sites. The sources of information are North American rather than London. Clearly non-EPA sites are another source of claim.

The coverage issues are to some extent different in London than here, partly because of the different wordings. There are certainly different wordings in the U.S. By and large the people making claims on London are mainly the Fortune 500 companies. Therefore the courts are less likely to be sympathy for them than for the dry cleaner who throws his cleaning oil out the back. That class of individual is unlikely to find his way into London, and so will remain in the USA. Thus the sympathy factor may well be working favorably for London underwriters. This is just as well as, in most cases, the EPA will be suing a U.S. company first. I'm quite sure Uncle Sam would much rather place this on Lloyd's and London market rather than the federal government, U.S. insurers or whatever.

The fortuity defense is probably a fairly good one, but then that's going to be an argument as to which set of years it favors. Clearly, it is going to favor of those who wrote in the later years, rather than the earlier years and this is where the fragmented approach in the London market may work against it.

Choice of juridictions is also relevant. Again, there are differences between London and the U.S. In particular, the Fortune 500 companies are more likely to be able to venue shop than the one site firm. The

Fortune 500 companies will all largely have some London coverage whereas the others will all largely be in the USA. Obviously it is very early days to make any detailed comments.

Thank you very much. I would now like to pass on to Fred, who is going to lead us into some of the mysteries of the London Market Spiral.

MR. DUNCAN: Thanks John. I'll start with a brief description of the LMX spiral and how it arises, and then I'll want to consider some of the problems involved in reserving for spiralling claims.

[SLIDE: "Simplified Spiral - All Reinsurers Identical"]

This will be a very much oversimplified picture of the spiral. Imagine a reinsurance market, consisting of a hundred companies. Each company reinsures direct insurers and also writes retrocession business (reinsurance of other reinsurance companies) in the market. Each company buys catastrophe protection, with a programme consisting of layers of cover amounting to $99m excess of $1m. And for simplicity I have assumed that each company reinsures itself with its next door neighbour. This slide portrays the property protection programmes of each company in this market. This shows the hundred companies, and then, right at the end of the chain, company 100 reinsures with company 1 to complete the cycle. This slide is two dimensional. It should be cylindrical (like this) to get a better picture of what's going on. On the face of it, though, there is $10 billion worth of catastrophe coverage there. But let's stop and think what happens after a $200m dollar loss (assumed to be spread evenly around the market). Each reinsurer will receive a claim for two million dollars from its direct insurers today, (let's call today day one). Tomorrow they will pay that claim for two million dollars and make a one million dollar recovery against their next door neighbour. But they will also receive a one million dollar claim from the next door neighbour on the other side. So on day two they have a three million dollar gross loss. On day four they make another claim against their next door neighbour and receive another claim from the next door neighbour on the other side. This goes on day after day until day 100 each reinsurer makes a claim on their reinsurers which exhausts their coverage, and receives another claim from their reinsureds, which now has nowhere to go. So the process stops there, with everyone having paid a net claim of $2m, consisting of one million dollars at the bottom (their retention) and one million dollars out of the top where they have run out of cover. In other words, the apparent $10bn of coverage is an expensive illusion.

That is a very much oversimplified explanation of how the spiral arises. I won't go into much more detail than that, but should add that the timeframe is actually much longer than indicated in this example. If you would like a fuller and more detailed explanation, you should refer to a very good paper which was presented to the spring meeting of the CAS in Palm Desert by Stanard & Wacek.

Does this happen in practice?

[SLIDE: "Property X/L - Gross Incurred Claims" (one line)]

Well, this graph shows how Hurricane Alicia (from 1983) is affecting the Property X/L book of a typical London market reinsurance company, (my employers, as it happens). It may come as something of a surprise to you to find that a claim which is eight years old is still moving. I checked just before I left the U.K. to come here to see how much it has developed this year and found that it has moved by more than half a million dollars at the gross level, and it's all driven by the spiral that I described.

This is not a very nice thing to happen. You can get some nasty surprises; it is hard to set reserves for spiralling claims; companies can run out of cover; and, as you can see, the claims can continue for some years.

Let's see what we can do to combat the effects of the spiral.

[SLIDE: "Simplified Spiral - One Reinsurer With Higher Protections"]

Well, the obvious thing to do is what company 3 has done in this example, which is to buy more vertical coverage. On the face of it, this sounds very good because they'll run out of cover last and their competitors will end up paying all the reinsurance competitors will end up paying all the reinsurance claims. But the problem with this idea, of course, is that everyone else can do the same thing.

In this case, everyone has now increased their $99m to $124m worth of coverage. But nobody is any better off, because at the end of the process they will all have paid the same net amount in claims as in the previous example. In fact the spiral will keep take longer to unwind, and the reserving problems are therefore probably even greater.

Only one group of people - the brokers - are much better off. (Laughter) One of the reputedly highest paid business executives in the U.K., with annual earnings currently of about $14m, is the Chief Executive of a London market excess of loss reinsurance brokerage which sees a lot of spiral-type business.

Another thing you can do is to retain part of each of the layers which go to make up the $99m of coverage in our example. If you refer back to the previous slides, you can see that the real problem was that the retention (at the bottom) was fixed. The higher the protection programmes, the more brokerage the reinsurance brokers got, but there was little or no extra benefit to the
reinsurers.

[SLIDE: "Simplified spiral - Co-reinsurance Layers Shown"]

In this example, each company retains (self-reinsures, or co-reinsures) 10% of each layer of its protection programme. The idea is to eliminate the problem caused by the fixed retentions and to damp down the development of large claims. As large claims are processed round the market, only 90% should be passed on by each reinsurer to its next door neighbours, and the claims should peter out in a geometrical progression (although obviously every reinsurer would end up with the same net claim as they had in the previous example).

So, after the problems caused by Hurricane Alicia, this is what the market tried to do. They reached an agreement whereby every property catastrophe reinsurer would retain a certain proportion of its coverages. Did the idea work?

[SLIDE: "Property X/L - Gross Incurred Claims" (two separate lines)]

Well, yes, to some extent. The first test of the system came in October 1987 with a windstorm which we call 87J. This graph shows the development of the gross claims to the same company as before, compared to the Alicia development. It's not clear from this if the pattern is different, so...

[SLIDE: "Property X/L - Gross Incurred Claims" (two touching lines)]

I've adjusted the data so as to superimpose the development of 87J (the green line) on top of the Alicia development. I think that this clearly shows that the development of 87J has been quicker, then slower, despite being a bigger gross claim to the LMX market.

But this still doesn't solve the problem, because gross 87J claims are still developing by in excess of half a million pounds p.a. in this company. So it is a partial solution but not complete.

[SLIDE: "Property X/L - Gross Incurred Claims" (four lines)]

87J was the biggest catastrophe claim until Hurricane Hugo, which is the blue line on this graph, and a huge windstorm (we call it 90A) which swept across Europe in January 1990, (the yellow line). And you can see what has happened there. The co-reinsurance agreement was useful in containing 87J, but didn't cope with these more recent really large claims. In fact, what is happening here is that the claims are going through the top of many companies' protection programmes. This should have the effect of slowing the later developments down even more dramatically than we saw with 87J. However, to the extent that many apparently adequate reinsurance programmes were shown to have been inadequate, it was clear that the nightmare of the spiral was still with us.

So this leads naturally on to the reserving problems. How do you reserve for these claims? (With difficulty!)

[SLIDE: "Simplified Spiral - Top Marine Protections Shown"]

But before moving onto the reserving problems, let's look at one last, but significant, complication. It is traditional, in the London market, for the very, very high layers of protection to be placed in the marine reinsurance market even though the original claim might be non-marine. This slide shows the picture now. Our non-marine reinsurer retains $1m plus its share of a protection programme placed in the non-marine retrocession market up to perhaps $90m. There is then a further blanket cover of say $10m on top, placed in the marine market, where there might be no self-reinsurance. (This graph is not to scale!).

The effect of this is to create the possibility of a secondary spiral in the marine market. As non-marine spiral for Hugo slows down, the marine spiral may start to take off.

[SLIDE: "Hugo - Paid & Incurred Claims"]

Here you see it. I should repeat that what you see there is a non-marine claim in a marine account. So you can see a further angle to the problem, especially if you also write marine reinsurance business.

Now to look at the reserving problems...

I'm going to try to draw a picture of one typical London market reinsurer in a bit more detail than I was able to draw earlier on.

[SLIDE: "One Reinsurer in More Detail"]

I hope you can see that fairly well. We're trying to assess the reserves for the property programme shown in the middle of this diagram. Claims are coming into it from direct and reinsurance companies or syndicates that it reinsures, symbolised by the block on the left hand side. Our reinsurer in turn makes claims on its reinsurance protection programme, placed with a series of reinsurance companies symbolised by the block on the right (some of which are involved in the spiral, some not). To confuse matters, there is no essential difference between the 'spiral' reinsurers on the right and those on the left.

You'd expect the claims from the direct companies to be notified first, then as claims start piling up from the bottom of the claim column for the company we are trying to reserve for, retrocession claims become an increasing proportion.

The bottom right-hand corner shows some claims dropping out of the spiral (perhaps to foreign reinsurers) not to reappear. Some, as the arrows indicate, go right back round and reappear (several times, possibly) as claims on the block of companies on the left hand side, who will in turn notify our reinsurer. Thus the column of claims incurred by our reinsurer climbs as the cycle continues. Is that fairly clear? Our question is: How do you reserve for this?

The problem of reserving for the direct business is probably straightforward, because you know what you've written on a direct basis. But setting accurate reserves for reinsurance of reinsurance is virtually impossible because you lack the complete knowledge of the market that you would need. You don't know what business the people you've reinsured have themselves reinsured. All you know is the exposure and structure of the business that you yourself have written. You also know the structure of your own reinsurance programmes, but you have no easy way of knowing what the gross claims coming in will be. They'll come around several times, no doubt, as we saw in the opening exhibit. So this is the model we try to work with. Your reserve will be within the red area unless you run out of protection coverages, in which case it's something above that blue line.

So the first stage is to try to analyse the current major component parts of the claim.

[SLIDE: "Extract from 90A Analysis"]

These graphs show how a sample of four of the subclasses used in our 90A analysis have been behaving. The x-axis represents weeks of development, and the y-axis the proportion of exposure that has been burnt through. The initials (e.g. "C/E/TA") are purely internal classifications relating to type of coverage, class of risk, geographical area etc.

The trouble is mainly the development of claims shown in the top left hand corner and the bottom right hand corner. These are reinsurances of reinsurances and it's hard to know where they are going to finish. One might be tempted just to draw a horizontal line somewhere and guess, and basically there's not much more we can do than that, but I'll show you one approach we try to use.

The next stage in the attempt to answer this question is an analysis by rate on line. Rate on line is simply the contract rate expressed as a percentage of the policy exposure. You would expect that higher rates relate to lower layers of protection, and vice versa. You saw from the picture two slides ago that our reinsurer is seeing its claims piling up as they come in from its reinsureds, and so we should expect to see the contracts with higher rates on line (and therefore lower layers) being hit first, with the claims progressively reaching higher layers (and therefore lower rates on line) over time.

[SLIDE: "January Storms: CETA - Rate-on-Line Analysis"]

This slide attempts to show this part of the analysis. Here we have tracked the cumulative position by grouped rate on line at (fairly irregular) intervals. Different time periods are shown as different colours in this graph. You can see that for contracts with rate 45% or higher, the bulk of the claims came in during the second period (to November 1990), and by the end of the third period (to January 10th 1991) exposure had been exhausted. At the other end of the scale, nothing happened on contracts with rates less than or equal to 5% until the second period, and there has been nothing since. The job is to guess (sorry, estimate!) where the ultimate value in each block will be.

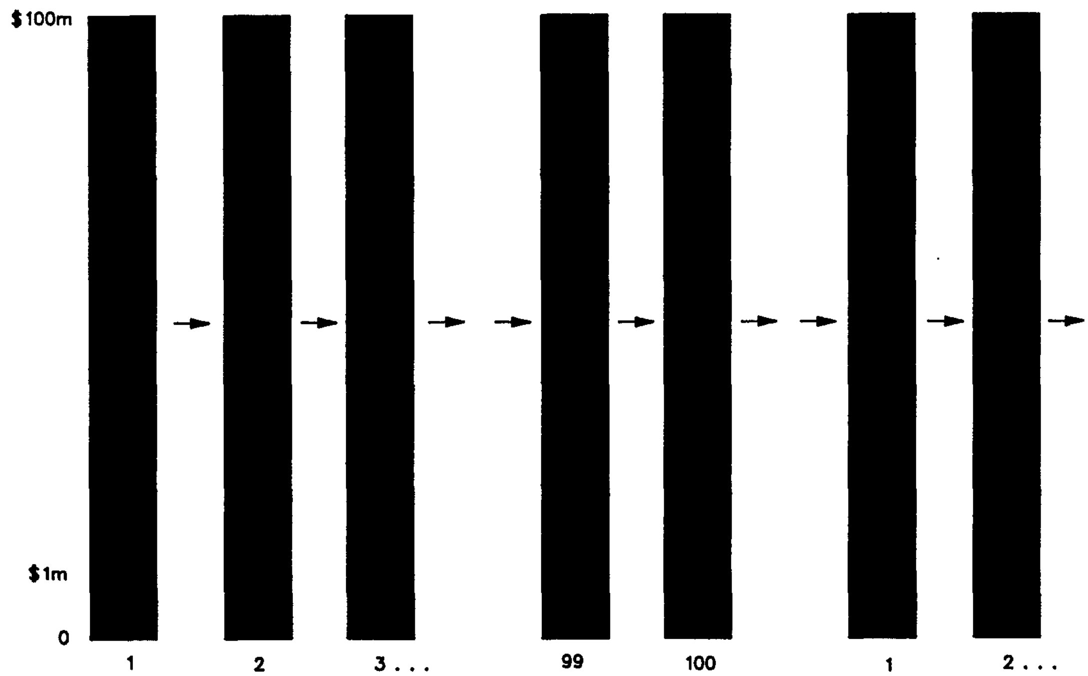
You will appreciate that once we have got to this stage things are not particularly scientific. The important thing now is to monitor your estimates on a regular basis and keep adjusting them in the light of changing circumstances.

I hope you understand, from the description I've given you, that it is very hard to get anything very scientific from the data available. I've just been attempting to outline some of the difficulties that face a reinsurer in setting reserves for spiral claims. This sort of analysis is part of the reserving process that we follow and the trick is to make sure that you monitor your estimate very regularly indeed (because we know they are not right), but just try to make them as good as possible.

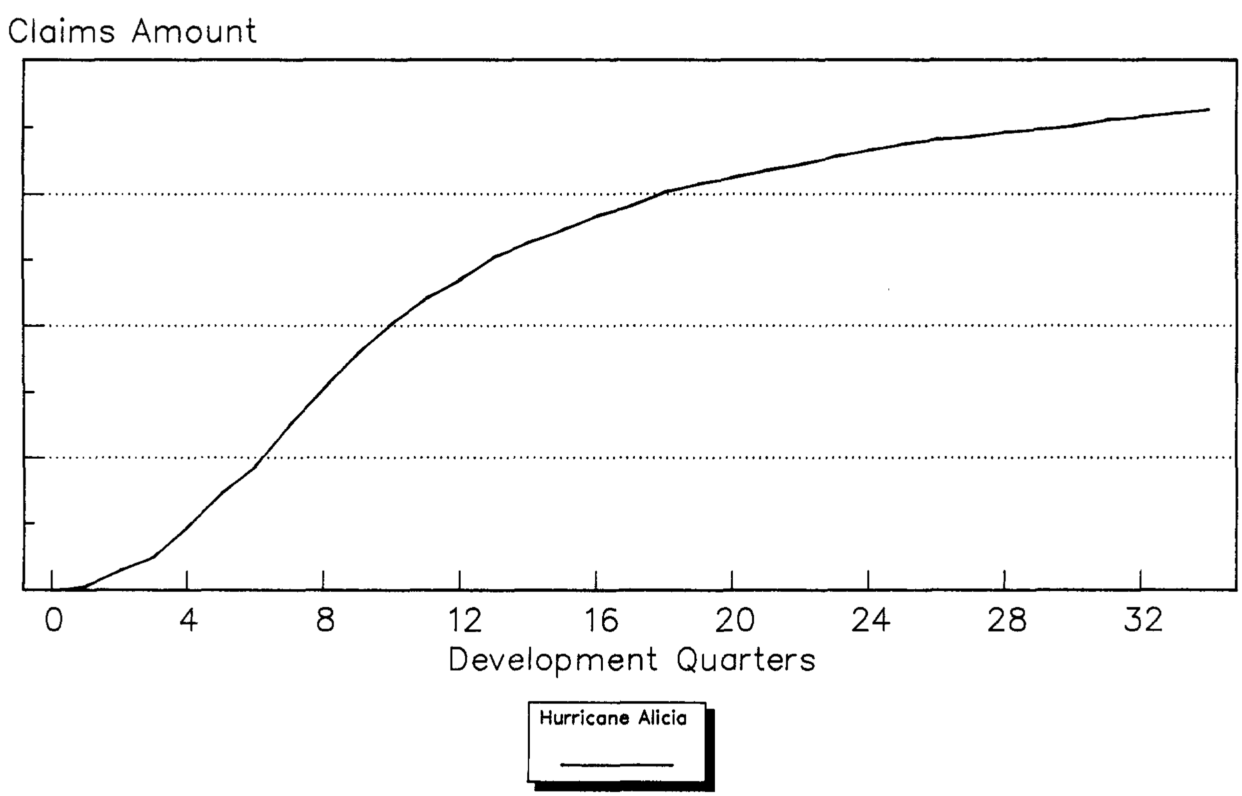
Now, if it's difficult for actuaries to try to set reserves for these claims when they are two years old or more, how difficult is it to set rates for them? The question arises because I don't think the underwriters really understand the details of this process. I think it could safely be said that rating levels for spiral-exposed business were probably too low in the past. The market is undergoing a thorough re-evaluation of how it rates for this business and I think that as far as the non-marine market is concerned, the spiral is dead because people now know and understand how it works better than they used to, and are taking action intended to solve the problem.

But that leads on to a presentation from David Sanders, who will take us from here onwards.

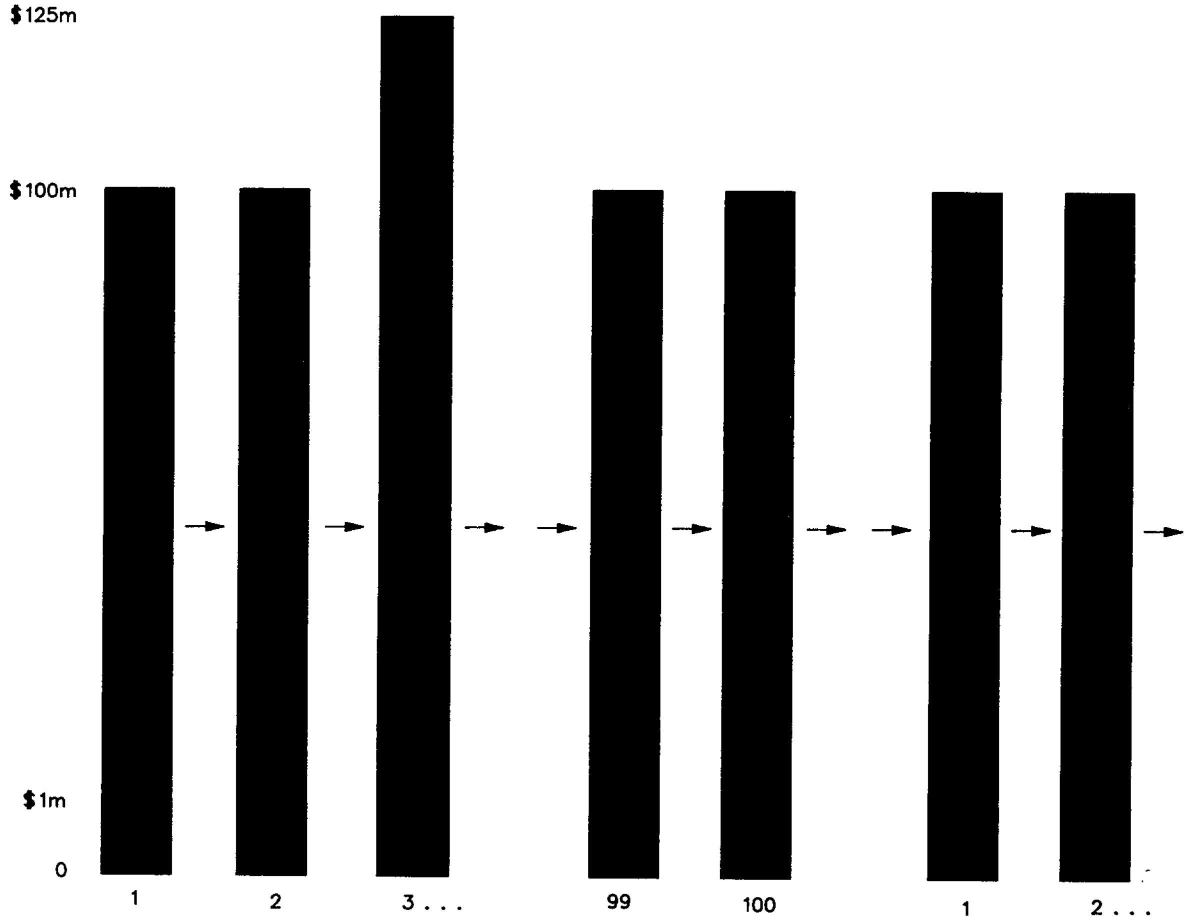
SIMPLIFIED SPIRAL – All Reinsurers Identical



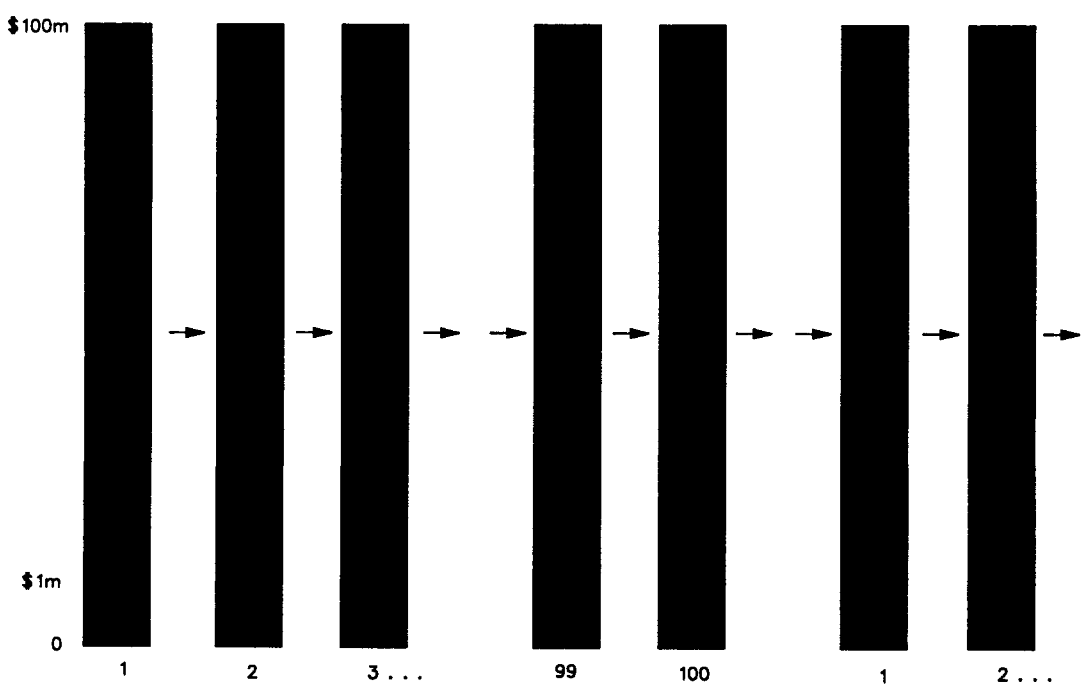
PROPERTY X/L
Gross Incurred Claims

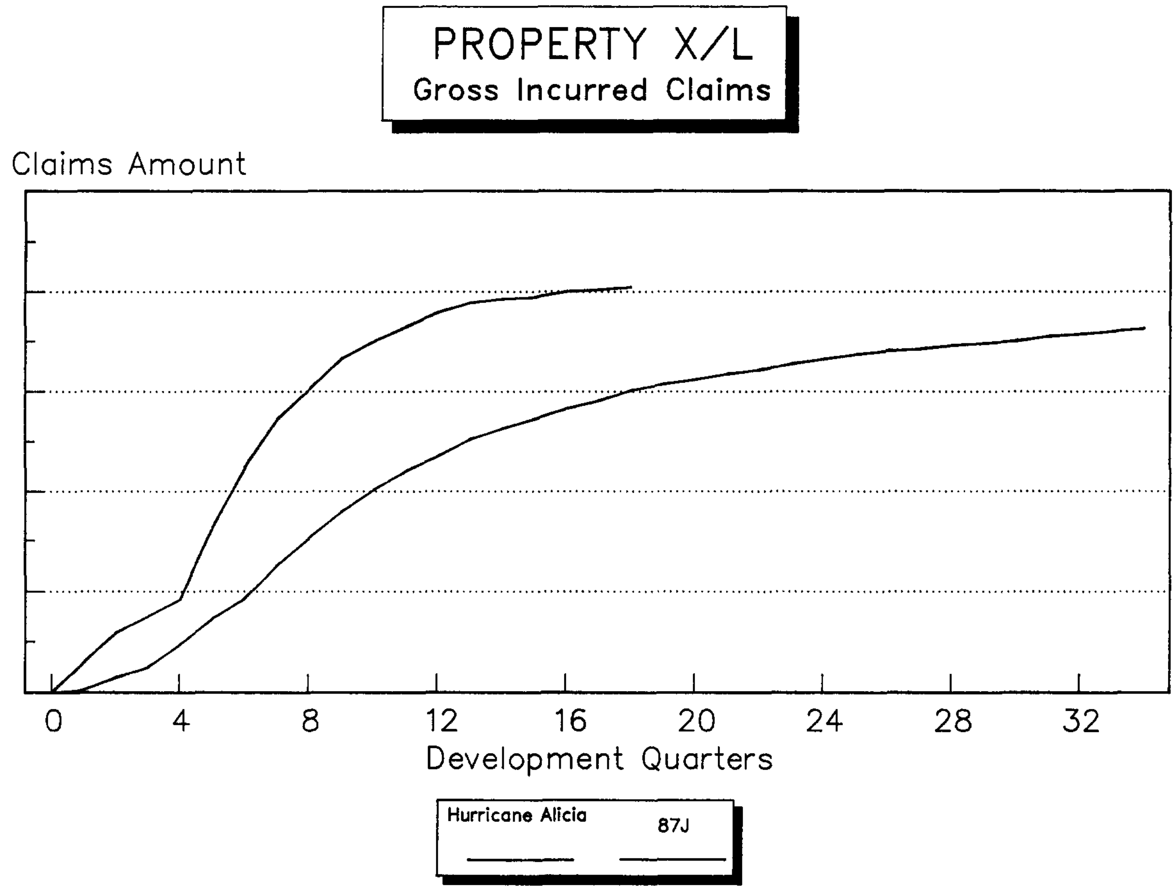


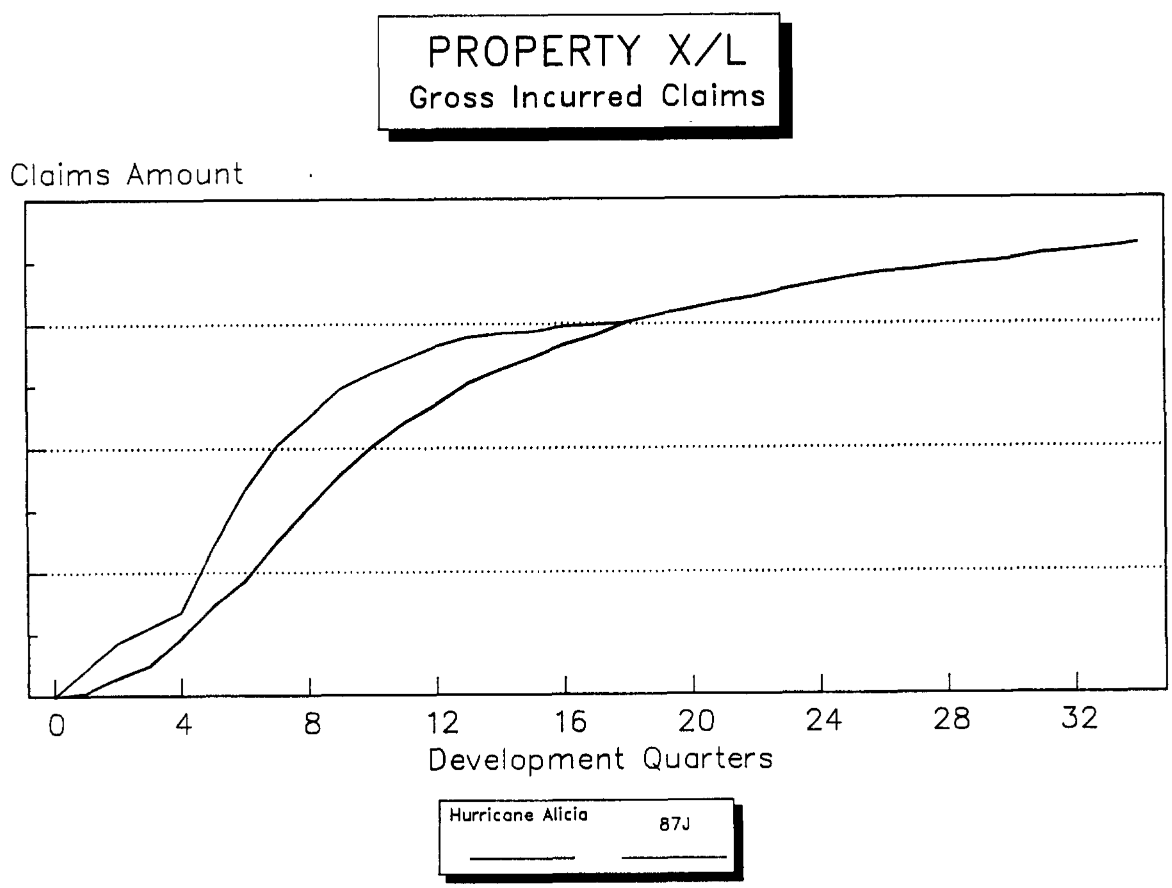
SIMPLIFIED SPIRAL – One Reinsurer With Higher Protections



SIMPLIFIED SPIRAL – Co-reinsurance Layers Shown




PROPERTY X/L
Gross Incurred Claims
Claims Amount
0
4
8
12
16
20
24
28
32
Development Quarters
Hurricane Alicia
87J


PROPERTY X/L
Gross Incurred Claims
Claims Amount
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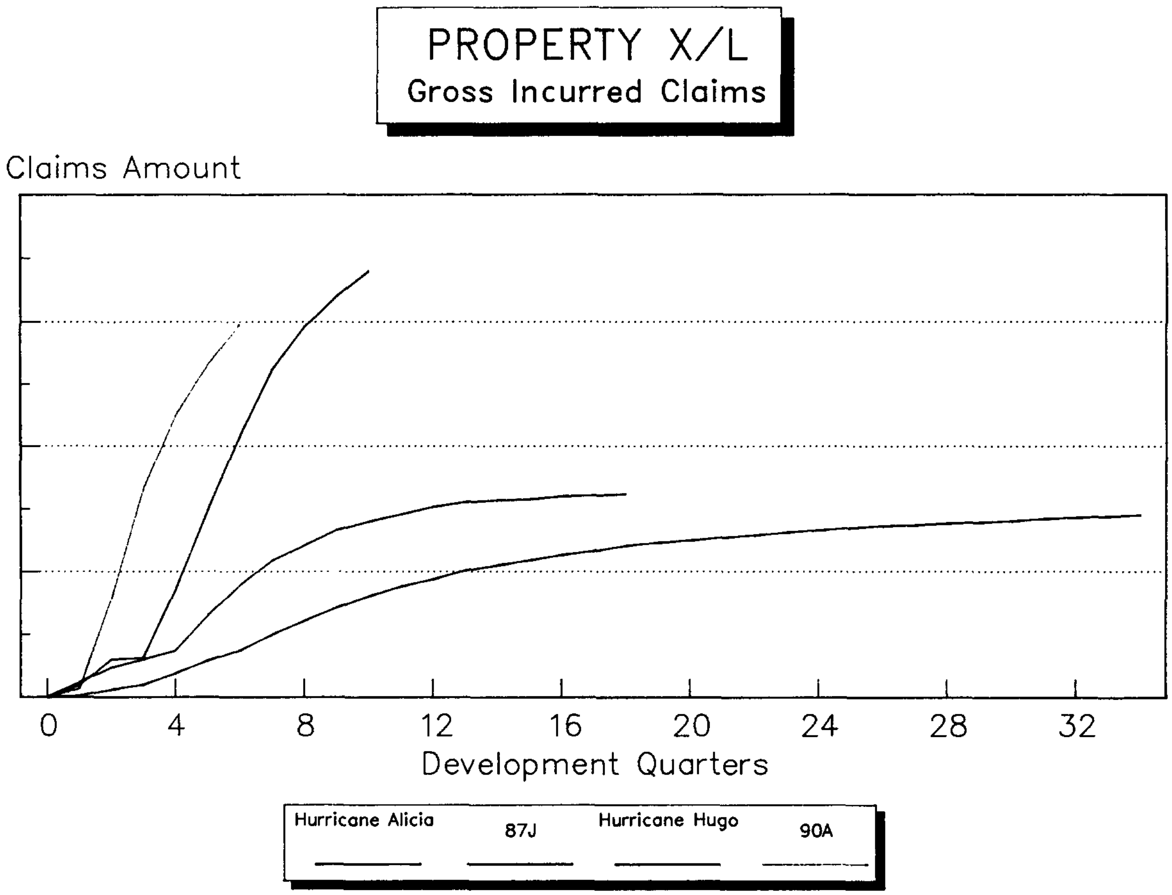
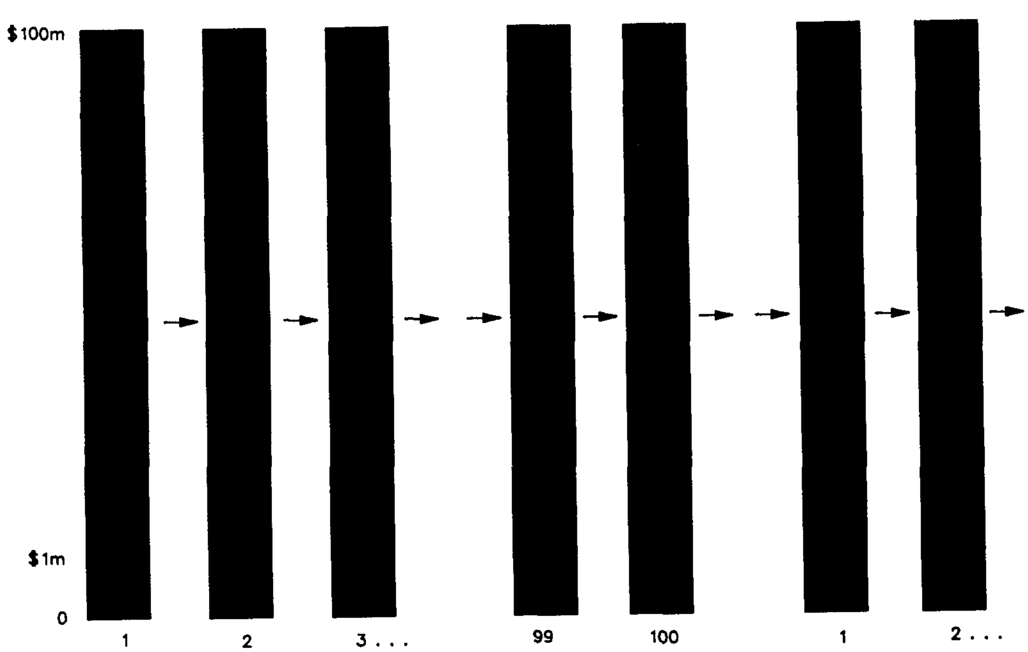
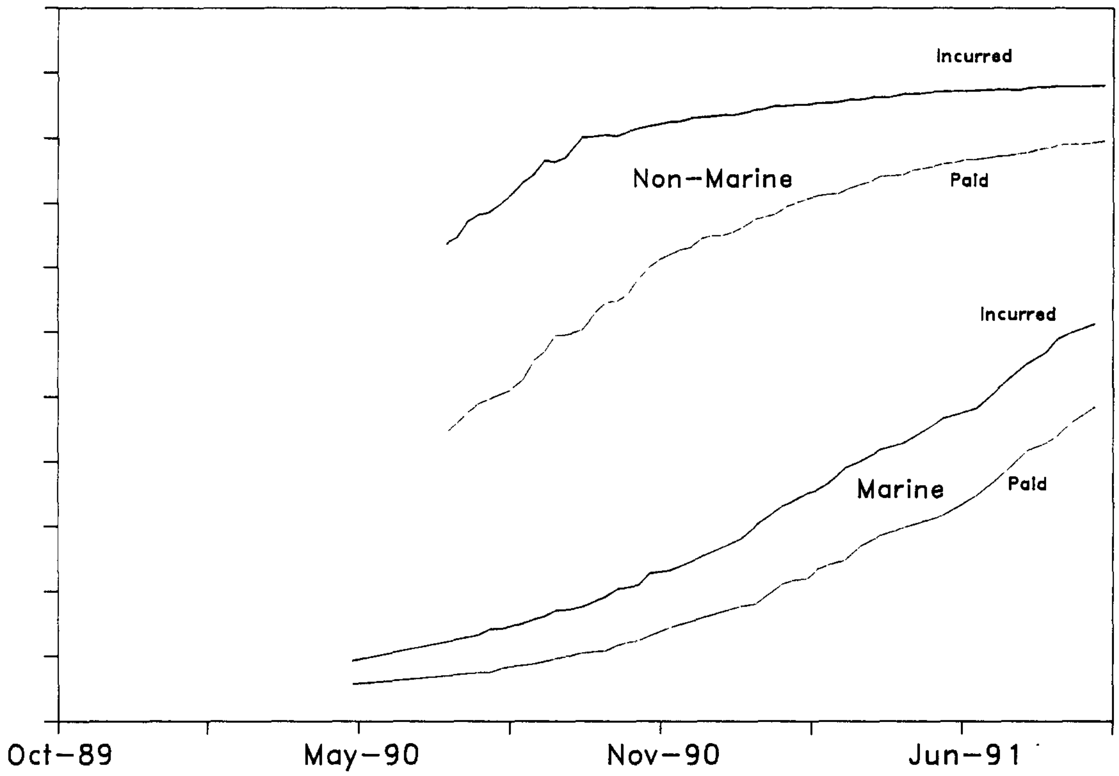
Development Quarters
Hurricane Alicia
87J



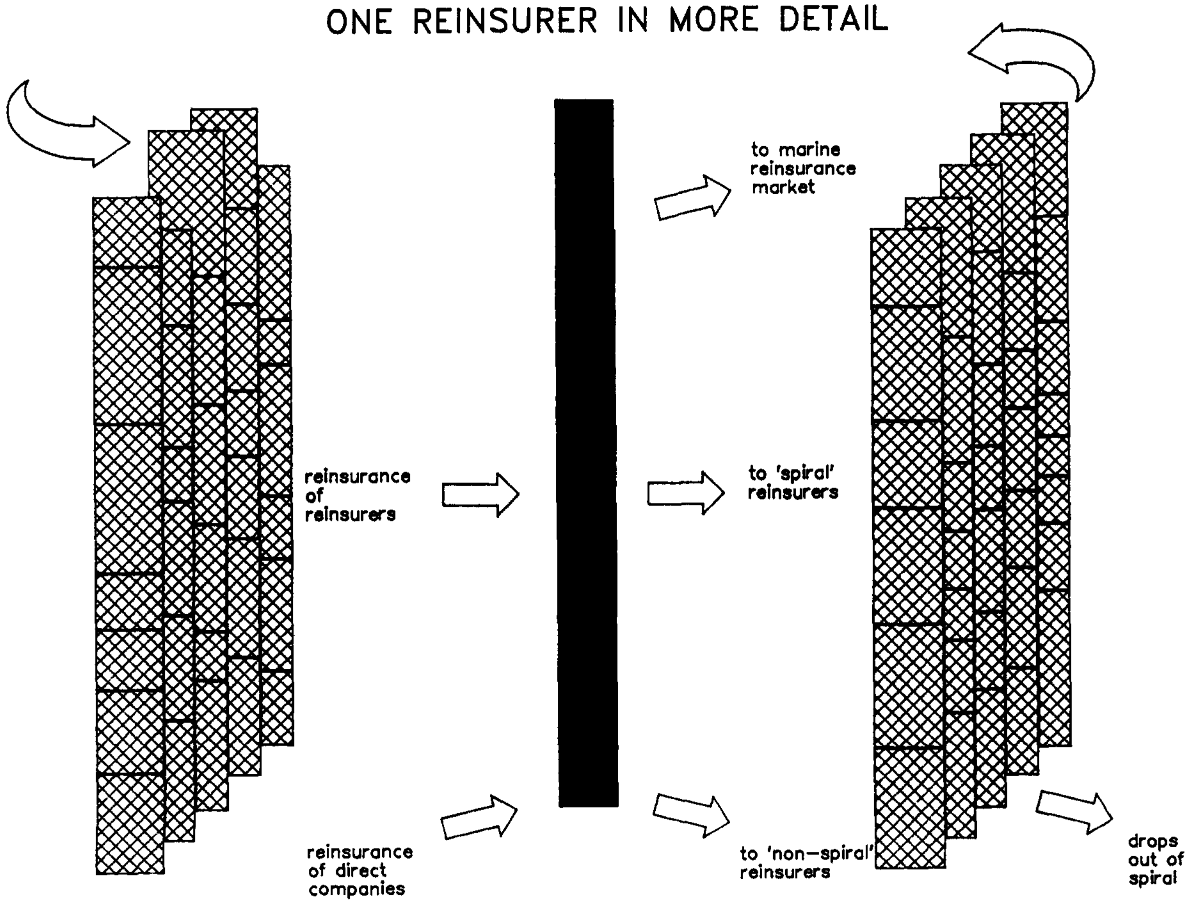
SIMPLIFIED SPIRAL – Top Marine Protections Shown



HUGO – PAID & INCURRED CLAIMS

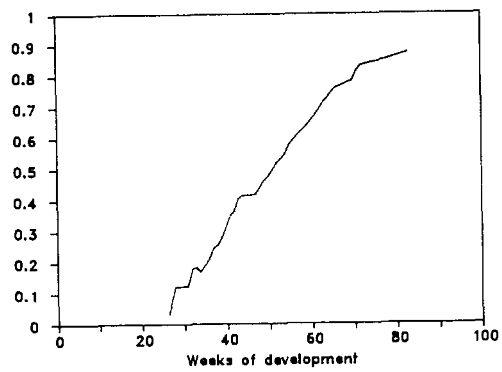


ONE REINSURER IN MORE DETAIL

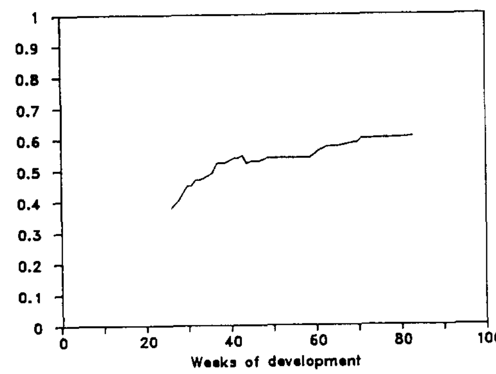


EXTRACT FROM 90A ANALYSIS

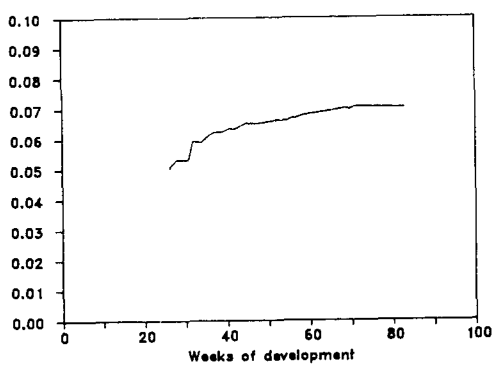
Class E/E/TA



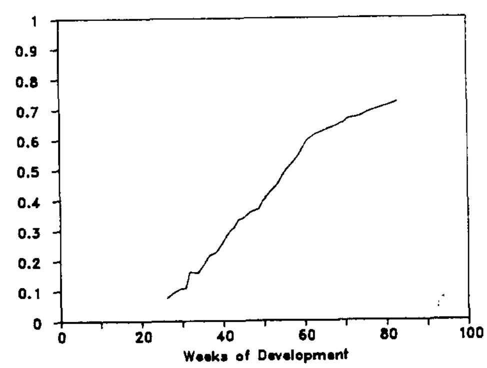
Class D/E/UA

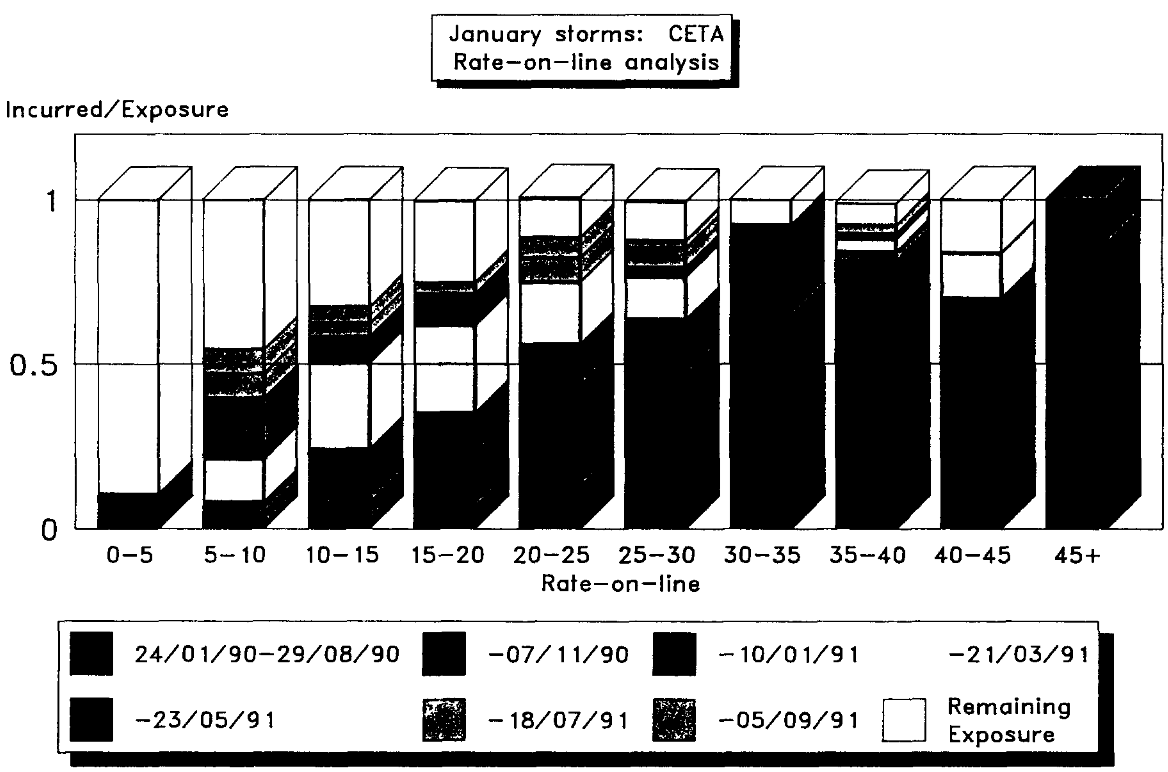


Residual Classes



Class C/E/TA





Incurred/exposure in $'000s @ contract roe
As @ 05/9/91

David Sander's Presentation

INTERNATIONAL INSURANCE/REINSURANCE EXPOSURE

1. Lloyds Non-Marine Market

The Lloyds non-Marine market is heavily dependent on retrocession and spiral (or secondary retrocession) capacity. The events of the last 3 years - 87J, Gilbert, Hugo, Newcastle (Australia) earthquake, Phillips Petroleum, San Francisco Earthquake, 90A (Daria), 90D and 90G, have heavily damaged this market. Furthermore the larger claims have proved the spiral market to be an illusion for many underwriters.

PROBLEM CLAIMS

NON MARINE

EUROPEAN WINDSTORM 87J
HURRICANE GILBERT
HURRICANE HUGO
PHILLIPS PETROLEUM
SAN FRANCISCO EARTHQUAKE
NEWCASTLE (AUSTRALIA) EARTHQUAKE
EUROPEAN WINDSTORM 90A
EUROPEAN WINDSTORM 90D
EUROPEAN WINDSTORM 90G

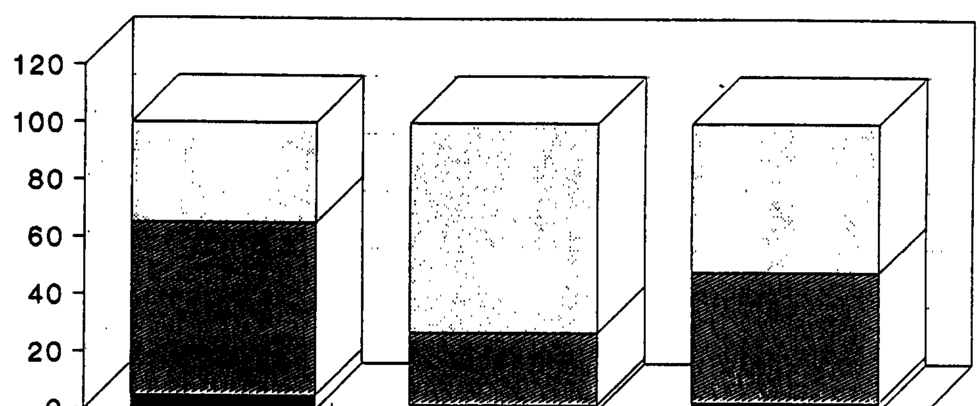
The level of retained risk by the underwriters was also largely an illusion, with exposure levels being substantially higher than anticipated. The "hidden" retention, i.e. that above the top layer of protection, is important in this context.

The prudent underwriter will write 60% xs 5% on total aggregate exposure, i.e. run 5% on the bottom and 35% at the top, for a big loss.

The actual picture for 1990 was 20%–30% xs 2% (i.e. running 70%–80% at the top).

A good company was running on its London market business 45% xs 3%.

HIDDEN RETENTION



	PRUDENT	ACTUAL	GOOD
Hidden	35	73	52
Reinsured	60	25	45
Retention	5	2	3

Retention   Reinsured   Hidden

In 1990 it may have been difficult to purchase the higher layers - but even so, the names at Lloyds were unaware of their net exposures. It is only now that the truth, for many, is being realised.

It should also be noted that HUGO did considerable damage to the market. It was only a small Hurricane that hit two US states - The Carolines - neither of which is a centre of great value. (My apologies to all Carolinians.) Imagine the consequences of a repeat of Betsy.

The result of these losses is a decimated secondary retrocession market - except for a few small pockets this market no longer exists. Accordingly, exposures on the retained and primary reinsurance layer are running more and more exposed. Less cover is being purchased for a significantly higher cost. Catastrophe XL used to be measured at rates of 3 on line - 4 times that amount is now the minimal rate generally available.

Other problems include asbestos, pollution, Savings & Loans. The first of these is quantifiable - but possibly in dispute following a recent U.K.court ruling in favour the Outhwaite syndicates on the validity of reinsurance of claims settled under the Wellington agreement. The last two are short of any serious workable quantum or solution. As previously mentioned, a number of syndicates are unable to reinsure to close - leaving their liabilities open. The expression "Reinsurances to Close" was also not understood by Lloyds names, being neither reinsurance nor closing the liability! It is now a new game to determine potential non-closers and to withdraw from these syndicates before they can no longer close.

2. Lloyds Marine Market

The Lloyds Marine market suffers from all these problems and more. As world shipping declined, underwriters, to maintain premium, wrote more non-marine business. For example, whole account protections in the London market are currently placed in the Marine market.

The Marine market has been hit by large losses, like Piper Alpha and Exxon Valdez, a host of medium size losses, plus the non-marine losses indicated previously. Although Marine losses in 1988 underwriting year were disasterous, the meltdown of capacity has not yet occurred, but is expected at the end of this year.

PROBLEM CLAIMS

MARINE

EUROPEAN WINDSTORM 87J
HURRICANE GILBERT
HURRICANE HUGO
PHILLIPS PETROLEUM
SAN FRANCISCO EARTHQUAKE
NEWCASTLE (AUSTRALIA) EARTHQUAKE
EUROPEAN WINDSTORM 90A
EUROPEAN WINDSTORM 90D
EUROPEAN WINDSTORM 90G

PLUS

PIPER ALPHA
EXXON VALDEZ

Lloyds is also broken down into "specialist" syndicates - Marine, Aviation, Motor, Life etc. It is proposed that "super" syndicates will form writing across all classes of business. Syndicates will be consolidated and some, smaller syndicates will be unable to close, because of the lack of a suitable successor syndicate.

In 1991 there were 98 "open years". These are increasing annually. It is anticipated that the total number of syndicates will fall to less than 100 by the end of the century, with further reductions in capacity.

The problems at Lloyds has also meant talk of limited liability.

3. Company Market

I come from a direct writing insurance and reinsurance company. The current situation in the market can be summarised as follows:-

The Company Insurance Market

'On their present form they make Lloyds' of London look profitable, the High Street Banks philanthropic, and the Inland Revenue market sensitive'.

Christopher Fildes
The Spectator

(Inland Revenue is the British Internal Revenue)

The London Market capacity for the Company Market is global in the sense that much of the market is owned by overseas insurers. Although the effect of the large claims on the larger reinsurers is minimal, rationalisation of capacity is expected due to problems with the smaller players.

In Europe, direct insurers (who own the reinsurers) are struggling to make profit in markets where prices are depressed and competition strident. Certain insurers have either sold their operation - Victory - or are threatening to - M & G and Royal Re. Others have withdrawn - Sampo, Yasuda, Lombard Continental, Pahjola and Cigna.

The arithmetic of capital versus retention means a reduction in capacity as operations are sold. The capacity of the combined NRG/Victory Group will not be as great as the separate entities, due to the merger of stamps and the maximum exposure any prudent insurer may with to place with any one entity.

Outside Europe, we have America and Japan. Japan's entry into the market is still awaited, and America appears to be totally disinterested in the London market, or other overseas markets - yet relies on these markets for the protection of its own business.

The picture, therefore, appears to be one of gloom for the underwriter. Lloyds appears to have been continually on the defensive for the last 8 months, with losses for the next 2 years predicted to exceed the 1991 losses (based on 1988 underwriting year). Names have resigned.

The availability of reinsurance cover has decreased, and its price has increased. If, in the past, underwriters could write business of 5 on line and reinsure for 4 on line, they did so, and kept the 1 on line profit. The secondary market no longer exists, and this means the primary reinsurance and the retrocession market themselves must rate adequately. Underwriters are discovering the lost science of underwriting. Examples exist in the market of insureds being covered with a deductible higher than their HUGO loss at a rate of 25 on line. This means, due to the reinstatement premium, that if a loss exceeds the HUGO amount, then for each claim of 100 the reinsurer will have received 25 initial premium and 25 reinstatement premium. The policy becomes, in effect, an aggregate second loss contract.

The opportunity to make money is therefore available, but the risk/reward formula requires real capital as opposed to the substituted spiral reinsurance.

Remembering the level of risk being retained in practice - the current risk/reward has a better ratio that the old spiral market, where profit was found at the margins.

The full impact on US insurers will be the increase in cost of cover despite the fact that they have not been subject to a loss! In certain areas, for reasons of cash flow, a reduction in rates may be available (i.e. the risk is weighed up against the cost of borrowing).

The second impact will be the lower availability of cover. A programme which was 90% placed 2 years ago may now only be placed 50%. The risks run by insurers is increased. How many insurers, when they underwrite a specific risk take into account that reinsurance may not be available for the whole period of risk due to different attaching dates of insurance and reinsurance contracts. This is particularly important for every risk in seismological or windstorm zones. The sudden unavailability of reinsurance protection at the right price may lead to considerable unintended exposures being run by the primary insurer should the market collapses.

In addition, although the insurers have retained substantially more of the risk, the security of the reinsurers themselves have diminished due to losses incurred.

A US insurer will be paying more for lower cover with lower security, and the cost of catastrophic claims will increase.

The larger catastrophic claims previously insured world wide, will be retained more in the US market.

From the reserving point of view – and this conference is about claims reserves – there is the need to review the losses gross, gross excluding catastrophic claims, and with due attention to the available reinsurance cover.

Finally, I would like to say a few words about 1992. This is the anniversary of a number of events. In Barcelona – home of the 1992 Olympics, there is a statue of Colombus. He is pointing out to sea. It is to Europe and not America. In 1992 the European market will be open, and London was taking advantage of this by establishing a non–marine company bourse, the London Underwriting Centre (LUC) to run parallel with the Institute of London Underwriters (ILU), the Marine equivalent. Unfortunately, the first claim was itself – a fire has caused damage in the order of £50 million to £100 million, and opening will be deferred a year.

For Europe 1992 is a misconstrued date. It is to be 1st January 1993. Large risks can be insured in any EEC country today – so cross–frontier transactions exist. For six months to 31.12.90, the Lloyds amount underwritten was £33 million of this business, of which only £2.2 million was non–Marine. To a large extend cross–frontier insurance will be a slow development, and market opportunities are limited.

After the bad news some good news. It is very difficult to be very positive about the London market, the one think that we should say is that although the London market appears to be in total disarray, with bad news all over the place, it isn't as bad as one may think. There is opportunity for profit and the underwriters who know the game will make that profit and will also reestablish their capital base to continue underwriting. They must be willing to take a much more serious down side risk to draw the higher rewards.

More and more underwriters are becoming aware of this opportunity. Capacity, which is now dead, will increase, but maybe not to the heavier days of the late 1980's. This will only occur over a period of time, which is probably as long as the memory retention of the underwriters who got caught out last year.

I think speeches like this presentation have to finish with a quote from a great novel and I tried to find one. "Is this the end of the beginning or the beginning of the end" didn't go down very well. So I don't know how many of you have read the Hitchhikers Guide to the Galaxy, which has the number 42 as the answer to Life, the Universe and Everything. The book itself has the clear message "Don't Panic", and the fourth part of the trilogy ends with God's final message at the end of the Creation. This summarises the London Market problems at the moment – "We apologise for the inconvenience".

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1991 CASUALTY LOSS RESERVE SEMINAR

4E: REINSURANCE COMMUTATIONS

Moderator

Dale F. Ogden
Dale F. Ogden & Associates

Panel

Michael A. McMurray
Milliman & Roberston, Inc.

David S. Powell, Consulting Actuary
Tillinghast/Towers Perrin

MR. OGDEN: Good afternoon. It is refreshing to know that there's a lot of people that actually have the fortitude to still be here this late in the afternoon. This is Session 4E, entitled Reinsurance Commutations. And if you are here for the telephone auditing conference, you are in the wrong room. That is where I went this morning. It was kind of interesting, but it may not count towards my professional education.

My name is Dale Ogden, and as I said, this is Reinsurance Commutations. I have to tell you all these things here. Make sure that at the end of the session you turn in your evaluation forms, unlike me, who usually sends them in six months later.

The session will be recorded, so if you have questions or comments, please make sure you get up to the microphones, and state your name, and then go on with your question or comment.

We ask that you not only put your slips into the box, but that you actually evaluate us, critique us. If you have any ideas that will make it better, or if you think we ought to eliminate this session, or whatever, say that as well.

Since several people have asked us, it is important to note that we have no handouts here, so don't go looking for them. You are going to have to earn your way through this one.

Our two panelists today are Dave Powell and Mike McMurray. Dave is with the New York office of Tillinghast. He has been around for 45 years, more than half of which he has been an actuary. That's how he describes himself. Just more than half. Okay.

Mike is a principal in the Los Angeles office of Milliman and Robertson. He is a fellow of the Casualty Actuarial Society, as is Dave, and a member of the American Academy of Actuaries, as is Dave. He served on the CAS Committee on Reserves, and is a past chairman of that committee, and is also a past chairman of the Loss Reserves Seminar Planning Committee.

Mike has almost 20 years of actuarial experience, joining M&R in 1978. He has been heavily involved in a variety of projects related to reinsurance. Most recently he has assisted the liquidator of a well-known insolvency situation in evaluating reinsurance commutation opportunities. As a result, he is well suited to present the seeding carrier's perspective on the topic.

I think it's important that you realize how qualified our panel is, as a gentleman from New York and a gentleman from Los Angeles would be uniquely qualified to comment on commuting.

The booklet says that this is a basic session. That is probably an understatement, but we are going to go through the basics in any event. Our first speaker will be Dave Powell.

MR. POWELL: Thank you, Dale.

What is commutation? Basically, commutation is the release of liability in exchange for a consideration. We normally think of it in terms of reinsurance. It can apply equally well to a direct policy. Somebody is going to give the other party money. The other party will release them from all liabilities associated with the contract. That contract could be a treaty, facultative certificate, or a direct policy.

Why would you do such a thing? Well, in the beginning it was typically done with small bookkeeping items. We had an excess of loss reinsurance contract covering, oh, say worker's compensation, and we find ourselves in a periodic payment pension case. This is the only loss that is still active, and every month the ceding company is sending a bill to the reinsurer.

The reinsurer is processing it and sending a check back. The administrative costs get burdensome. Someone says, why don't we just settle it up right now? We can project a sum of money and save all of this admin. And that was a worthy thing to do.

Of late, commutation has been used for a variety of other purposes. Sometimes the need for reinsurance is past. Very typical of financial reinsurance arrangements, finite risk coverage. When I bought the coverage I needed something, usually capacity, surplus relief. That need is now past. I don't need the coverage any more. Let's commute out of it.

Sometimes we have disputes. Reinsurance, in particular, has been prone to some problems of late. Contracting wording disputes. Is this thing covered or not? We have several cases around where the definition of facultative or treaty is key. We have the authority to write facultative but not treaty, and you did this thing that is a facultative obligatory treaty. Is it covered or isn't it?

We have a treaty that excludes casualty coverage except for incidental casualty coverage. What does that mean?

Several reinsures have denied coverage. You end up in arbitration or litigation and sooner or later it is just easier to try and structure an agreement and commute the treaty rather than support a whole fleet of attorneys litigating it.

Lastly, and perhaps most importantly, at least in terms of the number of commutations that are being structured these days, is the question of a workout plan. A reinsurer, sometimes is in financial difficulty. One way out is to try and settle liabilities for less than they are worth. Commute. If you can do enough of this the company can thrive. This has a valid purpose. It has been used and successfully used in a number of situations.

To be honest, there is also a fair number of people that seem to be abusing the situation and saying, we really didn't want to write this stuff in the first place, and nobody told us that we could have loss ratios this high. We don't want to pay. You fraudulently induced us to take this treaty, and if you don't commute we are going to be insolvent, so here's 50 cents on the dollar, take it or leave it. And this often ends up as a game of financial chicken.

For any of these reasons, it is important to evaluate the basic worth of the commutation. Mike will be going over some of these in more detail, but I'd like to spend a little time just discussing the basic elements. First, and obviously, is the present value of unpaid losses. Whatever we are going to do, we are going to trade dollars today. What is the present value? Case reserve, IBNR, some assumed payment pattern, some assumed interest rate.

It is important to note that the perception of unpaid loss, the perception of present value is unique to each company. It is entirely possible and entirely permitted for different companies to have different perspectives on the same book of business. Interest rate, in particular, can vary between ceding and assuming company. It depends on how your investments are managed.

The value that you are seeking is the value to you. Along with that present value are some less obvious items. The present value or dispute value of the items in dispute, if there are any. No different than any claim situation. There's an argument over whether this thing is covered. It is very seldom clear whether it is true or not.

There is a bit of gray. It has some settlement value, just like any liability case. There is some value that both parties would rather pay than go through the expense of arbitration and/or litigation. That value should be considered. It is non-actuarial value. It is very akin to a claim settlement process.

More on the actuarial side is the present value of current balances. There are two balances that might appear in a reinsurance arrangement. First, you have owed us money for some time on paid losses. Well, you have been trying to induce us to commute. You have not paid me anything. The reinsurance contract, as most primary contracts, contemplate some time value of money.

By not paying me you have deprived me of money and deprived me of interest. I should throw interest on overdue payments into a commutation consideration.

I also have quite frequently seen loss sensitive reinsurance arrangements. The premium for the cover is equal to the losses ceded to the cover times some loading factor subject to a minimum or a maximum. We have a sliding scale commission on the proportional coverage.

How one takes that in a commutation is a matter of some debate. In my judgment, you compute how you expect losses to emerge, how that emergence effects the payment of premium or commission, compute the present value of that stream, and that enters the commutation negotiation.

In my view, it would be incorrect, for example, to say that since we are commuting this today, and the commutation amount is less than the provisional premium, there is no adjustment necessary. The thing that should underlie the adjustment ought to be the projected stream of premium and commission payments.

So, that should be computed, which generally means some emergence pattern. Some treaties use a formula IBNR that will say, for purposes of making this adjustment we will assume IBNR is 90 percent of premium ceded for the first year and 80 percent the second, and gradually winding down.

Fine. That's what it says. It translates into an income stream one way or the other. The present value of that income stream belongs in the commutation discussion.

Those items, present value of unpaid losses, dispute resolution balance, the present value of net balances, together form what we might call a fair commutation value, an actuarial commutation value, an expected value.

To that has to be added a risk factor. I think we'd all agree that the company reassuming the risk deserves some consideration for that fact.

It is like buying reinsurance. You should price if for something more than expected value. So, there ought to be some recognition of the risk that the company is reassuming, plus there might also be some reward of getting cash now rather than taking your chances on a liquidation later.

Frequently, if the company is in financial difficulties, the other party is willing to settle for quite less than 100 cents on then present value dollar just to get something. Anything is better than nothing. So that, too, becomes a risk factor, often a negative risk factor, and frequently they offset.

Lastly, one ought to worry about federal income tax. Mike is going to tell you that the vast majority of companies computing would love to worry about federal income tax. But there really are commutations that occur between quite solvent taxpaying entities. Particularly under the '86 Tax Reform Act, there is an effect of commutation and you've go to look at the tax consequences.

Having done all that, you have some sense of the value of the commutation. What happens then gets weird. Commutation discussions, stripped of all of their actuarial calculations, are, first and foremost, a business negotiation. Sometimes they resemble haggling at a bizar, but they are and should be a business negotiation.

It is generally a zero sum game. Like any business negotiation, the side that is better prepared has a better chance of prevailing.

It is not my intent to discuss negotiating strategy and tactics, but I would like to relate some of the things that ought to be thought of in those lines. Beginning. Know the value to you. Never mind that you are dealing with a probable insolvent company. What is it really worth to you in terms of the present value of unpaid losses?

Decide whether your discussions have a precedent. Are we talking about one treaty? Are we talking about all transactions between the two companies? Are we going to negotiate them all together? Are we going to negotiate them sequentially?

If I have but one treaty, precedents aren't set. The only thing that matters to me is the bottom line. I don't care how we got there. I really don't care if the interest rate that the other guy used was too small but his IBNR was too big. All I care about is the bottom line.

If, however, I am going to negotiate a series of commutations, then each factor becomes a little more important. I've got to worry about the interest rate, and I can't say that it's offset by a faster payment pattern. The next discussion I am stuck with the same interest rate. I am going to have a hard time moving it.

So, you might really want to think, what are we setting precedents for?

The piece that the actuary is most helpful with is analyzing the effect on the other company. Commutations affect the books. If you are doing this correctly, you should evaluate what the other person has, how is it going to affect them?

Remember what you are doing on the financial statement. You are generally trading a discounted dollar. You are getting cash that corresponds to a discounted amount for a full valued reserve.

If I am the ceding company, the direct writing company that bought reinsurance and I am now commuting it, I've got reserves that hopefully are adequate, that I've ceded on a nominal basis. I'm going to trade that with my reinsurer. I'm going to commute it.

They're going to pay me cash somewhat based on the present value of those losses, so my cash goes up by the present value. My liabilities go up by the nominal value. Surplus goes down.

If surplus is going to go down, I'd better have enough surplus in the beginning to absorb the hit or I am going to be insolvent. There are a number of commutations that are bounded by the solvency of one party. It is important to understand and try and anticipate what the other party is up to.

How does it affect their balance sheet? What are they likely to be carrying for reserves? If they are carrying discounted reserves and their entire annual statement is discounted at 9 percent, they are going to have a very difficult time commuting for anything other than 9 percent.

So, that, in my judgment, is one of the biggest contributions the actuary can make to the discussion. And sometimes that takes strange shapes. I have seen a few cases where everything was kind of projectable and everybody agreed until you started talking about potential pollution cases, environmental impairment.

And someone says, yes, but we've got this huge amount of potential pollution cases and, you know, we are entitled together put in a direct reserve for it or a large risk charge.

And that sounded great, but on further analysis, if they had looked at the other party's financial statement they'd realize that those pollution cases, if they came in, would have driven the company into receivership that the reinsurer had so much exposed on pollution, I mean, they didn't only write your treaty, right? If they were dumb enough to do that, they were dumb enough to do the rest.

If you were right, and there are these kind of pollution reserves, then the reinsurer is insolvent and the liquidator is going to get all the money. And indeed, you'd end up not even getting the present value of the non-pollution losses, because of the friction of the liquidation. Plus it would be ten years down the road.

So, you have to think through the analysis. It is not only are the reserves big enough, but what do those reserves do to the company, particularly areas like asbestos and pollution, where it is not going to be unique to your cessions.

And with that, I am going to turn it over to Mike, who I think is going to delve with a little greater depth into some of these calculations.

MR. MCMURRAY: I am going to be giving you a little bit different perspective on commutation issues. I am going to be giving you the perspective of a seeding carrier, since I have never done work for a carrier who is assumed under commutation.

I want to provide you with the kind of an overview of the things that we feel are important when we are trying to estimate what a commutation value should be, and also to give you some ideas of where some of the pitfalls in the process may lie.

Dave has done a good job of explaining to you what the potential reasons for commuting are, and they essentially apply to the seed as well as to the assuming -- the reinsurer. Dale. I just want to stress one point that I don't think Dave would have necessarily paid that much attention to.

Under ceding liquidation, which I seem to spend an awful lot of time on, there are, in addition to the four reasons you see present, the reinsurer's financial status, resolve coverage disputes, cancel unnecessary coverage, cedent cash needs, cedent in a liquidation status has a couple of other things to worry about.

One is to finance the liquidation. They may well need the cash from commutations just to finance the structure of the liquidation. Secondly, at least some feel that by commuting the liabilities they can effect a more timely and more expeditious runoff or closing out of an insolvent carrier.

Of the ones I am familiar with, we haven't gotten to the point yet where we are actually running them off or trying to close them out yet. But the feeling is that by commuting the liabilities it will make the process a little bit easier.

I look at establishing a commutation as having four elements or, excuse me, five elements to it. Dave has touched on these as well. The boxed item, economic value of commuted liabilities, is the one that I will spend the most time on, but I do want to highlight a couple of other issues here for reasons that may be surprising to some of you, can be pretty contentious items.

If we are talking about a ceding carrier and a reinsurer that have had a dispute over the coverage, you could well have a substantial volume of paid recoverables due. Strangely enough, you can end up spending 90 percent of your time on a commutation negotiation reconciling paid recoverables. Just find out what they think you already owe today.

The second item, which is again -- can be an emotional item more than anything else, is interest owed on the paid recoverables.

Many reinsures in a situation where they may have a dispute with the seeding carrier will say, well, okay, maybe I'll pay you your -- I'll fess up to the paid recoverables but I don't like the way you have done business in the past, and I can't understand why I am going to owe you for interest due since you didn't provide me with the information necessary for me to make the payments on a timely basis. The seeding carrier, of course, says, tough, give me my interest due. And then, of course, you can fight over the interest rate you should be using.

The third item is timing of cash transfers. It is amazing how many times it is easy to decide what the value of the commutation will be, but then structuring it out over an actual cash transfer can be a whole new realm of negotiations, and sometimes it can be quite complex, and some of the people in this audience have made my life quite complex.

And then, of course, the coverage disputes. Carriers will -- a reinsurer may say, well, you didn't abide by -- you, Mr. Seeding Carrier, didn't abide by all aspects of the reinsurance agreement. Therefore, I am owed some sort of discount to the commutation values.

I am happy to say that is an aspect of the commutation thing that I leave to the lawyers. I won't touch that with a ten-foot pole.

Now we will go on to the aspects of estimating the economic value of the commuted liabilities. When looking at the commuted liabilities, look at there being four aspects to it: determining the full value of future loss payments, including known case reserves and IBNR, either the narrow or the broad definition of IBNR; projected payout patterns; interest rates for discounting; and whether or not there is going to be an explicit provision for uncertainty, a risk margin, as Dave referred to it.

I was interested in the way -- Dave mentioned that it is fairly obvious that in most situations there should be a risk margin, but it is also amazing how many times people on the other side of the fence will absolutely go ballistic if you mention anything regarding a risk margin in a commutation.

Now, obviously, the biggest item here is estimating the liabilities, the known case reserves and IBNR that may be coming in, and this is one area where in my experience has been the actuaries have had genuine reasons to disagree, and to do so on a professional basis.

Here are essentially the reasons why it is so easy to disagree on what is happening. When you are trying to estimate the full value payments, one obvious thing you need to have knowledge of is the subject book. What were the limits that were written? What were the attachment points? What were the lines of business, and within the lines of business, what types of business was written?

It seems fairly obvious that this type of information is fairly fundamental to any sort of estimate of liabilities, but in many situations this type of information is very difficult to get a hold of, particularly if you are working in a liquidation situation where there may be no corporate memory any more.

There may be very limited documentation of what the subject book was. And it could well be that the seeding carrier's knowledge of the book of business doesn't correspond real well to what the reinsurer thought they were getting in terms of limits, attachment points, and types of business. So, to a large extent this can be a search and destroy mission in terms of trying to find fairly fundamental information on just what the nature of the book of business to be commuted is.

In addition, there is -- you need to compile historical, book-specific data. Ideally, of course, you would have paid and incurred loss triangles for the book. You would have claim data for the book, claim -- historical in force accounts, certificates, et cetera, and you would also have rating data available to you.

In my experience, very rarely is this sort of information available in the type of form that you would really want to have, and if it is available, the completeness is sometimes a problem issue. And then we get to the point of the actuarial credibility of it. I use actuarial credibility for lack of a better word. You will sit there with a book of business that may be relatively small and the ceding carrier may think, well, I can rely on this data totally, it is a big enough volume of business for me to work with, yet the reinsurer may think otherwise, or vice versa. It usually depends, of course, on what sort of numbers you kick out from using book-specific data.

Another point that can make the process a little bit more difficult is that the ceding carrier's book specific data may not be consistent with what the reinsurer thinks it has in terms of historical development data. So, it really takes quite a bit of effort in a lot of situations to get quality information together for a specific book of business that you are trying to commute.

And, unfortunately, we are almost always relying on the infamous relevant external data sources. Then we get into the issue of, well, what is relevant, and what source am I going to use? The seeding carrier maybe wants to use other equivalent books of business or their gross subject book of business as a credibility supplement.

The assuming carrier, on the other hand, is probably going to be looking at books of business that it is assuming and say, well, why should I expect this book to be different from what I have seen? Then, of course, there's Best data, RAA data, ISO data, and the neat part about when you get into using Best, RAA, and ISO data, or other sources like this, is that the actuaries can just fight about it all day long, and it's enough to make some lawyers even blush, I guess, sometimes.

After kind of putting down the use of external data, let me say that we are almost always having to rely on it. It is very, very valuable, but the proper use of it is very difficult to determine, and difficult to get agreement with everybody.

Now, let's get to the situation where you have cranked through your numbers, you've got your historical development patterns, you've determined how you're going to use your external data. Now you've got unusual events. And as far as my clientele, its unusual events are us.

Essentially everyone that I have dealt with has some sort of major change in management, or in the cases of a cedent insolvency, we have got a total change in the way business is processed, and that can manifest itself in a couple of ways. One, the in-house operations of the company may be totally different under liquidation status than it was as a going concern, so what does that do to your historical data?

Two, if the company is in liquidation status and the claims have been distributed for processing to each of the guarantee funds you effectively may have 50 odd claim departments, each with their own philosophy on claims reserving and claim payment that you are going to have to deal with and try to understand what that does to your historical data.

Other points. Unanticipated coverage expansions, Dave kind of alluded to that. Whether we've got a lot more in the way of environmental liability than we had ever anticipated when we wrote the book of business. Have we expanded -- or have the courts expanded defense liability a lot further than we had ever anticipated. And, of course, you've also got significant economic changes.

This isn't that different, I guess, from a normal reserve study. However, it seems to compound itself when we get into a situation with an insolvent carrier, or when we are talking about commutation of a problem book of business.

And then, what can really impact the way a commutation -- estimating the way -- let me back up. What can really impact the actuary's ability to come to an agreement on what the full value payments might be is the relationship between the cedent and the reinsurer.

My personal experience has been that if we've got an amicable and cooperative attitude between the two, a fair commutation -- or a fair estimate of the full value of payments is fairly easy to come by if you've got people trying to speak from the facts. Even in an adversarial but cooperative environment that can usually happen.

But if we've gotten a litigious environment, we have frequently a breakdown in the system, and let me tell you why. If you have two actuaries in a room under Situation Number One, they can usually come to some agreement. Get two actuaries in the room under Situation 2, adversarial but cooperative, generally they are in the room but there are lawyers outside the room, but the actuaries can still talk and reach some professional understanding.

In the third environment, where you've got actuaries in the room with lawyers, it is amazing how communication comes to a complete halt. And it is incredible how, in that situation, actuaries can be very certain about their estimates. In any event, Scenarios 1 and 2 are a lot more fun to deal with.

Those are essentially the key points from my perspective in reaching full value payment estimates, full value payments under a commutation.

The second item that involves, obviously, a lot of actuarial input is projecting payout patterns. Again, we've got historical payout patterns, and that is subject to the availability and completeness of the data. We've got relevant external data for analogous books, and other data sources, something to work with.

More often than not we will be in a situation where we are having to deal with theoretical models of some sort, and actuaries on both sides have their own theoretical model they feel real comfortable with. Strangely enough, though, I found that when it comes to projecting payout patterns, these are fairly easy to come to some agreement on, so you might not agree what the total amount is, but you can agree how it is going to pay out.

I think it is because nobody knows enough about the payout patterns to feel that they are that certain and hold to one position. But there are unusual circumstances that can affect a payout pattern in a commutation situation. If you've got a cedent insolvency, who is making the payments, and where, and when? What is the status of significant claimant litigation, if there are some unusual forces going on that may be slowing up or speeding up the payment of claims for a particular book. And then, again, we've got economic changes.

Discounting interest rates. How do you choose them? This can be another emotional issue, and unfortunately, much of this has to be subjective. From the cedent's perspective, they may think, well, hey, what makes sense is what I can realize when I get this money back. Now, maybe you agree to that conceptually. Then, is it past yields?

Should it be on just the current portfolio, what the yields are on that? Or, is there a certain level that conservation should be conservative? You can tell I've been working with liquidators and conservators a little too much. Should there be an explicit level of conservatism in the interest rate chosen?

The cedent will be looking at it from, hey, it is my choice. I am taking the risk. Now, the reinsurer says, well, wait a minute. Just because you have a lousy investment portfolio and you are in a situation where you can't make the most out of the funds as you can receive, I don't understand why I, the reinsurer, should have to pay for that. Why don't you use what I could realize on it?

This gets to be a real touchy issue when you are dealing with an insolvent carrier whose investment portfolio may be 100 percent in 90-day bills and the reinsurer says, well, wait a minute, why do I have to be stuck with that? I don't answer those questions. I just ask.

Sometimes when you can't come to an agreement on reinsurer realizable, you will go to some sort of external model. Here I have just given you kind of a laundry list of the types of things you might look at. But I have found that the selection of an interest rate can be a real sticking point.

Explicit uncertainty provisions. Again, Dave mentioned risk margins. A comment that I have frequently heard is that, gee, the cedent's liability estimates are always so conservative anyway, there is no need for an uncertainty provision, and it is amazing. Sometimes that statement will be made as there are very big changes being made in the estimates over time.

Speaking from personal experience, this is not always the case. Sometimes the cedent's liability estimates really are expected value. But then, now that we've gotten to the point of agreeing that may be there should be explicit estimates, what should you use? Again, as Dave mentioned, this effectively is a reinsurance agreement again. Is this essentially -- should it be treated as a new retrocession?

Well, that kind of depends on the age of the book of business you are looking at and the nature of the business written. If it is relatively immature, long-tail casualty business, it probably should be treated as a new retrocession with an explicit risk load that is pretty substantial. On the other hand, if it's an old book of business, if it's an old property book of business, then you can feel fairly comfortable that a minimum risk load is probably needed from the cedent's point of view.

Again, we get down to the nature of the economic value estimates. Do you really believe that they are conservative, the full value estimates, and then --well, they may not be, but the discounting assumptions may be conservative. Again, they've got both the underwriting and the investment risk to consider.

Dave touched on essentially the accounting impact. From some of my clients, the level of surplus hit that a commutation may cause also impacts the way they will view what sort of uncertainty provision they need. With some of my clients, surplus is not an issue anyway, so it doesn't really matter, but it has come up at times that to the extent they are taking a surplus hit, they would like an explicit provision for the level of uncertainty that they are taking in.

That is essentially what I wanted to share with you, and I'd be happy to answer any questions. Dale, do you have some follow-up?

MR. OGDEN: Yes. Thank you, Mike and Dave.

(Applause)

MR. OGDEN: We wanted to leave plenty of time for questions. In past years these discussions have gone on sometimes for hours and hours and hours. I don't know if we necessarily resolve anything, but a couple of interesting comments that I might make here. There are some unusual situations that I've been involved in, which is quite surprising.

Having been on both sides of these transactions, my favorite one is always to bed on the reinsurer's sided, because you've got the money so the other guy's got the problem, you know, but I have found surprisingly in a lot of situations the ceding companies had lower estimates of the ultimate liabilities than I, working for the reinsurer, had, so that it was always good to hear what they wanted first, before I said anything about what I thought they could be offered.

Now, it didn't really matter because we didn't have the money to cover those liabilities anyway, but at the same time it was always nice if I thought a treaty was $5 million for the cede to come in and say, and actually thinking they are probably highballing it because they don't -- you know, IBNR is some alien concept for a lot of companies -- well, we think we have $3 million of losses.

Okay, we won't dispute that fact. That's pretty close to what we came up with. Now we have to discount that at 30 percent interest. So, I think it's -- that supports Dave's idea that whoever is best prepared is usually going to have a slight advantage, if not a terrific advantage.

And the other comment, which is not original, there is a old and somewhat wise in some ways lawyer that told me that. He says, if you've got the money, the other guy has the problem, and that's the way you negotiate. So, if any one has any questions or comments, we will be happy to try to respond as best we can.

Step up to the microphone if you could.

QUESTION: In case of insolvencies, how much of a headache are regulators? I am sure they must get involved.

MR. OGDEN: Regulators are no more of a headache than they always are. Actually, I haven't had trouble with regulators. Usually in an insolvency situation they are happy if you can clean up the mess. You know, if you tell them it is going to take this much out of the estate, or that much out of the estate, or bring this much in, and we're going to take a 25-percent hit or whatever, they're amenable to that. A lot of the commutations are going to end up -- and those situations are going to have to be approved by the courts.

In that sense, you need to have some rational basis to present to a judge typically why you are doing it, you know, is this a fair deal or are we just giving away the store, that kind of thing, but I have had very little problem with regulators.

I guess the big reinsurance situation that is practically ancient history now, there was probably six months of negotiations with about four insurance departments before anything was done, and then the insurance department said, okay, do it, and from then on it was pretty smooth sailing ahead.

But the problem there was that there were multiple companies, multiple, and domiciled in different states, and that was the old, you know, everybody's fighting over -- you know, it's like State A says, this is my company, like they think they're the stockholders of it, and State B thinks they're the stockholders of the other company, and by the time you're done, you know, they are all trying to protect their own interests. I think that might support that federal regulation thing for reinsures, but those things happen.

A PARTICIPANT: There are other circumstances. Depending on the state, you get involved with offset, which -- the two parties owe each other amounts, either on this contract or on other contracts, which may or may not be offsetable, even in a commutation.

In some jurisdictions, you have the question of whether an offer made to one set of parties must be made to all comparably situated parties. If I have 10 people on my treaty, do I have to offer them all the same terms, or approximately equivalent terms, or can I be creative and recognize that they all have different needs.

If you extend regulatory concerns to those matters, there are some places where it is very, very difficult.

A PARTICIPANT: I would somewhat echo what Dale said, in that once we get all the regulators working together it is fairly easy from that point on, but it's initially establishing the ground rules that can be a real pain.

A change in regulators during the course of insolvency can introduce unique challenges sometimes.

QUESTION: And now you add federal regulators to that also.

A PARTICIPANT: Well, they have done a -- well, Congress seems to have tried their best to get their hands into it already, when it comes to the insolvency issue. It is amazing how much of an impact they are already having.

QUESTION: Yes, but a lot of that impact is in federal priority. You can't disperse funds from the state until the feds have been satisfied, and nobody knows what satisfying the feds mean. That may run to pension guarantees. So there's --

A PARTICIPANT: Well, yes, I guess looking at the regulators and going beyond insurance departments, I have had situations where, before we could commute reinsurance treaties we had to -- and we are talking a massively insolvent company, before it could commute these treaties had to pay its excess profits taxes.

(General laughter)

A PARTICIPANT: Which is even worse than the situations where the IRS is claiming they owe income taxes. It is not just income taxes, but even excess profits taxes, just based on the statements that were filed two years earlier. Well, you had excess profits two years ago, or at least you claimed you did, so you owe us this money.

I think there have been some favorable rulings on that federal priority thing, because I know that with regard to some of these Superfund EPA claims there were some people who are charged as liquidators who basically said, we are done paying claims until this is resolved, because they were told, you could have personal liability.

If you have a situation where you are going to have guarantee fund coverage for these claims, and you start paying 50, 70, 80 cents on the dollar to your claimants, you exhaust the assets of this estate paying off your claimants, and then the EPA says, you owe us $40 million, you could be personally liable for that.

That scares liquidators. It certainly would scare me. I don't have $40 million, and even though I know they will never get the money out of me, they could probably make my life quite miserable in the process.

Any other questions? Could you step up to the microphone, please?

QUESTION: I have a pretty loud voice.

MR. OGDEN: Okay.

QUESTION: I wondered to what extent, if any, some of the experiences or the difficulties that cedents have had in commuting for other reinsures,if it has had any influence on the way that they write their new reinsurance treaties.

A PARTICIPANT: The answer to that is, most definitely, and I seem to remember some comments that Dave made about that, but just quickly, I have seen some -- I have seen reinsurance contracts that now have built-in commutation clauses, so, you know, if you want to unwind this later, here is how we do it.

That is the most obvious answer to that. Do we have anything to add to that?

A PARTICIPANT: Yes, I think the major effect is not how, but who. People, I think, have finally started to learn that there is a difference between quality reinsures and the bargain basement variety. And it matters.

MR. OGDEN: Yes?

QUESTION: Are there options on how you look at commutation?

MR. OGDEN: As with all accounting things, yes.

(Applause)

QUESTION: (Inaudible)

MR. OGDEN; No. One interesting situation that demonstrates how accounting issues matter is that there is a number of treaties between an insolvent cedent and a rather wealthy solvent reinsurer, which is backwards from what seems to happen a lot, but the reinsurer has a number on their books, and they say, we owe X million dollars, and the cedent says, well, it is really, you know, 25 percent higher than that.

And as Mike was mentioning, it is surprising how you come out very close on the discounting, and the payout patterns, and so forth. So, you know, say we're $20 million apart, and we recognize there's all these coverage issues, and you know, late notices, and all these other things that are going to be; raised when we go to court and spend $12 million fighting over the $5 million, that makes everyone want to settle the case out.

But the reinsurer doesn't want to take a hit on their books today. They'd rather take their hit more slowly. And the ceding company is more interested in getting, you know, whatever cash they can get when they can get it, and there's already built up a sizable payable loss. So, rather than actually commute the contract they go through what I call a non-commute, where they say, okay, we'll knock 20 cents off the dollar on every claim, and nobody will dispute any claims any more. and from that day forward the ceding company, which, I mean, accounting well?

You know, accounting in the sense that we go to the court and say we can 60 cents on the dollar now instead of 30 cents on the dollar, or something like that, is the only accounting we do. They don't file statements any more in most cases like that.

But the reinsurer can then carry whatever they think the right estimate is on their books for those reserves, and just like in any other reinsurance and ceding situation, there may be very different estimates. I know there's been talk about making reinsures and ceding carriers' reserves mirror each other, now that you have gross and net on the annual statement, but that hasn't happened yet, and I would be surprised in any situation if the accounting mirrored each other.

Any other questions?

(No response)

MR. OGDEN: Okay. Well, thank you very much for coming. You can make it an early day.

(Applause)

1991 CASUALTY LOSS RESERVE SEMINAR

4F/7E: LOSS RESERVE OPINION REQUIREMENTS

Moderator

R. Michael Lamb
Insurance Division State of Oregon

Panel

Patrick J. Grannan
Milliman & Robertson, Inc.

David G. Hartman
Chubb Group of Insurance Companies

Lee R. Steeneck
General Reinsurance Corporation

Recorder

Kelly Walsh
Coopers & Lybrand

MR. LAMB: This is Session 7E on the Loss Reserve Opinion. And welcome to the crescendo of the whole seminar. Actually, that mock trial this morning though...I don't know if we can compare with that.

We have some handouts prepared for us. What it is, is it's a copy of a letter from me to the Blanks Committee of the NAIC proposing changes in the instructions for 1992. So it shows you the instructions for 1991 and the changes for 1992.

Well, this is Session 7E on the Loss Reserve Opinion. And the Organizing Committee has asked that you all evaluate our session and they would like you to use the full page form rather than the back of the ticket if you can. They'll be collected, those and your attendance tickets, at the back sometime after the meeting.

Well, my name is Michael Lamb and I'm Casualty Actuary for the State of Oregon Department of Insurance and Finance. The last couple of years I have served as Chairman of the NAIC's Casualty Actuarial Task Force, which seems to be where attention on the actuarial opinion has been focused the last couple of years.

I would like to give you three reasons why the NAIC wants to have you give an opinion.

One reason is that the officers of the NAIC in the last couple of years have come out with what they call their solvency agenda. One objective of the agenda is to make the examination process more efficient. The cycle has been to examine every company every three years whether they need it or not and it has been criticized as not a very efficient use of examination resources. So they are changing that model to go to once every five years, which means our resources will be freed up to go to some companies more often when it is necessary. That's a bold move because we get criticized for not examining every company every year. To do that we'd have hire all of you and everybody else who looks like an actuary, and have you go live in all those companies.

Inbetween these five year times, unless something else draws a flag to a company, we need to have you tell us that everything is alright there, at least in your professional opinion.

The second reason is that states do not have statutes that tell you clearly how to calculate reserves for casualty lines of business. Insurance codes of most states have several pages of the standard valuation law for life insurance, which specifies formulas for minimum values for reserves. But we don't have that for casualty insurance. Casualty exposures cover the whole universe of human endeavor, so I don't think we want formulas in statutes. Here's what we do have, at least in my state, and I think this is fairly typical: one statute requires insurers to maintain reserves in the "amount necessary to pay all of the unpaid losses and claims incurred...together with the expenses of adjustment or settlement thereof." That is not a very specific standard.

Another section of our statutes says additional reserves can be required by the director (or the commissioner) as he determines "necessary for the protection of policyholders and stockholders." It is important to notice that stockholders can be injured by inadequate reserves also.

A third section of our statute says that when the director makes these determinations he is supposed to consider recommendations by the NAIC and something called "customary and general practice in insurance accounting." Well, I would think that customary and general practice certainly includes principles, concepts and methods in actuarial literature. That tells you how reserves should be calculated. I had a legislative committee ask me a while ago: "How do you do reserves?" And I said, they are calculated according to these standards in the actuarial literature, and I sent them a bibliography from the CAS on reserves. That made them happy and they stopped asking.

So, anyway, what we're asking here for, in this opinion, is for you to tell us that you are a qualified actuary and you've reached into your bag of actuarial techniques and pulled out something that wasn't just a random thing. You've made some sense in picking out the techniques to use.

A third reason is we would like you to protect the industry and the insurance consumer. We read in the study, called "Failed Promises," that came out a year or so ago, about short term financial rewards from greed and fraud and incompetence that happens out there in the insurance industry. We've read about outrageous attitudes of reckless management. Officers and directors who disclaim responsibility and then walk away. This kind of thing happens. It doesn't everywhere, thank goodness, but it does happen. So we are asking you to use your integrity to give us one more protection against these people.

When you compare insurance against banks and savings & loans...the failure rate of banks and savings & loans is way up here while the failure rate for insurance companies is way down there. It's been around one percent, a man from Bests' said yesterday.

Insurance company managers come from the same genetic pool that the people who manage banks and savings & loans come from, so I don't see that as being the difference. The difference is that we have actuaries, right? That's certainly one of the differences. (Laughter) Actuaries are one of the differences between the savings & loans and insurance. So, we're looking for you to be the people who keep these companies adequately reserved.

Now I would like to describe for you, some of the changes in the instructions for 1991 compared to 1990. The first big change is we included direct and assumed reserves, or "gross" reserves, in the scope for this opinion. So now it's both gross and net.

Publications of the NAIC say that this gives regulators a clearer picture of potential liability if reinsurance were to fail. I think that it's realistic to say that technical insolvency on a gross basis should be a regulatory concern even if ceded reinsurance gives sufficient surplus relief. We want company management to know what the gross liability is. Some of them don't even know that. Seems absurd, but they don't. The gross liability actually is the real obligation of the insurance company. That's what you've promised to provide and that's what you should.

I think insurers should calculate their direct reserves and then make some conservative adjustment to get to a net basis. I found, however, that it is quite common for companies to do it the other way around. They start with their direct losses, make some simplistic adjustments to get to net losses, use that data to project their ultimate incurreds, and then leave it to some junior accountant to make adjustments back to direct or direct and assumed. I really don't think that's the most professional way to do it and I'd encourage you to do it on direct basis.

Another reason for this requirement is that insurers must maintain deposits for reinsurance with unauthorized carriers, so it has to be a genuine number.

The second major change for 1991 is that we're asking for comments in the scope section on topics that would affect the reserves. Obviously, affect means there is a standard of materiality that has yet to be shaken out here. The situation is this: You've given us your most reasonable estimate of what reserves are. We are asking you to tell us if there are some important contingencies that need to be reexamined in the future. We are not saying that your estimate is inadequate or that it needs to be more conservative or anything like that. We are just asking for you to tell us what needs to be monitored, to aid our examiners, maybe to aid the next actuary who comes along or maybe to remind you next year.

What we are doing here is we are giving you an opportunity to put these things into your opinion and not have it be called a qualified opinion. Putting these things in, in our way of thinking, does not say that your estimate of the reserves is an inadequate estimate.

Four or five examples of topics are listed in the Instructions. One is discounting. Here's your opportunity to disclose some trepidations you might have about the discount rate or the payout patterns or any of those things.

Collectibility of reinsurance is one that is asked about a lot. We're not expecting you to go out and do a detailed examination of every reinsurer. Sometimes there are hundreds of them. What we are asking you to do is apply some standard of reasonableness, something like what did you know or what could you have known had you kept your ears open and asked a few questions. What you might do is something like this: You could get ahold of some of the actuarial opinions of the major reinsurers for the last year or two. Check the ratings of the reinsurers. Have they dropped? Nowadays, when the ratings start to drop, they drop pretty fast, so get the latest ratings you can. Take the trouble to ask some of the company people if they've had any trouble collecting reinsurance. And then check to see if any of the recoverables are over 90 days or 180 days or a year overdue. Just keep your ears open and ask questions and make a little better effort to find out.

A third change in the same paragraph is that we're asking for an explanation if reserves will create exceptional values on the NAIC IRIS tests. Now, we are not asking you to tell us in your opinion how to calculate those test ratios. We're not asking you say they produce an exceptional result because the reserves change. Every year insurance companies send their annual statements on diskettes to Kansas City and they go into our computers. Thousands of test ratios get calculated out. So we know very well what the IRIS test ratios are and how to calculate them and which companies have reserve problems that are causing that. We don't need you to calculate that for us. What we are asking for is an explanation of why the reserves changed? I think the way it will work is like this: The relevant tests are nine, ten and eleven, which are loss reserve run-off tests. Very likely you're going to do something like them anyway when you're evaluating last years' methods of doing loss reserves to see if they've worked well. So you should have some handle on those. An asterisk by nine, ten or eleven will very likely prompt an examiner to look at your opinion to see if there is an explanation there.

Some of the other IRIS tests may be affected by reserves as they affect surplus, like a premium-to-surplus ratio could be affected, and maybe some others. And if the company gets on a priority list of troubled companies and if it looks like these ratios are affected by the reserves, examiners will look at your opinion to see if you have some explanation. In any event, what we desire is an explanation of the change in the reserves, not how IRIS ratios are calculated.

A fourth change for 1991 is one that most everyone agrees with. In the opinion paragraph we changed the phrase "good and sufficient" to "reasonable", which is what most people were wanting to write anyway. Given the state of the art of actuarial science at any given time, we think that is a better word to use. We want you to tell us your best estimate on the reserves based on what you knew or could have known at the time. That's basically what reasonable means.

Now, please be aware that you must still satisfy the laws of the various states, particularly the state of domicile, and some of those state laws do have words in them like "sufficient". So you should be aware of those.

Fifth change for 1991 is we're asking you to give us a brief description of some of the actuarial assumptions and methods that you have used. We did not intend for this to turn your opinion into a very long actuarial report. It should still be just a page or two. But, we want is a brief description to show that you didn't blindly reach into your bag of actuarial techniques and pull out something just because it fit the data that you had, but rather you used something that made good sense in this instance. Regulatory actuaries or other people will be looking at your opinion just to get a feel for how much of an effort you put into this. You might say, for example, "I used historic development patterns for payments and for case reserve estimates, claim counts and averages, and I selected estimates from the central tendency of these methods." Or, in an appropriate situation, you might say: "I used company ratemaking expected loss ratios." Something brief like that.

Dave Hartman, back in about February or so, had an article in The Actuarial Review where he gave several examples of what you might say. You can check that. I'd like to suggest that in a more complicated situation where you have a large multi-line carrier or something where there's lots of lines and lots of states and lots to do, that maybe you give us a range of the methods that you're using. Like you might describe some simple expected loss method for a quick payoff property line and a more sophisticated method for a long tail liability line. Give us a range of methods by sophistication.

The sixth change is we are asking for work papers to be kept on the premises of the company and available for examination for seven years. So if you're a consultant that means that a copy of your essential work papers need to be kept on-hand there at the company.

A seventh change is new since June. I'll say a little bit about this now. If you have a copy of the instructions for 1991, dated before the June NAIC meeting this year, you need to get a new one. They made a little change for us. If you do not make your own examination of the underlying data, which is always an option you have, for use in calculating loss reserves, and if the company is required to have an audit report, then you must state that you relied on the audited data. We'll talk more about that in a little bit.

And those are the major changes for 1991. You can see more details in the handout there.

Now I'd like to describe for you, some of the proposed changes for 1992. These have gone from our task force to the Blanks Task Force of the NAIC, which meets in two weeks in Arizona. From there they go to whole NAIC in December and then they become the requirements for 1992. So at this point they are still proposals, but we've had very good success getting these through and I don't really know of any opposition.

The first major change for 1992 is we proposed the concept of the appointed actuary, meaning the actuary must be appointed by the Board of Directors of the insurance company. The actuary must report at least once a year to the board and on the items addressed by the opinion. And if the board changes that appointment at any time, they must notify the domiciliary commissioner within 30 days and give some good reasons. This concept is similar to what happens in Great Britain and Canada, where this kind of thing is becoming the rule. We didn't go quite as far as some of those countries have done. Part of that concept in those countries that we did adopt is an appointed actuary there is required to confer with the previous actuary. In the mock trial today, we saw that sometimes this is a good idea. It remains optional here. Another thing that we did not go as far to do is to say when the appointed actuary has any reason to be concerned about solvency for the actuary to go to company management. If the management does not resolve the problem, go to the board. If the board doesn't resolve the problem, the actuary is supposed to go to the regulator directly. We did not go that far. Someday we might, but we didn't yet. Since we came up with this proposal, we found that a lot of companies that I think you would all consider to be well run, already do this. They already have the board listening to the actuaries, because the board realizes that senior management does not have a real hands-on familiarity with losses from one day to the next and they want to hear from the actuaries. We think that's a very healthy thing to do and we want to encourage it.

I'd like to point out that we are not requiring the actuary to be an independent outside actuary. The appointed actuary could be either an employee or a consultant. A few states do require independence. Minnesota, I think, is one. And some other states will require them in certain situations, for troubled companies or some of those things.

Another change for 1992 is we are changing the term "workpaper", that you are required to keep for seven years, to "actuarial report." We want you to do a regular actuarial report. You don't have to send that in by March 1st. It can be prepared a little later if you want. The reason we made this change is that we don't want to go to the company and find a box full of doodles and scratches and telephone messages and so forth. We want to see the actual triangles or other analysis you had with the numbers in it. So you'll see a definition of "actuarial report" in the handout. The definition comes right out of Actuarial Standard of Practice Number 9 on Disclosure, except that we added a phrase requiring the report to "document the analysis underlying the opinion." In other words, we need to see the actual numbers and your worksheets. As a tradeoff here, the requirement for 1991 that I told you about describing the actuarial methods and assumptions...we are proposing to drop that. The description requirement is still there for 1991, so for 1991 we need an explanation or description of your methods. If this gets adopted we won't need that for 1992. We won't mind if you still provide one then, but we at least need it for 1991.

One more thing I need to point out. I forgot to say this yesterday. Everywhere throughout the instructions, the word "certification" used to be in there. We've stricken that out and put in "opinion."

We wanted to make sure that people say opinion rather than certification.

COMMENT FROM AUDIENCE: Inaudible (Question was whether the appointed actuary would be required for 1991.)

MR. LAMB: That's for 1992. It's not a requirement for 1991.

Let me just make another final comment on what the public is expecting from you. These opinions probably would have very little purpose if there were not going to be some times when you are going to find it difficult to form an opinion or maybe you're going to think that you have to give an adverse opinion. And you might even think that your employment is in jeopardy or at risk. I want to encourage you to notice that most of us have worked at various places in our careers and we do move around. A person of this kind of integrity, who would do an adverse opinion when it's necessary or who would say you can't form an opinion when you can't, there's a great demand for people like that. Certainly there are a great many states who would hire you very quickly. (Laughter) I think the appointed actuary concept will give you some protection, but regardless, be confident there is plenty of opportunity. Consider the alternative. If you don't stick by your guns but just wait for the walls to fall in around you, it could result in losing your livelihood for some time. This is the world's number one professional that we're in, so it's not your to advantage to do that.

Well, that's what I came to say. Our panelists here have been waiting very patiently for their opportunity to tell you everything else you want to know, so let me introduce them.

Our first panelist will be Lee Steeneck. Lee is Vice President for General Reinsurance Corporation, where he's been for sixteen years in Stanford, Connecticut. He is a Fellow of the Casualty Actuarial Society and Member of the American Academy of Actuaries and a Fellow of the Canadian Institute of Actuaries. He heads the Corporate Actuarial Department, which is responsible for loss reserves and management information. He currently serves on the Casualty Actuarial Society's Board of Directors. Lee Steeneck.

MR. STEENECK: Thank you, Mike. As a casualty actuary of some twenty years, the last sixteen spent at General Reinsurance, I feel most comfortable and qualified to speak to you today about loss reserve opinion problems as they relate to assumed and ceded company reinsurance programs.

I've narrowed the myriad of issues we confront to four. And I hope you gain a healthy respect for the leverage against your balance sheet that can result from reinsurance problems.

Issue Number One. Giving an opinion on direct as well as well as net loss and loss expense reserves. In my experience, companies do not have well integrated reinsurance systems given an historic emphasis on net results for annual statements, annual reports, other audiences and so on. Almost all work I've seen is done on net data. Direct or assumed business isn't afforded the same level of scrutiny as net. Direct insurance companies and by analogy, reinsurance companies, attempt to build gross of reinsurance or retrocessional reserves with largely flawed methods. Some merely gross up their net experience based on ceded to net premiums earned. While possibly correct if proportional reinsurance is solely purchased, this method is clearly inappropriate when the insurer has an excess of loss program. It would be only coincidental that reserves or even incurred loss ratios would match.

Other companies take their ceded case incurred to date and develop it to ultimate using net incurred loss triangle expected emergence patterns. Ceded case plus IBNR to ultimate is likely to be seriously understated relative to true ceded development and true IBNR. While insurers argue that few IBNR cases by count can exist in their net outstanding, recall that net case development will appear to an excess of loss reinsurer as a truly incurred but not reported case to them. A clear majority of casualty long tail reinsurance is purchased on an excess of loss basis.

The Reinsurance Association of America publishes comparative loss emergence curves by major line of business. To the extent a company's own ceded experience is not credible for determining emergence curves, the RAA serves as a most useful source of data.

Your reinsurance company obviously has a very large stake in reserving its assumed business from you. The actuary is probably using the Bornhuetter-Ferguson or the expected loss method. Your reinsurance actuary ought to advise you how they carry your ceded case and IBNR reserves. Even on brokered accounts, you should consult with your lead underwriters to get an expert actuary's opinion.

My experience is that companies reserve their ceded liabilities optimistically, thereby threatening their net balance sheets with significant adverse loss and expense development. Consider the company who in 1987 and 1988 recognized that they were ceding well priced business to their reinsurers and hence increased their net retentions aggressively. Since then the market has softened considerably. While prices have declined, net loss development has lengthened. Companies are essentially acting as their own first layer excess reinsurer. As such, they need to recognize the volatility and latent emergence associated with reinsurance layers.

Consider also the adverse impact of the following; reinsurance with sunset provisions, certain cancellation penalties for claims, indexing via retention clauses, etc. These provisions tend to keep the reinsurance pricing down, but impute additional liabilities to the buyer. Unfortunately, while the buyer enjoys the net volume, he frequently does not adjust reserves appropriately. Also consider reinsurance accounts that are retrospectively rated at cost plus, subject to minimums and maximums. Frequently and to provide enhanced cash flow to the customer, the provisional or paid premium is low balled. That's a technical, actuarial term. (Laughter) Without a proper assumed reserve from the reinsurer, the cedent is unlikely to accrue additional premiums to be ceded in the future. The same is true on contingent commission agreements. To the extent that the reinsurance IBNR is understated, contingent commissions paid will be recaptured in the future via unaccrued amounts.

This leads me to my second point, verifying the recoverability of booked reinsurance recoverables. Net reserves have always had an imbedded assumption regarding the collectibility of the reinsurance currently maintained and that of our predecessor managers. It is becoming quite clear that adversarial as opposed to cooperative dealings on large cases makes recoverability an important consideration. Recent efforts of reinsurers to seek court relief by recision of contract, highlight an immediate concern. The reputation, longevity, and credit offered by a particular reinsurer ought to be considered by the loss reservist in establishing either a bad debt reserve or conservatively setting the net loss provision. The first signs may be falling ratings from outside ratings observers, inexplicably failed IRIS tests or just slow payment of claims. Maybe not for your company, but for others.

I'm in the process of investigating bond ratings versus insurer reinsurer ratings to determine if a parallel can be made between bond defaults and insurer reinsurer insolvencies. Just as a bond has a credit value, which determines its sale price, so too should reinsurance pricing and recoverability vary with the ability of the reinsurer to pay in the future. The quality of the promise needs to fully investigated.

Carrying a bad debt reserve for failed promises is obvious. Carrying an IBNR net reserve for probable future failures is more controversial. Our accountants accept it. We reserve for it. I can not say who will fail, only that inevitably we will not collect 100 cents on a dollar for our IBNR claims. I take comfort in my loss reserve opinion statement being clean, having established an IBNR loss and, yes, expense reserve for more than this contingency.

Nowhere is the issue more pertinent than in the latent injury area. Late notice on asbestos and environmental damage from the 1950s, 1960s and 1970s has caused many a reinsurer and retrocessionaire to stall claim payments for more information or just to refuse to pay. And as large as the industry asbestos liability is at least it was confined to a manageable number of classes and the insurers that wrote that business. The potential 200, 500 billion dollars of environmental liability clean-ups in this country will fall on a variety of classes. Those we all wrote and loved.

This brings me to point three. What is an appropriate reserve opinion for reserves associated with environmental liabilities? Asbestos liabilities thrust upon insurers and self-insurers were a great lesson for some of us. I suppose we could still argue whether these were IBNR losses or NIBNR losses. Not incurred but not reported either. (Laughter) That is court mandated, contra-policy wording and retroactive liabilities. Being so latent and with loss date interpreted as multiple year, and further with multiple year renewals at risk, our liabilities escalated during the late 1970s and 1980s into a material amount.

Hardly a day goes by without reading about environmental liabilities. We will not escape similarly pyramiding losses associated with lead poisoning, sick buildings, widely distributed flawed pharmaceuticals and medical hardware, occupational diseases and so forth. We must correct our balance sheets immediately for these growing liabilities. Obviously, companies do not wish to highlight in a discoverable way (for plaintiff's attorneys) that they are carrying case or IBNR loss reserves associated with a particular case or cause, for example, environmental impairment. They feel their defenses with be prejudiced by their financial dealings. They are denying coverage. Nonetheless, it is up to the reserving actuary to establish an appropriate net and gross liability. I favor an approach that established massive unallocated loss adjustment expense reserves to defend the policy provisions. ULAE is entirely a net of reinsurance liability in standard reinsurance contractual terms.

Declaratory judgment expenses are outside of the reinsurance agreement as well. DJs aren't allocated loss adjustment expenses either. They aren't to the defense of the policyholder and they certainly don't accumulate toward the aggregate limit of certain insurance contracts. Depending on the materiality to the insurers net financial position, the actuary may offer a slightly restricted opinion or the actuary may have to state that no provision has been made for loss only, only expense on these controversial exposures. Of course, just as case law built to shape future asbestos liabilities, so too must insurers be prepared to establish IBNR loss reserves when the environmental law becomes clear.

I see a telescoping of reserves increasing in purview, starting with unallocated, expanding to allocated IBNR, then to case loss reserves and eventually full payments. For environmental, this may take another twenty years. And, of course, the government may intervene with an alternate funding mechanism. But today's actuary must opine today. The ability and willingness of reinsurers and retrocessionaires to honor their legal obligations also needs to be considered.

Collectibility of reinsurance and hence, direct and net reserving are of fundamental importance. All things considered, offering a clean opinion statement for a company issuing decades of GL policies may be impossible. Admitting this may be a good start on reassessing who should pay for the sins of the many.

Speaking of sins, I come to my fourth and final point. How should I portray interest discounting, financial or finite reinsurance, or loss portfolio transfers? I believe the current thrust beyond merely discounting tabular workers' compensation pension claims to improve perceived current financial performance is a disservice to our industry and the public it serves. While some companies perceive it as astute financial management, use of financial reinsurance or loss portfolio transfers has been used to create an illusion of success at underwriting and for temporary competitive advantage. In reality, I believe they are near cousins to mortgaging, (eventually unraveling) real estate loans, loans to lesser developed countries, junk bonds and inflated real estate values. If a purpose of loss reserve opinions is to lend credence to the solidity of the company and the accuracy of its stated statutory surplus, than only judicious use of reinsurance should get a clean opinion.

Lastly, we expect quality of others. Let's focus more of our efforts toward written and oral communications on the results and how we got there. Thank you.

MR. LAMB: Well, thank you, Lee. I appreciated your solid positions on a lot of things, particularly your fourth point on some of these illusions that have come up in financial reporting.

Our next panelist is Patrick Grannan. He is a Consulting Actuary with Milliman & Robertson. He's been there since 1978. He is a Fellow of the Casualty Actuarial Society, a Member of the American Academy of Actuaries and a Fellow of the Canadian Institute of Actuaries. He's been a member of Financial Analysis Committee of the CAS and he's been on the Academy's Committee on Property Liability Financial Reporting. He is a frequently speaker on loss reserving and other actuarial topics. He teaches classes on reserving and ratemaking for actuarial exams. And last year he was the Chairman of the Casualty Loss Reserve Seminar. Patrick Grannan.

MR. GRANNAN: Thank you, Mike. As Michael indicated, I'm going to give you my perspective as a consulting actuary, working more or less in the trenches when it comes to reserving. For those of you who were thinking that year end work might be dull now that you've mastered the new Schedule P, there's no need to worry. The changes in the statement of opinion this year are going to add new excitement to your life. It's not necessarily what you'd like to do, but it will something to do.

Overall, I believe the changes will be helpful to the regulators and good for the actuarial profession, although they will certainly add to the year end work for many of you. The changes will make the opinions more useful to regulators because they will provide more information, much the way Schedule P is now providing more information, although they are not without a cost. The changes are good for the actuarial profession because they add to our responsibilities and because they will require the signers of statements of opinion to do some things that they should have been doing all along and most of them have been doing all along. The changes will also add to the workload of consulting actuaries. As a consultant, I'm not sure I need that kind of change.

While I believe the changes are for the better, it will take a while for practitioners to get comfortable with them. Many of us have concerns about how to apply some of the changes in practice. I'm hopeful that the regulators and/or the actuarial profession will give us guidance on some of the issues that we're talking about today.

Since the other speakers and handout pretty well describe what the changes are, I'm going to try to focus on what you need to do in order to implement the changes.

The single most important change to be aware of and to start preparing for right now is the requirement in paragraph eight for an opinion on the gross reserves in addition to the net reserves. For some companies that's not going to be a big deal. However, for the many companies who cede more than an insignificant amount of reinsurance, and have always done their studies on a net basis, it is critically important that you start thinking right now about how you're going to analyze the gross reserves. You may well decide that you need new data compilations. At most companies that I've worked with, it takes a while to get new data, especially if you want it to be right.

We're not describing the specific methods of estimating ceded reserves in this session. However, as Lee mentioned before, you should be aware that there are some serious pitfalls with some of the methods that might come to mind right away. There are a wide variety of reinsurance situations, and estimation methods that are appropriate for one situation will not be appropriate for some other situations. One area where it is very common and easy to underestimate the ceded reserves is casualty excess of loss layers.

You need to give some thought, in advance, to the methods and the data you are going to be using in estimating the ceded or the gross reserves. If you are not experienced in this area, I would echo Lee's suggestion that you talk with your reinsurer's actuary. Many consulting actuaries are also experienced with reinsurance reserving.

The second thing you need to do in advance is to make arrangements with the auditing firm to prepare an audit to the data you'll be using in your analysis. It is important to schedule this in advance and to coordinate your work with the auditors. You and they will want to make sure that the data that they audit really is the data that you're going to be using. The best way to do this is for you to give them a copy of the data compilations you will be relying on as early as possible in the process. Dave Hartman, the next speaker, will tell you about some of the logistically problems with the new data audit requirements. [Editorial note: The requirement for a data audit was dropped for year end 1991 at the December, 1991 NAIC meeting.]

The remaining items I want to talk about have to do with interpretation of the new wording in the statement of opinion instructions. Paragraph 11 of the instructions requires comments on relevant topics to the extent they effect reserves. It is not completely clear yet, how far you should go in these comments. The instructions give five examples of things to comment on.

The first examples are fairly easy. If the reserves have been discounted to present value or if they are net of salvage and subrogation, then we should comment on this fact in the statement of opinion. It also probably would not hurt to note the fact that the reserves are not discounted to present value and are gross of salvage and subrogation when that's the case, although it doesn't seem like that's necessary.

A question you might wonder about, is what to do in the common situation where some or all of the booked reserves are calculated using data that's net of salvage and subrogation. That's pretty common for liability coverages. The salvage and subrogation may be small and that's why you've worked on that basis.

Suppose you conclude that the book reserves are reasonable on a gross basis, despite the fact that they were calculated by the company on a net basis. My interpretation is that is it irrelevant how the company came up with the booked reserves. The booked reserves are simply the booked reserves and you're to give an opinion on them. If you conclude that they are reasonable estimates on a gross basis with regard to salvage and subrogation, then I think you can give your opinion on a gross basis.

The next two examples in the instructions of topics to comment on are loss portfolio transfers and financial reinsurance. I think the comment wording itself should be fairly easy to write, if you can just figure out which contracts are loss portfolio transfers and financial reinsurance.

It's not easy to draw the line, to distinguish a loss portfolio transfer or financial reinsurance contract from other reinsurance. The term loss portfolio transfer has a special meaning to regulators. As defined in the NAIC's Accounting Practices and Procedures Manual, the loss reserves are supposed to be booked on a gross basis with regard to loss portfolio transfers. Instead of reducing the net reserves, these contracts are handled through separate write-in items for the liabilities and special surplus funds.

In order for your opinion to be consistent with the accounting treatment, in the annual statement, your opinion naturally should be on a gross basis if these reserves are booked the way they're supposed to be booked.

With regard to financial reinsurance, my suggestion would be to error in the side of mentioning contracts that are in the grey area. It's a very good idea, anyway, for the company to talk with the insurance department in advance about any contracts that might be considered financial reinsurance. The company should make sure that the department agrees with the company's planned accounting treatment for these contracts. The worst thing that can happen is to pay the overhead costs of these contracts and then have the insurance department tell you that you can't account for them as reinsurance.

The fifth example, in the instructions, of topics to comment on is reinsurance collectibility. I was glad to hear Michael say that he doesn't think that this should require a complete study of the financial condition of all of the company's reinsurers. I would think a typical statement might be something to the effect that you have assumed that all the reinsurance treated as ceded by the company will be collectible and that you are not aware of any reinsurance contract as being uncollectible. You might also want to say that you have not done a detailed analysis of the collectibility of the reinsurance. Before you make these statements, I think you need to at least review the list of reinsurers to look for known problem reinsurers and ask the company's reinsurance experts if they are aware of any collectibility problems. You should keep in mind that uncollectibility of reinsurance can arise both from financial problems at the reinsurer and from coverage disputes. The company's reinsurance experts can tell you about both of these, particularly the coverage disputes.

The next item I wanted to talk about, because it is going to raise questions for many of you, is the requirement that if the booked reserves will create exceptional values on the IRIS tests, then you should include an explanation in your statement of opinion. If this comment or if this statement in the instructions were limited to the loss development tests, in the IRIS system, it would be straightforward. However, loss reserves affect the company's surplus through underwriting results, which in turn affects the other IRIS tests. If you read the instructions literally, I think they say that if any exceptional values will occur on any tests that are affected by the reserves then you need to give an explanation. Otherwise I don't see how you can determine whether the reserves are what caused the exceptional values. The explanation you give might have very little to do with loss reserves though.

You might also face a practical difficulty in that some of the IRIS tests can't be calculated until surplus is determined. You might have an idea of what surplus is going to be, but the booked surplus is not determined until the last minute for a lot of companies.

The last change in the instructions that I wanted to help you interpret is the change from saying that the reserves make "good and sufficient provision" to saying that they make a "reasonable provision." I never liked the old wording because of the possible connotations of the word "sufficient." How can a reserve be sufficient, except in hindsight? But what does reasonable mean? I think there are two distinctly different ways to interpret the word "reasonable" and that the common discussion of a range of reasonableness is just too vague to distinguish between these two interpretations. It is pretty well accepted that there is some sort of range of reserves that has to be considered reasonable. After all, ten actuaries are going to give you at least ten different estimates of reserves. And I would give you different estimates on different days. (Laughter)

One possible interpretation of this range of reasonable reserves, which I do not agree with, is that it is a range of reasonably likely actual loss outcomes. That's basically a confidence interval but we're not told whether it's supposed to be a 25% confidence interval or 50% or 75%. And that can make a huge difference.

The other interpretation, which is the one I prefer, is that the range should be a range of reasonable estimates of the actual outstanding losses. The range of reasonable estimates, in my view, is a range of estimates that would produced by alternative sets of assumptions that the actuary judges to be reasonable assumptions considering all available information. Now the distinction that I'm trying to make here is between a range of actual outcomes and a range of reasonable estimates of an expected value or average outcome. An extreme example of the difference would be a situation where the only available data is very bouncy or random and there's no reason for the estimate to differ from a long term average. In this case, the range of reasonable estimates would be very narrow. Ten actuaries are all going to use a long term average. But the range of reasonably likely actual loss amounts could be very wide. I think that the range of reasonable estimates is the more appropriate range for evaluating whether the booked reserve is reasonable. The question we are addressing is whether it is a reasonable estimate of the liability.

I should also say that if you've got two projection methods and they produce very different reserve estimates, then the range of reasonable estimates, in my view, is not the range from the lowest estimate to the highest estimate. If neither one of your estimation methods can be dismissed as being unreliable, then the best estimate is commonly determined as a weighted average of the different estimates. The range of reasonable estimates is the range that would result from varying assumptions within each of the methods as well as varying the weight that you give to the two methods, but it would not necessarily be reasonable to give a 100% of the weight to one of the methods. You should not ignore something if you can't dismiss it as being unreliable.

At this point I'd like to reiterate the single most important thing that I hope you are going to remember from my talk, which is that you should figure out, as soon as possible, what data and methods you are going to use in estimating the gross reserves. You might need to start the wheels turning right now, in order to get data in time for your study. Thank you.

MR. LAMB: Thank you, Pat. I appreciate the reminder about reinsurance collectibility also depending upon interpretation of the contracts. I went to the session this morning on AICPA's draft for their position on auditing loss reserves. And they had language in there which sounded like they are leaning toward your idea of what is reasonable.

Our next panelist is David Hartman. He is a Managing Director, Senior Vice President and Actuary for the Chubb Group of Companies. He is a Fellow of the Casualty Actuarial Society and Member of the American Academy of Actuaries and a Fellow of the Canadian Institute of Actuaries. He is a Past-President of the Casualty Actuarial Society way back in 1988. He is a former Vice President of the American Academy of Actuaries. And he now serves as Chairman of the Academy's Property Liability Financial Reporting Committee, which makes him very busy and puts him in the focus of attention of all this. Dave Hartman.

MR. HARTMAN: Thanks Mike and thanks to you. You're down to the last speaker of the last session of the CLRS.

I'm going to try to fulfill two roles this afternoon. One is that of a person who signs the casualty loss reserve opinion for a primary company and also, in my capacity as Chair of the Academy's Financial Reporting Committee for Property Liability. In those roles I'd like to address three points. First, I'd quickly like to go through my perspective on some of the changes for 1991 from the primary company point of view. Second, I'd like to address the audit of data underlying loss reserves, which is new news. And then, third, give some comments about public expectations.

But looking first at the primary company point of view, if you'll turn in your handout to paragraph 11, you'll see that there are a number of areas where the regulators are looking for comments from those of us who sign the opinions. It covers such things as discounting, loss portfolio transfers, financial reinsurance, and IRIS tests. I'd just like to underscore what Mike Lamb said, and that is that the regulators are looking for our help. They are looking for our insights. We work with the data. We know the situation. They'd like us to do our best to help them out, to put into a few words something that will explain what might take them a long time to figure out on their own. One specific, in this regard, is in the area of discounting. I think that if there are any reserves that are discounted on a net basis, when all is said and done, even if they are tabular work comp reserves, that the actuary ought to disclose that in the opinion, if the actuary is counting on the future investment income that is anticipated in order to cover the total liability.

A second area has to do with the reinsurance collectibility and the requirement of giving an opinion on both the direct and assumed, or gross, as well as the net reserves. Pat has indicated, and I totally agree with him, that this is a very significant area that requires planning right now. Hopefully, with the publicity about the fact that this was coming over the past year, companies are in pretty good shape to be able to address this, but here again, clearly the regulators are looking for some help. A number of the companies that have become insolvent over the recent past have done so because of problems in the collection of reinsurance. If the actuary gives an opinion on both the gross and the net reserves, that implicitly is providing an opinion on the ceded reserves as well, particularly when you look there in paragraph 11 and comments are requested on the collectibility of reinsurance. At a minimum, please, at least talk with the people in your companies who are responsible for placing the reinsurance. Furthermore, talk with whomever it is, probably in the accounting area, who is responsible for booking the collections from the reinsurers. Probe deeply. Find out. Are there any problems in the reinsurance collectibility area? And if so, highlight them. If not, say there are no problems. Actually the ideal is to encourage your company management to place all of your reinsurance with just the top rated reinsurers, so that you won't have problems. But even as Lee said, sometimes there will be some reinsurers who either will not pay or dispute the coverage that you thought might have been there in the first place.

The third area in the 1991 changes to look at is the sentence in the beginning of paragraph 13 that asks the actuary to describe the methods and assumptions. That sentence is new for 1991 and, if the Blanks Task Force adopts the recommendations that have been handed out, it will be gone in 1992. So I would reiterate what Mike says, keep your explanation in this year's opinion brief and to the point. To me, the public is best served if the statement of actuarial opinion is easily discernable as to whether it is a clean opinion, a qualified opinion, or a negative opinion. Don't clutter it up with a whole lot of extra stuff. At the same time, be working on a more thorough draft this year of an actuarial report. As you see there, in paragraph 15, the proposal for 1992 is that an actuary prepare an actuarial report and have that available for the next seven years. That is worthwhile and to me it is appropriate to have an actuarial report available for the examiners to see or whatever kind of a regulator is interested in reviewing the reserves of a company.

Moving on to my second major area -- regarding the audit of the data underlying loss reserves...this is, as I say, new news. If any of you are concerned with how to justify this trip to your boss, to me this is the point to do it with, because this is something that was adopted by the NAIC on an emergency basis at their June 1991 meeting that is applicable for the 1991 opinions due March 1 of 1992.

Historically, there have been essentially three options that the actuary could use in reporting on the review of the data. The first option is contained in paragraph 9 of the instruction that you have, and that is unchanged. That allows the actuary to personally perform a review of the data.

The other two options were in paragraph 10. Those two options were, on the one hand, to allow the actuary to rely on the responsible officers of the company for a review of the data or to rely on an accounting firm for the accuracy of the data. And the key word in the old paragraph 10(b) is "accuracy". That word has been there for about ten years, but it was only late 1990 that the accounting profession saw it and got very excited about it. In fact, in February of this year, the AICPA issued a notice to practitioners which concluded that if an actuary relies on the accountant for the accuracy, and I put the emphasis on the word "accuracy", of the underlying data, seek the advise of legal counsel. In other words, sue that actuary. "Accuracy" has a very specific meaning within the accounting profession. If an amount is shown in thousands of dollars and that amount is audited for accuracy, then that audit has to be complete enough to make sure that the auditor can be comfortable that that amount is accurate to the nearest thousand dollars. We, of course, express our reserves to the nearest thousand dollars and they are not about to do as complete an audit as to give assurance that the reserves are accurate to the nearest thousand dollars. However, they did feel comfortable with some new wording, which the American Academy of Actuaries and the AICPA jointly proposed to Mike Lamb's Casualty Actuarial Technical Task Force in June. And that wording is kind of in the middle of the new 10(b) saying, "I relied upon company produced data underlying loss reserves and loss adjustment expense as audited and reported upon by (the name of the accounting firm) on such and such a date." As I say, that was what the two professions jointly recommended to the NAIC. The Casualty Actuarial Task Force agreed with it and recommended to the Blanks Task Force that the rules be suspended and that revision be adopted on an emergency basis. Well, that was done, but somewhere between the Blanks Task Force and the EX(4) Committee of the NAIC, the opening phrase to both 10(a) and 10(b) was introduced. That phrase requires that if the actuary elects to rely on the accounting firm and if that company is required to have audited financial statements, then the data has to be audited as well. This creates a real problem, because the requirement for audited financial statements is not due until June 1st, whereas, as you well know, the opinion on loss reserves is due March 1st, three months earlier. Furthermore, the audit of the data is generally much more work for the accounting firm. It requires much more of a review than the audit for the financial statements. I honestly don't think that enough consideration was given by the EX(4) group as they addressed this matter, but it is clear that the NAIC wants to hold somebody responsible for the data. An actuarial opinion that is based on faulty data is not worth anything, and the NAIC recognizes that. Generally speaking, actuaries have elected one of the options in paragraph 10, although there are some who have elected the option under paragraph 9, but if the actuary has opted to rely on the responsible officers of the company for the data and that turns out to be faulty, then who can be held accountable. The NAIC wants to hold somebody accountable. They don't care whether it is the actuary or the auditor, but in my opinion, I'm not sure that I would be willing to assume the liability imposed by paragraph 9. I'd rather rely on those professionals who are trained to be auditors to audit the data.

But we've got a problem for this year and that problem is that the deadline for our opinion is before the audit of the data is likely to be completed for many companies. And this year, I think, the best thing that we can do, if the audit of the underlying data is not complete, is to essentially qualify our opinion and say that my opinion is that the reserves are reasonable subject to a completion of an audit of the data by June 1st. Now, in that regard, the accounting profession has already drafted, a couple of years ago, some sample wording for a special report regarding the audit of data underlying loss reserves. And those of you who have access to the AICPA Audit Guide will find it on page 165 of the Audit Guide. One of the things that the sample wording addresses is that the auditors have examined the schedule of data.

As two professions we need to work together to define what that schedule of data means. To me, in my work, in reaching conclusions and recommendations of what a reserve level ought to be, there are some things that I incorporate that I'm not sure that I would call part of a schedule of data. For example, as I look at an inflationary trend factor applied to past losses and come up with a reserve for future loss payments, I'm not sure that that's auditable in the terms of schedule of data. But I can assure you that the two professions are working together to work with the NAIC to provide a solution to this problem, rather than simply identifying the problem. It is easy to identify the problem.

My third area has to do with public expectations. It ought to be clear to everybody, if not before this meeting, certainly it was evident at the opening session yesterday morning, that the NAIC is under a great deal of pressure from the federal government to do a good job at what they do. The federal government, in many areas, is threatening federal regulation of insurance totally displacing the state system of regulation of insurance, if a good job is not done. In addition, in that same panel, we learned that the A.M. Best study of the insolvencies over a twenty plus year period found that the major cause of insolvencies was underreserving and/or underpricing. I want to state at this point that I'm all in favor of free enterprise and that there ought to be companies that become insolvent. I don't think that we should try to reach the point where no company goes broke. But I do think that we ought to do all that we can do to minimize the damage that results from that occurring. One of the things that that means, is that we as actuaries need to do all we can to make sure that the companies do, in fact, carry adequate reserves.

A question has been raised as far as the proposed change for 1992 regarding appointed actuary. Is an appointed actuary who is employed by a company as good as or about the same or better or whatever as an independent actuary? I think, yes. I work for a company. I live with the loss reserving process all year long. I'm aware of problems as they occur and I'm able to dig into them throughout the year. And at a primary company we've got a great deal of data. I contrast that to Lee's position as a reinsurance actuary where he doesn't have as much data or Pat's position as a consulting actuary where he doesn't have as much time. To me, then, a company actuary is, perhaps in many respects, in a better position to render an opinion than in independent actuary.

In my capacity as Chairman of the Academy's Financial Reporting Committee I do want to let all of you know that our committee is watching. We've done a number of studies over the years and the most recent one that is in process right now is one that has sought information from regulators on the 102 companies that became insolvent in 1988, 1989 and 1990.

Just as one example, 22 of those insolvencies occurred in the state of Texas. And I compliment the staff, there in Texas, for doing a very thorough and conscientious job in responding to the study for all 22 companies. One of the things that we asked for in this year's study was a copy of the loss reserve opinion, if one was rendered. In the case of 21 of the 22 insolvencies in Texas, there was a loss reserve opinion rendered.

There are two ways to look at this, however. One is that 20 of the 21 opinions were rendered by non-actuaries and the company subsequently became insolvent. Hurray for us actuaries! However, on the other hand, the one opinion that was rendered by an actuary was on a company that produced the single largest dollar amount of insolvency in the whole history in the state of Texas. And this was signed by a Fellow of the CAS, who is a Member of the American Academy. Not so good for us. But we will be, as a committee, following through on these and other opinions that have been rendered on companies that have gone insolvent.

Additionally, our committee is working on drafting some language to suggest to the Actuarial Standards Board some standard language to use in exceptional situations. For example, if a company is a new company, what sort of words should the opining actuary include in the opinion, or what should the opining actuary include if a company has been in business for a long time but has just recently entered a new line of business where it had no prior experience, and there's been a lot of recent growth. There are a number of these exceptional situations where we feel it would be useful to have some standard language. And, as I say, we are working on that.

Clearly, the public has placed a lot of trust in our profession by requiring an actuarial opinion signed by a qualified actuary in every state for virtually every company, at least every company that has at least a million dollars in premium in a year. But this is a two edged sword. All one has to do is to look at the number of lawyers per capita in this country. The lawyers are looking for people to keep them busy by filing suits and such, and we are targets more and more now.

Lee has mentioned, for example, the question of environmental liability. What do we do in forming an opinion about the adequacy of a company's reserves when that company has some exposure to environmental lawsuits? My primary recommendation is, to everybody, to keep the opinions as brief and to the point as possible. If there's been any criticism that has been most consistent about the opinions that have been rendered by casualty actuaries, it has been that it has been too difficult to determine whether the opinion is a clean opinion, a qualified opinion or a negative opinion because there are too many caveats included in the opinions. We need to do a better job of balancing an assumption of responsibility on our part for a company's reserves being reasonable, versus protecting our legal flanks.

One alternative is that maybe we in our profession can do something similar to what the accounting profession does and that is to issue a management letter, kind of off to the side, of an opinion. This management letter would be one, in which we as actuaries, would write to management whether it is our employer or whether it would be from a consulting actuary to the client, pointing out areas where company practices and procedures could be improved such that the resulting reserve calculation would be improved. Now I am aware that some actuaries, who work for accounting firms, contribute to paragraphs or points made by the auditors in the firm's management letter and I'm also aware that some consulting firms do this type of thing, more or less, informally with their clients, but it may be worthwhile to consider, in both cases, a more formalized communication directly from the actuary.

In conclusion, I'd like to say that the public has placed a great deal of trust in us. And it is our responsibility, yours and mine, to maintain that high level of public trust by doing a good, thorough, professional job in the opinion rendering process. Thank you.

MR. LAMB: Thank you, David. It's been a real thrill to moderate a panel of such qualified people. I hope you all get that experience some day.

I hope we have given you a little bit of helpful information and a little bit of courage to dive into this assignment. And by all means, if you have problems when you start to do this, you can call any of us or maybe even better yet talk to your state regulators about what they expect of you.

With that I think we can take a few questions if you have some. Please approach the microphone.

QUESTION: I want to thank you for the presentation. It was a wonderful presentation about all the changes that provide confidence in the actuary's role in assuring solvency. I am confused though about what you stated that the statutes relating to loss reserves which include the amount necessary to meet all insurance liability obligations of the company. However, when we come to the loss reserve opinion, and the word "reasonable" is put in there, meaning a reasonable approximation between methods and so on, is the loss reserve meant to be an adequate amount to meet all future obligations? Or is it meant to be a proven amount? The reason I ask this is because on the life side it is a very distinctive difference between the two types of reserves, statutory reserves and prudent reserves. In statutory reserves "sufficient" is an important statement, while on the prudent reserve, "reasonable" is more applicable. And I noticed the panel on the (inaudible) certain situations where adequate is a very difficult statement to use for reserves. Prudent is a more appropriate statement to use. And I think when you give an "adequate" opinion, you've made a stronger statement. Can you respond to that?

MR. LAMB: I think what we've been saying here is that by getting away from words like "good and sufficient" and going to "reasonable" we are getting away from a guarantee that this estimated reserve is always going to be enough. And getting more like...the state of the art of actuarial science and this is our best estimate. More like that.

Any other comment?

MR. HARTMAN: Just one point, that in life insurance, there's more certainty to the calculation of reserves than there is in property casualty, so I wouldn't expect that we would, on the property casualty side, be held to the same standard as on the life side.

QUESTION: I would assume though, on a statutory basis from an NAIC viewpoint, they are more concerned that the company maintain its solvency status forever and the reserve is important as a part of that. Whereas on the GAAP side they are more concerned with the fact of producing a stable profitability result.

QUESTION: Mike Walker. Interested in a comment from you, Mike, regarding the IRIS tests. I know you stated your intent clearly in regard to the IRIS as just 9, 10 and 11. Pat has put on the table that that's not what it literally says and you can't count on the wisdom of Oregon to carry through all the states in the NAIC. What comment do you have...or, I guess, I'm interested in what you think it appears that other states might be looking for if a company were to have an exceptional value, on say, the premium to surplus ratio? All I can think of to say that it's an irregular value.

MR. LAMB: I think you are correct in that it is any of the IRIS tests. What I said was that I think the way this will work is if you have an asterisk by 9, 10 or 11, that would be the first thing that would call attention to the opinion. If it comes out later that there is a troubled company or something and it has the asterisk by some other test and that result looks like it is caused by a reserve, then that also would prompt a look at your opinion.

1991 CASUALTY LOSS RESERVE SEMINAR

4F/7E: LOSS RESERVE OPINION REQUIREMENTS

Michael Lamb
Casualty Actuary
Insurance Division State of Oregon

surance Division
0 Labor & Industries Building, Salem, Oregon 97310 (503) 378-4271 FAX: (503) 378-4351

Oregon

DEPARTMENT OF
INSURANCE AND
FINANCE

June 27, 1991

Mr. Robert Solitro
Director of Examinations
New Hampshire Insurance Department
169 Manchester Street
Concord, NH 03301

Re: Statement of Actuarial Opinion: General Instruction 12
Annual Statement for Property/Casualty Companies
Proposals from the Casualty Actuarial Task Force for 1992

Dear Bob:

The NAIC Casualty Actuarial Task Force recommends some further changes to the Instructions relating to the Statement of Actuarial Opinion for property/casualty companies. I wish to describe the substantive improvements.

The only dramatic new concept is the requirement we wish to add to Paragraph (1) for the qualified actuary to be appointed by the Board of Directors, or the equivalent governing body. The company would have to notify the domestic commissioner whenever the Board changes appointments. The Board would have the actuary present at least one report each year on the items addressed by the opinion.

Some publics believe the actuary should be independent. Our task force is on record as stating that is unnecessary. We think it is much more important to have the actuary report on reserving matters directly to those who have ultimate responsibility for company solvency. Most well-managed companies realize that management cannot be expected to remain familiar with all the vagaries of loss reserves and their boards expect to hear directly from their actuaries. We think this is a very healthy structure regardless of whether the actuary is an employee or an engaged consultant.

We include a phrase that appointment could be "by the authority of the Board" because some companies may charge the audit committee of the Board, for instance, with this responsibility.

The concept of an appointed actuary is the rule in Great Britain, Canada and some other countries. The actuary is sometimes required to report solvency concerns directly to the regulators. We are not yet ready to recommend the feasibility of that feature in the United States.

We propose some clarifications for the Exemptions allowed by Paragraph (4). First of all, the current "Automatic Exemption" has been viewed as truly automatic by some companies. We propose to change that to "Exemption for Small Companies." Subparagraph (b) under this exemption describes the process of requesting the exemption. Since the process applies to all the categories of exemptions, we believe it belongs immediately under the heading of Paragraph (4).

We understand that some major reinsurers may have fewer than 1,000 policyholders and might technically qualify for exemption. Hence, we suggest deleting that eligibility option. The number of policyholders is not published anywhere.

We would like your concurrence to some clarification of the points listed in Paragraph (12). We believe there is a need to elevate the requirements of state laws to greater prominence. This belief is based on experiences of some of the actuaries on our task force in which actuarial standards or principles have been given higher regard, with inference that a practicing actuary might not be able to comply with state laws that conflict with them. Actually, published standards require state laws to be followed. If an actuary perceives a conflict, he or she need only mention the perception in an opinion or report to be absolved of any professional misconduct. We wish the precedence of state law to be clear to the profession which serves the industry we attempt to regulate.

Paragraph (15) currently requires workpapers to be kept at the company for seven years. We find that some onlookers consider "workpapers" to mean boxes of scribblings. We want to see the development triangles and whatnot which form the analysis that produced the final result. To accomplish this, we propose to change "workpapers" to "actuarial report," which has a definite meaning to match what we had intended by "workpapers." We offer a definition of "actuarial report" to be placed in Paragraph (2) that comes from the Actuarial Standard of Practice No. 9, as adopted by the Actuarial Standards Board, January 1991, plus a requirement that the report "documents the analysis underlying the opinion."

The opening sentence of Paragraph (13), requiring a description of actuarial assumptions and methods, would then be deleted. This information would be presented more fully in the actuarial report.

Throughout the instruction, we propose to delete references to "certification" and replace them with "opinion." This is to achieve some internal consistency and to match the language found in actuarial standards.

Thank you for the opportunity to present these recommendations. We believe the Statement of Actuarial Opinion for property/casualty companies with these revisions will become an even more useful tool for our efforts to monitor solvency.

Sincerely,

R. Michael Lamb, FCAS, MAAA
Casualty Actuary
Insurance Division
(503) 378-4271

RML:psm
7156u

Enclosure

cc: Jean Olson, NAIC

12. (1) STATEMENT OF ACTUARIAL OPINION

There is to be included or attached to Page 1 of the Annual Statement, the statement of a qualified actuary, entitled "Statement of Actuarial Opinion," setting forth his or her opinion relating to loss and loss adjustment expense reserves**. The qualified actuary must be appointed by the Board of Directors, or its equivalent, or by the authority of the Board, by December 31 of the calendar year for which the opinion is rendered. Whenever the appointed actuary is replaced by the Board of Directors, the company must notify the domiciliary commissioner within 30 days of the date of the Board action and give the reasons for the replacement. The appointed actuary must present a report to the Board of Directors each year on the items within the scope of the opinion.**

(2) DEFINITIONS

"Qualified actuary" is a person who is either:

(a) A member in good standing of the Casualty Actuarial Society, or

(b) A member in good standing of the American Academy of Actuaries who has been approved as qualified for signing casualty loss reserve opinions by the Casualty Practice Council of the American Academy of Actuaries, or

(c) A person who otherwise has competency in loss reserve evaluation as demonstrated to the satisfaction of the insurance regulatory official of the domiciliary state. In such case, at least 90 days prior to the filing of its annual statement, the insurer must request approval that the person be deemed qualified and that request must be approved or denied. The request must include the NAIC Biographical form and a list of all loss reserve opinions ~~and/or certifications~~ issued in the last 3 years by this person.

Notwithstanding the above, a domiciliary commissioner may, by bulletin or regulation, specify who may sign an opinion. Also, a domiciliary commissioner may require particular qualifications, including independence, for specific insurers.

"Insurer" means an insurer authorized to write property and/or casualty insurance under the laws of any state and includes but is not limited to fire and marine companies, general casualty companies, local mutual aid societies, statewide mutual assessment companies, mutual insurance companies other than farm mutual insurance companies and county mutual insurance companies, Lloyd's plans, reciprocal and interinsurance exchanges, captive insurance companies, risk retention groups, stipulated premium insurance companies, and non-profit legal services corporations.

"Actuarial report" means a document or other presentation, prepared as a formal means of conveying the actuary's professional conclusions and recommendations, of recording and communicating the methods and procedures, and of insuring that the parties addressed are aware of the significance of the actuary's opinion or findings and which documents the analysis underlying the opinion.

"Annual Statement" means the annual financial statement required to be filed by insurers with the commissioner.

(3) CONTENT

The opinion shall be in the format of and contain the information required by this Section 12 of the Annual Statement Instructions: Property and Casualty.

(4) EXEMPTIONS

An insurer who intends to file for one of the exemptions under this section must submit a letter of intent to its domiciliary commissioner no later than December 1 of the calendar year for which the exemption is to be claimed. The commissioner may deny the exemption prior to December 31 of the same year if he deems the exemption inappropriate.

A certified copy of the approved exemption must be filed with the annual statement in all jurisdictions in which the company is authorized.

~~Automatic~~ Exemption for Small Companies

(a) An insurer otherwise subject to the requirement that has less than $1,000,000 total direct plus assumed written premiums during a calendar year ~~or that has less than a total of 1,000 policyholders and certificate holders at the end of a calendar year,~~ in lieu of the ~~certification~~ opinion required for the calendar year, may submit an affidavit under oath of an officer of the insurer that specifies that amount of direct plus assumed premiums written ~~and the total number of policyholders and certificate holders.~~

~~(b) An insurer who intends to file for an exemption under this section must submit a letter of intent to its domiciliary commissioner no later than December 1 of the calendar year for which the exemption is to be claimed. The commissioner may deny the exemption prior to December 31 of the same year if he deems the exemption inappropriate.~~

Exemption for Insurers under Supervision or Conservatorship

Unless ordered by the domiciliary commissioner, an insurer that is under supervision or conservatorship pursuant to statutory provision is exempt from the filing requirements contained herein.

Exemption for Nature of Business

An insurer otherwise subject to the requirement and not eligible for an exemption as enumerated above may apply to its domiciliary commissioner for an exemption based on the nature of business written. This exemption is available to those companies writing property lines only.

Financial Hardship Exemption

(a) An insurer otherwise subject to this requirement and not eligible for an exemption as enumerated above may apply to the commissioner for a financial hardship exemption.

(b) Financial hardship is presumed to exist if the projected reasonable cost of the ~~certification~~ opinion would exceed the lesser of:

(i) One percent of the insurer's capital and surplus reflected in the insurer's latest quarterly statement for the calendar year for which the exemption is sought; or

(ii) Three percent of the insurer's projected net direct plus assumed premiums written during the calendar year for which the exemption is sought as reflected in the insurer's latest quarterly statement filed with its domiciliary commissioner.

(5) Such a statement of opinion must consist of a paragraph identifying the actuary; a scope paragraph identifying the subjects on which an opinion is to be expressed and describing the scope of the actuary's work (see sections 8-11 below); and an opinion paragraph expressing his or her opinion with respect to such subjects (see sections 12-14 below). One or more additional paragraphs may be needed in individual cases if the actuary considers it necessary to state a qualification of his or her opinion or to explain some aspect of the annual statement which is not already sufficiently explained in the annual statement.

(6) The opening paragraph should generally indicate the actuary's relationship to the company. For a company actuary the opening paragraph of the actuarial opinion should contain the sentence:

> "I, (name and title of actuary), am an officer (employee) of (named insurer) and a member of the American Academy of Actuaries and meet its qualification standards. (and/or) I am a Fellow/Associate of the Casualty Actuarial Society." **I was appointed by the Board of Directors (or equivalent authority) on (insert date) to render this opinion."**

For a consulting actuary, the opening paragraph of the actuarial opinion should contain the sentence:

"I, (name and title of actuary, am associated with the firm of (name of firm). I am a member of the American Academy of Actuaries and meet its qualification standards. (and/or) I am a Fellow/Associate of the Casualty Actuarial Society. ~~I have been retained by the (name of insurer) with regard to loss and loss adjustment expense reserves.~~" I was appointed by the Board of Directors (or equivalent authority) on (insert date) to render this opinion."

A member of the American Academy of Actuaries qualifying under paragraph (2)(b) must attach the approval letter from the Academy.

For a person other than a member of the American Academy of Actuaries or a member of the Casualty Actuarial Society, the opening paragraph of the opinion should contain the sentence:

"I, (name and title), am an officer (employee) of (name of insurer), and I have demonstrated competency in loss reserving to the satisfaction of (regulatory official of domiciliary state)." I was appointed by the Board of Directors (or equivalent authority) on (insert date) to render this opinion."

or

"I, (name and title of consultant), am associated with the firm of (name of firm). I have demonstrated competency in loss reserving to the satisfaction of (regulatory official of domiciliary state ~~and have been retained by the (name of insurer) with regard to loss and loss adjustment expense reserves.~~" I was appointed by the Board of Directors (or equivalent authority) on (insert date) to render this opinion."

(7) The following are examples, for illustrative purposes, of language which in typical circumstances would be included in the remainder of the statement of actuarial opinion. The illustrative language should be modified as needed to meet the circumstances of a particular case, and the actuary should in any case use language which clearly expresses his or her professional judgment.

(8) The scope paragraph should contain a sentence such as the following:

"I have examined the actuarial assumptions and methods used in determining reserves listed below, as shown in the Annual Statement of the company as prepared for filing with state regulatory officials, as of December 31, 19__."

The paragraph should list those items and amounts with respect to which the actuary is expressing an opinion. The list should include but not necessarily be limited to:

(a) Reserve for unpaid losses (Page 3, Item 1)

(b) Reserve for unpaid loss adjustment expenses (Page 3, Item 2).

(c) Reserve for unpaid losses - Direct and Assumed (Schedule P, Part 1, Cols. 13 and 15).

(d) Reserve for unpaid loss adjustment expenses - Direct and Assumed (Schedule P, Part 1, Cols. 17 and 19).

(9) If the actuary has examined the underlying records and/or summaries, the scope paragraph should also include a sentence such as the following:

"My examination included such review of the actuarial assumptions and methods used and of the underlying basic records and/or summaries and such tests of the calculations as I considered necessary."

(10) If the actuary has not examined the underlying records and/or summaries, but has relied upon those prepared by the company, the scope paragraph should include a sentence such as one of the following:

(a) If the domiciliary department has determined that an insurer shall not submit audited financial statements:

"I relied upon data underlying loss and loss adjustment expense reserves prepared by the responsible officers or employees of the company or group to which it belongs. In other respects, my examination included such review of the actuarial assumptions and methods used and such tests of the calculations as I considered necessary."

(b) If the domiciliary department requires an insurer to submit audited financial statements:

"I relied upon company-produced data underlying loss and loss adjustment expense reserves as audited and reported upon by (name of accounting firm) on (date). In other respects, my examination included such review of the underlying actuarial assumptions and methods used and such tests of the calculations as I considered necessary."

(11) The actuary should comment in the scope section, as appropriate, on relevant topics such as the following to the extent they affect, or could affect, the loss reserves; discounting, salvage/subrogation, loss portfolio transfers, financial reinsurance, and reinsurance collectibility. If the company reserves will create exceptional values using the NAIC IRIS tests, the actuary should include an explanation.

(12) The opinion paragraph should include a sentence which covers at least the points listed in the following illustration:

> "In my opinion, the amounts carried in the balance sheet on account of the items identified above
>
> (a) meet the requirements of the insurance laws of (state of domicile)."
>
> (a-b) are computed in accordance with accepted loss reserving standards and principles.
>
> (~~b~~-c) make a reasonable provision for all unpaid loss and loss expense obligations of the Company under the terms of its policies and agreements.
>
> ~~(c) meet the requirements of the insurance laws of (state of domicile)."~~

Insurance laws and regulations shall at all times take precedence over the actuarial standards and principles.

(13) ~~The actuary should describe the actuarial assumptions and/or methods which have been used.~~ If there has been any material change in the actuarial assumptions and/or methods from those previously employed, that change should be described in the statement of actuarial opinion by inserting a phrase such as:

> "A material change in actuarial assumptions (and/or methods) was made during the past year, but such change accords with accepted loss reserving standards."

A brief description of the change should follow.

The adoption of new issues or coverages requiring underlying actuarial assumptions which differ from actuarial assumptions used for prior issues or coverages is not a change in actuarial assumption within the meaning of this paragraph.

(14) If the actuary is unable to form an opinion, he or she should refuse to issue a statement of opinion. If the actuary's opinion is adverse or qualified, the actuary should issue an adverse or qualified actuarial opinion explicitly stating the reason(s) for such opinion.

(15) The statement must include assurance that ~~workpapers~~ an actuarial report supporting the actuarial opinion will be maintained at the company and available for examination for seven years. The wording for an actuary employed by the company should be similar to the following:

> "~~Workpapers~~ An actuarial report supporting the findings expressed in this statement of actuarial opinion will be retained for a

period of seven years in the administrative offices of the company and available for regulatory examination."

The wording for a consulting actuary retained by the company should be similar to the following:

"~~Workpapers~~ **An actuarial report** supporting the findings expressed in this statement of actuarial opinion have been provided to the company to be retained for a period of seven years at its administrative offices and available for regulatory examination."

(16) The statement should conclude with the signature of the actuary responsible for providing the opinion. The signature should appear in the following format:

____
Signature of actuary
Printed name of actuary
Address of actuary
Telephone number of actuary

ind\tf\ca\general

1991 CASUALTY LOSS RESERVE SEMINAR

4G: REPORT LAG DISTRIBUTIONS

Moderator

Stuart B. Suchoff
Milliman & Robertson, Inc.

Panel

Dr. Ira Robbin
CIGNA Property & Casualty Companies

Gary G. Venter
Workers' Compensation Reinsurance Bureau

MR. SUCHOFF: Good afternoon. This is Session 4G on Report Lag Distributions. I am Stuart Suchoff. I am a consulting actuary with Milliman and Robertson. On my left is Gary Venter, and on my right is Ira Robbin.

This session will be recorded. It is very important for you to speak into the microphone when asking questions. Please help us and the CLRS by completing an evaluation form for this session and leaving it in the back of the room along with your attendance ticket if you want to receive credit for the session.

The opinions expressed this afternoon are those of the individuals, and are not necessarily those of their employers or of the sponsoring organizations.

Scientists apply various models to analyze the occurrence of natural phenomena and physical processes. For example, health hazards can be measured in terms of morbidity and mortality statistics. Products are reviewed in some sciences in terms of their decay or failure rates.

Mathematical models of the reporting pattern may improve estimation of IBNR reserves for casualty exposures such as environmental liability, occupational diseases, or perhaps excess of loss reinsurance.

These exposures have in common the characteristic of very low frequency and/or long reporting lags. Moreover, mathematical models may aid our intuitive understanding and help to explain the claim-generating process.

The models that are used by most casualty actuaries in these applications offer little help in projecting whether and when events will occur. Our development patterns don't enable us to answer whether or when, for example, an underground storage tank may begin to leak, or how many insured coal miners will ultimately develop a significant case of pneumoconiosis.

New laws, court decisions, adverse publicity, or even coverage changes may in fact accelerate claim recognition. But it is difficult to incorporate these changes and their impact into the usual models that we work with.

Today we want to talk about different approaches to the problem, and our panelists will describe mathematical models and applications as they pertain to the claim reporting patterns.

Our fist panelist will be Gary Venter. Gary is president of the Worker's Compensation Reinsurance Bureau. Prior to that he was a vice president of the National Council on Compensation Insurance. He has also worked at Prudential Reinsurance and Fireman's Fund.

Gary received a bachelor's degree from the University of California Berkeley in 1966, and a master's degree from Stanford in 1970. He became a Fellow of the CAS in 1978. He is a member of the American Academy of Actuaries. As many of you know, Gary has authored numerous technical papers for the CAS over the years.

MR. VENTER: Okay. This talk is supposed to be a practical example of trying to fit distributions to report lags. You have probably seen Ed Wisner's paper from something like the 1979 proceedings on that topic, and there have been numerous sessions of fitting distributions to report lags, the time between accident and report.

And we tried to do this for some excess worker's comp data, and ran into a number of practical problems, so this is just sort of an example of what happened when we tried to do this, some of the distributions, things we found out about distributions in relation to this data.

Now, excess worker's comp is long tailed in terms of report lags. It might take -- well, it might take very many years before you get your last claim from a given accident year, because, as someone is paying a claim over years, they suddenly realize, hey, that claim has exceeded the retention from 1953, which was $25,000, which we just discovered, so they report the claim in 1991.

So, we started looking at heavy-tailed -- we needed heavy-tailed distributions, so, to start off with, the first chart is a table of some heavy-tailed distributions, and we are going to emphasize the closed-form distributions, so you don't have to calculate beta functions or gamma functions.

The first four on top are not actually closed-form, and they are not the ones we are going to use. They just sort of show the genealogy, and there are no lines from the generalized Pareto in the middle, but both the Pareto and inverse Pareto are special cases of that. So, we get down to the line with Weibull and below are the ones we are going to use.

The Weibull -- now, and the chart says "showing moments that exist." In heavy-tailed distributions, one of the primary things we have to deal with is that not all moments exist. Sometimes a very heavy-tailed distribution won't even have a mean. And it is quite common for the variance to be infinite. Also, lesser known is that sometimes the negative moments won't exist. A negative moment might be the expected value of one over X, or the expected value of one over X squared.

It turns out the existence of moments is important for the heaviness of the tail. The fewer moments that exist, the heavier the tail is as far as positive moments go. As far as negative moments go, it is similar with respect to the behavior near zero, and so the fewer negative moments exist, the heavier tail there is towards zero.

So, the Weibull -- these distributions are arranged symmetrically, and everything symmetric right and left is the distribution of one over X for the other one. So, the log extreme value is also the inverse Weibull. It is the distribution of one over X if X is Weibull. So, we have the burr and inverse burr. Then we get three special cases at this level.

The Pareto and log logistic are both special cases of the burr. The inverse Pareto and log logistic are both special cases of the inverse Burr. And here are two other distributions which are not as well known, which are somewhere in between the Pareto and the log logistic, which I am calling the paralogistic and its inverse.

Now, I advertised these are closed-form, so they are easy to deal with. The second chart shows the distribution functions. You see they are closed form. X is the variable, so Weibull has two parameters, A and B. Inverse Weibull has two parameters, A and B.

The burr has three parameters, A, B, and C, as does the inverse burr. And special cases, the log logistic is a special case of both the burr and inverse burr with C equals one. The Pareto is the special case of A equals one, and the inverse Pareto is also the special case of the inverse burr with A equals one.

And the paralogistic and its inverse are special cases of the burr and inverse burr taking A equals C. So these are--except for the burr and inverse burr, these are all two parameter distributions. One of the things we are finding out with lags is that it is a little suspicious if you start using three-parameter distributions. So, we are going to emphasize two-parameter distributions.

The next chart shows modes. With report lags you are dealing with data that is truncated from above. An accident year has happened. You have seen so many lags. You don't know if it's over yet. There are still some to come and you don't know how many. That is truncated from above. You don't have any information about how many are yet to come.

With data truncated from above, an important thing to look at is the mode, because if there is a positive mode, that can tell you something about where you are in the distribution, and what kind of distribution you might want to fit to it. In report lags there usually is a positive mode. In other words, the most claims are in the second year or the third year or the fifth year. It is not so usual, especially with heavy-tailed business, that the most claims would be reported in the very first year.

So, that would indicate you would be looking for a distribution with a positive mode. So, the modes are here, and the specific formulas aren't as important as whether or not they are positive.

An interesting one: the Pareto never has a positive mode. Its mode is always zero. The inverse Weibull always has a positive mode, it never has a mode of zero. So the inverse Weibull is a good one to use if nothing happens for the first year or so. If things start happening a little later, the inverse Weibull sort of stays away from zero. And for all the other distributions, it depends on the parameters.

To illustrate this, the next chart graphs the density functions for the two parameter cases. And you can see, for instance, the Pareto, which is the green one up here, starts at zero. The mode is zero. As you go on down the line, you have distributions whose mode is positive, but, for instance, the sort of light blue one, paralogistic, for these parameters it is just barely positive. It almost looks like a mode of zero.

Whereas you get down to the last one, the inverse Weibull, you see it stays well away from zero. And you see, the mode is the most positive.

These graphs are two-parameter distributions, and they are selected so that the mean is one, and the heaviness of the tails are the same, the heaviness of the tails being defined by the lowest moment that doesn't exist. So in this case, the lowest infinite moment is the 1.5th. That is sort of a common heavy-tailed distribution. A lot of loss severities might even be more heavy-tailed than that.

We were looking at some old accident years, so the truncation problem wouldn't be too severe, but it is still there. The next graph is accident year 1956, so the 35th evaluation would be 1990, I guess, so these are the percent of claims reported in each period.

The percent of the claims reported by 1990, reported in each period. The lowest bar represents one claim. So there is still a claim coming in in '90, and one came in in maybe '86. And I wouldn't worry too much about these fits. You might notice one thing, is that the Weibull seems to die out too fast, and that is one thing we will be seeing, that the Weibull doesn't fit this data too well. It is really not heavy-tailed enough. So, you see, it is pretty sparse after maybe 20 years.

Now, the other thing we did, we looked at 1955 in the next graph. The difference here is that it didn't seem to peter out as fast. You know, after 20 there's more claims, and we're scratching our head and saying, is '55 really different than '56, and we didn't really do a statistical test, and I don't know if we would have believed it if it said they were different, so we decided they were the same. Just, we have a strong prior. Let's put it that way, that there shouldn't be so much difference between '55 and '56, and we should use the same distribution in both cases.

Here is the combined. It is hard to tell the goodness of fit of any of those distributions except to say that the Weibull dies out too fast. Now, let's go on to fitting parameters.

We fit a number of distributions to '55, '56, and '55 and '56, combined, and we wanted to compare goodness of fit among the distributions, so we didn't use maximum likelihood. We used minimum ky square estimation. The reason for that is, you can't compare likelihood functions, but you can compare ky squares.

So, we want to see -- and it didn't seem fair to use maximum likelihood estimate and then compare the ky squares that result from that. So, in order to compare distributions, we used minimum ky square fits, and, well, you see right away Weibull has a big ky square compared to some of the others. Inverse Weibull fits pretty well in '55. It is not in '56.

Burr seems to fit pretty well both years. So does inverse burr. But those are both three-parameter distributions. And the parameters are pretty different for the two years, which -- we decided the two years are the same, so we are not sure we like those, even though they fit well.

Log logistic, we already saw a special case. That seems to fit reasonably well for both years. Pareto, which is, you know, archetypical heavy-tailed distribution, just doesn't seem to have the right shape, for some reason, and we will look at this a little more later. It doesn't fit well. And then these two new ones, paralogistic and inverse paralogistic, sort of do, and probably of the two-parameter distributions, the inverse paralogistic is probably the best fit.

It is interesting, too, to note that just about all the two-parameter distributions give the same parameters for both years. You know, the Weibull, inverse Weibull, log logistic, Pareto, paralogistic, you know, they all give -- well, no, the Pareto doesn't. Besides the Pareto, which doesn't fit that well anyway, the two-parameter distributions seem to give the same answer for both years, which, you know, tends to give us confidence that they really are the same.

Now, to compare goodness of fits, the next 3 charts graph the probabilities on a log scale. Actually, let me show you '55 first, because the scale didn't come out on '56. These are the probabilities of each evaluation. The black line is the actuals and then the different colored lines are different fits.

Well, you see the Weibull, you know, doesn't have a heavy enough tail. For this year, '55, there's about three of them there that fit pretty well. Two of them are the burr and inverse burr, which we decided aren't fair because there are too many parameters. And the log logistic fits pretty well there. The paralogistic isn't too good, but it's not too bad.

Same thing for '56, but then '56 is strange, because it starts falling off, and it looks like Weibull fits fine, and then it -- suddenly some more claims come in, you know, after 20 years now and then, and the Weibull again is too light. The Pareto doesn't fit, and some of these other heavy-tailed distributions sort of fit. It seems like a strange year, because nothing we could think of fits at all, fits all that well.

So, combining them together, which we think is valid, you see that the Weibull kind of falls away too fast. The inverse Weibull is too heavy-tailed, and the Pareto doesn't fit, but there are about four or five of them in here that fit pretty well. Well, throwing away the burr and inverse burr for too many parameters, it leaves the log logistic and the paralogistic and inverse paralogistic as good candidates.

As an indication, to show kind of how the special cases work, next is a graph of the log likelihood function. I guess in the last session we heard that no one really knows what log likelihood is anyway, and we don't, but we can graph it. This is for the burr. Now, this isn't really the log likelihood function, because the burr has three parameters. We would need a four-dimensional graph to really graph that.

But what this is is the maximum possible log likelihood for an AC combination. For each AC combination shown in that graph we find the B that gives you the maximum likelihood, and then calculate the likelihood function for that B, and that is what is graphed in this surface up here. So that's the best possible likelihood function for that AC combination.

Then what is projected down at the bottom is contours of that log likelihood function, so you see that there's sort of a plateau. Well, you could tell there's a plateau just looking at the graph. You know, the maximum isn't that clearly defined, and you see a sort of correlation between the parameters in this curve around here that shows, you know, that the A and C parameter are related to each other.

But what is pretty interesting, the A parameter -- A equals one was a special case of the Pareto. If you look at A equals one, and look at that line, you see that it doesn't get into the sort of maximum part of the likelihood function for this particular distribution. It just -- you know, I think this is the one where the maximum likelihood was something like C equals 31 or something. It is just, way out here somewhere is the maximum, and it is not really in the best part.

If you look, C equals one here, that goes right through, you know, a pretty high area of the likelihood function, so C equals one, which would be the special case of the log logistic, would be, you know, more likely, a more possible answer. And this red line, that is A equals C. That is the paralogistic. And you see that that goes kind of right through the heart of the maximum part of the likelihood function. So that is likely to be a good special case for this distribution.

Now, just to remember when we see the next slide that kind of the maximum is sort of over in here, around, say, A equals one and a half, or something.

If we go on to look at '55, the same thing, you see the maximum is way over here in this corner. It is a different shaped likelihood function for that other year. Again, the special case of the Pareto is way out in left field, but the special case of the log logistic barely gets into the best part, and the paralogistic doesn't work well, either.

But when we combine the years, and this one I graphed inverse burr because that was kind of the best fitting, you see again a correlation, and maybe not a sharp maximum, and again, you see A equals one doesn't work, C equals one gets in the good area, and

A equals C gets in the area that might be, you know, the maximum part of the function.

That gives some insight, I think, into which of the special cases of inverse burr and inverse paralogistic might tend to work best.

The other question we wanted to address is, what happens, what would we have gotten if we had fit these distributions much earlier on? You know, how many years of observations would it have taken before we could have gotten a decent idea of what the right distribution is? So, the next table is accident year '55.

We took a look at the burr distribution, and we looked at the parameters computed at six to tenth. It actually wouldn't converge at fifth, so we started at sixth out to 36th, which is the most recent, so you can look at the last column, which is the most recent parameters, and we also computed the value of the function at 36, the percent of claims observed by 36 years from those parameters.

And you see at sixth report you really didn't have a good estimate, but by tenth you at least had a good estimate of the F of 36th, the probabilities. Although the parameters were somewhat different than the ultimate parameters, maybe they weren't too bad, and over the years they converged.

And then inverse paralogistic, which we thought was, you know, a pretty reasonable distribution. Again, you are a little bit questionable at fifth report, and it takes a while before you get your ultimate parameters, but maybe you are not too far off at tenth.

Well, just quickly, to see some other years, we did that also at '56. Fifty-six, it seemed like it took until about 15th for the burr distribution to get in the ball park, and for the parameters, it probably took until 25th because that was the distribution that changed its shape after a while. And for '56 paralogistic, well, by tenth you are kind of in the right ball park. So maybe that's -- restricting yourself two parameters, you know, might again be healthy with this kind of problem.

So, that is sort of a live example of trying to use these kinds of distributions and the kind of problems that crop up, and the kind of distributions that seem to fit. It is a little disturbing that you can't get the right answer after two or three years, that with something like this it seems to take ten years or something before you are really getting a good handle on what your lag distributions are.

However, what we are hoping to do next -- this is a work in progress -- is see if you can use distributions you fit for one year to imply the next year, so, you know, after a while get a sort of a report pattern you can believe in. And we will maybe report on that at another meeting.

Thank you.

(Applause.)

MR. SUCHOFF: I guess we are going to take questions separately, and then together, so any questions on Gary's presentation before we get into the other material?

QUESTION: Gary, have you ever done anything like use severity distributions, you know, from your lower level data to predict, you know, the kind of settlement patterns you will get for the higher level?

MR. VENTER: Well, this is our lower level data.

QUESTION: You can't get any lower than that?

MR. VENTER: We get data excess of, right now, $500,000 per occurrence. This is the typical reinsurance problem; you get excess data and you are trying to make inferences, you know, based on the excess data. Sometimes we try to infer What the lower level data looks like based on the distribution. But we are not going to publish that.

QUESTION: I guess I am supposed to put this in the form of a question. Do you have a typo on the upper left-hand corner of your distribution function page?

MR. VENTER: Which one, the lower?

QUESTION: Yes, the Weibull. I believe you want that X to the plus A.

MR. VENTER: Oh, yes. Yes, that's right. I noticed that, too. The Weibull distribution, I should have mentioned, is X to the A, not X to the minus A. It is the inverse Weibull that has the minus A. Thanks for bringing that up.

QUESTION: In this methodology, it seems like it is very important to have stable distributions, if you need to have your data get to be ten years old before you can feel comfortable that you can predict the ultimate, and it seems that you have your best chance at having a stable distribution if there is something natural about using that form of a distribution for the data.

Have you done any work that would indicate that there is something natural about one distribution in measuring these lags as opposed to another, or anything else that would address this stability question?

MR. VENTER: I don't think there's anything natural about any of these distributions except for the log normal in certain circumstances. There is an argument why you should use log normal in that if you have random effects that are multiplicative, and if you have enough of them, they should be log normally distributed.

That is a nice argument, but then log normal doesn't fit that well. So you are left with one natural distribution that doesn't fit, and then some distributions are just handy, easy formulas. You know, some of them seem to fit.

But as far as stability, it looks to us at this point that you are better off just using two-parameter distributions, that the data itself is random enough that it will change three parameters -- it will select the three parameters of a three-parameter distribution to fit, and it will fluctuate more than it really should, and so I think you are better off with two-parameter distributions, and then just check the stability over time, over different accident years.

Okay, well, if there are any more questions later on we can take them after Ira's presentation.

MR. SUCHOFF: Thank you, Gary.

If you want copies of Gary's handouts but didn't find them at the back, please give Gary your business card at the end of the session and we will see that they get to you.

Our next speaker is Ira Robbin. Ira is director of actuarial research and assistant vice president at CIGNA Corporation. He has a BS in mathematics from Michigan State University circa 1973, and received his Ph.D. in applied mathematics from Rutgers University in 1980. His thesis was entitled, Orthogonally Invariant Distributions in Complex Dimensions, which he will not explain today.

(General laughter.)

Ira has presented several actuarial papers and served on various industry committees in addition to teaching CAS exam courses. This afternoon he will discuss a paper he wrote some years ago. It concerns a formula for IBNR counts that is a credibility weighted average of three standard actuarial estimates. The IBNR is modeled parametrically as a dependent random variable, and the credibilities are estimated magically.

(General laughter.)

MR. ROBBIN: That's about right.

MR. SUCHOFF: Take it from there.

MR. ROBBIN: I know you were all waiting for a quite thorough exposition of Bayesian credibility formulas for reserving. And indeed, I had prepared such a long and detailed discussion. However, because I have a cold, I will not be able to give the full discussion. I know you are all disappointed.

So, instead, this is going to be a rather brief run-through, hitting on the main points. Fortunately, I have Gary with me here. He wrote a review of my paper, and so, if you ask any questions that are beyond me, he will answer them.

MR. VENTER: What paper was this?

(General laughter.)

MR. ROBBIN: Now, the title of the paper was "A Bayesian Credibility Model of IBNR Counts". This is "Incurred But Not Reported" claim counts. How many claim counts are we going to get subsequently? That is the question we are asking. And we are going to use some Bayesian formulation to figure out what that would be.

Now, the notable thing about this is that Bayesian credibility is used in actuarial science, but usually in pricing. This is an application of credibility to reserving. So it's a little bit different.
What is Bayes' theorem? Well, I hope you all know what it is, but I will give you the basic gist of it. You have some prior knowledge about what you expect will happen. You get some data, and now you revise your belief about what will happen in the future. You do it methodically, depending on how strong your belief was at the outset versus how willing you were to be swayed by the data.

So, to give an example, say you are on the street, and some shady looking character comes up to you and says, "Here, pull a coin out of this bag, any coin." So you pull a coin out of the bag, and you toss it five times, and it turns up heads five times in a row. Hm. And then you are asked to make a bet on the next toss of that same coin. What do you do?

Well, the empiricist says, "It has turned up heads five times in a row. Therefore, it will always turn up heads. My data says heads. And heads it must be." Then there is the sort of a priori person who is very naive in the world, and says, "Oh, I believe the coin was fair, and it is just strange that it turned up heads five times in a row. Yet the odds are 50-50 because it was a fair coin."

And then there's the Bayesian who comes up with an answer something like five-sevenths. I won't explain that. But it is a melding of the actual data and some prior belief.

Now we're going to go into the slides here and try to explain what is going on and how we are going to get an analog of this in reserving.

We have claim counts that have been reported to date. That's the M. The incurred but not reported counts, the unknown, that's R. And N is the number of counts at ultimate. It then follows that M plus R is N. Okay? The counts you have reported to date plus the unreported counts will add up to the total at ultimate. And let's assume that M and R are parameterized random variables, which is what they are. They are random variables, at least and we are going to throw some parametric structure on them.

Also assume they are conditionally independent: conditionally independent, not parametrically independent.

Let's define the reporting pattern and ultimate counts. Let n be the initial expectation, our belief before we saw any of the data, our initial expectation of the ultimate number of counts we were going to get. Let q be the initial expected percent of counts that will be unreported at this age of development. So q has to do with the reporting pattern. We believed we would have, say, 70 percent of the counts in as of this date when we started this accident year off so the corresponding q is 30 percent.

Let V be the variance, the process variance, of counts to date. In other words, you may know the expectation, but there's a lot of volatility. How much volatility is there, even if you know the expectation? That is what V is trying to measure.

Now, just writing this out mathematically, the expected number of counts is n. The expected number of counts to date, which is the expectation of M, is n times 1 minus q. Q is what is unreported. One minus q is what has been reported.

The expected unreported is n times Q and the expected variance of the counts to date is V. Here I am just trying to explain what these symbols are in terms of expectations and variances and so forth.

Let's assume that the n and q are independent. In other words, our reporting pattern is independent from our estimate of ultimate number of counts. I think that is a reasonable assumption. If that is true, then the expected number of counts we have to date could be written as the expectation of n times the expectation of one minus q.

(Slide)

Now we are introducing parameter uncertainty. We don't know the parameter n. Not exactly. We don't really know the parameter q, the percent of ultimate. We do have some distribution on those parameters.

Now we want to get to the actuarial connection to all this. I know it has been long in coming, but here it is. There are three standard actuarial estimates for the IBNR. First of all, there is a pegged estimate. You say, well, I know at ultimate how may counts I am going to have, and I believe that, and therefore what is unreported is my estimate of ultimate minus what I have got reported to date.

Note, the data to date does not affect the projected ultimate. That is a peg.

Next, there is a loss development factor (LDF) estimate. I think that is the most commonly used. You take the stuff you have to date and you multiply it by your age to ultimate loss development factor. So, therefore, the IBNR is the counts to date, M, times the LDF minus one.

And finally, there's the Bornheutter-Ferguson estimate. You take your initial estimate of ultimate counts and you multiply it by one minus one over to the LDF to get the IBNR.

A small show of hands. How many are familiar with all those three? Okay. I once gave this lecture, and went through this, and went on to several things, and went on, and somebody had their hand raised, and I said, well, what was it, and they said, what is a loss development factor? And I knew then I had lost it. Okay, so you are familiar with what I am talking about.

You will read various articles on Part 7 claiming this one is better than that one, or one is better than the other, and you have an argument in any given situation. Well, why are you using loss development factors. The data is too volatile. Don't use loss development factors here. And sometimes they will say, the peg is right, just go with the peg. Others will say, no, no, loss development is right. And some will argue for Bornheutter-Ferguson. So you can get involved in all these arguments as to which is right in any given scenario.

Notice, by the way, that I have been able to write these different estimates in terms of these n's and Ms and so forth. I have introduced LDF as one over expectation of one minus q, one over the expected percent to date.

(Slide)

Now, if we are going to be pure Bayesians, without credibility, but just Bayesians, we would say we have some prior distribution on these parameters, n and q: n is the expected number counts at ultimate; q, the expected percent unreported. And as we get more and more data we will keep revising our distributional assumptions.

So, that second equation, G of n and q given M, that's my belief about n and q given the data to date, M. And by Bayes theorem, it is the distribution of the counts to date M, given n, and q, times G of n and q; G of n and q being the initial a priori belief about the distribution of the n and the q.

And that is very nice to look at, and I am not sure what else you could do with it. It is pretty difficult to work with even in fairly simple cases like Poisson claims counts, and gamma distributions, and beta distributions of q, and so forth. You get quite a mess. You can do something with it, but let's not talk about that.

So, go to Bayesian credibility, and try to get a linear estimate that has the least mean square error. So that's the best linear estimate relative to the true Bayesian estimate. And it turns out there's a standard formula that you could write out for that linear estimate which I write as RB. R is the IBNR and B means it's a Bayesian estimate here. This is E[R], which turned out to be your initial estimate of the unreported counts, plus the difference between what you expected to see to date and what you actually have to date, times the ratio of covariance between M and R over the variance of M.

Well, you take that formula, and you rewrite it terms of n, q, and v, and then you group these terms and you get a final estimate as a credibility weighted sum of the traditional estimates. So, in this fight between the three estimates, you can come up with one estimate that reflects all three, and you end up with a weighted average. For those that are interested, you can go through those formulas. I am not going to do it here.

(Slide)

I am going to get to the final formula here. We have a credibility of the pegged estimate times the pegged estimate of IBNR, credibility of the LDF estimate times the LDF estimate of IBNR, and the same thing for the Bornheutter-Ferguson. So, the question is, what are all these Zs, Z meaning the credibility of the various types of estimates.

So, Z (peg) is the weight that you give to the pegged estimate. The denominator is the variance in the number of counts to date. For Z (peg), the variance of one minus q is a term that occurs in the numerator. That's the variance of the percent reported to date parameter.

If we believe that the parameter for the counts reported to date is .7, 70 percent will be reported in an expectation sense, anyway. If we believe that 70 percent parameter totally, then that variance becomes zero. We are saying we are absolutely certain about the reporting pattern. No doubt about it. We are not going to be swayed by any data. So if we are absolutely certain about that reporting pattern, the Z peg drops away. We won't go with the pegged estimate.

Let's go to the loss development factor credibility and look at it. In its numerator it has a variance of n, n being our estimate of ultimate counts. So, if we believe our initial estimate of ultimate counts, and we believe absolutely that say 10,000 claim counts is the expectation with no uncertainty whatsoever, then the LDF drops out; the LDF credibility is zero.

The Bornheutter-Ferguson credibility has the V. The V has to do with the variance of the counts to date conditional upon knowing N and Q. So, you put these all together, and I guess the thing you notice is that these weights vary with age of development. You could start off and have a lot of weight attached to the peg. It could then evolve and put more in Bornheutter-Ferguson, and then it could evolve and put more on the LDF.

If you are absolutely certain about everything, your parameters, Poisson with 10,000, reporting pattern 70 percent reported, then you go with Bornheutter-Ferguson.

(Slide)

So, if the a priori estimates are believed with utmost faith, then Bornheutter-Ferguson will get all the weight. This lets us see the assumptions underlying a choice of Bornheutter-Ferguson, as opposed to pegged, as opposed to LDF.

Increasing process variance of m increases credibility assigned to Bornheutter-Ferguson. There is more process variance in counts to date, more volatility, so therefore, you are going to believe less in the pegged, you are going to believe less in the loss development factors because they are being applied to something that is very volatile. So, the more volatile your counts to date are, you know, you apply a loss development factor to something very volatile and you will get a very uncertain answer. So you've got to go with Bornheutter-Ferguson. It's the only thing that doesn't bounce around that much.

Decreasing parameter variance of reporting pattern increases credibility assigned to LDF. Again, if you believe the reporting pattern parameter, then go with loss development factors. Decreasing variance in the estimate of ultimate counts increases the credibility assigned to the pegged. So it is just kind of a way of making sense of which of these things works, and in what cases it would work.

(Slide)

Then I came up with some examples here. Now, you don't want to have to go making Bayesian assumptions about parameters, so to make it practical, why don't we just quantify how certain you are or how uncertain you are about the various parameters you are using in your estimates? How certain are you about your estimate of ultimate? How certain are you about your loss development factor?

So, for example, let's estimate the standard deviation of your estimate of ultimate as C (ult), which is a constant, times your estimate of ultimate. So you are saying, it is just a percentage, you are plus or minus 10 percent, say. In that case C would be .1. Also I want you to specify the standard deviation about your expected loss development factor. How much do you think that LDF expectation will vary? How confident are you of it?

Finally you specify the standard deviation in counts to date. All this is just a way of forcing people to say how confident they are about what is going into their estimates.

(Slide)

Now some observations. When you actually throw this in, the Z LDF tends to increase and Z peg tends to decrease, as the years age toward ultimate.

The reason is that your deviation in the percent of ultimate tends to go down. If your loss development factor is like 1.01, or it is 1.02, or something, that is a lot different than saying it is 1.8 or maybe it is 2.0, or maybe it is 1.5. There's a lot more volatility, and you are a lot less confident about your loss development factor estimate at the early ages. At the late ages you are pretty confident.

And if you don't have some kind of a C2 kicker term, Bornheutter-Ferguson dies out as the ultimate number of claims gets large. It is sort of like a central limit theorem almost. If you have a lot of claims, a lot of data in there, then you tend to go with the data more, and you start to say, well, I don't really want to look at this Bornheutter-Ferguson as much. I am willing to be very swayed by the data.

(Slide)

Here's an example. We expected 10,000 claims at the start, and we had a deviation of 1,000, so it is 10,000 plus or minus 10 percent we started off with. We had age to ultimate factors of 2.5, 1.5, 1.2, and 1.1 at the various evaluation ages and, I assume, some standard deviations, I don't know, of these numbers. I guess they are pretty small. The expected percent of ultimate, therefore, is 40, 66.67, 83.3, 90.91.

Thus, you get these expected claim counts to date. So, the 10,000 times the 40 percent yields the 4,000. See that? That is a priori what I expected. And I have made some assumptions about the process variance of my claim counts to date using the process variance coefficients found at the bottom of the page. So, here are estimates -- these are variances in the estimates of counts to date.

And now, you go through this whole formula, and you end up with the credibility for the peg, the credibility for the loss development factor, the credibility for the Bornheutter-Ferguson method. Let's see what they are.

Well, first, I guess at age 2, you already mostly believe the LDF estimate of IBNR, but you are going to give Bornheutter-Ferguson 9 percent. Pegged never got into the starting gate here. It was very low, and it deteriorates, and dies in this particular example. So in this particular example, I guess I really didn't believe my initial estimate of ultimate counts very much relative to how much I believed my estimate of the reporting pattern.

Notice how when I get to age 2 and 3 loss development really does take over, rising from 90 to 94 credibility. And that is the way it is in that example.

(Slide)

You could set up a spread sheet if you wanted to take this into account yourself. Just force yourself to say how much you believe the things that are going into it, and then you can sort of settle the arguments about which of these methods is best by taking a weighted average that reflects your beliefs.

In the next example, real quickly, we lowered the deviation of the counts to 500. I think the aged ultimate LDF standard deviations are the same. They were supposed to be. And now look what happened. Now Bornheutter-Ferguson is 28 percent credible at the first age; LDF credibility is down to .7, 71 percent.

So, by tightening that estimate, in other words, saying that I really believe my estimate of ultimate counts much more than I did the first time, I am now putting more weight onto the Bornheutter-Ferguson method in the initial ages and, I guess, even further out.

Anyway, that's it. If you have any questions, I would be happy to answer them, and I guess Gary would also be able to -- oh, one thing. I wanted to mention that in the paper I had done it just for the Poisson case, and Gary generalized it in the formulation you see here with the generalized v for the variance in the counts to date. That's it. Any questions? Yes?

QUESTION: On your Zs, you commented that if you completely believed your estimate of n, then your Z LDF would be zero. If you completely believe your estimate of n, wouldn't you simply go right with the pegged method? Why would you have weight for Bornheutter-Ferguson? That is not obvious to me.

MR. VENTER: What is going on, if you totally believe n, then you believe that to your ultimate number, but you are faced with the M that you observed already.

(Slide)

MR. ROBBIN: You are questioning if the variance of n is zero then you would want to go with peg. That is what you are saying.

QUESTION: Right, but this suggests if the variance of n is zero, you would go with some weighted average of peg and Bornheutter-Ferguson.

MR. ROBBIN: That's right, and it depends --

QUESTION: Whereas in real life if you were perfectly certain with n you wouldn't worry about Bornheutter-Ferguson.

MR. ROBBIN: Well, but hold it. How certain are you about your reporting pattern?

QUESTION: Suppose you are not completely certain about your reporting pattern.

MR. ROBBIN: Oh. Well, then, it seems that if you are not completely certain about the reporting pattern -- I was going to say, if you are completely certain about the reporting pattern, you've got an opposition

QUESTION: You've got a contradiction, right.

MR. ROBBIN: You've got a contradiction facing you. You are completely certain about your estimate of ultimate counts. There will be 10,000, variance of zero in that expectation. And you are completely certain that you expect 70 percent to be reported to date. Both those expectations you are certain of.

QUESTION: But if you are completely certain about n, this suggests that you are going to get a Z peg factor and a Z Bornheutter-Ferguson factor, and you are going to take some average.

MR. ROBBIN: That's correct.

QUESTION: And that's stupid, because in real life if you are certain about n you are going to use the peg.

MR. ROBBIN: That is a good question. Yes?

QUESTION: I don't know if this will resolve the previous question or not, but if you know little n, that is not what you really want to know. What you really want to know is N. The pegged method pretends that if you know the expected value of N, that is what you should use for the answer, but even if you know that, there is still uncertainty about what the real N will be, so that the pegged method is still not perfectly reliable.

QUESTION: Can I ask a question? I mean, I would like to respond to that as well, but I also have a question. I am a little confused about the variance of M. Isn't that a number that is totally known? Or is there something I am missing?

MR. ROBBIN: The variance of M includes both the process variance and the parameter variance.

QUESTION: Can you explain it in little terms?

(General laughter.)

MR. ROBBIN: Before you observe M you make some estimate of how many counts you will have to date. You estimate how many counts you will see as of, say, one year. Now, at the outset, we also should estimate what volatility we will see in that number.

So, you expect to see, based on all these other assumptions, 4,000 claims in one of these examples. Four thousand claims reported as of the end of the first period. Four thousand plus or minus what? How volatile do you think that initial data is going to be? That is what the variance of M is trying to get at.

QUESTION: So that is like a variance of an M then?

MR. ROBBIN: Yes, it's how much volatility do you think is associated with the data that you have seen? Obviously, once you have seen it, it is known, but before you actually saw it, how volatile did you think it was going to be? It's like -- I don't know, you roll a dice. After you see that there is a six, you knew that it was a six. But beforehand you knew that there was some volatility with what would turn up.

QUESTION: Okay.

MR. ROBBIN: There was some stocastic variation associated with that, plus some parameter variance, given that maybe the dice wasn't even fair.

QUESTION: I guess I was just confused, because the indication was you knew the counts to date on the first page.

MR. ROBBIN: Yes, well, that's a good point.

QUESTION: And responding to the other thing, let me just say, if there is no uncertainty in n, which is your initial expected value, that doesn't mean there is going to be no uncertainty in your final value of n, and the variance in M is one thing which creates, I think, drives that general uncertainty.

Knowing the M count to date may give you a change in what your ultimate is going to be, but your n is an initial expected value.

MR. ROBBIN: That's correct.

QUESTION: Your M drives what your stocastic and other factors have created, changing that result in the end.

And the other thing I have to say is, my bet is that the coin is two-headed.

MR. ROBBIN: Well, Stuart, do you want to say good-bye?

MR. SUCHOFF: Well, before we say good-bye, please join me in thanking the panelists. (Applause.)

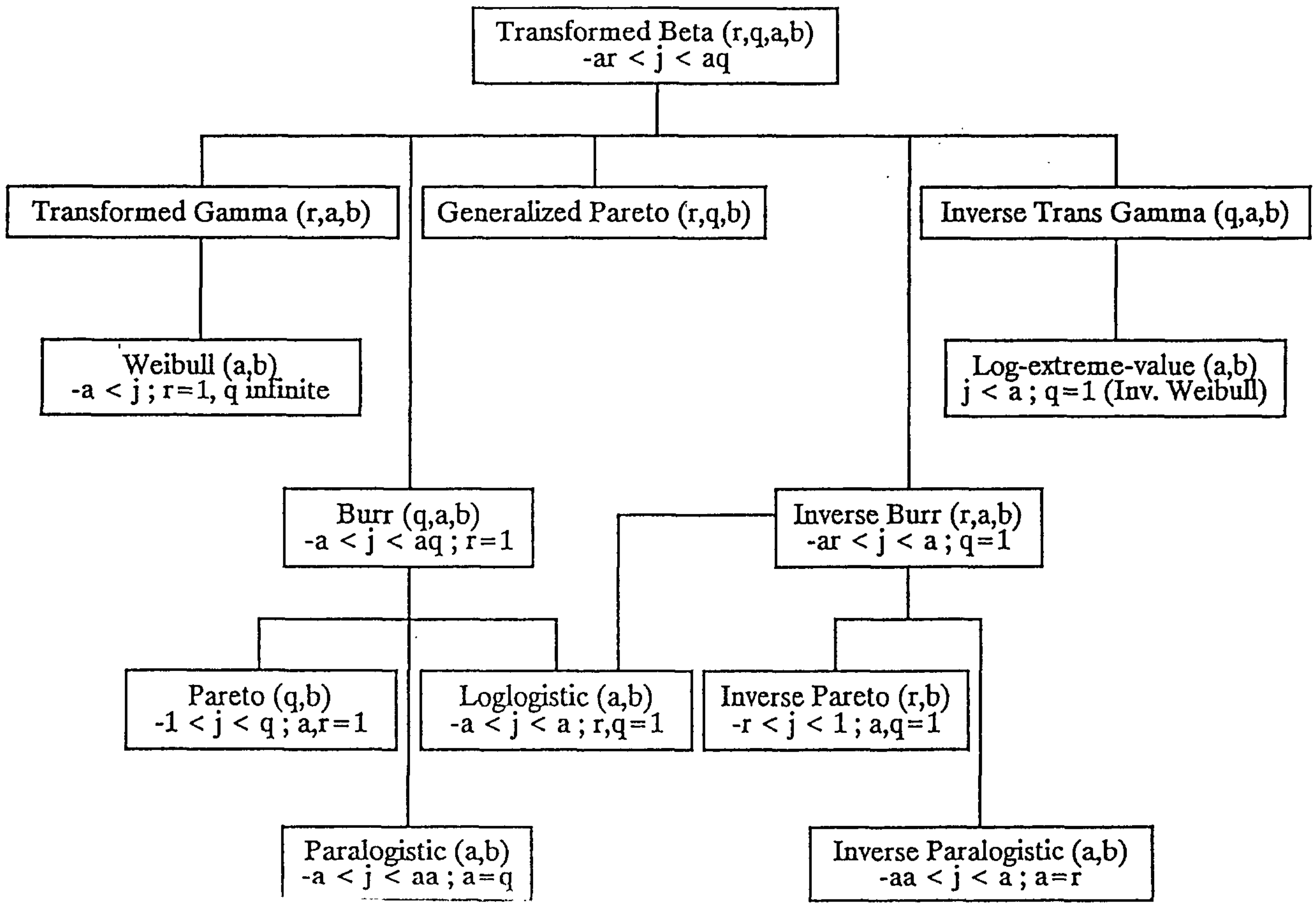
Are there any other questions?

(No response.)

MR. SUCHOFF: Now we will say good-bye.

DISTRIBUTION ORGANIZATION CHART
Showing moments j that exist
Closed Form Distributions

Gary G. Venter
Slide Presentation



Slide 1

Distribution Functions

Weibull

$$1-e^{-bx^{-a}}$$

should be "+" as noted in discussion

Burr

$$1-(1+bx^{a})^{-c}$$

Loglogistic:
$c=1$

Pareto:
$a=1$

Paralogistic:
$a=c$

Inverse Burr

$$(1+bx^{-a})^{-c}$$

Loglogistic:
$c=1$

Inverse Pareto:
$a=1$

Inverse Para-logistic:
$a=c$

Inverse Weibull

$$e^{-bx^{-a}}$$

Slide 2

Modes

Weibull
$[(a-1)/ab]^{1/a}$
if $a > 1$, and 0
otherwise

Burr
$[(a-1)/b(1+ac)]^{1/a}$
if $a > 1$ and
0 o.w.

Loglogistic
$[(a-1)/b(1+a)]^{1/a}$
if $a > 1$ and
0 o.w.

Pareto: 0

Paralogistic
$[(a-1)/b(1+a^2)]^{1/a}$
if $a > 1$ and
0 o.w.

Inverse Burr
$[b(ac-1)/(a+1)]^{1/a}$
if $ac > 1$ and
0 o.w.

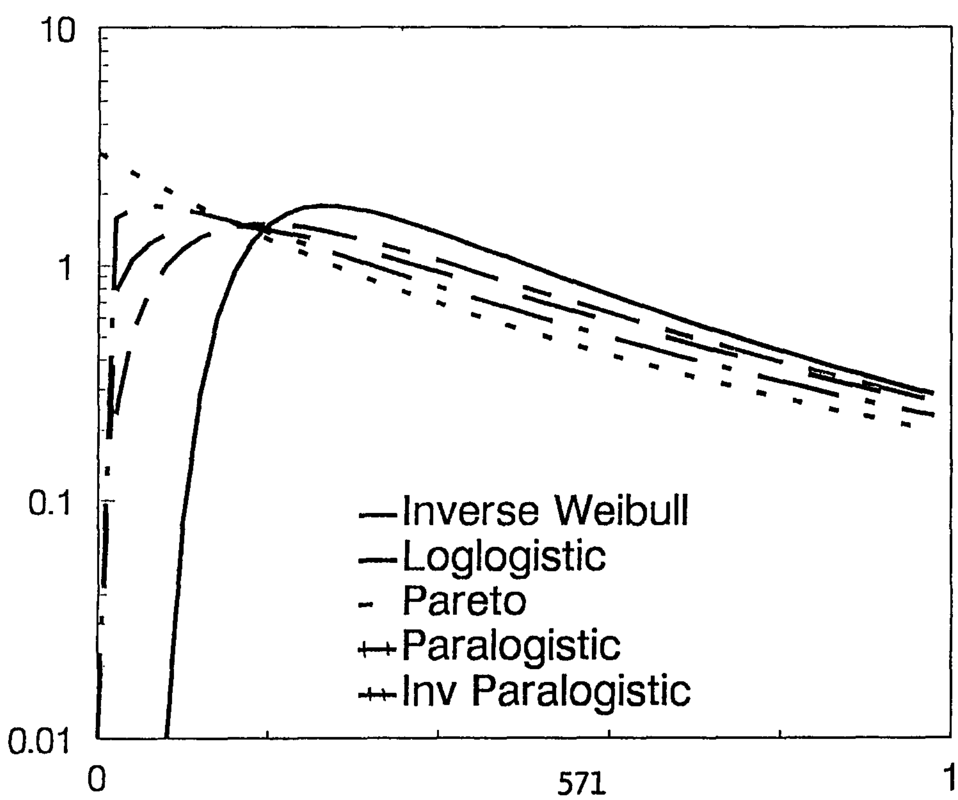
Inverse Pareto
$b(c-1)/2$
if $c > 1$ and 0 o.w.

Inverse Para-logistic
$[b(a-1)]^{1/a}$
if $a > 1$ and
0 o.w.

Inverse Weibull
$[ab/(a+1)]^{1/a}$

Slide 3

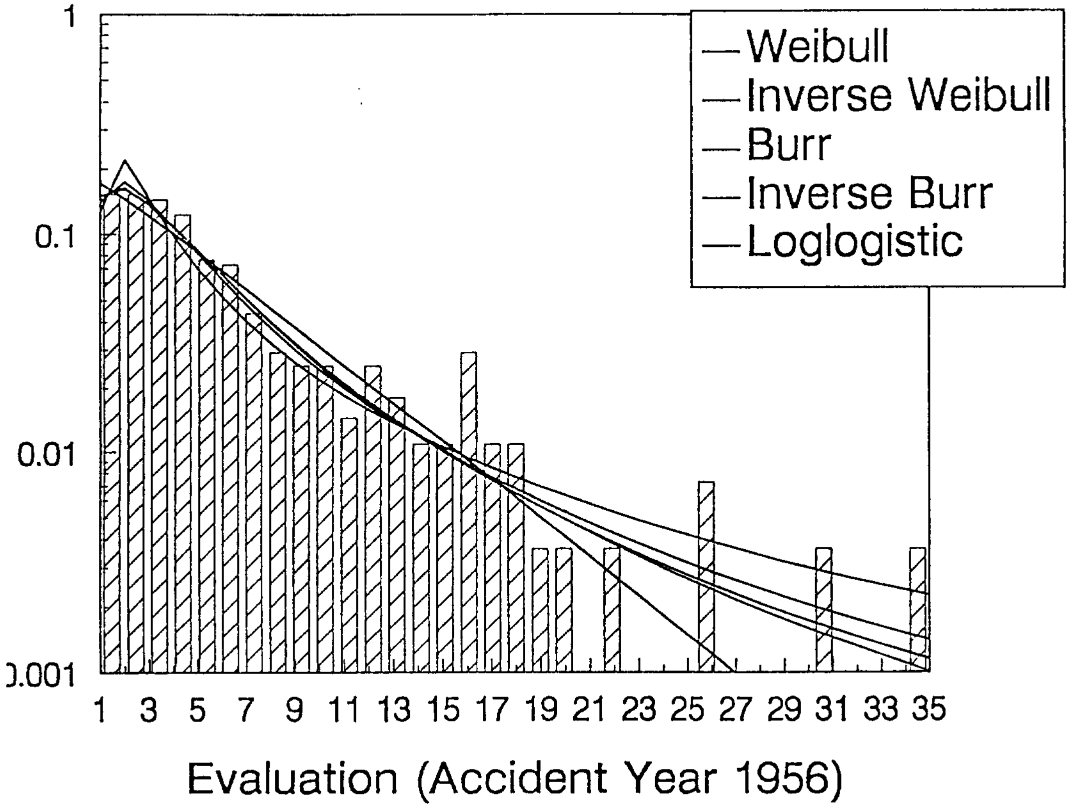
Heavy Tailed Closed Form Two Parameter Distributions



Mean = 1   Lowest Infinite Moment = 1.5th

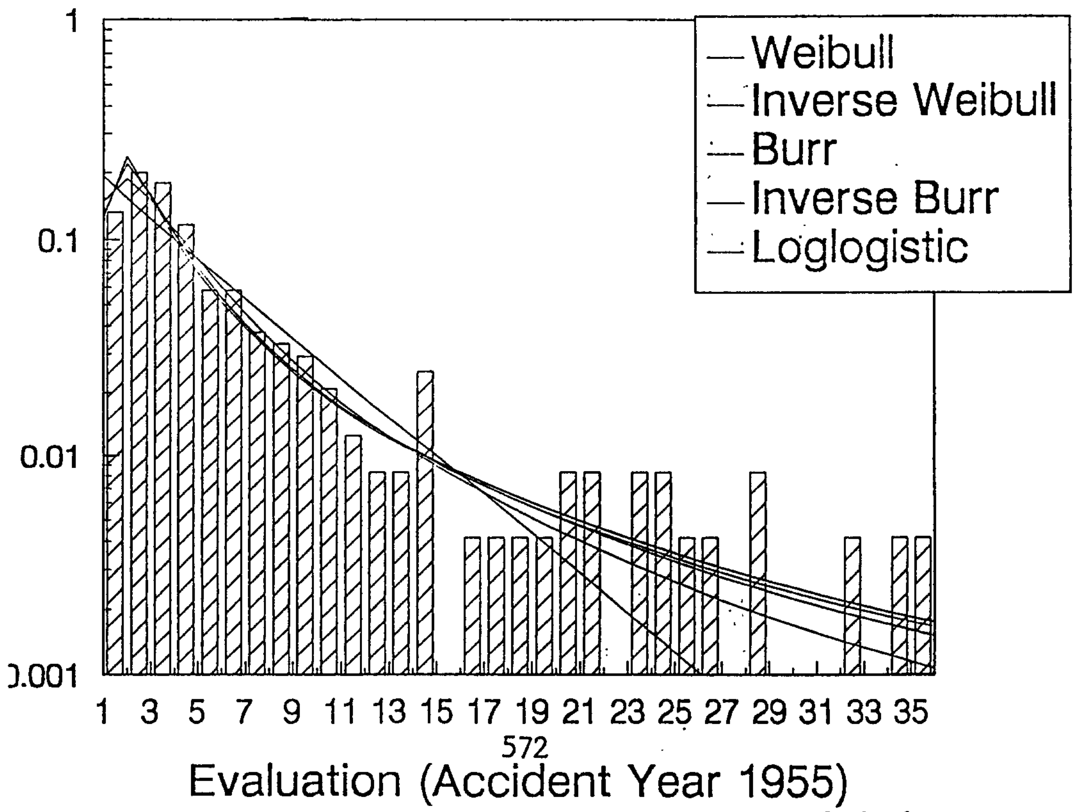
Slide 4

(# Claims Reported @ Each Evaluation)/
(# Claims Reported @ Latest Evaluation)



Slide 5

(# Claims Reported @ Each Evaluation)/
(# Claims Reported @ Latest Evaluation)

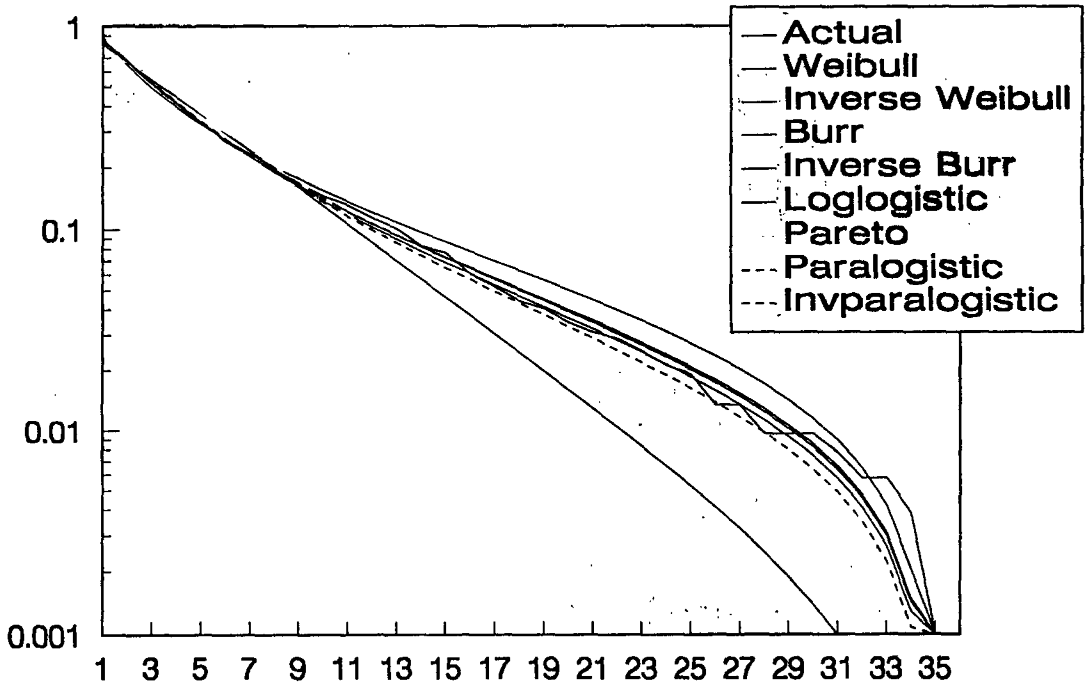


Slide 6

Acc Yr		b	a	c	Chi-Sq.	F(50)
55	Weibull	0.21	0.99	-	0.0517	1.00
56	Weibull	0.19	1.02	-	0.0123	1.00
55,6	Weibull	0.20	1.00	-	0.0706	1.00
55	InvWeibull	2.14	0.99	-	0.0042	0.96
56	InvWeibull	2.14	0.91	-	0.0289	0.94
55,6	InvWeibull	2.14	0.94	-	0.0373	0.95
55	Burr	0.34	2.06	0.45	0.0019	0.96
56	Burr	0.10	1.30	1.71	0.0039	0.99
55,6	Burr	0.21	1.62	0.76	0.0198	0.97
55	InvBurr	0.80	1.15	3.55	0.0028	0.97
56	InvBurr	15.10	1.72	0.69	0.0041	0.99
55,6	InvBurr	3.64	1.37	1.30	0.0200	0.98
55	Loglogistic	0.17	1.52	1.00	0.0095	0.99
56	Loglogistic	0.16	1.47	1.00	0.0058	0.98
55,6	Loglogistic	0.17	1.49	1.00	0.0211	0.98
55	Pareto	0.04	1.00	5.52	0.0438	1.00
56	Pareto	0.01	1.00	31.99	0.0124	1.00
55,6	Pareto	0.02	1.00	9.19	0.0645	1.00
55	Paralogisti	0.13	1.37	-	0.0152	0.99
56	Paralogisti	0.12	1.37	-	0.0042	0.99
55,6	Paralogisti	0.13	1.37	-	0.0253	0.99
55	Invparlogis	3.21	1.39	-	0.0056	0.98
56	Invparlogis	3.57	1.33	-	0.0086	0.97
55,6	Invparlogis	3.39	1.35	-	0.0200	0.98

(# Claims Reported @ Each Evaluation)/

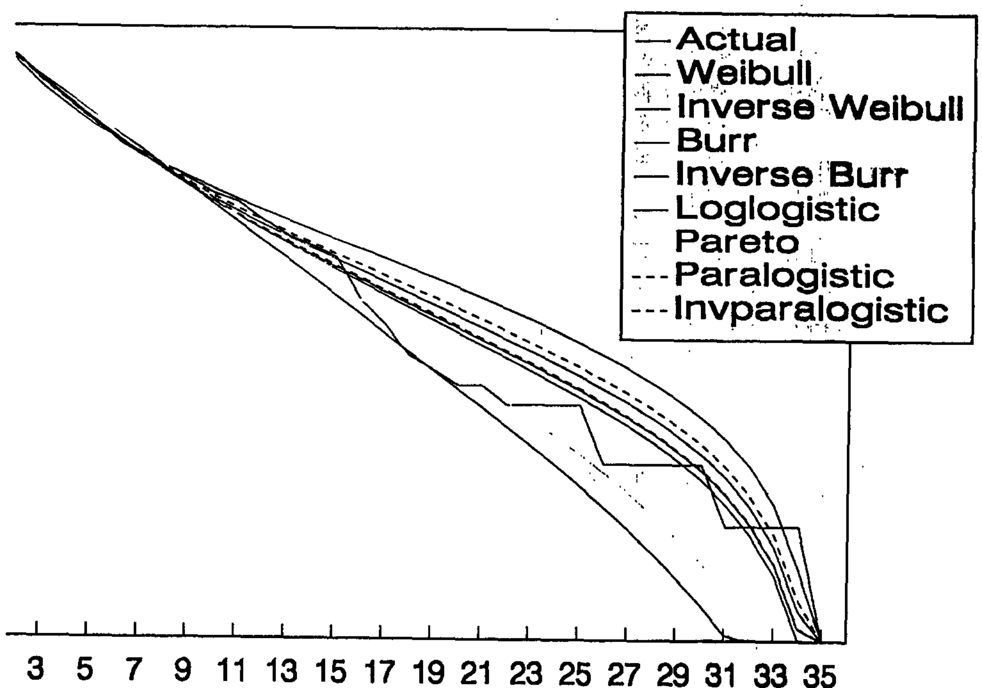
(# Claims Reported @ latest Evaluation)



Slide 8

Claims Reported @ Each Evaluation)/

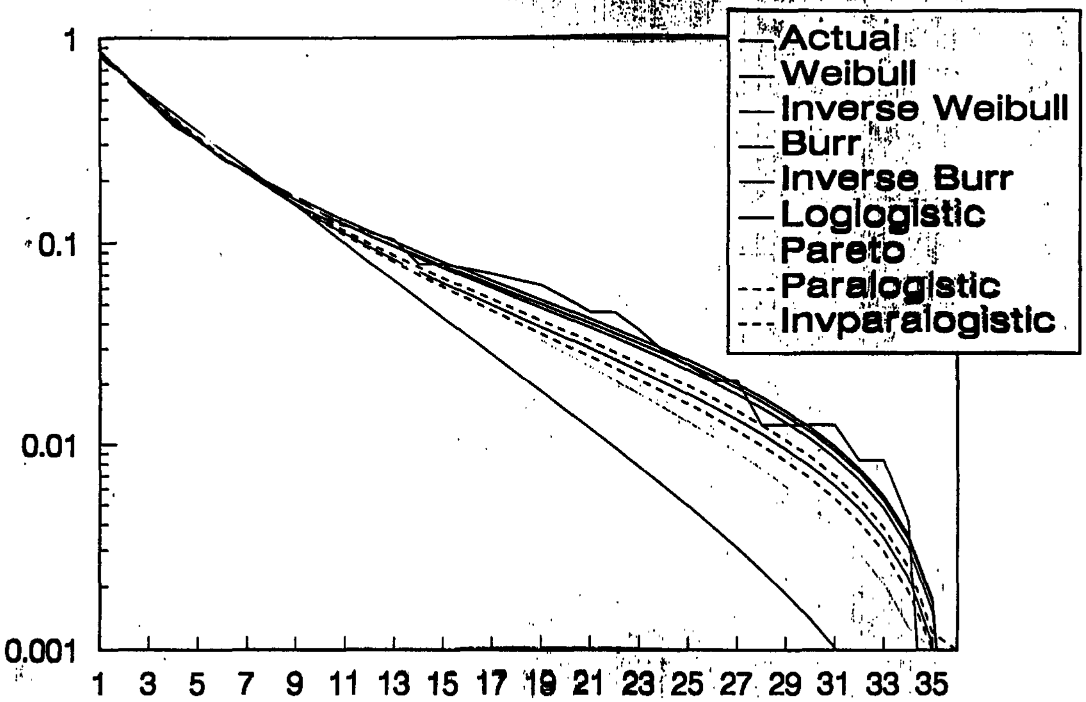
Claims Reported @ latest Evaluation)



Evaluation (Accident Year 1956)

Slide 9

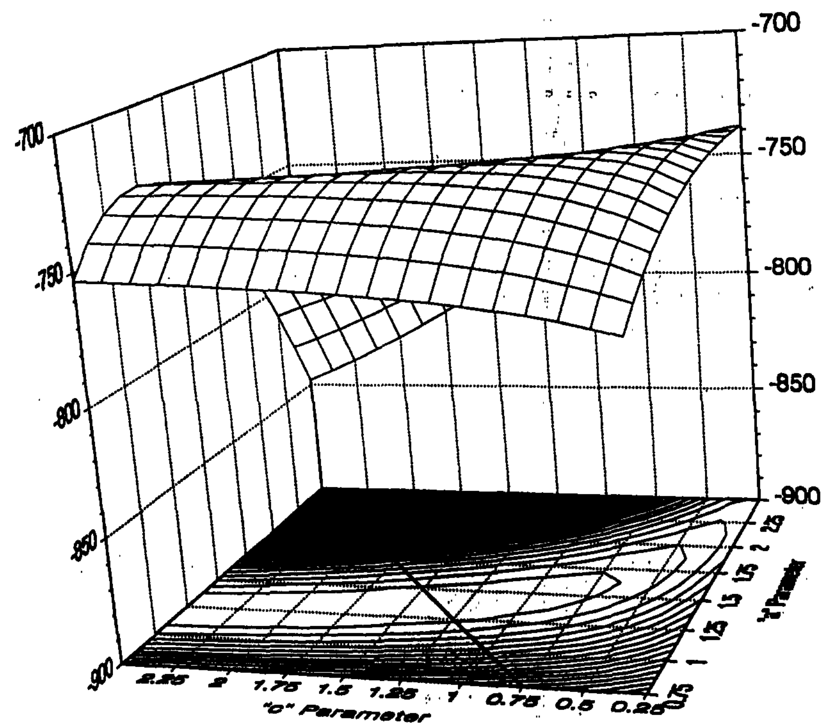
(# Claims Reported @ Each Evaluation)/
(# Claims Reported @ latest Evaluation)



Evaluation (Accident Year 1955)

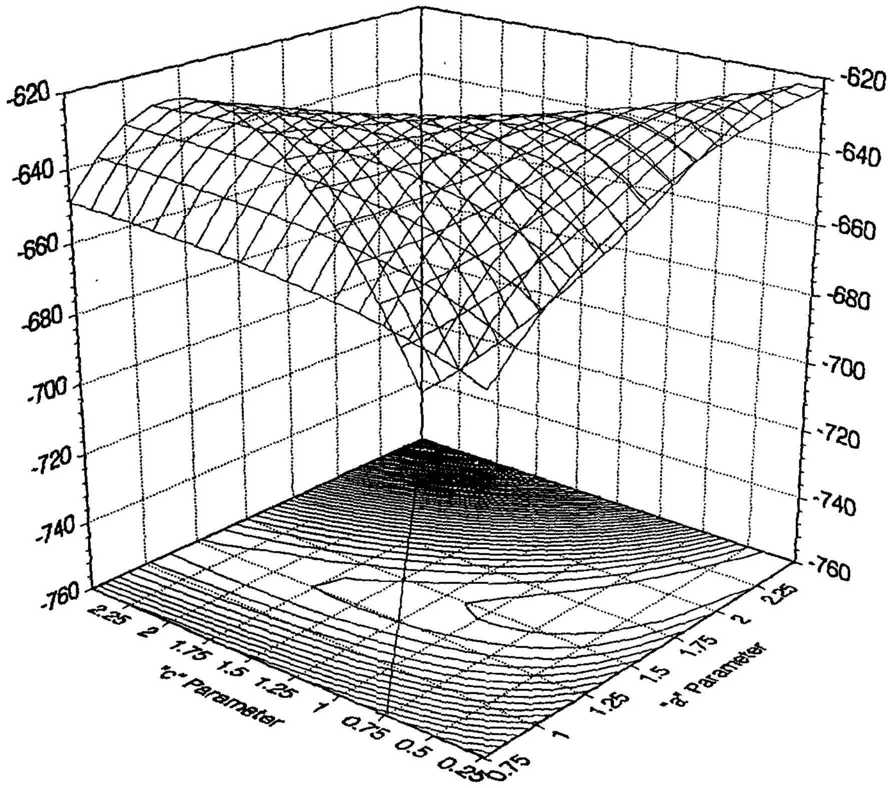
Slide 10

Accident Year 1956
Burr Loglikelihood



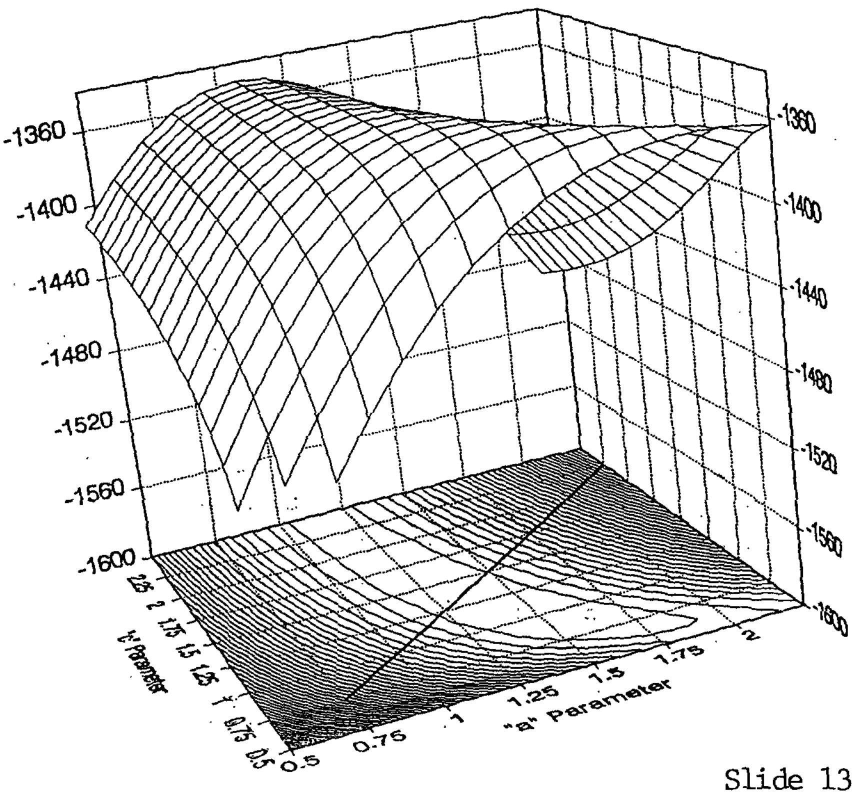
Slide 11

Accident Year 1955
Burr Loglikelihood



Slide 12

Accident Years 55-6
Inverse Burr Loglikelihood



Slide 13

ACCIDENT YEAR 1955 - BURR

	COMPUTED @ 6TH	COMPUTED @ 10TH	COMPUTED @ 15TH	COMPUTED @ 20TH	COMPUTED @ 25TH	COMPUTED @ 30TH	COMPUTED @ 36TH
F (36)	0.9955	0.9521	0.9635	0.9665	0.9429	0.9450	0.9424
A	0.1407	0.2861	0.2577	0.2498	0.3262	0.3192	0.3280
B	1.7871	1.9525	1.9196	1.9104	2.0373	2.0255	2.0405
C	1.2146	0.5284	0.55992	0.6214	0.4631	0.4740	0.4604

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ACCIDENT YEAR 1955 - INVPARALOGISTIC

	COMPUTED @ 5TH	COMPUTED @ 10TH	COMPUTED @ 15TH	COMPUTED @ 20TH	COMPUTED @ 25TH	COMPUTED @ 30TH	COMPUTED @ 36TH
F (36)	0.9833	0.9772	0.9774	0.9773	0.9730	0.9722	0.9708
A	2.6565	2.9928	2.9784	2.9769	3.1272	3.1509	3.1932
B	1.5298	1.4609	1.4628	1.4620	1.4164	1.4095	1.3960

Slide 15

Accident Year 1956 - Invparalogistic

	Computed @ 5th	Computed @ 10th	Computed @ 15th	Computed @ 20th	Computed @ 25th	Computed @ 30th	Computed @ 35th
F (35)	0.9151	0.9518	0.9513	0.9438	0.9550	0.9583	0.9593
A	5.2683	3.7950	3.8109	4.0625	3.7311	3.6375	3.6104
B	1.1737	1.2736	1.2713	1.2400	1.2930	1.3124	1.3185

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Accident Year 1956 - Burr

	Computed @ 10th	Computed @ 15th	Computed @ 20th	Computed @ 25th	Computed @ 30th	Computed @ 35th
F (35)	0.9954	0.9747	0.9656	0.9869	0.9911	0.9872
A	0.0360	0.1318	0.1996	0.0831	0.0656	0.0820
B	1.2760	1.3736	1.4311	1.2640	2.2245	1.2614
C	5.0391	1.2626	0.7820	2.0334	2.6112	2.0636

Slide 17

BAYESIAN CREDIBILITY
ESTIMATION OF IBNR

Dr. I. Robbin

REFERENCE

PCAS 1986
"A Bayesian Credibility Model of IBNR Counts"
Presentation here will be based on generalization in review by G. Venter

RANDOM VARIABLE MODEL

M COUNTS TO DATE
R IBNR COUNTS
N COUNTS AT ULTIMATE

PARAMETRIC STRUCTURE

* Assume M and R are parametrized random variables.

* Assume M and R are conditionally independent.

REPORTING PATTERN AND ULTIMATE COUNT

* Define parameters n,q, and v:

<u>Parameter</u>

n	Initial Expectation of Ultimate Counts
q	Initial Expected Percent IBNR Counts
v	Process Variance of Counts To Date

* Thus:

$E[N/n,q] = n$
$E[M/n,q] = n*(1-q)$
$E[R/n,q] = n*q$
$E[Var(M/n,q)] = v$

APRIORI EXPECTATIONS

* Assume n and q are independent.

* Then:

$E[M] = E[n]*E[1-q]$
$E[R] = E[n]*E[q]$
$E[N] = E[n]$

TRADITIONAL IBNR [illegible]

* Write in terms of n and q using LDF = (1/E[1-q])

PEGGED	RPEG	E[n]-M
LDF	RLDF	M * (LDF -1)
B-F	RBF	E[n] * (1 - (1/LDF))

PURE BAYESIAN REVISION

* Revise distribution of n & q given data to date via Bayes Theorem to get:

* g(n,q/M) = c * f(M/n,q) * g(n,q)
  where "c" is the normalizing constant, f(M).

* g(n,q/M) is often relatively difficult to work with.

BAYESIAN CREDIBILITY

* Best (least mean square error) linear approximation

RB = E[R] + (M-E[M])*Cov(M,R)/Var(M)

* Rewrite in terms of n, q, and v.
Group terms to get estimate as credibility-weighted sum of traditional estimates.

* First derive:

Cov(M,R) = V(n)*E[q]*E[1-q] - E[n*n]*V(1-q)

Var(M) = v + V(n)*E[1-q]*E[1-q] + E[n*n]*V(1-q)

BAYESIAN CREDIBILITY

RB = ZPEG*RPEG + ZLDF*RLDF + ZBF*RBF

where

ZPEG = (E[n*n]*Var(1-q))/Var(M)

ZLDF = (Var(n) * E[1-q] * E[1-q])/Var(M)

ZBF = v / Var(M)

OBSERVATIONS

* If the apriori estimates are believed with utmost faith, then the BF estimate will get all the weight.

* Increasing the process variance of M increases the credibility assigned to the BF estimate.

* Decreasing the parameter variance of the reporting pattern increases the credibility assigned to the LDF estimate.

* Decreasing the variance of the estimate of ultimate counts increases the credibility asigned to the Pegged estimate.

PRACTICAL APPLICATION

* Estimate parameter deviation in a priori estimates reflecting your subjective confidence in those estimates.

ULTIMATE: SD(ULT) = CULT * ULT
LDF : SD(LDF) = CLDF * (LDF-1.00)

* Estimate expected process deviation in counts to date reflecting your belief in data volatility even if true parameters were known.

SD(M) = C(1)*E[M] + C(2)*E[M]*E[M]

PRACTICAL OBSERVATIONS

* ZLDF tends to increase and ZPEG tends to decrease for later ages of development.
  REASON: The deviation of the percent of ultimate tends to decrease.

* Without a "C(2)" process deviation coefficient, ZBF tends to becomes small as the number of ultimate counts grows large.
  REASON: Both ZPEG and ZLDF include second order terms in "n".
  CAUTION: Using a relatively large "C(2)" can overemphasize ZBF.

BAYESIAN CREDIBILITY FORMULA ESTIMATION OF IBNR COUNTS

<u>Apriori Mean and Standard Deviation of Counts</u>

- Expected Claim Count Estimate 10,000
- Standard Deviation of Estimate 1,000

Evaluation	Expected Age-to-Ult LDF	Stn'd Dev of AU LDF	Expected Percent of Ult	Approx. Stn'd Dev of Pct of Ult	Expected Counts To Date	Process Variance of Counts To Date	Variance of Counts To Date
1−2	2.5000	0.0150	40.00%	0.24%	4,000.0	16,000	176,575
2−3	1.5000	0.0050	66.67%	0.22%	6,666.7	26,667	471,607
3−4	1.2000	0.0020	83.33%	0.14%	8,333.3	33,333	727,972
4−5	1.1000	0.0010	90.91%	0.08%	9,090.9	36,364	862,879

<u>Process Variance Coefficients</u>

- 1st Power Coefficient 4.00
- 2nd Power Coefficien 0.00

Evaluation	2nd Moment of "n" * Var(p)	V(n) * (Square of E[p])	Expected Process Variance of "M"	Credibility Pegged Method	Credibility LDF Method	Credibility B−F Method
1−2	575	160,000	16,000	0.0033	0.9061	0.0906
2−3	495	444,444	26,667	0.0011	0.9424	0.0565
3−4	194	694,444	33,333	0.0003	0.9539	0.0458
4−5	69	826,446	36,364	0.0001	0.9578	0.0421

BAYESIAN CREDIBILITY FORMULA ESTIMATION OF IBNR COUNTS

Apriori Mean and Standard Deviation of Counts

- Expected Claim Count Estimate 10,000
- Standard Deviation of Estimate 500

Evaluation	Expected Age−to−Ult LDF	Stn'd Dev of AU LDF	Expected Percent of Ult	Approx. Stn'd Dev of Pct of Ult	Expected Counts To Date	Process Variance of Counts To Date	Variance of Counts To Date
1−2	2.5000	0.0150	40.00%	0.24%	4,000.0	16,000	56,571
2−3	1.5000	0.0050	66.67%	0.22%	6,666.7	26,667	138,270
3−4	1.2000	0.0020	83.33%	0.14%	8,333.3	33,333	207,137
4−5	1.1000	0.0010	90.91%	0.08%	9,090.9	36,364	243,044

Process Variance Coefficients

- 1st Power Coefficient 4.00
- 2nd Power Coefficien 0.00

Evaluation	2nd Moment of "n" * Var(p)	V(n) * (Square of E[p])	Expected Process Variance of "M"	Credibility Pegged Method	Credibility LDF Method	Credibility B−F Method
1−2	571	40,000	16,000	0.0101	0.7071	0.2828
2−3	492	111,111	26,667	0.0036	0.8036	0.1929
3−4	193	173,611	33,333	0.0009	0.8381	0.1609
4−5	68	206,612	36,364	0.0003	0.8501	0.1496

1991 CASUALTY LOSS SEMINAR

5A-1/5A-2/6B: BASIC TECHNIQUES III

Faculty

Peter H. James
American Re-Insurance Company

Susan K. Woerner
Tillinghast/Towers Perrin

MS. WOERNER: Welcome to Basic Techniques III. This is Section 6B. You should have received handouts when you registered, but I think a number of you have indicated that you didn't. Unfortunately, it appears that we have only a few copies left.

It's a lot easier to follow if you have the handout. So those of you who don't have a handout, might want to look on with someone who does. Some of the exhibits are a little hard to read from here, but, hopefully, it will all work out.

My name is Susan Woerner, and I'm a consulting actuary with the Atlanta office of Tillinghast. My co-panelist today is Peter James. He is an actuary with American Re-Insurance in Princeton, New Jersey. Both Peter and I are members of the Casualty Actuarial Society as well as the American Academy of Actuaries.

What we're going to be talking about today involves four topics. I'll cover the first two topics, and Peter will cover the second two.

(Slide)

On Exhibit 1 you have the four topics that we're going to be discussing. We've been asked to request that you hold your questions until the end of both presentations.

The four topics that we're going to be talking about today are expected loss ratio techniques, tail factors, allocated loss adjustment expense (ALAE) reserves, and unallocated loss adjustment expense (ULAE) reserves.

(Slide)

Now let's take a look at Exhibit 2. We'll start with the expected loss ratio techniques. Basically there are two of them. The first one is the expected loss ratio method. This technique makes use of an estimated loss ratio, which we call the expected loss ratio. The expected loss ratio is equal to the anticipated ratio of incurred losses to earned premium. The key elements are the expected loss ratio and the earned premium.

The earned premiums are usually readily available from your accounting or financial area. The expected loss ratio may take a little more effort to get. That's usually what the actuary or the person in charge of the reserve analysis would be selecting.

One source for getting an expected loss ratio would be your pricing assumptions. Underlying any pricing analysis, you have a permissible or expected loss ratio. It's there whether you do your own rates or use a rating bureau. So that's one place you can start looking.

Another possible source for the loss ratio is the historical data, such as Schedule P. You may not be able to use your own Schedule P, but it is likely you can find some company somewhere that's written a line like the one you are reviewing, unless you're into something very, very exotic. In this later case, no one would dispute your selection anyway.

Another place you might want to check is various industry data sources, such as the Insurance Services Office (ISO) or the National Council of Compensation Insurance (NCCI). You can also find information in Best's Aggregates and Averages, etc. So if you have no information to go on, you can find something somewhere to use as a starting point.

(Slide)

Exhibit 3 shows part of a Schedule P. It's the private passenger auto liability. The columns that we are interested in occur in the third tier of this exhibit. They are columns 27, 28, and 29. If you go to Exhibit 4, you will see an enlarged version of this displaying some numbers for the hypothetical company.

In this example, we are trying to determine what ratio to use for our expected loss ratio. We can see that in columns 27, 28, and 29, loss ratios are displayed by accident year.

In reviewing these, we can see that they've calculated a three-year average and a five-year average. Since the three-year average is bigger than the five-year average, you may wish to assume that the loss ratios have been increasing over time. At least they have for the most recent four years, i.e. you can see an upward trend.

Now, if we were picking a loss ratio using this information, we probably would want to pick a loss ratio not much less than 100 percent on a direct basis and maybe 100 percent on a net basis. You might say, "Well, how do you know which you want to use?" The answer is, you want to use both. The analysis should be performed on both a gross (direct and assumed) basis as well as a net basis.

If you were doing a gross analysis, then you would use the information in column 27. You would use column 29 for net.

Now, let's look at how this method works. Let's assume we have picked an expected loss ratio on Exhibit 5. We can see that the method is really very simple and straightforward, and that's why a lot of people like to use it. It doesn't take a much effort. Your expected ultimate losses are determined by multiplying your expected loss ratio times your earned premium.

Once you have this, then all you need to do is subtract your paid losses to date, and you have your estimated total reserve. If you subtract your case reserves from the ultimates, you obtain the IBNR reserve. So this an extremely easy method to apply.

Let's look at a numerical example and see just how easy.

(Slide)

On the next exhibit, which is Exhibit 6, you can see we have a premium of 100,000. We have picked an expected loss ratio of 65. We have paid losses and case incurred of 10,000 and 13,000. The paid losses and the case incurred are known quantities as well as the earned premiums. So the only thing that we've had to select here is the expected loss ratio. So we take the .65 and multiply it times 100,000 to obtain $65,000 in expected losses or estimated ultimate losses. If we subtract the 10,000 in paid losses, we get a total reserve of 55,000. Then, if we subtract the case reserves of 13,000 from that, we get an IBNR reserve of 42,000. Now, the IBNR reserve is the reserve that the actuary is trying most frequently to estimate. The IBNR reserve is important to estimate because the case reserves are set by the claims department, and the actuaries are trying to estimate the part of the losses that are still out there to be reported, whether it's new claims or development on your known claims.

(Slide)

For this method, there are a couple of comments that you need to keep in mind, a couple of pitfalls associated with it. These are listed on Exhibit 7. You wouldn't want to use this method if you had any other information. If you had any other information, you really should be trying to incorporate it into your analysis.

This method is appropriate in situations where you have new lines of business, where your company is new, or where your existing lines of business have undergone significant changes. You would want to use this method whenever your past history is no longer valid, and you don't have anything else to rely on.

Another problem that can occur with this method is you can get an illogical result. Once you have applied your expected loss ratio method and have obtained your estimated ultimate losses for each accident year, you should always compare those to your actual paid losses. Estimated ultimate for that accident year should be at least as big as what you've already paid. That money is gone on the paid losses, and so your ultimates have to be at least that large. If they're not, you may need to pick a higher expected loss ratio.

Another test, when you're using this method, is to compare your incurred losses to date with the ultimate produced by this method. If you're incurred losses are already higher than our estimated ultimate, you might want to pick a higher expected loss ratio to produce a higher ultimate.

If you don't, you're saying that you have negative IBNR. This could happen if your case reserves were already so adequate that when they closed, not only would some of these cases cover any additional development on outstanding cases, but they would also cover any unknown cases (or IBNR) that was going to emerge. There can be situations like this. However, what you see happening, in most companies, is the case reserves developing adversely. So you want to make sure you've picked a reasonable expected loss ratio.

Now, the second method under the expected loss ratio techniques is called Reserves Based on Expected Loss Ratio and Case Incurred as shown on Exhibit 9. It's a long name. Actually, it often goes by another name. It sounds complicated, but it isn't. You will often hear with this method referred to as the Bornhuetter-Ferguson technique. The method was named after two gentlemen who developed the technique. It has become very widely used. I think you'll see why in just a minute. Now, for this method, we need two components. We need the expected loss ratio that we had in the previous method. Also, we need to know something about the reporting pattern. That is, we need cumulative loss development factors.

For a given accident year, this method multiplies the earned premium times the expected loss ratio to get estimated ultimate losses or expected losses. Then another factor is applied to the expected losses. This factor is the portion of losses that are unreported for that accident year at this point in time. It's called an IBNR factor.

Again, it represents the portion of the losses that are unreported as of the evaluation date for this reserve study. Once you have calculated your IBNR reserve by applying the IBNR factor to your ultimate losses, you can add those to your case reserve or to your case incurred. If you add the IBNR loss piece to your case incurred, you get the ultimate losses. If you add them to your case reserve, you get your total reserve.

Now, the way that this is applied is shown on Exhibit 9 and 10. So let's take a look. I think it will make more sense once you see an example with some real numbers.

(Slide)

First of all, you start with something that's probably very familiar to you. That's this loss development triangle using the incurred loss development.

We calculate age to age factors for each of these accidents years and each of the points in time, each of the intervals, and then we select our loss development factors just like you've done before. We get the cumulative factors by starting at the end of our selected factors and multiplying successively back.

Your IBNR factor is just (1-1/LDF). In this example, this number is 1 minus 1 divided by 1.219. The percentage that is reported at that point in time is just one divided by the LDF.

So if you subtract it from 1, you get the piece that's unreported. Together, it has to be 100 percent of your losses, i.e. your reported and your unreported pieces.

So you take the IBNR factors on Exhibit 10 and apply the method to the example for the Easy Insurance Company auto liability. In the columns here we have earned premium, which you've gotten from your financial area. Then we have the expected loss ratios by accident year. We multiply those, and we get our expected losses.

Now, if we were using just the expected loss ratio method, we would be finished. Column 3 would be our answer for the ultimate losses.

With this method, we take the total expected losses, and we apply the IBNR factor. In the case of 1990, we have an IBNR factor of .18 in Column 4. What that means is that 18 percent of the losses at 12 months are unreported.

So if I think my losses are going to be 23,000, I multiply the .18 times that, and I get an IBNR of 4,100 in column 5.

Next, I add that IBNR to the incurred to date, which is shown in 6. Using 1990 as an example, we would add 4,155 to 16,561 to get an estimated ultimate loss in column 7 of $20,716 million.

This is the number we use as the starting point to deduct our paids and our incurred losses to come up with our reserve estimates. You might think this is a roundabout way of doing things, but this method actually is quite useful. I can honestly say every time

I've done a reserve analysis in the last couple of years, I've used this technique.

This particular example that we have here shows incurred losses. You could do this same method with paids equally well. Instead of percent unreported, you would have percent unpaid, and it would just go through the process analogously substituting unpaid for unreported everywhere. Usually what I would do, or what I've seen done is you would use an incurred loss method and a paid method.

This technique is a way of incorporating what you actually know your losses have done at a certain point along with what you might expect them to do in the future.

You're trying to get a method that strikes a balance between the expected loss ratio method, which doesn't really pay any attention to what has actually happened, and your incurred loss development method, which stresses responsiveness.

If your incurred loss development patterns are atypical, you wouldn't want to give that method the full credibility and use it as the only method. So this is a way that you can balance these two methods.

(Slide)

Exhibit 11 is only trying to show what happens to the expected losses. For instance, in the first far left-hand side here, this is your expected. You don't know what's happened, but this is what you're expecting to happen. Now, if you use the expected loss ratio method, that's what you get as your ultimate loss.

You can see these bars are the same height. Now, in this example, we've assumed that your incurred losses are actually two times the expected losses. The incurred loss development method really responds and projects a fairly high ultimate. This would be an example for just one accident year.

The method that we've just talked about, the one that uses the expected loss ratio method and your incurred losses to date to estimate the ultimate loss, always will produce an ultimate that falls between your incurred loss development and your expected loss ratio method.

If you have a line of insurance that's very volatile like some of your professional liability lines or product liability you might want to use this method to avoid volatile estimates. The point is you do not want to rely only on one method.

Now, you might be wondering where would you get the percentages reported and unreported. What if you don't have any data that you can put in a nice triangular form like we did on the one exhibit and develop the IBNR factors? You can use industry data. You can get reporting patterns. There are a number of sources, some of the same sources that mentioned at the beginning - the ISO, the NCCI, the Re-Insurance Association of America (RAA). You can get reporting patterns for various lines of business on an industry-wide basis. So you really can use this method even if you don't have anything at all to go on except you're incurred losses as of the date that you're performing your reserve evaluation. That's all you really need to know. If you're lucky enough to have a lot of data, then you can develop your own factors.

Let's talk for a minute about some of the assumptions that go into this method. They are displayed on Exhibit 12.

(Slide)

We have assumptions and corresponding problems. The assumptions are that the premiums are an accurate measure of exposure. As we know, they often are not. There can be inconsistency in the pricing. A good example is what has happened in the soft market. A couple of years ago, you may have been writing a risk for $1 million, and now you're writing that same risk for $800,000 or even less. The exposure you had two years ago is still the same exposure you have today. Now you are receiving less money for insuring it.

So your premiums can be down. You have to consider this and judgmentally adjust your loss selection accordingly. If some adjustment is not made, you could easily underproject your estimated ultimate losses.

Another assumption is that the expected loss ratio is predictable. If it were, we wouldn't be here today.

We know it isn't, and we know that the example we have used here is a very well-behaved situation. For instance, you might have a loss ratio of 75 one year, 120 the next year, and 30 the next year. It could be very unstable especially on lines like general liability. That would not be unusual, and that would be why you might want to rely on industry data when you're picking your loss ratios (and make sure you know what is in that data) because you just may not have the kind of stability from your own Schedule P to make any kind of reasonable selection.

The other assumption that this method makes is that there's a constant reporting pattern. I think we know that reporting patterns change for a number of reasons over time. For instance, you can introduce a new claims system. That can easily change the reporting pattern. Also, changing the claims personnel or the reserving philosophy can impact the reporting patterns.

(Slide)

On Exhibit 13, we have additional comments about this method. We have some advantages and disadvantages listed. As I mentioned earlier, and as that little graph was intended to illustrate, this particular method is intended to be a compromise between the loss development method and the expected loss ratio method.

So when you're using it, an easy way of checking your result for reasonability is to be certain it produces an estimate falling between the other two. If it doesn't, something has gone wrong.

Another advantage is it avoids an overreaction. For instance, let's say you had been relying on the incurred development technique, and you had a change in your incurred patterns. It would be very easy for you to get in a situation where you over-projected or under-projected your ultimate losses because you've reacted to a blip in the data.

So what this does is it allows you to balance between the two methods and not give all of the weight to the incurred development technique, but it also says I'm not going to ignore my incurred losses either. It's also a method that's very, very suitable for new business. It's extremely useful there, because you really don't have anything to go on.

The other big advantage for this method is it's very easy to use. In fact, it's so easy that sometimes you might be tempted to use it when you probably should be using something else. One thing it does is to assume that case development is unrelated to reported losses. In other words, it's not using your incurred development. It's not reflecting that. All it's doing is reflecting your incurred losses at the evaluation date.

Another disadvantage is the uncertainty of the projected ultimate loss ratio. Again, you're using that expected loss ratio and you don't know how accurate it is.

This method ignores the incurred loss development to date. It really doesn't ignore the incurred losses, because it uses those and adds them to the IBNR.

The final item is it relies on the accuracy of earned premium. Now, this isn't a big disadvantage at all, because one of the easiest things for most insurance companies to figure out is the earned premiums. So that's not a very serious defect.

To summarize here, we've talked about the expected loss ratio techniques. There are two of them. One is the expected loss ratio method. That's where you just pick an expected loss ratio and apply it to earned premiums. It gives you ultimate losses, and you stop there. Then you use that ultimate loss number to get your IBNR and your total reserve.

The other method is this method that I mentioned was known as the Bornhuetter-Ferguson method. This method bases the reserves on both the expected loss ratio as well as the incurred losses to date and tries to strike a balance between those two methods. It is a way of balancing stability and responsiveness. This method is used very frequently, and it's a good method to use with the long tail lines. In fact, I would use it any time I'm doing a reserve analysis just as another technique in order to get a range of estimates.

The next topic that I'm going to be talking about addresses tail factors.

(Slide)

This topic starts on Exhibit 14. Now, tail factors really represent the amount of development expected from the last data point to ultimate. So what is it? It's just a development factor. It's the last development factor. It's at the very end.

A lot of times, we have a limited amount of data, and we assume nothing else is going to happen at points beyond our data. We don't know the history, so we'll assume there isn't any more development. The point of this section is to show you that this assumption is really not a very good idea. Let's take a look at the next exhibit, and I think you'll start to see why you don't want to ignore what might be going on beyond your last development point.

(Slide)

On Exhibit 15, this is, again, the Easy Insurance Company, and the line is auto liability. We could have made it even more dramatic if we had used something like professional liability or product liability; however, it's still dramatic even with a line that's well behaved.

First of all, let's look at what is happening. Here, we have our loss development. In this case, it's incurred loss development. We have it through 84 months, and what we've done is to take our normal incurred loss development technique and projected the losses to ultimate based on the selected factors. So all of the estimated ultimates in this column represent our final estimates of what we think these ultimate losses are going to be for these years. Now, this ultimate is 102,910. Now, the indicated total reserve is the 102,910 less the paid to date. This gives us 102,910 minus 75,094 which equals 27,816. So, we get 27,816 as the indicated total reserve.

To get the indicated IBNR we take the ultimate and subtract the incurred to date. We get an indicated IBNR of about 4,827.

Now, let's assume we have a situation where we have one percent development beyond 84 months. That's all, just one percent. What is one percent of this total? Well, one percent of the total would be 1,029. So if we had one percent development beyond 84 months, our estimated ultimate losses would increase by 1,029. This same 1,029 would increase our total reserve also. That's a 4 percent increase on reserves. But look what happens on the IBNR. The IBNR increases 21 percent. So it doesn't take a lot to throw off the IBNR estimate. Tail factors of 5 percent and certainly 1 percent are not uncommon. In fact, tail factors bigger than 5 percent are not uncommon beyond 84 months.

So if you had the situation where you should have had a tail factor of 5 percent (that would be a factor of 1.05), you would have five times this amount or a little over 5,000. You would have missed your IBNR by over 100 percent, which is a sizeable error.

To illustrate, I was telling the first session about a company where they didn't ignore the tail factors. They changed their assumptions, and their reserve estimate changed nearly a billion dollars. Even for a big company, that's a lot of money. I don't believe any of us would like to present that result to his CEO.

So, tail factors can have a very significant impact on a company's line if they are ignored or reflected inappropriately. Let's take a look at what we can do to estimate them so that we don't miss the mark.

(Slide)

On Exhibit 16, we have four methods listed. We can use external data. We can use an incurred to paid ratio. We can repeat the latest development, or we can use the half rule method.

Let's talk about each of these just briefly.

If we use external data, some of the data sources would be the same ones we've talked about already, for instance, industry Schedule P data. You could find the Schedule P for a company that wrote business very similar to what you were writing and use that.

You could use information from the Re-Insurance Association of America, the RAA. They do loss development studies, and those can be obtained rather easily. Also you have ISO and the NCCI. They also have data available.

So there are a number of places that you can get some idea of what is happening beyond a given point in your data.

(Slide)

Let's look at Exhibit 18. This is the incurred to paid ratio method. Now, this method needs two items. You need to know your incurred and paid losses. In this example let's say we have our incurred losses at 84 months, and those losses are $10,292 and our paid losses at 84 months are $9,759.

If we divide the paid into the incurred, we get a factor of 1.055. This would be the tail factor that we would use for our paid development method, not the incurred, but the paid development. What assumptions are we making here? We're assuming that those incurred losses are at an ultimate basis; in other words, they aren't going to develop anymore.

If you think they are, well, maybe before you apply this method, you should increase them before calculating your factor. Basically, you're assuming the incurreds are ultimate. How much further are my paids going to have to develop to get there? Then you apply that factor as the last factor in your paid loss development technique.

Again, it's important to note that this technique is only good for getting a tail factor for the paid loss development method.

(Slide)

Now, the next exhibit shows what's called the Half Rule Method, which is a mechanical way of getting a tail factor. The factors taper off nicely and approach no development or flat development.

Next we look at the method displayed on Exhibit 20. Let's say you have picked a factor of 1.037. What you would do with that is you would take the .037 (which is the percentage of additional development that occurred between 72 and 84 months) and divide it by two, and then you take that number and divide it by two, etc.

Then you take that number and divide it by two, and you get the .0046. You divide that by two, and you get the .0023. You keep on going until you come out to a number that's about zero. That is when you round it to four decimal places, you get zero.

Each of these is added to one and multiplied together. The number that you get from doing this is 1.041. You use this as the tail factor.

Now, you might notice that the tail factor can be bigger than your last development factor, and certainly it can be. Depending on where you cut off your development, you could always make your tail factor bigger than your last development almost. Because the sooner you cut your data off, the bigger the required tail factor. So don't feel like if you get a bigger factor, it's wrong. It can happen.

In fact, again, with the long tail lines, if you don't have very much history, you will see a very large development factor. As an example, in workers' comp, it isn't unusual, if you're only working with ten or twelve years of data, to have a paid tail factor over 1.2 or 1.5. It can easily be that big, depending on the kind of business you're writing.

Now, the last method is probably one of the easiest of all, and it's just called Use the Last Development. So you've gone through your paid and incurred development methods, and you've picked factors. Your factor selection for the 72 to 84 month development stage for your paid is 1.037, and for your incurred was 1.001.

So the factor that you would pick for the tail in each of these cases would be for the paid 1.037; just take the last one and repeat it, and for the incurred 1.001. Again, this is a fairly simple way of getting at it.

In each of the cases, it's important to test the tail factors for reasonableness. So you say, "Well, how do you do that?" One way that you can do it is get some industry data and see how your tail factor compares. If it's very different, then maybe you better take another look at what you're using. The important point here is you don't want to ignore the tail factor, because it can have a very significant impact on your final result.

Now, I am going to turn the session over to Peter, who is going to be talking to you about loss adjustment expense reserving.

MR. JAMES: Okay. You've heard about loss reserves, and now we're going to talk about loss adjustment expense reserves. Before we get into the exhibits and the specifics, I'd like to make sure we are all in agreement about what we're talking about.

Two things I want to discuss about loss adjustment expense reserves are, one, what exactly are loss adjustment expenses? They're defined to be expenses associated with the settlement and adjustment of claims.

Now, you'll see that there are two general categories -- everybody has probably heard of them all -- allocated loss adjustment expenses and unallocated loss judgment expenses. They have different characteristics, and we'll use different reserving techniques for each of them, and we'll get into the definition.

The second thing I want to do is just go over a few concepts about loss adjustment expenses. First, they tend to vary by line of business or by type of claim. Property lines of business will have a small amount of loss adjustment expense normally just having to do with evaluating the amount of loss.

You get into a liability bodily injury line of business, and you're going to have larger loss adjustment expense. It varies by line. You can have legal expense. The claim will go on for a longer period of time, and you'll end up with a higher loss adjustment expense.

Then you get into a line of business like products liability where the loss adjustment expense can be a very large portion of the loss. Many claims you'll see the loss adjustment expense exceeds the loss, or maybe you'll have a loss adjustment expense without a loss, because, keep in mind that a portion of the product, so to speak, of a liability insurance contract is the duty to defend the insured. So can you have loss adjustment expense without having any loss.

Another characteristic is that loss adjustment expenses tend to vary with the losses. That makes sense. You get a loss, you have loss adjustment expense associated with it. So the techniques we're going to look at, for the most part, will use that relationship of loss adjustment expense to loss in order to predict loss adjustment expense.

As I said, there are two basic categories: allocated and unallocated loss adjustment expense. The allocated loss adjustment expense has a definition right here. It says, "Expenses that are incurred with and are assigned to an individual claim." For allocated, you will normally find it coded up for a claim. You'll have a claim number associated with it. You can analyze it on a claim-by-claim basis.

It makes it nice to assign it to a reserving category. You can say, "These belong to property, these belong to workers' comp," and analyze it separately.

(Slide)

Here are some examples of allocated loss adjustment expenses. Everybody can read, but what you'll see here, basically, is that a lot of these items are expenses incurred by parties outside of the insurance company: police reports, engineers' evaluations. An interesting one here is expert witness fees.

These can be assigned to a particular claim because you pay someone to work on a particular claim. Now that we know a little something about loss adjustment expense, let's go on with allocated loss adjustment expense reserving methods.

We're going to talk about two methods here today. One is called Paid ALAE Development, and that method is just like paid loss development. It's just like incurred loss development. You create a history, a triangle of historical paid ALAE. You calculate development factors. You project to ultimate, and you subtract whatever you've got to date; that's one method.

The second method is Cumulative Paid ALAE to Cumulative Paid Losses, and that is what is commonly refer to as Paid-to-Paid method. That method, the paid-to-paid method, makes better use of the relationship of loss adjustment expense to loss not only for a particular line of business but over time. It's a little more complex.

In either case, you're going to have to use your judgment in order to apply the technique properly. So even though, for example, the Paid ALAE Development method is just like paid loss development, the judgments you use to test for reasonableness are going to be different from paid losses, because they're just a different animal we're talking about here.

Let's get into the development method.

(Slide)

Here's the basic work sheet, and I'm assuming that the work sheet that you see here is familiar to you. It's just like you saw in incurred or paid loss development.

The first triangle is your historical data. For example, the $71,000 represent $71,000 paid ALAE for accident year 1984 as of 12/84, and then the 166,000, going to the right, is the cumulative paid ALAE for accident year 1984 as of the end of 1985.

So you generate your triangle just like a loss triangle. The second triangle is your development factors. 2.338 is simply 166 divided by 71. You create that triangle. Down below are different averages. It's nice to have several averages to select from, and different people use different selections. Hopefully, you'll come up with the right one.

I'm going to point out two things on this exhibit, just to bring them to your attention. One is the large development factor way out here, way out at 72 to 84 months. That might be bigger than your paid loss development factor, but that shouldn't surprise you for a couple of reasons, one of which is that loss adjustment expense often lags behind loss.

Remember, these are billings quite often. Maybe you need to pay the bills on legal expenses that you owe, or even get the lawyers to get those bills in, in fact. Another thing is that loss adjustment expense tends to increase with the age of the claim. Those are older claims, and the development is going to continue on it. So don't be surprised by large development factors out in the tail.

The second thing I'm going to point out is that you do need to come up with a full triangle, a tail factor, and, in this example, we've chosen to just select the previous factor as our tail factor. So you'll need a tail factor for this method also.

Here are the results of our selections, and the method is really very straightforward. You've seen it before. You take your actual paid ALAE to date in column 1, multiply it by your selected development factor -- now this is a cumulative development factor -- and you end up with column 3, your estimated ultimate ALAE. Subtract column 1, the paid to date, and you get your ALAE reserve. It's really very straightforward.

It would not be wise to enter into any method without knowing the advantages or disadvantages of it. So let's discuss those and make some observations about them.

First of all, the Paid ALAE Development method has the advantage of being similar to Paid Loss method. It's easy. It's straightforward. People will be familiar with it. It's easy to explain to other people.

Secondly, it may work well for older accident years, and the reason we've got "older accident years" in that statement is that as you get farther and farther into the development on the triangle, it will become more predictable; whereas, in the earlier development periods, the reporting and payment pattern of expenses can be pretty volatile, just as losses can, but even more so with expenses. You've got smaller numbers.

It's easy for one individual claim to distort the triangle. So it is pointed out to work particularly well for older accident years, once the pattern has become more stable.

Disadvantages: First, it ignores the relationship to losses. There is a relationship between ALAE and loss activity; for example, age of claim. The older a claim is, when it's settled, the more likely to have higher loss adjustment expense. When you look at history, you'll find that to be true.

Secondly, you've got changing expense practices over time. A company that I worked with literally made

a change in who was going to be providing the legal services, whether it's in-house or from outside attorneys. That will be seen in a relationship to losses, and this method doesn't take use of that.
The second disadvantage is that it's heavily influenced by amount of highly volatile initial payments. That somewhat speaks to over here where the advantage is it works for older accident years, but a disadvantage is that individual payments will distort the method, and that's most likely to occur early in the development period. You would have to adjust your data for allocated expense just like you would anything else.

Let's go on to the second method.

(Slide)

Here's the raw data. This is the Cumulative Paid ALAE to Cumulative Paid Loss method, and that's what I'm going to refer to as the Paid-to-Paid method. Your raw data begins with your cumulative paid ALAE. This is exactly the data we used in the Paid ALAE Development method, but now we bring in loss information. Here is a triangle that you would use if you were performing the Paid Loss method for reserving losses.

The third triangle is simply the ratio, the paid-to-paid ratio of paid ALAE to paid loss; for example, you divide 71,000 by 3361, and you'll end up with .021. There's your paid-to-paid ratio.

(Slide)

On to Exhibit 27, the top triangle here, we just brought forward the paid-to-paid ratios from the other page.

A couple of things that you're going to notice in that triangle is that the paid-to-paid ratios increase over time. Now, that's not just the way it happened in this example. That's the way it will work out.

That happens because, as your losses develop, the older losses will generally require more allocated loss adjustment expenses than the losses reported in the first year; therefore, the ratio is going to climb over time. The paid-to-paid ratio will climb over time. That's why this technique works. It allows you to recognize, to actually see the allocated expense increase over time as a proportion of loss.

So that also points to a suggestion that I have, when you're looking at allocated loss adjustment expense as a ratio to loss. If it's a recent accident year, don't be fooled into thinking that that is going to be your -- or that that is your paid-to-paid ratio. It's going to develop. You've got to follow through and see where it goes at ultimate.

The rest down here, these are simply development factors. Well, that is not labeled very well, is it? Those are not cumulative paid losses. Those are development factors. It really is nothing more than you divide the .0277 by the .0211, and you get your 1.312. There is a consistent pattern here.

QUESTION: So those should be labeled ALAE Development?

MR. JAMES: Or maybe Paid-to-Paid Ratio Development. So the point here is that there is a timing relationship between losses and loss adjustment expenses, and you can see that when you read across the triangle, plus they're consistent by accident year.

Here we have all our averages. We want to select factors. When it comes to selecting these factors, I suggest that you get to know the claims department and what's going on there. You need to apply judgment in selecting factors in all techniques, and this is no exception. Find out what they're doing with allocated loss adjustment expense.

For example, it could be some sort of mix in the business, a little more first-party coverage as opposed to third-party. Hopefully, you've got it segmented properly. Maybe it's the use of independent adjusters. Maybe they know that they're behind in billings, that they have got a lot of bills outstanding that they're going to pay next year, but you need to find out what's happening in the claims department.

Now we move on to the results.

(Slide)

Here is the calculation of ALAE reserve, and I'd like to point out that there are really two steps, as I see it, in this calculation. The first step is in columns 1, 2, and 3.

You take your paid-to-paid ratio to date, multiply by your development factor, your cumulative development factor, and you get a developed paid-to-paid ratio. That's your expectation for the ultimate paid-to-paid ratio for that line of business.

That's, really, just like the development techniques that we've done with losses. At this stage, when you've got column 3, I strongly suggest you look at them and scrutinize them for reasonableness.

Is it acceptable that your paid-to-paid ratios will fall? Especially in the last year, you've seen it drop off quite a bit. What's the reason for that? Ask questions. Go to the claims department. Try to find out if there is some individual claim activity that's causing this, but test them for reasonableness, and, in the end, you may want, especially in the most recent years, to select a paid-to-paid ratio that seems more appropriate than this method has given you. You always need to apply judgment.

The second part of the calculation is in columns 4, 5, 6, and 7. Now that you've gotten your ultimate paid-to-paid ratio in column 3, you apply it to your ultimate losses of column 4, and you get your ultimate ALAE in column 5. Subtract the paid ALAE to date and get your reserve. So, again, you project to ultimate, subtract the paid to date, and you have your reserve.

Again, we'll talk about the advantages and disadvantages of this method. Advantages: a very strong advantage, is that it recognizes the relationship of ALAE to losses not only by line of business or type of claim, such as property versus liability, but over time.

As claims are reported, the later reported claims are often larger and have a higher proportion of loss adjustment expense to loss. This method measures it, quantifies it, and allows you to reflect that in your estimate.

Second, it's a straightforward and predictable methodology. It's an accepted standard. It works. It has certain characteristics that are nice to use. Third, it provides a tool for monitoring a relationship of ALAE to losses. That's valuable information to people, whether it's your claims department or the people in your product development.

The result of reserve analysis is partly a liability and partly information to feed back to the insurance operation people. This gives some excellent statistics to provide.

Disadvantages: The over - or underestimation of losses is reflected in your ALAE estimate. Because you rely on losses, it only makes sense that having relied upon the losses to set your reserve, you're going to be influenced by that. If you have over-projected losses, you apply your paid-to-paid ratio, and you will over-project ALAE. The same thing can happen in the converse.

Secondly, it's more complex than the paid ALAE Development method, and I'd say that that's normally just a practical consideration in putting together the analysis and also in explaining it to other people.

Now on to ULAE.

(Slide)

We'll start with a definition. "ULAE is expenses incurred in connection with settling claims which are not readily assignable to specific claims." That may sound vague, but when you see the examples, it becomes more clear.

Salaries of claim staff, rent, and utilities apportion to the claims function; pencils and papers. This is really not a typical actuarial projection, because what we're speaking about here is the claims department budget.

One point I want to make is that the accounting for allocated or unallocated expense varies from company to company. There are some standard definitions, but there can be some judgment in there. You need to find out from the claims department and from the accounting department what they're budgeting, where the expenses go. You need to know what they call allocated or unallocated loss adjustment expenses. You need to learn that from both the claims department and the accounting department.

Going on with the technique, what we're going to look at is, the standard technique for setting ULAE reserves, and it is characterized by the basic assumption called the 50/50 Rule. We assume that 50 percent of ULAE is paid when the claim is opened, and 50 percent is paid when the claim is closed.

Now, that seems like kind of a broad assumption, but if you think about the payment of rent and salary over time, when you average out to a 50/50 rule, it works out okay. So it's a generally accepted assumption. Some people get quite sophisticated in this, but this is a rule of thumb that's accepted, and, for that reason, if no other, is a good one to use.

So how do we apply it?

(Slide)

Here's out it works. First, you've got to get your paid-to-paid ratios. We're going to use paid-to-paid ratios, as we did with the allocated. We're going to do it a little differently now. It is generally accepted with unallocated reserves to use calendar year paid-to-paid ratios.

Again, it's important to look at it by line of business, if possible. Perhaps your claims department does surveys as to how much time each adjuster spends on property as opposed to casualty and so on and so forth. If not, you need to find out how it's allocated to line of business. If it's not allocated to a specific line of business, you may have no benefit in going into a complex analysis by line of business.

You take a three-year average of paid-to-paid ratios, then you apply these paid-to-paid ratios to two sets of losses. You apply 50 percent of that ratio to known case loss reserves. You only want 50 percent because, by our assumption, the other 50 percent was already paid when the claim was opened and initially adjusted.

Finally, you apply 100 percent of the ratio to IBNR reserves. It hasn't been reported. Nothing has been done yet on that claim, so you apply 100 percent of the ratio.

Sometimes you can just go straightforward. You would get your information from the accounting department. Get your paid unallocated expense for three years, divide by the paid loss and just run through the model. But typically, you're going to have to apply your judgment, and here's why:

First of all, you may see steadily increasing or decreasing factors. These are paid-to-paid ratios now. You may see increasing or decreasing factors. You need to find out why. You may have changes in expense allocation procedures, one line of business to another, one company to another. You need to find out what that's all about. Finally, you can have a change in claims handling policy regarding the use of independent adjusters.

I've been in a specific example where the company attempted to reduce expenses by using in-house adjusters. That altered not only the allocated but the unallocated paid-to-paid ratios. It's very important, in this method more than any other, at least I have found this, that you get in touch and you get to know the claims department management. "What are you budgeting? What do you see is going to be your staffing levels for next year?"

When you see increasing and decreasing factors, something may happen which seems unintuitive but is a practical consideration. You may find that your projection of losses is going up. You've just done a reserve analysis. You increase your projected losses, and yet your paid-to-paid ratios may be going down. That may seem contrary to your intuition, but really, what tends to happen, in practical day-to-day, is that whereas the loss activity is going up, budget restraints may not allow for additional staff.

So the losses are going up. You've got a constant staff. Your rent may be going up an inflation amount or something, but the paid-to-paid ratios, are going to come down. So keep that in mind. It is a real thing that takes place.

(Slide)

On to a numerical example, very straightforward. Column 1 is your paid ULAE provided to you by the accounting department, normally. Column 2 is your paid losses. Now these, keep in mind, are by calendar year. It's not the same data we used for developing accident year loss reserves. You take the ratio year-by year.

In this case, we've taken the total paid-to-paid ratio, and maybe you would just go ahead and apply that ratio, but I would observe that they are increasing over time. I would end up finding out why they were increasing over time and whether I expected that to continue in the future. I'd find out something about the budget for the next year or so, where the claims department manager sees his expenses going, and pick the appropriate factor.

You may want to perform this separately by line of business, or maybe you have subsidiary companies, but you may not benefit from that except for allocation purposes. You may have to split it back out.

Let's see where this ends up.

(Slide)

Here's a numerical example. We picked a paid-to-paid ratio of 7.84 percent, just for numerical purposes, and it's convenient to take half that ratio up front, because we're going to use it in the technique. Then you just apply a simple formula.

You take half of the paid-to-paid ratio and apply it to known losses. You take the full paid-to-paid ratio and apply it to your IBNR loss reserves, and you end up with a total reserve.

Now, the way I said that, it may have been a little confusing. You apply these ratios to unpaid losses, to loss reserves. You multiply the paid-to-paid ratio times your unpaid losses, and you get your expense reserve. So this method calculates the reserve directly, as opposed to projecting ultimate and subtracting to date.

Finishing up, I have some final comments, observations and situations I've been confronted with. The first is that loss adjustment expense reserves are all too often overlooked. Some companies include it with loss, some do not.

Companies that do not include it with loss often forget to recognize that your ultimate expenses are a very significant portion of your profitability, and claims expenses can be a big piece, especially in liability lines. So you need to know where those expenses are. Are they in the losses? Are they in another category? You can't allow yourself to overlook. You've got to ask the questions; where are the expenses?

Secondly, the accounting for loss adjustment expense varies from company to company. So, again, you need to ask. It would be a bad situation to have a reserve increase, and when someone asks you why the reserves increased, your answer would be, "Well, last time I forgot to make a provision for loss adjustment expense." Don't get yourself in that situation. Ask where they are and make a provision for them.

The third thing that I would comment on is that you may want to allocated loss adjustment expense in with loss, when you're developing your loss reserve. That's a common technique that is used. There, you may be developing a triangle of loss and loss adjustment expense, and at some point you would split it out and allocate it to a line of business. That's an acceptable technique.

Well, that's it for loss adjustment expense. Now we'll open it up for any questions that anyone has on what we went over today. Any questions?

QUESTION: I was just curious. How do you pick the different tail methodologies that you would use for the different reserve techniques? For example, the Bornhuetter-Ferguson incurred method.

MS. WOERNER: Well, with that method, you don't really need a tail factor, because you've assumed it in your development factors, when you're picking your age to ultimate.

The question was, how to you pick a tail factor methodology to use with a reserving technique? And for the Bornhuetter-Ferguson method, you don't need to worry about picking tail factors, because you're using your loss development factors including a tail factor.

Where you need to worry about tail factors would be on your paid loss development technique and your incurred loss development technique. How would you pick them? Well, you would do a number of methods and pick a result that looked to be within a reasonable range. You really would not want to rely on just one method.

MR. JAMES: Well, that's what I have for loss adjustment expense. I guess we'll open it up to any questions you might have. Hope you've remembered them.

QUESTION: Can the expected loss ratio vary by year?

MS. WOERNER: Yes.

QUESTION: The question is on Exhibit 10, column (2). What would be a reason why the expected loss ratios might vary by accident year.

MS. WOERNER: One reason would be, differences in rate adequacy by year. For example, you filed a proposal with the insurance department for a rate increase, but it was denied. An increasing loss trend with no rate relief could cause your expected loss ratio to increase over the prior year.

Conversely, if you had received a large rate increase, you would expect your loss ratio to go down in the subsequent year. Those are two examples of when you might want to have different loss ratios. Also, for competitive reasons, you might not even seek indicated rate increases. So you would expect to see deterioration in your expected loss ratios over time.

QUESTION: (Inaudible)

MS. WOERNER: The question was on the tail factor technique called the half rule method. Wouldn't it be better to apply some distribution for the tail as opposed to this mechanical process? The answer is sometimes. It often is better to do that. This is another technique for selecting the tail that can be used. I've seen the lognormal distribution as well as the Pareto distributed used to model loss development in the tail.

It depends on what you think your loss distribution is going to look like. If you think you're going to have a lot of development out there in the tail, you would pick a distribution that had a "thick" tail. For instance you might select a Pareto distribution. You want to be careful with the assumptions you make on the tail because it can have a huge impact. Remember the tail factor gets multiplied back through the previous development factors.

Any other questions? Yes.

QUESTION: I have a general question on ULE. How come (Inaudible)?

MR. JAMES: Okay. Now these are future expenses for claims known and unknown as of the accounting date, so it does match with that accounting standard. That's an important point. It's for future expenses on known and unknown losses incurred for that accident year. So it is appropriate and you do need to make a provision on that. In my judgement, there are not expenses being reserved or some liability put up in the accounting department other than our actuarial unallocated loss adjustment expense reserve. I don't know if anybody has any examples of the contrary.

QUESTION: (Inaudible)

MR. JAMES: Right. I think people have gotten much more in tune with unallocated reserves as they've done in all reserves. But it would be tragic to have a situation where that wasn't accounted for. How would you like to go back and say reserves are increasing due to unallocated loss adjustment expense reserves? Well, what were they before? Well, I ignored them. I forgot them.

Okay. There was another question in the back?

QUESTION: (Not at microphone) Everything I've seen here, I haven't seen any adjustments for investment income. Where do you take that into account?

MR. JAMES: Go ahead.

MS. WOERNER: Before considering investment income, you need to know what the reserves are prior to the discount. Once you have the undiscounted reserves, you can take payment patterns and an interest rate to derive discount factors. These would be applied by each accident year (or report year) separately.

Exhibit 1

BASIC TECHNIQUES III

I. Expected Loss Ratio Techniques

II. Tail Factors

III. Allocated Loss Adjustment Expenses

IV. Unallocated Loss Adjustment Expenses

Exhibit 2

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

EXPECTED LOSS RATIO (ELR)

The anticipated ratio of incurred losses to earned premiums.

Sources:

(1) Pricing assumptions.

(2) Historical data such as Schedule P.

(3) Industry data.

SCHEDULE P - PART 1B - PRIVATE PASSENGER AUTO LIABILITY/MEDICAL

(000 omitted)

1 Years in Which Premiums Were Earned and Losses Were Incurred	Premiums Earned			Loss and Loss Expense Payments							12 Number of Claims Reported – Direct and Assumed
				Loss Payments		Allocated Loss Expense Payments					
	2 Direct and Assumed	3 Ceded	4 Net (2 – 3)	5 Direct and Assumed	6 Ceded	7 Direct and Assumed	8 Ceded	9 Salvage and Subrogation Received	10 Unallocated Loss Expense Payments	11 Total Net Paid (5 – 6 + 7 – 8 + 10)	
1. Prior	XXXX	XXXX	XXXX								XXXX
2. 1981											
3. 1982											
4. 1983											
5. 1984											
6. 1985											
7. 1986											
8. 1987											
9. 1988											
10. 1989											
11. 1990											
12. Totals	XXXX	XXXX	XXXX								XXXX

Note: For "prior," report amounts paid or received in current year only.
Report cumulative amounts paid or received for specific years. Report loss payments net of salvage and subrogation received.

Years in Which Premiums Were Earned and Losses Were Incurred	Losses Unpaid				Allocated Loss Expenses Unpaid				21 Unallocated Loss Expenses Unpaid	22 Total Net Losses and Expenses Unpaid	23 Number of Claims Outstanding – Direct and Assumed
	Case Basis		Bulk + IBNR		Case Basis		Bulk + IBNR				
	13 Direct and Assumed	14 Ceded	15 Direct and Assumed	16 Ceded	17 Direct and Assumed	18 Ceded	19 Direct and Assumed	20 Ceded			
1. Prior											
2. 1981											
3. 1982											
4. 1983											
5. 1984											
6. 1985											
7. 1986											
8. 1987											
9. 1988											
10. 1989											
11. 1990											
12. Totals											

Years in Which Premiums Were Earned and Losses Were Incurred	Total Losses and Loss Expenses Incurred			Loss and Loss Expense Percentage (Incurred/Premiums Earned)			Discount for Time Value of Money		32 Inter-Company Pooling Participation Percentage	Net Balance Sheet Reserves After Discount	
	24 Direct and Assumed	25 Ceded	26 Net *	27 Direct and Assumed	28 Ceded	29 Net	30 Loss	31 Loss Expense		33 Losses Unpaid	34 Loss Expenses Unpaid
1. Prior	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX			XXXX		
2. 1981											
3. 1982											
4. 1983											
5. 1984											
6. 1985											
7. 1986											
8. 1987											
9. 1988											
10. 1989											
11. 1990											
12. Totals	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX			XXXX		

*Net = (24 – 25) = (11 + 22)

Exhibit 4

BASIC TECHNIQUES III

EXPECTED LOSS RATIO TECHNIQUES

Example of ELR from Schedule P

EZ INSURANCE COMPANY AUTO LIABILITY

Schedule P - Part 1B - Private Passenger Auto Liability/Medical

Years in Which Premiums Were Earned and Losses Were Incurred		Loss and Loss Expense Percentage (Incurred/Premium Earned)		
		27 Direct and Assumed	28 Ceded	29 Net
1	Prior	XXXX	XXXX	XXXX
2	1981	78.3	135.4	77.8
3	1982	84.8	153.1	84.2
4	1983	86.7	99.7	86.6
5	1984	87.2	167.8	86.5
6	1985	96.3	160.8	95.7
7	1986	98.1	157.3	97.5
8	1987	90.9	129.7	90.4
9	1988	94.4	106.2	94.2
10	1989	98.8	106.5	98.7
11	1990	100.2	117.7	99.9
12	Totals	XXXX	XXXX	XXXX
	3 year average	97.8	110.1	97.6
	5 year average	96.5	123.5	96.1

Exhibit 5

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

Estimating Reserves Based on ELR

Earned Premium x ELR = Expected Ultimate Losses

Ultimate Losses - Paid Losses = Total Reserve

Total Reserve - Case Reserve = IBNR Reserve

Exhibit 6

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

Estimating Reserves Based on ELR

Example:

Earned Premium = $100,000

Expected Loss Ratio = .65
Paid Losses = $10,000
Case Reserves = $13,000

Total
Reserve = ($100,000 x .65) – $10,000
= $65,000 – $10,000
= $55,000

IBNR
Reserve = $55,000 – $13,000
= $42,000

Exhibit 7

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

Estimating Reserves Based on ELR

(1) Use only when you have no history such as:

- New product lines.
- Radical changes in product lines.

(2) Can generate "negative" reserves if Ultimate Losses < Paid Losses.

Exhibit 8

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

Reserves Based on ELR and Case Incurred

$$\left(\text{Earned Premium} \times \text{ELR}\right) \times \left(1 - \frac{1}{\text{LDF}^*}\right) = \text{IBNR Reserve}$$

$$\text{Case Incrd} + \text{IBNR Reserve} = \text{Ultimate Losses}$$

$$\text{Case Reserve} + \text{IBNR Reserve} = \text{Total Reserve}$$

*LDF is the cumulative Loss Development Factor based on incurred losses.

The factor in parentheses is just the percent of losses unreported.

Exhibit 9

BASIC TECHNIQUES III

Expected Loss Ratio Techniques
Reserves Based on ELR and Case Incurred

EZ INSURANCE COMPANY AUTO LIABILITY
CUMULATIVE INCURRED LOSSES

ACCIDENT YEAR	........DEVELOPMENT STAGE IN MONTHS........ 12	24	36	48	60	72	84
1984	8,382	9,781	10,110	10,219	10,268	10,280	10,292
1985	9,337	10,847	11,092	11,192	11,235	11,250	
1986	10,540	12,205	12,551	12,690	12,725		
1987	11,875	13,832	14,238	14,413			
1988	13,343	15,542	16,066				
1989	14,469	16,776					
1990	16,561						

	..........INCURRED LOSS DEVELOPMENT FACTORS.......... 12-24	24-36	36-48	48-60	60-72	72-84
1984	1.167	1.034	1.011	1.005	1.001	1.001
1985	1.162	1.023	1.009	1.004	1.001	
1986	1.158	1.028	1.011	1.003		
1987	1.165	1.029	1.012			
1988	1.165	1.034				
1989	1.159					
1990						
SELECTED LDF'S	1.163	1.030	1.011	1.004	1.001	1.001
CUMULATIVE LDF'S	1.219	1.048	1.017	1.006	1.002	1.001
IBNR FACTOR $= 1 - \frac{1}{LDF}$	0.180	0.046	0.017	0.006	0.002	0.001

Exhibit 10

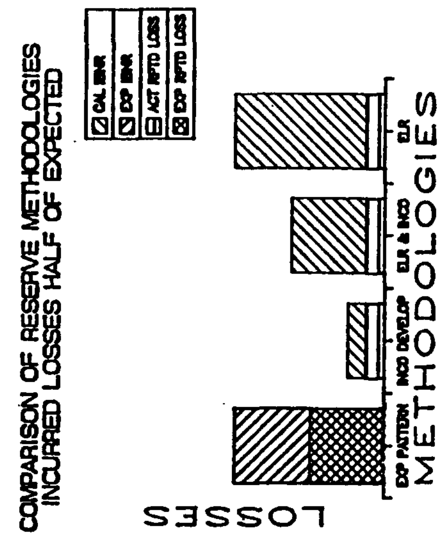
BASIC TECHNIQUES III

Expected Loss Ratio Techniques
Reserves Based on ELR and Case Incurred

EZ INSURANCE COMPANY AUTO LIABILITY

	(1)	(2)	(3) =(1)x(2)	(4)	(5) =(3)x(4)	(6)	(7) =(5)+(6)
ACCIDENT YEAR	EARNED PREMIUM	EXPECTED LOSS RATIO	EXPECTED LOSSES	IBNR FACTOR	IBNR	CUMULATIVE INCURRED LOSSES	ULTIMATE LOSSES
1984	$17,153	0.60	$10,292	0.000	$0	$10,292	$10,292
1985	18,168	0.60	10,901	0.001	11	11,250	11,261
1986	21,995	0.60	13,197	0.002	26	12,725	12,751
1987	24,173	0.60	14,504	0.006	87	14,413	14,500
1988	25,534	0.60	15,320	0.017	260	16,066	16,326
1989	31,341	0.60	18,805	0.046	865	16,776	17,641
1990	38,469	0.60	23,081	0.180	4,155	16,561	20,716
					1,250		

Exhibit 11



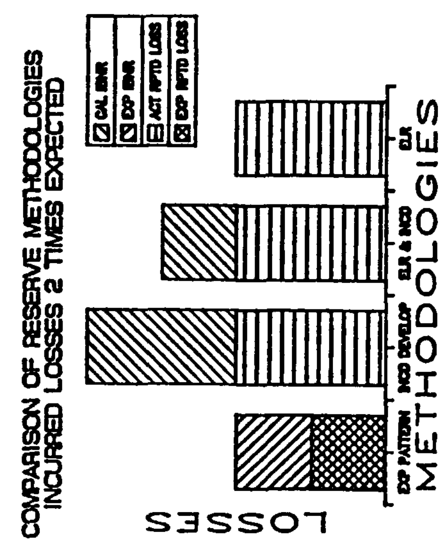


Exhibit 12

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

Reserves Based on ELR and Case Incurred

ASSUMPTIONS	SAMPLE PROBLEMS
. PREMIUMS ACCURATE MEASURE OF EXPOSURE	. PRICING INCONSISTENCY
. EXPECTED LOSS RATIO PREDICTABLE	. INSTABILITY IN ACCIDENT YEAR LOSS RATIOS
. CONSTANT REPORTING PATTERN	. INTRODUCTION OF AUTOMATED CLAIM SYSTEM
	. BACKLOG IN PROCESSING

Exhibit 13

BASIC TECHNIQUES III

Expected Loss Ratio Techniques

Reserves Based on ELR and Case Incurred

ADVANTAGES	DISADVANTAGES
. COMPROMISES BETWEEN LOSS DEVELOPMENT AND EXPECTED LOSS RATIO METHODS	. ASSUMES THAT CASE DEVELOPMENT IS UNRELATED TO REPORTED LOSSES
. AVOIDS OVERREACTION TO UNEXPECTED INCURRED LOSSES TO DATE	. UNCERTAINTY OF PROJECTED ULTIMATE LR
. SUITABLE FOR NEW OR VOLATILE LINE OF BUSINESS	. IGNORES LOSSES INCURRED TO DATE
. CAN BE USED WITH NO INTERNAL LOSS HISTORY	. RELIES ON ACCURACY OF EP
. EASY TO USE	

Exhibit 14

BASIC TECHNIQUES III

TAIL FACTOR METHODS

TAIL FACTOR

The amount of development expected from the last data point to ultimate.

Exhibit 15

BASIC TECHNIQUES III

Impact of Tail Factors

EZ INSURANCE COMPANY AUTO LIABILITY

	Estimated Ultimate Losses Based on Incurred Development Through 84 Months
1984	$10,292
1985	11,261
1986	12,750
1987	14,499
1988	16,339
1989	17,581
1990	20,188

	$102,910

<u>Indicated Total Reserve</u>

= Ultimate − Paid to Date
= $102,910 − $75,094
= $27,816

<u>Indicated IBNR</u>

= Ultimate − Incurred to Date
= $102,910 − $98,083
= $4,827

EVERY 1% DEVELOPMENT BEYOND 84 MONTHS

INCREASES Ultimate Losses by $1,029 or 1%.

INCREASES Total Reserve by $1,029 or 4%.

INCREASES IBNR by $1,029 or 21%.

BASIC TECHNIQUES III

Basic Tail Factor Methods

1. EXTERNAL DATA
2. INCURRED TO PAID RATIO.
3. REPEAT LATEST DEVELOPMENT.
4. HALF–RULE METHOD.

BASIC TECHNIQUES III

Tail Factor Methods

External Data

- INDUSTRY SCHEDULE P DATA
- SIMILAR COMPANY'S DATA
- REINSURANCE ASSOCIATION OF AMERICA LOSS DEVELOPMENT STUDY
- ISO OR NCCI DATA

Exhibit 18

BASIC TECHNIQUES III

Tail Factor Methods

Incurred to Paid Ratio

EZ INSURANCE CO. AUTO LIABILITY

INCURRED LOSS AT 84 MONTHS	$10,292
PAID LOSS AT 84 MONTHS	$ 9,759

TAIL FACTOR FROM 84 MONTHS TO ULTIMATE

$= \text{INCURRED} \div \text{PAID}$

$= 10{,}292 \div 9{,}759$

$= 1.055$

USE ONLY IF CONFIDENT THAT INCURRED LOSSES ARE FULLY DEVELOPED.

APPLY ONLY TO PAID LOSS DEVELOPMENT.

Exhibit 19

BASIC TECHNIQUES III

Tail Factor Methods

Half Rule Method

EZ INSURANCE CO. AUTO LIABILITY

PAID LDF FOR 72-84 MONTHS = 1.037

$$\frac{1}{2} \times .0370 = .019$$

$$\frac{1}{2} \times .0185 = .010$$

$$\frac{1}{2} \times .0093 = .005$$

$$\frac{1}{2} \times .0046 = .003$$

$$\frac{1}{2} \times .0023 = .002$$

$$\frac{1}{2} \times .0012 = .001$$

Tail Factor from 84 months to ultimate

$= 1.019 \times 1.010 \times 1.005 \times 1.003 \times 1.002 \times 1.001$

$= 1.041$

Test to verify if tail factor is sufficient.

Exhibit 20

BASIC TECHNIQUES III

Tail Factor Methods

Repeat Latest Development

EZ INSURANCE CO. AUTO LIABILITY

Age to Age Development Factors

	12-24	24-36	36-48	48-6	60-72	72-84
Avg. Paid LDF	1.796	1.233	1.131	1.083	1.054	1.037
Avg. Incrd LDF	1.163	1.030	1.011	1.004	1.001	1.001

84 Months to Ultimate

Paid Loss Tail Factor = 1.037
Incurred Loss Tail Factor = 1.001

Test to verify if tail factor is sufficient.

Exhibit 21

BASIC TECHNIQUES III

ALAE RESERVING METHODS

ALLOCATED LOSS ADJUSTMENT EXPENSE (ALAE)

Expenses that are incurred with and are assigned to an individual claim.

Examples:

- Cost of police reports.
- Attorney's fees.
- Engineer's evaluation.
- Expert witness fees.
- Adjuster fees.
- Appraiser fees.

Exhibit 22

BASIC TECHNIQUES III

ALAE RESERVING METHODS

1. PAID ALAE DEVELOPMENT.
2. CUMULATIVE PAID ALAE TO CUMULATIVE PAID LOSSES.

Exhibit 23

BASIC TECHNIQUES III

ALAE Reserving Methods
Cumulative Paid ALAE
(dollars in thousands)

EZ INSURANCE COMPANY AUTO LIABILITY

Accident Year	...............Development Stage in Months.................						
	12	24	36	48	60	72	84
1984	$71	$166	$286	$416	$527	$611	$677
1985	83	189	313	458	584	672	
1986	93	213	361	523	657		
1987	103	226	394	581			
1988	108	245	437				
1989	128	280					
1990	132						

accident year	............Paid ALAE Development Factors.........						
	12-24	24-36	36-48	48-60	60-72	72-84	
1984	2.338	1.723	1.455	1.267	1.159	1.108	
1985	2.277	1.656	1.463	1.275	1.151		
1986	2.290	1.695	1.449	1.256			
1987	2.194	1.743	1.475				
1988	2.269	1.784					
1989	2.188						
1990							
AVERAGING METHODS:							
average	2.259	1.720	1.460	1.266	1.155	1.108	
4 point average	2.235	1.719	1.460	-	-	-	
avg w/o high/low	2.258	1.720	1.459	-	-	-	
time wght avg	2.238	1.734	1.46258	1.264281	1.154	-	
volume wght avg	2.251	1.724	1.461	1.266	1.155	1.108	
SELECTED LDF'S	2.251	1.724	1.461	1.266	1.155	1.108	1.108
CUMULATIVE LDF'S	10.175	4.520	2.622	1.795	1.418	1.228	1.108

Exhibit 24

BASIC TECHNIQUES III

ALAE Reserving Methods

ALAE Reserves Based on Paid ALAE Development

EZ INSURANCE COMPANY AUTO LIABILITY

	(1)	(2)	(3)=(1)x(2)	(4)=(3)-(1)
ACCIDENT YEAR	ALAE PAID to DATE	SELECTED FACTOR	ESTIMATED ULTIMATE	UNPAID ALAE
1984	$677	1.108	$750	$73
1985	672	1.228	825	153
1986	657	1.418	932	275
1987	581	1.795	1,043	462
1988	437	2.622	1,146	709
1989	280	4.520	1,266	986
1990	132	10.175	1,343	1,211
TOTAL	$3,436		$7,305	$3,869

Exhibit 25

BASIC TECHNIQUES III

ALAE Reserving Methods

ALAE Reserves Based on Paid ALAE Development

Advantages	Disadvantages
Similar to paid losses; easy & straight forward.	Ignores relationship to losses.
May work well for older AY's.	Heavily influenced by amount of highly volatile initial payments.

Exhibit 26

BASIC TECHNIQUES III

ALAE Reserving Methods
Cumulative Paid ALAE to Cumulative Paid Losses
(dollars in thousands)

EZ INSURANCE COMPANY AUTO LIABILITY

Accident Year	....CUMULATIVE PAID ALAE.... 12	24	36	48	60	72	84
1984	$71	$166	$286	$416	$527	$611	$677
1985	83	189	313	458	584	672	
1986	93	213	361	523	657		
1987	103	226	394	581			
1988	108	245	437				
1989	128	280					
1990	132						

Accident Year	....CUMULATIVE PAID LOSSES.... 12	24	36	48	60	72	84
1984	3,361	5,991	7,341	8,259	8,916	9,408	9,759
1985	3,780	6,671	8,156	9,205	9,990	10,508	
1986	4,212	7,541	9,351	10,639	11,536		
1987	4,901	8,864	10,987	12,458			
1988	5,708	10,268	12,699				
1989	6,093	11,172					
1990	6,962						

Accident Year	......CUMULATIVE PAID ALAE to CUMULATIVE PAID LOSSES....... 12	24	36	48	60	72	84
1984	0.021	0.028	0.039	0.050	0.059	0.065	0.069
1985	0.022	0.028	0.038	0.050	0.058	0.064	
1986	0.022	0.028	0.039	0.049	0.057		
1987	0.021	0.025	0.036	0.047			
1988	0.019	0.024	0.034				
1989	0.021	0.025					
1990	0.019						

Exhibit 27

BASIC TECHNIQUES III

ALAE Reserving Methods
Cumulative Paid ALAE to Cumulative Paid Losses
(dollars in thousands)

EZ INSURANCE COMPANY AUTO LIABILITY

Accident Year	......CUMULATIVE PAID ALAE to CUMULATIVE PAID LOSSES....... 12	24	36	48	60	72	84
1984	0.0211	0.0277	0.0390	0.0504	0.0591	0.0649	0.0694
1985	0.0220	0.0283	0.0384	0.0498	0.0585	0.0640	
1986	0.0221	0.0282	0.0386	0.0492	0.0570		
1987	0.0210	0.0255	0.0359	0.0466			
1988	0.0189	0.0239	0.0344				
1989	0.0210	0.0251					
1990	0.0190						

Accident Year	....CUMULATIVE PAID LOSSES.... 12-24	24-36	36-48	48-60	60-72	72-84	
1984	1.312	1.406	1.293	1.173	1.099	1.068	
1985	1.290	1.355	1.297	1.175	1.094		
1986	1.279	1.367	1.273	1.159			
1987	1.213	1.406	1.301				
1988	1.261	1.442					
1989	1.193						
1990							
AVERAGING METHODS:							
average	1.2581	1.3952	1.2908	1.1690	1.0964	1.0682	
4 point average	1.2366	1.3925	1.2908	-	-	-	
avg w/o high/low	1.2609	1.3931	1.2947	-	-	-	
time wght avg	1.2403	1.4035	1.2908	1.1665	1.0956	-	
volume wght avg	1.2585	1.3934	1.2906	1.1690	1.0964	1.0682	
SELECTED LDF'S	1.2366	1.3925	1.2908	1.1690	1.0964	1.0682	1.0682
CUMULATIVE LDF'S	3.2508	2.6288	1.8878	1.4625	1.2511	1.1411	1.0682

Exhibit 28

BASIC TECHNIQUES III

ALAE Reserving Methods

ALAE Reserves Based on Paid ALAE Development

EZ INSURANCE COMPANY AUTO LIABILITY

	(1)	(2)	(3) =(1)x(2)	(4)	(5) =(3)x(4)	(6)	(7) =(5)-(6)
ACCDNT YEAR	RATIO to DATE	DEV'L FACTOR	DEVELOPED PAID/PAID RATIO	ULTIMATE LOSSES	ULTIMATE ALAE	PAID ALAE to DATE	INDICATED ALAE RESERVES
1984	0.0694	1.0682	0.0741	$10,292	$763	$677	$86
1985	0.0640	1.1411	0.0730	11,261	822	672	150
1986	0.0570	1.2511	0.0713	12,750	908	657	251
1987	0.0466	1.4625	0.0682	14,499	989	581	408
1988	0.0344	1.8878	0.0650	16,339	1,061	437	624
1989	0.0251	2.6288	0.0659	17,581	1,158	280	878
1990	0.0190	3.2508	0.0616	20,188	1,244	132	1,112
TOTAL				$102,910	$6,946	$3,436	$3,510

Exhibit 29

BASIC TECHNIQUES III

ALAE Reserving Methods

Cumulative Paid ALAE to Cumulative Paid Losses

ADVANTAGES

- RECOGNIZES RELATIONSHIP OF ALAE TO LOSSES.
- STRAIGHTFORWARD METHODOLOGY PREDICTABLE.
- PROVIDES TOOL FOR MONITORING RELATIONSHIP OF ALAE TO LOSSES.

DISADVANTAGES

- OVER OR UNDER ESTIMATION OF LOSSES REFLECTED IN ALAE ESTIMATES.
- MORE COMPLEX THAN PAID ALAE DEVELOPMENT.

Exhibit 30

BASIC TECHNIQUES III

ULAE Reserving

UNALLOCATED LOSS ADJUSTMENT EXPENSE (ULAE)

Expenses incurred in connection with settling claims which are not readily assignable to specific claims.

Examples:

Salaries of claims staff.

Rent and utilities apportioned to claims function.

Exhibit 31

BASIC TECHNIQUES III

ULAE Reserving

THE "50/50" RULE

Assumes 50% of ULAE is paid when the claim is opened, and 50% is paid when the claim is closed.

Exhibit 32

BASIC TECHNIQUES III

ULAE Reserving

THE "50/50" RULE

1. 3 year average of the ratio of calendar year paid ULAE to paid losses.
2. 50% of the ratio applied to known case loss reserves.
3. 100% of the ratio applied to IBNR reserves.

Exhibit 33

BASIC TECHNIQUES III

ULAE Reserving

Considerations in Applying "50/50" Rule

Average over 3 years may not produce appropriate factor. May need to judgmentally select factor based on:

- Steadily increasing or decreasing factors.
- Changes in expense allocation procedures.
- Changes in claims handling policy regarding use of independent adjusters.

Exhibit 34

BASIC TECHNIQUES III

ULAE Reserving

Example of "50/50" Rule

EZ INSURANCE COMPANY AUTO LIABILITY

Calendar Year	(1) Paid ULAE	(2) Paid Losses	(3)=(1)/(2) Ratio
1988	$1,038	$14,107	0.0736
1989	1,244	15,906	0.0782
1990	1,459	17,709	0.0824
Total	$3,741	$47,722	0.0784

Exhibit 35

BASIC TECHNIQUES III

ULAE Reserving

Example of "50/50" Rule

Ratio of ULAE Paid to Paid Losses	.0784
50% of Ratio	.0392
Known Case Loss Reserves	$22,989
IBNR Reserve	$ 5,296

ULAE Reserve
= (.0392 x 22,989) + (.0784 x $5,296)
= $901 + $415
= $1,316

Note: Dollars in thousands.

1991 CASUALTY LOSS RESERVE SEMINAR

5B: RESERVING ISSUES FOR WORKERS' COMPENSATION

<u>**Moderator**</u>

James M. Foote
The Travelers Insurance Companies

<u>**Panel**</u>

Roy K. Morell
Liberty Mutual Insurance Company

Ronald C. Retterath
National Counsel of Compensation Insurance

MR. FOOTE: This is 5B, Reserving Issues for Workers' Compensation. There are plenty of seats. Come right in. If you could hit the lights. We're going to dim the lights a little bit to give you a better view of the slides.

My name is Jim Foote. I'm the moderator for this session and also one of the panelist. I'm joined this morning by two distinguished colleagues, Roy Morell and Ron Retterath. And I'll introduce them as their sections come up.

The format for the session will be a presentation by each of the panelists followed by a question section. And let me remind you, as in all the other sessions, this is a recorded session. In the question series at the end, if you would just step up to the microphone, state your name and your question and we'll get it all down for posterity.

We've got a lot of workers' compensation knowledge and information for you this morning. I'm sure you'll find this session very informative. Just as sort of a brief reminder, the opinions stated by the panelists here are their own not necessarily those of their employers or sponsors of the seminar.

A little bit about my background. I'm a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries. My education includes Master's Degrees from the University of California in Mathematics and from Rutgers University in Statistics. I'm presently Workers' Compensation Actuary for The Travelers Insurance Companies. My previous experience includes several years in both consulting and working for another large insurer.

I'm going to start off with some general information on the workers' compensation industry and the results of such. The total industry data on the next few slides is taken from Bests' Aggregates and Averages.

(JMF 2)

We'll start by looking at written premium growth over the past ten years. This experience does not include state fund data, which in several states represents a significant amount of the workers' compensation premium. In this slide you can see that from 1981 through 1984 there was essentially no growth in the workers' compensation industry written premium. From 1985 through 1990 however we have a period of very steady growth with the 1990 premium at 31 billion dollars for the industry. During this time, workers' compensation premium, in terms of the volume of all lines data, went from just under 12% in 1985 to over 14% in 1990.

(JMF 3)

This slide shows the results for the workers' compensation in the form of combined ratios. It is pretty clear that the period of no premium growth in the early '80s led to deteriorating results as the increasing combined ratios in subsequent years on this slide illustrate. Premium growth in recent years has just barely kept pace with the growth in loss costs and we seem to be stuck at a combined ratio right around the 118% area. We do have a slight improvement in 1990 where it has dropped down to 117.4%.

The rapid increase in the cost of workers' compensation and the continued unprofitability of this line has led to a crisis mentality in many states and with many insurers.

In addition, some notable insolvencies of major workers' compensation insurers, namely the American Mutual and most recently Texas Employers Insurance Association, have added fuel to the fire. States have reacted and continue to react with major reform legislation aimed at cutting costs. Individual insurers have reacted with their own loss reduction measures and it is highly likely that all this activity has resulted in significant changes in the emergence patterns of loss and loss adjustment expense for workers' compensation experience and will continue to do so in the future.

(JMF 4)

To put things in a little different perspective, let's look at the size of the industry reserves. This shows a steady growth in industry loss and loss adjustment expense reserves for workers' compensation from around 31 billion in 1984 to 62.6 billion in 1990. Reserves have been growing at about 6 billion dollars per year for the last five years. I anticipate that we'll probably see an even bigger growth in 1991, since earlier this year we had a one and a half billion dollar addition to the National Assigned Risk Pool Reserves. There will also be an assessment of approximately 420 million dollars in 1991 to adequately fund the Texas workers' compensation insurance facility loss reserves. These two items alone add close to six points to the industry's combined ratio in 1991.

The reserve specialists in workers' compensation must be aware of the many critical issues, both internal and external which may impact their analysis. We only have time to look at a few of those issues this morning and I'm going to start with looking at one particular state, which has had some significant activity, that's Texas. Last year I did a presentation at the Loss Reserve Seminar on the history of the Texas workers' compensation assigned risk pool and now let's take a look at an update on the overall results of the pool.

(JMF 5)

You can see the rapid growth, both in written premium and in market share, accompanied by the rapid growth in underwriting losses. All this has led to a good deal of political activity during 1989 to reform the workers' compensation system in Texas. As a result of that activity in December of 1989, Senate Bill One passed, which became effective January 1, 1991 for most components of that bill. There are some key provisions in that law, which are likely to cause some noticeable changes in loss and loss adjustment expense patterns in Texas.

(JMF 6)

The Texas Workers' Compensation Commission was created to replace the old Industrial Accident Board. This new commission has much broader responsibilities and a more structured method of dispute resolution than the old board and is considerably bigger in the number of people involved. The American Medical Association guidelines for impairment were adopted. The trial de novo system was eliminated. Significant increases in benefit levels, including a 3% escalation rate on permanent disabilities, were adopted. Under the old system, an injured worker was entitled to a hearing on his claim. If he wasn't satisfied with the outcome, he was entitled to request a jury trial to try to increase his benefits. And the trial de novo system meant that the findings of the administrative hearing were not admissible in the jury trial, so the claimant had everything to gain and nothing to lose by asking for a jury trial. This system led to a very high degree of trial attorney involvement in workers' compensation claims and the uncertainty of the jury system in Texas ultimately led to most insurers settling claims rather than going to the trial. This whole process resulted in unwarranted delays in the system and increased costs and one of the major efforts of Senate Bill One was to reform the system to take the attorneys out of the loop as much as possible.

The improved administrative system and the elimination of the trial de novo, should result in a noticeable change in settlement patterns of claims in Texas. It is still a little too soon to see how much these patterns will change, but you should be watching your data closely if you have a large amount of Texas worker's compensation business. Early indications are that it is beginning to have some significant impact, but a lot of that is due to what claims people are putting up in terms of case reserves. I think it is a little immature to put too much reliability on that.

(JMF 7)

There are some other reserving issues in Texas which you should be aware of. As the size of the assigned risk pool deficit began to grow in Texas, the assessments for those deficits were partially deferred to future years. The last couple of years it was on a 25% per year over a four year basis. The Texas administration had ruled in the past that these deferred assessments did not have to be carried on statutory financial statements as liabilities. They just sort of put them aside and considered them as something coming in the future, which you really didn't have to recognize. Senate Bill One has corrected that situation and requires that deferred assessments now be carried as a liability for statutory accounting. There are three more installments on such deferred assessments. There's one that is due in 1991 and I would imagine bills are already on their way on that, but there are still deferred assessment due in 1992 and 1993 on prior deficit years.

The assigned risk pool deficits in Texas have always been calculated on a calendar year basis, which is considerably different from the national pool accounting process. By the way, the Senate Bill One renamed the assigned risk pool, the Texas Workers' Compensation Insurance Facility, so when I say facility it refers back to the same organization essentially. The facility does have an actuarial committee, which has recommended and the governing committee of the facility has approved some changes in the procedure for the deficit. The 1990 deficit should be assessed on a present value basis and collected in full, rather than being assessed on an ultimate basis and collected over a period of future years.

The present value calculation of the 1990 assessment takes into consideration the expected pay-out pattern of all 1990 and prior claims, and also, the cash flow from the deferred assessments, which would be coming due on some of those prior years.

The operating deficit for 1990 calendar year was about 532 million dollars. The assessment needed to fully fund the pool liabilities for losses occurring in 1990 and prior on a present value basis, is 331 million dollars based on the current projections of ultimate losses and using an interest rate of 6 1/2%. So the losses are stated on an ultimate basis, but in terms of what the members of the facility are going to be assessed, that is being done on a present value basis.

Another item which is going to come due in 1991 is the reapportionment of prior assessments from companies which have become insolvent, primarily the TIA insolvency. That adds up to about $89 million, some of which would be due this year and some of which will be part of the 1992 and 1993 deferred assessments. So the total amount of money which insurance companies will pay to the facility in 1991 is very close to 700 million dollars. That's a pretty heavy deficit.

Another significant change, recommended by the actuarial committee and approved by the governing committee, is that future deficits would be calculated on a limited accident year basis rather than on a calendar year basis. The assessment will be on the market share of the calendar year corresponding to the accident year. Each accident year beginning with 1990 will be subject to four annual reevaluations and any development on prior years will go to the oldest year being revalued. Future assessments would also be on a present value basis. Both of these changes are subject to approval by the State Board of Insurance, but insurance department staff have been involved in the governing committee process. So it is anticipated that there won't be any problem with that being approved.

After all of these changes took place, much to the surprise of some people, maybe not to others, the legislature in Texas actually passed another major reform bill impacting workers' compensation called House Bill 62. Among other things this bill provides for the creation of a competitive state fund, which will become the insurer of last resort as of January 1, 1994. Thus the current facility will cease to write new business as of that date and the small premium policy plan will be abolished. So we'll be looking at a run-off of the facility from 1994 forward, so the change to an accident year deficit is probably not as significant as it would have been if the facility continued to exist.

(JMF 8)

Looking at some recent activity in other states, Colorado has passed major reform legislation titled Senate Bill 218. After several months of intense negotiation a compromise agreement was finally reached amongst the parties and a bill actually made it through the legislature. One of the problems in Colorado is they have had a much higher frequency of permanent total claims than most states. This bill provides a strict definition of permanent total restricting such benefits to injured workers who are unable to earn wages from any employment. This is expected to result in a large drop in the number of permanent total claims. The bill also provides that permanent partial impairment ratings are to be established based on American Medical Association guidelines. Permanent partial awards will be based on impairment rating as a percent of the whole person. Independent medical examiners will be used to settle disputes over impairment ratings and the definition of maximum medical improvement. The National Council on Compensation Insurance estimated the cost savings of this bill to be equivalent to the 36% increase in rates that would have been filed had the bill not passed. This indicates a pretty significant change in the expectation of what compensation experience is going to do in the state of Colorado. That experience will bear close watching to see what the actual impact of the legislation is and how it affects loss emergence.

(JMF 9)

Several other states have passed legislation, which impacts workers' compensation data in various ways. Let's look at a couple of quick examples. New York, which had been a relatively low benefit state, approved substantial increases in benefit levels in 1990. This type of change in benefits often leads to increase frequency and extended durations as workers have less incentive to return to work. This undoubtedly will lead to changes in emergence patterns as well as to loss severity in the New York data.

Another case from last year, Rhode Island passed legislation, which included an annual escalation provision for permanent total benefits applicable to all new and existing claims. This should result in an immediate increase in all case reserves for permanent total claims. As an example, for an injured worker at age 40, adding a 5% escalation provision to an annuity reserve discounted at 3 1/2% would increase the outstanding reserve on that claim by 150%. For a 30 year old, the corresponding increase would be about 200%. So you can see this would have an immediate affect on your latest diagonal for all accident years.

On the other hand, in Massachusetts, when escalated benefits were introduced there several years ago, all escalated benefits on cases prior to the enactment of the change are funded from a special fund, not by the insurers. So when you are looking at a loss development triangle of indemnity in Massachusetts, the tail development you see in that triangle is not representative of what is going to happen on the years subsequent to the introduction of escalation.

(JMF 10)

There is a lot of other legislative activity, but we don't really have time to do much more than just briefly look at some of those issues. Another key area of change is internal changes. I mentioned earlier that insurers are reacting to the deteriorating workers' compensation environment with various cost containment measures. It is essential that you know what is going on inside the company whose reserves you are reviewing. Internal changes may also result in significant alterations in your loss emergence patterns. For example, at The Travelers, we are in the process of implementing an 800 number reporting system. We expect that this will reduce the time lag from the date of loss until the claim gets into our data systems. This will also allow the first contact between the claim representative and the injured party to take place sooner. One of our goals in this is to eliminate the uncertainty on the part of the injured worker and thus reduce the amount of attorney involvement in workers' compensation claims. Telephone reporting is tied closely to our establishment of preferred provider organizations, designed specifically for workers' compensation injuries. We want to assure that the best medical care is provided, but only what is appropriate. We have developed a utilization review process, as part of our PPO program, to reduce costs by eliminating unnecessary or inappropriate care. The expected result of these programs is a contraction of the development patterns, an increase in claim expense, and a reduction in both medical and indemnity loss costs. We will be watching our developmental patterns closely to see how they line up with our expectations.

In summary, the loss reserve analysts can not operate in a vacuum. You must be aware of what is happening in the environment, which can impact the data you are analyzing. Our next panelist will give you some techniques on some of the things that you should be doing. I'd like to now introduce Roy Morell. Roy is Assistant Vice President and Senior Associate Actuary at the Liberty Mutual Insurance Company. Roy is a Fellow of the Casualty Actuarial Society, a Fellow of the Canadian Institute of Actuaries and a Member of the American Academy of Actuaries. He received his BS degree in math from the University of New Hampshire. Roy has been with Liberty Mutual for close to twenty years, and is currently manager of their reserve unit. Roy is also current President of the Casualty Actuaries of New

England. I would like to welcome Roy for the next section.

ROY MORELL: Thank you, Jim and good morning everybody. There are a few seats down front for those people who are still standing at the back. If you'd like to move forward, you'll be a little more comfortable because we've got another hour to go, so feel free to move forward and find a seat.

Accurate loss reserve indications are critical to the proper management and regulation of insurance companies. Important decisions are being made based on loss reserve indications which are inaccurate and the results of those decisions can be catastrophic.

(RKM 1)

Almost all loss reserve analysis begins by segmenting the data by line of business. The use of further segmentation of the data depends on many factors. Because of the many issues accompanying the question of further segmentation, little uniformity of analysis exists below line of business. I contend that failure to properly segment your workers' compensation data can lead to multimillion dollar errors in reserve estimation.

What are the arguments for and against segmentation? What are some of the possible segmentations of workers' compensation data? What issues must be considered in selecting the optimal data segments? What are the major trends in workers' compensation data which should kept in mind when choosing the level of segmentation? These are some of the questions I would like to discuss.

(RKM 2)

The question of data segmentation is a classic actuarial problem. It involves balancing considerations of homogeneity and credibility. It is the problem of stability versus responsiveness. In general, data should be segmented into homogenous groups when credibility permits. These issues are discussed in more detail in the CAS Statement of Principles regarding property/casualty loss and loss expense reserves. A copy of which was included in your registration material.

(RKM 3)

Let's now review the arguments for and against data segmentation. The following arguments are given for not segmenting the data. (1) The amount of the data is too small to permit further segmentation. (2) There is a lack of resources to analyze the data in greater detail. (3) The necessary data is not readily available. (4) The relative mix of the segments is stable, so segmentation will not change the reserve indication. (5) There has been an internal or external change which has altered either segment definition or processing. So in that case it is better to use combined data.

Each of these arguments against segmenting, may on certain occasions be valid. In other situations, however, accepting such arguments may lead to serious errors in reserve estimation. These arguments must be carefully weighed against the dangers of not segmenting.

(RKM 4)

The following arguments for segmenting the data are often more powerful. (1) An accurate reserve estimate can only be made with segmented data. This argument at times will outweigh all others. (2) Segmenting the data into homogenous groupings is critical when the mix of the data by segment is changing and the segments have different characteristics. (3) Segmentation may be necessary in order to properly allocate the reserve to lower levels. (4) Segmentation may be necessary in order to meet standards of practice. Again, I refer you to the CAS Statement of Principles and the ASB standards on this topic.

(RKM 5)

Given these arguments for and against segmentation, what are some of the possible segmentations of workers' compensation data? Data could be analyzed by state or by region, rather than countrywide. This would reflect a company's changing mix by state and the unique benefit structure of each state. This cut of the data may be necessary for accurate state allocation of reserves. For a company, with operations in a limited number of states, this may be a very practical means of segmentation.

On the other hand, for a company with national operations careful reserve analysis in fifty states may not be practical. And in light of Jim Foote's comments about state changes, this is an important segmentation to consider.

Number two, data could be segmented by injury type, meaning death, permanent total, permanent partial and temporary total. Or more simply pension versus non-pension claims.

Number three, for workers' compensation, it is logical to segment the data into the two major benefit types, indemnity and medical. Vocational rehabilitation benefits in employers liability claims could also be segmented. Although segmenting data by class is needed in pricing and work for other lines of business, it is generally not practical for workers' compensation reserving unless a company specialized in a limited number of classes. I believe there is over 700 classes in workers' compensation today.

And finally, segmenting the data by market is possible. For example, voluntary versus involuntary, or national versus commercial accounts, or retrorated versus non-retrorated policies. Given these possible segments of workers' compensation data, what are the primary factors to be considered in choosing the optimal level of segmentation?

(RKM 6)

First, the availability of data is often a consideration. The actuary may need to make an argument that the benefit of having the segmented data outweighs the cost of gathering it and storing it.

Number two, the volume or credibility of a segment must be considered.

Third, the availability of resources to analyze the data in more detail is a consideration. Again, the actuary may need to argue that the benefit of more resources, for the reserving function, outweighs the additional cost of such resources. The business needs of the company are a major consideration for segmentation. The stability of the segments, in terms of their definition and processing, are important considerations.

For example, if at some point a company converted all of its retrospectively rated accounts to non-retrorated, than a retro versus non-retro split would no longer be practical, since in that case the retro segment would than be void and the non-retro segment would now take on the characteristics of the old total book of business.

(RKM 7)

Finally, the data should be segmented into homogenous groups. This means that the data in each segment should have similar characteristics in several respects. The data should have similar average value, claim emergence, severity development, paid loss and incurred loss development. The importance of each of these characteristics will depend on the method of reserve analysis being used.

(RKM 8)

Having discussed the issues of data segmentation in a general way, let me now turn to the specific methods of analysis and levels of data segmentation employed to Liberty Mutual.

For direct loss reserves our primary analysis focuses on an eight way segmentation of countrywide data. The eight segments result from a two way split along three dimensions. The data split by market, into voluntary and involuntary losses, by benefit type into indemnity medical, and by injury type into pension and non-pension claims. In addition, supplemental studies are done by state, by policy type and by profit center within the voluntary market for purposes of improved allocation and better understanding of the eight primary segments.

Let me now review the characteristics of these segments, which led to our selected level of data segmentation. The workers' compensation is composed of two distinct markets, voluntary and involuntary. For a company operating as a servicing carrier, the involuntary losses are reported in total direct losses. There are three important reasons for analyzing these losses separately. (1) The involuntary losses are generally ceded to workers' compensation pools. (2) The characteristics of the losses are different for the two markets. And the mix of the two markets has changed significantly.

(RKM 9)

This exhibit shows the explosive growth of the industry involuntary market as a percentage of total market since 1984. I apologize that the labelings on those axis are a bit small, but if you're sitting up close you can see that the involuntary market share has grown from about 5% in 1984 and is now approximately 25% or approaching 25%. Assuming the losses in these markets have different characteristics, this changing mix makes segmentation imperative in order to calculate accurate direct reserve estimates.

(RKM 10)

This next slide compares some key characteristics of the two markets. You will notice that based on Liberty Mutual data, the involuntary market has higher average values, 4900 versus 3900, in that particular period, but has much lower severity and incurred loss development factors. Development factors for paid loss and claim counts are similar for the two markets. You see that on the last two lines. These relationships are for Liberty Mutual's book of business and may be different for another company, depending on several factors. This information leads to the conclusion that unsegmented data would produce too high of a reserve estimate for Liberty Mutual using the claim count average value method or the incurred loss development method, since the mix of losses is moving toward the low development segment. The paid method should be undistorted if all of the things are equal which they're not, since the payment patterns are similar for these two markets.

(RKM 11)

The next dimension of segmentation is indemnity versus medical benefits. This slide, in column 3, shows the growth of medical benefits as a percentage of total WC losses. Liberty Mutual data indicates an increase from 33% in 1983 to 37% medical in 1990. Industry data indicates this percentage to be just above 40% now based on some industry data. This changing mix has been a result of medical inflation, which is running at about 14% per year, being much higher than the indemnity trend, about 10 or 11% indemnity losses. Wage inflation and benefit level increases, which drive indemnity losses have not been as high as medical inflation and that's the resulting shift in the mix based on losses.

(RKM 12)

This next exhibit compares the loss characteristics of the two segments. Notice particularly, the incurred loss development factors, 131 for medical versus 159 for indemnity, and the paid loss development factors, first ultimate 286 for medical, 711 for indemnity. Since medical losses exhibit lower development for both incurred and paid losses, failure to segment data on this dimension will, again, overstate the estimate of required reserves. This segmentation will also allow the reserve specialist to better analyze, understand and quantify any other trends in the system, which may appear as trends in development factors.

(RKM 13)

The next dimension of segmentation is injury type. This slide is probably the most important slide in my presentation and it shows the dramatic mix of change which is occurring in this dimension, based on Liberty Mutual data. As the percent of total loss due to pension claims has increased sharply. And, again, if you're having trouble reading that bottom axis, that is 1977 over on the left and 1990 on the right. The portion of total loss dollars associated with pension claims has declined from the 16 to 18% range in the late '70s down to the 12 to 13% percent range in the early '80s and finally down to the 8 to 10% range in the late '80s. Most of that decline coming up to 1985 and basically somewhat level since 1985. Although this graph is based on Liberty Mutual data, there is similar evidence in the industry data.

My belief is that there are several reasons for this trend. (1) As the U.S. economy moves slowly from a manufacturing to a service economy, there are fewer serious injuries, which are more prevalent in the manufacturing sector. (2) The combined efforts of OSHA, employers and insurance company loss prevention departments have resulted in a safer work place, particularly in respect to serious injuries. Employer safety programs are discussed in a recent Tillinghast study of the WC line. The study describes safety programs as the most popular and among the most effective cost control initiatives by employers.

A copy of that study was also available at this meeting. (3) The recent expansion of the WC system has been in the area of non-pension claims. The duration of non-pension has lengthened and the frequency of such claims has also increased. And the expansion of these claims pushes the percent of loss from pension claims lower and lower. Now, when we couple the changing mix with very different loss characteristics, the potential for erroneous reserve estimates, using unsegmented data, is very significant.

(RKM 14)

This slide compares the characteristics of pension and non-pension claims. Pension claims have much higher average values and higher severity development in the tail. Pension claims also emerge and pay much slower than non-pension claims. The bottom line there indicates pension claims being only 1% paid as a first report versus 22% for non-pension claims. So, as was the case for the first two dimensions, here again, the mix is changing toward the low development segment. This leads, again, to the conclusion that...(End of Side One)...on claims whose payments are fixed and determinable. Since the indemnity portion of pension claims generally fits this description, discounting for interest is permitted on that segment. And by segmenting the losses, between pension and non-pension claims, the amount of this discount is quantifiable.

On the other hand, the use of unsegmented losses would remove any interest discount on case reserves, since the interest accrual will show up as loss development. So this is another very important benefit of the pension versus non-pension split.

(RKM 15)

Let me now turn to the dollar impact of segmenting WC losses on reserve estimates at Liberty Mutual. This exhibit starts with the base case of a bulk reserve estimate of $100 using total direct unsegmented data. Although, for Liberty Mutual, this amount is roughly three billion dollars, I have shown the base as a hundred so that you can interpret the percent savings for your own firms.

In our case, segmenting the losses between voluntary and involuntary losses produced a 5% savings. Segmenting the losses between indemnity and medical resulted in only a 1% savings. The most significant savings, however, results from splitting the losses between pension and non-pension. For our data this produced a 19% lower estimate of required bulk loss reserves. In addition, this final segmentation allowed us to calculate an interest adjustment worth an additional 5%. The eight way segmentation, after interest adjustment, resulted in a bulk reserve requirement of $72 compared to the $100 base or a 28% savings. This means that there was a very significant overstatement of estimated reserves using unsegmented data.

(RKM 16)

In conclusion, I have demonstrated that the mix of WC data is changing along three dimensions, voluntary/involuntary, indemnity/medical, and pension/non-pension. Further, I have shown that the different segments have different average values and patterns of development, for both paid and incurred losses. For most firms, this data segmentation will enhance rather than reduce credibility.

Finally, data segmentation is necessary during these times of change in order to calculate an accurate reserve estimate. Reserve analysis using unsegmented data, as is found in annual statement Schedule P, can result in seriously flawed reserve estimates. Under current circumstances, such estimates are likely to be too high by a material amount.

Thank you very much for your attention.

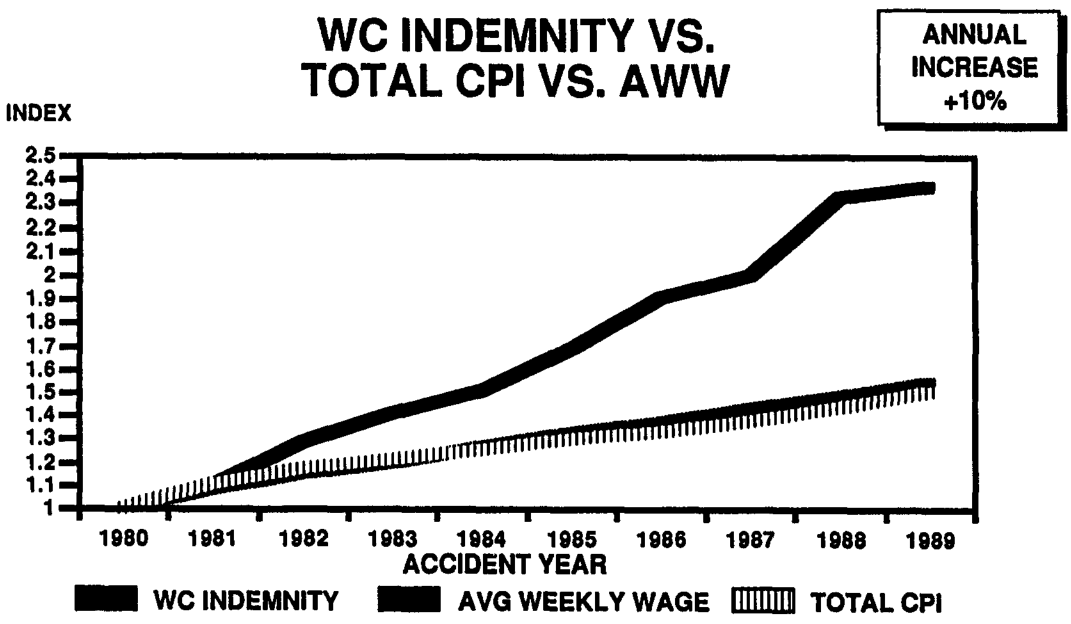
MR. FOOTE: Thank you, Roy. Our next panelist is Ron Retterath. Ron is Senior Vice President and Actuary for the National Counsel on Compensation Insurance. He is a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries. Ron received his degree in mathematics from the University of Wisconsin. Prior to joining the National Counsel, Ron had spent over 21 years with the Wassau Insurance Companies, where he served as Chief Actuary for the last ten of those years. Ron is going to give us a perspective of the impact of reserving on the ratemaking process and I'm sure you'll find what Ron has to say pretty interesting.

RESERVING ISSUES FOR WORKERS COMPENSATION

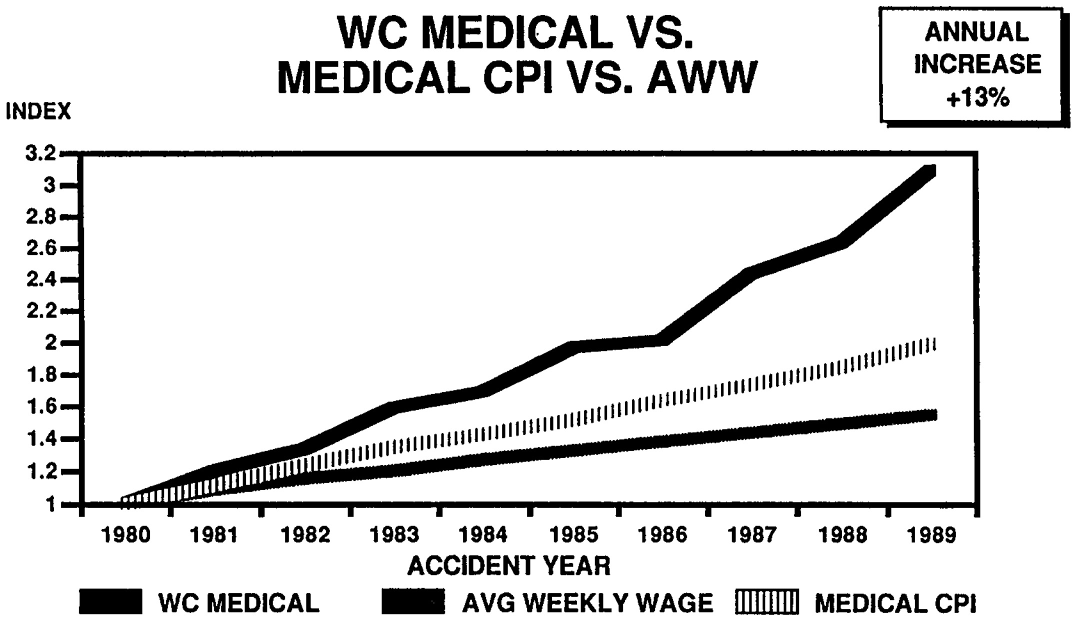
CASUALTY LOSS RESERVE SEMINAR

RON RETTERATH
SEPTEMBER 22 – 24, 1991
ARLINGTON, VIRGINIA

WC INDEMNITY COMPARATIVE COST INDEX



WC MEDICAL COMPARATIVE COST INDEX



NCCI RATEMAKING LOSS DEVELOPMENT METHODS

PAID

PAID + CASE O/S

INCURRED = PAID + CASE O/S + CARRIER IBNR

NCCI

PAID LOSS DEVELOPMENT

SIZE OF STATE COMPARED WITH DEVELOPMENT PATTERNS

EXAMPLE OF A LARGE STATE WITH STABLE PAID DEVELOPMENT

ILLINOIS

1990 WRITTEN PREMIUM — $2.1 BILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4	4:5	5:6	6:7	7:8
80	2.434	1.432	1.158	1.088	1.050	1.027	1.018
81	2.447	1.389	1.184	1.093	1.053	1.037	1.022
82	2.355	1.396	1.187	1.101	1.060	1.052	1.030
83	2.569	1.444	1.168	1.104	1.058	1.042	1.027
84	2.500	1.456	1.215	1.127	1.069	1.047	
85	2.407	1.478	1.235	1.136	1.071		
86	2.377	1.508	1.258	1.122			
87	2.468	1.540	1.242				
88	2.539	1.521					
89	2.643						

	1:10	CHANGE
3-YEAR AVG.	6.427	--
LATEST YEAR	6.685	+4.0%

NCCI

ILLINOIS

1990 WRITTEN PREMIUM — $2.1 BILLION
MEDICAL PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4	4:5	5:6	6:7	7:8
80	1.685	1.113	1.046	1.026	1.009	1.007	1.004
81	1.751	1.112	1.051	1.018	1.010	1.006	0.993
82	1.683	1.104	1.040	1.017	1.006	1.011	1.003
83	1.809	1.104	1.039	1.018	1.024	1.005	1.003
84	1.748	1.108	1.043	1.031	1.012	1.007	
85	1.814	1.136	1.065	1.023	1.013		
86	1.884	1.138	1.057	1.024			
87	1.989	1.142	1.053				
88	1.975	1.139					
89	1.963						

	1:10	CHANGE
3-YEAR AVG.	2.515	--
LATEST YEAR	2.472	+1.7%

EXAMPLE OF A LARGE STATE WITH TRENDING PAID DEVELOPMENT

FLORIDA

1990 WRITTEN PREMIUM — $1.7 BILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4	4:5	5:6	6:7	7:8
80	1.797	1.363	1.230	1.155	1.101	1.075	1.056
81	1.887	1.422	1.247	1.162	1.105	1.092	1.062
82	2.059	1.426	1.252	1.172	1.108	1.081	1.054
83	2.102	1.457	1.273	1.194	1.123	1.075	1.051
84	2.205	1.516	1.304	1.175	1.119	1.072	
85	2.307	1.590	1.299	1.190	1.114		
86	2.342	1.603	1.331	1.182			
87	2.560	1.677	1.334				
88	2.725	1.706					
89	2.953						

	1:10	CHANGE
3-YEAR AVG.	9.771	--
LATEST YEAR	10.659	+9.1%

NCCI

FLORIDA

1990 WRITTEN PREMIUM — $1.7 BILLION
MEDICAL PAID DEVELOPMENT FACTOR

AY	1:2	2:3	3:4	4:5	5:6	6:7	7:8
80	1.701	1.146	1.085	1.059	1.038	1.035	1.034
81	1.718	1.168	1.077	1.052	1.037	1.030	1.028
82	1.750	1.140	1.072	1.048	1.038	1.036	1.034
83	1.767	1.144	1.081	1.052	1.043	1.037	1.043
84	1.820	1.160	1.089	1.058	1.050	1.050	
85	1.915	1.166	1.103	1.064	1.058		
86	1.893	1.200	1.119	1.083			
87	2.043	1.222	1.130				
88	2.034	1.235					
89	2.047						

	1:10	CHANGE
3-YEAR AVG.	3.566	--
LATEST YEAR	3.788	+6.2%

POSSIBLE IMPACT OF TRENDING PAID DEVELOPMENT FACTORS

FLORIDA

1990 WRITTEN PREMIUM — $1.7 BILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4
80	1.797	1.363	1.230
81	1.887	1.422	1.247
82	2.059	1.426	1.252
83	2.102	1.457	1.273
84	2.205	1.516	1.304
85	2.307	1.590	1.299
86	2.342	1.603	1.331
87	2.560	1.677	1.334
88	2.725	1.706	**1.350**
89	2.953	**1.750**	**1.370**
90	**3.100**	**1.800**	**1.390**

	1:10	CHANGE
3-YEAR AVG.	9.771	--
LATEST YEAR	10.659	+ 9.1%
TRENDED	12.300	+ 26.0%

NCCI

FLORIDA

1990 WRITTEN PREMIUM — $1.7 BILLION
MEDICAL PAID DEVELOPMENT FACTOR

AY	3:4	5:6	7:8
80	1.085	1.038	1.034
81	1.077	1.037	1.028
82	1.072	1.038	1.034
83	1.081	1.043	1.043
84	1.089	1.050	**1.043**
85	1.103	1.058	**1.044**
86	1.119	**1.060**	**1.045**
87	1.130	**1.063**	**1.046**
88	**1.140**	**1.066**	**1.047**
89	**1.150**	**1.069**	**1.048**
90	**1.160**	**1.072**	**1.049**

	1:10	CHANGE
3-YEAR AVG.	3.566	--
LATEST YEAR	3.788	+ 6.2%
TRENDED	4.222	+18.4%

EXAMPLE OF A MEDIUM STATE WITH STABLE PAID DEVELOPMENT

INDIANA

1990 WRITTEN PREMIUM — $538 MILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4	4:5	5:6	6:7	7:8
80	1.970	1.213	1.075	1.024	1.018	1.013	1.011
81	1.888	1.224	1.083	1.044	1.021	1.021	1.012
82	1.860	1.213	1.102	1.037	1.019	1.018	1.013
83	2.036	1.192	1.086	1.038	1.035	1.012	1.012
84	1.963	1.214	1.086	1.036	1.018	1.020	
85	1.968	1.249	1.096	1.039	1.029		
86	1.958	1.217	1.088	1.053			
87	1.883	1.204	1.086				
88	2.060	1.238					
89	2.034						

	1:10	CHANGE
3-YEAR AVG.	2.962	--
LATEST YEAR	3.089	+4.3%

NCCI

EXAMPLE OF A MEDIUM STATE WITH TRENDING PAID DEVELOPMENT

NORTH CAROLINA

1990 WRITTEN PREMIUM — $549 MILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4	4:5
80	2.373	1.263	1.092	1.050
81	2.412	1.259	1.092	1.047
82	2.265	1.245	1.108	1.057
83	2.425	1.299	1.112	1.060
84	2.454	1.273	1.113	1.059
85	2.428	1.286	1.118	1.066
86	2.318	1.305	1.132	1.073
87	2.428	1.326	1.152	
88	2.463	1.375		
89	2.602			

	1:10	CHANGE
3-YEAR AVG.	4.474	--
LATEST YEAR	4.944	+10.5%

EXAMPLE OF A SMALL STATE WITH STABLE PAID DEVELOPMENT

DISTRICT OF COLUMBIA

1990 WRITTEN PREMIUM — $145 MILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4
80		1.645	1.298
81	2.597	1.671	1.292
82	2.468	1.573	1.299
83	2.343	1.464	1.212
84	2.338	1.504	1.359
85	2.022	1.467	1.268
86	2.147	1.527	1.234
87	2.604	1.550	1.266
88	2.563	1.574	
89	2.422		

	1:10	CHANGE
3-YEAR AVG.	7.095	--
LATEST YEAR	6.871	+3.2%

NCCI

EXAMPLE OF A SMALL STATE WITH TRENDING PAID DEVELOPMENT

SOUTH DAKOTA

1990 WRITTEN PREMIUM — $80 MILLION
INDEMNITY PAID DEVELOPMENT FACTORS

AY	1:2	2:3	3:4	4:5	5:6	6:7	7:8
80		1.353	1.178	1.065	1.100	1.029	1.027
81	2.027	1.345	1.193	1.123	1.056	1.036	1.043
82	2.153	1.325	1.154	1.100	1.087	1.026	1.068
83	2.310	1.397	1.235	1.098	1.176	1.050	1.104
84	2.512	1.418	1.271	1.114	1.094	1.069	
85	2.406	1.530	1.218	1.119	1.114		
86	2.510	1.426	1.205	1.140			
87	2.411	1.443	1.241				
88	2.491	1.508					
89	2.464						

	1:10	CHANGE
3-YEAR AVG.	6.730	--
LATEST YEAR	7.669	+14.0%

PAID + CASE OUTSTANDING LOSS DEVELOPMENT

HIGH DEVELOPMENT STATE COMPARED TO LOW DEVELOPMENT STATE

NCCI

PAID + CASE OUTSTANDING DEVELOPMENT FACTORS
INDEMNITY

FLORIDA

AY	1:2	2:3	3:4	4:5	5:6
82					1.061
83				1.104	1.053
84			1.166	1.088	1.059
85		1.273	1.159	1.111	1.056
86	1.502	1.283	1.171	1.090	
87	1.603	1.259	1.127		
88	1.648	1.229			
89	1.551				
			1:10		
		3-YEAR AVG.	2.883		

INDIANA

AY	1:2	2:3	3:4	4:5	5:6
82					1.001
83				0.963	0.995
84			0.991	0.972	0.979
85		1.047	0.989	0.992	1.012
86	1.172	1.027	0.993	0.994	
87	1.150	1.014	1.002		
88	1.212	1.067			
89	1.257				
			1:10		
		3-YEAR AVG.	1.201		

PAID + CASE OUTSTANDING DEVELOPMENT FACTORS
MEDICAL

FLORIDA

AY	1:2	2:3	3:4	4:5	5:6
82					1.031
83				1.059	1.032
84			1.080	1.034	1.034
85		1.114	1.059	1.059	1.042
86	1.316	1.126	1.073	1.045	
87	1.307	1.097	1.075		
88	1.294	1.131			
89	1.304				
			1:10		
		3-YEAR AVG.	1.933		

INDIANA

AY	1:2	2:3	3:4	4:5	5:6
82					1.012
83				0.999	0.993
84			0.984	1.002	0.992
85		1.026	0.993	0.990	0.987
86	1.195	1.027	0.979	0.990	
87	1.237	0.989	0.986		
88	1.205	1.007			
89	1.193				
			1:10		
		3-YEAR AVG.	1.176		

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INCURRED LOSS DEVELOPMENT

- AFFECTED BY CARRIER RESERVING PHILOSOPHY
- MAY BE INFLUENCED BY UNDERWRITING CYCLE
- SOME CARRIERS HAVE DIFFICULTY ALLOCATING TOTAL IBNR TO STATE

WHAT DEVELOPMENT FACTOR WOULD YOU EXPECT FROM FIRST REPORT TO ULTIMATE?

COUNTRYWIDE INCURRED (INCLUDING IBNR)

DEVELOPMENT FACTORS

INDEMNITY

AY	1:2	2:3	3:4	4:5	5:6
82				1.019	1.009
83			1.028	1.013	1.007
84		1.057	1.037	1.016	1.007
85	1.056	1.066	1.031	1.014	
86	1.020	1.050	1.025		
87	1.019	1.051			
88	1.027				

	1:Ult
3-YEAR AVG.	1.183
LATEST YEAR	1.159

MEDICAL

AY	1:2	2:3	3:4	4:5	5:6
82				1.007	1.003
83			1.006	1.005	1.003
84		1.008	1.015	1.001	1.005
85	1.074	1.023	1.010	1.008	
86	1.057	1.016	1.003		
87	1.065	1.010			
88	1.067				

	1:Ult
3-YEAR AVG.	1.181
LATEST YEAR	1.176

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TAIL DEVELOPMENT

SOME INFLUENCES:

- PERCENTAGE OF PENSION CASES
- ESCALATING BENEFITS
- LEGAL ENVIRONMENT
- MEDICAL INFLATION
- MEDICAL TECHNOLOGY

BASED ON COUNTRYWIDE DATA, APPROXIMATELY 13 PERCENT OF ULTIMATE LOSSES REMAIN TO BE PAID AFTER 10 YEARS.

FOR CONNECTICUT IT IS 29 PERCENT
FOR TENNESSEE IT IS 4 PERCENT

INCURRED DEVELOPMENT

10TH TO ULTIMATE FACTOR

3 HIGH STATES

STATE	INDEMNITY	MEDICAL	TOTAL
D.C.	1.137	1.233	1.159
CONNECTICUT	1.168	1.134	1.159
OREGON	1.151	1.154	1.152

3 LOW STATES

STATE	INDEMNITY	MEDICAL	TOTAL
TENNESSEE	0.991	1.005	0.997
HAWAII	0.986	1.053	1.006
IDAHO	1.018	0.980	1.004

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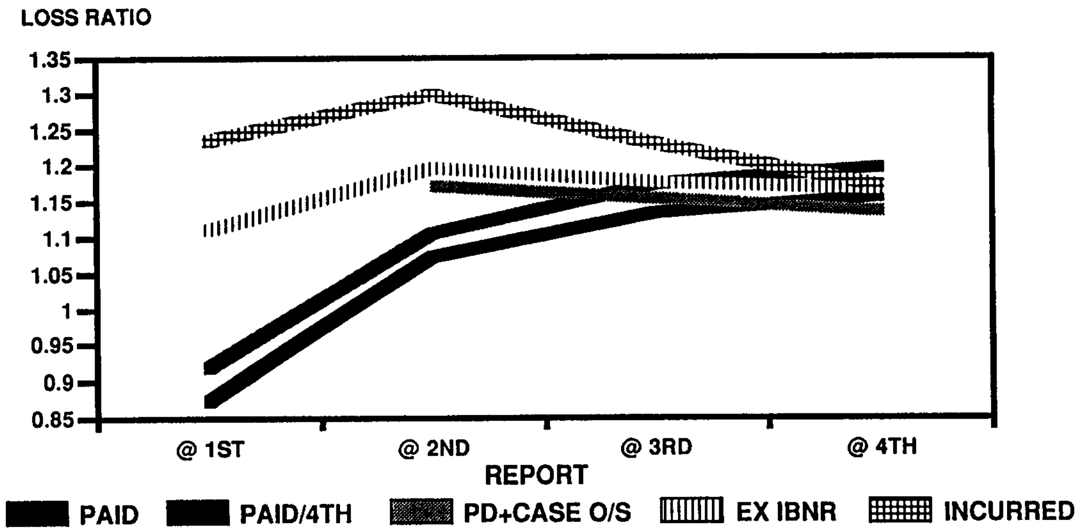
FLORIDA: PROJECTED ULTIMATE LOSS RATIO

ACCIDENT YEAR 1987



LOSS PROJECTION VARIANCE

METHOD:	PAID PLUS CASE O/S (AY 1989) AVERAGE LAST 3 FACTORS
STATES:	2 LARGE (OVER $2 BILLION PREMIUM) 2 MEDIUM (APPROX. $400 MILLION PREMIUM) 2 SMALL (APPROX. $100 MILLION PREMIUM)
CARRIERS:	PREMIUM BY STATE LARGE (10 OF TOP 20) MEDIUM (10 OF NEXT 30) SMALL (10 OF NEXT 30)

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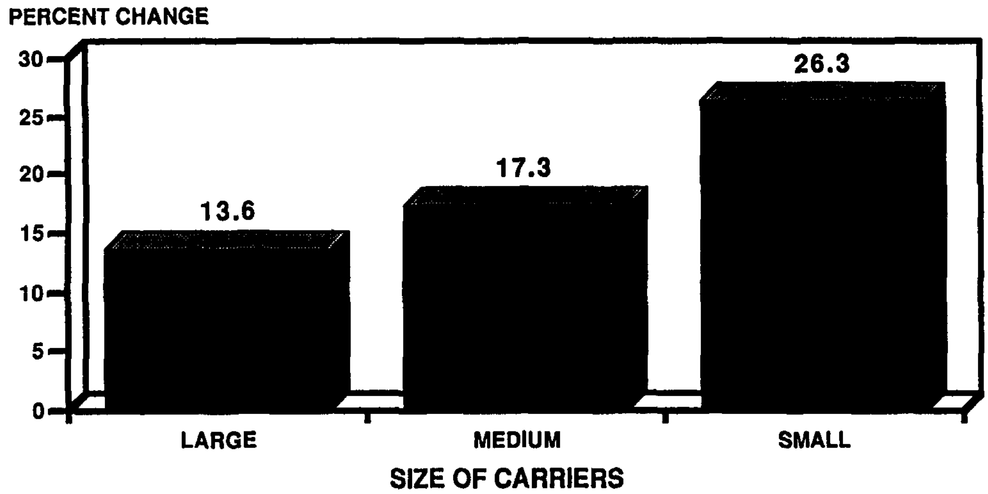
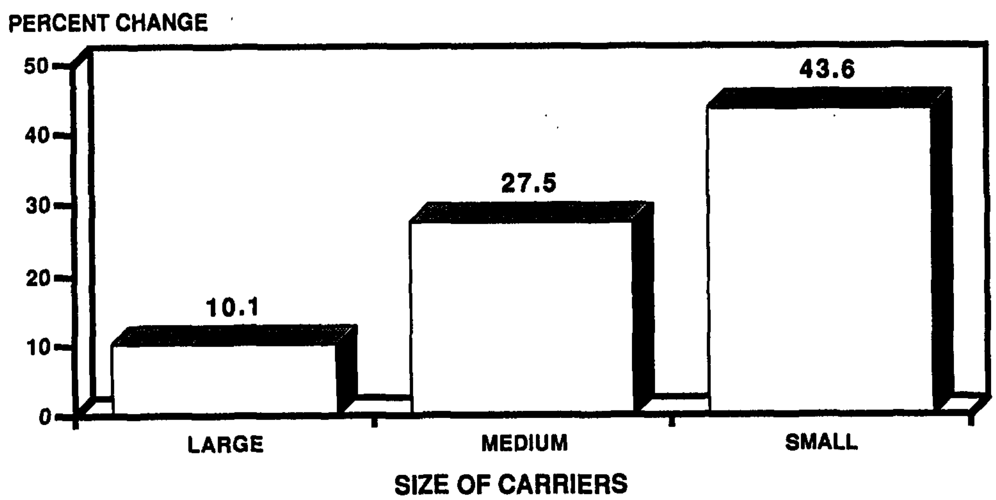
AVERAGE CHANGE IN ULTIMATE LOSS PROJECTIONS

LARGE STATES ACCIDENT YEAR 1989



AVERAGE CHANGE IN ULTIMATE LOSS PROJECTIONS

MEDIUM STATES ACCIDENT YEAR 1989



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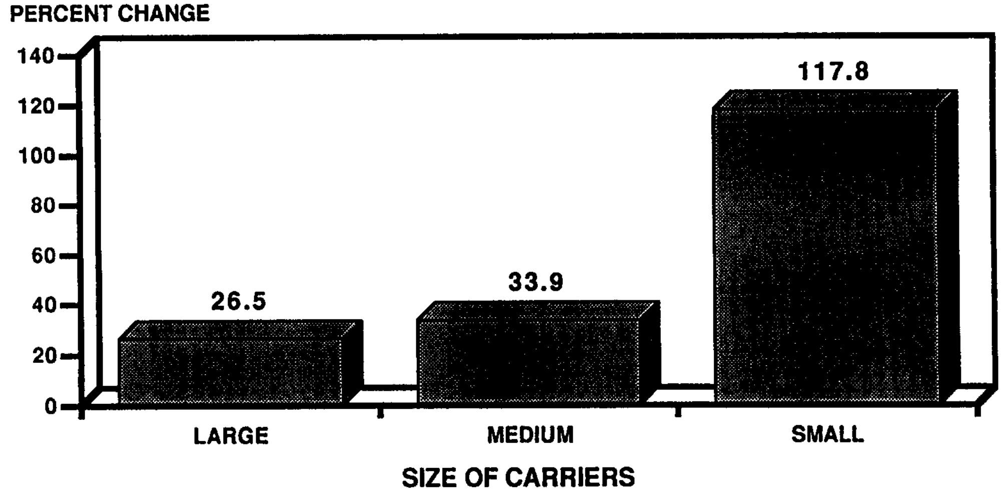
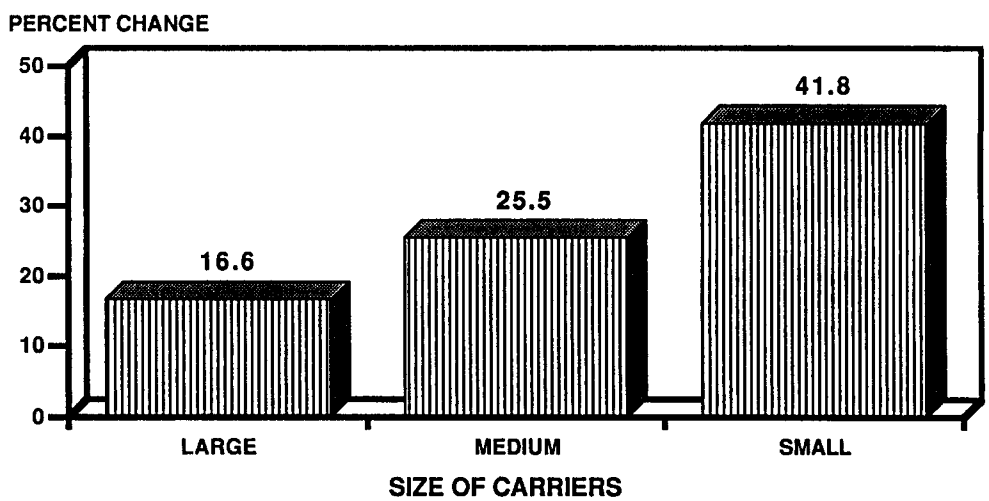
AVERAGE CHANGE IN ULTIMATE LOSS PROJECTIONS

SMALL STATES ACCIDENT YEAR 1989



AVERAGE CHANGE IN ULTIMATE LOSS PROJECTIONS

SIX STATES COMBINED ACCIDENT YEAR 1989



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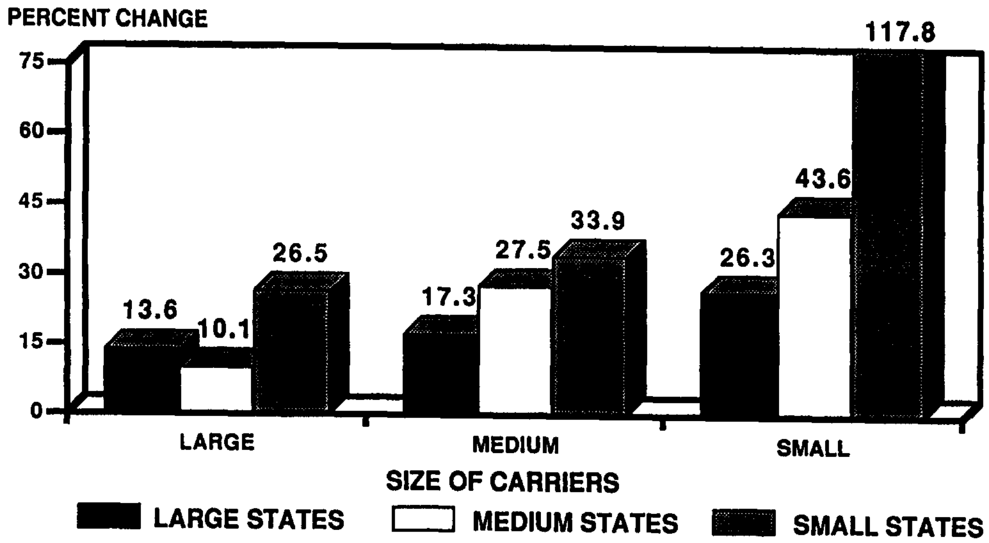
AVERAGE CHANGE IN ULTIMATE LOSS PROJECTIONS
SIX STATES COMBINED ACCIDENT YEAR 1989



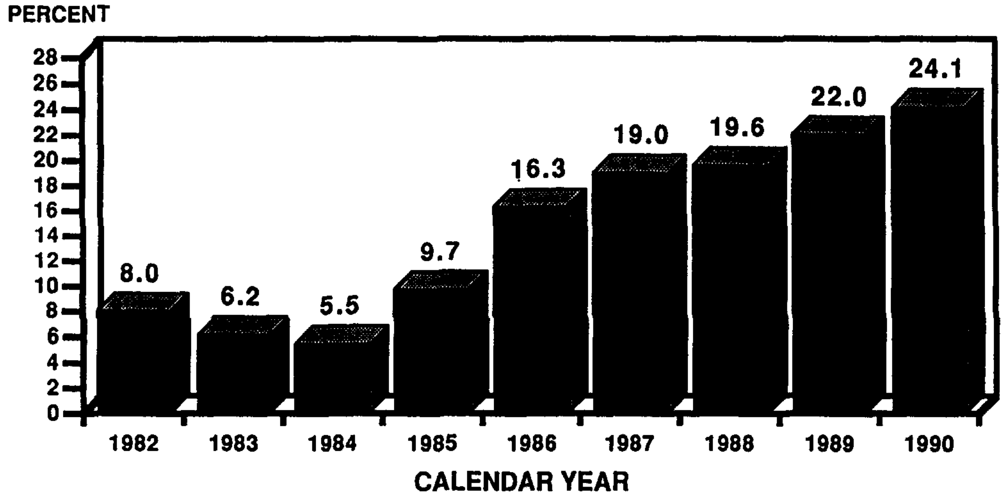
SPECIAL CONSIDERATIONS FOR THE RESIDUAL MARKET

GROWTH AND DEPOPULATION
CHANGING SERVICING CARRIERS
VOLATILE RISKS

NCCI

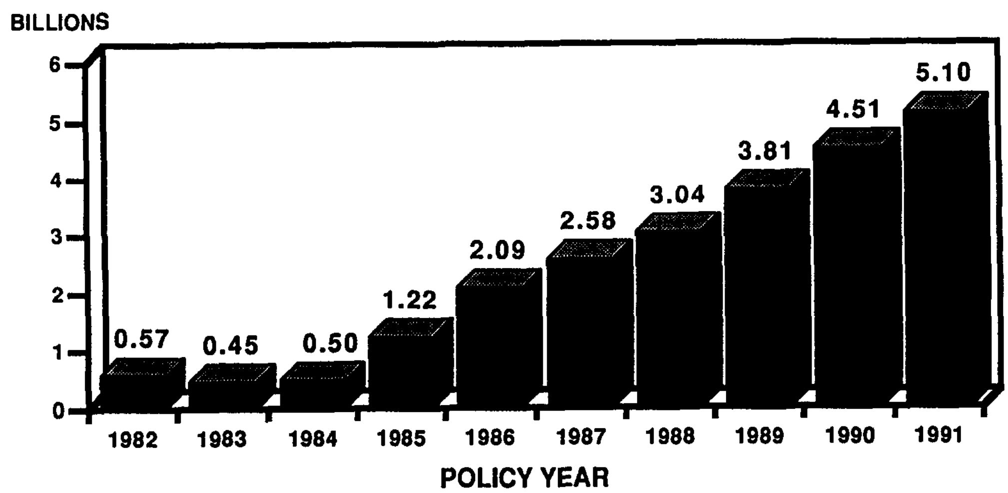
RESIDUAL MARKET SHARE

POOL PREMIUM AS A PERCENTAGE OF DIRECT WRITTEN PREMIUM



RESIDUAL MARKET WRITTEN PREMIUM

CEDED TO POOLS MANAGED BY NCCI



POLICY YEARS 1990 AND 1991 ARE ESTIMATED

NCCI

LARGEST 10 CLASSES IN THE RESIDUAL MARKET BY PREMIUM SIZE

CLASS CODE	ESTIMATED ANNUAL PREMIUM (IN MILLIONS) 1990	1987	1984	DESCRIPTION
7219	251	142	22	TRUCKING
9079	123	64	10	RESTAURANTS
8829	115	61	8	CONVALESCENT OR NURSING HOMES
5645	87	62	11	CARPENTRY CONSTRUCTION
8833	81	46	3	HOSPITALS PROFESSIONAL EMPLOYEES
8868	80	34	3	COLLEGE PROFESSIONAL EMPLOYEES
8380	82	49	8	AUTOMOBILE SERVICE OR REPAIR CENTER
5183	78	28	4	PLUMBING
9015	75	35	7	BUILDINGS OPERATION BY OWNER
8018	60	22	4	STORE – WHOLESALE

NATIONAL POOL DATA

COUNTRYWIDE ANNUAL PAID PLUS CASE OUTSTANDING LOSS DEVELOPMENT FACTORS

POOL GROWTH	POLICY YEAR	1ST TO 2ND	2ND TO 3RD	3RD TO 5TH
STABLE	1988	2.661	1.154	
GROWTH	1986	2.811	1.196	1.118
DEPOPULATION	1982	2.435	1.105	1.082
GROWTH	1976	2.879	1.145	1.066

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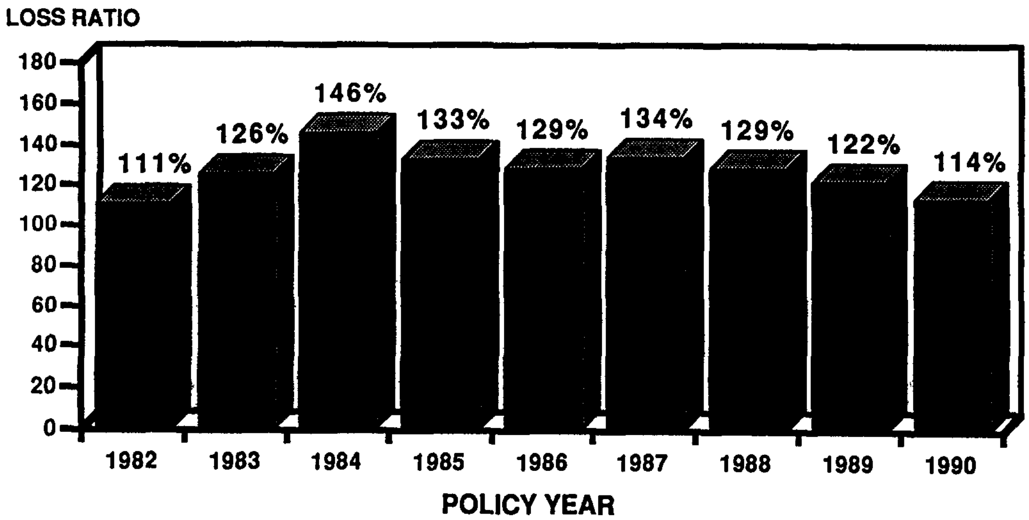
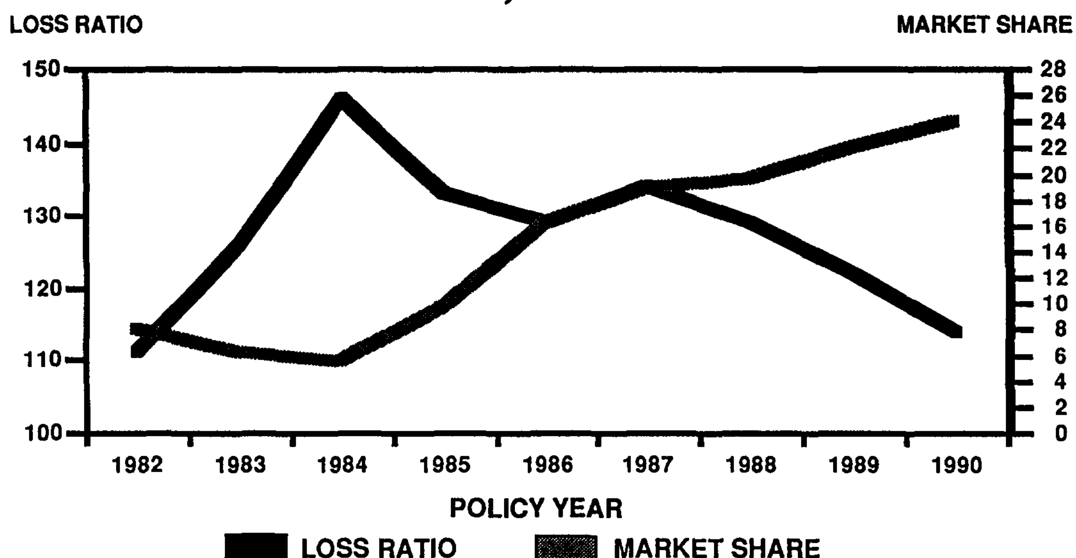
RESIDUAL MARKET LOSS RATIOS

ALL POOLS, AS OF 3/31/91



COMPARISON OF RESIDUAL MARKET SHARE AND LOSS RATIO

ALL POOLS, AS OF 3/31/91



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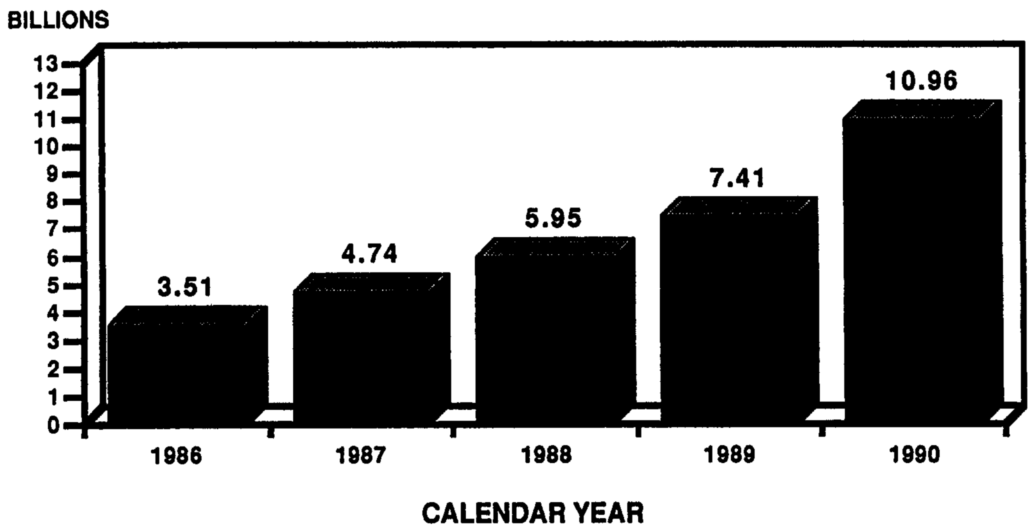
TOTAL CALENDAR YEAR LOSS RESERVES
CASE AND IBNR RESERVES, NCCI POOLS



MR. FOOTE: Thank you, Ron. We have a few minutes for questions. Let me just give you a quick reminder to fill out the white evaluation forms, if you would, before you leave and turn those in at the back. So the floor is open for questions.

Yes. Please step to the mike.

QUESTION: My name is Bob Linkquist and I'm from a state whose letter begins with F. It's seven letters long. I'm a consulting actuary. I have a question for Ron, if I could. On the slides there, they showed on the paid linkage ratios a tremendous difference between Florida, between your development years, and I think the other one was the state of Indiana. My first question is, is when you did that on incurred basis did you also see some type of a trend...what do you really attribute to the trend when it does occur?

MR. RETTERATH: Well, in the case of Florida, there is probably more knowledgeable people here on Florida. The case of Florida...back in 1979 when wage loss went in, everybody kind of thought they had solved the workers' compensation posture. It took about three years before people started recognizing that not only were the claims not closing, not only was there a very high percentage of all the claims containing lawyers and as soon as you have lawyers, 30 to 40% of all the claims...you have a spread out payment pattern. That's about as simple as I can say it. As soon as you have lawyers that are...the average countrywide state has roughly 20% of all indemnity claims has a lawyer representing the plaintiff. In some states, like New Jersey, has like 90 some. Texas had like 90 some. Florida has a very high number. And the most recent 1990 reform in Florida is, again, supposed to mitigate and ameliorate the lawyer involvement.

MR. FOOTE: Roy, you're the biggest writer down here.

MR. MORELL: I think the trends are due to additional use of the system. I think this goes well beyond the reform that took place quite a few years ago, so this is just extending duration in the non-pension area and that's probably the biggest cause and additional frequency as well. Just use of the system.

MR. FOOTE: Other questions?

QUESTION: Ollie Wilson, Consulting Actuary, Los Angeles...for Roy. When you speak of pension versus non-pension, how do you define pension?

MR. MORELL: We define it in terms of life pension claims. There are certain states which have limited benefits for death and permanent total cases. Other states have lifetime benefits. And I'm using the term pension meaning life pension claims, those claims in states where generally death and permanent total injuries are provided lifetime benefits.

QUESTION: Okay. And then if you add the pension to the non-pension would that equal your total in the indemnity payments?

MR. MORELL: Yes it would.

QUESTION: (Not at Microphone - Inaudible)

MR. RETTERATH: We looked at a few states on the swing limits. There are swing limits that say something like, no class can go up or down more than 25% from the industry group that it belongs to. But it turns out, unfortunately, and in so many states, we are filing for numbers that are 35-40% increases and one of the particular industry groups, it may be five or ten points higher than that, and I guess I would say the swing limits really don't have quite the material impact that a person would think. I think the swing limits are really intended to be there for when you get rate increases of 7.9 and then you don't want somebody to go flying to the moon based upon whatever the underlying data is. But, there are so many classes that...within a system that needs 30, 40, 50% that are way up there being cut off.

MR. FOOTE: Yes. Al?

QUESTION: There was a large increase in pool reserves this year that a lot of people felt. Is that analysis based on any kind of segmentation? Is there any hope that projected increase being overstated?

MR. RETTERATH: In all fairness, I think you've done enough loss reserves to where anytime you find bad news there is always more. And very seldom would you think that a whole industry would have agonized and put out a reduced reserve. Roy could talk to that process.

MR. MORELL: Yes, I would comment too. The data that was used to calculate that reserve increase was unsegmented combined data. It is obviously all of the involuntary market, but indemnity medical combined, pension/non-pension combined. So I would say there is some hope that as time marches on we will see the effects that I was talking about and it is conceivable that it was too much. And on the other hand, there were indications which were much higher. I don't think the pool booked a loss amount that was an unreasonable amount at the time. There were indications that were lower. There were indications that were higher. I think time will answer your question for sure. But I think there could be some reason to be hopeful.

MR. RETTERATH: I think that's fair, Roy, but I am going to Vegas this weekend and I'm going to bet against it. (Laughter)

MR. FOOTE: Yes, I think the assumptions that went into that were certainly not the highest that could have been selected. There were higher indications and the actuarial committee had actually selected some higher numbers than what ultimately was selected so there is a lot of uncertainty in the ultimate results.

Other questions?

QUESTION: (Not at microphone) Do the servicing carriers set their case reserves for the pool claims the same as for their regular business?

MR. MORELL: I can speak for Liberty Mutual that there is no differentiation on our claims department between voluntary and involuntary claims service.

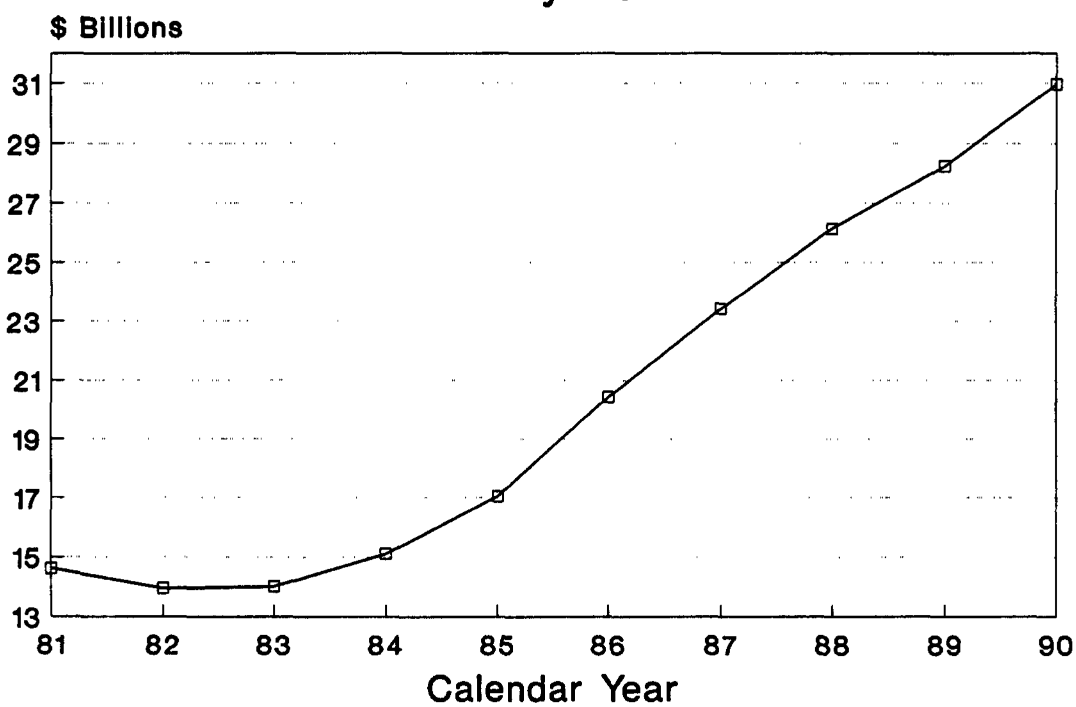
1991 CASUALTY LOSS RESERVE SEMINAR
SESSION 5B

RESERVING ISSUES FOR WORKERS' COMPENSATION

PANELISTS:
- JIM FOOTE
- ROY MORELL
- RON RETTERATH

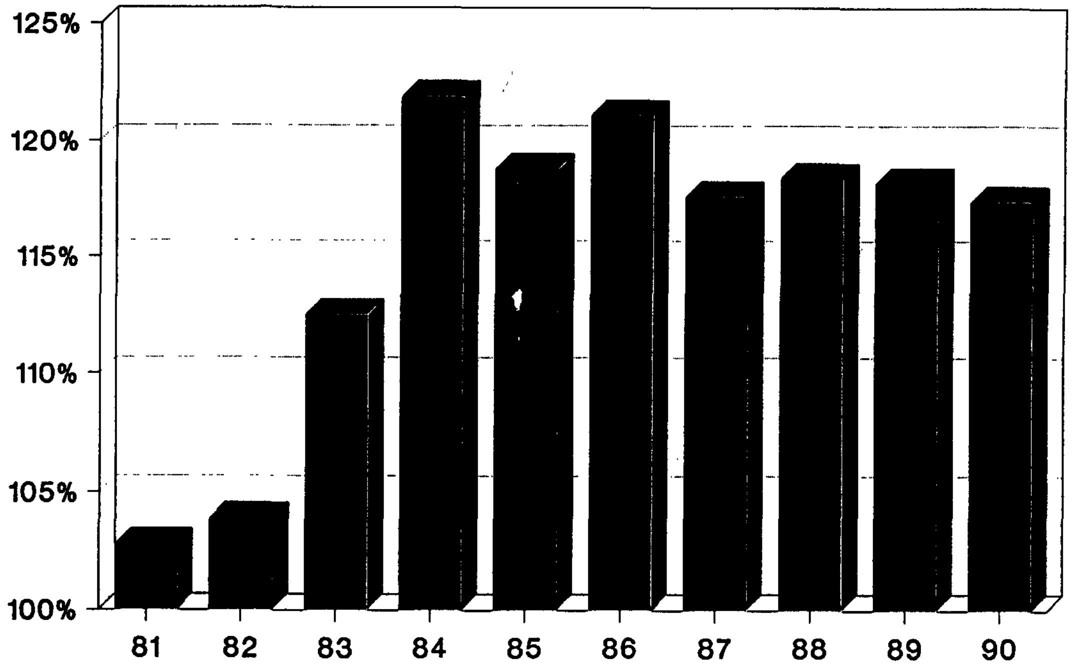
JMF 1

WORKERS' COMP NET WRITTEN PREMIUM
Industry Total



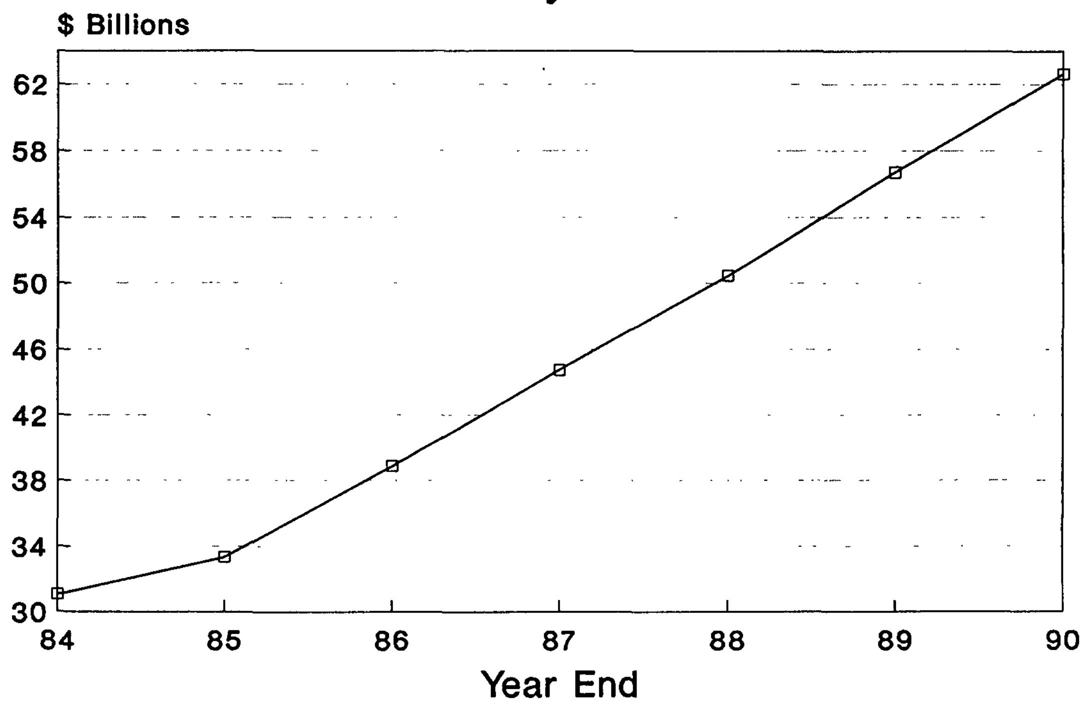
JMF 2

Workers' Compensation Combined Ratios
Industry Totals



JMF 3

WORKERS' COMP NET LOSS AND LAE RESERVES
Industry Total



JMF 4

TEXAS WORKERS' COMPENSATION
RESIDUAL MARKET RESULTS

POOL YEAR	WRITTEN PREMIUM ($000s)	MARKET SHARE	UNDERWRITING LOSS ($000s)
1984	49,679	3.1%	14,459
1985	146,255	8.7%	73,504
1986	347,857	16.1%	182,280
1987	446,407	18.5%	334,178
1988	586,241	19.1%	461,792
1989	809,836	23.4%	556,106
1990	1,238,937	29.9%	566,479

JMF 5

TEXAS WORKERS' COMPENSATION REFORM
SENATE BILL 1

- TWCC replaces IAB
- AMA Guidelines
- Trial de novo eliminated
- Significant benefit increases

JMF 6

TEXAS WORKERS' COMPENSATION
OTHER ISSUES

- Deferred Assessments
- 1990 Deficit = $532 Million
- 1990 Assessment = $331 Million
- Change to Accident Year Deficit
- House Bill 62

JMF 7

COLORADO WORKERS' COMP REFORM
SENATE BILL 218

- Strict Guidelines of Permanent Total
- AMA Guidelines Adopted
- Formula For Permanent Partial Awards
- IME's Required for Dispute Resolution

JMF 8

WORKERS' COMPENSATION REFORM
SOME OTHER STATES

- New York - 1990
  Significant Benefit Increases

- Rhode Island - 1990
  Escalation on all PTDs

JMF 9

INTERNAL CHANGES
SOME EXAMPLES

- Telephone Reporting Shortens Report Lag

- Cost Containment Programs
  Expect Lower Loss & Higher Expense
  Preferred Provider Organizations
  Utilization Review

JMF 10

RESERVING ISSUES FOR

WORKERS COMPENSATION:

WHAT LEVEL OF SEGMENTATION?

RKM 1

THE CLASSIC ACTUARIAL PROBLEMS:

HOMOGENEITY VS. CREDIBILITY

STABILITY VS. RESPONSIVENESS

RKM 2

ARGUMENTS AGAINST SEGMENTATION

1. DATA IS TOO SMALL
2. LACK OF RESOURCES
3. DATA IS NOT AVAILABLE
4. MIX OF SEGMENTS IS STABLE
5. A CHANGE IN SEGMENT DEFINITION

ARGUMENTS FOR SEGMENTATION

1. ACCURATE RESERVE ESTIMATION
2. IDENTIFY MIX CHANGES
3. PROPER ALLOCATION OF RESERVES
4. MUST MEET STANDARDS OF PRACTICE

POSSIBLE SEGMENTATIONS OF W.C. DATA

1. BY STATE OR REGION
2. BY INJURY TYPE
3. BY BENEFIT TYPE
4. BY CLASS OR INDUSTRY GROUP
5. BY MARKET

RKM 5

CONSIDERATIONS FOR CHOOSING THE OPTIMAL LEVEL OF DATA SEGMENTATION

1. AVAILABILITY OF DATA
2. VOLUME OF DATA
3. AVAILABILITY OF RESOURCES
4. BUSINESS NEEDS
5. STABILITY OF SEGMENTS
6. HOMOGENEITY OF SEGMENTS

RKM 6

HOMOGENEITY MEANS SIMILARITY OF:

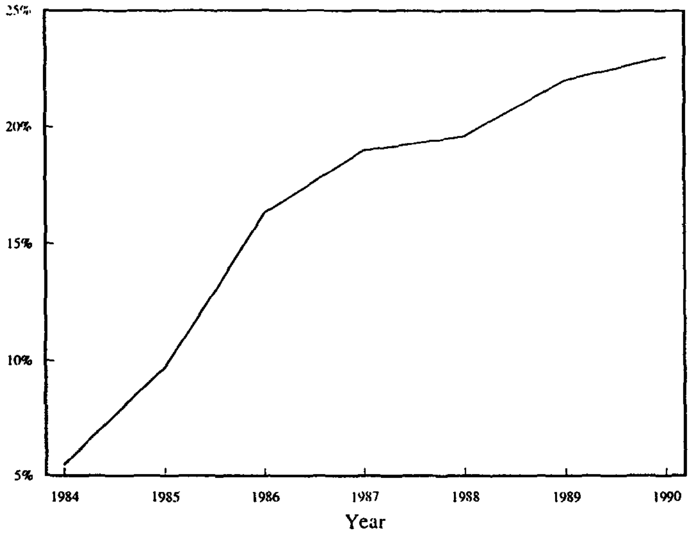
1. AVERAGE COST PER CLAIM
2. CLAIM EMERGENCE PATTERN
3. SEVERITY DEVELOPMENT
4. PAYMENT PATTERN
5. INCURRED LOSS DEVELOPMENT

THE LIBERTY MUTUAL APPROACH

* PRIMARY ANALYSIS IN 8 SEGMENTS
  * BY MARKET (Voluntary/Involuntary)
  * BY BENEFIT TYPE (Indemnity/Medical)
  * BY INJURY TYPE (Pension/Non-Pension)
* SUPPLEMENTARY STUDIES AS NEEDED FOR ALLOCATION AND MONITORING

INVOLUNTARY W.C. MARKET SHARE

AS % OF TOTAL MARKET



Source: NCCI Digest

WORKERS' COMPENSATION LOSSES

CHARACTERISTIC	Voluntary	Involuntary
AVERAGE VALUE 1990 AY @ ULTIM	3,900	4,900
SEVERITY DEVELOPMENT 1ST to ULTIM	1.32	1.12
INCURRED LOSS DEVELOPMENT 1ST to ULTIM	1.52	1.32
CLAIM EMERGENCE 1ST to ULTIM	1.15	1.17
PAID LOSS DEVELOPMENT 1ST to ULTIM	2.18	2.16

LIBERTY MUTUAL
WORKERS' COMPENSATION DATA

Acc. Year	SEVERITY CHANGE MEDICAL	SEVERITY CHANGE INDEMNITY	ULT. LOSS MEDICAL AS A % OF TOTAL
1983	12%	8%	33%
1984	16%	10%	33%
1985	15%	12%	34%
1986	16%	9%	35%
1987	12%	10%	35%
1988	16%	12%	36%
1989	14%	11%	36%
1990	14%	12%	37%
LIBERTY AVG.	14%	11%	
NCCI AVG.	13%	10%	

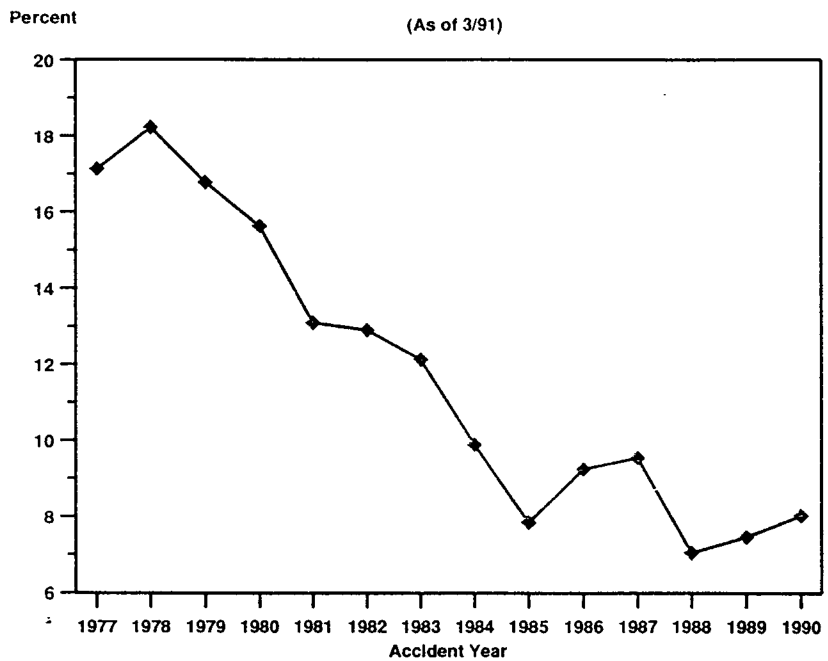
RKM 11

WORKERS' COMPENSATION LOSSES

CHARACTERISTIC	Indemnity	Medical
AVERAGE VALUE 1990 AY @ ULTIM	14,200	1,800
SEVERITY DEVELOPMENT 1ST to ULTIM	1.49	1.11
INCURRED LOSS DEVELOPMENT 1ST to ULTIM	1.59	1.31
CLAIM EMERGENCE 1ST to ULTIM	1.07	1.18
PAID LOSS DEVELOPMENT 1ST to ULTIM	7.11	2.86

RKM 12

WC ULTIMATE LOSSES
Pension As Percent Of Total
(As of 3/91)



RKM 13

WORKERS' COMPENSATION LOSSES

CHARACTERISTIC	Pension	Non-Pension
AVERAGE VALUE		
1990 AY @ ULTIM	200,000	3,700
SEVERITY DEVELOPMENT		
1ST to ULTIM	0.80	1.15
6TH to UTLIM	1.15	1.01
CLAIM EMERGENCE		
1ST to ULTIM	7.93	1.15
PAID LOSS DEVELOPMENT		
% PAID AT 1ST	1%	22%

RKM 14

LIBERTY MUTUAL
W.C. DIRECT RESERVE INDICATIONS
12/31/90

Type of data	INDICATION	SAVING
COMBINED (No Segmentation)	$100	Base
2-WAY (Voluntary/Involuntary)	$95	$5
2-WAY (Indemnity/Medical)	$99	$1
2-WAY (Pension/Non-Pension)	$81	$19
8-WAY (All Segments)	$77	$23
INTEREST ADJUSTMENT		$5
ADJUSTED 8-WAY	$72	$28

CONCLUSIONS

1. **The % Mix of W.C. Losses is Changing.**
   - Voluntary / Involuntary
   - Indemnity / Medical
   - Pension / Non-Pension

2. **The Different Segments Have Different Characteristics. They Are Non-Homogeneous.**

3. **For Most Firms, Data Segmentation Will Not Compromise Credibility.**

4. **Data Segmentation is Necessary For Accurate Reserve Estimates.**

1991 CASUALTY LOSS RESERVE SEMINAR

5C-1: THE ROLE OF UNDERWRITING AND CLAIM FILE REVIEWS IN LOSS RESERVING

Moderator

Glenn A. Evans
Pacific Actuarial Consultants

Panel

Malcolm Dodge
Applied Risk Management

Wendy A. Johnson
Pacific Actuarial Consultants

MR. EVANS: My name is Glenn Evans. Welcome to Session 5C-1, The Role of Underwriting and Claim File Reviews in Loss Reserving.

This is a short session; we only have 45 minutes. Because of the time restraints, we've elected to limit the topic that we're going to discuss. We're going to restrict our presentation to a discussion of the ways actuaries and claim consultants can work together in loss reserve evaluations. We'll have to leave the role of the underwriters to a different session.

There are a variety of situations in which actuaries might want to take into consideration the results of a claims evaluation before coming to any definite conclusions regarding loss reserves. Numerous examples exist, 1) situations where there is rapid growth in a company. 2) Situations where significant changes have taken place in claims administration practices and procedures. 3) Situations where there is significant adverse development over prior actuarial studies. 4) Situations where the results indicated by a variety of actuarial techniques differ significantly. 5) And finally, situations where a significantly higher or lower trend is observed in accident year results from year to year.

This morning we have both an actuary and a claims consultant as panelists. Wendy Johnson is one of three founding members of Pacific Actuarial Consultants. PAC is a newly formed actuarial consulting firm in California. Prior to her involvement with PAC, Wendy directed Coopers & Lybrand's casualty actuarial consulting practice for self-insurers in California. Her background includes stints as a pension actuary, as a commercial lines underwriters. She is an FCAS, a Member of the American Academy of Actuaries and she currently serves as president of Casualty Actuaries of the Bay Area.

Malcolm Dodge is Assistant Vice President with Applied Risk Management. That's a firm that provides consulting and claims administration services in the field of workers' compensation. His responsibilities have including the development of claims standards and policies, the assessment of claims administration of carriers and third party administrators, formulation of security procedures and the management of workers' compensation programs. He has claims management experience, chiefly in the southeast, southwest and in California. Malcolm graduated from Franklin & Marvel College in Lancaster, Pennsylvania. He's an active member of the Industrial Claims Association and holds a certificate in self-insurance administration.

Wendy is going to start the presentation; she will spend a couple of minutes introducing the topic. Wendy and Malcolm have selected a case study that they recently worked on to present in more detail. Wendy.

MS. JOHNSON: Can you hear me? I have a tendency to speak softly, so if I get too far away from the microphone or something, raise your hands. Except I won't be able to see you. (Laughter) Just yell.

(Slide)

We're going to be discussing a self-insured workers' compensation program for a group of hospitals. The program is about ten years old at this point and about three years ago they got a new third party claims administrator. As has been common in my experience, the new claims administrator has a lot of stories to tell about the poor job that old third party claims administrator had been doing. They also have a lot of reasons to substantiate the work that they had to do to clean up this mess that they found. As the actuary, I was in a quandary because I honestly believe that they were making a lot of changes and so I couldn't really rely upon the past loss development patterns. So, we agreed that for my analysis I would use the development pattern reported by the California Workers' Compensation Rating Bureau. We did that knowing that unless the claims administrator was doing what amounted to an unusually good job, we would likely fall short in our estimates. But we all agreed that that was the way that we would go forward for the moment. And we did that for a period of time.

(Slide)

My client's first response to the fact that we were having to make a large assumption about the development pattern was to say, let's have lots of actuarial reviews so that we can see how this development pattern is working for us, given that it is totally an assumption. You can see that we've looked in January of 1989; we looked in June of 1989; we looked in January of 1990. We were looking a couple, even three times a year. This is just an example of what was happening to the 1988 year. The other years were moving similarly. The ultimate loss estimate went from \$1,760,000 to \$2,300,000, \$2,550,000, and so on, all the way up to \$2,940,000 because actual development kept exceeding the assumed development. It was just really growing. And this was causing them some reserving nightmares, because they kept having to make accounting adjustments. I got real familiar with their Finance Committee.

(Slide)

I'm going to go two slides ahead here. At the same time that the loss development pattern that we were using seemed to be way short of what was taking place in actuality, it seemed that the loss costs were going up dramatically from year to year, especially after 1985. We were sure that this was real. That is, the costs were going up dramatically, but we weren't sure if we were measuring the increase accurately. And, in fact, we were pretty sure that we weren't, given the uncertainty in what the development pattern was.

One of things that was interesting is that we kept going back to the third party claims administrator and saying, look you've still got a lot of loss development two years after you took over, and they kept giving us reasons why they thought that that was appropriate. They kept telling us that we were finished now with the loss development, and we kept seeing still more of it. And finally we said, okay, one of the things that we need to do is check up on your procedures to see what's causing the situation that we see.

(Slide)

After quite a bit of discussion I convinced the employer to have a claims review. And we basically had five reasons for recommending the claims review.

The first reason was that we really wanted to get a second opinion on the appropriateness of the claims handling procedures in total, not just the reserving procedures, but the claims handling procedures. We wanted to know that paper was flowing at the right rate and the timing of the payments was right and appropriate things were being done with each piece of paper as it entered the administrator's office and so forth. And then, of course, we wanted to know, given all that was happening, that the reserves were being set appropriately.

We obviously also wanted increasing accuracy in our forecasts. Just what was the appropriate development pattern, given that we had had all this discussion about one to assume and it wasn't working? Also we wanted to know why there was so much loss development. Was it a reserving issue? Was it a procedural issue? Just what was it? And we wanted to know why the loss costs seemed to be going up so much from year to year. Having learned a little bit about why, we wanted to be able to figure out how to stop that cost spiral and that was the point at which we brought Applied Risk Management in.

Now I'm going to let Malcolm Dodge talk about what he did.

MR. DODGE: Thank you, Wendy. You have handout material that matches...the slides. The slides should proceed in the same order that they are in the handout. You'll also find that there is an outline of about three pages that details, in a little bit greater fashion, what the audit process entailed.

Our role in this process was to evaluate the way in which workers' compensation claims were being managed.

(Slide)

Here in Slide One you can see that our first step was to undertake a needs assessment. The audit process involved interviews, both of the self-insured and the third party administrator. It next involved an audit. We came up with a variety of findings and made several recommendations. Following this process, a second audit was performed.

The purpose of the interviews was to determine what the roles and responsibilities were of the third party administrator as well as the self-insured. There was an attempt to identify how each perceived their own strengths and weaknesses as well as how they perceived the strengths and weaknesses of each other. This process took about a day and a half and it involved interviews of about twelve to fifteen people.

I mentioned that there were two audits. The first audit was a general audit, as well as a reserve audit. In the general audit, we reviewed 30 claims, and there were 40 additional cases reviewed for reserve purposes. If you take a look at the handout, there were a variety of categories that were reviewed as part of the general audit process. These are fairly common categories for review in an audit. They include things like the way in which claims are initially investigated, how claims are medically managed, how costs are contained within cases, vocational rehabilitation, litigation management, etc. The reserve component is a part of the standard audit and we included these other 40 cases to get a feel for whether the reserves were adequately maintained, how often they were reviewed and the like.

As a result of the reserve findings in the first audit, which showed that about 75% of all the cases that we reviewed had more than a 10% reserve difference between our estimate and the third party administrator's estimate, we conducted a second audit with a much larger sample. In this second audit, we reviewed 120 cases with a focus on older claims. Our thinking was that these are cases which have already had a great deal of development and, therefore, the administrator should be more adept at identifying what the limited future exposure might be on these cases. Unfortunately, what we found was that there was a similar pattern of reserving inadequacy. Here again, about 75% of all claims had more than a 10% difference. If we were to expand the incurred differences to look at those cases where there was at least a 20% difference than we found that our estimates differed from those of the administrator 50% of the time.

(Slide)

Here in Slide Two...one of the things that we learned from the interview process is that the third party administrator had insufficient staffing. In California, responsible case loads are somewhere between 140 to 180. There has been much reform over the last year and a half to two years and this has necessitated a reduction of case loads to something that's more manageable. This administrator had case loads in the area of 280 to 300 claims which simply did not afford them an opportunity to do the kinds of things that they needed to do in order to be more successful. As a result of this understaffing, they tended to react to claim situations rather than to be able to create them.

One example that I might give you is this. In the initial investigation phase of the case, one of the things that administrators are encouraged to do is look for pre-existing conditions. Administrators should determine whether or not there is any type of illness or ailment that the person is being treated for on an ongoing basis. Evidence of such activity was lacking. What we found instead was that there was a tendency only to get records at a time when the administrator was interested in addressing permanent disability. Therefore, there was no real effort to establish the injured worker's pre-injury status and thereby minimize costs and disability.

What happens in a situation like the one we confronted in our audits is that administrators tend to manage disability and not medical information within the file. This leads, oftentimes, to symptom migration where a neck injury becomes a low back injury. A wrist claim becomes a shoulder claim. Costs escalate and when litigation occurs, attorneys who represent injured workers expect that the benefits that have been provided on an on-going basis can be taken for granted. Injured workers are not easily going to give these benefits up; therefore settlement costs increase. Clearly the outgrowth of all this mismanagement is that reserves will be maintained inappropriately, without well-reasoned strategies.

(Slide)

Here in the next slide you see half of our work sheet which was split into two basic categories. One was a medical reserve; the other, indemnity. This worksheet happens to come from one of the files we audited. Typically what the administrator would do when establishing a medical reserve would be to put a lump sum figure into a medical reserve category so that you couldn't really tell what the thought process was that went into the estimate. This created a problem in trying to establish why they had established that particular dollar value on a claim.

(Slide)

A similar problem occurred with the indemnity portion of the reserve work sheet. Typically, the administrator would borrow from one subcategory to pay benefits out of another. So if temporary disability ran longer than had been anticipated, a reserve that had been earmarked to pay permanent disability was now being used to pay temporary disability benefits. And the same thing was true in other benefit categories, where vocational rehabilitation reserves might be used to pay temporary disability benefits.

Another problem with this administrator related to its management of the permanent disability benefit, which should be paid out as soon as it's known. If the administrator holds back on making permanent disability payments, then when the case comes time to settle, even in cases where the injured worker is not represented, there's a large chunk of money that is going to be paid out at one time based on the accrued benefits that exist. Simply put, injured workers in this scenario are less encouraged to settle all benefits because they will receive a lump sum anyway.

(Slide)

This slide shows a different way of evaluating the case we've just seen in the two previous slides. One of the things that I mentioned earlier on was that 50% of all the claims we reviewed had at least a 20% difference in the incurred estimate. The administrator had paid approximately $100,000 on the claim. Our incurred estimate amounted to $166,000, their's to about $120,000. So we came up with a 40% difference in the incurred value of our reserve compared to their's. When we look at what the future exposure is you can see that the difference is rather dramatic. The difference is almost 350% in future exposure, which is really the only thing that there is left to determine. The paid figures clearly are well known.

(Slide)

Here in the last slide, what we have proceeded to do, since the time of these audits, is to create a situation where the administrator has a better opportunity to succeed. We have established a dedicated claims unit, obviously with the support of the client, the self-insured. This has resulted in an increase of about two and a half people within the unit. Administrator case loads are about 175. This affords them the opportunity to take on certain tasks that previously they had not done.

One of the things that happens in the early investigative process is that claims staffs do a great deal of information gathering. We found that a lot of the information gathering that needed to be done was not and we attributed this, in part, to the fact that the administrator was understaffed. This staffing change should allow cases to be better medically managed. And the focus of the administrator should shift from one of managing disability to one of managing the health of the injured worker. Doctors, as a rule, tend to prefer to be asked questions about medical conditions rather than when the injured worker is going to return to work, when their condition will be permanent and stationary, whether or not they will need vocational rehabilitation. If the focus is on wellness and this focus derives from an objective analysis of the injured worker's medical condition, then what we anticipate is that reserves will be more appropriately stated. Wendy.

MS. JOHNSON: I think you can see that we gained a lot of information that will help us to control the cost increase that we had noticed, but I'm going to move on from that to talk about the reserving issue, which is really the focus of this talk.

While Malcolm was doing his work, I had gone back and compiled quarterly loss evaluations, which I had not had the opportunity to do in the past, and put together an observed development pattern of three years duration based on each of those quarterly evaluations. The first thing I noticed was that the development pattern was really quite consistent, which was not what I had expected, given what I had heard from the claims administrator about the backlog of cases that they had taken over from the previous administrator. But it really was quite consistent over the whole three year period. So I felt reasonably comfortable in using the whole three year quarterly history at that point, which really did surprise me.

(Slide)

I summarized the results of Malcolm's review for the purpose of reexamining the loss development pattern, in this way, as shown on the slide. Obviously, many cases were over-reserved and, at the same time, many cases were under-reserved. Malcolm's finding was that 75% of the cases had over 10% difference in the reserve. Yet at the same time the aggregate total reserve was pretty much about right on all of the cases. So that means, of course, that many are over and many are under. The reserve inaccuracy seemed primarily to be due to infrequency of review. They just weren't getting around to changing the case reserves often enough to keep up with the changing circumstances on the cases.

The newer cases were more likely to be over-reserved. They maintained strenuously that they were putting up conservative initial reserves and we found that, in fact, we definitely agreed with them. However, the older cases were more likely to be under-reserved. Again, this is typical in a situation where you're not looking at the cases frequently enough.

The smaller cases were also more likely to be over-reserved. Smaller cases tend to be the newer cases and so this seems consistent with the previous two comments. And the larger cases were more likely to be under-reserved. Again, this seems consistent. The larger ones are the older ones in general.

The extent of the under-reserving was much greater per claim than the extent of the over-reserving. In other words, there were many more cases that were over-reserved than there were cases that were under-reserved, but the dollar values associated with the differences were greater when the cases were under-reserved. This smells to me like you're going to get a lot of loss development, which in fact is what we had seen.

(Slide)

The one thing that we ruled out very quickly in my review of the quarterly data, was that the large amount of loss development was the result of late reporting of claims. The claim count development pattern was the pattern that I had assumed and had worked with over the past several actuarial reviews. And you can see that the actual pattern when I got the quarterly data all compiled was actually much faster. There really was no delay at all in the reporting of claims to speak of. So the loss development was not due to reporting delay.

(Slide)

This is the final graph and really the one that pleased me the most when I saw it, because it really struck me that what we had done together, Malcolm and I, dove tailed very nicely. The pattern that I had observed with the quarterly statistics matched very nicely the findings that we had come up with in the procedural review and the reserve review. What we have here is the pattern that I had been working with on an assumed basis. The top row of squares...and then two years later the pattern that I had modified, based on the continuing high loss development... that's the diamonds, the lower relatively smooth pattern.

Then we have the pattern that I had observed with the statistical patterns following Malcolm's review. And, well, the first thing you can see is that it kind of wanders all over the place. But it really was quite consistent within each age to age link. And the first thing you can see is that between about 18 months and about 24 months, the percent of the ultimate that is reported is actually quite a bit greater than the modified pattern that I had looked at. And I believe that that was because the initial case reserves that they were putting up really were pretty conservative. Then you can see that it wanders well below the diamond line. That, I believed, was because they were not keeping up with making reserve changes as needed and the reserve levels, in aggregate, were falling further and further behind on the more serious cases which, of course, were the only ones that tended to be open between three and five years. The pattern just continued to wander, but always well below the other patterns that I had been working with on an assumed basis. I attributed that to the infrequency of the review and the fact that the older cases and the more serious cases tended to be under-reserved. So I was really pleased at the final result, both the ability that we had to help the employer control the costs and the fact that we should now be in a much better position to make accurate reserve projections.

And that's where we'll stop. We'll be happy to take questions. Somebody want to turn the lights back on?

QUESTION: I just want to make sure I understand how those last patterns were developed. Your pattern was developed simply by those...the (inaudible) of the last couple of years. What you had seen emerge was his was based on adjusting percentage wise all of their cases upward or downward based on the percentages that he had seen on the samples. Claims samples as of that stage of development?

MS. JOHNSON: Not quite. What Malcolm did was go through file by file and say, what do I think this reserve should have been? And he came up with dramatic differences between his reserves and the claims administrator's, both positive and negative. He didn't do anything to estimate a development pattern. I did that, going back and obtaining quarterly data, which I had not had the opportunity to do previously, so I had three years of quarterly tabulations. We worked totally independently at this point. You know, I was busy tabulating and he was busy reviewing the reserves. The thing that pleased me was that in the end Malcolm's findings very neatly explained the statistical observations that I was able to make, so that this wandering pattern that you might look at and say, "Boy, something is wrong there. We don't understand it. How can that be?" seems to be very understandable at this point. We felt much more confident that we now had something that really made sense.

MR. EVANS: Are there other questions?

MS. JOHNSON: Well, thank you for coming.

MR. EVANS: I guess we would have had time for underwriting after all.

1991 CASUALTY LOSS RESERVE SEMINAR

5C-1: THE ROLE OF UNDERWRITING AND CLAIM FILE REVIEWS IN LOSS RESERVING

Slides

CHANGES IN ULTIMATE LOSS ESTIMATE FOR 1988

REVIEW DATE	AMOUNT
JANUARY 1989	1,760,000
JUNE 1989	2,300,000
JANUARY 1990	2,550,000
JUNE 1990	2,700,000
SEPTEMBER 1990	2,690,000
JANUARY 1991	2,940,000

REASONS FOR RECOMMENDING CLAIMS REVIEW

- ✓ "SECOND OPINION" ON APPROPRIATENESS OF PROCEDURES
- ✓ INTEREST IN INCREASING ACCURACY OF FORECASTS
- ✓ CONTINUING VERY HIGH LOSS DEVELOPMENT
- ✓ CONTINUING ESCALATION OF LOSS COSTS
- ✓ INTEREST IN IDENTIFYING WAYS OF CONTROLLING COSTS

Malcolm Dodge
Applied Risk Management, Inc.
Oakland, Ca.
(415) 452-9300

THE NEEDS ASSESSMENT PROCESS

I. INTERVIEWS
   A. Key employer staff
   B. Key administrator staff
   C. Other program participants
II. THE AUDIT
   A. Initial investigation
      1. employee contact
      2. employer contact
      3. physician contact
      4. witness contact
      5. statements
      6. apportionment
      7. subrogation
      8. surveillance
      9. evaluation of liability
   B. Medical management
      1. reporting
      2. planning
      3. independent examinations
      4. ongoing contacts
   C. Disability management
      1. benefit provision
      2. return-to-work programs
      3. timely recognition
   D. Cost containment programs
      1. fee schedules
      2. utilization review
      3. pre-certification
   E. Vocational rehabilitation
      1. approach to the benefit
      2. timely referral
      3. adequacy of services

F. Litigation Management
   1. frequency
   2. referral timeliness
   3. degree of attorney involvement
   4. program awareness
   5. resource
G. Reserving
   1. frequency
   2. approach
   3. tools
   4. responsiveness
   5. excess report recognition
H. File maintenance
   1. diary system
   2. responsiveness
   3. documentation
   4. chronology
   5. direction toward closure
I. Recommendations to the employer
J. Recommendations to the carrier/administrator

III. Findings
   A. Limited management involvement
   B. Size of staffing
   C. Limited medical investigation
   D. Evaluation of liability
      1. adequacy
      2. control
   E. Emphasis on disability management
   F. Need to improve ongoing contacts
   G. Quality of legal representation
   H. Limited analysis in claim review meetings
   I. Weak strategies influence reserves

IV. Recommendations
   A. Increase staffing
   B. Develop claims standards
   C. Provide training
      1. definition of responsibilities
      2. gathering of information
      3. medical management(scope and approach)
      4. reserves reflect strategies

D. Develop better management review
E. Improve medical panels
F. Contain medical costs
   1. charges to self(this employer is a healthcare provider)
   2. preferred provider network
G. Manage indemnity benefit so as to increase settlement opportunities

Needs Assessment

- Interviews
- Audit
- Findings
- Recommendations

Problem

Insufficient Staffing	→	Interview Process
	↗	Initial Investigations Medical and Disability Management Litigation Vocational Rehabilitation
Reactive Claims + Management		
Inappropriate Reserves	→	Unpredictability (Findings)

Medical Reserve Worksheet

Paid to Date:	$ 69,884.25
Future:	
Doctor:	7,000.00
Hospital	1,700.00
Physical Therapy	2,000.00
Pharmacy	1,200.00
Mileage	200.00
Other	2,500.00
Total	$ 84,484.25

Indemnity Reserve Worksheet

Paid to Date:	$ 30,089.56
Future:	
Temporary Disability:	2,113.40
Permanent Disability	26,965.00
Rehab Disability	10,988.12
Rehab Vendor	2,800.00
Rehab Education	8,500.00
Rehab Travel	500.00
Total	$ 81,956.08

Reserve Comparison

	Auditor	Administrator
Paid	$ 99,973.81	99,973.81
Incurred	166,440.33	119,051.00
Difference	40.0%	----
Future Exposure	66,466.52	19,077.19
Difference	348.0%	----

Solution

Sufficient Staffing → Ability to Succeed

Information Gathering
Medical Management
Resolution/Wellness

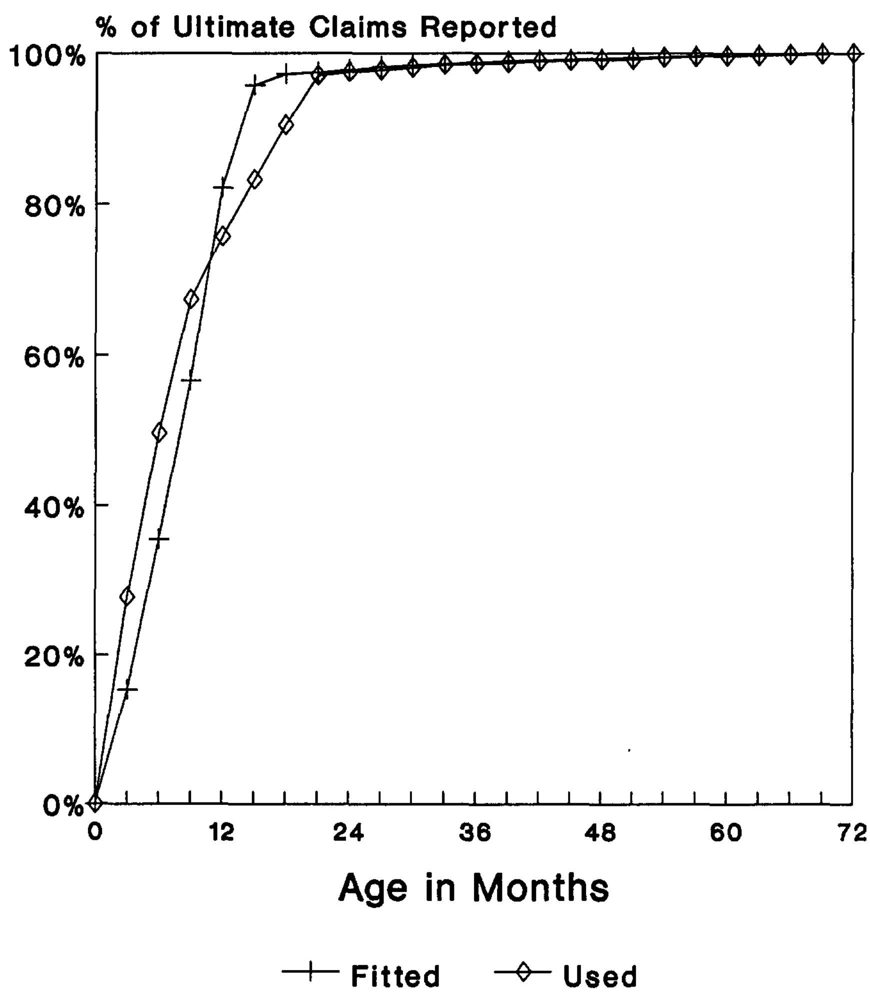
Proactive Claims
\+ Management

Appropriate Reserves → Objective Analysis

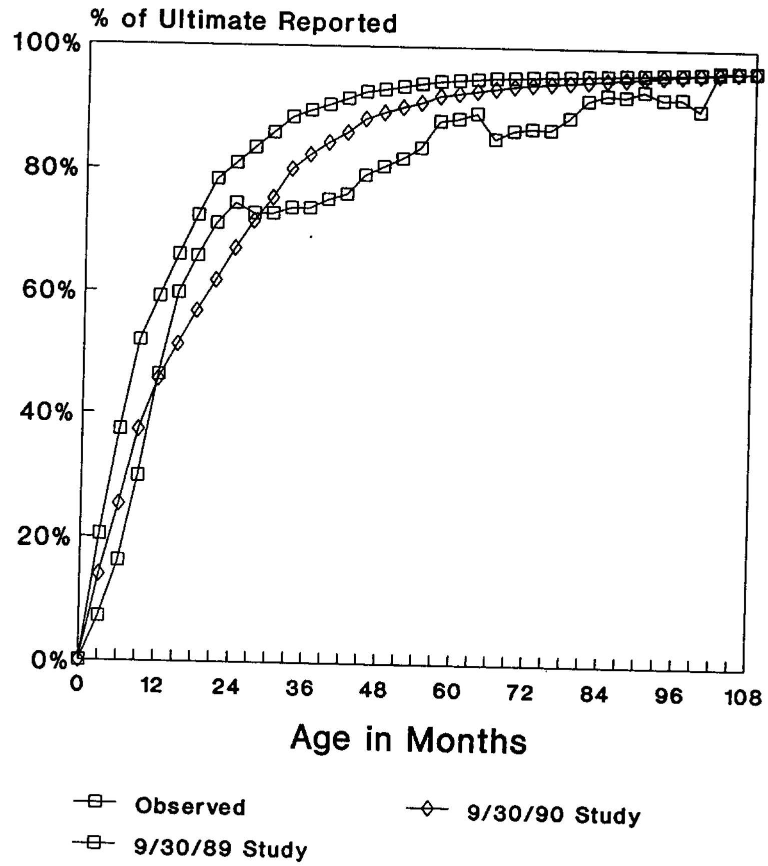
Selected Loss Rates

Accident Year	Loss Rate
1982	1.02
1983	1.82
1984	1.23
1985	2.17
1986	3.27
1987	3.04
1988	3.51
1989	4.55

Claim Count Development



Reported Loss Development



KEY RESULTS OF CLAIMS REVIEW CORROBORATED BY OBSERVED DEVELOPMENT PATTERN

- MANY CASES OVER-RESERVED
- MANY CASES UNDER-RESERVED
- RESERVE INACCURACY DUE TO INFREQUENCY OF REVIEW
- NEWER CASES MORE LIKELY TO BE OVER-RESERVED
- OLDER CASES MORE LIKELY TO BE UNDER-RESERVED
- SMALLER CASES MORE LIKELY TO BE OVER-RESERVED
- LARGER CASES MORE LIKELY TO BE UNDER-RESERVED
- EXTENT OF UNDER-RESERVING MUCH GREATER PER CLAIM THAN EXTENT OF OVER-RESERVING

1991 CASUALTY LOSS RESERVE SEMINAR

5C-2: DATA PROCESSING TECHNOLOGIES

<u>Moderator</u>

John J. Schultz
California Casualty Management Company

<u>Panel</u>

Michael C. Garner
Coopers & Lybrand

MR. SCHULTZ: ...Of all the people in this room, how many degrees in insurance? You may be the only one. Mike has fifteen years of experience with a leading software vendor, Policy Management Systems Corporation in Columbia, South Carolina. He spent three years with Digital Equipment Corporation, heading up their insurance industry practice and is now with Coopers & Lybrand. Mike will be speaking about emerging technologies. Mike.

MR. GARNER: The first part of emerging technology is not to trip over the cord as you're walking over it. Can everybody hear me in the back of the room? If I'm standing in the way, let me know. I'll give you a minute to get used to my, now Midwestern accent.

What we want to talk about for the next thirty minutes. We've got forty minutes and John told me I could have thirty of them, is to talk about what is going on in technology. And we've tried to focus on those things that are going to impact you, particularly, but we're not going to limit it to just that.
The one thing that I am excited about is that people have been making promises for technology since the '50s when it first came out about what technology was going to do for us. But if you look at what the insurance industry has done with technology over the past thirty years, basically we have continued to add up numbers and we have automated some functions, but we have not really yet taken competitive advantage of technology.

Two interesting stories that I enjoy from the '50s. One relates to IBM. When IBM first manufactured their mainframe technology in the 1950's they felt this was a very limited marketplace. They anticipated selling thirty machines. They missed the mark. Simultaneously to that, there was a large...a very large Mid Atlantic insurer that the Vice President in the '50s...the Vice President of Actuarial Services was encouraged to go look at one of these pieces of new technology and come back and say, how will that affect our corporation? So he went to IBM, visited and came back and said, I see no impact whatsoever. I don't think we need one of these things. So we've come a long way, I think. We've moved a long way from yesterday, today, tomorrow...we're going to kind of step through that a little bit.

The noticeable change out there is you used to think of software as cheap. That was just something our programmers did and the hardware part was expensive. The reverse of that is really turning out to be true. Hardware, most of you probably have more power on your desktop right now then...I'm not an old guy...I'm pushing forty, but I'm not an old guy...but you probably have more horsepower on your desk right now than was in the data center when I started. So that's where that technology is going out there.

It is interesting also...Digital Equipment Corporation, while I was there, made a commitment to its client base that it will field upgrade its new 6000 series hardware. Approximately every two years they will come out and make that hardware 40% faster. What's happening is you now have the technology to do something, rather than just add up numbers, you now have the technology to do things with telecommunications, to do things with image processing, voice response, optic systems, expert systems and some of the mass storage that's out there including the CD Rom. The net result is finally as we move into the '90s we have a tremendous capacity to achieve like we haven't had before. I'll give credit to some of my brethren.

Arthur Young, before it was Ernst & Young, put out a manual and it talked about the four levels of technology. First level was we add up numbers, reports. The second level is we automate functions, claims drafts, debts, claims processing. The third level is where we provide information to our users. It is also interesting, Dr. Hammer points out that only the drug industry and data processing people refer to their clients as users. (Laughter) But the third level of data processing is information. And the fourth level is using information or using technology for competitive advantage.

Competitive advantage. The first Bank to use an ATM. That was competitive advantage. Everybody else was automating a function. The insurance industry, by and large, is around level one and number two. We're adding up the same reports we had in the '60s. We're automating functions and we're just now learning how to provide information to our customers. Very few insurance companies, although USAA talks a very good game. I'm not down playing that. They talk a very good story on that one. There are several like Progressive that talk a very good leading edge story, but very few insurers are out there on that level four where we are using technology for a competitive advantage.

We've got a tremendous opportunity now to achieve and for those of you who remember the Hubbel Telescope, there is also the tremendous technology for one little thing right smack in the middle to go wrong to cause it not to work.

The impact on the industry. Believe it or not, and we were talking to some people from USAA just a couple of minutes ago, believe it or not you probably have 300% more data than you had ten years ago. The problem is you just can't get to it. You are still getting the same reports, the same data features. You're still getting the same information, but out there in that 300% more data you have new formats. You have new variables. You have new pieces of information that you'd like to get your hands on, but unfortunately they are in multiple different files and in multiple different locations. And the issue is, how do I get to them?

Well, what we want to talk about today, some of the technologies that we feel are going to affect, particularly your group, over the next couple of years. Databases. Distributed systems. Spend just a little bit of time on expert systems. If we get time we'll come back to that again. Languages. Some of the re-words, re-engineering, re-systemization, and the implications of those.

Database technology has advanced significantly from the '70s into the 1993's and the 1990's time frame. The first thing you have to do...we've gone from hierarchial to network to relational and moving into database machines. There are a few Terra-Data users out there...Blue Cross/Blue Shield of Illinois, Liberty Mutual.

First thing I want to do is explain the difference between the flat file and a database. A lot of people get into conversation and they say, what's the difference? A flat file like a V-Sam file is a string of data. The piece of data beside it doesn't know what the other piece of data is, doesn't know where one field stops and the next one starts. The only thing that knows the difference between this data element and this data element is the program itself that says, go read this string of data, find record 02 position 47 and get the data element that starts in the next six positions. So to change a file, to change a program, to make zip code a seven digit number instead of a five position number, is a major effort.

Database is the separation of programs from the data file that says, zip code is a field out here. A program goes and gets zip code. When you can get your technology to a database technology, the ability of you getting to your data has gone up about a 1000%. Your objective, as users of data processing, is to get your data into a database technology.

We have passed very quickly, fortunately, from hierarchial to relational. Relational is basically a free formatted database. I don't have to predefine the relationship between this data element and this element. The benefits are obviously tremendous ease of use, easy to modify, entity easy to interface with, and for those of you that know SQL, much easier to get to that data that is out on the data file.

There are still some issues around performance. Transaction performance for Aetna to run all of its claims to say against the DB2 database. That takes a lot of power to do that. So the performance of the database kept past you is not that great yet.

Going through this pretty quickly. Somebody slow me down if there is particular area we want to get more into.

Database machines. IBM processors are basically multi-function processors. They do a lot of things. They run CICS. They interact with other machines. They do peer to peer communications. Database machines are machines that are designed that do nothing but handle the data. Have large amounts of data out there to let you get access to that. Basically it's taking the database and machine and making those functions one. So where the software or the hardware does it, it's all in the hardware now. It's much faster, much easier access. I was talking to Liberty Mutual and he said though it was like trying to get to the data through a straw. That only one or two people knew how to work that environment. So, again, it is shoving a lot of responsibility back out to you to learn how to be an intelligent user of that devise. How's that going to work?

Distributed systems. How many people in here have a PC? You have distributed systems. You get into an argument sometimes about what is a distribution system and what isn't a distributed system. Anytime you've got any data or any processing capacity, which is somewhere other than the mainframe, you've got a distributed system. How many of you have that system networked so that everybody else in the network can get to your files when they need it? The data that is on your system, other people can get to that? You guys are getting there. Okay.

Data should be owned by the corporation and everybody should be able to get to that data. For those clients that are sitting there with floppy disk and moving around from one PC to the next PC, why is your data right? That's what we're trying to get past. And that when you look at the development of data processing in the traditional, that was kind of the 8100, system 36, we had processing at a site, we took the net result of that and we passed it up to a mainframe and some portion of that data was stored on the mainframe.

This is pretty much a typical condition that you'll see out there right now. You'll see a blend, but in most environments that we walk into if the data's right here, this guy usually can't get to it. They can usually get to anything that's on their network, they can usually get to anything that's on their network, but the ability to move data across the network...very few companies out there have that. That's where we see the client base going. And I hate to use an old Digital logo, having come from there, but I like their slogan "the network is the system." You need to quit thinking of the mainframe as the center of your data processing environment and start thinking of the network as your data processing environment and you should have the access to get to any data, with the right security of course, but you should have the ability to get to any data stored anywhere on the network. That includes somebody's PC. That means the regional office. That means the mainframe.

The technology is there. It now exists, such that where the users sit, where the programs sit, where the programs reside or the processors are and where the data is stored are absolutely independent positions. Absolutely independent.

We're making real good progress. I'm going to take a couple of minutes on expert systems. If you look at the impact of expert systems, in the insurance industry, five years ago there was a tremendous excitement about expert systems and then it all fizzed and nobody got real excited for a year or two. Absolutely back on the upswing right now, with people trying to figure out how to best use those and rather than large one-off expert systems that do something, they are now integrating them into their current processing environment. It says right here in this little area, in this claims department, or in this actuarial area, I want to use the power of expert systems to perform this function. So you're seeing much smaller one-off focused applications and the use of expert technology.

(Slide)

We do an annual survey and I won't go through all of it, but if you look in the property/casualty in the life side of the mid-tier clients, that's pretty much where the breakdown of our annual survey came out this year. Mid-tier, top one hundred, if you break it down by type of application, that was pretty much the breakdown.

The main point that I want to get out you're going to have data that you've never had before. There's a term, we're doing a project with the Chicago Board of Trade right now on insurance health futures, which is kind of interesting, but you are going to be capturing new data that you have never had before that's going to be out there on those distributing systems and if you are really trying to do loss reserving and price reserving, you've got an entire richness of data that's out there in the regional office that if you can get to and bring that back to your actuarial and your loss triangles, is absolutely going to impact the granularity of how you can view the numbers. You are to be able to look at it in new demographic fashions you've never had.

Is there a Progressive person in the room? I was working with Terry Buchanan and your people were saying there were like 4,000 actuarial components that you guys feel you are capable of capturing and getting to now. And that that type of granularity, to be able to look at data in that way, allows you to have a different price for a red car as opposed to a price for a blue car, which very few people can do.

COMMENT FROM AUDIENCE: (Inaudible)

(Slide)

MR. GARNER: Most of you know the Cobol and Assembler languages. Most of you are still getting reports that are written in Cobol and Assembler. That's why I'm going to come down to some of the stuff called CASE and re-engineering in a minute. You're starting to use some of the newer languages out there, Natural, Focus, SQL. Those things are very much dependent upon you having access to your data, being able to get to those databases. There are a couple of vendors now that even have front-ends that you can do menu select...I want that data element and that data element and that data element on that file and it will write the SQL calls for you. So the capacity to have a very junior person, if you've got the data, to sit down at a distributed system and have the machine write the SQL calls and go get that data for you, that technology now exists.

(Slide)

CASE technology is what we want to talk about and I put the word theory up there, because it doesn't work quite as well as the CASE sales people lead you to believe. Case technology says, I can describe a business process. I can describe my information that I need to do that. I can describe both logical and physical models. And I can have that technology produced in code for me. I can produce IBM Cobol. I can produce Dec Cobol. I can produce Honeywell code if I needed to, so that we are taking our business processes and data and separating those from the technology that we run them on so when the new technology of the year 2000 comes out, we should be able to regenerate all that code and bring it across.

There's a little problem, which we'll get to in a minute. Very few people build new systems anymore. There are some people that are attempting to build new systems, but after they've built those new systems they find out that about 60 to 70% of what they have rebuilt was the exact same thing that was in the old system. We still earn premium in the same way. We still collect the same data elements, so that will get us into one of the trends that we're going to talk about. But, again, the trend with case technology is to make it absolutely technology independent.

Redevelopment engineering. Seventy-seven billion lines of code in the world. USAA has got some of the finest systems in the world. They really do. They've also got some code that was written in the '60s. Aetna, Safari...where's some Aetna people? There's got to be some Aetna people in the room. Okay. Safari, one of the greatest systems ever built. I mean, it is a wonderful system. You guys led the industry. You were so early and so fast that CICS wasn't available. You had to build your own telecommunication piece on the front end. If that thing ever doesn't run one night you'll never catch up again. (Laughter) When people at Aetna talk about rebuilding Safari, some people get nauseous and leave the room. It is a huge system and that what companies are doing now is saying, wait a minute, I have no intention of throwing that old system away. There is no way that I'll throw that old system away. That old system runs my business every night and it is my competitive advantage. What I've got to do is find out what is in that old system that I like, extract it, bring it forward and do business in a new way. This is the technology that had surfaced pretty much this year. People started talking about it three or four years ago. I think it's another three years before it gets off the bleeding edge, but the ability to be able to go in, understand what your systems do, do an archaeological dig of your old systems. I'm getting some grins out there now. How many people really feel like they've got a well documented system? (Laughter) There is technology and Coopers doesn't sell technology, so I'm not doing a plug for what we do.

There is technology out there now and a new word called Parce. Got to have a new word every year. The ability to Parse your code. The ability to read your code at a high rate of speed and have these new technologies tell you what your old systems do. This program talks to this program. These programs are called by this program. This program uses these data elements. These data elements are used by these programs. And I'm not sure, but I found this eighteen digit number that was called Pol., Policy Num., Number, P. Number, and to be able to bring it back and say I found fourteen different places where this thing kind of looked alike and kind of had synonyms out there. Is there any chance that all of these are the same number?

We have recently won an out-sourcing maintenance contract. And the reason we won that is because the typical approach to maintenance is when you request a change...I make the on-line version...and then I use the input from the on-line version to help me debug the batch tonight. When it doesn't go through and it blows up tonight, it's going to fix the batch program. And this weekend when I pass the data from the back cycle into the weekly system, is when the weekly system blows up. And at the end of the month when the monthly system blows up. And at the end of the year when the annual statement blows up. And that's how we debug our live system. The ability to have code...read your entire code...literally at thousands of lines per minute, reassemble those and say, you are getting ready to change policy number or you are getting ready to change zip code or the year 2000 is coming up and you'd like to know every place that that is used in your system to have this code read your entire system and say, here's the 412 places that you need to change. And I can say that unequivocally. Bam! Right here.

Again, we won a contract because we felt like we could do maintenance with 30% less than the other competing vendor, because we were bringing that capability to the table.

Do you get rid of your programers? No. You work on that backlog that's out there that we hadn't gotten to yet. So we think there is a lot of impact in the re-engineering. I jumped through a whole lot of it there.

James Martin says there is a two to four year documented backlog. We think there's at least that much again of people who have just gotten tired of asking for stuff and have just quit asking.

We think this one is critical. This is the re-engineering, again, component where you recycle back through. And there are various different levels and you won't do one of them, you'll do subsets of all of them. But you can't tell an entire business community you don't get anything for five years while we go build a new system. One, because five years is going to be ten. And then when you get through with ten, a lot of it is going to be what you had before. So the ability to be able to loop back first through the design, change the design, break out all the IO, break out the change in the final structure, change the platform...but just go through the physical design. Then leap back through and bring out the business analysis and change those. One of the parts that you really need to watch that's coming, which gets back to the case technology that I said I was going to talk about...the problem with case technology is nobody builds new systems. And when case technology came out as the promise of the mid-'80s, all the CEOs got excited about it. All the CFOs got excited about it. We're going to be able to build systems in half the time. Nobody builds new systems. The technology is now there. Soft. It's real soft to take your old Cobol code, move that through the Parcers and load that out to case technology. Today you can take Cobol code. You can drive it into such case tools as a knowledge-ware or a TI's tool. You can drive it into that and generate new Cobol code from that. So the ability to be able to populate case tools should allow your data processing department to quit dragging a large piece of that anchor along that they do.

In summary, it sure is our philosophy or our opinion that as we move into the '90s the tools for success are kind of for the first time there. We have got enough compute power speed to do anything we need to do. It's cheap enough to do anything we need to do. The tools are there. We're still dragging a lot of old code with us, but we think the tools are there. And we think that integration is the word. That just piling stuff on top of each other does not make a pyramid. It's gonna...remember I said the complexity of making it all work together. Your DP department or your MIS, your IT department has a challenge they really haven't had before.

Questions? Alright. We're finishing up pretty much right on time. Yes.

QUESTION: (Inaudible)

MR. GARNER: There is a fair amount of that. I mean, you've hit a couple of different things. When you've got to have a database, and it is a database, you've got to have a PC, but you've got to have both the network capability and you've got to have the software capability to do that re. There are two or three vendors now that have build software read shells. So that enabling software is available from a couple of vendors. IBM has got it. Digital has got it. So it's out there, but you are right, there is an enabling piece of software in the middle, but it exists.

Other questions? Yes.

QUESTION: I've got a survey question (Inaudible) from the audience too? How many people out there use...you mentioned in your speech about relational databases (Inaudible). How many people have that (Inaudible) relational tools? Not very many. You say that where you have to be and it's been seven years that...we don't have it at ours either and we keep pushing it. What is it going to take to get people to convert over to put in data processing (Inaudible)?

MR. GARNER: You've kind of been the forgotten breed out there for a while. I will also venture...put those hands up again, the people who have the database in the SQL. Did you do it yourself?

COMMENTS FROM AUDIENCE: Yes. Yes. Yes.

MR. GARNER: Okay. Remember back to what I said earlier, Arthur Young's publication...it's an excellent publication and it said level one was information, where we report the month end report. Level two was automating the function. Level three is information. We're just now kind of moving to Level three and you guys are probably the ones that use information or have had that light bulb come on first. Customer services, underwriters are starting to have that come on, but you guys are the people that are users of information that is out there right now. You're going to have to get a little higher in the priority que. There is a whole nitch market that is developing that is selling software, stand alone, point applications to you where you go out and get data off flat files that you want, load them into databases that you control and you put your intelligent computers in front of it. That's pretty much what's out there right now. I still think that is a reasonably proper approach, because if I were Aetna...and I had all of my files out on the DB2 file, I'm not sure I want 150 actuaries going straight against that file. I'd rather give your own file and let you do it yourself, whatever you want to do. But it's going to take some dollar commitment to get data off the various different files or at least put them in a database format so you can get to it, put the software in place that creates the length and put the intelligence on your desk to do something with it.

I met with a software vendor last week that was very excited about their new actuarial software. And it's wonderful. The bad part is that you are looking at a MS-DOS machine, which is a wonderful machine, and everybody's going all I got to do is buy the software and put it on this MS-DOS machine and I'm now through. I've solved my problem. No. You didn't get to your data. Somebody's got to make that data available to you in a database format that you can get to it, then you can take advantage of that new software. I think if we ask that question next year, a lot more hands are going to come up with people who have got that technology out there.

More questions? Yes.

QUESTION: What service systems do you offer your clients who suddenly access lots and lots of data, but their coding schemes have changed over time? A data along here from 1980 doesn't mean what it means in 1984 and so on.

MR. GARNER: Yes. This is part of what John is going to talk about. What serves do we offer? Okay. That's an awful lot of work. Okay. I've got 7's and 3's and 4's and 12's and down here I've got A's and B's and C's and D's. And you can...and I don't know if I particularly agree with this...you can take that data and convert it to the new format and I don't get real excited about that because I think you lose a lot of the integrity of the data that you had before, but if you have two different type historical files, you are going to have to have software...if you don't do a conversion...you're going to have to have your software with enough intelligence to say, I want to mix these 3's and 7's and 12's with these A's, C's and D's down there and bring it together in one meaningful answer, because you are mixing apples and oranges. I don't know if I answered your question, other than just good solid analytics.

QUESTION: (Inaudible) are you recommending the section (Inaudible)?

MR. GARNER: Might given where technology is today, my answer is yes. Given where technology was five years ago, the answer was no. The ability to get to all that old data was too painful. Five years ago I wanted a common look and feel, so you smoosh all the data together and you have forever more lost the integrity of what was past. If you have your data in multiple different formats, you may not like it, but you got history as it was and you can now, if your intelligence on your front end, go back and do that. Even if you create a file, an immediate file that you've smooshed it together, that's okay, but you didn't lose your history.

QUESTION: So is this a version of the expert system, where somehow you're putting up intelligence in the system to recognize that, well, it's different here and it's different here, but I can combine them because something (Inaudible) individual defined a way to do it. Is that it?

MR. GARNER: You have just found what I think is an excellent potential application for expert systems. Is there an expert system out there today that does that? No. But that is a darn good application for one.

QUESTION: How are the expert system shells coming along (Inaudible)...

MR. GARNER: Getting easier.

QUESTION: (Inaudible)

MR. GARNER: Getting easier. Getting easier. Getting cheaper. Getting smaller. I won't call Vender names, but if you remember the shells of ten years ago, five years ago, it starts out with take the 3090. Alright? (Laughter) They now start out with take a PC. So, yes, the shells and the capability are infinitely easier and better used than they were.

QUESTION: (Inaudible)

MR. GARNER: Yes.

QUESTION: (Inaudible)

MR. GARNER: More like...if you'd asked me that question two years ago...more like mainframe size. They're starting to be about the size of that thing right now...you know, table...that when I went over and looked at the Tenna-Data machine at Blue Cross/Blue Shield of Illinois, I was kind of going, where is it? And it's...oh, okay...it's a pretty small machine, but very quick, very quick access to data.

QUESTION: (Inaudible) ...price on... (Inaudible)

MR. GARNER: Don't know. A few hundred thousand, but I don't know. I'm not a qualified person to answer that one. Somewhere in there I need to break to John. Why don't we let you go?

MR. SCHULTZ: Mike is an extremely difficult act to follow. He's been talking about the rapidly emerging technologies and where all the glitter is and I'm here to talk about a little bit of practical reality.

My training is as an actuary. I've dabbled in data processing for seven or eight years. It seems like seventy or eighty years. I was playing with my PC the other day. I have one too, like everyone in the room, and I got a new graphics package compliments of the folks in the client computing area. I loaded the package and started to look at a few of the ICONS, and it struck me that Porsche really symbolizes the pace of technological evolution. It's just screaming along at about 150 miles an hour. The elephants at the bottom of the slide, are really reflective of the real world in terms of trying to use technology. It really boils down to how many elephants does it take to move that ponderous load (inaudible) forward an inch at a time? And the view for that second elephant never gets any better. (Laughter) That second elephant is always looking at the first one. And if you're a big company you've got a lot of elephants. You can bring a whole herd of those to the effort. Well, we little companies, and that's what California Casualty is, perhaps have two elephants to help us with our DP problems as opposed to the 20-25 elephants in the DP cages of the large companies.

I've been on a twenty year archeological dig. We have more data than one could possibly imagine for a company our size and precious little information. When Mike speaks in terms of being data rich and information poor, I can really relate to that. Our amount of disk storage has increased six fold in eight years but the actuarial systems and analyses really have not moved very much at all.

It's been a struggle throughout the '80s dealing with changing systems, different file layouts, and the problems of fifteen different fields supposedly meaning the same thing. Much of what Mike talked about we deal with every day. Our situation is rapidly changing. Our company entered the decade of the '80s with one personal computer. It was the IBM 5100. IBM didn't call that a personal computer. They don't look to that machine as the origin of their PC line. They say that the first PC came along in 1981, but the 5100 looked like a PC and did the things that a PC does. As far as I'm concerned it was a PC. It just had a very high price tag. California Casualty bought its first PC, the IBM 5100 in 1976 and paid $25,000 for it. It had a 64K chip, one tape drive, no disk drives, a very antiquated piece of equipment, but we loved it. It was great. A tremendous breakthrough. So we entered the decade of the '80s with one PC in the company and a mainframe capable of about one million instructions per second. Now the PCs are capable of doing that. The only problem with the PCs is they're all I/O bound. While a PC might be capable of processing a million instructions per second, in reality you do much less processing than that, because I/O slows you down. Our company now has 400 personal computers, soon to be 600. We have mainframe power of 43 mips, so we've increased mainframe power 43 times. And we've got 400 times as many PCs.

The economics of our business haven't changed, however. If you look at our operating statement it's still the same as it was in 1980. The dollar figures are larger, but the relationships between quantities haven't changed much. We still struggle with expense control and improvements. What's ahead though for us? What kinds of things do we see in the environment of the '90s that will affect the jobs that actuaries do? I think inter-company processing will become a reality. Much like electronic funds transfer, we will directly trade information about insureds and claimants. That will change our jobs.

Expert systems we've already discussed. How many think that an expert system should be developed that could do the actuaries reserving job? It's possible, right? Could happen in this decade? You think so? I don't. I think that it's possible but I don't think that it will become a broad based reality because of the amount of money that it will take to develop such a system and maintain it. It won't pay for itself. There aren't enough jobs to eliminate through doing that. The opportunities for expert systems really are in other areas, the claims jobs, for example. What will happen to claims because of expert systems? There will be much more standardization. The best claims person in your organization effectively will be handling all the files, because every other person, even the newest trainee will have access to an expert system that mimics the performance of that renowned claims expert. So you'll get much more consistency in the handling of claims and that will change the reserving effort for all of us.

James Martin, who Mike talked about earlier, if you're not aware, is one of the acknowledged experts in data processing, a visionary, one who talks about how things will change and makes bold predictions...I attended a talk that he gave in 1984 and he said that by 1990 there would be no more Cobol programmers. (Laughter) What he overlooked was the tens of millions of lines of code that exist and need to be maintained. We will struggle with those lines of code throughout the '90s and all that data. Database technology holds the promise for accelerating the pace of change in insurance systems. Separating the data from the code that manipulates the data is the key to productivity improvement. I think that our transaction processing systems in the '90s typically will be built around database management systems. When that happens it will become much easier for actuaries to get the databases that they need in order to perform their jobs.

But what's the down-side of that increased data access? You're familiar probably with the expression "want-to-be". I want-to-be a programmer. Many the people, through the use of PCs, really spend their time writing programs. Well, at California Casualty, the want-to-be's are actuaries. Everybody wants to be an actuary, from the chairman down to the sales rep. As soon as they get a PC, we have claims people in workers' comp thinking they'll just access that data file and calculate what the average reserve value ought to be for medical on indemnity claims. Then they put out some instructions to...the rest of the claims people. Advising the amounts of reserves which should be assigned to certain types of claims. Just get that policy year data, manipulate it and do a little projection. We now have 500 to 750 actuaries. We thought we had five. (Laughter) That's one of the manifestations of expanding the availability of data and data processing capability.

End user computing and work stations will change our jobs as well. As we move intelligence out to the front-end of data capture the data will become cleaner. The edits will be much better. The use of English screens, the use of the mouse for data capture, and windowing capability to provide help and prompts, will cause the data that we work with to become much cleaner. We are getting at it quicker. It'll be cleaner. We will perform more sophisticated analyses as a result.

And the last trend that I've mentioned are economies of scale...

In my opinion, Information Technology has not as yet changed the basic economics of the insurance industry. Computers haven't affected our economics to this point. Our industry has spent billions in the last thirty years on computers, yet we are still seen as an industry that's grossly inefficient. When you look at the overall operating statement for the insurance industry in 1990 and compare it to 1960 you are hard pressed to discern any change that you can relate to the use of the computer. I think that's going to change in the '90s. I think that image processing and expert systems are the technologies with which we will radically change the way in which insurance is transacted. Those changes will create economies of scale that will affect the structure of our industry and affect all of our jobs.

Any questions about that? We are three minutes over. Thank you very much for your time and patience.

1991 CASUALTY LOSS RESERVE SEMINAR

5E-1: RAA LOSS DATA

Speaker

John W. Buchanan
Tillinghast/Towers Perrin

MR. BUCHANAN: 8:30 session for presentation on the Reinsurance Association of America Loss Development Study, a historical loss development study.

My name is John Buchanan. I'm going to be presenting the study. I was noticing in the CLRS program that this session is the only one where the person who's speaking is actually called a speaker. In every other session the presenters are called either moderators or panelists. I don't know if there is any significance to that. Maybe it means I don't have to take any questions afterwards or maybe I just don't have to answer the tough questions. In any case, I don't get someone to present me so I'll just do that myself. I work at Tillinghast in the Philadelphia office and in the past I've been a frequent user of the RAA data, some people might say an abuser. This is the first year that I've actually been involved in working with the production of the RAA data and I was asked to oversee the analysis and presentation of the booklet. The information is very timely. I know in the past the RAA committee has tried to have the study done in time for the CLRS meeting. The study, in case you're not aware, is done every two years and the booklet is out. It came out about two weeks ago and many people have these sitting in their in-box or maybe have started to do some analysis on it.

In addition to the booklet now, you can also get the information on a floppy disk. Actually this was true two years ago too. Not that many people knew about it. There are order forms in the back with the handouts that you can pick up to order the RAA study and the diskette. So make sure you pick up one of those, especially if you haven't received the information already. It is a very widely used study. I know it is often quoted and has been mentioned quite a few times already in the sessions here yesterday. And so it is worthy of some investigation, especially if you are doing reinsurance pricing. It certainly has more universal applications now, with people needing to do some gross, ceded and net calculations for this year ends. And so it is, again, very timely that it's coming out.

What I'm going to do in today's presentation is just highlight the information that's in the book, what is not in there, some of the questions that have been resolved over the last couple of studies and with this study, and some of the questions that are still remaining. And so I think it will be very helpful when you focus in on some of the key points that I'll bring out here.

As I said, the data is available on disk and all of the companies gave us data on disk so I won't be surprised if companies in their analysis of the data start to take the information from the disk compare the development factors that come out of it to the development factors from the data on this disk. So I'm sure we'll keep some actuaries pretty happy over the next couple of weeks, crunching along with the numbers.

The presentation that I'm going to do will be in two parts. One will be where I'm going to go through and highlight some of the key points that are in the RAA study. And the second part will go back to some of the exhibits and give some of my own personal viewpoints on some of the rational on why certain things happened and so forth.

First I'm going to review the purpose of the RAA study. As you can see from the handouts there is about a half dozen pages where we'll go through some narrative. That's including going through the purpose and scope and caveats and all that. It wouldn't be a good Tillinghast presentation unless there were a few caveats thrown in there. And then I'll go through about a half dozen overheads, which show some of the graphs in the report. And then we'll go back and do some analysis about it.

(Page 2)

The purpose of the study is to compile historical loss development information, emphasis on historical. This is not meant to produce a certain picture of what will happen in the future, it's just meant to show what historically has happened from the companies that have submitted the data. There's a lot of variation in the loss development factors from company to company and we'll go into some of the reasons why there's such a large variation. Each company would presumably go into the RAA data and come up with their own sets of benchmark patterns. So each company is encouraged to do their own analysis.

(Page 3)

The scope of the study...feel free to ask any questions as we go through if you want me to clarify something and at the end, hopefully we'll have a few minutes for other questions. The scope of the study...with each time that we do the study we get a little better at asking for the information and companies get a little better at responding with the data. We're asking for casualty loss information from casualty excess reinsurance business. This is U.S. casualty. There may be some foreign that goes into it, but we're trying to zero in on just U.S. business. And it is supposed to be excess business. I know in the past there were some companies that thought that the information had to tie into the annual statement, which would include all their excess and prorata business, but that's not what we're going after. We just want true excess business.

The data is from 33 companies and that's been pretty stable. So from analysis to analysis it is generally the same companies that are in there, so that helps on analyzing the continuity of the graphs and the charts. And most of the companies have been in there for ten or more years, so it's getting to be pretty sizable.

The lines of business we analyze are auto, GL, medical malpractice and workers' compensation. In the past NOC, not otherwise classified data, was given but that's not included in the call for data, because it turned out to be not very usable data and some people weren't using it correctly.

Asbestos and environmental claims were excluded. New for 1991 is the exclusion of the environmental claims. And, as you'll see, this has a tremendous impact on the development curves.

Again, treaty and facultative data was segregated. The '89 study, which was the last one that was done, we had also asked for treaty versus facultative and most companies were able to respond with that. And new for '91 was splitting the facultative into the individual and automatic facultative. In the past study a lot of the facultative and treaty curves looked very similar. We'll later get into some reasons for why people thought they were going to be different, so they were surprised that they were very similar. So, this time, we wanted to separate the individual and automatic, because some people thought that the automatic was going to behave like the treaty business or at least different from the individual facultative. The separation of automatic facultative, it was thought, was going to create a bigger distinction between the facultative, the individual facultative and the treaty business. As we'll get into later, this separation didn't seem to solve the problem, because there still seems to be some unresolved questions on treaty versus facultative.

The data we asked for is accident years 1956 to 1990 and so we're getting pretty large triangles, 35 years of them, and we're asking for annual evaluations. Frequently we're asked, whether companies are just putting on the last two diagonals off of their previous study. Well, some companies are doing that if they've investigated that their old data hasn't changed. The old data may change due to commutations and so forth, so each time around we get a brand new set of triangles from each company. For some of the companies the data is the same, but we check to see how different the data points are from time to time, but it is a new set of triangles that are coming in. We end up getting about a thousand triangles out of this 35 by 35. The Hartford people who actually do the number crunching on this are saying that their hard disks are getting filled to capacity with this data. Some of the files get to be about 15 megabytes. It's a lot of data that's in there. And then, of course, we do a lot of combinations of the data to produce the graphs and numbers that you see in the report.

Limitations...more caveats. Limitations of the composite development data. These are highlighted in the study. Maybe one of the more critical ones might be the underlying retentions varying dramatically from the companies. The attachment points may vary from $25,000 all the way up to one million, five million, ten million. It's just all the excess business that the companies have so the underlying retentions vary quite dramatically. And anybody who had seen the Pinto Gogol Techniques or the Clive Keating presentation yesterday would see that there is a large impact due to the underlying retentions area. The reinsurance company retentions vary. What they are holding net varies a lot from company to company so that will also create variations in the individual company data and why the composite development data may not be true, in every case. You hear a lot of people saying, well, this business is better than average. Of course, not all business can be better than average.

The geographic marketing areas may vary tremendously. Especially in workers' compensation you may see some states with escalating benefits and others without, so that may have some impact on workers' compensation. We'll get into a little bit more of that later about the workers' compensation triangles.

Underwriting rules and restrictions vary. Companies on what kinds of business they want to write will vary tremendously. And reserving practices would vary quite a bit, depending on whether ACRs are included, how aggressive the company is on auditing and so forth. There's lots of reasons why the composite development data may not be applicable for any one given submission.

Additional problem areas. I'll just quickly go through this right now. There is a lot of volatility in the older years. If you start to look at the data there is a lot of information presented for 25 years to 35 years and there's still, depending on the line of business, a lot of volatility in those old data points. The development may come from new claims that are being reported to the reinsurer or a change in claims that are already reported. With the call we are not asking for individual claim data or any of that, it's just aggregate loss data, so we don't have a way to measure the percentage development from new claims versus the changing claims already reported. So that's not something you'll be able to get from the study. You're just looking at the composite development of those two pieces.

The other problem area is asbestos and environmental liability claims are excluded, so that may create some distortions.

Introduction of claims made coverage. The medical malpractice, in particular, may have been subject to a change over in the kinds of policies that were being issued and so that may have a dramatic impact on the development curves that you see in the triangles. We did try to separate the medical malpractice. We asked in our call for a split between the underlying occurrence and underlying claims made business. We didn't get enough companies to respond favorably to that, so we weren't able to put that kind of analysis together.

And the definition of the treaty versus facultative business would be another problem area. There still may be some grey areas in the distinction between those.

(Page 6)

And lastly on the words, the loss development data that was requested. As I said we are getting better about asking for the data and companies are getting better about responding with the data. Keep in mind this requested loss development data we put together is to have a consistency base between the companies. We are not saying that this is an optimal way to analyze the data, but we just wanted to establish some consistency criteria for people putting the data together. The data is suppose to exclude IBNR and that seems to have been done pretty well. Data was supposed to be on an accident year basis and as we mentioned in the report, there were a few companies that are still putting it on an underwriting year basis. We ended up taking those triangles out of the database. Of course, we did want to have just straight accident year data. And you're still going to have problems with borderaux submissions, where companies have to go through an allocation of their data to different accident years. They are giving us these triangles and we're using that data, so there may still be some distortions due to borderaux statements. Companies are presumably trying to get back to accident years as best they can. The data is supposed to include ACRs, if they have established them. Data is net of retrocessions, so they may be somewhat capped on the top end. The data is supposed to have the commutations removed and there was a little confusion as to whether we meant all commutations, both assumed and ceded, and so for next time around we'll clarify that, presumably both types will be excluded. Portfolio treaties would be removed. Data with aggregate provisions would be removed. And data with asbestos or environmental was supposed to be removed or deemed immaterial. Yes?

QUESTION: What's an ACR?

MR. BUCHANAN: An ACR is additional case reserves. The ceding company will present certain claims to the excess carrier. The excess carrier may look at the information that's provided and determine on their own that additional reserves need to be put up. So it's additional reserves on top of what's reported from the ceding company. Yes?

QUESTION: (Inaudible)

MR. BUCHANAN: The aggregate provisions...this is dealing with when you have claims that are aggregating together underneath what's called an annual aggregate deductible clause, referred to as AAD's.

QUESTION: In the past, the data was asked to be reported after the aggregate deductible had been exceeded so that there was an additional reporting lag in the triangle. This year we asked that the data not include the effects of the aggregate deductibles. Do you think the reinsurance business includes retrocessional business?

MR. BUCHANAN: It would be all excess business coming into the reinsurer, so presumably it could include some of the retrocessional business too.

Most of the companies were able to respond with the data in this kind of format, so we were able to use most of the data.

(Page 7)

Okay, on page 7, the first graph in the booklet. There are a lot of stories that could be told about this graph. And probably one of the biggest changes you would see is the general liability curve seems to be moving up. This graph is a representation of the reporting pattern. It shows the percentage of ultimate to the left, and the report period of years down at the bottom. So this is showing that maybe as of 12 years the general liability curve is going up to maybe 70% reported.

There is a large amount of distance, compared to prior graphs, between the general liability and workers' compensation. Workers' compensation is the slowest reporting and on here, auto liability being the fastest. There is quite a movement there of the general liability moving up and the workers' compensation seems to be moving down.

One of the highlights on this is that the losses are only submitted for 35 years and so we've assumed that there is no development past 35 years for the graphs. We'll get back to that a little later.

(Page 8)

Next, a graph on the treaty versus facultative. This will be page 8. This is showing that there doesn't seem to be a lot of difference between the facultative and treaty loss development, except maybe in the tail area a little bit. Out past 12 years there may be somewhat of a break between the two patterns, but up until then it was rather consistent. And we'll get back into why that seemed to occur a little bit later. Yes?

QUESTION: On the treaty versus facultative, the last three points on the graph are matched or are the same. Are they the same only because you don't have data running out that far? Is it possible that the data spread at the end, but you just don't know it yet?

MR. BUCHANAN: Yes. The data that we have, we are not getting full 35 year triangles for treaty versus facultative, so when the data started to run out on the facultative piece, especially, we needed to make some assumption and as we highlighted in the report we've assumed that the treaty and facultative come together at about 23 years. So that is why you see the curves matching at that point. So there could be a distinction in the future and some people think there will be a distinction in the future.

(Page 9)

The next exhibit, page 9. This shows the same information on the treaty versus facultative that the other graph was showing, but it highlights a little bit more what the difference is...or the similarities are between the treaty, the automatic fac and individual fac. This seems to indicate back in the earlier periods that there was some variations, but in total there wasn't any clear pattern between the height of these charts. The previous chart was a percentage of reported. This shows the report to report development factors, so this is shown on an incremental basis. For instance, in the two to three period (Inaudible) treaty is very similar to the automatic fac and the individual fac. There is some variation as you go down here in each of the incremental periods. And then there is a conglomeration of five years, eight to thirteen is rather similar, and then maybe after that there might be a little bit of a distinction between patterns.

QUESTION: If you don't have Gen Re in the data, do you still have the same shape?

MR. BUCHANAN: We haven't analyzed the exclusion of any one particular company. This is just composite data, so we haven't taken a look at that.

(Page 11)

Just skip past page 10 for right now. We'll get back to that in a second. That's referred to as our hot dog and sausages exhibit.

On the question of asbestos and environmental claims, this is probably one of the really very interesting graphs in the study. This shows, again, on the development factor basis what the difference is between the general liability patterns excluding asbestos and environmental versus including. Not a very large distinction in the earlier points but as you get out past eight and ten years, this is shown in two year clumps, that the general liability including asbestos and environmental is extremely long tailed. We see development factors of 1.1, 1.15, 1.2 going on and on. However, the good news is in the data excluding asbestos and environmental. The development seems to disappear in the tail area. So there's quite a difference between the GL excluding and GL including asbestos and environmental.

(Page 12)

And that's further clarified in page 12, which shows on the percentage of ultimate basis, a real distinction between the two patterns.

(Page 13)

Page 13 shows the asbestos and environmental emergence by calendar year. I'll just take a minute to explain what this chart represents. This is all claims that are reported as of December 31, 1990. This shows what percentage was reported in each of the calendar years. If you add up all the bars here it would come up to 100%. This is showing that there was a large amount of emergence in the last four years, proportion wise. And at least on the data presented to date, it seems to have peaked. Yes?

QUESTION: Is the data split between asbestos and environmental?

MR. BUCHANAN: These boxes are the combination of asbestos and environmental together. So this is the combined impact of asbestos and environmental.

QUESTION: Is it split in the study?

MR. BUCHANAN: Remember the scope of the project was to look at general liability excluding asbestos and environmental and the committee wanted us to just focus in on GL excluding asbestos and environmental, so we don't have that split.

QUESTION: What's the maturity of the data?

MR. BUCHANAN: This is all data reported through December 31, 1990. So it's all claims presented as of year end 1990.

QUESTION: The data could be from accident years that are very new or very old. Is that correct?

MR. BUCHANAN: That's right. This is not accident year, this is calendar year, so these may be reportings from ten, twenty years ago, even longer.

QUESTION: Please explain the graph again.

MR. BUCHANAN: This is showing by calendar year what the claims were reported by calendar year. If you look at the difference in the diagonals of the triangle, this shows what the amount of losses were reported in each calendar year of the current triangle.

That pretty much highlights the presentation of what's in the report. Now we're going to take a quick analysis of some of the information that's included in there. Let's look at the additional problem areas and some of the real interesting facts that comes out of this when you start to analyze the data.

One such area is the volatility in the older years in the past study with the general liability including environmental. Last time when the GL data excluded asbestos but not environmental, there was a lot of noise still in the tail area. Now, with the exclusion of the two, if you look at the GL data from 25 years to 35 years, there would be some 50 to 60 observations there. The number of observations that have material increases in general liability, there's only three or four data points that are above let's say 1.02. The majority of the GL triangle was 1.00 going out there.

However, on the workers' compensation data, a majority of the data points are above 1.02. There is still a significant amount of workers' compensation development going on in the triangle. I was trying to figure out why this was happening, so I've asked a few people what would be causing the workers' compensation development. One problem is we don't know what the difference is between new claims reported or change in claims already reported. Presumably there's not that many new claims that are being reported to the primary company. Maybe to the reinsurer there might be some new claims being reported, but the development may be arising from medical inflation on the lifetime pension cases and it may be arising from the roll-out of the discount amounts. The discount may cause classical loss development technique to fall down. If the development was, let's say, 100% from the roll-out of the discount, you would be getting false indications of what the development factors would be out in the tail area as you are replacing the discounted reserves with undiscounted payments. It's conjecture as to what the percent of the split is between the medical inflation and the development due to roll-out of discount, but that may be something you might want to take a look at.

But on the other side of the workers' compensation development, as I've said before, we've chopped off the development at 35 years. We've assumed a 100% reported in 35 years. Who knows how far out it's really going to go...40 or 50 years. And so people will have to make their own judgments on what's going to happen there.

On the asbestos and environmental claims, maybe the very good looking GL data right now, may not be representative from a reserving or rating standpoint. What's going to happen in the future? Maybe it's easy now to look back and see who the bad guys are, but in the future other ones may develop. Fortunes are going to be made and lost by people trying to answer that question of what's going to happen in both reserving and ratemaking in the future.

The introduction of the claims made coverage in medical malpractice and to a lesser extent the GL data...may give you distorting factors because you've got the occurrence versus claims made problem in there. So you may want to be very careful when you're selecting those factors. Classical development factor selections will fail here.

And we already went into the treaty versus facultative. I'm going to show one more slide here on the possible rationale on why the treaty and facultative seems to be showing similar development. Yes?

QUESTION: Does the workers' compensation data include employers liability?

MR. BUCHANAN: I believe it does include employers liability.

(Page 10)

This is page 10 of the handout. In the treaty versus facultative issue, the observations from the data seem to be that there was very little distinction between the treaty and the I-fac except maybe in the extreme tail areas. And the A-fac at the start seemed to be somewhat faster than the treaty or the I-fac. There's some discussion that maybe that won't happen in the future, that maybe A-fac will behave like the other ones.

Before we received the data, there was a lot of discussion as to what's going to happen with the treaty versus facultative? Some people were saying that the facultative business may be more hazardous so you're going to get more development, especially out in the tail area for facultative. And others were saying, well, the facultative business is much more scrutinized. There's a lot more individual attention paid. You may know that book of business a little better, so maybe that will be better. It appears as though from the data that they are offsetting each other.

Another rationale for why there maybe very similar development patterns is that it may really become more of an attachment point issue. Where the average attachment point for the treaty business versus the facultative may be the same, but the distributions may be very different. And that's where we get into the hot dog and sausages, so to speak, where the information for the relativities between the treaty may be 75%, A-fac and I-fac, 10 and 15%. Treaty being the majority of the business may expand the whole scope of what the attachment points would be, 25,000 up to five million, ten million, twenty million, and so there's a real distortion coming in by varying attachment points. The automatic fac may attach down a little bit lower. We did observe that A-fac did seem to be a little bit faster than the other two, but then the I-fac maybe attaches a little bit higher, but overall the averages are the same between the treaty and the I-fac. Yes?

QUESTION: Where do you get the data for this?

MR. BUCHANAN: This is in the study. Oh, the data for the attachment point. This is just personal viewpoints on what the information would be included.

QUESTION: Is there data supporting?

MR. BUCHANAN: There's no data supporting what the distributions of the attachment points are. I was purposely vague on what the attachment points are in the chart. We haven't done a study asking companies what the attachment points are. Maybe that will be something that will be done in the future as people try to investigate this problem. Again, the data for now shows similar development between facultative and treaty. Future studies may show differences emerging.

Okay. We have time for a couple of questions.

QUESTION: Would you go back to graph number one on page 7, please? This is the excess reinsurance historic loss development. What accident years do those graphs represent?

MR. BUCHANAN: These represent the full 35 year history.

QUESTION: Then that means that you have worked up ultimates. Somebody has done it to get that type of graph.

MR. BUCHANAN: Well, what we've done is we've assumed ultimate is 35 years and these were produced by a mechanical procedure whereby we had the development triangles that are shown in the study and ran those through a mechanical procedure. That procedure capped some of the outlying averages and did some averaging of the latest three or five values.

QUESTION: It assumes that you have an ultimate for 1989 and 1990 and you've done it somehow. Mechanically or something?

MR. BUCHANAN: Right. It's a mechanical procedure that went through and developed the curves.

One could put graph paper on top of these curves and try to estimate what the points are. That's really missing the point of what the whole RAA study is, if somebody starts to do that. The idea is that this is presenting the data that you would individually analyze on your own and come up with your own reporting pattern. The study uses a mechanical procedure to make it pictorially easier to discuss the different issues that are involved in the study. So the graphs are not meant to portray the only ultimate development factors possible. Development factors will vary tremendously depending on the underlying book of business.

Any other questions? Yes. Will you step up to the mike, please?

QUESTION: You mentioned that the work comp reserves are discounted. In your call do you request what the discount rate is now and what it has been through time that might be impacting the tail on the work comp?

MR. BUCHANAN: No, we haven't specifically asked for how companies are discounting, if indeed they are discounting those reserves. So it's just what the company's reporting to us. We have not asked them what kind of discount rate or mortality tables are embedded into this. Presumably many companies are just taking what the primary company reports to them and putting that on the books with maybe some ACRs attached to them. So we haven't investigated what the effect of the discount would be on it.

MR. BUCHANAN: Okay. We've run out of time.

Purpose of RAA Loss Development Study

- Compilation of historical loss development
- Analysis of variation in loss development
- No projection of future loss development

Scope of RAA Loss Development Study

- Casualty excess reinsurance business
- Data from 33 companies
- Auto Liability, General Liability, Medical Malpractice, and Workers Compensation
- Asbestos and environmental claims excluded
- Treaty and Facultative segregated
- Facultative segregated between Individual and Automatic
- Accident Years 1956 to 1990
- Annual Valuations of reported losses through December, 1990

Inherent Limitations of Composite Development Data

- Underlying retentions vary
- Reinsurance company retentions vary
- Geographic marketing areas vary
- Underwriting rules/restrictions vary
- Coverage terms vary
- Case basis reserving practices vary

Additional Problem Areas

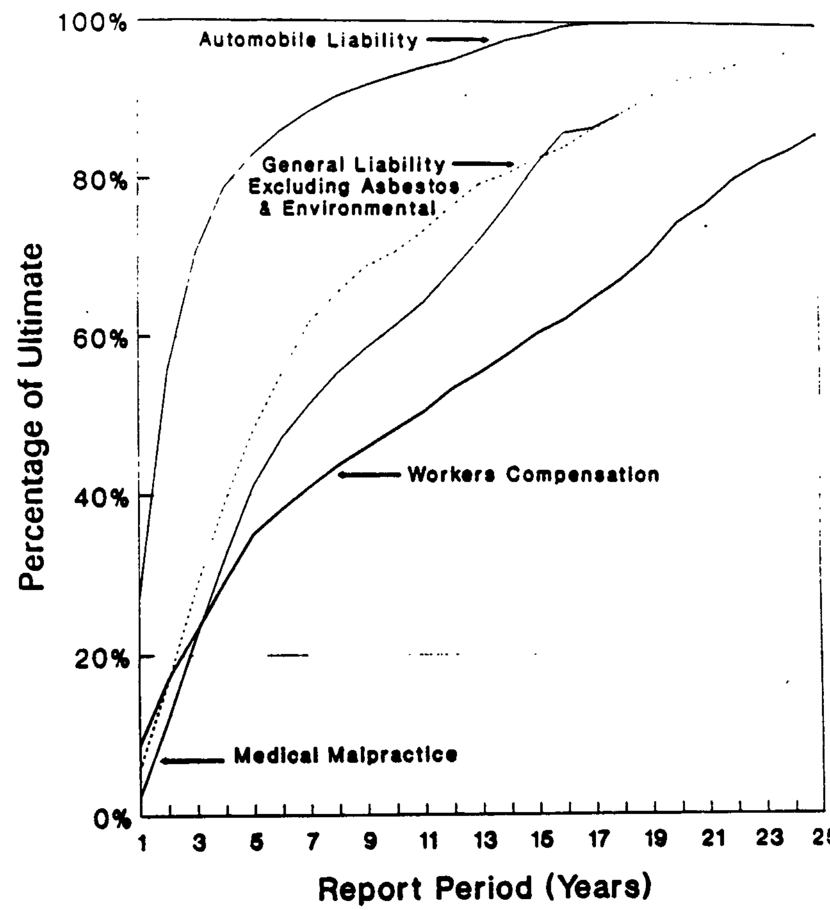
- Volatility in older years
- Development both from:
  - new claims reported (to reinsurer)
  - change in claims already reported
- Asbestos and Environmental liability claims
- Introduction of claims-made coverage
- Definition of Treaty vs. Facultative business

Tillinghast
a Towers Perrin company

<u>Requested Loss Development Data</u>

- Data excluding IBNR
- Data on Accident Year basis
- Data including ACRs (if established)
- Data net of Retrocessions
- Data with Commutations removed
- Data with Portfolio treaties removed
- Data with Aggregate provisions removed
- Data with Asbestos and Environmental either removed or immaterial

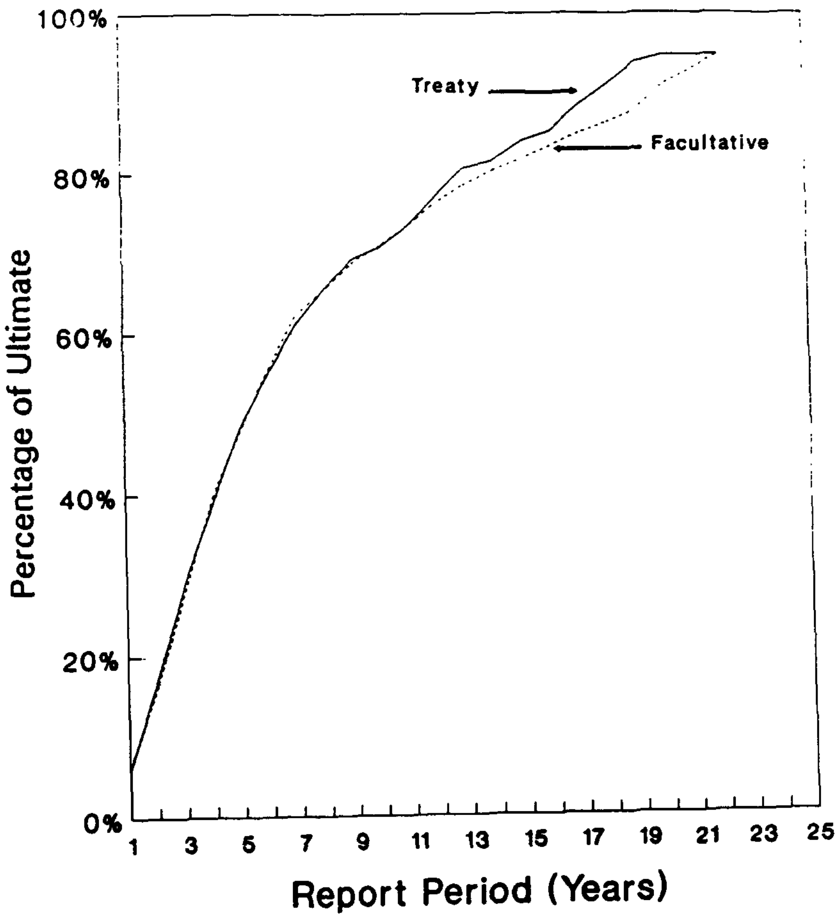
Excess Reinsurance Historical Loss Development



Based on combined treaty and facultative data; all patterns assume that development as of 35 years is ultimate.

Treaty vs. Facultative
Historical Loss Development

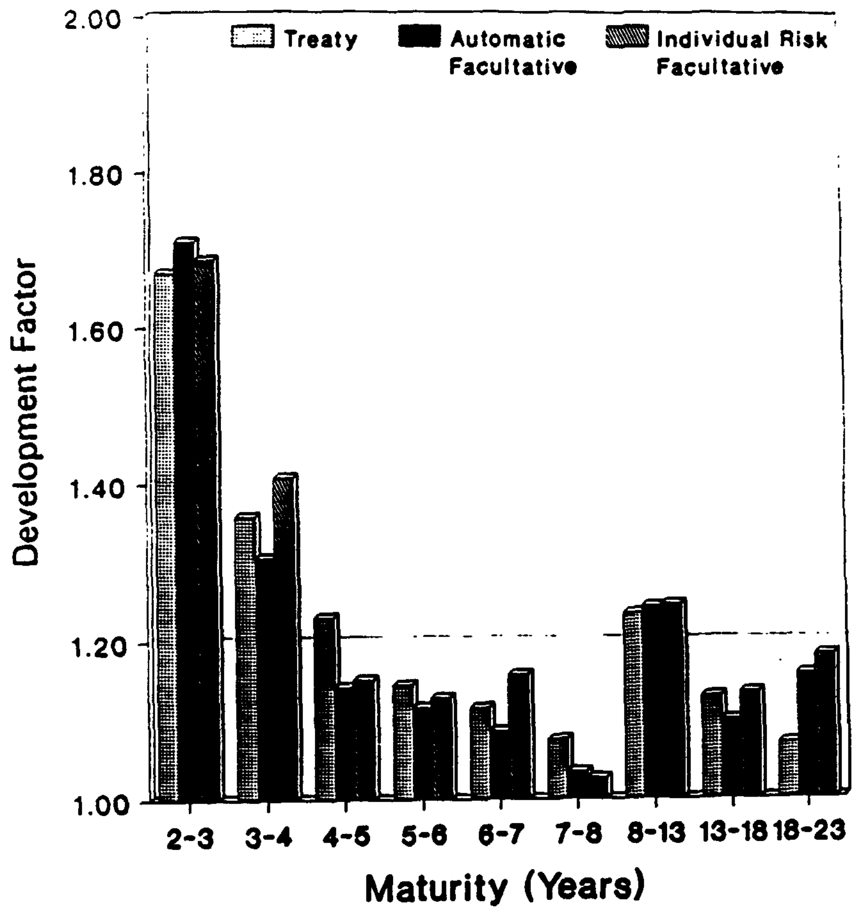
General Liability Excl. Asbestos & Environmental



Assumes treaty and facultative development is the same beyond 22 years.

Treaty vs. Facultative
Historical Loss Development

General Liability Excl. Asbestos & Environmental



12-May-91

Treaty vs. Facultative

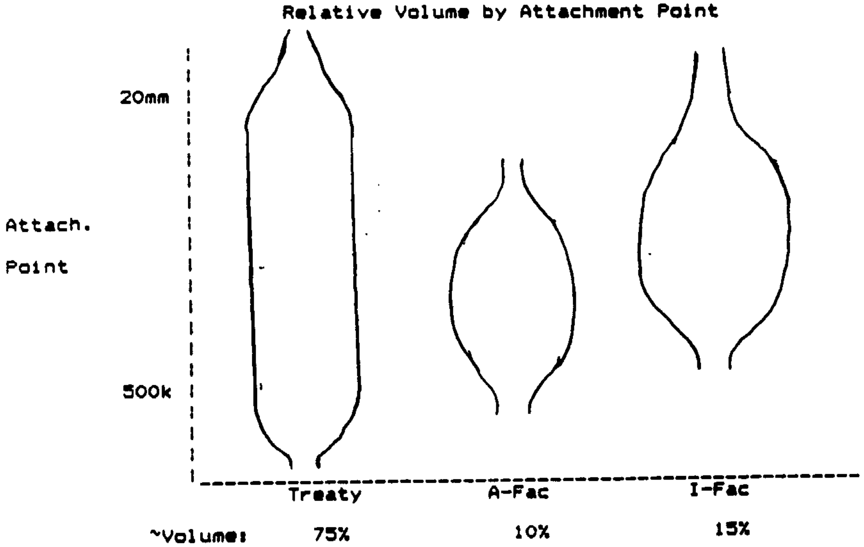
OBSERVATIONS FROM DATA:

- o Very little difference between Treaty and I-Fac except:
  - I-Fac slower in first 2-3 years
  - I-Fac GL tail possibly slower after 18-20 years
  - I-Fac AL, WC tail possibly faster after 8-10 years
- o A-Fac somewhat faster than Treaty or I-Fac

POSSIBLE RATIONALE:

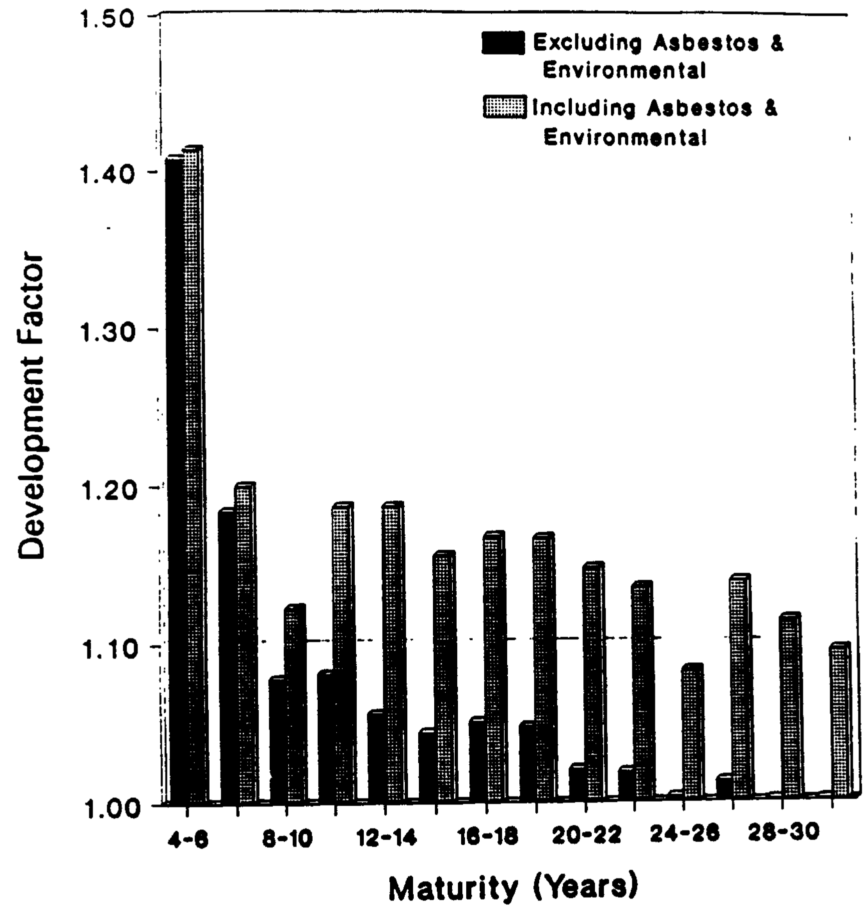
- o More hazardous Fac business offset by closer scrutiny (individual attention, ACRs)
- o General industry attachment point scenario shown below (AVERAGE attachment point relatively the same between Treaty and I-Fac with A-Fac being lower but distribution different)

Relative Volume by Attachment Point



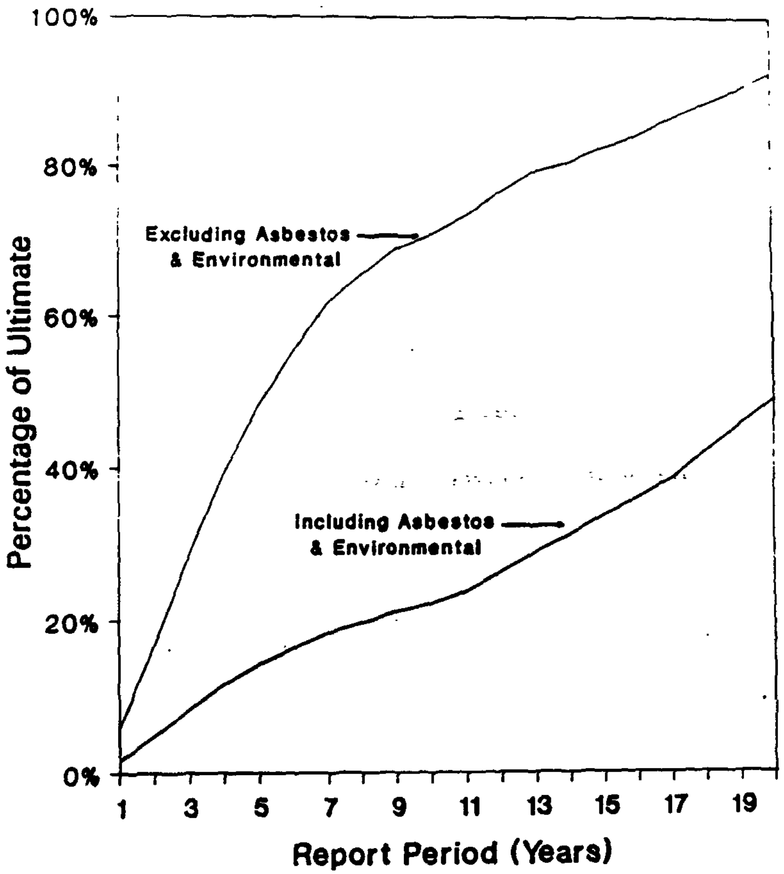
Impact of Asbestos and Environmental on General Liability

Historical Loss Development



12.

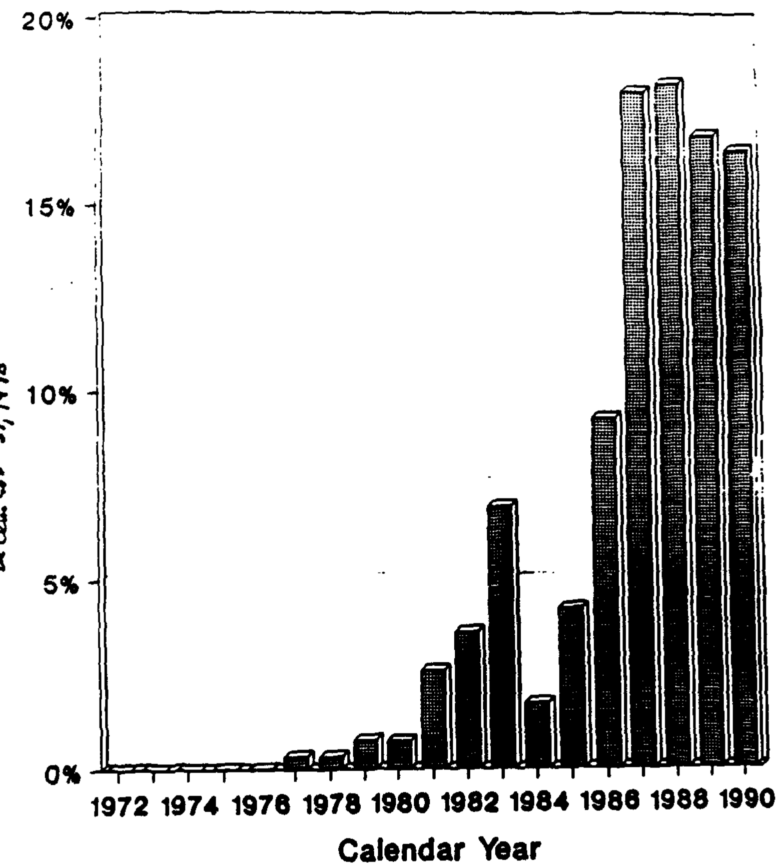
Impact of Asbestos and Environmental on General Liability Historical Loss Development



13.

Asbestos & Environmental
Emergence By Calendar Year

Percent of Reported Asbestos and Other Environmental as of December 31, 1990



ORDER FORM FOR THE

<u>1991 HISTORICAL LOSS DEVELOPMENT STUDY</u>

Please send _____ copies of the 1991 Historical Loss Development Study at $30.00 per copy and _____ copies of the data on diskette at $30.00 per copy to:

Name ____________________________

Company ____________________________

Address ____________________________

____

_____ Please bill us.

_____ Check enclosed.

Please return to:

Reinsurance Association of America
Attn: Adrienne McAdoo
1819 L Street, N.W. - 7th Floor
Washington, D.C. 20036

1991 CASUALTY LOSS RESERVE SEMINAR

5E-2: RESERVING FOR FREE EXTENDED REPORTING COVERAGE UNDER CLAIMS-MADE POLICIES

<u>Moderator</u>

Charles L. McClenahan
William M. Mercer, Inc.

<u>Panel</u>

Debra L. McClenahan
Aon Corporation

Remarks of Charles L. McClenahan

Good morning and welcome to session 5E-2 ***Reserving for Free Extended Reporting Coverage Under Claims-Made Policies***. Unfortunately, the session is so short, and the title so long that we have already run out of time.

Joining me this morning is my wife Debra. Debra is a Fellow of the Casualty Actuarial Society and has held actuarial positions with CNA, Marsh & McLennan, Allstate Reinsurance and is currently with Aon Corporation. Debra lives in Winnetka, Illinois with her handsome, talented and extremely modest husband and their two children, Scott and Edie.

In discussing the approach which we should take to this topic, we were not entirely in agreement. Debra believed we should discuss the need for reserves in a highly professional actuarial manner and provide a considered review of all of the various opinions. I, on the other hand, wanted to take the industry to task for failing to recognize the basic economics of guaranteed extended reporting coverage and for allowing a largely unfunded liability to be accumulated - a situation I have analogized to a dung beetle rolling its ball of dung before it.

Unable to reach a compromise, we decided to settle the matter the way we resolve our domestic disputes - by arm wrestling. What Debra failed to consider was that I had agreed to take responsibility for preparing the slides. So, even though she won you will be seeing a good bit of my friend the dung beetle this morning.

We also had trouble agreeing on how to organize the presentation. I wanted to debate the issue *a la* Point-Counterpoint while Debra again preferred the boring high ground. I came close to winning this one, but my arm was still a bit sore ...

So, I will be discussing the nature of the problem and the methods available for estimating the liability for guaranteed extended reporting coverage. Whereupon, Debra will review the reporting options available and current activities relating to this problem.

In May of 1988 I presented a paper entitled *Liabilities for Extended Reporting Endorsement Guarantees under Claims-Made Policies* as part of the CAS Call Paper Program. For those of you who do not have access to the Call Papers for 1988 I have brought a few copies along and they are in the back of the room.

Sometime in the early 1980's, when competitive juices were flowing freely, some physicians medical malpractice policies, written on a claims-made basis, were expanded to include the guarantee that when the doctor died, became unable to continue practicing due to a disability or retired, an extended reporting endorsement would be provided at no charge. This coverage became known colloquially as *Free Tail*. More recently, some extended reporting endorsement guarantees have been amended to require that the death, disability or retirement occur during the policy period and/or that retirement coverage required five continuous years of coverage.

The problem created by these guarantees is that for those insureds who leave the insured population due to death, disability or retirement, the coverage provided is effectively **occurrence** coverage. And generally the coverage is being provided at less than occurrence-based rates. In fact, the coverage provided by claims made policies followed by an extended reporting endorsement is frequently greater than straight occurrence coverage because policy limits tend to increase over time and extended reporting endorsements are generally issued at the expiring claims-made limits.

Rate adequacy notwithstanding, the policy guarantee of future coverage represents a contingent liability to the insurer and some part of the premium funds should be held to fund that contingent liability.

This liability is hardly inconsequential. In New York, for example, Regulation 101 establishes mature extended reporting rates at approximately 1.8 times the mature claims-made rate. Yet many companies have not reflected the liability in their financial statements.

Regardless of whether the policy form provides guaranteed extended reporting coverage for the current policy period only or implies coverage in the future, the fact remains that the same claims are covered by a continuous series of claims-made policies followed by an extended reporting endorsement that would have been covered by a continuous series of occurrence policies. When claims-made policies were introduced, they were issued at lower-than-occurrence rates reflecting the uninsured tail. Extended reporting endorsement guarantees tend to abrogate any premium savings inherent in the claims-made form.

If rate adequacy concerns were not enough, it must be understood that there is generally no agreement with reinsurers regarding continuation of reinsurance protection for the extended reporting period. Any reserve which is established without prearranged reinsurance must be on a direct basis without reduction for reinsurance.

There are four basic ways of estimating the extended reporting liability. The first is the *pay-as-you-go* method which is based upon the time-honored actuarial practice of *oozing it in*. Under this method, the accrual is meant to cover only coverage extensions which will be granted during the terms of in-force policies. In other words, it assumes that all policies in force will be non-renewed at expiration. This is the equivalent of a life insurer reserving only for this year's deaths.

The second method - the *allocation of premium method* - sets aside a portion of policy premium, usually based upon a pricing study, to cover future extensions of coverage under the guarantee. At the conservative extreme, this method would accrue the difference between adequate claims-made and adequate occurrence rates each year.

The *Actuarial Method* is named to reflect the ideal, not necessarily the real world. While the CAS *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves* does not address policy reserves, application of actuarial principles to the extended reporting endorsement guarantee would require the estimation of mortality, morbidity and retirements as well as the time value of money as part of the estimation process and the proper actuarial accrual would be the aggregate increment to the policy reserves.

Finally, there is the always popular option of ignoring the liability altogether.

Assuming a company opts for one of the first three methods, the question arises as to how to report the liability. Debra will discuss this issue as well as the current activities relating to the problem.

Remarks of Debra L. McClenahan

I didn't really beat Chuck at arm-wrestling. Not that I couldn't - it's just that I find it more amusing to better him intellectually. Besides which, if I ever let him know just how strong I am, he might expect me to help move furniture or take out the garbage.

As Chuck indicated, I am going to talk about the options available for reporting the reserve for guaranteed coverage extensions. Basically, there are only three available options for the liability; it can be reported as an addition to the unearned premium reserve, an addition to the loss reserve, or as a write-in liability.

Whenever insureds avail themselves of the free extended reporting coverage there will be an immediate increase in the IBNR reserve reflecting the occurrences not covered under the prior claims-made policies. In making decisions regarding reporting, it is important to focus on the goal of a smooth transition between the extended reporting liability and the IBNR.

The unearned premium reserve option is probably the most appropriate from an accounting standpoint. By establishing unearned premium equal to the present value of the losses which are expected to be covered under the extended reporting guarantees, the "premature earning" of premiums is prevented. This is the method recommended by the NAIC Casualty Actuarial Technical Task Force which has proposed that the reserve be identified as "unclaimed coverage extension benefits."

The unearned premium option treats the liability as a policy reserve - which it is - and does so on a basis consistent with the treatment of policy reserves for accident and health coverages.

A second option is to include the liability an an addition to the loss reserves. The NAIC Casualty Actuarial Technical Task Force has recommended that this be permitted only where authorized by the domiciliary Commissioner.

The loss reserve option has the advantage of simplifying the transition between policy reserve and IBNR and presumably would be assigned to accident year based upon the occurrence date. This would eliminate the indicated adverse reserve developments which will result from a shift into IBNR from unearned premium or write-in liabilities.

While not specifically addressed by the NAIC Casualty Actuarial Technical Task Force, we presume that one of the write-in lines could be used to report the reserve with the permission of the domiciliary Commissioner.

However the liability is reported, there will be tax impacts. If the reserve is established as unearned premium, the increment will be hit with the 20% prepaid acquisition expense penalty. This will of course be recovered when the reserve shifts from unearned premium to IBNR.

Where the liability is carried as an addition to loss reserves, it will be discounted for interest. It is important that any inherent discount be identified so that a double discounting not take place. Also note that where a company is using its own payout patterns in the tax discounting, those patterns will be affected by the inclusion of the additional IBNR reserve.

Finally, either an advantage or a disadvantage - depending upon your viewpoint, liabilities carried as part of the loss reserves will be subjected to actuarial scrutiny and will be covered as part of the loss reserve opinion.

At its last meeting on June 11, the NAIC Casualty Actuarial Technical Task Force determined that the NAIC Accounting Manual would require that the reserve be established and that it be carried as an addition to unearned premium unless the domiciliary Commissioner approved its being included with loss reserves. Permission is granted to discounting for interest as well as mortality, morbidity and retirement decrements.

The Task Force language is very clear that there is an expectation that the rates being charged are sufficient to cover the extended reporting guarantees. The CAS *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* is also quite clear in this regard.

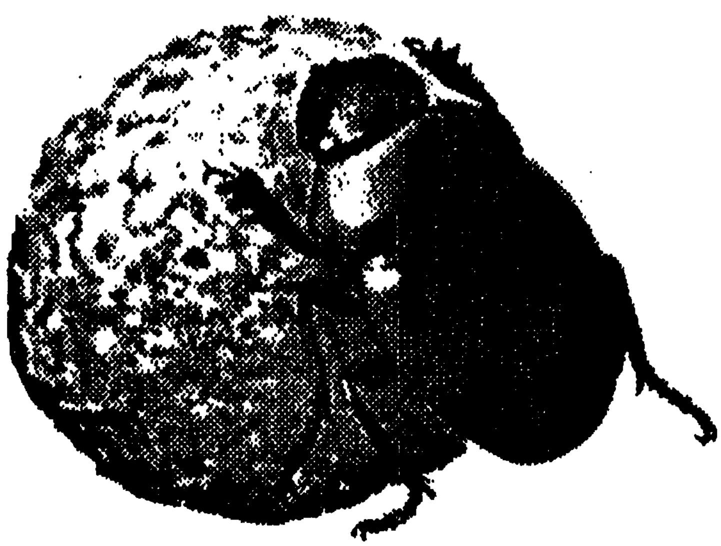
Chuck and I would like to thank you for your attention. If there are any questions we will be happy to attempt to answer them at this time.

Session 5E-2

Reserving for Free Extended Reporting Coverage Under Claims-Made Policies

Charles L. McClenahan, FCAS, ASA, MAAA
Debra L. McClenahan, FCAS, MAAA

Reserving for Free Extended Reporting Coverage Under Claims-Made Policies



AGENDA

· Nature of the Problem

· Reserving Methods

· Reporting Options and Impacts

· Current Activities

Nature of the Problem

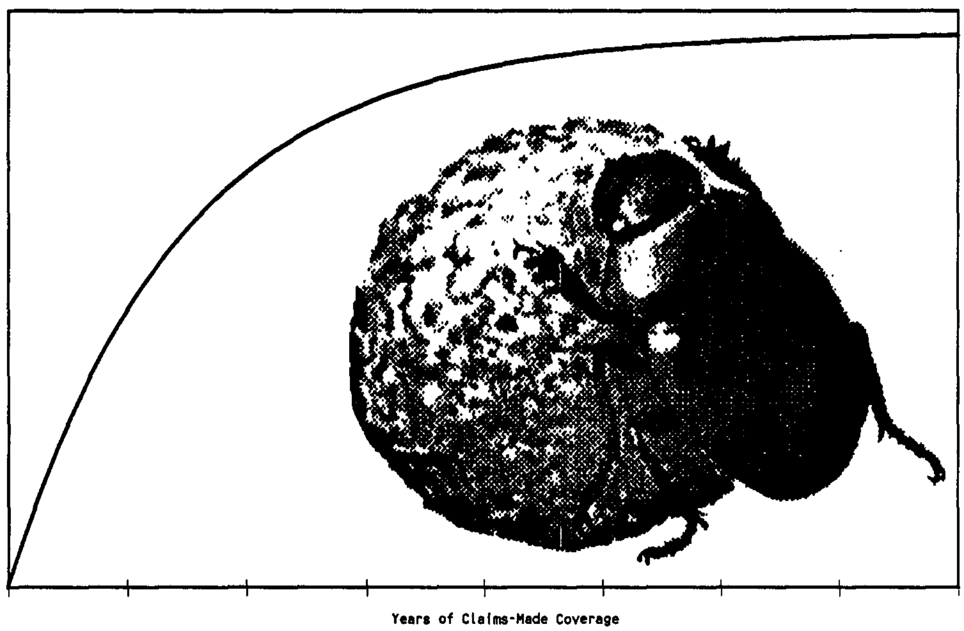
· Claims-Made policies providing guaranteed extended reporting endorsement coverage in the event of death, disability or retirement at no (additional) cost

· For those leaving insured population through death, disability or retirement provides effective occurrence coverage

· This guarantee is inconsistent with the pro-rata earning of premium over an annual term

Nature of the Problem (Continued)

Extended Reporting Exposure



Nature of the Problem (Continued)

- Two Basic Types of Policy Language
  - Guarantee extended only where death, disability or retirement occurs during policy period
  - Guarantee extended to all insureds
- Continuous claims-made policies cover all claims covered under occurrence policies
  - Premium savings reflects uninsured tail
  - ERE guarantee abrogates savings
- Reinsurers generally not bound to follow guarantees

Reserving Methods

- Pay-as-you-go
  - Accrue only for extensions granted during policy period
  - Accrual = ERE premium X expected extensions
- Allocation of Premium
  - Accrual based upon *a priori* split of premium between claims-made and extended reporting

Reserving Methods (Continued)

- Actuarial Method
  - Project mortality, morbidity, retirements, interest
  - Calculate policy reserve on discounted basis
  - Accrue increment to policy reserve
- Ignore it
  - (... and maybe it will go away)

Reporting Options and Impacts

- Three Options for Reporting
  - Unearned Premium Reserve
  - Loss Reserve
  - Write-in Liability
- However reported, goal is smooth transition between policy reserve and IBNR

Reporting Options and Impacts (Continued)

- Unearned Premium Reserve Option
  - Recommended by NAIC Casualty Actuarial Technical Task Force
  - Identified as "unclaimed coverage extension benefits"
  - Consistent with treatment of A&H policy reserves

Reporting Options and Impacts (Continued)

- Loss Reserve Option
  - NAIC would permit as alternative where authorized by Commissioner of state of domicile
  - Included with unpaid losses
- Write-in Option
  - Not specifically addressed by NAIC
  - Presumably would require approval

Reporting Options and Impacts (Continued)

- Tax Impacts
  - UPR hit with 20% for prepaid acquisition
  - Loss reserve discounted for interest (not mortality, morbidity, retirement)
  - Company-specific payment patterns affected
- Loss reserve option requires actuarial opinion

Current Activities

· NAIC Casualty Actuarial Technical Task Force - 6/11/91

- Accounting Manual would require reserve
  - -- Preferably as UPR addition
  - -- Loss reserve with approval
- Permits discounting for time value of money
- Assumes liability is funded through rate levels

1991 CASUALTY LOSS RESERVE SEMINAR

5F-1: AUDITOR'S GUIDE TO LOSS RESERVING

Moderator

Stephen P. Lowe
Tillinghast/Towers Perrin

Panel

Ruben Nava
Deloitte & Touche

MR. LOWE: This is one of the mini-sessions. The topic is the new AICPA proposed statement of position entitled "Auditing Insurance Entities Loss Reserves." I guess we are the mini-panel and you are the mini-audience for this mini-session. Because it involves auditors and actuaries talking together, the time allowed has been limited to forty minutes, in the interest of not boring anyone to death. Actually, I hope we can have a interesting presentation. This document has just come out from the AICPA and I think it's worthy of attention from both actuaries and auditors and all parties who are interested in loss reserves. While it has a lot of boiler plate in it, quite candidly, inter-spruced in the boiler plate is some pretty hot stuff. (Laughter)

Okay, the session...I'm really not very good first thing in the morning. It was a long night last night. You'll have to bear with me.

A couple of housekeeping items. A first I am to announce that the session is being recorded and that tapes will be available shortly following the session at the cassette sales booth, which is a new innovation I believe.

Our panel this morning is a small panel. It consists of Ruben Nava. Ruben is a Partner with Deloitte & Touche and he is the National Director of Insurance Industry Practice there. He has spent over twenty years serving insurance companies in the areas of accounting, auditing, mergers and acquisitions, restructurings and other areas. He is a CPA, CPCU and a CLU. He has served on numerous committees of the American Institute of CPAs, including the AICPA Insurance Companies Committee, the AICPA Relations with Actuaries Committee, which meets regularly with the Academy's counterpart committee and he has also chaired the Property/Liability Audit Guide Task Force and other committees. I'm sorry he's chaired the task force which recently developed and has issued this exposure draft entitled "Auditing Insurance Entities Loss Reserves." And he has some prepared material which we'll go over and then I will make a few comments after his presentation and then I hope we'll have time left for questions. It's only a forty minute session so we'll have to move quickly. Ruben.

MR. NAVA: Thanks Steve. You've already heard the topic is the new exposure draft on auditing loss reserves. There is one thing that I'm not going to talk about today and that's catastrophes. I witnessed two of them last night. One when the Jets missed the field goal and another one when the Bears scored the overtime touchdown. Those of you from Chicago might see it differently.

As Steve mentioned, this exposure draft was just issued last week and has gone out to interested parties. I don't know if you would have received this as part of a regular distribution, but there are copies in the back if you need them. It was prepared by an AICPA task force, which included representatives from the big six firms, from one non-big six firm and we accountants, being smart enough not to do anything like a paper on loss reserves without including the actuaries, we did contact the American Academy of Actuaries and the Casualty Actuarial Society for a representative and Steve Lowe was the representative of both organizations to this task force.

It was formed in January 1990 and completed a working draft last December, which is fairly fast for most of these task forces and cleared through the AICPA earlier this year and through an editorial process this summer. There is a mistake. It says the draft was issued in August. That was what I was hoping for when these slides were made up. Unfortunately, it didn't get out until last week. And the comment deadline is November 15th. Technically this will not be in force for this year end. It will be effective for 1992, although the mere fact that it's in an exposure draft stage, many auditors would begin to adopt the provisions.

(Slide)

This is designed as a statement of position, which is a supplement to the property/casualty or property and liability audit guide. Replies to property/liability companies, reciprocal exchanges, pools, captives and public entity risk pools, which if you go back to the title, which is why we don't call it insurance companies, we call it insurance entities. And every word, believe me, is very carefully reviewed by the American Institute.

(Slide)

Some of the things it does not cover. It does not cover some of the tangible issues such as premium deficiencies, transfer of risk, credit risk, discounting, contingent commissions and the like. And some of this I will go through fairly quickly. Some of this is for auditors rather than actuaries, but the paper itself does discuss use of specialists and the overall reserve process.

(Slide)

So it begins by discussing loss reserve process, policy durations, types of coverages, kinds of insurance written, which we all call lines of business or types of risks, but when you put it through an editorial process is becomes kinds of insurance, so we'll have some new terms that come up. It discusses long duration and short duration, policies, although the paper is really dealing with short duration. It goes through types of coverages occurrence bases, claims-made, pure claims-made and variations. And the kinds of insurance, the different lines of business and starts into a discussion of the loss reserve process or the components of loss reserves and the like. Some of this, obviously, is designed as a primer for an auditor who is not familiar with property/liability companies. It's kind of, as Steve said, it's really down to basics, but it's something that we have to put into the paper. It goes through estimating methods, how you group loss data, how you group types of data.

What the paper is not, it is not a critique or an evaluation of different loss reserve methods. It does goes through a few different methods, but it is not designed to tell the reader or the auditor what is the best method in all cases or what is the best method in a particular case. It is simply a paper to describe what some of the risks are when the auditor is looking at loss reserves.

(Slide)

It goes through estimating methods, extrapolation of loss dollars, frequency severity data, use of loss ratios and the like. And goes through illustrations of projection data on occurred loss and paid loss basis to, again, to show how some of the differences are created. Again, it's not a book on loss reserving. And we'll go through LAE reserve approaches and ULE reserve approaches, calendar year, paid-to-paid and timing of payments.

What's more appropriate from the audit standpoint is looking at things like changes in environment, identification of the variables as they might affect loss reserves, and how that might affect selection of methods, adjustment of data, etc.

As Steve said there are a few issues that are a little more than mundane in the paper and this is one of them, use of specialists by management. The paper stated definitively that termination of loss reserves should involve a specialist and that the absence of involvement would constitute a reportable condition or possibly a material weakness in controls. Now this goes far beyond any current accounting or auditing literature in the AICPA, but the Auditing Standards Board is aware of this. We pointed it out to them and they agree with the position as of now.

(Slide)

You probably noticed I didn't use the word actuary on this slide. I used the word specialist. So let's get into, for a moment, definition of a loss reserve specialist. The paper states that a specialist is an individual with a sufficient level of competence and experience in loss reserving, including knowledge about the kinds of insurance for which a reserve is being established and an understanding of the appropriate methods available for calculating reserve estimates. We did not go as far as saying that an actuary must be used or that a casualty actuary must be used. We used the word specialist for several different reasons. One is specialist is a fairly defined term in accounting literature and there are all kinds of specialists, medical specialists and oil and gas specialists and the like. We went a long way to even do this. Apparently any time you require something like the use of a specialist, the AICPA goes up in arms because the auditor up in North Dakota is said to not have a loss reserve specialist available to him when auditing the property/liability company in North Dakota. And I apologize for using North Dakota if anybody is from there. Our reaction to that is fly him in. That it is necessary and, again, the paper does require use of a specialist.

(Slide)

The paper then goes on through a number of, what I would call, the audit issues, audit planning, objectives. And audit risk goes through, what is called, inherent risk in the process, discussing product mix, new products, etc., backlogs, managements attitude, conservatism, new policy forms and how they might affect the loss reserve process. Then it goes into what is called control risk, which is the quality of personnel, internal control, reliability of the database, loss payment practices, volume of claims, changes in systems and how all of those might affect the process. And it gets into auditing the claims database itself.

(Slide)

Then we get into evaluating the reasonableness of the estimate. And I want to just give you a little bit of background on how this was developed. There is a Statement of Auditing Standards, Number 57, called the "Auditing Accounting Estimates", which really served as the basis, so to speak, of some of the positions in this paper. And that paper, SAS57 states that an auditor should use or a combination of the following: review and test managements process, develop an independent expectation or review subsequent events. In the case of insurance loss reserves this paper states that the last approach, approach C is insufficient for auditing loss reserves. So you basically...the auditor will have a choice of either using managements' process or developing their own estimate.

In going through managements' process, the audit process so to speak, includes identifying the controls, review of the data, evaluation of assumptions and analyzing the data, etc.

(Slide)

Use of specialists by auditors. Use of specialist is covered in another auditing standard called, SAS11, which states that...and 11 does not preclude the auditor from using the work of a specialist who is related to a client. This SOP states that the order of loss reserves requires the use of an outside specialist. So this, again, is an extension of current literature. If an auditor were auditing an oil and gas company where he has to estimate oil reserves that are in the ground, technically if you read the auditing literature, he could use a specialist inside the company to...a specialist who might be part of internal audit or another area to help evaluate those oil and gas reserves. In this case, because of the significance of the loss reserves to the financial statements of the company we took the position that the auditor must use a specialist who is an outside specialist. And, by the way, it doesn't say independent specialist, it says outside or unrelated specialist. One of the reasons for that is that the definition of independent is different between the accounting profession and the actuarial profession, so we didn't want to get into misinterpretations of what independent meant versus unrelated. Yes?

QUESTION: (Not at microphone) Yesterday they were talking about...

MR. NAVA: Excuse me. Excuse me. Could you do us a favor and speak into the microphone with the question? That way we'll end up on the...

QUESTION: Yesterday, in one of the sessions, they were talking about the actuary didn't have to be independent or outside. Are you saying, if I understand correctly, from the auditor's point of view if you are having an audit you need to have an outside specialist come in as opposed to if...maybe if you're not having an audit, although most companies probably do?

MR. NAVA: Yes. I'm not sure which session you're referring to. It might have been the session on...

QUESTION: It was on...

MR. NAVA: ....actuarial opinions...

QUESTION: Yes.

MR. NAVA: ...for the yellow blank, for the NAIC blank. That's an NAIC rule as to whether the actuary giving the opinion has to be inside or outside.

QUESTION: Okay. But here if a company is having an audit, then they have to have an outside specialist.

MR. NAVA: Right.

MR. LOWE: I think to clarify, there are two specialists that we are referring to here. One is a specialist that is either employed by or engaged by the company, by management, to set the loss reserves. And the auditor's responsibility is to test and evaluate managements' loss reserves. And what we're saying is that the audit also must have a specialist to participate in that evaluation and testing. So essentially what we are saying is there have to be two specialists. I guess there are circumstances where they could be the same person. Management specialist can be an employee or could be a consulting actuary. The auditor's specialist must be outside the company. In other words, the auditor in evaluating the reserves can't go to the company employed actuary and rely on him in evaluating the reserves.

MR. NAVA: Yes. It's basically an evaluation of, what are the risks in a particular company? And, obviously, the size of the loss reserves to the overall financial statements is very, very significant and the judgement of this task force is that you can not rely on insiders to form an independent opinion.

(Slide)

So what the paper then did was go through some of these scenarios to try to clear up this precise issue. Went through four situations. First was where a company has no loss reserve specialist involved in the determination of loss reserves. And these are quotes out of the paper, that this situation might constitute a reportable condition, which is an auditors term and possibly a material weakness in internal control, which is not only an auditor's term, but also a legal term because if you have a material weakness then the company is violating the foreign corrupt practices act if you are federally regulated. So this does become significant to management or potentially significant.

In this case, the paper states that the auditor should use an outside specialist to determine an independent expectation. If you recall, again, the other standard that I mentioned gave you two choices. You could either review management's estimate or develop an independent expectation. And what we are saying is that in this case you would have to develop an independent expectation, because there was no specialist involved inside the company.

(Slide)

Second situation is where the company has an in-house loss reserve specialist who is involved in the determination and the company does not use an outside specialist. And, Judy, I guess this is the situation that you are talking about where the in-house specialist would have been rendering the opinion on the loss reserves. The auditor's response here would be, again, to use an outside specialist to evaluate the reasonableness of the estimate. And this is what Steve was talking about about having two people involved. The first being the specialist who determines the reserve. The second being the specialist that reviews or audits or evaluates that determination.

(Slide)

The third situation, and these are not easy to write by the way as Steve could tell you. We spent many days in the words of these four slides. And, again, these are quotes out of the paper. The third situation, a company has no in-house specialist but does use an outside specialist in the determination of the loss reserves. This is probably the one we had the most difficulty with. It stated and I'll read it first, "This auditor should evaluate the relationship. If the specialist is related the auditor should perform additional procedures, with respect to some or all of the assumptions, methods or findings to determine if the findings are no outside unreasonable or not unreasonable or engage an outside specialist for that purpose." The reason this one was a little more difficult was because of what Steve was mentioning. We were looking at this concept of one person sets the reserves and another one reviews that determination. In this case, you may not have two people. You do have an outsider, however, so the auditor has the responsibility to evaluate that relationship, look to see how close that outside specialist might be to the company and we discuss things such as is this that actuary's or that specialist's only client or is it his major client and we really look at that as an unrelated or independent estimate, so to speak.

(Slide)

Fourth situation, which is probably the best one from the audit standpoint, would be where the company involves an in-house specialist and involves an outside specialist to separately review the reserves. And in this case the auditor could use the outside specialist as his specialist, so to speak. If you're dealing with some of the big, one or more of the big six accounting firms, all of the big six have in-house actuaries, but there are locations around the country where even the big six will use outside specialists in some audits. So, again, this is the situation where the company has an inside specialist and there is an outsider independent specialist reviewing that estimate.

The paper then gets into areas such as loss reserve ranges, that the audit should address the variability of loss reserves and that no single loss projection addresses the concept of variability and that the audit should consider those ranges and now necessarily the absolute best and worst case, but actually a range of reasonable estimates. And basically the auditing literature says that if the company's recorded loss reserve is within a reasonable range then there is no "error" in those financial statements. If it is outside of a reasonable range then this is an error that the auditor has to either evaluate or have corrected.

In reviewing those ranges, the auditor should consider frequencies, policy characteristics, retention levels, mix of business and other factors. And, as I stated, if the recorded reserve is outside of a realistic range then it is considered an error.

There is one instance, which is mentioned in the property/liability audit guide, where an auditor can qualify an opinion on the financial statements regarding the uncertainties involved in loss reserves. And that's where there is insufficient historical data that may create an uncertainty. And this is typically a new company that doesn't have base historical data or a company moving into a major new line of business for which it does not have historical data. Those are fairly restrictive instances where the auditor can now use what used to be called the subject-to-opinion, subject to the adequacy of loss reserves. Those opinions will be few and far between in the future.

And lastly, the other areas addressed involve evaluating loss adjustment reserves and evaluating reinsurance ceded effects on the loss reserve estimate.

That concludes my comments. As I mentioned, the comment period is about 60 days. November 15th is the deadline for comments. We don't know how much opposition this will get from either the professions or the industry, but this by the way was an outgrowth of the new property/liability audit guide, which was completed about a year and a half, two years ago and there was considerable comment at that time that there was not enough discussion within the audit guide regarding auditor guidance on auditing loss reserves. That it should have several separate chapter or separate discussion. We didn't want to hold up the issuance of that audit guide, so that was issued and then this task force was formed to basically supplement that audit guide with a separate discussion on loss reserves.

And we'd be happy to take any question you may have. If somebody could turn up the lights so that we could... Thank you.

MR. LOWE: Thank you, Ruben. As I said at the outset, I think this is an excellent document that's worthy of review both by actuaries and auditors. It takes a number of positions that strengthen and clarify the auditors responsibilities relating to loss reserves. And when you read it I would encourage you to recognize that perhaps it's stronger than it may appear. It was an education for me working with the AICPA, participating with this task force because they really have a very carefully defined funicular that they work through and I learned that when the document says shall, that means must. (Laughter) Okay? And the way to recognize those terms, and the words are carefully chosen, is when you read it think of how it would be used against you in a trial if you were on the witness stand. As a layman, it is my view that the, in my own words I guess, it's the auditors responsibility to review and test the process and results of managements preparation of the financial statements including the loss reserves. The auditor must develop sufficient evidence to support management's assertions as to the financial condition and earnings of the company. The key part of the document is on pages 25 and 26, where as Ruben says, it essentially says management should use a specialist. And you would read that as management must use a specialist, I think. Because if management does than management has to have a good reason why it chooses not to. Well, given the auditors responsibility, I think it is therefore safe to say that part of the auditor process will probably entail the auditor evaluating whether the person who set the reserves is actually a specialist or not. How will they do that? Well, the document does go on and say that the Casualty Actuarial Society trains people and the Academy qualifies them and sets standards for actuaries who practice in this area. As Ruben says, it does not say you have to have an actuary. On the other hand, it does lay out, right after it introduces the fact that you must have a specialist, that an actuary is probably such a person. It does allow others to be qualified but if I were a non-actuary and I were trying to decide whether or not I was qualified, I would think about what it would be like to be on the witness stand saying, well, I don't have any of those exams and I haven't read any of those materials and I only have two or three years of experience. You have to be prepared if you're going to accept this role as a non-actuary you have to be prepared to stand a withering attack on whether or not you are in fact qualified to do this. I think there definitely are some people who fit that bill and, therefore, I think the language that is chosen here is appropriate. I don't think you must necessarily be a card carrying triple-A/CAS member in order to be qualified in this area, so I think we've struck the right balance there, although others may disagree.

And then the document goes on to say that the absence of a specialist may constitute a reportable condition, presumably reportable to the audit committee, which I think is very significant. It really puts the auditors feet to the fire on what he must do in situations where he does not feel that the reserves are set for reserve process involves people who are qualified to do that job within the company. And I suspect that particular section of the report may receive a lot of comment from, particularly smaller companies, and I would be disappointed if there will be change.

The second area, which I think actuaries will find very interesting, is that the guide takes the position that in order for the auditor to test the reserve, he must develop or a range must be developed. It doesn't say directly, those words, but it says in order to evaluate the reserve you must perform alternative calculations and develop some sense of the inherent variation in the estimate. This is an area where I think actuaries may in 1992, when this becomes effective, be asked to do a little more than what has normally been done in the past. I think we should expect some questions from auditors as to where we are within a range and what we think the range is and we better have some procedures and protocols set up to respond to that inquiry, as I think it is an appropriate line of inquiry for them given their responsibility.

Well, we have about ten minutes left for questions. And I hope there are some. Mike? Would you? Thanks.

QUESTION: I was very interested in the concept of a range. Does that mean that a company actuary should provide a range to his auditor? Does that...how do you see that working in practice? We've always given them a number, because my experience has been that accountants often aren't happy with more than one number. (Laughter)

MR. NAVA: We're happy with one number as long as it's the right number.

If my discussion and Steve's discussion on ranges was not clear, it is because it is a difficult area. We did not come to agreement that the auditor must have a range to evaluate. He can evaluate a point estimate, that being the company's estimate, but he has to consider the variability of the number. You didn't get to a point of saying you have to have some where in your work papers, a range and determine that the company's estimate is within it, but you have...at minimum should evaluate the variability of that number if you can conclude that there is not a significant variation from that point estimate, that's fine. But believe me, it is carefully worded. We didn't get as far as saying you must have a range.

MR. LOWE: It's more carefully worded than apparently I read it. As Ruben says, it puts the onus on the auditor and presumably the auditor specialist to evaluate management's estimate. Management estimate is a point. It is what the number that management has determined is the reserve that ought to be put into the financial statements. That's managements job. Now management may have its own actuaries...just make a recommendation and book it or may ask the company actuary for a range. But the sense of the language in the document is that for the auditor to assess the risk he has to have some sense as to what the inherent variability is. Part of that, I think, relates to a materiality issue, if the reserve is so uncertain as to be material to the overall financial position then I presume some kind of qualification to the opinion might be appropriate.

MR. NAVA: Let me just give you an example, because this is a difficult area in the paper. If you have a recorded loss reserve of ten million dollars in two different companies, one where the range is from nine million to eleven million and the second company where the range is five million to fifteen million, what we are trying to get at...and let's say management and the auditor agree on those ranges in those two examples, what we are trying to get at in the second example, that being where the range is five to fifteen, is has either management or the auditor done enough work to determine that ten million is the right number. Or maybe you have to do more work. Maybe you have to break it down further into different lines of business or further analysis to try to reduce that range or that variability. That's not to say that ten was not the reasonable number, because the paper will say that as long as it's a reasonable range then it is a reasonable estimate. But that might get you to the point of, is there enough disclosure in the financial statements regarding the variability of that estimate.

MR. LOWE: Do you have a follow-up?

QUESTION: I have people talk about using a number around 10% as a range...if you are a consulting actuary reviewing a company's estimate...that if that company's estimate is within 5% either way of your estimate, which are a total swing of around 10% of the total reserves, that could be regarded as an acceptable range of variability. But 10% of the reserve level might well correspond to 25 or 30% or more of equity. Is that a reasonable concept for auditors to certify that...or give their opinion on the adequacy of the financial statements?

MR. NAVA: It's a good point. It does not discuss whether the...the paper does not discuss whether 5% is okay or 10% is okay. It does say you have to look at the reserves and determine your materiality and look at variability in comparison to the financial position of the company. So, yes, you definitely have to look at what the affects are on the equity of the company.

MR. LOWE: In my view this is a challenge that's been laid at the actuaries doorstep. The audit material simply says, well, gee, you've got an estimate in the financial statement. It's not a quantity that's capable of definitive evaluation. It's material to the company's overall financial position. We think as part of the audit process, the auditor ought to have some perception and some clear understanding as to what the inherent uncertainty is of that estimate. I mean, that is their responsibility. In my view, the actuary's responsibility and as a profession, our responsibility is whether we are company actuaries or whether we're consulting actuaries, whether we're specialists working for the auditor or specialists working for the company. Our job is to come up with techniques and some sensible way for characterizing that uncertainty and perhaps having our own standards as to what is a reasonable level of uncertainty associated with an estimate and even how we would qualify our own opinion in situations, for example, where the data is inadequate and therefore the estimate is subject to a great deal of uncertainty. It seems to me that we ought to think about that ourselves. I think the auditors will look to us to give them some guidance as to that level of uncertainty and I think their request is fair and we should be prepared to respond to it by year end 1992. We have fifteen months.

MR. NAVA: There's nothing, as an auditor, I would like better than to have the actuaries in bed with me when we issue that opinion on the financial statements. There's only one company that I know of where the actuarial opinion is actually published in the company's annual report. It happens to be Steve's firm that issues that opinion. I think we might see more of that. I think there's going to be a lot more involvement between the auditors and the actuaries and probably see more opinions being published.

MR. LOWE: Other questions? Anyone have any other last words?

QUESTION: I do a lot of work for the smaller companies and I don't have in-house people. Sometimes they think they do, but from our viewpoint they really don't. They all use outside specialists. As an auditor and maybe this exposure draft addresses it a little more than it was previously...if an outside specialist, essentially, is making recommendations as to what the reserves should be and the client records, according to the specialist. As long as I work and talk with the specialist and understand their assumptions, how much further, as an auditor, do we have to go?

(End of Side One)

...compares to the company's reports and things like that. That's always been a problem. I mean, how much further do we have to go or can we just rely on the actuary?

MR. NAVA: Well, I think you're referring to what we call the situation three, where the company uses an outside specialist or outside actuary. As long as the auditor follows the guidance of the...SAS11 on use of specialists, which is review that specialists qualifications in relationship to the company, that is enough as long as you have an understanding of his...reasonable understanding of his procedures. You obviously...you can get into a great circle of, do you have to be a specialist to evaluate the qualifications of a specialist? We obviously can't go that far. But, yes, you can use the work of that outside specialist even though he or she is the one setting the reserves.

QUESTION: I was wondering, is it necessary that there be agreement between the specialist and the auditor as to the final number? In other words, in your example, the specialist comes up with a range of five million to fifteen million and does the auditor just go along and pick and say, well, eight million looks like a good number? Or does he require the specialist the concurrence in the reasonableness of the final number?

MR. NAVA: The final number ultimately is set by management. The specialist technically, and this is my opinion, I don't think it's actually stated in the paper...technically the specialist would not...excuse me, the auditor would not have to ask the specialist for concurrence on the final number as long as the specialist gave the auditor the reasonable range.

QUESTION: Alright.

MR. NAVA: ...would not have to actually concur on the number selected within the range, although many times we, as we all know, many times they would have a recommended reserve level would not be necessary.

MR. LOWE: I believe that the document suggests that essentially if the auditor believes that management's estimate is within a range that is reasonable then the auditor would not take issue with that number and with management's number or suggest that it needed an audit adjustment.

MR. NAVA: There are one or two nuances in that. If the person...if there is a range and the specialist setting or determining that range or setting the reserves has recommended a most reasonable or best estimate within that range, then I don't believe that management can simply pick another number if the specialist is saying that's the best estimate or if management is saying this is the best estimate, but since I have this range I can select anything in the range. My answer to that is no. Once management has decided that one number within that range is the best estimate then that's the number that has to be recorded in the financial statements.

MR. LOWE: Well, there the auditor is evaluating management's process.

MR. NAVA: Right.

MR. LOWE: And if management's process to say to the actuary, well, give me your best estimate and a range about that estimate and my process is to book the bottom of the range, then I think the auditor has to question management's process as to whether or not that's a valid process for management to use in determining what the reserves should be in the financial statements. And I would hope to see in more cases the auditor rejecting that and saying, no, management has to have a process in place that involves taking the work of the specialist. And if management brings in input from other areas and says, well, the specialist has not reflected thus or so and can make a cogent argument, then I think the auditor might very well be satisfied, but I think in too many instances there is a brazen situation where the bottom of the range is simply the number. And I think that is not acceptable. And I think this document goes a long way toward trying to say, you can't have it that way anymore guys.

Well, we're out of time, so I'm going to have to cut this off. I want to thank Ruben for coming and filling us in on this document. And thank you for attending.

1991 CASUALTY LOSS RESERVE SEMINAR

5F-2: NEW DEVELOPMENTS IN FASB'S POSITION ON DISCOUNTING

Moderator

Bertram A. Horowitz
Bertram Horowitz, Inc.

Panel

Allan M. Kaufman
Milliman & Robertson, Inc.

Wayne Upton
Financial Accounting Standards Board

MR. HOROWITZ: I'm Bert Horowitz, moderator for New Developments on FASB's Position on Discounting. This session is being recorded and tapes will be available shortly following the session at the cassette booth.

This panel will discuss the controversial topic of discounting and latest developments in the area. Some of the diverse views on discounting range from: (1) reserves are already inadequate and discounting can only further erode this inadequacy, (2) we all recognize there is a time value of money and reserves should be set at their expected value and they should be discounted at their expected value using an expected interest rate and an expected paid out pattern, and (3) discounting should be reflected in our financial statements, but should also incorporate the riskiness that the outcomes other than expected values may and in fact are even likely to emerge. And of course there are many other views on discounting and many ways to implement the various views on discounting.

Here to discuss the discounting issue are two distinguished panelists, Wayne Upton and Allan Kaufman. Wayne Upton, our first speaker, is a certified public accountant. He's the project manager of the present value project for FASB, the Financial Accounting Standards Board. He holds a BS from Regis College Denver, was a partner in Clifton, Gunderson & Company. Wayne joined FASB in 1984 and before he was project manager of the present value report, he was project manager of the famous statement 97 on universal life. He's been working on present value project for three years. Wayne will present the background and discussion of the FASB discussion memo. Wayne.

MR. UPTON: Being introduced as the project manager on statement 97 is always a mixed blessing, I guess. I need to open with a disclaimer that being that the FASB encourages the expression of views by members of the board and staff, but that much of what you'll hear this morning are my personal views. Official positions of the FASB being reached only after extensive deliberation and due process. That's the official disclaimer. The unofficial disclaimer being that if I insult anyone and probability suggest that there is some likelihood of that happening, please accept it as a personal affront on my part (Laughter) as opposed to an official insult on the part of the FASB (Laughter) which would require a discussion memorandum, an exposure draft (Laughter) and all the rest.

This session is billed as a discussion of the FASB's position on discounting of property/casualty loss reserve. That's a bit misleading, since we don't have one per se. The board is in the midst of a larger project and a longer term project that deals with present value questions and accounting generally. Having said that though, I would be disingenuous if I didn't acknowledge the property/casualty reserves are clearly on most short lists of candidates for a present value measurement among things that currently in financial accounting are not routinely discounted.

Last December the board issued a neutral discussion memorandum entitled "Present Value Based Measurements and Accounting." We always make them big. Always a big title. That DM is the first step in a project that examines accounting measurements based on principles of present value and interest. And we refer to those collectively as present value based measurements. They've been part of many issues considered by the board in recent years, but the board has been reluctant to move ahead and expand the use of present value into new areas without first considering the role of present value in financial reporting generally. That reluctance is historical. It dates back well into the board's predecessors.

I'll focus my comments today on areas that are of particular interest, it seems to me, to actuaries and professionals in the insurance industry. To start with a bit of background, accounting uses a multi-attribute system. We choose different measurements for uses in different situations and we expect that this approach will continue. There's no notion that because we are considering present value that we expect ever to apply it broadly throughout the financial statements. What we are interested in is the selection of present value in specific situations. And here the discussion memorandum talks about two families of measurements.

Direct measurements are those that are based entirely on current assumptions and estimates. Now most measurements that accountants take an initial recognition of assets and liabilities are direct measurements and they are less common in subsequent measurement, once the asset or liability originally reaches the balance sheet. But certainly the reserves of a property/casualty company are an example of direct measurement taken every period. The insurer remeasures claim liabilities from period to period updating as they go with current information and assumptions. This contrast with accounting allocations that record an historical amount in the financial statements and deal some way with the disposition of that original recorded amount over time. The amortization of a bond on the amortized cost basis or the interest method is an example of an accounting allocation. Now I've said then all that I'm going to say this morning about accounting allocations, because it seems to me of little interest to a group principally concerned with loss reserving.

The ideal measurement attribute, at least from our perspective at the FASB, is one that best combines reliable measurement on the one hand and relevant information on the other. There's a constant conflict or push-pull between those two in determining accounting measurement. And the discussion memorandum focuses on that combination. What is it that makes a present value measurement reliable? What information do we believe that it's designed to communicate? And how well suited is it to that objective when compared with other available measurement attributes?

The discussion in the DM begins with the premise that some may find troubling, but one that's well established in accounting measurement. And that is that present value is almost always a second choice. It's almost always an orphan.

Now the FASB's concept statements define five measurement attributes. And there's a preference in accounting for the three attributes that are based on observable market place values, those being a transaction price, a current cost, an entry value or a current market value, an exit value. To the extent that one of those is observable and reliable, accountants tend to prefer those measurements to attributes based on estimates of the future, those being net realizable value, the undiscounted sum of cash flows and present value, a discounting notion.

The need for reliable estimates is often sited as an objection to present value or to an expansion of present value into a new area of accounting measurement. And this is particularly true in areas like property/casualty loss reserves. At the risk of oversimplifying their views, those who use this argument tend to reason in the following way. First, time value is acknowledged as an inherent element in all economic considerations. Certainly the role of investment income in a well-run insurance company and the growth of products labeled financial reinsurance testify to the truth of this assertion. However, Point B, these people realize a reason, excuse me, that the estimated timing and amount of cash flows in the property/casualty setting is subject to some considerable uncertainty and they include, therefore, C that accounting should ignore the time value of money. Ignore, if you will, the economics of the transaction in measuring the company's liabilities. Stated differently, the appropriate discount rate is 0%. I find this a curious syllogist. There are conceptual and practical answers to be determined and when and if the board actually considers discounting in the property/casualty industry, it may determine that it is inappropriate in this setting. But C, ignore time value, doesn't seem to me to follow from A and B in my syllogism.

The DM describes factors that lead to the conclusion that a measurement is reliable, but reliability is a matter of degree. It's not a principle per se. It's not something that we can point to as an absolute quantity. Most would agree that estimates should be reliable enough and that they shouldn't cost too much to obtain. But enough and too much are likely to be fairly elastic sorts of notions and they'll produce considerable disagreement. No one would advocate a measurement that is clearly unreliable, but measurers often accept a fair amount of unreliability or imprecision, although the terms are not synonymous, in exchange for measurements that produce considerably more relevant information to financial statement readers. The cash basis of accounting is an example of an incredibly reliable method of accounting measurement. When we've written a check for something, we pretty much know what it was that we expended. It's reliable. Of course it produces almost no relevant decision making information, as we found in the area of post-retirement benefits, so we've got some kind of a stress, some kind of a trade-off that needs to be made there.

We have to begin then with the idea of an objective. What is it that we're trying to accomplish? What is that relevant information? The DM suggests three alternative views in the present value context. The first is a broad view that says present value is a measurement on its own feet and that sometimes it's good enough just to capture the time value element of an economic measurement, even though we might not be able to capture other attributes. And an example of that would be found in the way we account for pensions or now post-retirement benefits, in which our estimates are based on the best estimate or most likely outcome discounted at what is approximately a risk free rate of return. So notionally, at least, we're capturing the time value element but nothing else.

The second alternative says no, no, no, no. Present value is just a hammer looking for a nail. It really is a surrogate for some other measurement that we would have used if we could have found it. In most people's minds present value becomes a surrogate for market value, a way of estimating market value.

And finally the discussion memorandum allows a third alternative, a selected view. It moves on to address several specific areas including the role of risk and I'll get back to that in talking about the comment letters and the public hearings. We received about 120 comment letters on the DM and that's about what we would expect for this sort of a conceptual document. People find it very difficult to comment on neutral discussion memoranda. They find it much easier to comment once there is a proposal on the table and then they can say, well, I don't like this about it, I don't like that about it, or I like this. It's much easier to get your arms around when it is a specific proposal.

I have to say I'm surprised by the scant response that we received from the insurance industry and to an extent from the actuarial profession. We received only four insurance company comment letters and one insurance trade association, the ACLI comment. That was it in terms of industry response.

On the other hand, you can be very proud of the role that the Academy played. Their comment letter was cogent and thoughtful and Allan Kaufman and David Rogers were among the most thoughtful and helpful participants in our (inaudible). In addition, two other actuaries submitted comment letters in their own right. Both of them focused primarily on the question of risk and both of them were superior efforts in my view. But, in general, the insurance industry as a whole was more or less silent on the issue. And I find that surprising.

Now let's move now to some specific comments, particularly about the objective of present value measurement and this notion of risk. Most of the participants in the public hearings and respondents to the comment letters favored a selective view. That being that present value will serve one objective and one situation and another objective and another. And that's fine. That's what we expected. I think people are reluctant to sign on to a single predominant principle for all possible applications. The difficulty with the selective view is that a workable situational approach needs some guiding, underlying principle. There are lots of situational systems of thought. We're all familiar with situational ethics, the principle of which tends to be the greatest good for the greatest number of people. The point is that if a selective view is going to work it needs a decision rule. Without a decision rule you can't describe what you are doing in any terms other than I'm going to make it up as I go along, which doesn't seem very appropriate as an accounting standard.

The Academy was an outlier. It was among the minority of respondents who favored a measurement surrogate view. The Academy letter described the surrogate view in the following terms, "In our view a risk adjusted interest rate equals market value in a suitable market place. Therefore, present value based measurements serve as a surrogate for market value when that value...when that...when market value information is not directly available." Contrast that with a letter that we received from General Re Insurance, which was also one of the most thoughtful letters that we received. They also took the measurement surrogate view, but with a somewhat more restrictive approach. Their letter read in part, "The conditions which lead to a lack of relevant market values, especially for monetary assets and liabilities are likely to be the same conditions, which cause present value measurement to be inappropriate".

As question of objective is critical because if we're going to determine how to use present value based measurement, we have to have a clear idea of objective. If we attempt to debate the issue without a clear idea of objective, the debate is undisciplined and too often the discussion deteriorates from a discussion of the right way of measuring assets and liabilities to a discussion of what you think net income ought to be, which is inappropriate in an accounting context.

Now let me move then in the time that I have left to talk about the role of risk. This question, in the DM, produced the most interesting and also the most troubling comments that we received. Accounting pronouncements don't deal with risk in any systematic way. Accountants have an in-born desire to avoid those sorts of notions and to look toward observable values whenever possible the characterization of us as bean counters is not entirely inappropriate. (Laughter) So for many respondents an explicit idea of risk and a consideration of that was really a new notion. Now some of those who commented would prohibit any consideration of risk at all. They see it as a kin to a general contingency reserve or a catastrophe reserve of the sort prohibited by Statement 5 on contingencies. And certainly the board had no intention of opening the area of contingency reserves to reconsideration. The whole idea that bad surprises are worse than good surprises and that we ought to make measurements designed to produce good surprises is absolutely contrary to any notion of representational faithfulness in financial reporting. And we certainly had no desire to move that way.

On the other hand, the market place assesses risk and it's reasonable to ask why our measurements shouldn't. Others see riskiness as implicit somehow in the estimation process. This is troubling if one believes that best estimate is synonymous with most likely. If an outcome is, in fact, the most likely, the mid point on a distribution if you will, than it can't include explicitly or implicitly a provision for risk. Others see the interest rate as a place to hold risk and this may spring from the accountants' tendency to look at contractual cash flows and a market place interest rate. The problem here being that we really don't have any systematic way of assessing risk and knowing how that should fit in to the interest rate.

And finally there were a few commentators, including the Academy and General Reinsurance and the actuaries who spoke individually, who did speak about risk and the need for a systematic approach. And their comments were quite helpful and a considerable contribution to the process.

One final troubling aspect about risk raises up though and I'd like to mention that to you this morning. There are some who suggest that the use of present value, especially in the context that we are speaking of today, should not proceed until we have some reasonable framework for measuring risk. Carried to its extreme that would suggest that similar liabilities should also be undiscounted. And so I suggest to you that those who hold that view have to reconcile that view with the current accounting for pensions, post-retirement benefits and life insurance. And I suspect that if you go back to your corporate controllers and tell them that you believe in your heart of hearts that the post-retirement benefit obligation, thought necessarily to be an undiscounted liability...after they recover from the heart attack you may have cause to reconsider that view. Clearly, accountants sometimes accept less reliability, again, in favor of greater relevance. Our estimation procedures may in imperfect, but I personally see that there...I see no reason, personally, for accounting to consistently foreswear relevance in a search for reliability that may or may not be achievable.

With that and given the shortness of time, I'm going to cut off my remarks and leave some time for Allan to speak about the Academy's response.

MR. HOROWITZ: Our next speaker is Allan Kaufman, as you may have guessed. He is a Fellow of the Casualty Actuarial Society and a Member of the American Academy of Actuaries. Allan is Principal and Consulting Actuary for Milliman & Robertson. He received a BS from Brooklyn College and an MS from the University of Wisconsin. And Allan is currently Vice President of Research and Development of the Casualty Actuarial Society. Allan will present the American Academy of Actuaries' reply to the FASB discussion, which was prepared by an ad hoc committee of the Casualty Actuarial Society Research Committees. Allan.

MR. KAUFMAN: As it turned out the committee on the American Academy Committee on Financial Reporting was confronted with this tone of accounting discussion of the discounting issue and they dealt with it for awhile and then involved some of the CAS committees in preparing a response, which in normal actuarial profession approach was the CAS working as the brains and the Academy working as the voice. So we wrote a document and attached a partners name to it.

The accounting terminology gets to be rather dense. You've heard that. When the committees were trying to construct an Academy response to the Academy discussion document, I think we kind of focused on three objectives and more actuarial insurance framework than accounting framework, although some of those objectives were taken from the document itself. First of all, the document refers to wanting an accounting approach that would avoid the ability of a company to create gains due to changes in accounting treatment, i.e., financial reinsurance. And we would agree that that is a good objective for a system. You shouldn't be able to artificially create gains.
Secondly, an accounting system ought not to distort decision making. So an accounting system that doesn't reflect the time value of money, particularly as interest rates change as they did in the early '80s, has the potential to distort insurance company decision making. So you'd like an accounting system not to do that.

And finally, and perhaps most importantly, from an actuarial and insurance perspective, we don't want an accounting system that would discourage adequate reserves. And more importantly we would want one that would encourage an adequate measurement of liabilities.

That's an actuarial insurance perspective on some of those same accounting issue that I think Wayne was talking about in a totally different language. Don't ask me to draw an exact line between my words and his, but I think those are the same thoughts. The Academy response to the FASB discussion memorandum had three key points. I'll describe them...I'll list them and then say a few words about each and then we'll turn this into questions.

The three key points were: (1) that if present value methods are used then a risk adjustment is necessary; (2) that even though the state of actuarial science and art is such that we don't know now exactly how to do that risk adjustment, we can figure it out, particularly if forced to, we could figure out something and if given enough time we would probably figure out something better. So we felt that the fact of the state of the art is not there. That's a fact, but that should not inhibit the risk adjustment process; and (3) that interest rates have to depend on the asset valuation technique that is being used. You can't just look at the liability. You also have to take a look at the assets.

Well, what did we mean by that? Well, risk adjustment is necessary. Generally actuaries think that you want a conservative estimate of the liability and we think in terms of risk for doing that. Wayne complimented us on responding to their question and proposing the market based surrogate formula approach and we did do that, although possibly that was because that was the only hook we had to stick safety margins onto reserves. It works. It kind of describes what we feel about safety margins and we hope it is correct. It leaves unanswered some questions, the ones that Wayne brought out about how does that relate to non-casualty actuarial issues like post-retirement medical benefits where there is no discounting. And they asked me that questions and I punted. So present value methods, if they're used, risk adjustment is necessary. We can explain that through a market process.

FASB's current position, on that topic, is something of an all or nothing position and that, I think, is mostly what concerned the people who helped write the Academy response. The current position is something like, either cash flows are reliable and you discount them or they are not reliable and you don't discount them. Well, accounting now is treated in the second category. They are not so reliable that it requires discounting. If they simply shifted to the alternative view that would imply something like, or in the worst case, imply something like, measure the liabilities, look in the annual statement for the company's average interest rate and of course they were earning 15% from the junk bonds they bought and discount the liabilities at 15%. Now that's clearly a worst case interpretation, but even a more moderate interpretation like look up a risk free interest rate in the current newspaper and discount at that risk free interest rate creates some problems, we would think, in terms of getting to an adequate reserve. So we don't want them to move from don't discount to look up an interest rate in the newspaper and discount based on that interest rate. And the risk adjustment is a step to get something that we believe would better accomplish adequate reserves, non-artificial accounting gains and good decision making.

With respect to assets, the committee said that we have GAAP accounting as it is now, so if you're going to change it that raises all sorts of issues, so we're not anxious to propose that you change it. But, on the other hand we said, if you were starting from scratch what do we think should be done, we said, well, you do have to think about assets and liabilities. There is a relationship and perhaps the cleanest way to do it, if you were starting from scratch, would be to value the assets, which for a P&C company is heavily bonds at market value and do a present value of reserves considering market value interest rates and risk. We didn't say they should do that. We just said if you are starting from scratch, that's probably the way to think about it. Given that framework, it says, if you are going to discount, but you are going to leave bonds at amortized value then you have to use interest rates that are drawn from the asset valuation technique that you're using, i.e., amortized values.

We were very concerned, and I guess this is the last point on that interest rate, with the relationship between assets and liabilities. We think that some bad decision making happens if you look...if you were to do bonds at market value and not discount liabilities you have a problem, because as interest rates rise, as they did in the early '80s, you see your bond values drop. But if you are running an insurance enterprise carefully you may have some degree of matching between your assets and liabilities, so your net worth should not change greatly as that happens. But if you value bonds at market and did not discount then you do have a dramatic shift in net worth as some companies showed in footnotes, not in the statement, in terms of the degree that bonds are underwater. On the other hand, if bonds produce gains because interest rates fall, but you are matched to some degree in your assets and liabilities, then there is no gain there. So you really don't want bonds and the bond value and the undiscounted reserves to get too far out of whack.

So those are our key points. If present value is used, risk adjustment is necessary. We don't know for sure how to do risk adjustments, but we think we have some tools lying around and we can make them better. And finally, the interest rate that's used in this process should relate to the asset valuation technique. Thank you.

MR. HOROWITZ: Thank you. As you can see from our discussion, the discounting issue is coming to the fore and in the same vein the Actuarial Standards Board of the American Academy of Actuaries is currently preparing a standard discounting of property and casualty loss and loss adjustment expense reserves. A public hearing on this proposed standard is being held tomorrow morning in this very hotel at Salon D & E at 9:00 in the morning, for those of you who wish to attend. And I see some in the audience who are actually speaking at the public hearing.

With the few minutes we have left, I would like to open this up for questions. Could you please identify yourself first?

QUESTION: (Not at microphone) I'm Mike McCarthy from (inaudible) Insurance. Allan, you mentioned that one of the criteria for the American Academy's response was not to distort decision making, but then you also mentioned that we're going to have amortized value assets and use some sort of (inaudible) I'm not sure exactly what discount. Doesn't that, in that case, allow potential for sort of an expanded financial reinsurance type thing because of the difference between (inaudible) and (inaudible) market yields to (inaudible) funny things to adjust those yields and yet impact on the discounting of reserves?

MR. KAUFMAN: I don't think so. I think...

QUESTION: (Inaudible) market value...

MR. KAUFMAN: Well, if you go to market...if you market...let's see...if you don't the value the assets at market, but you do go to a market value on the liabilities, then I think you have a problem, because...

QUESTION: (Inaudible)

MR. KAUFMAN: Well, variability and I think a misstatement of net worth, because if interest...if your bonds are earning 5% and current interest rates are 12%, it doesn't make sense to discount your liabilities at 12% unless you've restated your assets down to what they would be currently worth.

QUESTION: But a misstatement of net worth would not be because your liability evaluation, it would be because of your asset valuation.

MR. KAUFMAN: That's right. And to some extent you don't want to mix...on one hand, you might say, you don't want to mix the asset value with the liability value. They're two separate questions. And on...to a certain extent that's true. What we also think is true is that there is some relationship there and you will create some bad decision making and misleading statements unless you reflect both of those items, because they both depend on market interest rates. So to do one and not the other creates a problem. I think that was our main point.

You raised a question of whether if you used amortized value to value your assets and you used...and did not to value the assets...and did not use market to value the liabilities, then there's some arbitrage possibilities. I think not, because I think you would have to take...if you actually did a transaction, you would have to hand, to the reinsurer, assets whose market value equalled the present value of those liabilities plus their risk load. And so you would have to hand over to them either more or less assets than you thought you were on a market value basis than you thought on an amortized value basis. So it's not obvious to me that there is an arbitrage opportunity there. But if there is one, someone will find it. (Laughter)

MR. HOROWITZ: Yes. If you could step up to the microphone?

QUESTION: Ron Bornhuetter. The company that I'm involved in...the present value accounting would increase...it's a publicly traded company...increase its book value about 40% so obviously I'm interested in the subject. Now Wayne, what's next? In your judgement, do you think something will happen? And if so, when?

MR. HOROWITZ: Just so I can stick a word in there. If they did it the way the Academy suggested, then the adjustment to your net worth might be 40% or 20% or zero or if there's enough risk margin, it might reduce it. Correct? Having put that in, I'll let Wayne answer the question.

COMMENT FROM AUDIENCE: (Inaudible) ...risk adjustment.

MR. UPTON: I'll only bet about 500 on predicting what the board is going to do. Our next step, at least what we expect to propose to the board, is that they move to a document that we call preliminary views. Those of you who are at all involved in pensions recall preliminary views. It's something less than an exposure draft and something more than a DM. As I mentioned, one of the problems that people have is getting their arms around the neutrality of a DM and they do much better when there's something specific out there to shoot at. So I would think that we would move to a preliminary view first, but we're going to continue to address the problem, I believe, in a general sense first. And we're going to get some general rules laid down before we move to any specific industry application.

I found it interesting that Allan described a board view of discounting based on the reliability of cash flows. Part of the reason we have this project is because that ad hoc approach that we followed in the past has produced that view and about 25 others in the accounting literature. If you want a rule for discounting, in the accounting literature, look and you'll find it. And you'll find a whole bunch of different one. And so we've got to lay down a general principle first, it seems to me. And we'll probably do that by laying out a preliminary views document first to get some more public comment and then move ahead.

One of the proposals that we had, just real quickly, was that we issue an accounting standard, like Statement 97 or 60 or any of the others, that would tell people how to use present value and how to apply a present value based measurement, but not require it for anything. Then if people wanted to change they'd have the rule in place and they would just change to this statement. We wouldn't have to reargue it every time. And that's certainly kind of interesting and that's one that we'll be following up.

MR. HOROWITZ: With that, we are out of time. Won't you please join me in thanking our speakers for their presentations.

1991 CASUALTY LOSS RESERVE SEMINAR

5G: PROBABILITY LEVELS FOR LOSS RESERVES

Moderator

Nolan E. Asch
Scor Reinsurance Company

Panel

Glenn G. Meyers
Insurance Services Office, Inc.

Douglas W. Oliver
KPMG Peat Marwick

MR. ASCH: I'm Nolan Asch, Senior Vice President at Scor Reinsurance. For those of you who have any confusion about what this session is, I've got my only slide up there. I think I'm able to deal with it; Session 5G: Probability Levels for Loss Reserves.

A couple of brief logistical announcements, and then we'll get right into the meat of the presentation. Everything here is being recorded. We hope to have a lot of questions from the floor. We'd like it to be a discussion oriented situation. But, please, if and when you have questions, speak into the microphones.

Also, a little paid announcement on behalf of the Casualty Actuarial Society, on October 7th and 8th, there is going to be a seminar on the theory of risk in Boston, Massachusetts. I'm kind of the administrative representative from continuing ed. Gary Ventor, right over here in the front row, is running the theory of risk committee of the CAS and the presenters.

For those of you that want to make a little trip up the highway to Boston on October 7th and 8th, we still have a few spaces left. We now have about 65 people signed up, and we have capacity for 100.

So you can approach either myself or Gary for, during -- well, not during -- before or after the session to speak about that.

Our first speaker this morning is going to be Doug Oliver. Doug is a senior consultant in the insurance consulting firm of KPMG Peat Marwick in the New York office. Doug has contributed papers on the subject of loss reserve margins and statutory accounting to the Casualty Actuarial Society and has made various presentations at previous casualty loss reserve seminars and to other industry groups. Doug graduated from Rutgers University with Bachelor of Arts degrees in mathematics and economics. I'll turn the presentation at this point over to Doug Oliver.

MR. OLIVER: It's either a speaker's nightmare or a speaker's dream to have the first session the second morning of these seminars. So, depending on how well prepared I am, you can be the judge of my dream or nightmare.

What I'm going to talk about this morning is, as Nolan has already mentioned, is probability levels in loss reserves.

What I'm going to talk about this morning are some aggregate models that I've developed at Peat Marwick and have been using for the last three or four years. They help us put a range around the reserve levels that we are estimating.

In case you're not aware, Peat Marwick is a large accounting firm which has some consulting operations. I'm coming to you this morning from the perspective of a consulting actuary.

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To give you a little perspective, most of the analytical points I'll discuss represent a continuation of a paper that Aaron Halpert and I wrote a few years ago called "Reserves, Surplus and Uncertainty", as part of the 1988 CAS discussion paper program. The technical background of my talk today is contained in there, and therefore I'm going to skip over it this morning. It's much too early to go through loss distributions, for myself at least.

All of my comments are from the viewpoint of an independent consultant within an accounting or auditing firm. Also, all comments are personal opinions and not the views of the firm or the cosponsoring organizations.

I'll be talking a little bit about things sometimes referred to as margins, confidence levels, risk and variance. I know technically that there are differences among these, however, all represent recognition of, if not an estimation of, the variability in a loss reserve estimate.

In looking back at all yesterday's sessions, including the general session in the morning, I believe everyone is in agreement that there is no one right answer for a loss reserve. All you can hope for is to get as close to that right answer as possible. Given all the various loss reserving techniques that exist, there is naturally a range that envelopes your estimates.

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There are three types of risk, or variability, that are usually spoken of when doing loss reserves. Parameter risk, which is a measure of the variability of your loss and loss adjustment expense estimates, as a result of not selecting the correct underlying model parameters.

For example, if you've decided to use an incurred loss development model to come up with ultimate losses, have you chosen your incurred loss development factors correctly?

Process risk is that "nice fuzziness" in the insurance process. There is noise in the system. Even if you selected the model parameters exactly right, there is still going to be some variability in your loss reserve estimates simply because insurance is a very variable process.

And finally, there is something called Specification risk, which is not discussed very often. It's a measure of the variability, or the risk, in a system reflecting the possibility that you've initially chosen the incorrect reserving model. The incurred loss development method may be incorrect in certain scenarios, whereas the paid loss development method may be better.

Specification risk is a close relative of parameter risk. If you incorrectly estimate the parameter to such a degree that you're basically picking a different model, Parameter risk becomes Specification risk. Specification risk, therefore, is an extreme case of poor parameter choice.

My talk this morning will focus primarily on the first two types of risk, and of those, primarily on the first one, parameter risk.

I'm giving you an overview of the model that was created. Again, it's an aggregate loss reserve model, with losses and allocated loss adjustment expenses combined. However, I don't think there's anything theoretical that says that it couldn't have been modeled on losses and ALAE separately.

I utilized incurred data, paid plus case reserves not including our company's estimate of IBNR. Again, I don't think there's anything theoretical that says the model couldn't have been built off of paid loss data instead of incurred. The model output produces the percentage change needed in ultimate losses (loss and allocated loss adjustment expenses) for various increasing confidence levels.

Parameter risk and process risk were separately identified and measured, although specification risk wasn't addressed. Also, the analysis was performed by line of business, using four lines of business in the 1988 paper. I've updated the numbers through 1990 using the 1991 Best's Aggregates and Averages. The updated model was run with seven or eight lines of business that I'll be commenting on this morning.

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I'll detail some key assumptions of the model before discussing some of the conclusions. The original model was based on an internal database of Peat Marwick clients, so that we had the ability to remove inconsistencies in the data: Berquist-Sherman type techniques to remove case reserve adequacy changes, changes in settlement and emergence patterns, etc. Much of the systematic noise was removed from the database so we could start with a clean slate.

We assumed, and there's a lot of assumptions in here, that within a loss development triangle, down a column of loss development factors, the factors are normally distributed, and it didn't seem to be all that poor an assumption, given the Peat Marwick database. Again, it's fairly simplifying but it also made the mathematics a little easier.

We assumed that each column of loss development factors was normally distributed. We did not assume that the whole triangle was normally distributed, at least for the parameter risk model, and the way we were measuring parameter risk was the variation in the loss development factors for each particular age to age factor.

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All of the statistics, (means, deviation, coefficient of variation), were calculated at each age of development, again as the parameter risk was based on the variability in the historical age-to-age factors. The nice thing about doing it in on an accident year basis was that we then calculated variability (or margin) for a single accident year, a group of accident years, or all accident years combined.

To estimate process risk, we assumed that the whole development triangle was coming from a single normal distribution.

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I'd like to talk about the model conclusions now. Some of these conclusions may seem obvious to you. If they don't, then here's some news for you. If they do seem obvious, at least what we've done is that we've proved what we had assumed going into the process.

One conclusion is that there is more variation (or risk) for a single accident year than for a group of accident years. If you're only concerned about how wide of a range is needed on your 1990 accident year reserve, that's a bigger range than for the 1986 through 1990 accident years combined, on a percentage basis.

Although independently, you might happen to predict a good year for 1988, a good year for 1989, and a good year for 1990, it would not be true to say that for all years combined, you would expect three good years in a row. When you start adding more and more accident years to your process, the variation, as a percentage, starts to shrink.

Another conclusion is that there is more variation, or risk, in a less mature accident year than a more mature accident year. The 1990 accident year has much more uncertainty in it, much more unknown, as most of it is still case reserves or IBNR. You don't know where that's going to end up, as opposed to the 1978 accident year which, depending on your line of business, should be more fully developed and contain less uncertainty. The more mature an accident year is, the less variation or risk that comes out of the model.

Our model also concludes that a smaller company has more risk or more variation in their reserves than a larger company. Again, I don't think that was really unintuitive, but the model proved that out. Given the size of a company, the base of the data is smaller and therefore the variation is greater.

There is also more variation (or risk) in a longer tailed line of business than in a shorter tailed line of business. Auto physical damage closes out within two or three at most. Medical malpractice, products liability, etc, takes a longer time to settle, to close out. If there's more of a lag in the business, the longer you have uncertainty about your loss reserves.

Again, I don't think there's any ground-breaking results coming out of this. But we did show that at least for some internal clients these intuitive type of results did prove true.

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The handout which I'm going to talk about now shows the results from the study that was performed and presented in 1988 as well as the updated numbers.

What I did, is I took the new 1991 Bests' Aggregates and Averages which displays industry data through year end 1990, ran it through the model that we created, and show here the various increases needed for various confidence levels. For example, for commercial auto liability, to get to a 65 percent confidence level for all accident years combined, you would add another .17% to your estimated ultimate losses. (You'd multiply your estimated ultimate losses by 1.0017).

Again, some of the same conclusions starting to play out. For all accident years combined, on a percentage basis, the need for the increased confidence levels is smaller than for just the latest accident year.

You can also see that the need or the increase in confidence level does increase as you get either to a longer tail line of business or to some more risky business. I don't think there were, again, any surprises in terms of the conclusions. This does give you a feel for the type of numbers that are needed, and these are changes in estimated ultimate losses.

Let's assume you write CMP business, and you may have ultimate losses of $500 million, with $40 million of reserves based on the maturity of your book. I'm saying I would add a half of percent for a 75 percent confidence level for all my years; half a percent on $500 million is a big number. Again, these are percentages of ultimate losses.

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In contrast, I also show some of the <u>internal</u> calculations we did. Again, this was using 1986 data through year end. The luxury we had here was the ability to go through and perform the various adjusting procedures needed to remove all changes in adequacy and settlement patterns, etc, from the various clients we analyzed.

We also had a chance to group small versus large insurers. Small for Peat Marwick is somewhere in the range of $10 to $30 million of premium for a given line of business per year. Large is anything over about $100 million.

Again, you can see here that separately for all accident years versus the latest accident year, the latest accident year is more variable; it requires more margin than for all accident years combined. For the small company versus the large company, the small company has more variability. It needs a bigger margin than a large company.

Going down the list, it had seemed like there should be an increase from homeowners to auto liability to GL to WC of increasing percentages. The one that kind of surprised us was that in private passenger auto the large company was actually more variable than the small company.

Again, it wasn't a single company; it was a group of companies we were looking at through year end 1986. I don't know if it's an anomaly or if it says something about the industry.

One thing to notice here is that for the same confidence level need, (the 75th percentile) a small company for all years seems to be around the same percentage as for a large company for just the latest accident year. This is more of a coincidence, I think, than not.

If I was going to value a small insurance company, I would want to add a little over 2 percent to my estimated ultimate losses to get me to about a 75th percentile confidence level. That's about the same 2 percent as a large company would add just for the latest year of accidents.

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Process risk was also examined. The amount of variability added to the overall system from process risk was much smaller, and was almost insignificant compared to the variation that came out of the parameter risk estimates.

There is noise in the system. But to the extent that you picked your loss development factor poorly and continued to pick poorly, that variation seemed to create a bigger range than simply the noise in the system.

Another conclusion of our analyses was that a smaller company just entering the industry had a larger allowable premium to surplus ratio than a larger company who has been in the business for years. That seemed counterintuitive. The reserve to surplus ratio seemed to make more sense. A smaller company with a new line of business and brand new writings would be allowed a smaller premium to surplus or reserve to surplus ratio than a larger, more established company.

Our studies have found that the difference between the reserves discounted for investment income and undiscounted reserves was greater than the margin implied by the model at no less than 90 percent confidence level through all of our calculations and all of our estimates.

For all lines of business, all company sizes and maturities, the difference in the discounting was greater than at least the 90th percent confidence interval. We were using a discount rate (or an investment income rate) of 7 percent.

To give you a bit of an accounting perspective on all this, when we do an audit for an insurance company and come up with an estimate of loss reserves, the company's held reserves are usually "considered reasonable" if they are within 5 percent of our indicated total reserve.

Now, every case is different. But that's about the ballpark we shoot for. If we come up with $100 million as total reserve need, and the client is holding $99 million we'll usually consider that reasonable. There is errors in judgment. There is rounding. There is variation, noise in the system, parameter risk. That's usually considered an acceptable range on the accounting side of things.

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The internal studies show that the 5 percent of total reserve estimate, for internal Peat Marwick clients, is not necessarily above the 85th percent confidence level. It's closer to the 70th or 75th percent confidence level.

Industry statistics, however, shows that 5 percent of total reserves is above the 85th percent confidence level in terms of total ultimate losses from our model. Internally, like I said, it runs about a 70 to 75th percent confidence level. Our studies seemed to bear out that a 70th to 75th percent confidence level seems like a reasonable high end of a normal range. I assume there will be some questions on ranges a little bit later.

When we talk about a best estimate of loss reserves, there is a range that envelopes that. There's also optimistic and conservative estimates of that same loss reserve. We consider somewhere in the 70th percent confidence level to be toward the high end of a reasonable range as opposed to being a conservative estimate.

I didn't want to go through all the specifics of the model, the analyses or any of the statistics. I think it was more important to highlight some of the conclusions and let that be the basis for some discussion once Glenn speaks. Thank you.

MR. ASCH: Our next speaker is going to be Glenn Meyers, Assistant Vice President and Actuary at ISO. Glenn works in the actuarial development department where they recently have produced a new approach to increased limits rate making. That's having an impact and will have an impact around the industry.

He formerly spent four years at the University of Iowa, eight years at the CNA insurance companies. I know he's written a lot of papers. Evidently, he's got a count on it. Being an actuary, he tells me he's written nine papers for the proceedings, which is a pretty high number.

MR. MEYERS: We're in the process of waking everybody up again, not that I think that Doug put them to sleep.

What I'm going to be talking about today is a paper that was written about four years ago. It was probably the last piece of scholarly work I did when I was officially a scholar. It's actually written up in, I think, the 1989 edition of the proceedings. This is the title of it: "Risk Theoretics Issues in Loss Reserving: The Case of Workers' Compensation Pension Reserves."

So I'm just going to outline the paper today. If you want to get the fine details of this, you can just simply refer to that article.

Now, to start off with, let me give what was my introduction to the issue right here of surplus, risk margins and loss reserves. I think it probably would be similar to a lot of other people's introduction to the idea. You recall that the Tax Reform Act of 1986 finally mandated that we discount loss reserves for the purpose of calculating income tax.

Now, what happened was that people thought that gee, we have to keep a little bit of extra money there. We didn't think we should be taxed on this money. It was argued that the discount in the loss reserve represented an implicit -- I want to emphasize implicit -- risk margin. Since we valued the reserves at full value, we really didn't need an explicit risk margin.

But when that was taken away from us, what they did was that we now need an explicit risk margin for loss reserves. Now, those of you who were attending CAS meetings may recall that the Casualty Actuarial Society, committing on a theory of risk, put across I think a very both entertaining and informative session about this where they talked about the various issues surrounding the idea of discounting loss reserves and risk margins.

Now I think the lasting impression I got from that was that the Committee on the Theory of Risk identified two problems. The first problem right here was just simply the technical problem of finding out what is the distribution of ultimate results or the runoff distribution of loss reserves. That is a difficult technical problem.

But then once we have solved this problem -- you've got a distribution. Now, where do you get a risk margin out of that? I think these were two problems that I think the committee really pointed out, but they haven't really solved yet. I might point out that this is the focus of a lot of current research that is being done right now.

The Committee on Reserves has got an RPF for proposals on what to do with the second problem. The Committee on the Theory of Risk is sponsoring a prize paper program to work on the first problem. So this is still very much in the active area of research. Now, when I was at the University of Iowa, although I was there as a casualty actuary, we sort of --

In an academic setting, actuaries are thrown into one very small pot as part of the academic environment. So we have to do more than just simply teach casualty work. I found myself teaching life contingencies. Now, those of you who are older to this society recall that we took life contingencies out of Jordan. Those of you who have taken part 4 recently will recall that we're taking a new textbook, I guess Newton, Bowers, Jones, Nesbitt, Hickman, in some sort of order like that. I for one view the new life contingencies as a very positive enhancement to what was done in Jordan.

Now what they do that is really good is they focus on the (Inaudible) nature of life contingencies. The way they do it is this. They start off defining -- which I denote by a capital T here -- a random variable for future lifetime of an individual. We've got distributions for this kind of thing.

Usually, if you wanted to describe them analytically, we've got things like the Makem Law, the Converts Law, and all that kind of stuff. So the idea that it teaches future lifetime has a random variable. Then what you can do is you can take a function of that random variable, in particularly A angle T, and come up with a function of this random variable and have a new random variable.

Now what is special about this function is that this is the present value of a pension. Now, what this does right here for the case of pension reserves, it basically solves the first problem. We have a distribution of the present value of the loss reserves. Now when I say it solves the solution to the first problem almost, in a sense that we don't address parameter risk. This is entirely what I would call a process risk phenomenon.

Now, also connected with this is that they have a well-defined mechanism for discounting reserves. Now being aware of the Committee on the Theory of Risk problem or the issues going on with loss reserves, and the interaction of confidence internals, distributions, and defective discounting, I thought this as an academic was a situation that was too good to be true.

We had all the elements of what we needed to take in this study and we had something that was actually fairly realistic. This actually does apply to a lot of the insurance problems we have to deal with today. So what I decided to do was to take on a project. Actually, I got funding from the Actuarial Education and Research Fund for this and worked through the implications of our loss reserving problem.

Now I started off right here with -- and I wanted to express these results in the case of a specific exhibit that I think is semi-realistic in the sense that it's got all the elements. I just wanted to keep the number of classes down to some sort of workable minimum.

But I set up a sample portfolio where what we have is a bunch of reserves with pensions, annual pensions and the number of lives connected with this. I took people of a variety of ages. Now we also have to be concerned about the unearned premium reserve. My reason for getting involved in that, both the unearned premium and the loss reserve will become apparent as we go on right here.

Now what's different about the unearned premium is that the claims haven't happened yet. So what we do is we have more lives, some of which will have claims. We actually put down the probability of having the claims. Now what I wanted to do was I wanted to describe right here the distribution of T by Makem's Law and here's the formula for Makem's Law.

I simplified things somewhat here. I didn't mention the initial age, but that can be worked into it. In the paper we've got all the details for that. So this is the way I wanted to begin this. Now the life contingency book essentially gives you the mathematics that is necessary to come up with the mean and the variance of our loss reserves.

Actually, then, what they have a tendency to do is to come up with a mean and the variance and then go ahead and use the normal approximation. Now, what I was able to do was actually work out the distribution explicitly. It involved a lot of convolutions and so forth, and I actually had the Hickman-Meyers algorithm available.

So what I did is I actually worked it out that the distribution of loss reserves would be exactly. What I did is first thing, I wanted to see how good is this normal approximation that the textbook actually recommends. When I actually worked this out, I said gee, that is actually quite good, not exact but it did work out pretty well.

So the sample portfolio I had an expected reserve of \$30 million and a standard deviation of this reserve was about \$600,000. Now what I did was I did the same problem and I did this for not only the pension reserve, but I did it for the pension reserve plus the unearned premium reserve.

Again, right here, through mathematics that I don't really want to describe here, I was able to work out what the distribution of this thing is, the sum of the two reserves. Again, what we see is that the normal approximation does actually quite well for this.

Now, what I mentioned right there was that the life contingency books didn't take us quite far enough. The next thing we have to deal with is this thing called parameter uncertainty. Here's where the mathematics gets a little bit ugly. I've tried to omit some of the ugly parts and just give you the broad outline as to what we've done.

Now you'll recall I mentioned that we use the Makem's Law or what I'll call the Makem's distribution right here to describe the mortality table. Now the Makum distribution has three parameters. I'll just simply call Φ the victor of these three parameters. Now, how did we come up with our Φ, but we came up with the estimate of Φ via a maximum likelihood procedure.

Now you'll recall that in previous sessions and other places, they actually can work out, I guess, at least the asymptotic distribution of the maximum likelihood estimator in terms of the true parameters that underlie it. This is the thing that we described by the Fisher information matrix. It's actually a (Inaudible) normal distribution. •

Now we're lucky we're limited to three parameters. If you're going to try to do this with these loss development factors, you'd probably have to do this about 10 or 12 parameters. But we're not going to get into that. I've picked a nice simple model here. So what we do know is we know the distribution of the maximum likelihood estimator in terms of the true parameter.

The next thing we've just got through working out right here is we worked out the distribution of the loss reserve given a parameter. That's what we just go through working out. That's the thing that we just approximated very nicely with a normal distribution.

Now the next thing we have to pull into this is we don't know what the true value of Φ is, so we have to become basion right here and supply a prior density to it. Now this time I guess one of the rages that was happening around our department in IOS was this business of defused priors.

I tried something like I put a flat prior -- I said all possible sets of parameters are equally likely. So I put one of these diffused priors on the thing. Now this is the things that we have, we know. Now let's try to do a little bit of mathematics to work this to get the stuff that we're interested in.

Now what we have right here is essentially a -- we want to find a joint distribution of the reserve and the maximum likelihood estimator. We can write this out as essentially a product of a bunch of densities that we already have up there. Now I might point out right here that since this is a three parameter model, this integral right here is really a triple integral.

I would have to say that the most time I spent on this was one in trying to formulate the entire problem. The other one is evaluating that triple integral.

(Inaudible) -- lot of work involved in that. Now, once we have this joint distribution of the reserve and the maximum likelihood estimator, we have to find the distribution of the maximum likelihood estimator. What I did is I just simply integrated out the reserve. That was a bit easier to do.

So using Bay's Theorem right here, what we have is the density function for the reserve given the maximum likelihood estimator. Now, this is how we pull parameter uncertainty into the whole thing. So the idea right here is this is the mathematics all compacted on to one page.

Now I might point out right here that I have seen a lot of approaches to coming up with probability for loss reserves. By and large, I think I can view these things all as various shortcuts to this kind of approach. I'll have to think a little bit because the one that Bob Butsic came out with, his diffusion model, I'll have to think about that. But I'm pretty sure I could probably put this in this kind of a framework.

What I did here was I said let's take no shortcuts. Let's get the exact thing or at least approximate up to numerical integration. So this is what I call the no shortcut solution. Believe me, it does take a lot of work. I mean, I would do things like I would go to work in the morning with my PC running and come back at night and see that it was done. It was this kind of a number-crunching thing.

Now what I did is I actually went ahead and I worked out the distribution of loss reserves with parameter uncertainty. Now the kind of thing right here is you can see we get a slightly different meaning and a very much larger standard deviation. I believe that our mean was around $30 million, a little bit higher than this. The standard deviation was $600,000, much lower.

So the idea, as soon as you thrown in parameter risk you are increasing the variability of the reserve. Now here the normal approximation did not work nearly as well. So I just brought that out. The dotted line is the normal approximation. So the next thing we do is we wanted to get the distribution of the total pension plus the unearned premium reserve.

Here we go. Here we have the same sort of thing. We've got a mean of around 36,600 and a standard deviation of about 2.4 million. Again, right here, very noticeable increases in the variability due to parameter uncertainty. So although I would say in this case the parameter uncertainty is not totally dominant, I would say it seems to be the bigger part, but certainly the process risk is there. We didn't get rid of it with this particular example.

Now just to summarize right here, what I did is I took a look at -- I just want to point out the contrast. You can see right here just skewed to the -- I guess it's right or left. I have trouble right and left on these things, but it's sort of a backwards skewed. But what we're seeing is that when you introduce parameter uncertainty for this particular model, we're actually reducing our estimate of the mean, but we're increasing the estimate of the variance.

Now the idea right here is why did we reduce the mean. Well, it has to do with the prior selection that I picked. I tried to show that pick up prior where all parameters were equally likely. That does not necessarily mean that you are going to get the same mean. Perhaps I should pick my prior differently. If anybody wants to tell me how to do this, I will be happy to hear it.

Anyhow, this is the effect right here of coming out with the distribution of possible results. Now again, right here, this is the one case where I actually feel fairly comfortable that we have worked out the distribution of loss reserves -- now these are discounted loss reserves -- in a mathematically rigorous way. I consider these to be actually fairly realistic examples.

So we've got the distribution of reserves. This is the second problem that the Committee on the Theory of Risk has pointed out. How do we translate this into something we can put onto an annual statement, something like that. What is the risk load that is associated with this reserve?

I think in many cases this is the nontechnical problem, although as you'll see, you have to go through a little bit of technical work to come up with a solution. But the kind of assumptions that I want to make right here, first of all, is that the risk load for reserves should reflect the insurer's attitude toward risk.

Now, you can do this in a number of ways. You can go ask the CEO to select a utility function. Has anybody ever tried that? I wouldn't guarantee much success for that. So what I want to do right here is I want to take a look at other decisions an insurance company makes to get a hint as to what it's attitude toward risk is.

Now we have an indication of what the company's attitude toward risk is when we watch him participate in the decision to participate in the insurance market. He says I am willing to sell this policy for this much of a risk or profit load or whatever. Given that he's willing to do that, you know something about his attitude toward risk.

What I wanted to do is I wanted to take a look at what this decision to participate -- make use of that in coming up with some idea as to how risk averse the insurance company is. Now the other thing right here is I took the liberty of saying I know insurers are risk averse. What is some sort of way of expressing this? I expressed this with a utility function. In some circles, that's controversial, but I did it anyway.

Now we got these assumptions that I want to make right here. What I wanted to do was I wanted to translate these assumptions into real live risk margins with the example that I have concocted. Now how do we do this? First of all, what I want to say is that the expected utility of three things is going to be the same.

In other words, we have our company right here. They are just simply holding the surplus. By themselves, they are functioning as a nice dole investment firm. They just take this surplus and invest it. The other thing they do right here is that they are also just as comfortable holding the surplus plus the loss reserve and basically getting out of the insurance business.

We will let the business that we have run off, but we're not going to sell any more business. Then the other thing I want this to be equal to is the expected utility of holding the surplus and the loss reserve and participating in the new ongoing insurance market at the market rates.

So I wanted the expected utility of these three things to be equal. Now how do I set this off in terms of some sort of a mathematical equation. Well, what I did was I set the utility of the surplus as going to be equal to the utility of the surplus plus the expected value of the reserve plus the risk margin for the loss reserve. Then what we will do is we will take away the actual outcome of the loss reserve.

Now for this third equation right here we wrote down the expected utility of the surplus plus -- now R2, you recall that R2 was the sum of the loss reserve and the unearned premium reserve, plus the risk margin for the loss reserve, plus the risk margin for new business, minus the total of the runoff of the loss reserve or the new business and the loss reserve.

So the idea right here is I wanted to set these things equal. Now what I did right here was I selected a utility function. This is one I picked from one of Gary Vendor's papers on utility theory. It was sort of based on the liable distribution. Now what we have here is two equations and three unknowns.

Now the idea right here is -- what we know is we start off knowing the surplus. I just set that as equal to one-half of the expected loss for the new business, thinking (Inaudible) or something like that. Then the other thing we have worked out right here is the distribution of the loss reserve and the distribution of the results for new business. We worked those out with a parameter uncertainty.

Now we also know the risk margin for new business. What I did was I just picked off the risk margin for the new business would be 12 percent of surplus. I have been chastised for that. Now that I'm back in industry, I probably would raise that a little. But anyhow, as an academic at the time --

So anyhow the idea right there is we have these things here. So this is the information we know. Now what we don't know right here were the parameters B and C of the utility function up here. What we also don't know is the risk margin for the loss reserves. So now here we have our two equations and three unknowns.

Now I might point out that what I could have done is I could have picked a one parameter utility function and simply refused to deal with this. But the one thing that I wanted to do was I wanted to test the sensitivity of the results to different utility functions. I figured one way to do this, the easiest way to do it was to pick a two parameter utility function and basically simply select different values of C.

Now once I have selected the value for the C parameter, then I can actually -- I've sort of taken away one of the three variables. I have two variables left. So once I've done that, I've got -- what I've got is two equations and two unknowns. It's certainly a nonlinear kind of thing.

You can go ahead and work these things out. Actually, that went fairly quickly. It's some sort of a iterative procedure. All the stuff we had learned in part 3 is actually relevant. Certainly it's thrown into a lot of the stuff I do. So the idea right here is we are able to go ahead and solve for this risk margin for loss reserves and for various values of C.

We go ahead and we get the values of B and we come up with the risk margins for loss reserves. Again, I want to emphasize what this is. It is a risk margin for the loss reserve that is consistent with the decision to participate in the insurance market. Now I suspect that that kind of risk margin, whether that's what you want to do, may be debatable, but that's essentially what we did.

I might point out that I also attended the session yesterday morning where Bob Butsic -- this general outline of trying to use the market to calculate a risk margin was exactly what Bob was doing.

Now go back. Now we're able to calculate this kind of thing. What I did was I said gee, what we were interested in was sort of using this risk margin as an explicit risk margin. The idea, it was there to replace the amount of the discount for loss reserves. I thought well, gee whiz, it's possible to remove the discount from these loss reserves. Just plug interest rate of O into the annuity functions.

I was able to do that. What I found right here is that the undiscounted loss reserve was 64 million. Then right here given that the interest rate I used was 29 million, that implies that the implicit risk load brought about by the discounting was 34 million. Then right here we take a look at the risk margin. These things are off by a factor of about 100.

I said well, wait a minute. Pension reserves are commonly discounted at 3.5 percent. I said well, let's plug in 3.5 percent and see what we get. We can see that this implies an implicit risk load of about 9 million which is about 20 times what this is.

Now the conclusion that I came to right here is that risk loads that we have, that we calculate for this, are not comparable to discounts in loss reserves. I said wait a minute. There is just something wrong here. These things are in a totally different ballpark.

Now I might point out right here that it would be possible for me to pick something like maybe 5.9 percent or something like that to come up with a discount for -- to express this in terms of an interest rate. As I stated yesterday in the other session was I thought the idea of expressing this risk load has a somewhat lower interest rate. I thought it was very artificial and unnecessary.

I didn't do that because I think generally the best thing to do is just simply put the risk margin there and express that for what it is. But that's just sort of a technical minor problem. The idea is that it is important that we get an explicit risk load. For this example, admitted it is a very long tailed generally-conceived-to-be not risky example. We are in a totally different ballpark here.

That concludes my remarks.

MR. ASCH: Thanks, Glenn. Well, we told you it was going to be an advanced session. So everybody knew it coming in. I wanted to try to tie a few things together, try and get a couple of things I think are very, very important to tie together. Then we're going to have a little quasi-unrehearsed panel discussion. I like to do little play acting things to try and drive these points home to people in their guts.

Both speakers were very, very clear in saying parameter risk is much, much more powerful than process risk. I think that's a seminole point. Doug has a lot of real industry statistics. Another nice thing about Doug's work I think is worth noting is a lot of times you hear studies and papers done, but nobody comes back three or five years later to say okay, I observed these things and what happened.

You'll see him coming back here and showing that the margins that he comes up with and the confidence intervals in the line of business are stable, which I think is very interesting and you don't see every day.

Glenn's point about the power of discounting is very, very important. But I think it is important to note that he's talking about a pension line of business which has tremendous tail. You're not talking about two, three or four year time periods. You may be talking about 5, 10, 20 year time periods.

Since I'm never accused of being moderate, I'm going to try to make a few comments particularly aimed at those that are relatively new to the business. I see a lot of familiar faces out there, but I see some faces that look a little -- I'm not getting older. You all are getting younger. There are some young looking faces out there.

The issue of loss reserve margins has gained prominence, I'd say, in the last five to seven years. Really, the Tax Reform Act was the shove that pushed even the most reluctant actuaries over the edge of having to do something regarding loss reserve margins. What you heard over and over and over again in presentations from the very first session all the way through is it is extremely appropriate to use risk margin to add to a discounted loss reserve.

What you are hearing here very clearly is there is a tremendous difference between a discounted loss reserve margin and undiscounted loss reserve margin. One other thing I want to make very clear is I'm a big fan of utility theory and Glenn talked about it a bit saying has anyone tried to get a utility function out of senior management and talking about loss reserves.

You really do have implicit utility functions. If you are a loss reserving actuary and the company is carrying a loss reserve of 100 units and have 20 units in surplus and you come up with a range of outcomes of 80 million to 120 million, at the high end of that range of outcomes, the company is 0 surplus. The management definitely has a utility function related to that.

Even to discuss items like that is going to create all kinds of reactions. You may not call them strict utility functions, but it does translate directly into human behavior. I am a very firm believer in being very careful -- I guess I'm the only one on the panel that's a company actuary. I have been for 17 years. So I'm coming very much from that standpoint.

for those of you who are relatively new in the business and are maybe not yet dealing with top managements or will deal with top managements, let's say, as you advance in your career, one thing that is very worrisome to me is an actuary who may be in the best position of anyone in the company to really be able to accurately assess the loss reserves devaluing his input into the management process by coming in and saying well, we have 100 in surplus. Everyone knows that. I think the expected answer is 100, but it could be anywhere from 80 to 120.

You've got company people. Of course, you've got to book one number. It is totally paramount in terms of the surplus of the company, the future of the company, this year's earnings. You're dealing with people that are not all scientific people, that are not going to necessarily go with the intellectual approach that you may be taking.

If you were going to buy auto insurance or something, your insurance premium can be $800 to $1200. You pick. Well, I think you know what people are going to pick. An actuary that comes in and says your loss reserve answer can be 80 to 120, it's a nice out. We're getting more and more into a legally-exposed area to be able to have an actuary come out and say okay, it could be 80. It could be 120.

There's a nice confidence interval and I'm protected in all outcomes. But there are other executives in the company with their own agendas that are very, very clear saying it's 80. When you're a CEO or you're an executive and you have to make a very, very big decision such as this, I hope the actuarial profession does not make the pragmatic mistake of overstating the uncertainties because the uncertainties are there. No one is more aware of them than we are.

I think we may hurt ourselves in the decision making process and being top management participants if we overdue expressing the uncertainty and saying I think it's 100, but it really could be in a range.

I guess I would encourage -- I don't want to preempt all the time, and I've jumped out of my moderator's role, as I normally do, but the other people here may have views on the panel. Then I'll open it wide open for questions. If anyone wants to speak to a nontheoretic point --

MR. MEYERS: Let me just take the ball on the one question that I think Nolan brought up, this idea of giving ranges. I'm one of those who believe you should almost never -- I have to say almost because I've been through the grinder enough where I've had to compromise -- but almost never give results in terms of probabilities. Probabilities are all intermediate calculations.

That's why what I did in this particular result is I didn't stop with just simply saying this is the distribution. Here are the probability levels. I actually wanted to go express a risk load in terms of real live dollars. I think that's one way to get around this business of expressing ranges.

MR. OLIVER: I don't think there's a client that I work on, that in the analysis process I don't come up with a range of reserve results at least internally. My presentation of reserves is always a point estimate with an understanding that there is some variation around that.

Being a bit conservative, if someone asks me about the range, I'll usually make it nonsymmetric with the optimistic (or the low) end of the range being slightly below my best estimate and the conservative side being higher than low variance.

From a consulting standpoint, we're testing the loss reserves a company as booked. If a company is holding more than our estimate, it's usually not a problem, IRS aside. A company being below what we think their total reserve needs to be calls in our plus or minus 5 percent discussed earlier.

A range of reserves was created to test the reasonability of a client's held reserves. I don't think anyone should come away from a loss reserving process with the full confidence that they've done all possible tests.

I think you do have to recognize that there is some variance in any estimate. Also, just because there's a range, it doesn't necessarily mean that all outcomes in that range are equally likely.

I think it is a mistake to go into a meeting presenting a range, because you do have individuals that will assume all results are equally likely. I wouldn't present a range and let a client pick their estimate from within that range. Also, from the independent auditing perspective, we can't present a range to a client and say "you pick what you want to book". We're testing when they're booking.

I think reserve ranges need to be very narrow and skewed to the right on the conservative side.

MR. ASCH: We've got some live questioners. Go right ahead. Could you go to the microphone, if you would take the trouble? We can record your question for posterity that way?

MR. MEYERS: The small and large -- again, small was for our purposes, somewhere between \$10 and \$30 million per line of business in annual premium. I was working with net dollars, net annual statement type of numbers. I think the other thing I failed to mention was when we had talked about why parameter risk may be overshadowed, at least in my study -- process risk.

Don't forget I was using numbers that had already been massaged, if you will, or adjusted to remove a lot of the variation that goes on in a normal process of an insurance company to speed up the settlement and the case reserve adequacy. So once that's out of there, I think the process risk does become minimal.

Again, the sizes are, like I said, \$10 to \$30 million per year for line of business. Large was anything over about \$100, \$150 million. But it grew from there.

QUESTION: Doug, you show the margins, the percentages you need to get to various confidence levels. Those are a percent of --

MR. OLIVER: Ultimate loss and expense.

QUESTION: The percentages are surprisingly small.

MR. OLIVER: That's my observation.

QUESTION: As in percent of reserves, what would they be? In other words, can you translate this into a reserve margin?

MR. OLIVER: That's what I had done when I said the 5 percent (as a percentage of estimated reserves) is equal to about a 75 percent confidence level.

QUESTION: (Inaudible) that was kind of a fixed interest rate. That certainly must be another source of uncertainty. Did you leave it out because you thought it would be harder to incorporate it, because you thought the magnitude would be effective worrying about it? (Inaudible)

MR. MEYERS: Probably neither. Let me put it this way. I would say it was more the fact that -- I'm not sure whether it was hard but it was more work. One of the things I figured is that you can't wait to present things before you solve all the problems. I would say that's certainly something that should be there. That may very well raise the magnitude of the riskiness of this. It may even as much as double or triple it.

QUESTION: Two easy questions for Doug. How many accident years of data were you using?

MR. OLIVER: I was using 10 accident years of data.

QUESTION: Recognizing that some companies and lines have more or less years, how would you deal with that?

MR. OLIVER: The lines I was dealing with were mainly liability lines, even the homeowners and farm owners. I didn't do any testing on auto physical damage and pure fire losses, et cetera.

QUESTION: Did you get your data from information which ties to any statutory schedules?

MR. OLIVER: Yes, the Annual statement.

QUESTION: The second easy question is when you subdivided your data, internal data, into small and large companies was a small HO book in a large company considered "small" or "large"?

MR. OLIVER: We went with "large" if the company was a large company, even though the homeowners book might have been small. It was grouped in with the large company data, thinking that the type of information, type of claims management, etc, from the company would be similar.

QUESTION: One question for Glenn. The risk load that you calculated, do you propose adding that to the reserves that would otherwise (Inaudible) so that the discounted reserve would be something that the company could live with?

MR. MEYERS: The answer is yes. That's exactly what I'm proposing.

QUESTION: Do you know any of the actions that the (Inaudible) to seeking an implicit risk load on top of the otherwise calculated loss reserve? Have they had any reaction to that that you know of given that the entire purpose of discounting loss reserves was to generate some revenue?

MR. MEYERS: I think the entire purpose -- I agree that their purpose was to generate revenue. The only thing I will say is that I have not had any contact, either direct or indirect with the IRS on this matter.

MR. OLIVER: The insurance industry/IRS relationship is a lagged relationship. I don't think we're even getting into the 1986 or 1987 tax cases yet.

QUESTION: How would reinsurance data look?

MR. OLIVER: Much different. We did try to do some test work on reinsurance only data. The data was obviously not as smooth and the development factors were a lot more variable. What I did see was larger risk -- I don't want to call it risk loads but larger margins.

When we started to try to combine two or three reinsurance companies we realized that the type of reinsurance in the industry are different enough that they were not easily combined. We did use RAA data however from their latest study.

QUESTION: I have four comments (Inaudible)

The first one is there's another risk that we have and that's model risk. If one model uses paid loss and another model uses incurred losses, each one of those will generate a set of statistics which (Inaudible)

Yet, the results of the two models can be quite different. I suggest that the problem here is that in each one, or possibly both cases, we are not working with the right data. The data should have been adjusted before we began our calculations. For example, if there has been a speed up or a slow down (Inaudible)

MR. MEYERS: Doug did that.

QUESTION: (Inaudible)

MR. MEYERS: That's the difference between the 39.1 and the 29.9. The idea is that interest -- I guess the IRS, even before the Tax Reform Act of 1986, the 3.5 percent was a permitted discount rate for work comp reserves.

QUESTION: The next comment is that I can't (Inaudible) I think it belongs in reserve loss. The reason being that if you put the risk (Inaudible) in reserves, on the average you're going to have respected value for your reserves which is more than the loss. So you won't always have losses. You will tend, in the long run, to have losses that (Inaudible) as they run off. While some may think that's a good thing, I (Inaudible)

The other thing is that if you were in a case of increasing business as you do this, these reserves are not the ones that you can use for rate making or your rates would then be too high.

MR. MEYERS: Well, let me say this. For rate making, I don't -- I'm saying you should --

Perspective

- o Continuation of paper written by myself and Aaron Halpert: "Reserves, Surplus & Uncertainty", 1988 Casualty Actuarial Society Discussion Paper Program.

- o All comments are made from the point of view of an independent consultant, working for a large accounting/auditing firm.

Slide 0

Definitions

Parameter Risk

A measure of the variability of loss and loss adjustment expense estimates, as a result of the inaccuracy of the assumptions or inputs to a given model or a specific method.

Process Risk

A measure of the variability of the overall insurance mechanism, given that the assumptions and parameters chosen are sufficiently accurate.

Specification Risk

A measure of the variability of loss and loss adjustment expense estimates, due to the incorrect or inappropriate choice of model or method. In one sense, specification risk is the same as parameter risk.

Slide 1

Model Overview

- Aggregate reserve model for losses and allocated loss adjustment expenses.
- Accident year incurred (paid + case reserve) data utilized.
- Produces percentage change in estimated ultimate loss and allocated loss adjustment expenses needed for increasing confidence levels.
- Parameter and Process risk identified and measured. Specification risk was not addressed.

Slide 2

Parameter Risk Model Assumptions

- Assumes all inconsistencies in data have been adjusted or removed (Berquist / Sherman adjustments for changes in emergence & settlement patterns or case reserve adequacy).
- Assumes that incurred loss and allocated loss adjustment expense development factors are normally distributed at each age of development. (Does not assume that each incremental factor comes from the same distribution).
- Assumes that variation (as measured by the coefficient of variation or CV) within the columnar LDFs becomes asymptotic to some positive number.

Slide 3

Model (Risk) Calculations

- Mean, standard deviation and CV are calculated at each age of development.

- ***Parameter*** risk is based on the variability in the historical age-to-age factors (LDF), given the selection of a point estimate for each factor.

- ***Parameter*** risk variation can be calculated for a given accident year, for a group of accident years, or for all accident years combined.

- ***Process*** risk variation is calculated for the development triangle as a whole. A normal distribution of total losses is assumed.

Slide 4

Parameter Risk Model Conclusions

- There is more variation or risk (as a % of ultimate) for a single accident year, then for a group of years.

- There is more variation or risk (as a % of ultimate) in a less mature accident year than in a more mature year.

- There is more variation or risk (as a % of ultimate) for a smaller company than a larger company.

- There is more variation or risk (as a % of ultimate) in longer tailed lines of business.

Handout shows key results from 1988 paper, as well as results based on recently released 1991 Best's Aggregates and Averages.

Slide 5

Parameter Risk Estimates

1991 Best's Aggregates & Averages

Line	Accident Years	Increase in Ultimate Needed For Various Confidence Levels 55%	65%	75%	85%	95%
HO / FO	All	1.0004	1.0011	1.0020	1.0030	1.0048
	Latest	1.0021	1.0066	1.0117	1.0180	1.0287
CAL	All	1.0005	1.0017	1.0030	1.0045	1.0072
	Latest	1.0036	1.0113	1.0199	1.0306	1.0488
CMP	All	1.0009	1.0027	1.0048	1.0074	1.0117
	Latest	1.0060	1.0190	1.0335	1.0515	1.0820
Med Mal	All	1.0024	1.0075	1.0132	1.0204	1.0324
	Latest	1.0112	1.0356	1.0627	1.0964	1.1535

Parameter Risk Estimates

1986 KPMG Internal Database

Line	Size	Accident Years	Increase in Ultimate Needed For Various Confidence Levels 55%	65%	75%	85%	95%
HO/FO	Small	All	1.0039	1.0122	1.0215	1.0331	1.0526
		Latest	1.0214	1.0679	1.1197	1.1841	1.2931
	Large	All	1.0004	1.0013	1.0023	1.0035	1.0055
		Latest	1.0036	1.0112	1.0198	1.0305	1.0485
PPAL	Small	All	1.0017	1.0055	1.0097	1.0150	1.0238
		Latest	1.0089	1.0281	1.0495	1.0761	1.1211
	Large	All	1.0024	1.0075	1.0132	1.0203	1.0323
		Latest	1.0124	1.0393	1.0692	1.1065	1.1695
GL	Small	All	1.0066	1.0210	1.0371	1.0570	1.0908
		Latest	1.0278	1.0881	1.1553	1.2387	1.3801
	Large	All	1.0023	1.0073	1.0130	1.0199	1.0317
		Latest	1.0090	1.0287	1.0505	1.0777	1.1237
WC	Small	All	1.0036	1.0114	1.0201	1.0310	1.0493
		Latest	1.0285	1.0902	1.1590	1.2445	1.3893
	Large	All	1.0010	1.0032	1.0057	1.0088	1.0140
		Latest	1.0046	1.0145	1.0255	1.0393	1.0625

Other Model Conclusions

- *Process* risk as a source of variation is relatively minor when compared to parameter risk.

- Maximum reserve to surplus ratios appear to be better measures of leverage than the traditional premium to surplus ratios.

- The difference between reserves discounted for future investment income and undiscounted reserves provides a greater margin than that implied by the model at no less than the 90% confidence level.

Session 2G for specific treatment of this topic

Slide 8

Accounting Perspective

- Client held reserves with 5% of our indicated total reserve estimate is *usually* considered "reasonable".

- Internal studies have shown that +5% of our total reserve best estimate is NOT above 85% confidence level produced by this model.

Slide 9

CLRS - 1991

Session 5g - Probability Levels for Loss Reserves

Glenn Meyers

Insurance Services Office, Inc.

Reference: Risk Theoretic Issues in Loss Reserving: The Case of Workers' Compensation Pension Reserves, PCAS LXXVI.

My introduction to risk margins for loss reserves

- TRA86 mandated discounts for loss reserves for tax purposes.
- An argument against this was that the discount was an implicit risk margin.
- CAS Committee on the Theory of Risk was charged with the task of developing an explicit risk margin to replace the implicit one removed by discounting reserves.
- COTR identified two problems
  1. Problem of describing the run-off distribution
  2. Problem of translating the run-off distribution into a risk margin

The "New Life Contingencies"

- T a random variable for future lifetime of an individual.
- $\bar{a}_{\overline{T}|}$ the present value of a pension reserve is also a random variable.

From the distribution of T we can derive the distribution of $\bar{a}_{\overline{T}|}$.

- This provides us with a solution of the COTR #1 (almost)
- We can calculate the effect of discounting reserves
- This is a realistic example

An insurance company will have reserves set up for several claims.

Construct a sample portfolio of pension cases

Pension Reserves

Age	Annual Pension	# Lives
30	\$ 10,000	24
40	12,500	36
50	15,000	48
60	17,500	60

Unearned Premium

Age	Annual Pension	# Lives	Pr{Claim}
30	\$ 10,000	1500	.002
40	12,500	1500	.003
50	15,000	1500	.006
60	17,500	1500	.014

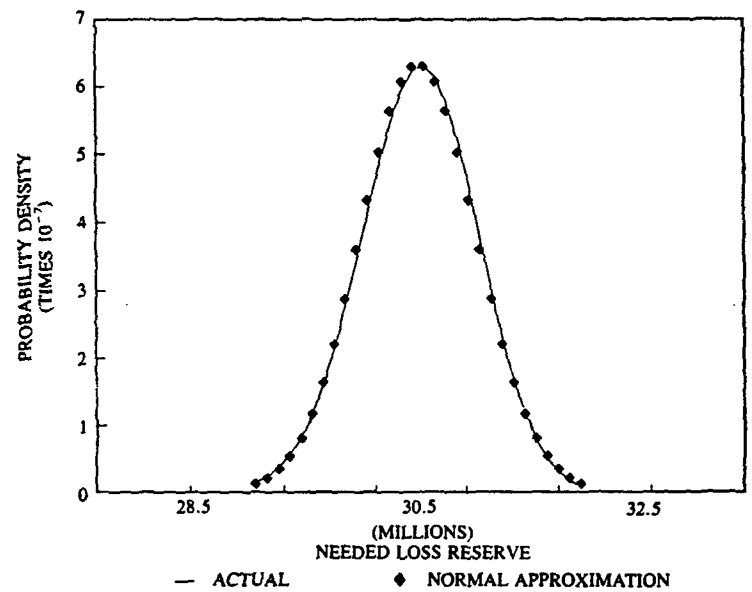
Distribution of T given by Makeham's Law

$$F(t) = 1 - e^{-At - m(c^t - 1)}, \quad m = \frac{B}{\log c}$$

R_1 = Pension Reserves Only

With no parameter uncertainty: $E[R_1] = 30{,}482{,}413$

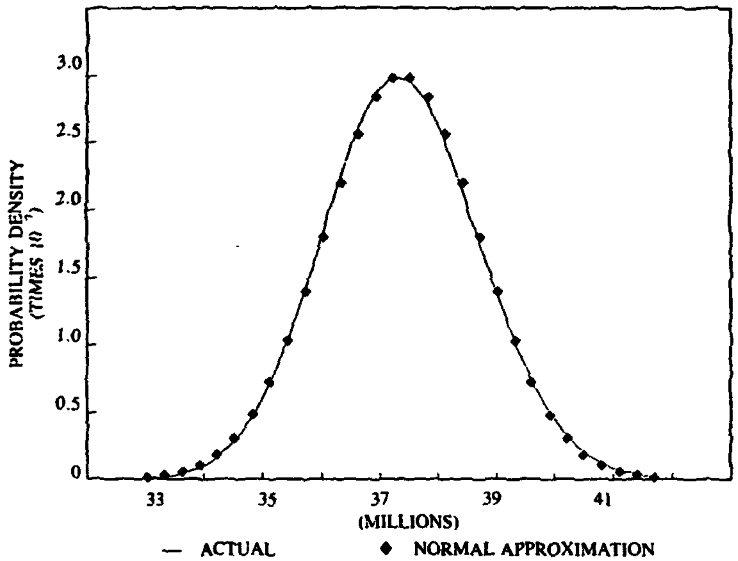
$Std[R_1] = 630{,}686$



R_2 = Pension Reserves plus Unearned Premium Reserve

With no parameter uncertainty $\quad E[R_2] = 37{,}380{,}329$

$$\mathrm{Std}[R_2] = 1{,}329{,}353$$



Parameter Uncertainty

Let $\theta = (A, B, c)^{\tau}$

θ_M = maximum likelihood estimate of θ

$f(\theta_M \mid \theta)$ is known

$f(r \mid \theta)$ = density of reserve given θ (worked out above)

$f(\theta)$ = prior density of θ

$$f(r, \theta_M) = \int f(r \mid \theta) \cdot f(\theta_M \mid \theta) \cdot f(\theta) \cdot d\theta$$

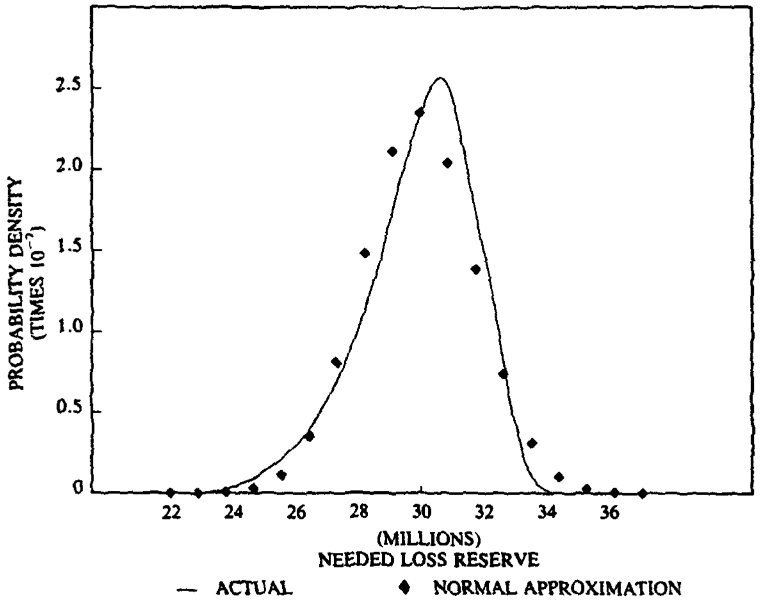
$$f(\theta_M) = \int_0^{\infty} f(r, \theta_M)\, dr$$

$$f(r \mid \theta_M) = \frac{f(r, \theta_M)}{f(\theta_M)} \quad \text{(No Shortcut Solution!)}$$

R_1 = Pension Reserves Only

With Parameter Uncertainty: $E[R_1] = 29{,}903{,}274$

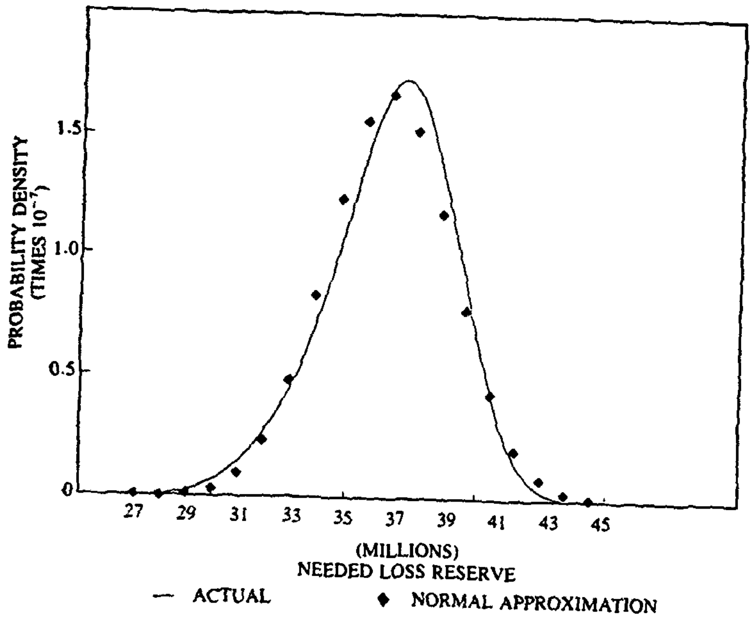
$Std[R_1] = 1{,}700{,}463$



R_2 = Pension Reserves plus Unearned Premium Reserve

With Parameter Uncertainty $E[R_2] = 36{,}649{,}786$

$Std[R_2] = 2{,}389{,}486$



R_1 = Pension Reserves Only

With no parameter uncertainty: $E[R_1] = 30{,}482{,}413$

$Std[R_1] = 630{,}686$

With Parameter Uncertainty: $E[R_1] = 29{,}903{,}274$

$Std[R_1] = 1{,}700{,}463$

R_2 = Pension Reserves plus Unearned Premium Reserve

With no parameter uncertainty $E[R_2] = 37{,}380{,}329$

$Std[R_2] = 1{,}329{,}353$

With Parameter Uncertainty $E[R_2] = 36{,}649{,}786$

$Std[R_2] = 2{,}389{,}486$

We now have the distribution of reserves

So???

What is the Risk Load?

Assumptions:

- Risk load for reserves should reflect insurer's attitude toward risk.
- An indication of the insurer's attitude toward risk is given by its decision to sell insurance at market prices.
- We can describe an insurer's attitude toward risk with a utility function.

Translate these assumptions to risk margins in loss reserves

(Expected) Utility of:

(1) Holding Surplus

(2) Holding Surplus + Loss Reserve

(3) Holding Surplus + Loss Reserve + New Busines

are all equal.

u(Surplus)

equals

E[u(Surplus + E[R_1] + Risk Margin for Loss Reserve - R_1)]

equals

E[u(Surplus + E[R_2] + Risk Margin for Loss Reserve
+ Risk Margin for New Business - R_2)]

Utility Function $u(x) = -e^{-(x/b)^c}$

Known:

- Surplus (one half of expected loss for new business)
- Distribution of Loss Reserve
- Distribution of results of New Business
- Risk Margin for New Business (12% of Surplus)

Unknown:

- Parameters b and c of the utility function
- Risk Margin for Loss Reserve

We have two equations in three unknowns. The strategy becomes:

- For several values of c, solve for b and the risk margin.

This is a way to test sensitivity to the choice of the utility function.

The results:

c	b	Risk Margin
0.5	6,880,932	348,034
0.6	4,042,686	376,650
0.7	3,238,015	402,100
0.8	2,921,056	425,562
0.9	2,783,539	447,068
1.0	2,726,577	446,740

Recall: COTR's charge was to calculate the explicit risk margin to replace the implicit risk margin "implied" by discounting.

Consider:

Interest Rate	Discounted Loss Reserve	Implicit Risk Load
0.0%	$64,425,775	......
3.5	39,158,882	$9,255,608
6.0	29,903,274	34,522,501

Conclusion: Risk loads are not comparable to loss reserve discounts for pension reserves.

1991 CASUALTY LOSS RESERVE SEMINAR

6A-1/6A-2/7B: BASIC CASE STUDY WORKSHOP

Faculty

Andrew E. Kudera
Tillinghast/Towers Perrin

Christopher M. Suchar
Milliman & Robertson, Inc.

MR. KUDERA: My name is Andy Kudera. I'm a consulting actuary with Tillinghast a Towers Perrins Company. My partner's name is Chris Suchar, and he's a consulting actuary with Milliman & Robertson.

The first run of business here is some administrative details. Since the session is going to be recorded, if everyone could please try and speak into the microphone, we'll be able to get it on tape. There will also be tapes available after the session. At the end, please turn in the evaluation forms. Also, if you want to receive credit for this session, the blue cards have to be handed in at the end.

One other thing, our standard disclaimer is that the views expressed here are the individual's and not those of the American Academy or the Casualty Actuarial Society.

The way we're going to structure this session is that there is going to be two case studies. Both are going to require audience participation. The first case is going to be a straightforward application and the methods that hopefully you were presented with in techniques one and two. They are going to include the paid and incurred development method, the counts and the averages method, the paid ALAE method and the ULAE ratio estimate method.

The second case is going to be a variation of the first case, and that's going to illustrate why some of the methods in the first case will not work without further analysis and
adjustment.

The way the format is going to work on the first case, you should have set number 3 and there is going to be 8 exhibits in there. We're going to go through all eight exhibits. There's various pieces of information on those exhibits that are missing. We'd like to call on individuals to tell us how to calculate the missing information.

Just to get a feel, does everyone have calculators? No. I guess for some of the answers you don't really have to have them in decimal form. You can just tell the fraction, numerator over denominator.

We're not trying to embarrass anybody or trick anybody. It's pretty straightforward. The purpose here is to see if you can apply the methods that were learned. The best way is by just doing it. Also, we don't want to stand up here and bore you to death speaking. We'll go through the first eight exhibits as quick or as slow as you would like. So if it seems that everybody knows it, let us know and we'll just move through a lot quicker.

On the second case, we're going to break out into small groups of five to eight people. What we're going to try to do is formulate some response as to a list of questions. We're going to hand out the variant case after I finish with the first eight exhibits. Then we'll go through and let the groups respond to some of the questions.

This is the first case. It's Monster Truck Mutual. It's a commercial automobile liability writer. What you have here is a reported loss triangle which is paid plus case outstanding losses, and it's by accident year. You have evaluations 12 through 84 across the top. So it's the first seven evaluations of the earliest accident year.

To get right into this, the first value there, A, which is the 12 to 24 development factor for the 1988 accident year, can anyone tell us how to calculate that?

ANSWER: 1.433 = 11,+ 87 divided by 8.225.

MR. KUDERA: Correct. How about the factors in the selected column? We have selected factors and then we have a line there that says cumulative under the 48 to 60, the B factor there.

ANSWER: 1.061 = 1.031 x 1.029.

MR. KUDERA: Correct. In the bottom here, we have the reported losses and the LDFs that are used to come up with the estimated ultimate losses. Can anyone tell us how to get C.

ANSWER: 9,989 = 9,707 x 1.029.

MR. KUDERA: Did everybody here that? On Exhibit 2, there's a paid loss development triangle. It's in the same format as the reported loss triangle was. Can anyone tell us how to calculate item D for the 1987 accident year at 36 months.

ANSWER: 8,734 = 10,+ 38 divided by 1.218.

MR. KUDERA: Can you say that one again, please?

ANSWER: Repeated

MR. KUDERA: Correct. Or another way is that you can take the 6,044 at 24 months and multiply it by the 24 to 36 factor of 1.445.

On Item E, there's a tail factor there from 84 to ultimate. Does anyone want to tell us what they would select and why?

ANSWER: 1,068 which is equal to the industry fact.

MR. KUDERA: Does anyone else want to try? There's a number of ways to come up with the tail factor. That's probably one of the most difficult things, picking tail factors, especially for paid data because it takes a lot longer for the losses to pay out.

One option to get an indicator, it was pointed out, you could look at the incurred losses projected out for the latest year, divide it by the paid losses, and see what tail factor you would need. However, you probably don't want to rely on that one year in case it's not what your average is or what you'd expect the average to be.

You can also rely on industry data. In this case, you could just carry the 1.068 down if you felt that industry was applicable in this case. Or what you can do is you can project out your ultimates. You know what the latest three years of the ultimates look like from the reported loss development method. You could also back into a paid tail factor that way and look at the individual years.

Item F on here for 1988?

ANSWER: 10,893 = 15,608 divided by 1.433.

MR. KUDERA: Correct, or you can pull the number right off the upper triangle too.

The next one is Exhibit 3. The first one on here is the average excluding the high and low values, the small letter G in the 36 to 48 column. Any takers?

ANSWER: 1.015.

MR. KUDERA: How did you come up with that?

ANSWER: (Inaudible)

MR. KUDERA: Correct. I guess the number is 1.011, the average of 1.012 and 1.009.

QUESTION: No. I got 1.015.

MR. KUDERA: That's 1.012 and 1.009. That's the correct way. Does everyone see that?

The H factor, I don't know if you can see this bottom line here, and the projections on the bottom of the page, the claim counts.

ANSWER: 1.276.

MR. KUDERA: Correct. Did everyone hear that? 1.276. You go to the cumulative line for the 12 to ultimate factor.

This is the reported counts and averages method. Here we have the average reported claims. They are by accident year, again by maturity from 12 through 84 months. The first item here is for 1986 at 36 months, the average reported claim size.

ANSWER: 11,383 = 10,482 x 1.086.

MR. KUDERA: Correct. The other way to come up with that too is if you go back to the first triangle on Exhibit 1 you can pick up the reported losses of 8,883,000 and then you have the claim counts on Exhibit 3 of 780. You divide by the 780 and then multiply that by 1,000 because the first exhibit was in thousands. The answer is 11,383.

The estimated ultimate losses for the 1989 accident year in this lower section of the page?

ANSWER: 17207 x 1,001.

MR. KUDERA: Correct, and divide it by 1,000 to get the estimated ultimate losses. Does everybody follow that? You need to go back to Exhibit 3 to get your projected ultimate claim counts for the 1989 accident year. They are 1,001. You multiply them by your average claim size for 1989, which is 17,207, and divide it by 1,000 so you get 17,224.

We changed the alphabet around. M and N come before K and L here on these exhibits, not to confuse anybody. On this sheet here, what we're doing is we're going to select ultimate losses and we're going to calculate some ratios. We're going to do it by accident year for each of the methods that we've developed the ultimate losses for.

We've used the reported loss development method, the paid loss development method and then the reported counts and average method. Then we're also going to make a selection in the far right-hand column.

The first item, though, for the 1989 accident year, the paid loss development method is item M. Does anyone want to tell us where that comes from?

ANSWER: 16,317 from Exhibit II.

MR. KUDERA: Correct, and that would be 16,317,000. What we do here after we summarize the methods, in this particular case, since the projections are fairly close based on all three methods, the selected are based on an average giving equal weight to all three of the methods.

That doesn't always have to be the case. You must use judgment. In some cases you may put more weight on the incurred method and in others you may put more on the paid, and still other times the reported counts and averages. What we do on the bottom part of the exhibit, we look at some ratios to see if the patterns are fairly consistent from year to year.

For the 1988 year, we need to come up with a selected ultimate loss ratio for the 1988 accident year. That's little item N. Does anyone want to take a crack at that?

ANSWER: 74%

MR. KUDERA: Yes. How did you get that?

ANSWER: $74\% = \frac{73 + 75 + 73}{3}$

MR. KUDERA: That's one way, since they are based on the average and the premiums are the same and all. You could just average the three, the 73, the 75, and the 73. That actually would average out to 74. You could take the ultimate losses of 15,357,000 from above and divide them by the earned premium in the second column of 20,845,000. That will give you, I guess, 73.7 percent or 74 percent.

Now all the exhibits we just dealt with, they are loss only. They don't include any allocated or unallocated expenses. Exhibit 6 here is the paid ALAE ratio development method. What we're doing here is we have ratios of paid ALAE to paid loss, all the different evaluation points by accident year. We're going to pick development factors and develop those ratios out to ultimate.

The way we get the dollar ALAE at the end, is by multiplying the ALAE ratios by the selected ultimate loss only selections for each accident year. The first item we need to calculate on here is K in the 1988 accident year, at 24 months of maturity.

ANSWER: Multiply the 12-month ratio of 18.13 times the 12.4 development factor of 0.783?

MR. KUDERA: Correct. Down on the lower half of the exhibit here, the bottom of the exhibit, the 1990 column, item L, the estimated ultimate ALAE ratio?

ANSWER: 16.67% = 19.25% x 0.866.

MR. KUDERA: Correct. What you would do -- in here we've left out the paid ALAE triangle, but presumably you'd have paid ALAE by accident year, by maturity, and you could divide that triangle by the paid loss to come up with this. Without that piece of information, you do need those loss development factors to back into it.

The method we're going to use here to get a ULAE ratio is a paid ULAE to paid losses method. We're looking at calendar year payments of unallocated loss adjustment expense to paid loss. For the 1990 year, we need the ULAE ratio, item O. Does anyone want to take a shot at that?

ANSWER: Divide 785 by 15,098.

MR. KUDERA: Correct. On Exhibit 8 now, this is where we're going to summarize the ultimate losses, paid to date, the reported losses. The purpose on this exhibit is to calculate the IBNR and also the unpaid ALAE and the ULAE and come up with a total indicated reserve for all the accident years so that we can compare that to what we're carrying as of December 31, 1990 to see whether or not we're redundant or deficient.

The way the top part of this is set up, we start out with our estimated ultimate losses. Then we have the reported losses and the paid losses. The next column over says case unpaid losses. They are really your outstanding losses. Can somebody tell us how to come up with item P?

ANSWER: 379 = 7,332 - 6,953.

MR. KUDERA: Correct. The next column over is the estimated IBNR losses. For the 1989 accident year, item Q?

ANSWER: There's a couple ways to do it. First you've got the total unpaid losses so you can subtract the case outstanding losses from the total unpaid losses.

MR. KUDERA: Correct. The other way I sometimes think of it is if you take the estimated ultimate less the reported losses, that's your IBNR, the second and the third column on there.

The total unpaid losses in the last column there, the total, little R, any takers on this one?

ANSWER: Sum of the last column, total unpaid losses.

MR. KUDERA: Correct. You can just sum the column down as one way or you can look at the total in the estimated ultimate loss column of 92,204, and subtract your paid losses of 57,951.

On the second part there, we have various figures by accident year. Now we're going to come up with the unpaid ALAE and ULAE. The first step is to come up with the estimated ultimate ALAE for the 1987 accident year, item S, in the third column?

ANSWER: 1,912 = 12,498 x 15.3%.

MR. KUDERA: Correct. What he did, if you go up to the top to the second column, for 1987 year, your estimated ultimate losses are 12,498,000. You apply your estimated ultimate ALAE ratio of 15.3 percent. That gives you estimated ultimate ALAE of 1,912,000.

I guess to start out on here I've got to tell you what rule we're using to come up with the estimated unpaid ULAE. I'm not sure if this method was covered or not. It's called the 50-50 rule. It assumes that half the unallocated is spent when a case reserve is open and the other half when it closes.

So the way that gets applied, when you get your estimated ultimate ULAE ratio that we calculated on Exhibit 7, you apply half of that ratio to your case outstanding and then the full ratio to your IBNR to come up with your unpaid ULAE.

Does anyone want to just go through the numbers now for item T?

ANSWER: I didn't compute the number, but I'd take 5.2 percent of the estimated IBNR plus 9,552 plus 2.6 percent of the case unpaid losses of 7,130.

MR. KUDERA: Correct. Does everybody see that? What you would do to get that number -- maybe I can write it out here -- the first thing you would do is take your IBNR losses of 9,552,000 times the ALAE ratio which is 5.2 percent, and then you would add on to that. You would go to your case unpaid which is 7,130,000 times the 5.2 percent, times 1/2. That's going to equal 682,000.

The reason you only apply half the ratio again is because it's the 50-50 rule with the unallocated, assuming that half is spent when the case is set up and the other half when it settles.

The last item on here, there's just a bottom-line comparison, estimated redundancy or deficiency based on the estimated total reserve. The first thing, just so everyone knows how to get it, can somebody tell me how to get the 41,466,000? That's our estimate of reserves?

ANSWER: 34,253.

MR. KUDERA: Okay, that's part of it. What you need to do -- that's just the loss only piece from up on top. The first two numbers that were pointed out there, that's subtraction. The 92,204,000 minus the 57,951,000 will give you item R which is 34,253,000. What you need to do is add the unpaid ALAE of 5,902,000 and then also the unpaid ULAE of 1,311,000. That will give you the 41,466,000.

QUESTION: How do you do that again?

MR. KUDERA: What you're doing here is comparing your indication to what you're carrying as of December 31, 1990. There's three components that go into that estimated number. You have the loss component, you have the ALAE component, and also the ULAE. The loss only is item R which is on the top half of the exhibit, the right-hand column. The second item, the estimated unpaid ALAE is the 5,902,000 and then the third item is the estimated unpaid ULAE which is the 1,311,000. That gives you your total reserve.

After you compare this now, does anyone want to tell us how to get U?

ANSWER: 561,000 equals the carried of 40,905,000 minus the indicated of 41,466,000.

MR. KUDERA: Correct. What do you wind up with, a redundancy or a deficiency in this case?

ANSWER: A deficiency.

MR. KUDERA: Correct. What would happen here since your estimated or your indicated as of December 31, 1990 is 41,466,000, and you're only carrying 40,905,000, is that you wind up with a 561,000 deficiency.

Are there any other questions?

(No response.)

MR. KUDERA: I'll turn it over to Chris now.

MR. SUCHAR: The first thing to do here is to hand out the second set of handouts which is mistakenly labeled set one.

Set one of the handouts shows three exhibits and a set of questions. They basically parallel the first set of exhibits, which is mistakenly labeled set three. These exhibits, however, are labeled the variant case. What we've done is to change a couple things in the exhibits that are going to require a reexamination of the assumptions that were used.

The methods that are shown here are the same methods. Exhibit 1 shows an incurred loss development method. I'll just go through this very quickly because I'm going to ask you to break into groups and discuss them. Very quickly, Exhibit 1 is incurred loss development. Exhibit 2 shows paid loss development.

One thing I should say, I just used the word incurred loss development. The exhibit is labeled reported loss development. It means the same thing in this case. When I say incurred loss development, I'm talking about case incurred losses, which is the paid losses plus case reserves, but not including any IBNR.

Exhibit 2 is paid loss development. Exhibit 3 shows the estimates resulting from those two methods next to each other. The selected estimated ultimate losses column has question marks in it. The reason it has question marks in it is that you'll notice that the column totals resulting from the two different methods are pretty significantly different.

That didn't happen in the base case, by design. All of this data is fabricated. In this case, we've changed a couple of the underlying factors that produce this data. Now the straightforward application of the two methods produces divergent answers. That's going to be the core of what the variant case is about: investigating the source of that difference.

Exhibit 4 shows some questions. In the base case all of the selected development factors were made based on the latest three average statistics of the development factors. In fact, the selections in the base case are all equal to the last three average, except for the tail factor which is based on the industry data that's shown.

That's appropriate because the industry factors are very similar to the experience in the triangle. Everything is nice and predictable, and it's fairly easy to just select the averages. That's no longer the case in this variant scenario.

What I'd like to do now is I'd like to have people break into groups of about five people each. The ultimate idea is to have six groups of people. I'm not sure what the best way is to break people up, but if you're relatively experienced with these techniques and you know that somebody else is relatively experienced, try to break up into different groups so that we get a spread of experienced people to different areas. Other than that, it's, I guess, whoever you're closest to.

What's going to happen is I'm going to ask you to discuss for a few minutes among yourselves what your answers would be to these four questions in Exhibit 4. Then I would like to ask somebody from the group to stand up and say what their conclusion was. So if you could just figure out what your groups are, rearrange the chairs so that you can talk to each other.

I guess one other thing I'd like to say is that the base case was intended to illustrate essentially how you connect the numbers between the different methods, how you go from the basic data in the triangle, apply development factors, estimate ultimate losses, etc., in other words the mechanics of the calculation methods.

The base case was intentionally focused on mechanics. This variant case is intentionally focused on actual analysis of the data. So what you should be focusing on is actually looking at the data patterns within the triangles as opposed to the mechanical calculations between them. We've left all the numbers in. There aren't any blanks to fill in.

I think in the interest of time I'd like to call the discussion here. What I'd like to do now is ask each group to have one person give their group's answer on one of the questions. Then we can discuss it. I guess we can start over at that end of the room. Does anybody want to hazard a guess at an answer to number 1?

QUESTION: We said that the first thing we possibly could do would be to investigate the potential reasons for the difference in the estimates, and then we made changes to the assumptions so that the two methods give the same answers.

MR. SUCHAR: The first part of the answer, I guess, is philosophically the ideal answer. When you find two different methods producing different results, you're not supposed to just say oh, well, one of the methods didn't work, let's fix it, change the factors to make the answers match. What you should do when you find a significant difference is try and look for the reason for it.

In theory, if you're able to find the reason or reasons you can adjust the assumptions that you make appropriately. In the ideal case, if you adjust your assumptions appropriately, the two methods will come out close to each other.

In the real world, that doesn't always happen. In the real world, what you'll find is you might run into a situation like this. You investigate the cause of the difference. Usually you'll be able to formulate no more than a theory. Nobody will have a definitive answer. Based on your theory, you can adjust your assumptions for the different methods, but they might still not match.

If you run into that situation, if you believe you've taken into account any changes in conditions, and your methods still don't match, then there's clearly some other change that you don't know about. At that point, if you've done as much investigation as you can, you don't know which method is the one that's being distorted, or maybe both methods are being distorted.

So, in a situation like that, after you've gone through the investigation phase and reevaluated your assumptions, at that point if you're methods still don't match up very well, the best course of action is to take a weighted average of the different methods on the theory that there's some chance that either one of the two methods is right.

There's some chance that either method is right. Your best estimate is a weighted average where your weights reflect however reliable you think each method is. That's the general approach. But you're right, you always do want to investigate the cause of changes first, rather than simply arbitrarily change the assumptions to make the answers match up.

Does anybody from another group want to try the second question?

ANSWER: In the 12 to 24 column of the reported loss development method, the latest factor is much higher than the others. It looks like something changed in the way the claim department is setting reserves.

MR. SUCHAR: In fact, you could make the same observation about the 24 to 36 column, although it's not as pronounced because the factors aren't as large. You can make the same observation about 36 to 48 and 48 to 60 even. You could even try and apply that to 60 to 72. In isolation, 60 to 72, the latest development factor doesn't look like it's more than just random variation. But as part of the pattern, the latest diagonal is clearly higher than the previous ones.

That's the heart of the variation that we've thrown in here. I think you've jumped ahead a little bit as far as actually theorizing what the cause was. The next stage of the case study gets to that. Actually, I guess you've essentially hazarded an answer to number 3, what are some possible explanations.

The fourth question, once you've gotten the right answers to one through three and you go to investigate, how would you approach that? Does anybody have any plans for that? It's probably the hardest part of any loss reserve analysis, trying to actually gather information once your numbers are together.

Well, on your theory, what would you do to follow up and test that theory?

ANSWER: I would talk to some people in the claims department.

MR. SUCHAR: Yes, that's the essential answer. There are a number of things you can do, but talking to the claims department is the heart of the matter because they are the people that are actually setting the case reserves that produce the numbers that show up in the triangle.

The other thing you could look into, in this case we've got it set up so that the paid loss development factors remain very stable. Nothing really changes very much in the paid loss development pattern. But in some situations, if something changed in the paid loss development pattern, that could also affect the incurred loss development pattern because the incurred losses, of course, include paid.

I guess the other thing that you would do in terms of investigating the changes is look at more different kinds of data. Andy, if you could hand out the remaining exhibits.

But you would try and talk to somebody in the claims department who is in a position where they would understand any changes in policy at a high enough level to understand what's going on department-wide, and somebody also who has been there long enough so that they would have some sense of history. They would know about changes, how this year differs from last year or two years ago or four years ago.

The same would be true if you were perhaps investigating a change in underwriting practices. The change that we've included in these exhibits happens to occur along a diagonal, which is essentially a calendar year change. Changes along diagonals tend to be due to something happening in claims handling or claims processing or case reserving.

Another variation you'll find sometimes is a similar change in development factors like this, but you'll find it happening from one accident year to the next or a change between the rows. For instance, for 1988, if the 12 to 24 factor was also something like 1.57, instead of drawing a line along the diagonal, cutting off that last diagonal development factors, you could draw a line between accident years 87 and 88.

Changes on an accident year basis tend to reflect changes in the mix of business, changes in underwriting practices and the like. That's a general statement, but I'd say it holds true in 90 percent of the situations or more. Now, you'll find problems in real world data where there are random variations and there may be multiple changes in circumstances going on where it's hard to tell.

It's clear that there's been some change, but sometimes it's hard to tell whether it's along a diagonal or along a row. That's where things get tricky, but we didn't do that here.

The third thing you can try is to use another method. If your first two methods aren't agreeing with each other, you can sort of use another one as a third opinion.

Now the remaining exhibits that we've handed out include a bunch of things. Exhibits 5 through 10 are labeled diagnostics. The first one simply shows a triangle of closed claim counts, which is data that you need to calculate some of the subsequent diagnostics.

The remaining things that are called diagnostics are triangles that are computed to give you a different look at patterns in the data. You don't make projections using these triangles, but you look at them. It often helps to look at data from a different angle.

The most common different angles to look at them from are average claim sizes. Exhibit 6 shows average paid losses per closed claim. It's the paid loss triangle divided by the closed claim count triangle. Then down below the average claim sizes we've shown year-to-year trends. Those are trends down the column.

You normally expect average claim sizes for most lines of business to generally trend upward from one year to the next, just due to underlying inflation in dollars. That's something that's universal to almost all lines of business. For a long time it's been worse for liability than property type coverages. But it happens everywhere.

So you expect to see general upward movement down the columns. In this data, there are some blips. I mean, there are some years with big upward jumps, some years where there's no change. There are a few years with decreases. That's basically due to random variation.

When we constructed the example, we -- I guess it's fairly obvious that we constructed the reported and paid loss triangles to produce fairly stable development patterns and then threw a twist into that. We didn't similarly construct the average claim size triangles to produce nice placid trend patterns.

But in this paid loss triangle, if you look at these trends, you don't see any particular diagonal or row where there's a dramatic change. Now that's not so in Exhibit 7 which is the same basic idea, but it uses reported losses and reported claim counts. It's computed the same way; it's just a ratio of data that's shown in previous exhibits.

But if you look at these trend factors, there is still a lot of variability in them. But on this one it's easier to mark off the last diagonal as being consistently unusual. That basically mirrors the unusual development factors. It stems from the same thing.

Then Exhibit 8 shows a third kind of average claim size that you can compute. Unfortunately, the heading got cut off a little bit at the end, but it's pretty easy to figure out. It's average outstanding losses or case outstanding losses or case unpaid losses per-open claim count. You take the reported minus paid losses and divide by the reported minus closed claims.

What this is trying to measure is the average case reserve on open claims. It's probably the most direct measure that you can usually get of what the claims department is doing as far as setting case reserves. When you look at trends in average outstanding losses, just like average paid and average incurred, you expect to see an underlying upward trend over the long term due to inflation.

But you will also find changes from year to year due to changes in case reserving practices, sometimes for a reason. If you have a jumbo claim that's still open that requires a huge case reserve, that will show up as a blip in here. It will also show up as a blip in average reported, but it shows up more clearly in average outstanding. It's highlighted much better.

In the scenario here where we've had essentially case reserve strengthening in the latest diagonal, you see very pronounced large trend factors in the last diagonal. Again, it's clearly a diagonal effect as distinct from an effect along a row that would probably be associated with underwriting, a change in underwriting or a change in the underlying exposures of some sort.

Exhibit 9 shows ratio of paid to reported losses. This is an interesting triangle to compute. If you have a situation like the base case where the development patterns are stable and don't change much over time, the ratio of paid to reported losses will stay very stable over time too. For any given maturity, you expect to see about the same ratio from accident year to accident year.

However, if there is a change in either the paid or reported loss development pattern, the ratios will blip. Again, you can see that here. Prior to the last diagonal, the ratios are very stable. They stay within .01 or .02 of the same number over the long term. But the last diagonal is lower.

Now with a triangle like this, that change can be either due to something going on in the paids or something going on in the reporteds or both in complicated situations. In this case, we already know that the reported losses have changed. They've had unusually high development. So the denominators of these ratios have jumped unusually.

One thing to point out about this triangle that makes it especially useful is that it's the only one of these diagnostic triangles that doesn't require you to have claim count data. You run into a lot of situations in the real world where you can't get claim counts, or you can get reported but not closed, or closed but not reported, or you can get all the claim count data but you have some reason to suspect its accuracy.

That happens a lot. In those situations, either you can't do average claim size triangles or you can do them but you never know if the trend factor you're looking at is distorted by a real phenomenon or distorted because there's a data error. The ratio of paid to reported allows you to avoid those distortions. That makes it particularly valuable.

Finally, Exhibit 10 does show claim count patterns. I've shown two patterns here. The top one is the ratio of number closed to ultimate number of claims. This is a claim count closing pattern. This pattern is expected to somewhat correspond to the paid loss development pattern. It won't exactly correspond because not every claim closes for the same amount.

What this allows you to evaluate is whether there have been changes in the claim department as to how quickly they are closing claims. You can also look for those changes in the paid loss development triangle, but those changes can be masked by something that's happening to the dollars.

If they are closing claims faster, but they happen to be closing them for larger or smaller amounts for some reason, you may not see it clearly in the paid loss dollar triangle. But it will show up more clearly if you look at purely the counts.

A similar argument holds true for the bottom triangle which is the ratio of number recorded to ultimate number. If you want to judge how quickly claims are being reported to you, you can look at the reported loss triangle. But as we've seen, that can be distorted by things going on with the case reserves. Reported claim counts, though, aren't affected by case reserves. Every claim gets one count. Hopefully, the claim department doesn't change that over time, although they can.

The general point of exhibits 5 through 10 is that they've taken the same data that you had before and give you a different cut on the data. They arrange the data a little bit differently, take some ratios between two types of data. Different ways of looking at data often tend to highlight changes or lack of changes more clearly and allow you to zero in on what's going on, what the cause of your high development factors is and then what you should do about it.

The remaining exhibits, Exhibit 11, there are some questions that I just answered. They shouldn't have been in the final version. The last three exhibits show revised estimates. Exhibit 12 shows the same reported loss development method with the same data that was in Exhibit 1 with the strange factors on the last diagonal, but the selections have been changed. So the exhibit is labeled revised.

Exhibit 13 shows one possible counts and averages method. The base case showed another counts and averages method. There are still others besides this. So when you hear somebody talk about a counts and averages method or an average claim size projection method, they could be talking about any of a number of things. Exhibit 13 just shows one possible method.

It's used to get an additional estimate for the latest two accident years which are the accident years where you're finding the greatest disagreement between the other two methods.

Exhibit 14 is just another summary exhibit that pulls together the estimates from the three methods. It shows a selected value and then the reported losses and the estimated IBNR that results from them.

Now, I have some additional questions that are not shown in the handouts but that I would like to use for discussion for the remainder of the time.

The question I most wanted to get at was in Exhibit 12, the revised reported loss development method, that's basically comparable to Exhibit 1 in set one of the handouts, which is the original reported loss development method that we've now concluded is distorted.

The selections in Exhibit 1 were made equal to the latest three averages of the development factors which is the same selection method that was used made in the base case, but it no longer appears to be appropriate. So in Exhibit 12 revised selections have been shown. They are no longer equal to any of the calculated averages. They've been selected judgmentally based on a certain rationale as to why they should be selected.

The question is what rationale do you think was used, and do you think it makes sense. That's not necessarily an obvious question. There is often disagreement among actuaries as to what the appropriate factor is to select in these situations. Is there anybody who has an answer?

(No response.)

Okay. It's not immediately obvious from looking at the exhibit because I didn't include any explanatory notes. That was deliberate. I would have liked to have had a little more time to let you discuss it. But essentially the philosophy is that prior to the last diagonal, the development history has been very stable and very constant.

Something different happened on the last diagonal. We've concluded, based on the additional data that's been shown that there was case reserve strengthening in the last diagonal. Now basically what that means is that nothing changed about the fundamental underlying claims, but the claims adjusters changed their estimates of the ultimate losses. Perhaps they improved them. Perhaps they are more accurate. Perhaps they are less accurate. But the important point is that they've changed. That affected our data.

The particular way it affected our data was it makes it look like the development was accelerated. The dollar amounts in the triangle moved towards their ultimate values at a higher rate than we would have expected. The selected development factors fundamentally are supposed to be our guess - you can debate whether you should use that word, but it's our guess - as to what the future development is going to be.

When you do a loss development method and you make your selections based on the past development patterns, you're making the fundamental assumption that the future development is going to be the same as it was in the past. When you have a nice stable history like you have here prior to the last diagonal, that's a reasonable assumption. It makes a lot of sense. That's what you should do.

When you see something like what we've got here, the last diagonal looks like the development was accelerated. We believe that it was artificially accelerated. If you believe that theory, and you have to establish whether they are reasonable based on investigation, but once you've accepted that theory, what you've got to believe is that the future development is going to be like the old stable development but somewhat less because there has been this artificial surge.

At some point in the future there is going to be an artificially low development if the dollar amounts are going to get to the same ultimate point where they would have been based on the old development pattern.

To show how a particular factor was selected, the first one, the 12 to 24 factor, 1.35, the basic idea was prior to that the latest factor in the historical triangle, the 1.571, the history was very stable.

If that 1.571 hadn't happened, we probably would have selected something based on the couple factors before it, which would be something in the neighborhood of what was selected in the base case, which was 1.41.

But then what happened for 1989, there was this artificial surge of development. What actually happened was 1.571 which was approximately 16 points higher than the true underlying pattern. Sixteen points, that's probably 10 percent higher.

So what we expect is that the future development is going to be roughly 10 percent lower than what we would have previously expected, about 10 percent lower than the 1.41. Now that doesn't exactly result in 1.35. When I made these selections I deliberately did not calculate an exact factor and say we had 11.2 percent higher development than expected, so the future development is going to be exactly 11.2 percent lower. This is a judgmental process.

So the selection I made, it was based on a sort of a quantitative relationship, but it was done approximately. So you won't find that you can calculate these selections exactly based on some of the numbers, but that's the essential rationale.

The latest diagonal was roughly some percent higher than we would have expected. So we expect that there's going to be a future diagonal that's going to be about that same percentage lower than the underlying development pattern. That was the rationale for the development factors in the revised selections.

At this point, it is three minutes to 12:00, so I guess this session is over. I'd like to point out just very quickly that this is new material this year. We've changed the case study material completely. This idea of having group discussion is new.

As you noticed, there are a couple of minor glitches in it, hopefully no major glitches. But we'd really like to hear what you think of this, whether you think the group discussion idea is more productive than having us only lecture. If there's anything you'd suggest that we do better next year, we'd really like to hear about it.

We thought the group discussion idea would be a better way to get people involved and have them actually think about the kind of questions we'd like you to think about in the case study. But we'd like to know whether or not it worked. I have the feeling that most people were getting involved, were understanding at least the points we were trying to make, even if you didn't all arrive at the same answer.

In a lot of these cases, there is no correct answer. But we would like feedback. We'd really appreciate it either on the form you hand in at the door or on the form that you can mail in later. So, with that, I thank you for your attention, and enjoy the lunch.

1991 Casualty Loss Reserve Seminar

Sessions 6A and 7B

Basic Case Study Workshop

Andrew E. Kudera

Michael L. Scruggs

Chris M. Suchar

Nancy P. Watkins

SET I

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

REPORTED LOSS DEVELOPMENT METHOD
(DOLLARS IN 1,000'S)

ACCIDENT YEAR	REPORTED LOSSES AS OF (NUMBER OF MONTHS): 12	24	36	48	60	72	84
1984	4,392	5,819	6,553	6,979	7,209	7,317	7,332
1985	5,117	6,913	7,950	8,399	8,728	9,020	
1986	5,833	7,799	8,883	9,339	9,817		
1987	6,912	9,732	11,036	12,024			
1988	8,225	11,787	14,042				
1989	8,980	14,107					
1990	13,181						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	1.325	1.126	1.065	1.033	1.015	1.002	
1985	1.351	1.150	1.056	1.039	1.033		
1986	1.337	1.139	1.051	1.051			
1987	1.408	1.134	1.090				
1988	1.433	1.191					
1989	1.571						
AVERAGES:							
ALL YEARS	1.404	1.148	1.066	1.041	1.024	1.002	
LATEST 3	1.471	1.155	1.066	1.041			
EX HI-LO	1.382	1.141	1.061	1.039			
INDUSTRY	1.398	1.141	1.063	1.032	1.016	1.001	1.013
SELECTED	1.471	1.155	1.066	1.041	1.024	1.002	1.013
CUMULATIVE	1.959	1.332	1.154	1.082	1.040	1.015	1.013

ACCIDENT YEAR	REPORTED LOSSES AS OF 12/31/90	SEL. LDF TO ULT	EST. ULT. LOSSES
1984	7,332	1.013	7,427
1985	9,020	1.015	9,156
1986	9,817	1.040	10,207
1987	12,024	1.082	13,015
1988	14,042	1.154	16,199
1989	14,107	1.332	18,793
1990	13,181	1.959	25,824
	79,524		100,622

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

PAID LOSS DEVELOPMENT METHOD
(DOLLARS IN 1,000'S)

PAID LOSSES AS OF (NUMBER OF MONTHS):

ACCIDENT YEAR	12	24	36	48	60	72	84
1984	1,713	3,758	5,239	6,328	6,657	6,837	6,953
1985	2,042	4,387	6,256	7,551	7,959	8,222	
1986	2,223	4,933	6,940	8,467	8,941		
1987	2,589	6,044	8,734	10,638			
1988	3,043	7,487	10,893				
1989	3,368	7,932					
1990	4,370						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	2.194	1.394	1.208	1.052	1.027	1.017	
1985	2.148	1.426	1.207	1.054	1.033		
1986	2.219	1.407	1.220	1.056			
1987	2.334	1.445	1.218				
1988	2.460	1.455					
1989	2.355						
AVERAGES:							
ALL YEARS	2.285	1.425	1.213	1.054	1.030	1.017	
LATEST 3	2.383	1.436	1.215	1.054			
EX HI–LO	2.276	1.426	1.213	1.054			
INDUSTRY	2.410	1.432	1.209	1.050	1.032	1.015	1.068
SELECTED	2.383	1.436	1.215	1.054	1.030	1.017	1.068
CUMULATIVE	4.903	2.057	1.433	1.179	1.119	1.086	1.068

ACCIDENT YEAR	PAID LOSSES AS OF 12/31/90	SEL. LDF TO ULT	EST. ULT. LOSSES
1984	6,953	1.068	7,426
1985	8,222	1.086	8,930
1986	8,941	1.119	10,003
1987	10,638	1.179	12,544
1988	10,893	1.433	15,606
1989	7,932	2.057	16,319
1990	4,370	4.903	21,424
	57,949		92,252

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

SELECTED ESTIMATES OF ULTIMATE LOSSES
(DOLLARS IN 1,000'S)

ACCIDENT YEAR	INDICATED ULT. LOSSES BASED ON: PAID DEVEL	RPTD. DEVEL	SELECTED EST. ULT. LOSSES	REPORTED LOSSES AS OF 12/31/90	ESTIMATED IBNR
1984	7,426	7,427	?	7,332	
1985	8,930	9,156	?	9,020	
1986	10,003	10,207	?	9,817	
1987	12,544	13,015	?	12,024	
1988	15,606	16,199	?	14,042	
1989	16,319	18,793	?	14,107	
1990	21,424	25,824	?	13,181	
	92,252	100,622	?	79,524	

Questions for discussion based on Exhibits I through III:

1. In this example, the Reported Loss Development Method produces higher ultimate loss estimates than the Paid Loss Development Method. What would you do in this situation:

   a. pick the average of the two as a compromise

   b. pick the higher answer to be more conservative

   c. pick the lower answer to appear more profitable

   d. investigate potential reasons for the difference in estimates

   e. change the assumptions so that the two methods produce equal results

2. Do the historical reported loss and paid loss development patterns look consistent in this instance, or have the patterns changed?

3. What changes did you notice? What are some possible explanations for them?

4. How would you go about investigating the changes? Who would you talk to, and what additional data would you look at?

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SET II

Exhibit V

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

DIAGNOSTICS – CLOSED CLAIM COUNTS

ACCIDENT YEAR	MATURITY (MONTHS) 12	24	36	48	60	72	84
1984	54	238	357	435	490	546	568
1985	51	274	422	515	568	635	
1986	66	308	473	594	675		
1987	64	364	527	647			
1988	71	393	589				
1989	72	403					
1990	86						

Exhibit VI

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

DIAGNOSTICS – AVERAGE PAID LOSSES PER CLOSED CLAIM

ACCIDENT YEAR	MATURITY (MONTHS) 12	24	36	48	60	72	84
1984	31,722	15,790	14,675	14,547	13,586	12,522	12,241
1985	40,039	16,011	14,825	14,662	14,012	12,948	
1986	33,682	16,016	14,672	14,254	13,246		
1987	40,453	16,604	16,573	16,442			
1988	42,859	19,051	18,494				
1989	46,778	19,682					
1990	50,814						

ACCIDENT YEAR	YEAR TO YEAR TRENDS DOWN COLUMNS 12	24	36	48	60	72
1984 to 1985	26%	1%	1%	1%	3%	3%
1985 to 1986	−16%	0%	−1%	−3%	−5%	
1986 to 1987	20%	4%	13%	15%		
1987 to 1988	6%	15%	12%			
1988 to 1989	9%	3%				
1989 to 1990	9%					

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

DIAGNOSTICS – AVERAGE REPORTED LOSSES PER REPORTED CLAIM

ACCIDENT YEAR	MATURITY (MONTHS) 12	24	36	48	60	72	84
1984	9,870	10,677	11,397	11,991	12,323	12,508	12,533
1985	9,406	10,887	11,795	12,351	12,798	13,226	
1986	9,333	10,483	11,388	11,822	12,411		
1987	10,003	11,683	12,584	13,618			
1988	10,478	12,756	14,446				
1989	11,588	15,007					
1990	14,098						

ACCIDENT YEAR	YEAR TO YEAR TRENDS DOWN COLUMNS 12	24	36	48	60	72
1984 to 1985	-5%	2%	3%	3%	4%	6%
1985 to 1986	-1%	-4%	-3%	-4%	-3%	
1986 to 1987	7%	11%	10%	15%		
1987 to 1988	5%	9%	15%			
1988 to 1989	11%	18%				
1989 to 1990	22%					

Exhibit VIII

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

DIAGNOSTICS – AVERAGE OUTSTANDING LOSSES (REPORTED MINUS PAID) PER OPEN CL

ACCIDENT YEAR	MATURITY (MONTHS) 12	24	36	48	60	72	84
1984	6,852	6,713	6,028	4,429	5,811	12,308	22,294
1985	6,237	6,997	6,722	5,137	6,746	16,985	
1986	6,458	6,573	6,329	4,450	7,555		
1987	6,895	7,864	6,577	5,874			
1988	7,258	8,098	8,221				
1989	7,983	11,499					
1990	10,379						

ACCIDENT YEAR	YEAR TO YEAR TRENDS DOWN COLUMNS 12	24	36	48	60	72
1984 to 1985	-9%	4%	12%	16%	16%	38%
1985 to 1986	4%	-6%	-6%	-13%	12%	
1986 to 1987	7%	20%	4%	32%		
1987 to 1988	5%	3%	25%			
1988 to 1989	10%	42%				
1989 to 1990	30%					

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

DIAGNOSTICS – RATIO OF PAID TO REPORTED LOSSES

ACCIDENT YEAR	MATURITY (MONTHS) 12	24	36	48	60	72	84
1984	0.39	0.65	0.80	0.91	0.92	0.93	0.95
1985	0.40	0.63	0.79	0.90	0.91	0.91	
1986	0.38	0.63	0.78	0.91	0.91		
1987	0.37	0.62	0.79	0.88			
1988	0.[illegible]7	0.64	0.78				
1989	0.38	0.56					
1990	0.33						

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

DIAGNOSTICS – CLAIM COUNT REPORTING AND CLOSING PATTERNS

RATIO OF NUMBER CLOSED TO ULTIMATE NUMBER OF CLAIMS

ACCIDENT YEAR	12	24	36	48	60	72	84
1984	0.09	0.41	0.61	0.74	0.84	0.93	0.97
1985	0.07	0.40	0.62	0.76	0.83	0.93	
1986	0.08	0.39	0.60	0.75	0.85		
1987	0.07	0.41	0.59	0.73			
1988	0.07	0.40	0.60				
1989	0.07	0.40					
1990	0.07						

RATIO OF NUMBER REPORTED TO ULTIMATE NUMBER OF CLAIMS

ACCIDENT YEAR	12	24	36	48	60	72	84
1984	0.76	0.93	0.98	0.99	1.00	1.00	1.00
1985	0.80	0.93	0.99	1.00	1.00	1.00	
1986	0.79	0.94	0.99	1.00	1.00		
1987	0.78	0.94	0.99	1.00			
1988	0.80	0.94	0.99				
1989	0.78	0.94					
1990	0.78						

Questions for discussion based on Exhibits V through X:

5. What does the additional diagnostic data tell you about changes in the loss development patterns?

6. After examining this additional data, how would you change the original methods and assumptions shown?

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

REPORTED LOSS DEVELOPMENT METHOD – REVISED
(DOLLARS IN 1,000'S)

ACCIDENT YEAR	REPORTED LOSSES AS OF (NUMBER OF MONTHS): 12	24	36	48	60	72	84
1984	4,392	5,819	6,553	6,979	7,209	7,317	7,332
1985	5,117	6,913	7,950	8,399	8,728	9,020	
1986	5,833	7,799	8,883	9,339	9,817		
1987	6,912	9,732	11,036	12,024			
1988	8,225	11,787	14,042				
1989	8,980	14,107					
1990	13,181						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	1.325	1.126	1.065	1.033	1.015	1.002	
1985	1.351	1.150	1.056	1.039	1.033		
1986	1.337	1.139	1.051	1.051			
1987	1.408	1.134	1.090				
1988	1.433	1.191					
1989	1.571						
AVERAGES:							
ALL YEARS	1.404	1.148	1.066	1.041	1.024	1.002	
LATEST 3	1.471	1.155	1.066	1.041			
EX HI-LO	1.382	1.141	1.061	1.039			
INDUSTRY	1.398	1.141	1.063	1.032	1.016	1.001	1.013
SELECTED	1.350	1.080	1.020	1.010	1.010	1.000	1.013
CUMULATIVE	1.537	1.138	1.054	1.033	1.023	1.013	1.013

ACCIDENT YEAR	REPORTED LOSSES AS OF 12/31/90	SEL. LDF TO ULT	EST. ULT. LOSSES
1984	7,332	1.013	7,427
1985	9,020	1.013	9,138
1986	9,817	1.023	10,044
1987	12,024	1.033	12,425
1988	14,042	1.054	14,800
1989	14,107	1.138	16,059
1990	13,181	1.537	20,257
	79,524		90,151

Exhibit XIII

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

ULTIMATE AVERAGE CLAIM SIZE PROJECTION METHOD
(DOLLARS IN 1,000'S)

ACCIDENT YEAR	SEL. ULT. BASED ON LOSS DEVEL	EST. ULT. NUMBER RPTD.	ULT. AVG. CLAIM SIZE	YEAR TO YEAR CHG. IN ULT. AVG. CLAIM SIZE	PROJ. ULT. LOSSES
			BASE YEARS		
1984	7,427	585	12,695		
1985	9,034	682	13,246	4%	
1986	10,024	791	12,672	–4%	
1987	12,485	886	14,091	11%	
1988	15,203	984	15,450	10%	
			PROJECTED YEARS		
1989		1,000	16,687	8%	16,687
1990		1,192	18,021	8%	21,482

NOTE: for 1989 and 1990, the year–to–year changes in average claim size were selected, and the resulting ultimate average claim sizes were calculated based on them.

Exhibit XIV

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY – VARIANT CASE

SELECTED ESTIMATES OF ULTIMATE LOSSES
(DOLLARS IN 1,000'S)

	INDICATED ULT. LOSSES BASED ON:					
ACCIDENT YEAR	PAID DEVEL	RPTD. DEVEL	AVG CLM SIZE PROJ.	SELECTED EST. ULT. LOSSES	REPORTED LOSSES AS OF 12/31/90	ESTIMATED IBNR
1984	7,426	7,427	--	7,427	7,332	95
1985	8,930	9,138	--	9,034	9,020	14
1986	10,003	10,044	--	10,024	9,817	206
1987	12,544	12,425	--	12,485	12,024	460
1988	15,606	14,800	--	15,203	14,042	1,161
1989	16,319	16,059	16,687	16,355	14,107	2,248
1990	21,424	20,257	21,482	21,054	13,181	7,873
	92,252	90,151		91,581	79,524	12,057

Exhibit I

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY
REPORTED LOSS DEVELOPMENT METHOD

1991 Casualty Loss Reserve Seminar

Sessions 6A and 7B

Basic Case Study Workshop

Andrew E. Kudera

Michael L. Scruggs

Chris M. Suchar

Nancy P. Watkins

ACCIDENT YEAR	REPORTED LOSSES IN 1000'S AS OF (# MONTHS): 12	24	36	48	60	72	84
1984	$4,392	$5,819	$6,553	$6,979	$7,209	$7,317	$7,332
1985	5,117	6,913	7,950	8,482	8,728	8,833	
1986	5,833	7,799	8,883	9,425	9,707		
1987	6,912	9,732	11,036	11,754			
1988	8,225	11,787	13,484				
1989	9,624	13,367					
1990	11,500						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	1.325	1.126	1.065	1.033	1.015	1.002	
1985	1.351	1.150	1.067	1.029	1.012		
1986	1.337	1.139	1.061	1.030			
1987	1.408	1.134	1.065				
1988	(a)	1.144					
1989	1.389						
AVE ALL YEARS	1.374	1.139	1.065	1.031	1.014	1.002	
AVE LATEST 3	1.410	1.139	1.064	1.031			
AVE EX HI-LO	1.371	1.139	1.065	1.030			
INDUSTRY	1.398	1.141	1.063	1.032	1.016	1.001	1.013
SELECTED	1.410	1.139	1.064	1.031	1.014	1.002	1.013
CUMULATIVE	1.812	1.285	1.128	(b)	1.029	1.015	1.013

ACC YEAR	REPORTED LOSSES AS OF 12/31/90	SEL LDF TO ULT	ESTIMATED ULTIMATE LOSSES
1984	$7,332	1.013	$7,427
1985	8,833	1.015	8,966
1986	9,707	1.029	(c)
1987	11,754	1.060	12,462
1988	13,484	1.128	15,217
1989	13,367	1.285	17,182
1990	11,500	1.812	20,843
TOTAL	$75,978		$92,082

SET III

Exhibit II

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY
PAID LOSS DEVELOPMENT METHOD

ACCIDENT YEAR	PAID LOSSES IN 1000'S AS OF (# MONTHS): 12	24	36	48	60	72	84
1984	1,713	$3,758	$5,239	$6,328	$6,657	$6,837	$6,953
1985	2,042	4,387	6,256	7,551	7,959	8,222	
1986	2,223	4,933	6,940	8,467	8,941		
1987	2,589	6,044	(d)	10,638			
1988	3,043	7,487	10,893				
1989	3,368	7,932					
1990	4,370						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	2.194	1.394	1.208	1.052	1.027	1.017	
1985	2.149	1.426	1.207	1.054	1.033		
1986	2.219	1.407	1.220	1.056			
1987	2.335	1.445	1.218				
1988	2.460	1.455					
1989	2.355						
AVE ALL YEARS	2.285	1.425	1.213	1.054	1.030	1.017	
AVE LATEST 3	2.383	1.436	1.215	1.054			
AVE EX HI-LO	2.276	1.426	1.213	1.054			
INDUSTRY	2.410	1.432	1.209	1.050	1.032	1.015	1.068
SELECTED	2.383	1.436	1.215	1.054	1.030	1.017	(e)
CUMULATIVE	4.903	2.057	1.433	1.179	1.119	1.086	(e)

ACC YEAR	PAID LOSSES AS OF 12/31/90	SEL LDF TO ULT	ESTIMATED ULTIMATE LOSSES
1984	$6,953	1.068	$7,427
1985	8,222	1.086	8,931
1986	8,941	1.119	10,004
1987	10,638	1.179	12,545
1988	(f)	1.433	15,608
1989	7,932	2.057	16,317
1990	4,370	4.903	21,425
TOTAL	$57,951		$92,257

Exhibit III

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY
REPORTED COUNTS AND AVERAGES METHOD

ACCIDENT YEAR	REPORTED CLAIM COUNTS AS OF (# MONTHS): 12	24	36	48	60	72	84
1984	445	545	575	582	585	585	585
1985	544	635	674	680	682	682	
1986	625	744	780	790	791		
1987	691	833	877	883			
1988	785	924	972				
1989	775	940					
1990	935						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	1.225	1.055	1.012	1.005	1.000	1.000	
1985	1.167	1.061	1.009	1.003	1.000		
1986	1.190	1.048	1.013	1.001			
1987	1.205	1.053	1.007				
1988	1.177	1.052					
1989	1.213						
AVE ALL YEARS	1.196	1.054	1.010	1.003	1.000	1.000	
AVE LATEST 3	1.198	1.051	1.010	1.003			
AVE EX HI-LO	1.196	1.053	(g)	1.003			
SELECTED	1.198	1.051	1.010	1.003	1.000	1.000	1.000
CUMULATIVE	1.276	1.064	1.013	1.003	1.000	1.000	1.000

ACC YEAR	REPORTED CLAIM CT AS OF 12/31/90	SEL LDF TO ULT	ESTIMATED ULTIMATE CLAIM CT
1984	585	1.000	585
1985	682	1.000	682
1986	791	1.000	791
1987	883	1.003	886
1988	972	1.013	984
1989	940	1.064	1,001
1990	935	(h)	1,193
TOTAL	5,788		6,121

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY
REPORTED COUNTS AND AVERAGES METHOD

ACCIDENT YEAR	12	24	36	48	60	72	84
	AVERAGE REPORTED CLAIM AS OF (# MONTHS):						
1984	9,870	10,678	11,396	11,991	12,323	12,508	12,533
1985	9,406	10,886	11,795	12,474	12,798	12,951	
1986	9,333	10,482	(i)	11,930	12,272		
1987	10,003	11,683	12,584	13,311			
1988	10,478	12,757	13,873				
1989	12,418	14,221					
1990	12,300						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	1.082	1.067	1.052	1.028	1.015	1.002	
1985	1.157	1.083	1.058	1.026	1.012		
1986	1.123	1.086	1.048	1.029			
1987	1.168	1.077	1.058				
1988	1.217	1.088					
1989	1.145						
AVE ALL YEARS	1.149	1.080	1.054	1.027	1.014	1.002	
AVE LATEST 3	1.177	1.084	1.054	1.027			
AVE EX HI-LO	1.148	1.082	1.055	1.028			
SELECTED	1.177	1.084	1.054	1.027	1.014	1.002	1.015
CUMULATIVE	1.424	1.210	1.117	1.059	1.031	1.017	1.015

ACC YEAR	AVE REPTD CLAIM AS OF 12/31/90	SEL LDF TO ULT	ESTIMATED ULT AVERAGE CLAIM	ESTIMATED ULTIMATE LOSSES
1984	$12,533	1.015	$12,721	$7,442
1985	12,951	1.017	13,172	8,983
1986	12,272	1.031	12,650	10,006
1987	13,311	1.059	14,097	12,487
1988	13,873	1.117	15,490	15,247
1989	14,221	1.210	17,207	(j)
1990	12,300	1.424	17,515	20,891
TOTAL	$91,461			$92,272

MONSTERTRUCK MUTUAL
SUMMARY OF LOSS ESTIMATES

-- Estimated Ultimate Losses --

ACCIDENT YEAR	EARNED PREMIUM	REPORTED LOSS DEV'T METHOD	PAID LOSS DEV'T METHOD	REPORTED COUNTS & AVERAGES METHOD	SELECTED ULTIMATE LOSS
1984	$10,460	$7,427	$7,427	$7,442	$7,432
1985	13,185	8,966	8,931	8,983	8,960
1986	15,603	9,986	10,004	10,006	9,999
1987	17,803	12,462	12,545	12,487	12,498
1988	20,845	15,217	15,608	15,247	15,357
1989	21,212	17,182	(m)	17,216	16,905
1990	26,383	20,843	21,425	20,891	21,053
TOTAL	$125,492	$92,082	$92,257	$92,272	$92,204

-- Estimated Ultimate Loss Ratio --

ACCIDENT YEAR	EXPECTED LOSS RATIO	REPORTED LOSS DEV'T METHOD	PAID LOSS DEV'T METHOD	REPORTED COUNTS & AVERAGES METHOD	SELECTED ULTIMATE LOSS RATIO
1984	65%	71%	71%	71%	71%
1985	65%	68%	68%	68%	68%
1986	65%	64%	64%	64%	64%
1987	65%	70%	70%	70%	70%
1988	65%	73%	75%	73%	(n)
1989	65%	81%	77%	81%	80%
1990	65%	79%	81%	79%	80%

Exhibit VI

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY
PAID ALAE RATIO DEVELOPMENT METHOD

ACCIDENT YEAR	RATIO OF PAID ALAE TO PAID LOSS AS OF (# MONTHS): 12	24	36	48	60	72	84
1984	17.09%	13.36%	13.50%	14.05%	14.40%	14.62%	14.72%
1985	17.28%	13.55%	13.66%	14.13%	14.39%	14.62%	
1986	17.15%	13.51%	13.73%	14.33%	14.78%		
1987	17.66%	13.69%	13.88%	14.47%			
1988	18.13%	(k)	14.37%				
1989	18.73%	14.40%					
1990	19.25%						

LOSS DEVELOPMENT FACTORS

ACCIDENT YEAR	12 TO 24	24 TO 36	36 TO 48	48 TO 60	60 TO 72	72 TO 84	84 TO ULT
1984	0.782	1.010	1.041	1.025	1.015	1.007	
1985	0.784	1.008	1.035	1.018	1.016		
1986	0.788	1.016	1.044	1.031			
1987	0.775	1.014	1.043				
1988	0.783	1.012					
1989	0.769						
AVE ALL YEARS	0.780	1.012	1.041	1.025	1.016	1.007	
AVE LATEST 3	0.776	1.014	1.041	1.025			
AVE EX HI-LO	0.781	1.012	1.042	1.025			
SELECTED	0.776	1.014	1.041	1.025	1.016	1.007	1.010
CUMULATIVE	0.866	1.117	1.101	1.058	1.033	1.017	1.010

ACC YEAR	PAID ALAE RATIO AS OF 12/31/90	SEL LDF TO ULT	ESTIMATED ULTIMATE ALAE RATIO
1984	14.72%	1.010	14.87%
1985	14.62%	1.017	14.87%
1986	14.78%	1.033	15.26%
1987	14.47%	1.058	15.32%
1988	14.37%	1.101	15.82%
1989	14.40%	1.117	16.09%
1990	19.25%	0.866	(l)

Exhibit VII

MONSTERTRUCK MUTUAL
COMMERCIAL AUTOMOBILE LIABILITY
ULAE RATIO ESTIMATE

CALENDAR YEAR	PAID ULAE	PAID LOSS	ULAE RATIO
1988	$537	$10,131	5.3%
1989	643	12,616	5.1%
1990	785	15,098	(o)
TOTAL	$1,965	$37,845	5.2%

Exhibit VIII

MONSTERTRUCK MUTUAL

TOTAL LOSS AND LOSS ADJUSTMENT EXPENSE RESERVES
($ IN THOUSANDS)

ACCIDENT YEAR	EST'D ULTIMATE LOSSES	REPORTED LOSSES AS OF 12/31/90	PAID LOSSES AS OF 12/31/90	CASE UNPAID LOSSES	EST'D IBNR LOSSES	TOTAL UNPAID LOSSES
1984	$7,432	$7,332	$6,953	(p)	$100	$478
1985	8,960	8,833	8,222	611	127	738
1986	9,999	9,707	8,941	766	291	1,057
1987	12,498	11,754	10,638	1,116	744	1,860
1988	15,357	13,484	10,893	2,591	1,873	4,464
1989	16,905	13,367	7,932	5,435	(q)	8,973
1990	21,053	11,500	4,370	7,130	9,552	16,683
TOTAL	$92,204	$75,978	$57,951	$18,027	$16,226	(r)

ACCIDENT YEAR	EST'D ULTIMATE ALAE RATIO	EST'D ULTIMATE ALAE	CUMUL PAID ALAE	EST'D UNPAID ALAE	EST'D ULAE RATIO	EST'D UNPAID ULAE
1984	14.9%	$1,105	$1,024	$81	5.2%	$15
1985	14.9%	1,332	1,202	130	5.2%	22
1986	15.3%	1,526	1,321	205	5.2%	35
1987	15.3%	(s)	1,540	375	5.2%	68
1988	15.8%	2,430	1,565	865	5.2%	165
1989	16.1%	2,719	1,143	1,577	5.2%	325
1990	16.7%	3,511	841	2,669	5.2%	(t)
TOTAL		$14,538	$8,636	$5,902		$1,311

Total loss and loss adjustment expense reserve--

Estimated as of 12/31/90:	$41,466
Recorded as of 12/31/90:	40,905
Estimated redundancy/(deficiency):	(u)

1991 CASUALTY LOSS RESERVE SEMINAR

6C/7D: INTERMEDIATE CASE STUDY

Panel

Andrew W. Moody
Signet Reinsurance Company

William A. Van Ark
The Wyatt Company

MR. VAN ARK: The first case study will be presented by Andy Moody. Andy is an associate member of the Casualty Actuarial Society, a member of the American Academy of Actuaries. He's spent 14 years in this business. He graduated from Central Connecticut State University and has worked with the Aetna Insurance Company, Crum & Forster. He's currently vice president at Signet Reinsurance in Basking Ridge, New Jersey. Andy.

MR. MOODY: Thank you, Bill. I seem to be missing a clip for this mike, but we'll forge ahead as best we can. Unfortunately, the handouts for this session seem to have been misplaced. So after the session is over, if you take a business card over to the American Academy's registration desk, if you leave a business card with session number in the back, they'll make sure that the handouts get to you. There's a possibility that the handouts will appear before the end of the session, but if they don't, that's the alternative. Do I really need this? Can you hear me without it?

My case study involves a reserve study at the XYZ Insurance Company, which writes solely general liability insurance. You've gotten some background information from the handout that you should have received at registration, and I'll go through some of that, highlighting some of the things that I think are important.

Again, they write the one line general liability. It's been a stable book of business, basically, the same insureds throughout their history. Their reserve studies have been done by an actuarial student. They didn't say whether he's been to a loss reserve seminar, but we hope she or he may have.

The concern from the reserve study that they've done is that they see diverging paid and incurred loss projections in the most recent years. They are somewhat concerned that that may be from a shift out of their main core light GL business into writing more of the heavy GL business. The ultimate reserve estimate that they're going to put on in their balance sheet is an average of their paid and incurred estimates.

A consultant has been asked to come in and take a look at the reserves to do the certification for year end. The consultant has come in and had some discussions with some of the company's key personnel. In particular, she or he has talked to the claims department, and from those discussions, it's been discovered that the claim department, again, has been operating in a very stable environment.

The procedures, their staffing, and their systems have all -- those three aspects of the claims department -- have been stable. Whether it's necessarily appropriate that they should have remained stable throughout time is something that might be questioned, but that's probably something for more of an advanced case study.

In the discussions with the marketing department, again, it's come out that they have a stable clientele base. Growth has been coming from the existing clients. They've been branching out into other kinds of business, and that's really one of the areas of concern for the consultant.

The underwriting department has a particular concern about the loss ratios from '87 to '90. Those loss ratios have been increasing. They think that, perhaps, it's because of the pricing of the heavier risks. They think that those prices have, perhaps, lagged behind their usual book of business, their lighter risks. They say about 5 percent is what they think might be an adequate additional amount of rate relief for the heavier risks.

We also find out from the underwriters that they've arranged to have new reports generated so that they can see some experience separated out by these heavier and lighter risks. That, we hope, will be very informative as we get further into the case study. Just one point to make, all of the loss dollars you see on exhibits are loss and LAE combined.

(Exhibit I)

First, we're going to take a quick look at XYZ's balance sheet, and this is information that's summarized from the annual statement. The assets on the right, here, are the assets condensed from the information on page 2 of the annual statement, and the liabilities are condensed from page 3.

The IBNR reserve that we'll be particularly looking at is part of this loss and LAE reserve. Along with the balance sheet information in the top part, underneath, we see some key ratios. These ratios are the kinds of ratios that are calculated in the IRIS tests. The company seems to be doing fairly well. They have passed all the tests. Their ratios are all within the acceptable range.

Getting into the data used by the actuarial student, those projections, as you know, have been done on both a paid loss and incurred loss basis.

(Exhibit II)

Here is the paid loss triangle. Of particular note that I see is the growth patterns that you notice down the columns. There seems to be a steady growth pattern, but maybe some more exceptional growth from '87 onward.

From the loss development triangle, we can calculate the link ratios, the loss development factors. Again, looking down the columns, we see what we think is probably a trend in the loss development factors. We don't know exactly what that's coming from, but the factors seem to be getting larger, especially in the first three columns.

So that's something that we need to look into, but when we take some of the averages that we were going to use to make our selected loss development patterns, we'll see one way in which we treat that trend in the development factors.

Those averages are just three-year average, loss volume weighted averages and five-year averages. As you can see, the shorter term averages, the three-year averages, tend to give higher factors than the longer term averages. That, again, is confirming the fact that we think we see this trend down the column.

The selections that were made by the actuarial student, seem to have been conservative. Indeed, the most recent one, this 1.49, is actually higher than any average you see above. If you look at the center part of the exhibit, you can see the data. The person took an average of the most recent two factors.

Again, the remaining factors seem to have been conservatively selected. So perhaps the reserves are adequately stated. We have that conservatism built in.

(Exhibit III)

Exhibit 3 shows some fitting of curves to the loss development patterns. We have two curves, an exponential curve and a Weibull curve. There is really no great magic to this. It's just a matter of selecting a curve that you think might be appropriate and reducing that curve to a linear form.

Here they take the log of the curve twice. That reduces each of those two curves to a linear form with some algebraic manipulation. You can do a linear regression on that. That generates the remainder of the tail beyond the 132 months for which we actually have data.

We used all of the development factors in order to determine what the tail factor might be. It's possible that you might want to fit the curves to something less than all of the data. If you believe that the claims that were reported earlier somehow are settled based on a different sort of pattern, you might want to exclude, say, the first two factors, or the first three factors, and fit the tail or the remaining factors thinking that those claims are settled in a fashion that's more consistent with what's in the tail.

So far we've talked about the paid losses. We have the same sort of data for the incurred losses.

(Exhibit IV)

Again, we see growth down each of the columns, somewhat accelerated growth, starting in about '87. The same sort of pattern on the development factors is seen. They seem to be increasing as we go down the columns, especially for the most recent three columns.

So that, we hope, will be reflected in the student's selection of the factors used to project to ultimate.

The selected factors on the incurred losses are, at least high in the range of possible suggestions from the various averages, and, in the more recent year, again, it's higher than any of the ones that you see there. For the older years it appears, again, to be more of an average of the latest two factors. So we're, perhaps, a little hopeful that the projections made will hold.

(Exhibit V)

There is another exhibit showing projection of tail factors. It's much the same as you saw before. They use the same curves, the same technique.

(Exhibit VI)

Here is a summary of some of the suggestions for tail factors. We have some broader industry data, some Best's data from '88 was examined, and we have relatively high factors. That's the industry total. It's not necessarily reflective of XYZ's book of business, which is some mixture of light and heavy.

We have a Bondy method, which assumes that the last factor from your actual triangle, the last factor that you can calculate from your triangle, can be carried forward and used as a tail factor to take us from 132 months to ultimate, and a summary of our curve fits as well. The fits seem to be relatively good. Maybe this one is not so good as the others.

Now we come down to a point where we have to make a selection, and once again, the selection seems to be high in the range. They picked the same Weibull number there for our selected factor, and the 1.025, again, is not as high as the industry in general, but higher than the other calculations that we've made.

(Exhibit VII)

Now we can put our development factors together with our losses, either paid-to-date or reported-to-date, and get a set of ultimate projections by accident year, and that's what this exhibit displays. You've got the paid losses, the incurred losses, the associated factors, and the product of the paid losses and the factor gives us the ultimate, relatively straightforward. Likewise, for the incurred.

Then, in the last two columns, we can see what the underwriter has been telling us about, his concern for the loss ratios over the last three or four years. There is definitely a trend upward, especially in the paid loss estimates. If you can believe the paid loss projections for '89 and '90, there has been a very significance jump.

I pointed out the paid specifically because of it's a high loss ratio, but also it has some very high factors, high development factors, at the front end of the selected cumulative development factors. Those factors being so high perhaps make this kind of projection a little less reliable than it is for some of the other years.

We may want to augment this kind of development projection with something else, and, in particular, we're going to look at a couple of Bornhuetter-Ferguson-type projections for some of the most recent years for the paid and incurred.

(Exhibit VIII, page 1)

Here is one of the applications of the Bornhuetter-Ferguson method. We have this relatively large paid to ultimate factor, which suggests that something less than 25 percent of the losses have been paid to date or should have been paid to date, assuming our pattern is correct.

In order to apply this method, we need some estimate of the expected losses, and that's derived from the earned premium and this loss ratio that's been selected. That loss ratio can be selected from internal data. You can use pricing data to see how much your pricing has changed versus how much you think it should have changed, and that can give you an idea of how much your loss ratio might be changing and in which direction.

You might use some industry fast track type data also to augment that selection.

Earned premium times the expected loss ratio gives us the expected losses. Those expected losses multiplied by that factor that we can derive from this, by use of this formula, those expected losses times that percentage is the amount unpaid. Again, if roughly 20 to 25 percent is expected to be paid to date, 80 to 75 percent is expected to be unpaid.

So that percentage of somewhere between 80 and 75 is applied to these expected losses to get those expected unpaid losses. So the sum of the paid-to-date and the unpaid give us the ultimate. If you have any questions, feel free to jump in any time.

(Exhibit VIII, page 2)

We did the same thing for the 1990 year on both the paid estimates and the incurred estimates, and once again, it's a matter of selecting a loss ratio based on some sort of expectation from either internal data or industry data and calculating your percentage unreported and doing much the same process as we did for the '89 paid development.

These two estimates are now quite close together. That's, in part, because we used the same loss ratio in both cases, which is pretty much what you have to do and also because of the fact that so much of the losses are as yet either unpaid or unreported.

So both estimates are going to tend towards this 90 percent loss ratio only modified by that which has been reported to date. The amount reported to date indicates either something higher or lower, as you could have seen from the application of the development factors in the earlier exhibit.

(Exhibit IX)

This exhibit brings all of that together. We've modified some of the projections here in the '89 and '90 years to reflect our expected loss ratio method, the Bornhuetter-Ferguson method, and we took those estimates as our selection. We still see the same sort of pattern in loss ratios, increasing somewhat dramatically, again, being quite disturbing to the underwriters and the rest of the company management, too.

These are the IBNR amounts, the 193,000,000 and 202,000,000 from the two projections, the paid projections and the incurred projections, and, as we mentioned earlier, the company is using an average of those two amounts as what their going to put on their balance sheet. That works out to be about 198,000,000.

(Exhibit X)

Moving on, we get our first glimpse of what the new underwriting reports are going to show. We have a summary now of earned premiums by the heavy GL business and the light GL business, and as can you see, what they thought was predominantly light GL and was historically is now no longer predominantly light. As a matter of fact, the heavy has become a majority of the book, and, the growth has been most substantial in the latest three or four years.

So that exhibit gives us our marching orders. What we want to do next, then, is to split the data out. We want to look at the heavy risks separately from the light risks, and then, once we've projected both those pieces, we want to put them together again to see what the total looks like.

(Exhibit XI)

Again, loss development triangles, this is the heavy part of the business only, and there is substantial growth down each of the column, again, reflective of the earned premiums that we saw from the prior exhibit.

Loss development factors calculated from the loss dollars are now more stable. There doesn't seem to be any significant trend down each column. We could do something more formal to examine that. We haven't for this case study, but if you'd like to do that on your own, you're more than welcome to.

The fact that the factors are more stable down each column makes our selection process quite a bit easier. Again, not much to tell between the shorter term averages and the longer term averages, apparently, no special trend.

We are still selecting our factors at the high end of the range of the averages. Again, trying to build some conservatism into the projection. Those are the paid losses. These are the incurred losses. Pretty much the same comments apply to the incurred as they do for the paids.

(Exhibit XIII)

Development factors, again, more stable. Down each column, no specific trend is evident, and the selection process, again, is relatively easy, not much to choose from among the different factors. There are also exhibits in the package showing the revised estimates of the tail factors using the tail fitting of the incremental development factors. (Exhibits XII and XIV)

There is not too much difference in those exhibits, in terms of the fits that you saw from the initial factors. Again, the fits are relatively good. We have the same sorts of things to choose from in order to select our tail factor.

(Exhibit XV)

The broader industry sources are, again, all GL, some mixture of light and heavy. The Bondy method, again, you can see those factors carried forward from the earlier exhibit in the later part of the package when you get it. Again, the factors fit from the curves.

The selected factors are, again, high relative to the range that we have here, and higher than the factors that we had before. Before, when we had both segments of the business combined, we had 1.075 and 1.025. So things have changed.

One might ask why this development factor isn't as high as the industry average. It's not clear from this why that might be. That might be some sort of internal processing that this company does that's better than the industry. Again, it may be something specific to the kind of risks that they write.

(Exhibit XVI)

This is the lighter risks. Again, the paid loss development triangle, not really too much different to talk about there than we did on the heavier side except that the development factors are lower than the averages that we saw before. No specific trend down the column.

Again, we've taken out those trends that we saw in the initial development factor exhibits by separating the two pieces of business out. That changing mix caused the pattern. We separated the mix, so now we've got that increasing pattern down the columns removed and the various averages and the selected values.

You've got the same things on the incurred losses. I guess I can put those up quickly so you can see them.

(Exhibit XVIII)

I could say the same words all over again, if you'd like, but, really, just more stability, just an easier job of projecting, since we have a more homogenous book, a more homogenous set of data.

(Exhibit XX)

Likewise, on our selection of the tail factor for the light segment of the business, we have fits again, the fitting of the two curves of the development pattern to derive tail factors. Again, the industry is the same as it's always been. The Bondy factors are the same as they were in the first exhibit, and that's because these factors are derived from data that's from 1980. That's the oldest year for which we had data, and that was predominantly the light business.

So these factors won't have changed. Any change that's made is reflected in what we did on the heavier risks. However, the selections for the incurred is the same as we had before, but somehow, when we modified the data, we got some higher factors here, on our fits, fitting to the tail, and we've selected a higher factor than the 1.075 that we had before. Again, that may be an effect of having the more homogenous data.

(Exhibit XXIa)

This is similar to one of the final exhibits that you've seen in the initial handout. It shows the application of the development factors to make the projections to ultimate. Now that we've split things out, the trend in the loss ratio is not quite so pronounced. It's still upward, and we have more consistency in the paid and the incurred projections, at least through '89.

In 1990, we still have a fairly large disparity, and we'll do much as we did before, we'll use some

Bornhuetter-Ferguson estimates instead of the loss development projection estimates. Likewise, on the light segment of the business, here the loss ratios are still trending upward.

(Exhibit XXIb)

This is not part of a rate review, but they were probably right when they said they needed more on their heavy business, but it looks like they need more on their light business, too. That 133 percent paid projection, if you believed it, would be particularly disturbing. Again, we may not believe that so much, since, the two estimates are fairly wide apart and are derived from factors that are fairly large.

(Exhibit XXIc)

Putting the two pieces back together, we can see what the total looks like. Again, more consistency between the paid and the incurred by projecting to ultimates using what are probably more appropriate patterns. The 1990, again, still looks unusual because of the great difference between the paid and the incurred estimates.

(Exhibit XXIIa)

Here is that application of the Bornhuetter-Ferguson technique. This is the heavy GL on the 1990 year. We used a much increased loss ratio that's, perhaps, reflective of industry data, or more likely, reflective of the data that you saw in the earlier exhibit showing the paid and the incurred projections. The upward trend in those loss ratios supports picking something that continues that trend which you believe truly exists. Likewise, on the lighter side of the business.

(Exhibit XXIIb)

Once again, these estimates, and you probably noticed it on the heavy side, too, the estimates, paid and incurred, are almost forced to be close together, because the factors are large and the same expected loss ratio is used. You can't really use a different expected loss ratio, one versus the other. Your ultimate loss ratio is your ultimate loss ratio.

(Exhibit XXIIIa)

This exhibit shows the IBNR amounts for the heavy risks and a restatement of the loss ratios with the Bornhuetter-Ferguson technique projections replacing the loss development projections. Still that upward trend in the loss ratio, as we expect, is evident, likewise on the light portion of the business.

(Exhibits XXIIIb and XXIIIc)

Putting those last two exhibits back together again, we can now derive what we think our estimates of the ultimate IBNR reserve or what the current IBNR reserve ought to be. We have 215,000,000 under the paid, and almost 214,000,000 on the incurred, and using their average of the paid and the incurred, we're going to get something close to the 215,000,000. That's significantly different from the original reserve that we were carrying, that XYZ was carrying.

(Exhibit XXIV)

This helps show those differences. First are the original estimates that the actuarial student had made using the paid and incurred estimates that gave us the 198,000,000, which is the average of the two. These are now our new estimates, which are the sum of the two components, the light and heavy.

We see the resulting deficiency of nearly $17 million. So the company is not quite in as good condition as they thought they were. We can go back and restate that first exhibit that we were looking at and see how things may have changed.

(Exhibit XXV)

The assets certainly haven't changed. All we've done is change our required reserve level.

The reserve level has changed, and on the liability/surplus side, that changes the surplus as well. Those dollars have to come directly out of surplus back up into the reserves, and in terms of the key ratios down here, now we've failed three of them.

The general public, the regulating public, might not have as high opinion of this company as they once had, once these reserves are restated. Just some comments about what these ratios might have looked like if they had been able to do this kind of split out of their loss projections earlier.

Well, certainly, the ultimate losses wouldn't have been any different than they are now, assuming that we've made all the improvements appropriately and also assuming that they would write the same business throughout their history. So what does that mean that could have changed? That sounds like, maybe, nothing.

Well, if they had been properly stating their reserves all along, their surplus hit of $17 million would not necessarily have come all in one year. That could have a substantial effect on this change in surplus number. That might have been a pass there.

If the company starts seeing their surplus being depleted, which is what they probably would have seen if they could have reserved accurately all along, that would have given them a chance to make a couple of changes in their operations.

They could have gone out and sought more capital to build their surplus back up to an appropriate level relative to the writings, or, alternatively, they could have written less and, again, keep a more appropriate level of writings to surplus. In that case, they may have even have passed those other two tests.

That's it for my case study. If you have any questions, I'll be glad to give a shot at answering them. Again, I either spoke too fast or explained things very clearly. Thank you for listening.

Bill Van Ark will be presenting the second case study, a case study of a workers' compensation insurance company.

Bill is an FCAS and is a member of the American Academy. He's been in the business 16 years, and his experience has been from the Century Insurance Company, the Argonot Group, the National Council on Compensation Insurance, which is why he gets to do this one, and he's currently a consultant with the Wyatt Company out of their Detroit office. He also has an MA from the University of Michigan, specializing in actuarial science. Bill.

MR. VAN ARK: Thanks Andy. He just took away my joke. I was going to say that we flipped a coin, and I got to do a case study with a happy ending. The second case study involves the WC Insurance Company. It's a small stock insurance company, been insuring for over 15 years. Management has been stable. The company has seen moderate, prudent growth, but it's triennial exam time, though I guess from one of the other sessions that triennial exams aren't anymore.

The insurance department has come in. It's June of '91. They want to look at the annual statement as of December '90. They got some incurred and paid development triangles from the chief financial office, and away they went.

You, the subject of this case study, are a recent ACAS. You've been hired to start an actuarial department for this company, and one of your first assignments is to work with the examiners, to sort of watch over their shoulders, answer their questions, be helpful, whatever.

While you're at it, you've set up some meetings with key people in data processing, underwriting, and claims. The insurance department examiners gave you the results of their initial review, and, in general, there's not a problem, but they got a problem in workers' comp medical, which they've looked at separately.

In that subline, they think they've found a large deficiency, on the order of 20%. So now it's your turn to see if you can be helpful to them in deciding whether or not that's a true finding.

As with Andy, by the way, I should say that a more complete handout packet was supposed to have been in the back of the room for the actual session, and I apologize that it's not there. I gather, if you give the registration desk your business card, they will send it to you.

MR. MOODY: You could leave them up front here, too, and we'll make sure they get over to the box.

(Exhibit I)

MR. VAN ARK: This is the first exhibit or the summary exhibit showing what the insurance department examiners have come up with. Your company has shown some stable but fairly rapid premium growth over the years, up to 18 million in the most recent year.

The paid losses and the incurred losses have sort of followed along. There (columns 5 and 6) are the development factors they've used, and we'll look at those in a moment. Developed losses to ultimate(columns 7 and 8), and there're the ultimate loss ratios (columns 9 and 10).

MR. VAN ARK: The paid loss ratios are generally a little bigger, and by the time you get down to the end of this, they're really bigger. If you look down at the bottom corner of that exhibit, you'll see that by the time you get down to 1990, we get a spread of about 16 points.

(Exhibit II)

Here is the incurred loss development triangle that they're using. Looking at just the numbers, you can certainly see the rapid growth in each column. You'll see some blips, if you'll look at the individual loss ratios. We'll talk a little bit more about that shortly, but the averages are pretty stable.

Unlike the first case study, the three-year average and the all-year average are fairly consistent. So they've picked reasonably consistent and appropriate development factors off those averages.

(Exhibit III)

Similarly, with paid losses, again, there is rapid growth in the dollars, but the development factors have been pretty stable. The three-year average for the newest point is a little under the all-year average. You don't really see anything there that grabs your attention.

So much for the insurance department. Now it's your turn.

(Exhibit IV)

You're taking a look, again, at that incurred loss triangle. I don't know how well it shows up there, but we've gray shaded the second number up in each column. If you scan down the particular columns, you'll see pretty stable numbers over the years, but the gray shaded numbers are pretty consistently much higher than the historical ones, and generally, the last number in each column has been somewhat lower than the historical number.

So the three-year average is averaged out, but there's a discontinuity there, something that may be disturbing to our analysis. So it's something to watch for in our incurred loss review.

(Exhibit V)

When we take another look at the paid loss triangle, it's more straightforward, as we saw a moment ago. There really don't seem to be trends. There don't seem to be discontinuities in the data. We could probably live with the development factors that they've chosen.

In an effort to look a little deeper, we're going to work with some average claim sizes, paid averages, reserved averages, incurred averages. As a first step to doing that, we're going to project our number of claims by year to an ultimate value.

(Exhibit VI)

So here's a triangle of reported claims. There is nothing particularly special about it. So there it is. Look at it. Remember it. It's gone.

(Exhibit VII)

Here is the resulting projection of ultimate claim counts. Reported (column 2), developed to ultimate (column 4). Partly as an effort to see what's going on, and partly as a reasonableness check, you also do a frequency calculation with exposures (presumably adjusted for wage changes), and the frequency has been fairly stable, though it's at a high point right now.

While we're at it, we'll take a look at what percentage of the claims have been closed at particular intervals over the years. You can get some significant distortions in a paid loss analysis, if your claim department has developed a significant backlog or, for that matter, resolved one, settled more claims or settled fewer claims. This is a way of checking on it.

(Exhibit VIII)

There is some volatility there. If you look at the bottom three numbers in the first column, they're certainly lower than the average but not lots lower, and since the paid loss triangle itself was pretty stable, this is probably as far as we'll go into looking into that.

(Exhibit IX)

This is another view of the same data. Some people would rather look at it by closing 12 months rather than by cumulative through the particular year end. The bottom two numbers in the second column seem to stand out a little until you remember you matched them up with the same two numbers in the first column, when you were below average. Now you've caught up in the second year, apparently.

(Exhibit X)

This is an informative exhibit, I think, to try to analyze whether anything funny is going on with either your paid losses or your incurred losses. You look at how they're related to each other and how that relationship has changed over time.

You can see why we've drawn in the line we have. The two numbers below it in each column are very different from the two numbers above it. They've been depressed significantly. Either the incurred losses have jumped up, or paid losses have jumped down, or maybe some of both.

(Exhibit XI)

As I said, the next thing we'll look at is average claim sizes. We've got it in three sections on this exhibit. In the top section, we're looking at average incurred claim size, reported losses at each point divided by the reported number of claims at each point. Looking at the raw data, you'll certainly see some increases down the columns, nothing really informative, I think.

The paid triangle, by comparison, is very stable. There are increases down the columns, but they're not large. The average outstanding column at the bottom is different. Again, those two latest points at the bottom of each column jump out at you. Something is happening to your case reserves.

Sometimes, columns of numbers don't talk too well or communicate too well. It's not a bad idea to take a graphic look at it.

(Exhibit XII)

This, again, is the average incurred claim sizes. The 12-month column is in red. The 24-month column is in blue. Fairly stable, and, perhaps, a little discontinuity two or three years ago, but in the 12-month column only. The 24-month column, I wish my data looked like that in the real world.

The average paid sizes, again, the 24-month column is a model. It's in blue, as before. The 12-month column is pretty stable as such things go. The last point has dropped off some and might bear some watching for in the analysis.

Finally, the graph of average case reserves. Pretty obviously, there's a problem. The 12-month line, something happened. It seemed to have actually gone down three years ago and then took a big hop back up two years ago, and it's still up there. The 24 and 36 months points both seem to have taken off in 1989, the second prior year.

(Exhibit XIII)

I mentioned that one of your first actions as a new actuary was to go talk to some of the people who know what's been going on in the company. There is a two-page exhibit in the handout, should you have it. This is sort of a summary of the summary.

Your underwriting vice president has told you that the character of your business in workers' comp has been stable. Your underwriting has been stable and conservative. They've been getting regular annual rate adjustments. Workers' comp is a funny line. The Rate Bureau gets most of your adjustments for you, and we'll take that as a given for the moment, to be checked later.

Your claims VP has said his management is stable. The staffing is adequate, but he's got a difficulty or had a difficulty. Claim size was taking off on him, on his reserves got behind. So in late 1988, he had a training session, told his people to get their medical reserves up. That's a nice, clean cut answer. I hope, in the real world, you can dig them out as nice as that.

Your actuarial consultants have complimented your management, said their analyses are straightforward, but the paid and incurred analyses are diverging, and they tend to believe the paid. They think the reserve level is changing, and the book reserve has been based on their recommendations.

(Exhibit XIV)

The two actuaries named Berquist and Sherman may not have been the first people to use this methodology, but they described it in a paper some years ago so their name gets attached to it. The top triangle is your actual case reserve triangle; that is, amount of case reserves divided by number of known open claims at each point.

The second triangle is an attempt to restate your history as though your reserves have always been as adequate as they are now. But, there's always a complication. Inflation is the complication in this case. You've got to make an adjustment for changing cost levels.

In this case, we have decided, set aside for the moment the question of how, that an average inflation rate for average outstanding should be about 15 percent. So we've taken the most recent average outstanding, 1451, in this first column, and started dividing it by 1.15. Divide it once, you get 1262. Divide that by 1.15, you get 1097, and so forth up the column.

Now, what you've got is artificial, in a way. I mean, there is some tie to reality there, but it's our estimate, only an estimate, of what the case reserves would have been if they would have been doing it the same way they are now, but adjusted for yesterday's cost level.

The bottom triangle, then, is a recalculation of the total case reserves. You take those restated averages, multiply them by the number of open claims at each point. Having restated the case reserves, we can add in the actual paid dollars at each point to get an adjusted estimate of the incurred dollars at each point.

Again, the point having been to get development data consistent with the way your incurred dollars are on the books today. You get a development triangle.

(Exhibit XV)

Problems with the triangle seem to have gone away. The discontinuities aren't there, since you've defined them out of existence. It becomes easy to pick some appropriate development factors, and so you do.

(Exhibit XVI)

At this point, I have to make an apology. Our quality control department didn't quite succeed in all its goals this month. The column numbered 4 is inconsistent with what you've seen before. I'll ask you to let that pass and let's go on with the talk, for example's sake.

We take the paid losses and the incurred losses, supposedly as you've seen them before, adjust them with our new development factors. The paid losses are the same as they were before, and the paid development factors. We get new incurred estimates of ultimate losses and new loss ratios.

As this example is shown, the incurred loss ratios are generally somewhat lower than paid, and that is more drastically so in 1990, where we got a spread of nine points. So this may be an improvement on the initial analysis, but we've still got a little work to do.

(Exhibit XVII)

One of the ways of trying to get away from the question or to minimize the effect of case reserve levels in your analysis is the Average Hindsight method. In this example, we've chosen to recalculate with that method just the latest accident year.

The method is to restate all your old reserves using today's estimate of ultimate losses and then divide it by today's estimate of what claims you had to cope with back then to get a reconstructed or hindsight average outstanding.

This is a different average than we were talking about a minute ago. This is both known and unknown claims. Total ultimate dollars minus paid dollars divided by ultimate claims minus closed claims.

So there it is, the triangle of reconstructed averages. We trend down the column. In this example, a simple exponential curve is a wonderful fit. The trend isn't far from the 15 percent we took before. Maybe it's not at all when you make the transformation. Projecting with your exponential curve, we project an average known and unknown claim dollars of 2,069. We then can multiply that by our ultimate claims minus closed claims for 1990, add in the paid dollars and get a new estimate of ultimate dollars for 1990. In this example, the result is $13,785,000.

(Exhibit XVIII)

As I said, in this case study, we get the happy ending. The new analysis has suggested that ultimate loss amounts are $69 million. Our needed loss reserves are just under $20 million. Since you've booked $20.7 million, you're showing a slight redundancy, if anything. You've got something to go to your insurance department examiners with and say, "Hey, those reserves on the books are certainly adequate."

That's the end of the study. Questions or comments? We'll ask you to step to the microphone, if you have any questions, for the benefit of the recorder.

Well, thank you all for attending.

1991 CASUALTY LOSS RESERVE SEMINAR
INTERMEDIATE CASE STUDY

BACKGROUND INFORMATION FOR
WC INSURANCE COMPANY

WC Insurance Company is a small, stock insurance company that has been insuring businesses against Workers' Compensation exposures for over fifteen years. Management of the company has been relatively stable over the years, and the company has seen moderate, prudent growth.

The insurance department of the company's state of domicile arrived at the company in June of 1991 in order to perform its normal triennial review of statutory financial condition as of December 31, 1990. Its financial examiners began their review of loss reserves by requesting actuarial data "triangles" of incurred and paid losses as of December 31, 1990. These were provided by the Chief Financial Officer, after being prepared by the company's financial reporting department.

You are a recent Associate in the Casualty Actuarial Society, and were hired by the Chief Financial Officer in late July to create a small actuarial department at WCIC. The company has been using actuarial consultants for the past few years to fulfill reserve certification requirements, but the C.F.O. has decided that this approach has become too expensive.

Your first assignment at WCIC is to follow the progress of the insurance department's reserve review, answer questions and provide any additional data they request, as well as compile additional data and information you think will be necessary to your department in order to predict reserves in the future. Your first step in this process has been to set up meetings with key people in the data processing, underwriting and claims areas.

The insurance department examiners presented you with the results of their initial review of Workers' Compensation - Medical in early August. (See the attached Exhibits I through III.) Their analysis indicated that the company booked a rather large reserve deficiency in this sub-coverage – nearly 20%. You know that this large difference will necessitate that you do your own actuarial review, so you begin immediately. You decide to take a look at some of the data first, and then immediately follow up with some interviews of key people in the underwriting and claims departments. You hope that the data processing department will be able to quickly compile some additional information on claim counts and exposures that you think will be helpful . . .

WC INSURANCE COMPANY *Exhibit I*

Workers' Compensation Medical - Results of Insurance Department Reserve Analysis (dollars in 1,000's)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Paid	Incurred						
Accident	Earned	Losses	Losses	Cumulative LDF		Losses Developed to Ult.		Ultimate Loss Ratio	
Year	Premiums	@ 12/31/90	@ 12/31/90	Paid	Incurred	Paid	Incurred	Paid	Incurred
						(3)x(5)	(4)x(6)	(7)/(2)	(8)/(2)
1978	$1,980	$1,323	$1,415	1.060	1.006	$1,402	$1,423	70.8%	71.9%
1979	2,174	1,518	1,632	1.067	1.012	1,620	1,652	74.5%	76.0%
1980	2,450	1,740	1,883	1.076	1.022	1,872	1,924	76.4%	78.5%
1981	2,698	1,991	2,174	1.087	1.030	2,164	2,239	80.2%	83.0%
1982	3,029	2,279	2,504	1.098	1.042	2,502	2,609	82.6%	86.1%
1983	3,821	2,854	3,175	1.114	1.052	3,179	3,340	83.2%	87.4%
1984	4,883	3,575	4,017	1.131	1.066	4,043	4,282	82.8%	87.7%
1985	5,981	4,456	5,083	1.153	1.081	5,138	5,495	85.9%	91.9%
1986	7,588	5,499	6,430	1.188	1.098	6,533	7,060	86.1%	93.0%
1987	8,981	6,171	7,305	1.224	1.129	7,553	8,247	84.1%	91.8%
1988	10,725	6,604	8,293	1.322	1.169	8,730	9,695	81.4%	90.4%
1989	14,171	7,238	10,151	1.533	1.243	11,096	12,618	78.3%	89.0%
1990	17,881	4,001	8,590	3.526	1.976	14,108	16,974	78.9%	94.9%
Total	$86,362	$49,249	$62,652			$69,940	$77,558	81.0%	89.8%
1989 & 1990	$32,052	$11,239	$18,741			$25,204	$29,592	78.6%	92.3%

Insurance Department Selected Ultimate Loss Amount:				$74,000		
Indicated Loss Reserves Needed :	$74,000	-	$49,249 =	$24,751		
Company Booked Reserves:				$20,700		
Insurance Department Indicated Deficiency:				$4,051	or	19.6%

Workers' Compensation Medical - Incurred Losses (000's)

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	752	1,199	1,274	1,310	1,334	1,348	1,358	1,368	1,375	1,381	1,385	1,412	1,415
1979	865	1,370	1,461	1,509	1,541	1,555	1,569	1,579	1,588	1,596	1,630	1,632	
1980	1,029	1,594	1,691	1,746	1,784	1,800	1,814	1,827	1,836	1,882	1,883		
1981	1,122	1,847	1,959	2,023	2,061	2,081	2,097	2,112	2,167	2,174			
1982	1,278	2,128	2,263	2,331	2,378	2,403	2,423	2,497	2,504				
1983	1,682	2,709	2,879	2,961	3,022	3,054	3,158	3,175					
1984	2,213	3,484	3,669	3,767	3,843	3,999	4,017						
1985	2,859	4,390	4,645	4,799	5,060	5,083							
1986	3,524	5,591	5,912	6,316	6,430								
1987	4,232	6,497	7,197	7,305									
1988	4,529	8,023	8,293										
1989	6,794	10,151											
1990	8,590												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	1.594	1.063	1.028	1.018	1.010	1.007	1.007	1.005	1.004	1.003	1.019	1.002	
1979	1.584	1.066	1.033	1.021	1.009	1.009	1.006	1.006	1.005	1.021	1.001		
1980	1.549	1.061	1.033	1.022	1.009	1.008	1.007	1.005	1.025	1.001			
1981	1.646	1.061	1.033	1.019	1.010	1.008	1.007	1.026	1.003				
1982	1.665	1.063	1.030	1.020	1.011	1.008	1.031	1.003					
1983	1.611	1.063	1.028	1.021	1.011	1.034	1.005						
1984	1.574	1.053	1.027	1.020	1.041	1.005							
1985	1.536	1.058	1.033	1.054	1.005								
1986	1.587	1.057	1.068	1.018									
1987	1.535	1.108	1.015										
1988	1.771	1.034											
1989	1.494												
<u>3-Yr Simple Average</u>													
	1.600	1.066	1.039	1.031	1.019	1.016	1.014	1.011	1.011	1.008	1.010	1.002	
<u>3-Yr Volume Weighted Average</u>													
	1.586	1.064	1.038	1.030	1.018	1.015	1.014	1.011	1.011	1.008	1.010	1.002	
<u>All Year Simple Average</u>													
	1.596	1.062	1.033	1.024	1.013	1.011	1.011	1.009	1.009	1.008	1.010	1.002	
<u>All Year Volume Weighted Average</u>													
	1.586	1.062	1.034	1.026	1.014	1.012	1.011	1.009	1.010	1.008	1.010	1.002	
<u>Selected Factors</u>													
	1.590	1.063	1.036	1.028	1.016	1.014	1.013	1.010	1.011	1.008	1.010	1.006	1.006
<u>Selected Cumulative Factors</u>													
	1.976	1.243	1.169	1.129	1.098	1.081	1.066	1.052	1.042	1.030	1.022	1.012	1.006

Workers' Compensation Medical - Paid Losses (000's)

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	429	929	1,068	1,148	1,180	1,218	1,243	1,261	1,279	1,292	1,305	1,314	1,323
1979	457	1,037	1,216	1,319	1,354	1,399	1,430	1,454	1,473	1,489	1,505	1,518	
1980	529	1,254	1,434	1,538	1,579	1,625	1,656	1,680	1,703	1,721	1,740		
1981	580	1,423	1,635	1,764	1,813	1,873	1,908	1,937	1,969	1,991			
1982	743	1,656	1,907	2,045	2,100	2,171	2,214	2,246	2,279				
1983	967	2,087	2,398	2,610	2,680	2,756	2,816	2,854					
1984	1,121	2,600	3,041	3,299	3,398	3,506	3,575						
1985	1,531	3,306	3,892	4,197	4,337	4,456							
1986	1,956	4,200	4,892	5,325	5,499								
1987	2,266	4,872	5,697	6,171									
1988	2,608	5,618	6,604										
1989	3,270	7,238											
1990	4,001												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	2.166	1.150	1.075	1.028	1.032	1.021	1.014	1.014	1.010	1.010	1.007	1.007	
1979	2.269	1.173	1.085	1.027	1.033	1.022	1.017	1.013	1.011	1.011	1.009		
1980	2.371	1.144	1.073	1.027	1.029	1.019	1.014	1.014	1.011	1.011			
1981	2.453	1.149	1.079	1.028	1.033	1.019	1.015	1.017	1.011				
1982	2.229	1.152	1.072	1.027	1.034	1.020	1.014	1.015					
1983	2.158	1.149	1.088	1.027	1.028	1.022	1.013						
1984	2.319	1.170	1.085	1.030	1.032	1.020							
1985	2.159	1.177	1.078	1.033	1.027								
1986	2.147	1.165	1.089	1.033									
1987	2.150	1.169	1.083										
1988	2.154	1.176											
1989	2.213												
3-Yr Simple Average	2.172	1.170	1.083	1.032	1.029	1.021	1.014	1.015	1.011	1.011	1.008	1.007	
3-Yr Volume Weighted Average	2.177	1.170	1.084	1.032	1.029	1.020	1.014	1.015	1.011	1.011	1.008	1.007	
All Year Simple Average	2.232	1.161	1.081	1.029	1.031	1.020	1.015	1.015	1.011	1.011	1.008	1.007	
All Year Volume Weighted Average	2.201	1.166	1.082	1.030	1.031	1.020	1.015	1.015	1.011	1.011	1.008	1.007	
Selected Factors	2.300	1.160	1.080	1.030	1.030	1.020	1.015	1.015	1.010	1.010	1.008	1.007	1.060
Selected Cumulative Factors	3.526	1.533	1.322	1.224	1.188	1.153	1.131	1.114	1.098	1.087	1.076	1.067	1.060

Workers' Compensation Medical - Incurred Losses (000's)

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	752	1,199	1,274	1,310	1,334	1,348	1,358	1,368	1,375	1,381	1,385	1,412	1,415
1979	865	1,370	1,461	1,509	1,541	1,555	1,569	1,579	1,588	1,596	1,630	1,632	
1980	1,029	1,594	1,691	1,746	1,784	1,800	1,814	1,827	1,836	1,882	1,883		
1981	1,122	1,847	1,959	2,023	2,061	2,081	2,097	2,112	2,167	2,174			
1982	1,278	2,128	2,263	2,331	2,378	2,403	2,423	2,497	2,504				
1983	1,682	2,709	2,879	2,961	3,022	3,054	3,158	3,175					
1984	2,213	3,484	3,669	3,767	3,843	3,999	4,017						
1985	2,859	4,390	4,645	4,799	5,060	5,083							
1986	3,524	5,591	5,912	6,316	6,430								
1987	4,232	6,497	7,197	7,305									
1988	4,529	8,023	8,293										
1989	6,794	10,151											
1990	8,590												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	1.594	1.063	1.028	1.018	1.010	1.007	1.007	1.005	1.004	1.003	1.019	1.002	
1979	1.584	1.066	1.033	1.021	1.009	1.009	1.006	1.006	1.005	1.021	1.001		
1980	1.549	1.061	1.033	1.022	1.009	1.008	1.007	1.005	1.025	1.001			
1981	1.646	1.061	1.033	1.019	1.010	1.008	1.007	1.026	1.003				
1982	1.665	1.063	1.030	1.020	1.011	1.008	1.031	1.003					
1983	1.611	1.063	1.028	1.021	1.011	1.034	1.005						
1984	1.574	1.053	1.027	1.020	1.041	1.005							
1985	1.536	1.058	1.033	1.054	1.005								
1986	1.587	1.057	1.068	1.018									
1987	1.535	1.108	1.015										
1988	1.771	1.034											
1989	1.494												
<u>3-Yr Simple Average</u>													
	1.600	1.066	1.039	1.031	1.019	1.016	1.014	1.011	1.011	1.008	1.010	1.002	
<u>3-Yr Volume Weighted Average</u>													
	1.586	1.064	1.038	1.030	1.018	1.015	1.014	1.011	1.011	1.008	1.010	1.002	
<u>All Year Simple Average</u>													
	1.596	1.062	1.033	1.024	1.013	1.011	1.011	1.009	1.009	1.008	1.010	1.002	
<u>All Year Volume Weighted Average</u>													
	1.586	1.062	1.034	1.026	1.014	1.012	1.011	1.009	1.010	1.008	1.010	1.002	
<u>Selected Factors</u>													
	???												
<u>Selected Cumulative Factors</u>													
	???												

Workers' Compensation Medical - Paid Losses (000's)

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	429	929	1,068	1,148	1,180	1,218	1,243	1,261	1,279	1,292	1,305	1,314	1,323
1979	457	1,037	1,216	1,319	1,354	1,399	1,430	1,454	1,473	1,489	1,505	1,518	
1980	529	1,254	1,434	1,538	1,579	1,625	1,656	1,680	1,703	1,721	1,740		
1981	580	1,423	1,635	1,764	1,813	1,873	1,908	1,937	1,969	1,991			
1982	743	1,656	1,907	2,045	2,100	2,171	2,214	2,246	2,279				
1983	967	2,087	2,398	2,610	2,680	2,756	2,816	2,854					
1984	1,121	2,600	3,041	3,299	3,398	3,506	3,575						
1985	1,531	3,306	3,892	4,197	4,337	4,456							
1986	1,956	4,200	4,892	5,325	5,499								
1987	2,266	4,872	5,697	6,171									
1988	2,608	5,618	6,604										
1989	3,270	7,238											
1990	4,001												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	2.166	1.150	1.075	1.028	1.032	1.021	1.014	1.014	1.010	1.010	1.007	1.007	
1979	2.269	1.173	1.085	1.027	1.033	1.022	1.017	1.013	1.011	1.011	1.009		
1980	2.371	1.144	1.073	1.027	1.029	1.019	1.014	1.014	1.011	1.011			
1981	2.453	1.149	1.079	1.028	1.033	1.019	1.015	1.017	1.011				
1982	2.229	1.152	1.072	1.027	1.034	1.020	1.014	1.015					
1983	2.158	1.149	1.088	1.027	1.028	1.022	1.013						
1984	2.319	1.170	1.085	1.030	1.032	1.020							
1985	2.159	1.177	1.078	1.033	1.027								
1986	2.147	1.165	1.089	1.033									
1987	2.150	1.169	1.083										
1988	2.154	1.176											
1989	2.213												
<u>3-Yr Simple Average</u>	2.172	1.170	1.083	1.032	1.029	1.021	1.014	1.015	1.011	1.011	1.008	1.007	
<u>3-Yr Volume Weighted Average</u>	2.177	1.170	1.084	1.032	1.029	1.020	1.014	1.015	1.011	1.011	1.008	1.007	
<u>All Year Simple Average</u>	2.232	1.161	1.081	1.029	1.031	1.020	1.015	1.015	1.011	1.011	1.008	1.007	
<u>All Year Volume Weighted Average</u>	2.201	1.166	1.082	1.030	1.031	1.020	1.015	1.015	1.011	1.011	1.008	1.007	
<u>Selected Factors</u>	2.300	1.160	1.080	1.030	1.030	1.020	1.015	1.015	1.010	1.010	1.008	1.007	1.060
<u>Selected Cumulative Factors</u>	3.526	1.533	1.322	1.224	1.188	1.153	1.131	1.114	1.098	1.087	1.076	1.067	1.060

Workers' Compensation Medical - Reported Claims

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	4,191	4,779	4,859	4,899	4,924	4,939	4,950	4,960	4,971	4,975	4,980	4,985	4,990
1979	4,162	4,810	4,887	4,924	4,951	4,965	4,976	4,986	4,995	5,000	5,005	5,010	
1980	4,238	4,839	4,909	4,947	4,974	4,990	5,000	5,010	5,020	5,025	5,030		
1981	4,233	4,874	4,940	4,979	5,002	5,017	5,026	5,035	5,044	5,050			
1982	4,208	4,880	4,958	4,995	5,023	5,039	5,049	5,059	5,070				
1983	4,729	5,405	5,487	5,530	5,554	5,570	5,581	5,593					
1984	5,223	5,983	6,063	6,109	6,138	6,158	6,171						
1985	5,777	6,604	6,696	6,751	6,787	6,809							
1986	6,249	7,282	7,402	7,463	7,505								
1987	6,378	7,324	7,447	7,505									
1988	6,358	7,364	7,482										
1989	7,067	8,149											
1990	7,834												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	1.140	1.017	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
1979	1.156	1.016	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001		
1980	1.142	1.014	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001			
1981	1.151	1.014	1.008	1.005	1.003	1.002	1.002	1.002	1.001				
1982	1.160	1.016	1.007	1.006	1.003	1.002	1.002	1.002					
1983	1.143	1.015	1.008	1.004	1.003	1.002	1.002						
1984	1.146	1.013	1.008	1.005	1.003	1.002							
1985	1.143	1.014	1.008	1.005	1.003								
1986	1.165	1.016	1.008	1.006									
1987	1.148	1.017	1.008										
1988	1.158	1.016											
1989	1.153												
<u>3-Yr Simple Average</u>													
	1.153	1.016	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>3-Yr Volume Weighted Average</u>													
	1.153	1.016	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>All Year Simple Average</u>													
	1.150	1.015	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>All Year Volume Weighted Average</u>													
	1.151	1.015	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>Selected Factors</u>													
	1.150	1.015	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	1.002
<u>Selected Cumulative Factors</u>													
	1.200	1.044	1.028	1.020	1.015	1.012	1.010	1.008	1.006	1.005	1.004	1.003	1.002

WC INSURANCE COMPANY ** YOUR ANALYSIS ** *Exhibit VII*

Workers' Compensation Medical - Estimated Ultimate Claims

(1) Acc. Year	(2) Reported Claims @ 12/31/90	(3) Cumul. Reported Dev. Fact.	(4) Claims Developed to Ult.	(5) Estimated Exposures ($100 Payroll)	(6) Est. Ult. Claim Frequency
			(2)x(3)		(4)/(5)
1978	4,990	1.002	5,000	$1,875,000	0.267%
1979	5,010	1.003	5,025	$1,860,000	0.270%
1980	5,030	1.004	5,050	$1,848,000	0.273%
1981	5,050	1.005	5,075	$1,859,000	0.273%
1982	5,070	1.006	5,100	$1,865,000	0.273%
1983	5,593	1.008	5,638	$2,046,000	0.276%
1984	6,171	1.010	6,233	$2,232,000	0.279%
1985	6,809	1.012	6,891	$2,436,000	0.283%
1986	7,505	1.015	7,618	$2,667,000	0.286%
1987	7,505	1.020	7,655	$2,647,000	0.289%
1988	7,482	1.028	7,691	$2,648,000	0.290%
1989	8,149	1.044	8,508	$2,912,000	0.292%
1990	7,834	1.200	9,401	$3,220,000	0.292%

WC INSURANCE COMPANY ** YOUR ANALYSIS ** *Exhibit VIII*

Workers' Compensation Medical - Claim Closing Pattern

Acc. Year	Cumulative Closed Claims 12	24	36	48	60	72	84	96	108	120	132	144	156	Ult.
1978	2,447	4,109	4,401	4,599	4,668	4,742	4,793	4,832	4,874	4,895	4,917	4,934	4,950	5,000
1979	2,453	4,144	4,459	4,616	4,693	4,766	4,818	4,853	4,888	4,915	4,939	4,960		5,025
1980	2,443	4,106	4,462	4,641	4,715	4,785	4,833	4,872	4,916	4,938	4,965			5,050
1981	2,623	4,126	4,467	4,665	4,742	4,818	4,864	4,906	4,942	4,965				5,075
1982	2,646	4,195	4,531	4,701	4,768	4,843	4,888	4,927	4,965					5,100
1983	2,866	4,640	4,993	5,191	5,264	5,352	5,404	5,445						5,638
1984	3,219	5,147	5,522	5,757	5,836	5,917	5,972							6,233
1985	3,447	5,644	6,113	6,337	6,439	6,537								6,891
1986	3,901	6,229	6,752	7,023	7,119									7,618
1987	3,943	6,342	6,807	7,049										7,655
1988	3,714	6,355	6,812											7,691
1989	4,087	6,973												8,508
1990	4,672													9,401

Acc. Year	Cumulative Closed Claims / Ultimate Claims 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	48.9%	82.2%	88.0%	92.0%	93.4%	94.8%	95.9%	96.6%	97.5%	97.9%	98.3%	98.7%	99.0%
1979	48.8%	82.5%	88.7%	91.9%	93.4%	94.8%	95.9%	96.6%	97.3%	97.8%	98.3%	98.7%	
1980	48.4%	81.3%	88.4%	91.9%	93.4%	94.8%	95.7%	96.5%	97.3%	97.8%	98.3%		
1981	51.7%	81.3%	88.0%	91.9%	93.4%	94.9%	95.8%	96.7%	97.4%	97.8%			
1982	51.9%	82.3%	88.8%	92.2%	93.5%	95.0%	95.8%	96.6%	97.4%				
1983	50.8%	82.3%	88.6%	92.1%	93.4%	94.9%	95.8%	96.6%					
1984	51.6%	82.6%	88.6%	92.4%	93.6%	94.9%	95.8%						
1985	50.0%	81.9%	88.7%	92.0%	93.4%	94.9%							
1986	51.2%	81.8%	88.6%	92.2%	93.4%								
1987	51.5%	82.8%	88.9%	92.1%									
1988	48.3%	82.6%	88.6%										
1989	48.0%	82.0%											
1990	49.7%												
Avg.	50.1%	82.1%	88.5%	92.1%	93.4%	94.9%	95.8%	96.6%	97.4%	97.8%	98.3%	98.7%	99.0%

WC INSURANCE COMPANY *Exhibit IX*

Workers' Compensation Medical - Claim Closing Pattern

Acc. Year	Incremental Closed Claims 0-12	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	Ult.
1978	2,447	1,662	292	198	69	74	51	39	42	21	22	17	16	5,000
1979	2,453	1,691	315	157	77	73	52	35	35	27	24	21		5,025
1980	2,443	1,663	356	179	74	70	48	39	44	22	27			5,050
1981	2,623	1,503	341	198	77	76	46	42	36	23				5,075
1982	2,646	1,549	336	170	67	75	45	39	38					5,100
1983	2,866	1,774	353	198	73	88	52	41						5,638
1984	3,219	1,928	375	235	79	81	55							6,233
1985	3,447	2,197	469	224	102	98								6,891
1986	3,901	2,328	523	271	96									7,618
1987	3,943	2,399	465	242										7,655
1988	3,714	2,641	457											7,691
1989	4,087	2,886												8,508
1990	4,672													9,401

Acc. Year	Incremental Closed Claims / Ultimate Claims 0-12	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156
1978	48.9%	33.2%	5.8%	4.0%	1.4%	1.5%	1.0%	0.8%	0.8%	0.4%	0.4%	0.3%	0.3%
1979	48.8%	33.7%	6.3%	3.1%	1.5%	1.5%	1.0%	0.7%	0.7%	0.5%	0.5%	0.4%	
1980	48.4%	32.9%	7.0%	3.5%	1.5%	1.4%	1.0%	0.8%	0.9%	0.4%	0.5%		
1981	51.7%	29.6%	6.7%	3.9%	1.5%	1.5%	0.9%	0.8%	0.7%	0.5%			
1982	51.9%	30.4%	6.6%	3.3%	1.3%	1.5%	0.9%	0.8%	0.7%				
1983	50.8%	31.5%	6.3%	3.5%	1.3%	1.6%	0.9%	0.7%					
1984	51.6%	30.9%	6.0%	3.8%	1.3%	1.3%	0.9%						
1985	50.0%	31.9%	6.8%	3.3%	1.5%	1.4%							
1986	51.2%	30.6%	6.9%	3.6%	1.3%								
1987	51.5%	31.3%	6.1%	3.2%									
1988	48.3%	34.3%	5.9%										
1989	48.0%	33.9%											
1990	49.7%												
Avg.	50.1%	32.0%	6.4%	3.5%	1.4%	1.4%	0.9%	0.8%	0.8%	0.5%	0.5%	0.4%	0.3%

WC INSURANCE COMPANY **** YOUR ANALYSIS **** *Exhibit X*

Workers' Compensation Medical - Paid vs. Incurred Diagnostic

Acc. Year	Paid Losses / Incurred Losses 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	0.570	0.775	0.838	0.876	0.885	0.904	0.915	0.922	0.930	0.936	0.942	0.931	0.935
1979	0.528	0.757	0.832	0.874	0.879	0.900	0.911	0.921	0.928	0.933	0.923	0.930	
1980	0.514	0.787	0.848	0.881	0.885	0.903	0.913	0.920	0.928	0.914	0.924		
1981	0.517	0.770	0.835	0.872	0.880	0.900	0.910	0.917	0.909	0.916			
1982	0.581	0.778	0.843	0.877	0.883	0.903	0.914	0.899	0.910				
1983	0.575	0.770	0.833	0.881	0.887	0.902	0.892	0.899					
1984	0.507	0.746	0.829	0.876	0.884	0.877	0.890						
1985	0.536	0.753	0.838	0.875	0.857	0.877							
1986	0.555	0.751	0.827	0.843	0.855								
1987	0.535	0.750	0.792	0.845									
1988	0.576	0.700	0.796										
1989	0.481	0.713											
1990	0.466												

WC INSURANCE COMPANY ** YOUR ANALYSIS ** *Exhibit XI*

Workers' Compensation Medical - Average Claim Size Diagnostics

Average Incurred Claim Size (Incurred Loss / Reported Claims)

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	179	251	262	267	271	273	274	276	277	278	278	279	279
1979	208	285	299	306	311	313	315	317	318	319	320	321	
1980	243	329	344	353	359	361	363	365	366	367	368		
1981	265	379	397	406	412	415	417	419	420	422			
1982	304	436	456	467	473	477	480	482	484				
1983	356	501	525	535	544	548	552	554					
1984	424	582	605	617	626	631	634						
1985	495	665	694	711	721	725							
1986	564	768	799	816	828								
1987	664	887	920	938									
1988	712	1,014	1,056										
1989	846	1,163											
1990	961												

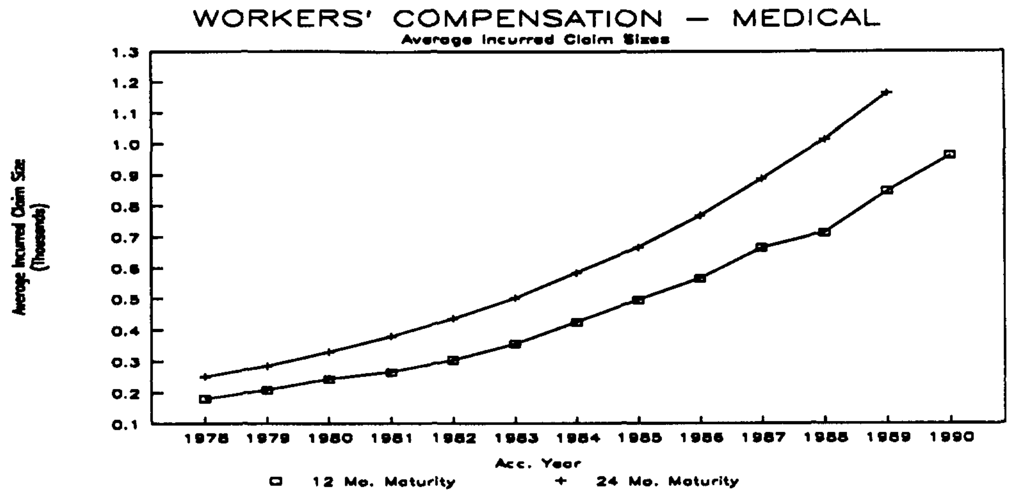
Average Paid Claim Size (Paid Loss / Closed Claims)

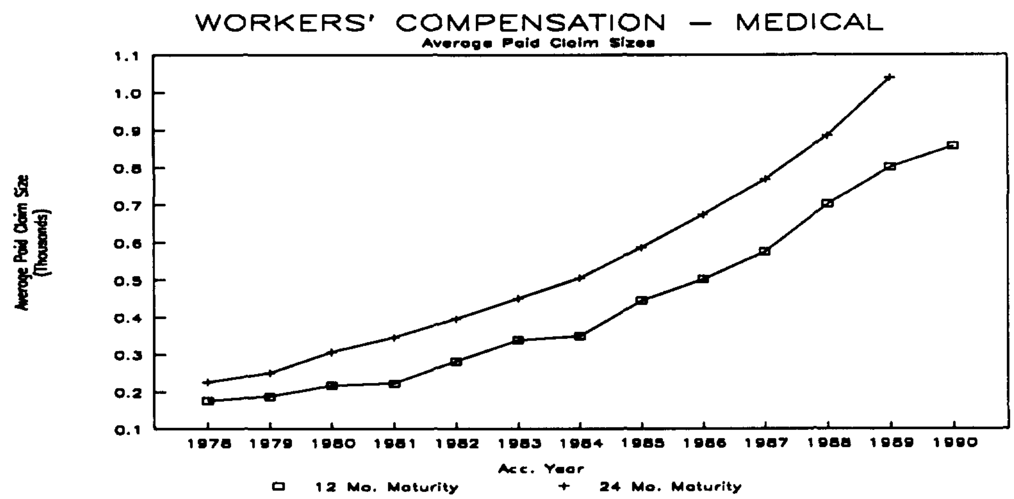
Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	175	226	243	250	253	257	259	261	262	264	265	266	267
1979	186	250	273	286	289	294	297	300	301	303	305	306	
1980	217	305	321	331	335	340	343	345	346	349	350		
1981	221	345	366	378	382	389	392	395	398	401			
1982	281	395	421	435	440	448	453	456	459				
1983	337	450	480	503	509	515	521	524					
1984	348	505	551	573	582	593	599						
1985	444	586	637	662	674	682							
1986	501	674	725	758	772								
1987	575	768	837	875									
1988	702	884	969										
1989	800	1,038											
1990	856												

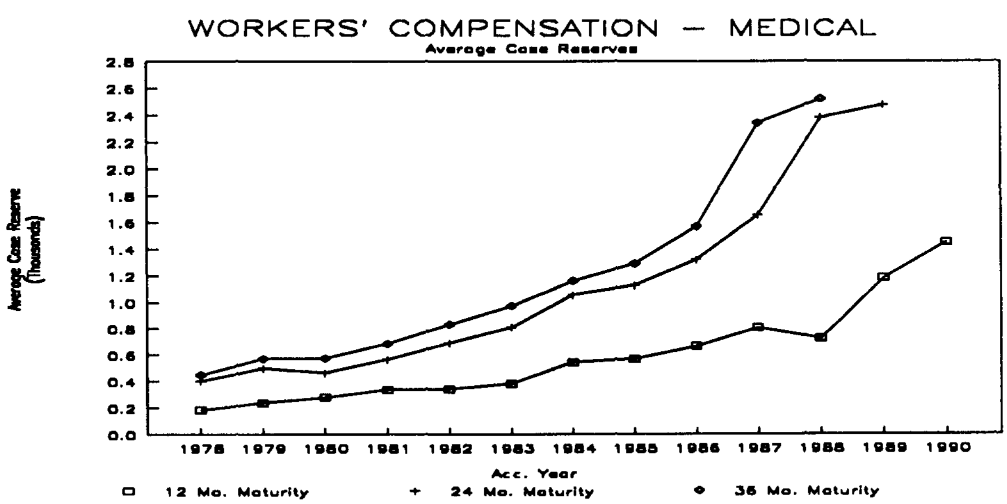
Average Case Reserve (Case Reserve / Open Claims)

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	185	403	450	540	602	660	732	836	990	1,113	1,270	1,912	2,308
1979	239	500	572	617	725	784	880	940	1,075	1,259	1,891	2,288	
1980	279	464	575	680	792	854	946	1,065	1,279	1,853	2,200		
1981	337	567	685	825	954	1,045	1,167	1,357	1,937	2,156			
1982	343	689	834	973	1,090	1,184	1,298	1,901	2,142				
1983	384	813	974	1,035	1,179	1,367	1,932	2,170					
1984	545	1,057	1,161	1,330	1,474	2,044	2,221						
1985	570	1,129	1,292	1,454	2,077	2,304							
1986	668	1,321	1,569	2,251	2,411								
1987	807	1,655	2,344	2,486									
1988	727	2,384	2,520										
1989	1,183	2,477											
1990	1,451												

Workers' Compensation Medical - Average Claim Size Diagnostics







Workers' Compensation - Medical

Notes from Interviews:

UNDERWRITING VICE PRESIDENT

1. The volume of the company's business has grown, but nothing too dramatic. They had a "mild" marketing push in the mid-1980's, and had started another one about 18 months ago. Most of the effort was geared toward referrals from their existing customers, so she finds it unlikely that the character of their overall business has changed very much.

2. Underwriting guidelines and training have remained relatively stable over the last several years. She would characterize the underwriting philosophy as "conservative."

3. Rates have been changed every year to keep up with inflation. Inflation in medical coverage has been atrocious, however, and sometimes hard to keep up with. The company generally follows the rating bureau's rating plan, but has actuarial consultants look over the plan changes every year to make sure the company is following a reasonable path.

CLAIMS VICE PRESIDENT

1. Claims management has been relatively stable over the past several years. Staffing has been able to keep up with claim volumes.

2. There have been no specific problems he can think of in the handling of claims. Claim sizes continue to go "through the roof," especially in medical coverage. Historically, it has been difficult to keep up with the increasing claim sizes.

3. He implemented a claims training program in late 1988. It focuses on pension-type (long term) cases. The main thrust of training was to be able to better take inflation into account when setting case reserves for long-term cases. Both indemnity, but especially medical reserves had been chronically under-reserved in the past.

ACTUARIAL CONSULTANTS

1. The company has very qualified management, and has been fairly stable over time.

2. Estimating reserves has always been relatively straightforward, except for the last couple of years on medical. Incurred and paid loss development estimates have begun to diverge.

3. The consultants have moved more toward believing the paid loss development estimates, because they suspect a change in case reserve adequacy. The company's booked reserves at year-end were based on the consultant's recommendations.

WC INSURANCE COMPANY ** YOUR ANALYSIS ** *Exhibit XIV*

Workers' Compensation Medical - Berquist/Sherman Adjustment For Case Reserve Strengthening

Acc. Year	Actual Average Case Reserve (Case Reserve / Open Claims) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	185	403	450	540	602	660	732	836	990	1,113	1,270	1,912	2,308
1979	239	500	572	617	725	784	880	940	1,075	1,259	1,891	2,288	
1980	279	464	575	680	792	854	946	1,065	1,279	1,853	2,200		
1981	337	567	685	825	954	1,045	1,167	1,357	1,937	2,156			
1982	343	689	834	973	1,090	1,184	1,298	1,901	2,142				
1983	384	813	974	1,035	1,179	1,367	1,932	2,170					
1984	545	1,057	1,161	1,330	1,474	2,044	2,221						
1985	570	1,129	1,292	1,454	2,077	2,304							
1986	668	1,321	1,569	2,251	2,411								
1987	807	1,655	2,344	2,486									
1988	727	2,384	2,520										
1989	1,183	2,477											
1990	1,451												

Acc. Year	Adjusted Average Case Reserves (1990 Actual Averages Detrended by 15%) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	271	532	623	708	788	866	960	1,079	1,225	1,417	1,663	1,990	2,308
1979	312	612	717	814	906	996	1,104	1,241	1,409	1,630	1,913	2,288	
1980	359	704	824	936	1,042	1,145	1,270	1,427	1,620	1,875	2,200		
1981	413	810	948	1,076	1,198	1,317	1,460	1,641	1,863	2,156			
1982	475	931	1,090	1,237	1,378	1,515	1,679	1,887	2,142				
1983	546	1,071	1,253	1,422	1,585	1,742	1,931	2,170					
1984	628	1,232	1,441	1,635	1,823	2,003	2,221						
1985	722	1,417	1,657	1,880	2,097	2,304							
1986	830	1,629	1,905	2,162	2,411								
1987	954	1,873	2,191	2,486									
1988	1,097	2,154	2,520										
1989	1,262	2,477											
1990	1,451												

i.e.,	$1,262	=	$1,451	/	1.15
	$1,097	=	$1,262	/	1.15

Acc. Year	Adjusted Case Reserves (Adjusted Averages x Open Claims) (in 1,000's) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	473	356	285	212	202	171	151	138	119	113	105	101	92
1979	533	408	307	251	234	198	174	165	151	139	126	114	
1980	644	516	368	286	270	235	212	197	168	163	143		
1981	665	606	448	338	311	262	237	212	190	183			
1982	742	638	465	364	351	297	270	249	225				
1983	1,017	819	619	482	460	380	342	321					
1984	1,259	1,030	780	576	551	483	442						
1985	1,682	1,360	966	778	730	627							
1986	1,949	1,715	1,238	951	931								
1987	2,323	1,839	1,402	1,134									
1988	2,900	2,173	1,688										
1989	3,761	2,913											
1990	4,588												

Workers' Compensation Medical - Berquist/Sherman Adjustment For Case Reserve Strengthening

Acc. Year	Adjusted Incurred Losses (Actual Paid + Adjusted Case Reserve) (in 1,000's) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	902	1,285	1,353	1,360	1,382	1,389	1,394	1,399	1,398	1,405	1,410	1,415	1,415
1979	990	1,445	1,523	1,570	1,588	1,597	1,604	1,619	1,624	1,628	1,631	1,632	
1980	1,173	1,770	1,802	1,824	1,849	1,860	1,868	1,877	1,871	1,884	1,883		
1981	1,245	2,029	2,083	2,102	2,124	2,135	2,145	2,149	2,159	2,174			
1982	1,485	2,294	2,372	2,409	2,451	2,468	2,484	2,495	2,504				
1983	1,984	2,906	3,017	3,092	3,140	3,136	3,158	3,175					
1984	2,380	3,630	3,821	3,875	3,949	3,989	4,017						
1985	3,213	4,666	4,858	4,975	5,067	5,083							
1986	3,905	5,915	6,130	6,276	6,430								
1987	4,589	6,711	7,099	7,305									
1988	5,508	7,791	8,292										
1989	7,031	10,151											
1990	8,589												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	1.425	1.053	1.005	1.016	1.005	1.004	1.004	0.999	1.005	1.004	1.004	1.000	
1979	1.460	1.054	1.031	1.011	1.006	1.004	1.009	1.003	1.002	1.002	1.001		
1980	1.509	1.018	1.012	1.014	1.006	1.004	1.005	0.997	1.007	0.999			
1981	1.630	1.027	1.009	1.010	1.005	1.005	1.002	1.005	1.007				
1982	1.545	1.034	1.016	1.017	1.007	1.006	1.004	1.004					
1983	1.465	1.038	1.025	1.016	0.999	1.007	1.005						
1984	1.525	1.053	1.014	1.019	1.010	1.007							
1985	1.452	1.041	1.024	1.018	1.003								
1986	1.515	1.036	1.024	1.025									
1987	1.462	1.058	1.029										
1988	1.414	1.064											
1989	1.444												
3-Yr Simple Average	1.440	1.053	1.026	1.021	1.004	1.007	1.004	1.002	1.005	1.002	1.003	1.000	
3-Yr Volume Weighted Average	1.439	1.054	1.026	1.021	1.004	1.007	1.004	1.002	1.006	1.001	1.002	1.000	
All Year Simple Average	1.487	1.043	1.019	1.016	1.005	1.005	1.005	1.002	1.005	1.002	1.003	1.000	
All Year Volume Weighted Average	1.471	1.047	1.021	1.018	1.005	1.006	1.005	1.002	1.006	1.001	1.002	1.000	
Selected Factors	1.470	1.050	1.025	1.020	1.006	1.005	1.005	1.004	1.004	1.003	1.002	1.001	1.002
Selected Cumulative Factors	1.666	1.133	1.079	1.053	1.032	1.026	1.021	1.016	1.012	1.008	1.005	1.003	1.002

WC INSURANCE COMPANY *Exhibit XVI*

Workers' Compensation Medical - Your Results of Paid vs. Incurred Development (dollars in 1,000's)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Paid	Incurred						
Accident	Earned	Losses	Losses	Cumulative LDF		Losses Developed to Ult.		Ultimate Loss Ratio	
Year	Premiums	@ 12/31/90	@ 12/31/90	Paid	Incurred	Paid	Incurred	Paid	Incurred
						(3)x(5)	(4)x(6)	(7)/(2)	(8)/(2)
1978	$1,980	$1,323	$1,394	1.060	1.002	$1,402	$1,397	70.8%	70.6%
1979	2,174	1,518	1,606	1.067	1.003	1,620	1,611	74.5%	74.1%
1980	2,450	1,740	1,850	1.076	1.005	1,872	1,859	76.4%	75.9%
1981	2,698	1,991	2,132	1.087	1.008	2,164	2,149	80.2%	79.7%
1982	3,029	2,279	2,452	1.098	1.012	2,502	2,481	82.6%	81.9%
1983	3,821	2,854	3,101	1.114	1.016	3,179	3,151	83.2%	82.5%
1984	4,883	3,575	3,915	1.131	1.021	4,043	3,997	82.8%	81.9%
1985	5,981	4,456	4,938	1.153	1.026	5,138	5,066	85.9%	84.7%
1986	7,588	5,499	6,215	1.188	1.032	6,533	6,414	86.1%	84.5%
1987	8,981	6,171	7,043	1.224	1.053	7,553	7,416	84.1%	82.6%
1988	10,725	6,604	7,903	1.322	1.079	8,730	8,527	81.4%	79.5%
1989	14,171	7,238	9,479	1.533	1.133	11,096	10,740	78.3%	75.8%
1990	17,881	4,001	7,531	3.526	1.666	14,108	12,547	78.9%	70.2%
Total	$86,362	$49,249	$59,559			$69,940	$67,355	81.0%	78.0%
1989 & 1990	$32,052	$11,239	$17,010			$25,204	$23,287	78.6%	72.7%

Notes:

Paid and Incurred Loss Development still diverge somewhat, especially for 1990.

You decide to try the Average Hindsight Reserve method for 1990, which should be relatively unaffected by any recent changes in case reserving practices.

Workers' Compensation Medical - Average Hindsight Reserve Method Used For AY 1990

Acc. Year	Average Hindsight Reserves 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	380	529	554	628	663	705	758	827	960	1,029	1,145	1,303	1,540
1979	451	657	707	726	789	838	899	942	1,044	1,155	1,291	1,508	
1980	513	648	735	802	857	909	968	1,045	1,216	1,295	1,482		
1981	643	773	859	959	1,033	1,105	1,180	1,302	1,414	1,509			
1982	713	924	1,028	1,120	1,181	1,249	1,311	1,422	1,578				
1983	793	1,080	1,189	1,242	1,297	1,430	1,491	1,611					
1984	962	1,308	1,377	1,515	1,567	1,627	1,705						
1985	1,037	1,440	1,555	1,634	1,692	1,825							
1986	1,215	1,637	1,827	1,931	1,954								
1987	1,406	1,990	2,108	2,168									
1988	1,514	2,254	2,304										
1989	1,730	2,397											
1990	??												

0.994	= Exponential Curve:	R-Squared
14.7%	=	Trend Factor
2,069	=	Fitted Value for 1990
$13,785	= Estimated Ultimate Losses for 1990 (in $1,000's)	

NOTES:

1. Triangle of average hindsight reserves calculated as follows:

   (Ult. loss for AY n - paid loss for AY n at maturity y) /
   (Ult. # claims for AY n - closed claims for AY n at maturity y).

2. Ultimate loss estimates used for accident years 1982 - 1989 are the averages of the incurred and paid loss development estimates from Exhibit XVI.

3. Estimated ultimate losses for 1990 calculated as follows:
   [Fitted value for 1990 (2,069) x (Ult. # claims for 1990 - closed claims for 1990)] + paid losses for 1990.

WC INSURANCE COMPANY *Exhibit XVIII*

Workers' Compensation Medical - Results of Your Reserve Analysis (dollars in 1,000's)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Estimated Ultimate Losses				
Acc. Year	Earned Premiums	Paid Devel.	Incurred Devel.	Average Hindsight	Selected	Ult. Loss Ratio
		Exh. XVI	Exh. XVI	Exh. XVII		(6)/(2)
1978	$1,980	$1,402	$1,397		$1,400	70.7%
1979	2,174	1,620	1,611		1,616	74.3%
1980	2,450	1,872	1,859		1,866	76.2%
1981	2,698	2,164	2,149		2,157	79.9%
1982	3,029	2,502	2,481		2,492	82.3%
1983	3,821	3,179	3,151		3,165	82.8%
1984	4,883	4,043	3,997		4,020	82.3%
1985	5,981	5,138	5,066		5,102	85.3%
1986	7,588	6,533	6,414		6,474	85.3%
1987	8,981	7,553	7,416		7,485	83.3%
1988	10,725	8,730	8,527		8,629	80.5%
1989	14,171	11,096	10,740		10,918	77.0%
1990	17,881	14,108	12,547	13,785	13,785	77.1%
Total	$86,362	$69,940	$67,355	--	$69,109	80.0%
1989 & 1990	$32,052	$25,204	$23,287	--	$24,703	77.1%

Your Selected Ultimate Loss Amount:					$69,109	
	Ult.		Paid			
Indicated Loss Reserves Needed :	$69,109	-	$49,249	=	$19,860	
Company Booked Reserves:					$20,700	
Indicated Deficiency (Redundancy):					($840) or	-4.1%

ADDITIONAL INFORMATION

FROM DATA PROCESSING

WC INSURANCE COMPANY

Workers' Compensation Medical - Reported Claims

Acc. Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	4,191	4,779	4,859	4,899	4,924	4,939	4,950	4,960	4,971	4,975	4,980	4,985	4,990
1979	4,162	4,810	4,887	4,924	4,951	4,965	4,976	4,986	4,995	5,000	5,005	5,010	
1980	4,238	4,839	4,909	4,947	4,974	4,990	5,000	5,010	5,020	5,025	5,030		
1981	4,233	4,874	4,940	4,979	5,002	5,017	5,026	5,035	5,044	5,050			
1982	4,208	4,880	4,958	4,995	5,023	5,039	5,049	5,059	5,070				
1983	4,729	5,405	5,487	5,530	5,554	5,570	5,581	5,593					
1984	5,223	5,983	6,063	6,109	6,138	6,158	6,171						
1985	5,777	6,604	6,696	6,751	6,787	6,809							
1986	6,249	7,282	7,402	7,463	7,505								
1987	6,378	7,324	7,447	7,505									
1988	6,358	7,364	7,482										
1989	7,067	8,149											
1990	7,834												

Development Factors

Acc. Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156 to ult.
1978	1.140	1.017	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
1979	1.156	1.016	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001		
1980	1.142	1.014	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001			
1981	1.151	1.014	1.008	1.005	1.003	1.002	1.002	1.002	1.001				
1982	1.160	1.016	1.007	1.006	1.003	1.002	1.002	1.002					
1983	1.143	1.015	1.008	1.004	1.003	1.002	1.002						
1984	1.146	1.013	1.008	1.005	1.003	1.002							
1985	1.143	1.014	1.008	1.005	1.003								
1986	1.165	1.016	1.008	1.006									
1987	1.148	1.017	1.008										
1988	1.158	1.016											
1989	1.153												
<u>3-Yr Simple Average</u>													
	1.153	1.016	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>3-Yr Volume Weighted Average</u>													
	1.153	1.016	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>All Year Simple Average</u>													
	1.150	1.015	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>All Year Volume Weighted Average</u>													
	1.151	1.015	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	
<u>Selected Factors</u>													
	1.150	1.015	1.008	1.005	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	1.002
<u>Selected Cumulative Factors</u>													
	1.200	1.044	1.028	1.020	1.015	1.012	1.010	1.008	1.006	1.005	1.004	1.003	1.002

WC INSURANCE COMPANY *Exhibit VI-B*

Workers' Compensation Medical - Closed Claims

Accident Year	12	24	36	48	60	72	84	96	108	120	132	144	156
1978	2,447	4,109	4,401	4,599	4,668	4,742	4,793	4,832	4,874	4,895	4,917	4,934	4,950
1979	2,453	4,144	4,459	4,616	4,693	4,766	4,818	4,853	4,888	4,915	4,939	4,960	
1980	2,443	4,106	4,462	4,641	4,715	4,785	4,833	4,872	4,916	4,938	4,965		
1981	2,623	4,126	4,467	4,665	4,742	4,818	4,864	4,906	4,942	4,965			
1982	2,646	4,195	4,531	4,701	4,768	4,843	4,888	4,927	4,965				
1983	2,866	4,640	4,993	5,191	5,264	5,352	5,404	5,445					
1984	3,219	5,147	5,522	5,757	5,836	5,917	5,972						
1985	3,447	5,644	6,113	6,337	6,439	6,537							
1986	3,901	6,229	6,752	7,023	7,119								
1987	3,943	6,342	6,807	7,049									
1988	3,714	6,355	6,812										
1989	4,087	6,973											
1990	4,672												

Development Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156
1978	1.679	1.071	1.045	1.015	1.016	1.011	1.008	1.009	1.004	1.004	1.003	1.003
1979	1.689	1.076	1.035	1.017	1.016	1.011	1.007	1.007	1.006	1.005	1.004	
1980	1.681	1.087	1.040	1.016	1.015	1.010	1.008	1.009	1.004	1.005		
1981	1.573	1.083	1.044	1.017	1.016	1.010	1.009	1.007	1.005			
1982	1.585	1.080	1.038	1.014	1.016	1.009	1.008	1.008				
1983	1.619	1.076	1.040	1.014	1.017	1.010	1.008					
1984	1.599	1.073	1.043	1.014	1.014	1.009						
1985	1.637	1.083	1.037	1.016	1.015							
1986	1.597	1.084	1.040	1.014								
1987	1.608	1.073	1.036									
1988	1.711	1.072										
1989	1.706											
3-Yr Simple Average												
	1.675	1.076	1.038	1.015	1.015	1.009	1.008	1.008	1.005	1.005	1.004	1.003
3-Yr Volume Weighted Average												
	1.675	1.076	1.037	1.014	1.015	1.009	1.008	1.008	1.005	1.005	1.004	1.003
All Year Simple Average												
	1.640	1.078	1.040	1.015	1.016	1.010	1.008	1.008	1.005	1.005	1.004	1.003
All Year Volume Weighted Average												
	1.641	1.078	1.039	1.015	1.015	1.010	1.008	1.008	1.005	1.005	1.004	1.003

WC INSURANCE COMPANY *Exhibit VI-C*

Workers' Compensation Medical - Estimated Earned Exposures

(1) Acc. Year	(2) Estimated Exposures ($100 Payroll)
1978	$1,875,000
1979	$1,860,000
1980	$1,848,000
1981	$1,859,000
1982	$1,865,000
1983	$2,046,000
1984	$2,232,000
1985	$2,436,000
1986	$2,667,000
1987	$2,647,000
1988	$2,648,000
1989	$2,912,000
1990	$3,220,000

WC INSURANCE COMPANY ** YOUR ANALYSIS ** *Exhibit XI*

Workers' Compensation Medical - Average Claim Size Diagnostics

Acc. Year	Average Incurred Claim Size (Incurred Loss / Reported Claims) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	179	251	262	267	271	273	274	276	277	278	278	279	279
1979	208	285	299	306	311	313	315	317	318	319	320	321	
1980	243	329	344	353	359	361	363	365	366	367	368		
1981	265	379	397	406	412	415	417	419	420	422			
1982	304	436	456	467	473	477	480	482	484				
1983	356	501	525	535	544	548	552	554					
1984	424	582	605	617	626	631	634						
1985	495	665	694	711	721	725							
1986	564	768	799	816	828								
1987	664	887	920	938									
1988	712	1,014	1,056										
1989	846	1,163											
1990	961												

Acc. Year	Average Paid Claim Size (Paid Loss / Closed Claims) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	175	226	243	250	253	257	259	261	262	264	265	266	267
1979	186	250	273	286	289	294	297	300	301	303	305	306	
1980	217	305	321	331	335	340	343	345	346	349	350		
1981	221	345	366	378	382	389	392	395	398	401			
1982	281	395	421	435	440	448	453	456	459				
1983	337	450	480	503	509	515	521	524					
1984	348	505	551	573	582	593	599						
1985	444	586	637	662	674	682							
1986	501	674	725	758	772								
1987	575	768	837	875									
1988	702	884	969										
1989	800	1,038											
1990	856												

Acc. Year	Average Case Reserve (Case Reserve / Open Claims) 12	24	36	48	60	72	84	96	108	120	132	144	156
1978	185	403	450	540	602	660	732	836	990	1,113	1,270	1,912	2,308
1979	239	500	572	617	725	784	880	940	1,075	1,259	1,891	2,288	
1980	279	464	575	680	792	854	946	1,065	1,279	1,853	2,200		
1981	337	567	685	825	954	1,045	1,167	1,357	1,937	2,156			
1982	343	689	834	973	1,090	1,184	1,298	1,901	2,142				
1983	384	813	974	1,035	1,179	1,367	1,932	2,170					
1984	545	1,057	1,161	1,330	1,474	2,044	2,221						
1985	570	1,129	1,292	1,454	2,077	2,304							
1986	668	1,321	1,569	2,251	2,411								
1987	807	1,655	2,344	2,486									
1988	727	2,384	2,520										
1989	1,183	2,477											
1990	1,451												

NOTES FROM INTERVIEWS

WC INSURANCE COMPANY

Workers' Compensation - Medical

Notes from Interviews:

UNDERWRITING VICE PRESIDENT

1. The volume of the company's business has grown, but nothing too dramatic. They had a "mild" marketing push in the mid-1980's, and had started another one about 18 months ago. Most of the effort was geared toward referrals from their existing customers, so she finds it unlikely that the character of their overall business has changed very much.

2. Underwriting guidelines and training have remained relatively stable over the last several years. She would characterize the underwriting philosophy as "conservative."

3. Rates have been changed every year to keep up with inflation. Inflation in medical coverage has been atrocious, however, and sometimes hard to keep up with. The company generally follows the rating bureau's rating plan, but has actuarial consultants look over the plan changes every year to make sure the company is following a reasonable path.

CLAIMS VICE PRESIDENT

1. Claims management has been relatively stable over the past several years. Staffing has been able to keep up with claim volumes.

2. There have been no specific problems he can think of in the handling of claims. Claim sizes continue to go "through the roof," especially in medical coverage. Historically, it has been difficult to keep up with the increasing claim sizes.

3. He implemented a claims training program in late 1988. It focuses on pension-type (long term) cases. The main thrust of training was to be able to better take inflation into account when setting case reserves for long-term cases. Both indemnity, but especially medical reserves had been chronically under-reserved in the past.

ACTUARIAL CONSULTANTS

1. The company has very qualified management, and has been fairly stable over time.

2. Estimating reserves has always been relatively straightforward, except for the last couple of years on medical. Incurred and paid loss development estimates have begun to diverge.

3. The consultants have moved more toward believing the paid loss development estimates, because they suspect a change in case reserve adequacy. The company's booked reserves at year-end were based on the consultant's recommendations.

1991 CASUALTY LOSS RESERVE SEMINAR

INTERMEDIATE CASE STUDY

BACKGROUND INFORMATION FOR

XYZ INSURANCE COMPANY

XYZ Insurance Company is a stock insurance company writing only general liability policies. It has been in business for over 20 years and has had a very stable book of business; in fact, has continued to insure virtually the same group of insureds. The company appears to be well managed and has a healthy balance sheet (Exhibit I).

XYZ has a small actuarial staff headed by an actuarial student. The department calculates year end reserves using both paid and incurred loss development techniques. The staff supplements this analysis with the use of expected loss techniques if needed. Tail factor selections are based upon reviews of industry data as well as curve fits of selected loss development factors.

In previous years, paid and incurred loss projections were almost identical. Recently though, differences between the two estimates are emerging. The company carried reserves are based upon a straight average of the paid and incurred loss projection methods after application of expected loss techniques. The company's carried reserves, based upon the actuarial department's recommendations for 1990, are as follows:

	(000s)
Projected IBNR -Paid Estimate	$193,539
Projected IBNR -Incurred Estimate	202,644
Carried IBNR	$198,092

XYZ has employed you, a consulting actuary, to complete their 1990 reserve certification. You have been given the actuarial staff's analysis (Exhibits II through IX), and have been asked to critique their work, as well as to prepare the certification. To begin your review, you conduct interviews with all major insurance disciplines. The results of those discussions are outlined below:

Claims - Staffing and procedures have remained the same for as long as anyone can remember. Systems have not changed, and there have been no accounting or other changes that would have impacted year end processing.

Marketing - The client base is extremely stable. Growth has come primarily from increases in business from existing clients, as opposed to new clients. XYZ's clients represent almost all US distributors of XWidgets. Given the company's understanding of the product, and their sensible approach to pricing (small annual increases), they have captured and retained this market. These clients are expanding into other areas, generating the growth in premiums for XYZ Company.

Underwriting - The underwriting department is concerned about the deterioration in the loss ratio (including ALAE), from 82% in 1987 to 91% in 1990, on an accident year basis. They attribute at least part of the problem to the heavier GL exposures being accepted from their long-term clients. The Underwriting Department, with the help of the Actuarial staff, will be conducting separate rate analyses for heavy versus light GL later in the year. Reports by class of business have just been provided via an adhoc request from the Data Processing Department. Although the analysis has not yet been completed, the Underwriting Department suspects that heavy GL rates need to increase by more than the traditional 5% annual increase taken in previous years for total GL.

In all loss exhibits attached, loss data includes allocated loss adjustment expense.

Exhibit I

XYZ INSURANCE COMPANY

BALANCE SHEET @12/31/90
(in 000s)

ASSETS		LIABILITIES/SURPLUS	
Bonds	$265,084	Loss/LAE Reserves	$208,052
Stocks	$48,262	Unearned Premium Reserve	$84,196
Cash	$11,028	Other Liabilities	$24,965
	----------		----------
Total Invested Assets	$324,374	Total Liabilities	$317,213
Agents' Balances	$19,799	Policyholders' Surplus	$62,622
Other Assets	$35,662		----------

TOTAL ASSETS	$379,835	TOTAL LIABILITIES/SURPLUS	$379,835

KEY RATIOS:	SCORE	TEST RESULT
Premium to Surplus	2.69	PASS
Agents' Balances to Surplus	31.6%	PASS
Liabilities to Liquid Assets	97.8%	PASS
Change in Surplus	0.0%	PASS
Change in Writings	27.7%	PASS

XYZ INSURANCE COMPANY

Total GL - Paid Losses
(000's)

Accident Year	12	24	36	48	60	72	84	96	108	120	132
1980	1,340	3,188	5,072	6,973	8,677	10,008	11,802	12,606	13,174	13,596	14,033
1981	1,857	4,297	6,864	9,438	11,820	13,594	14,783	15,710	16,439	16,972	
1982	2,024	4,891	7,790	10,773	13,792	16,071	17,695	18,886	19,735		
1983	2,781	6,655	10,671	14,738	18,022	20,795	23,179	24,597			
1984	3,439	8,272	13,325	18,551	23,386	26,861	29,409				
1985	3,714	9,039	14,638	20,326	26,117	30,643					
1986	4,652	11,236	18,109	25,239	31,250						
1987	5,292	12,974	21,106	29,611							
1988	6,818	16,984	27,677								
1989	9,337	23,263									
1990	15,073										

Development Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
1980	2.379	1.591	1.375	1.244	1.153	1.179	1.068	1.045	1.032	1.032
1981	2.314	1.597	1.375	1.252	1.150	1.087	1.063	1.046	1.032	
1982	2.417	1.593	1.383	1.280	1.165	1.101	1.067	1.045		
1983	2.393	1.603	1.381	1.223	1.154	1.115	1.061			
1984	2.405	1.611	1.392	1.261	1.149	1.095				
1985	2.434	1.619	1.389	1.285	1.173					
1986	2.415	1.612	1.394	1.238						
1987	2.452	1.627	1.403							
1988	2.491	1.630								
1989	2.491									
1990										

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
<u>3-Yr Simple Average</u>	2.478	1.623	1.395	1.261	1.159	1.104	1.064	1.045	1.032	1.032
<u>3-Yr Volume Weighted Average</u>	2.482	1.624	1.396	1.259	1.160	1.103	1.064	1.045	1.032	1.032
<u>5-Yr Simple Average</u>	2.457	1.620	1.392	1.257	1.158	1.115	1.065	1.045	1.032	1.032
<u>Middle 3 of 5-yr Average</u>	2.459	1.619	1.392	1.260	1.156	1.104	1.065	1.045		
<u>All-yr Volume Weighted Average</u>	2.443	1.615	1.390	1.255	1.159	1.109	1.064	1.045	1.032	1.032
<u>Selected Factors</u>	2.491	1.623	1.395	1.261	1.152	1.104	1.065	1.045	1.032	1.032

Exhibit III

XYZ INSURANCE COMPANY
TOTAL GENERAL LIABILITY

ANALYSIS OF DEVELOPMENT PATTERNS
USING "THE METHOD OF LEAST SQUARES"

		Curve : Y = A^(B^X) (Power Model)				Curve : Y = 1 / [1 - EXP(-AX^B)] (Weibull)			
ACTUAL VALUES		TRANSFORMED VALUES		FITTED VALUES		TRANSFORMED VALUES		FITTED VALUES	
X	Y	X	LN[LN(Y)]			LN(X)	Double Log [Y/(Y-1)]		
X-VARIABLE DESCRIPTION	Y-VARIABLE DESCRIPTION	X'	Y'	X	Y	X'	Y'	X	Y
12	2.491	12.00	-0.09	108	1.034	2.48	-0.67	108	1.036
24	1.623	24.00	-0.73	120	1.023	3.18	-0.04	120	1.026
36	1.395	36.00	-1.10	132	1.016	3.58	0.23	132	1.019
48	1.261	48.00	-1.46	144	1.011	3.87	0.45	144	1.014
60	1.152	60.00	-1.96	156	1.007	4.09	0.71	156	1.010
72	1.104	72.00	-2.31	168	1.005	4.28	0.86	168	1.008
84	1.065	84.00	-2.77	180	1.003	4.43	1.03	180	1.006
96	1.045	96.00	-3.12	192	1.002	4.56	1.15	192	1.004
108	1.032	108.00	-3.46	204	1.002	4.68	1.25	204	1.003
120	1.032	120.00	-3.46	216	1.001	4.79	1.25	216	1.002
				228	1.001			228	1.002
SUM		660.00	-20.45	240	1.000	39.95	6.21	240	1.001
AVERAGE		66.00	-2.05	252	1.000	4.00	0.62	252	1.001
				264	1.000			264	1.001
FIT TAIL FROM	132			276	1.000			276	1.001
								276 to Ult	1.001

PARAMETER ESTIMATES (Power Model)		PARAMETER ESTIMATES (Weibull)	
N =	10.000	N =	10.000
A =	2.961	A =	0.061
B =	0.968	B =	0.857
R^2 =	0.984	R^2 =	0.996

FITTED TAIL FACTOR FROM 132 TO ULT 1.049

FITTED TAIL FACTOR FROM 132 TO ULT 1.075

XYZ INSURANCE COMPANY

Total GL – Incurred Losses
(000's)

Accident Year	12	24	36	48	60	72	84	96	108	120	132
1980	5,662	8,879	11,006	12,396	13,067	13,526	13,838	14,075	14,315	14,573	14,778
1981	6,975	10,897	13,556	15,303	16,271	16,861	17,252	17,565	17,883	18,208	
1982	8,345	13,012	16,304	18,417	19,507	20,224	20,677	21,077	21,465		
1983	10,652	17,073	21,391	23,978	25,469	26,443	27,073	27,550			
1984	13,647	21,807	27,086	30,684	32,600	33,807	34,584				
1985	15,549	24,872	31,261	35,432	37,460	38,965					
1986	18,260	29,200	36,605	41,696	44,488						
1987	22,029	35,312	44,500	50,322							
1988	28,730	46,297	58,061								
1989	39,637	64,628									
1990	55,297										

Development Factors

Accident Year	12–24	24–36	36–48	48–60	60–72	72–84	84–96	96–108	108–120	120–132
1980	1.568	1.240	1.126	1.054	1.035	1.023	1.017	1.017	1.018	1.014
1981	1.562	1.244	1.129	1.063	1.036	1.023	1.018	1.018	1.018	
1982	1.559	1.253	1.130	1.059	1.037	1.022	1.019	1.018		
1983	1.603	1.253	1.121	1.062	1.038	1.024	1.018			
1984	1.598	1.242	1.133	1.062	1.037	1.023				
1985	1.600	1.257	1.133	1.057	1.040					
1986	1.599	1.254	1.139	1.067						
1987	1.603	1.260	1.131							
1988	1.611	1.254								
1989	1.630									
1990										

	12–24	24–36	36–48	48–60	60–72	72–84	84–96	96–108	108–120	120–132
<u>3-Yr Simple Average</u>	1.615	1.256	1.134	1.062	1.038	1.023	1.018	1.018	1.018	1.014
<u>3-Yr Volume Weighted Average</u>	1.618	1.256	1.134	1.062	1.039	1.023	1.018	1.018	1.018	1.014
<u>5-Yr Simple Average</u>	1.609	1.253	1.131	1.061	1.038	1.023	1.018	1.018	1.018	1.014
<u>Middle 3 of 5-yr Average</u>	1.605	1.255	1.132	1.061	1.037	1.023	1.018	1.018		
<u>All-yr Volume Weighted Average</u>	1.605	1.253	1.131	1.062	1.038	1.023	1.018	1.018	1.018	1.014
<u>Selected Factors</u>	1.621	1.256	1.134	1.062	1.038	1.023	1.018	1.018	1.018	1.014

XYZ INSURANCE COMPANY
TOTAL GENERAL LIABILITY

ANALYSIS OF DEVELOPMENT PATTERNS
USING "THE METHOD OF LEAST SQUARES"

		Curve : Y = A^(B^X) (Power Model)				Curve : Y = 1 / [1 - EXP(-AX^B)] (Weibull)			
ACTUAL VALUES		TRANSFORMED VALUES		FITTED VALUES		TRANSFORMED VALUES		FITTED VALUES	
X	Y	X	LN[LN(Y)]			LN(X)	Double Log [Y/(Y-1)]		
X-VARIABLE DESCRIPTION	Y-VARIABLE DESCRIPTION	X'	Y'	X	Y	X'	Y'	X	Y
12	1.621	12.00	-0.73	108	1.012	2.48	-0.04	108	1.011
24	1.256	24.00	-1.48	120	1.008	3.18	0.46	120	1.008
36	1.134	36.00	-2.07	132	1.006	3.58	0.76	132	1.006
48	1.062	48.00	-2.81	144	1.004	3.87	1.04	144	1.004
60	1.038	60.00	-3.29	156	1.003	4.09	1.20	156	1.003
72	1.023	72.00	-3.78	168	1.002	4.28	1.33	168	1.002
84	1.018	84.00	-4.03	180	1.001	4.43	1.40	180	1.002
96	1.018	96.00	-4.03	192	1.001	4.56	1.40	192	1.001
108	1.018	108.00	-4.03	204	1.001	4.68	1.40	204	1.001
120	1.014	120.00	-4.28	216	1.000	4.79	1.45	216	1.001
				228	1.000			228	1.001
SUM		660.00	-30.52	240	1.000	39.95	10.40	240	1.000
AVERAGE		66.00	-3.05	252	1.000	4.00	1.04	252	1.000
				264	1.000			264	1.000
FIT TAIL FROM	132			276	1.000			276	1.000
								276 to Ult	1.001

PARAMETER ESTIMATES		PARAMETER ESTIMATES	
N =	10.000	N =	10.000
A =	1.484	A =	0.193
B =	0.968	B =	0.671
R^2 =	0.888	R^2 =	0.973

FITTED TAIL FACTOR FROM 132 TO ULT 1.018

FITTED TAIL FACTOR FROM 132 TO ULT 1.022

<u>TAIL FACTOR ESTIMATES</u> - Total GL
132 Months to Ultimate

	Paid	Incurred
Broader Data Sources		
Best's 1988	1.135	1.037
Bondy Method	1.032	1.014
Curve Fits		
Power Model	1.049 (R^2 = .984)	1.018 (R^2 = .888)
Weibull	1.075 (R^2 = .996)	1.022 (R^2 = .973)
SELECTED	1.075	1.025

XYZ INSURANCE COMPANY

Total GL

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Paid	Incurred						
Acc.	Earned	Losses	Losses	Cumulative LDF		Losses Developed to Ult.		Ultimate Loss Ratio	
Year	Premiums	@ 12/31/90	@ 12/31/90	Paid	Incurred	(Paid Est.)	(Inc. Est)	(Paid Est.)	(Inc. Est)
						(3)x(5)	(4)x(6)	(7)/(2)	(8)/(2)
1980	22,122	14,033	14,778	1.075	1.025	15,085	15,147	68.19%	68.47%
1981	26,474	16,972	18,208	1.109	1.039	18,822	18,918	71.10%	71.46%
1982	30,286	19,735	21,465	1.144	1.058	22,577	22,710	74.55%	74.99%
1983	37,741	24,597	27,550	1.195	1.077	29,393	29,671	77.88%	78.62%
1984	45,691	29,409	34,584	1.273	1.096	37,438	37,904	81.94%	82.96%
1985	50,562	30,643	38,965	1.405	1.121	43,053	43,680	85.15%	86.39%
1986	60,349	31,250	44,488	1.619	1.164	50,594	51,784	83.84%	85.81%
1987	75,972	29,611	50,322	2.042	1.236	60,466	62,198	79.59%	81.87%
1988	97,616	27,677	58,061	2.849	1.402	78,852	81,402	80.78%	83.39%
1989	131,861	23,263	64,628	4.624	1.761	107,568	113,810	81.58%	86.31%
1990	168,391	15,073	55,297	11.518	2.855	173,611	157,873	103.10%	93.75%
Total	747,065	262,263	428,346			637,459	635,097	85.33%	85.01%
1980–1988	446,813	223,927	308,421			356,280	363,414	79.74%	81.33%

APPLICATION OF BORNHUETTER-FERGUSON (B/F) TECHNIQUE

TOTAL GL

ACCIDENT YEAR 1989

Paid Estimate

(1)	Paid LDF = 4.624	
(2)	Earned Premiums = $131,861	
(3)	Expected Loss Ratio = 86%	
(4)	Paid Losses a/o 12/31/90 = $23,263	
(5)	Expected Losses = $113,400	(2) x (3)
(6)	Expected Unpaid Losses a/o 12/31/90 = $88,876	(5)x(1.0-(1.0/(1)))
(7)	Revised Ultimate Loss Projection = $112,138	(6)+(4)

Incurred Estimate

Application of B/F not necessary

APPLICATION OF BORNHUETTER-FERGUSON (B/F) TECHNIQUE

TOTAL GL

ACCIDENT YEAR 1990

Paid Estimate

(1)	Paid LDF = 11.518	
(2)	Earned Premiums = \$168,391	
(3)	Expected Loss Ratio = 90%	
(4)	Paid Losses a/o 12/31/90 = \$15,073	
(5)	Expected Losses = \$151,552	(2) x (3)
(6)	Expected Unpaid Losses a/o 12/31/90 = \$138,394	(5)x(1.0-(1.0/(1)))
(7)	Revised Ultimate Loss Projection = \$153,467	(6)+(4)

Incurred Estimate

(1)	Incurred LDF = 2.855	
(2)	Earned Premiums = \$168,391	
(3)	Expected Loss Ratio = 90%	
(4)	Incurred Losses a/o 12/31/90 = \$55,297	
(5)	Expected Losses = \$151,552	(2) x (3)
(6)	Expected Unreported Losses a/o 12/31/90 = \$98,469	(5)x(1.0-(1.0/(1)))
(7)	Revised Ultimate Loss Projection = \$153,766	(6)+(4)

Exhibit IX

XYZ INSURANCE COMPANY

Total GL

Acc. Year	Earned Premiums	Selected Ult. Losses (Paid Est.)	Selected Ult. Losses (Inc. Est)	Sel. Ult. Loss Ratio (Paid)	Sel. Ult. Loss Ratio (Inc.)	Required IBNR (Paid Est.)	Required IBNR (Inc. Est)
1980	22,122	15,085	15,147	68.19%	68.47%	307	369
1981	26,474	18,822	18,918	71.10%	71.46%	614	710
1982	30,286	22,577	22,710	74.55%	74.99%	1,112	1,245
1983	37,741	29,393	29,671	77.88%	78.62%	1,843	2,121
1984	45,691	37,438	37,904	81.94%	82.96%	2,854	3,320
1985	50,562	43,053	43,680	85.15%	86.39%	4,088	4,715
1986	60,349	50,594	51,784	83.84%	85.81%	6,106	7,296
1987	75,972	60,466	62,198	79.59%	81.87%	10,144	11,876
1988	97,616	78,852	81,402	80.78%	83.39%	20,791	23,341
1989	131,861	112,138	113,810	85.04%	86.31%	47,510	49,182
1990	168,391	153,467	153,766	91.14%	91.31%	98,170	98,469
Total	747,065	621,885	630,990	83.24%	84.46%	193,539	202,644
1980-1988	446,813	356,280	363,414	79.74%	81.33%	47,859	54,993

Exhibit X

XYZ INSURANCE COMPANY

EARNED PREMIUM

YEAR	TOTAL	HEAVY	LIGHT	% HEAVY
1980	22,122	192	21,930	0.9%
1981	26,474	822	25,652	3.1%
1982	30,286	2,499	27,787	8.3%
1983	37,741	5,101	32,640	13.5%
1984	45,691	9,987	35,704	21.9%
1985	50,562	12,065	38,497	23.9%
1986	60,349	15,174	45,175	25.1%
1987	75,972	22,537	53,435	29.7%
1988	97,616	35,455	62,161	36.3%
1989	131,861	59,999	71,862	45.5%
1990	168,391	86,337	82,054	51.3%
TOTAL	747,065	250,168	496,897	33.5%

XYZ INSURANCE COMPANY

Heavy GL - Paid Losses
(000's)

Accident Year	12	24	36	48	60	72	84	96	108	120	132
1980	11	29	49	71	91	108	120	130	137	142	148
1981	45	120	210	309	400	472	533	576	609	635	
1982	138	374	640	935	1,249	1,496	1,677	1,811	1,909		
1983	318	845	1,451	2,107	2,663	3,148	3,573	3,834			
1984	644	1,707	2,926	4,263	5,555	6,516	7,233				
1985	758	2,027	3,489	5,063	6,733	8,080					
1986	1,009	2,675	4,574	6,655	8,485						
1987	1,360	3,643	6,270	9,167							
1988	2,157	5,830	9,998								
1989	3,793	10,135									
1990	4,589										

Development Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
1980	2.636	1.690	1.449	1.282	1.187	1.111	1.083	1.054	1.036	1.042
1981	2.667	1.750	1.471	1.294	1.180	1.129	1.081	1.057	1.043	
1982	2.710	1.711	1.461	1.336	1.198	1.121	1.080	1.054		
1983	2.657	1.717	1.452	1.264	1.182	1.135	1.073			
1984	2.651	1.714	1.457	1.303	1.173	1.110				
1985	2.674	1.721	1.451	1.330	1.200					
1986	2.651	1.710	1.455	1.275						
1987	2.679	1.721	1.462							
1988	2.703	1.715								
1989	2.672									
1990										

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
3-Yr Simple Average	2.685	1.715	1.456	1.303	1.185	1.122	1.078	1.055	1.040	1.042
3-Yr Volume Weighted Average	2.682	1.716	1.457	1.300	1.187	1.119	1.076	1.055	1.042	1.042
5-Yr Simple Average	2.676	1.716	1.455	1.302	1.187	1.121	1.079	1.055	1.040	1.042
Middle 3 of 5-yr Average	2.675	1.717	1.455	1.303	1.187	1.120	1.081	1.054	-	-
All-yr Volume Weighted Average	2.676	1.716	1.457	1.298	1.187	1.119	1.076	1.055	1.042	1.042
Selected Factors	2.684	1.717	1.456	1.303	1.187	1.122	1.078	1.055	1.040	1.039

Exhibit XII

XYZ INSURANCE COMPANY
HEAVY GENERAL LIABILITY

ANALYSIS OF DEVELOPMENT PATTERNS
USING "THE METHOD OF LEAST SQUARES"

ACTUAL VALUES		Curve : Y = A^(B^X) (Power Model) TRANSFORMED VALUES		FITTED VALUES		Curve : Y = 1 / [1 - EXP(-AX^B)] (Weibull) TRANSFORMED VALUES		FITTED VALUES	
X	Y	X	LN[LN(Y)]			LN(X)	Double Log [Y/(Y-1)]		
X-VARIABLE DESCRIPTION	Y-VARIABLE DESCRIPTION	X'	Y'	X	Y	X'	Y'	X	Y
12	2.684	12.00	-0.01	108	1.042	2.48	-0.76	108	1.045
24	1.717	24.00	-0.62	120	1.029	3.18	-0.14	120	1.033
36	1.456	36.00	-0.98	132	1.020	3.58	0.15	132	1.024
48	1.303	48.00	-1.33	144	1.013	3.87	0.38	144	1.018
60	1.187	60.00	-1.76	156	1.009	4.09	0.61	156	1.013
72	1.122	72.00	-2.16	168	1.006	4.28	0.80	168	1.010
84	1.078	84.00	-2.59	180	1.004	4.43	0.97	180	1.007
96	1.055	96.00	-2.93	192	1.003	4.56	1.08	192	1.006
108	1.040	108.00	-3.24	204	1.002	4.68	1.18	204	1.004
120	1.039	120.00	-3.26	216	1.001	4.79	1.19	216	1.003
				228	1.001			228	1.002
SUM		660.00	-18.88	240	1.001	39.95	5.46	240	1.002
AVERAGE		66.00	-1.89	252	1.000	4.00	0.55	252	1.001
				264	1.000			264	1.001
FIT TAIL FROM	132			276	1.000			276	1.001
								276 to Ult	1.003

Power Model — PARAMETER ESTIMATES

N =	10.000
A =	3.246
B =	0.969
R^2 =	0.985

FITTED TAIL FACTOR FROM 132 TO ULT 1.064

Weibull — PARAMETER ESTIMATES

N =	10.000
A =	0.052
B =	0.875
R^2 =	0.996

FITTED TAIL FACTOR FROM 132 TO ULT 1.099

XYZ INSURANCE COMPANY

Heavy GL – Incurred Losses
(000's)

Accident Year	12	24	36	48	60	72	84	96	108	120	132
1980	50	85	110	127	135	141	145	149	152	155	158
1981	223	377	490	565	605	631	649	663	677	692	
1982	703	1,175	1,531	1,768	1,892	1,975	2,027	2,073	2,119		
1983	1,465	2,512	3,263	3,729	4,005	4,185	4,303	4,393			
1984	3,036	5,148	6,595	7,611	8,166	8,518	8,739				
1985	3,774	6,397	8,297	9,575	10,207	10,676					
1986	4,660	7,889	10,201	11,833	12,744						
1987	6,641	11,230	14,566	16,736							
1988	10,587	17,903	23,023								
1989	18,254	31,014									
1990	26,102										

Development Factors

Accident Year	12–24	24–36	36–48	48–60	60–72	72–84	84–96	96–108	108–120	120–132
1980	1.700	1.294	1.155	1.063	1.044	1.028	1.028	1.020	1.020	1.019
1981	1.691	1.300	1.153	1.071	1.043	1.029	1.022	1.021	1.022	
1982	1.671	1.303	1.155	1.070	1.044	1.026	1.023	1.022		
1983	1.715	1.299	1.143	1.074	1.045	1.028	1.021			
1984	1.696	1.281	1.154	1.073	1.043	1.026				
1985	1.695	1.297	1.154	1.066	1.046					
1986	1.693	1.293	1.160	1.077						
1987	1.691	1.297	1.149							
1988	1.691	1.286								
1989	1.699									
1990										

	12–24	24–36	36–48	48–60	60–72	72–84	84–96	96–108	108–120	120–132
3-Yr Simple Average	1.694	1.292	1.154	1.072	1.045	1.027	1.022	1.021	1.021	1.019
3-Yr Volume Weighted Average	1.695	1.291	1.154	1.072	1.045	1.027	1.021	1.022	1.022	1.109
5-Yr Simple Average	1.694	1.291	1.152	1.072	1.044	1.027	1.024	1.021	1.021	1.019
Middle 3 of 5-yr Average	1.693	1.292	1.152	1.072	1.044	1.027	1.023	1.021	-	-
All-yr Volume Weighted Average	1.695	1.291	1.153	1.072	1.045	1.027	1.022	1.022	1.022	1.019
Selected Factors	1.694	1.292	1.154	1.072	1.044	1.027	1.022	1.022	1.022	1.017

Exhibit XIV

XYZ INSURANCE COMPANY
HEAVY GENERAL LIABILITY

ANALYSIS OF DEVELOPMENT PATTERNS
USING "THE METHOD OF LEAST SQUARES"

ACTUAL VALUES

X X-VARIABLE DESCRIPTION	Y Y-VARIABLE DESCRIPTION
12	1.694
24	1.292
36	1.154
48	1.072
60	1.044
72	1.027
84	1.022
96	1.022
108	1.022
120	1.017
SUM	
AVERAGE	
FIT TAIL FROM	132

Curve : Y = A^(B^X)
(Power Model)

TRANSFORMED VALUES X X'	LN[LN(Y)] Y'	FITTED VALUES X	 Y
12.00	-0.64	108	1.015
24.00	-1.36	120	1.010
36.00	-1.94	132	1.007
48.00	-2.67	144	1.005
60.00	-3.15	156	1.003
72.00	-3.63	168	1.002
84.00	-3.83	180	1.002
96.00	-3.83	192	1.001
108.00	-3.83	204	1.001
120.00	-4.08	216	1.001
		228	1.000
660.00	-28.95	240	1.000
66.00	-2.89	252	1.000
		264	1.000
		276	1.000

PARAMETER ESTIMATES

N = 10.000
A = 1.540
B = 0.969

R^2 = 0.885

FITTED TAIL FACTOR FROM 132 TO ULT 1.023

Curve : Y = 1 / [1 - EXP(-AX^B)]
(Weibull)

TRANSFORMED VALUES LN(X) X'	Double Log [Y/(Y-1)] Y'	FITTED VALUES X	 Y
2.48	-0.11	108	1.014
3.18	0.40	120	1.010
3.58	0.70	132	1.007
3.87	0.99	144	1.005
4.09	1.15	156	1.004
4.28	1.29	168	1.003
4.43	1.35	180	1.002
4.56	1.35	192	1.002
4.68	1.35	204	1.001
4.79	1.41	216	1.001
		228	1.001
39.95	9.87	240	1.001
4.00	0.99	252	1.000
		264	1.000
		276	1.000
		276 to Ult	1.001

PARAMETER ESTIMATES

N = 10.000
A = 0.175
B = 0.683

R^2 = 0.971

FITTED TAIL FACTOR FROM 132 TO ULT 1.030

TAIL FACTOR ESTIMATES - **Heavy GL**
132 Months to Ultimate

	Paid	Incurred
Broader Data Sources	N/A (1.135 - all GL)	N/A (1.037 - all GL)
Bondy Method	1.039	1.017
Curve Fits		
Power Model	1.064 (R^2 = .985)	1.023 (R^2 = .885)
Weibull	1.099 (R^2 = .996)	1.030 (R^2 = .971)
SELECTED	1.100	1.030

XYZ INSURANCE COMPANY

Light GL - Paid Losses
(000's)

Accident Year	12	24	36	48	60	72	84	96	108	120	132
1980	1,329	3,159	5,023	6,902	8,586	9,900	11,682	12,476	13,037	13,454	13,885
1981	1,812	4,177	6,654	9,129	11,420	13,122	14,250	15,134	15,830	16,337	
1982	1,886	4,517	7,150	9,838	12,543	14,575	16,018	17,075	17,826		
1983	2,463	5,810	9,220	12,631	15,359	17,647	19,606	20,763			
1984	2,795	6,565	10,399	14,288	17,831	20,345	22,176				
1985	2,956	7,012	11,149	15,263	19,384	22,563					
1986	3,643	8,561	13,535	18,584	22,765						
1987	3,932	9,331	14,836	20,444							
1988	4,661	11,154	17,679								
1989	5,544	13,128									
1990	10,484										

Development Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
1980	2.377	1.590	1.374	1.244	1.153	1.180	1.068	1.045	1.032	1.032
1981	2.305	1.593	1.372	1.251	1.149	1.086	1.062	1.046	1.032	
1982	2.395	1.583	1.376	1.275	1.162	1.099	1.066	1.044		
1983	2.359	1.587	1.370	1.216	1.149	1.111	1.059			
1984	2.349	1.584	1.374	1.248	1.141	1.090				
1985	2.372	1.590	1.369	1.270	1.164					
1986	2.350	1.581	1.373	1.225						
1987	2.373	1.590	1.378							
1988	2.393	1.585								
1989	2.368									
1990										
<u>3-Yr Simple Average</u>	2.378	1.585	1.373	1.248	1.151	1.100	1.062	1.045	1.032	1.032
<u>3-Yr Volume Weighted Average</u>	2.378	1.585	1.374	1.246	1.152	1.100	1.062	1.045	1.032	1.032
<u>5-Yr Simple Average</u>	2.371	1.586	1.373	1.247	1.153	1.113	1.064	1.045	1.032	1.032
<u>Middle 3 of 5-yr Average</u>	2.371	1.586	1.372	1.248	1.153	1.100	1.064	1.045		
<u>All-yr Volume Weighted Average</u>	2.367	1.587	1.373	1.245	1.153	1.108	1.063	1.045	1.032	1.032
<u>Selected Factors</u>	2.378	1.601	1.358	1.248	1.153	1.100	1.064	1.045	1.032	1.032

Exhibit XVII

XYZ INSURANCE COMPANY
LIGHT GENERAL LIABILITY

ANALYSIS OF DEVELOPMENT PATTERNS
USING "THE METHOD OF LEAST SQUARES"

ACTUAL VALUES

	X	Y
	X-VARIABLE DESCRIPTION	Y-VARIABLE DESCRIPTION
	12	2.378
	24	1.601
	36	1.358
	48	1.248
	60	1.153
	72	1.100
	84	1.064
	96	1.045
	108	1.032
	120	1.032
SUM		
AVERAGE		
FIT TAIL FROM		132

Curve : Y = A^(B^X)
(Power Model)

	TRANSFORMED VALUES		FITTED VALUES	
	X	LN[LN(Y)]		
	X'	Y'	X	Y
	12.00	-0.14	108	1.034
	24.00	-0.75	120	1.023
	36.00	-1.18	132	1.016
	48.00	-1.51	144	1.011
	60.00	-1.95	156	1.007
	72.00	-2.35	168	1.005
	84.00	-2.78	180	1.003
	96.00	-3.12	192	1.002
	108.00	-3.46	204	1.002
	120.00	-3.46	216	1.001
			228	1.001
SUM	660.00	-20.71	240	1.001
AVERAGE	66.00	-2.07	252	1.000
			264	1.000
			276	1.000

PARAMETER ESTIMATES

N =	10.000
A =	2.769
B =	0.969
R^2 =	0.983

FITTED TAIL FACTOR FROM 132 TO ULT 1.050

Curve : Y = 1 / [1 - EXP(-AX^B)]
(Weibull)

	TRANSFORMED VALUES		FITTED VALUES	
	LN(X)	Double Log [Y/(Y-1)]		
	X'	Y'	X	Y
	2.48	-0.61	108	1.036
	3.18	-0.02	120	1.027
	3.58	0.29	132	1.020
	3.87	0.48	144	1.014
	4.09	0.70	156	1.011
	4.28	0.87	168	1.008
	4.43	1.03	180	1.006
	4.56	1.15	192	1.005
	4.68	1.25	204	1.003
	4.79	1.25	216	1.003
			228	1.002
SUM	39.95	6.39	240	1.002
AVERAGE	4.00	0.64	252	1.001
			264	1.001
			276	1.001
			276 to Ult	1.000

PARAMETER ESTIMATES

N =	10.000
A =	0.069
B =	0.830
R^2 =	0.997

FITTED TAIL FACTOR FROM 132 TO ULT 1.080

XYZ INSURANCE COMPANY

Light GL - Incurred Losses
(000's)

Accident Year	12	24	36	48	60	72	84	96	108	120	132
1980	5,612	8,794	10,896	12,269	12,932	13,385	13,693	13,926	14,163	14,418	14,620
1981	6,752	10,520	13,066	14,738	15,666	16,230	16,603	16,902	17,206	17,516	
1982	7,642	11,837	14,773	16,649	17,615	18,249	18,650	19,004	19,346		
1983	9,187	14,561	18,128	20,249	21,464	22,258	22,770	23,157			
1984	10,611	16,659	20,491	23,073	24,434	25,289	25,845				
1985	11,775	18,475	22,964	25,857	27,253	28,289					
1986	13,600	21,311	26,404	29,863	31,744						
1987	15,388	24,082	29,934	33,586							
1988	18,143	28,394	35,038								
1989	21,383	33,614									
1990	29,195										

Development Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
1980	1.567	1.239	1.126	1.054	1.035	1.023	1.017	1.017	1.018	1.014
1981	1.558	1.242	1.128	1.063	1.036	1.023	1.018	1.018	1.018	
1982	1.549	1.248	1.127	1.058	1.036	1.022	1.019	1.018		
1983	1.585	1.245	1.117	1.060	1.037	1.023	1.017			
1984	1.570	1.230	1.126	1.059	1.035	1.022				
1985	1.569	1.243	1.126	1.054	1.038					
1986	1.567	1.239	1.131	1.063						
1987	1.565	1.243	1.122							
1988	1.565	1.234								
1989	1.572									
1990										

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132
<u>3-Yr Simple Average</u>	1.567	1.239	1.126	1.059	1.037	1.022	1.018	1.018	1.018	1.014
<u>3-Yr Volume Weighted Average</u>	1.568	1.238	1.126	1.059	1.037	1.022	1.018	1.018	1.018	1.014
<u>5-Yr Simple Average</u>	1.568	1.238	1.124	1.059	1.036	1.023	1.018	1.018	1.018	1.014
<u>Middle 3 of 5-yr Average</u>	1.567	1.239	1.125	1.059	1.036	1.023	1.018	1.018		
<u>All-yr Volume Weighted Average</u>	1.568	1.24	1.125	1.059	1.036	1.023	1.018	1.018	1.018	1.014
<u>Selected Factors</u>	1.567	1.239	1.126	1.059	1.037	1.022	1.018	1.018	1.018	1.014

Exhibit XIX

XYZ INSURANCE COMPANY
LIGHT GENERAL LIABILITY

ANALYSIS OF DEVELOPMENT PATTERNS
USING "THE METHOD OF LEAST SQUARES"

ACTUAL VALUES		Curve : Y = A^(B^X) (Power Model) TRANSFORMED VALUES		FITTED VALUES		Curve : Y = 1 / [1 - EXP(-AX^B)] (Weibull) TRANSFORMED VALUES		FITTED VALUES	
X	Y	X	LN[LN(Y)]			LN(X)	Double Log [Y/(Y-1)]		
X-VARIABLE DESCRIPTION	Y-VARIABLE DESCRIPTION	X'	Y'	X	Y	X'	Y'	X	Y
12	1.567	12.00	-0.80	108	1.012	2.48	0.02	108	1.012
24	1.239	24.00	-1.54	120	1.008	3.18	0.50	120	1.008
36	1.126	36.00	-2.13	132	1.006	3.58	0.78	132	1.006
48	1.059	48.00	-2.86	144	1.004	3.87	1.06	144	1.005
60	1.037	60.00	-3.32	156	1.003	4.09	1.20	156	1.003
72	1.022	72.00	-3.83	168	1.002	4.28	1.35	168	1.003
84	1.018	84.00	-4.03	180	1.001	4.43	1.40	180	1.002
96	1.018	96.00	-4.03	192	1.001	4.56	1.40	192	1.002
108	1.018	108.00	-4.03	204	1.001	4.68	1.40	204	1.001
120	1.014	120.00	-4.28	216	1.000	4.79	1.45	216	1.001
				228	1.000			228	1.001
SUM		660.00	-30.83	240	1.000	39.95	10.55	240	1.001
AVERAGE		66.00	-3.08	252	1.000	4.00	1.05	252	1.000
				264	1.000			264	1.000
FIT TAIL FROM	132			276	1.000			276	1.000
								276 to Ult	1.001

Power Model — PARAMETER ESTIMATES

N =	10.000
A =	1.439
B =	0.969
R^2 =	0.884

FITTED TAIL FACTOR FROM 132 TO ULT 1.018

Weibull — PARAMETER ESTIMATES

N =	10.000
A =	0.218
B =	0.646
R^2 =	0.972

FITTED TAIL FACTOR FROM 132 TO ULT 1.026

<u>TAIL FACTOR ESTIMATES</u> - Light GL
132 Months to Ultimate

	Paid	Incurred
Broader Data Sources	N/A (1.135 - all GL)	N/A (1.037 - all GL)
Bondy Method	1.032	1.014
Curve Fits		
Power Model	1.050 (R^2 = .983)	1.018 (R^2 = .884)
Weibull	1.080 (R^2 = .997)	1.026 (R^2 = .972)
SELECTED	1.080	1.025

Exhibit XXIa

XYZ INSURANCE COMPANY

Heavy GL

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Acc. Year	Earned Premiums	Paid Losses @ 12/31/90	Incurred Losses @ 12/31/90	Cumulative LDF		Losses Developed to Ult.		Ultimate Loss Ratio	
				Paid	Incurred	(Paid Est.)	(Inc. Est)	(Paid Est.)	(Inc. Est)
						(3)x(5)	(4)x(6)	(7)/(2)	(8)/(2)
1980	192	148	158	1.100	1.030	163	163	84.90%	84.90%
1981	822	635	692	1.143	1.048	726	725	88.32%	88.20%
1982	2,499	1,909	2,119	1.189	1.071	2,270	2,269	90.84%	90.80%
1983	5,101	3,834	4,393	1.254	1.095	4,808	4,810	94.26%	94.30%
1984	9,987	7,233	8,739	1.352	1.119	9,779	9,779	97.92%	97.92%
1985	12,065	8,080	10,676	1.517	1.149	12,257	12,267	101.59%	101.67%
1986	15,174	8,485	12,744	1.801	1.200	15,281	15,293	100.71%	100.78%
1987	22,537	9,167	16,736	2.347	1.286	21,515	21,522	95.47%	95.50%
1988	35,455	9,998	23,023	3.417	1.484	34,163	34,166	96.36%	96.36%
1989	59,999	10,135	31,014	5.867	1.917	59,462	59,454	99.10%	99.09%
1990	86,337	4,589	26,102	15.747	3.247	72,263	84,753	83.70%	98.17%
Total	250,168	64,213	136,396			232,687	245,201	93.01%	98.01%
1980-1988	103,832	49,489	79,280			100,962	100,994	97.24%	97.27%

Exhibit XXIb

XYZ INSURANCE COMPANY

Light GL

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Paid	Incurred						
Acc.	Earned	Losses	Losses	Cumulative LDF		Losses Developed to Ult.		Ultimate Loss Ratio	
Year	Premiums	@ 12/31/90	@ 12/31/90	Paid	Incurred	(Paid Est.)	(Inc. Est)	(Paid Est.)	(Inc. Est)
						(3)x(5)	(4)x(6)	(7)/(2)	(8)/(2)
1980	21,930	13,885	14,620	1.080	1.025	14,996	14,985	68.38%	68.33%
1981	25,652	16,337	17,516	1.115	1.039	18,216	18,199	71.01%	70.95%
1982	27,787	17,826	19,346	1.151	1.058	20,518	20,468	73.84%	73.66%
1983	32,640	20,763	23,157	1.203	1.077	24,978	24,940	76.53%	76.41%
1984	35,704	22,176	25,845	1.280	1.096	28,385	28,326	79.50%	79.34%
1985	38,497	22,563	28,289	1.408	1.120	31,769	31,684	82.52%	82.30%
1986	45,175	22,765	31,744	1.623	1.161	36,948	36,855	81.79%	81.58%
1987	53,435	20,444	33,586	2.026	1.229	41,420	41,277	77.51%	77.25%
1988	62,161	17,679	35,038	2.751	1.384	48,635	48,493	78.24%	78.01%
1989	71,862	13,128	33,614	4.404	1.715	57,816	57,648	80.45%	80.22%
1990	82,054	10,484	29,195	10.473	2.687	109,799	78,447	133.81%	95.60%
Total	496,897	198,050	291,950			433,480	401,322	87.24%	80.77%
1980-1988	342,981	174,438	229,141			265,865	265,227	77.52%	77.33%

XYZ INSURANCE COMPANY

Heavy + Light

Acc. Year	Earned Premiums	Paid Losses @ 12/31/90	Incurred Losses @ 12/31/90	Losses Developed to Ult. (Paid Est.)	Losses Developed to Ult. (Inc. Est)	Ultimate Loss Ratio (Paid Est.)	Ultimate Loss Ratio (Inc. Est)
1980	22,122	14,033	14,778	15,159	15,148	68.52%	68.47%
1981	26,474	16,972	18,208	18,942	18,924	71.55%	71.48%
1982	30,286	19,735	21,465	22,788	22,737	75.24%	75.07%
1983	37,741	24,597	27,550	29,786	29,750	78.92%	78.83%
1984	45,691	29,409	34,584	38,164	38,105	83.53%	83.40%
1985	50,562	30,643	38,965	44,026	43,951	87.07%	86.92%
1986	60,349	31,250	44,488	52,229	52,148	86.54%	86.41%
1987	75,972	29,611	50,322	62,935	62,799	82.84%	82.66%
1988	97,616	27,677	58,061	82,798	82,659	84.82%	84.68%
1989	131,861	23,263	64,628	117,278	117,102	88.94%	88.81%
1990	168,391	15,073	55,297	182,062	163,200	108.12%	96.92%
Total	747,065	262,263	428,346	666,167	646,523	89.17%	86.54%
1980–1988	446,813	223,927	308,421	366,827	366,221	82.10%	81.96%

APPLICATION OF BORNHUETTER-FERGUSON (B/F) TECHNIQUE

HEAVY GL

ACCIDENT YEARS 1988 and 1989

Paid Estimate/Incurred Estimate

Application of B/F not necessary.
Incurred LDF's are low and paid results
are very close to incurred results.

ACCIDENT YEAR 1990

Paid Estimate

(1) Paid LDF = 15.747

(2) Earned Premiums = $86,337

(3) Expected Loss Ratio = 102%

(4) Paid Losses a/o 12/31/90 = $4,589

(5) Expected Losses = $88,064 — (2) x (3)

(6) Expected Unpaid Losses a/o 12/31/90 = $82,472 — (5)x(1.0-(1.0/(1)))

(7) Revised Ultimate Loss Projection = $87,061 — (6)+(4)

Incurred Estimate

(1) Incurred LDF = 3.247

(2) Earned Premiums = $86,337

(3) Expected Loss Ratio = 102%

(4) Incurred Losses a/o 12/31/90 = $26,102

(5) Expected Losses = $88,064 — (2) x (3)

(6) Expected Unreported Losses a/o 12/31/90 = $60,942 — (5)x(1.0-(1.0/(1)))

(7) Revised Ultimate Loss Projection = $87,044 — (6)+(4)

APPLICATION OF BORNHUETTER-FERGUSON (B/F) TECHNIQUE

LIGHT GL

ACCIDENT YEAR 1989

Paid Estimate/Incurred Estimate

Application of B/F not necessary.
Incurred LDF is low and paid result
is very close to incurred result.

ACCIDENT YEAR 1990

Paid Estimate

(1)	Paid LDF = 10.473	
(2)	Earned Premiums = \$82,054	
(3)	Expected Loss Ratio = 83.5%	
(4)	Paid Losses a/o 12/31/90 = \$10,484	
(5)	Expected Losses = \$68,515	(2) x (3)
(6)	Expected Unpaid Losses a/o 12/31/90 = \$61,973	(5)x(1.0–(1.0/(1)))
(7)	Revised Ultimate Loss Projection = \$72,457	(6)+(4)

Incurred Estimate

(1)	Incurred LDF = 2.687	
(2)	Earned Premiums = \$82,054	
(3)	Expected Loss Ratio = 83.5%	
(4)	Incurred Losses a/o 12/31/90 = \$29,195	
(5)	Expected Losses = \$68,515	(2) x (3)
(6)	Expected Unreported Losses a/o 12/31/90 = \$43,016	(5)x(1.0–(1.0/(1)))
(7)	Revised Ultimate Loss Projection = \$72,211	(6)+(4)

Exhibit XXIIIa

XYZ INSURANCE COMPANY

Heavy GL

Acc. Year	Earned Premiums	Selected Ult. Losses (Paid Est.)	Selected Ult. Losses (Inc. Est)	Sel. Ult. Loss Ratio (Paid)	Sel. Ult. Loss Ratio (Inc.)	Required IBNR (Paid Est.)	Required IBNR (Inc. Est)
1980	192	163	163	84.90%	84.90%	5	5
1981	822	726	725	88.32%	88.20%	34	33
1982	2,499	2,270	2,269	90.84%	90.80%	151	150
1983	5,101	4,808	4,810	94.26%	94.30%	415	417
1984	9,987	9,779	9,779	97.92%	97.92%	1,040	1,040
1985	12,065	12,257	12,267	101.59%	101.67%	1,581	1,591
1986	15,174	15,281	15,293	100.71%	100.78%	2,537	2,549
1987	22,537	21,515	21,522	95.47%	95.50%	4,779	4,786
1988	35,455	34,163	34,166	96.36%	96.36%	11,140	11,143
1989	59,999	59,462	59,454	99.10%	99.09%	28,448	28,440
1990	86,337	87,061	87,044	100.84%	100.82%	60,959	60,942
Total	250,168	247,485	247,492	98.93%	98.93%	111,089	111,096
1980–1988	103,832	100,962	100,994	97.24%	97.27%	21,682	21,714

Exhibit XXIIIb

XYZ INSURANCE COMPANY

Light GL

Acc.	Earned	Selected Ult. Losses		Sel. Ult. Loss Ratio		Required IBNR	
Year	Premiums	(Paid Est.)	(Inc. Est)	(Paid)	(Inc.)	(Paid Est.)	(Inc. Est)
1980	21,930	14,996	14,985	68.38%	68.33%	376	365
1981	25,652	18,216	18,199	71.01%	70.95%	700	683
1982	27,787	20,518	20,468	73.84%	73.66%	1,172	1,122
1983	32,640	24,978	24,940	76.53%	76.41%	1,821	1,783
1984	35,704	28,385	28,326	79.50%	79.34%	2,540	2,481
1985	38,497	31,769	31,684	82.52%	82.30%	3,480	3,395
1986	45,175	36,948	36,855	81.79%	81.58%	5,204	5,111
1987	53,435	41,420	41,277	77.51%	77.25%	7,834	7,691
1988	62,161	48,635	48,493	78.24%	78.01%	13,597	13,455
1989	71,862	57,816	57,648	80.45%	80.22%	24,202	24,034
1990	82,054	72,457	72,211	88.30%	88.00%	43,262	43,016
Total	496,897	396,138	395,086	79.72%	79.51%	104,188	103,136
1980-1988	342,981	265,865	265,227	77.52%	77.33%	36,724	36,086

Exhibit XXIIIc

XYZ INSURANCE COMPANY

Heavy + Light

Acc. Year	Earned Premiums	Selected Ult. Losses (Paid Est.)	Selected Ult. Losses (Inc. Est)	Sel. Ult. Loss Ratio (Paid)	Sel. Ult. Loss Ratio (Inc.)	Required IBNR (Paid Est.)	Required IBNR (Inc. Est)
1980	22,122	15,159	15,148	68.52%	68.47%	381	370
1981	26,474	18,942	18,924	71.55%	71.48%	734	716
1982	30,286	22,788	22,737	75.24%	75.07%	1,323	1,272
1983	37,741	29,786	29,750	78.92%	78.83%	2,236	2,200
1984	45,691	38,164	38,105	83.53%	83.40%	3,580	3,521
1985	50,562	44,026	43,951	87.07%	86.92%	5,061	4,986
1986	60,349	52,229	52,148	86.54%	86.41%	7,741	7,660
1987	75,972	`2,935	62,799	82.84%	82.66%	12,613	12,477
1988	97,616	82,798	82,659	84.82%	84.68%	24,737	24,598
1989	131,861	117,278	117,102	88.94%	88.81%	52,650	52,474
1990	168,391	159,518	159,255	94.73%	94.57%	104,221	103,958
Total	747,065	643,623	642,578	86.15%	86.01%	215,277	214,232
1980-1988	446,813	366,827	366,221	82.10%	81.96%	58,406	57,800

XYZ INSURANCE COMPANY

SUMMARY OF IBNR ESTIMATES (000s)

	Paid Est.	Inc. Est
Total GL	$193,539	$202,644
Sum of Components	$215,277	$214,232

Carried IBNR Reserves*	$198,092
Indicated Deficiency*	$16,663

* Average of paid and incurred estimates

Exhibit XXV

XYZ INSURANCE COMPANY

RESTATED BALANCE SHEET @12/31/90
(in 000s)

ASSETS		LIABILITIES/SURPLUS	
Bonds	$265,084	Loss/LAE Reserves	$224,715
Stocks	$48,262	Unearned Premium Reserve	$84,196
Cash	$11,028	Other Liabilities	$24,965
Total Invested Assets	$324,374	Total Liabilities	$333,876
Agents' Balances	$19,799	Policyholders' Surplus	$45,959
Other Assets	$35,662		
TOTAL ASSETS	$379,835	TOTAL LIABILITIES/SURPLUS	$379,835

KEY RATIOS:	SCORE	TEST RESULT
Premium to Surplus	3.66	FAIL
Agents' Balances to Surplus	43.1%	FAIL
Liabilities to Liquid Assets	102.9%	PASS
Change in Surplus	-26.6%	FAIL
Change in Writings	27.7%	PASS

1991 CASUALTY LOSS RESERVE SEMINAR

6E: RESERVING FOR ENVIRONMENTAL CLAIMS

Moderator

Amy S. Bouska
Tillinghast/Towers Perrin

Panel

William P. Gulledge

Douglas L. Talley
Risk International Services, Inc.

Recorder

Elena D. Mohler
Tillinghast/Towers Perrin

MS. BOUSKA: Before we start, we need to make two points clear: The first is that statements by a member of the panel or by someone asking a question should be considered to be a matter of personal opinion or personal curiosity, not reflecting the views of their employer or clients. Second: Although the panel title says "Environmental Claims," this is not always a well-defined term. In general, we will not be dealing with asbestos, or with sudden and accidental claims (such as spills caused by transportation accidents), or with intended coverage. Generally, we will be dealing with cases — usually at waste sites — where coverage is being sought but the insurer says none was intended.

There are three panelists today: The first speaker will be Doug Talley. Doug is Assistant Vice President and Counsel for Risk International, an independent professional services firm, addressing the risk management needs of companies of all sizes. He was formerly a litigator in private legal practice, but for the last four years he has focused on obtaining insurance recoveries for environmental and toxic tort liabilities. He received his BFA from Bowling Green State University and his JD from the University of Akron. According to our registration material, most of you are from insurance companies, so this is your chance to gain some insight into the other side of the coverage disputes.

The second speaker will be Bill Gulledge. Bill is an independent environmental and management consultant. Formerly at Front Royal, he developed and administered their pollution liability program, with an emphasis on underground storage tanks. Before joining Front Royal, he was Associate Director of the Chemical Manufacturers' Association in charge of environmental programs, and a Senior Environmental Engineer with the Department of Energy. He received his BA and MS from American University.

I am the last panelist. I'm Amy Bouska, an Actuary and Principal with Tillinghast, a Towers Perrin company in their Arlington office. I am the coordinator of Tillinghast's National Environmental Specialty Group. I have been working in the pollution area since 1984. My degrees came from the University of Nebraska at Lincoln, Duke and Virginia Tech.

All of us encourage questions. We are eager to have this be interactive; however, because you have to use the microphone, we would prefer to save the interaction until the end. So keep a piece of paper handy, write the questions down, and be ready to ask them at the end.

MR. TALLEY: Can everybody hear me well enough? With this mike you can take the boy out of the courtroom, but you can't take the courtroom out of the boy...and I'm used to standing up and moving around when I address an assembly like this.

Amy and I had conferred a little bit before the meeting here, and we had speculated that there might be a mix of policyholders and insurance carriers and certainly I welcome that opportunity. We were surprised to find out how much of the audience really are representatives of insurance carriers. And I welcome that opportunity as well. I think that the perspective that I bring to this meeting is one that you might benefit from, and that is, the perspective that the policyholder has, a typical policyholder has, in addressing, managing, and dealing with an environmental liability that may face his company.

I'll focus primarily upon Superfund liabilities. There are a number of claims now, before the courts, addressing other kinds of liabilities. For example, those that are found under RCRA, another environmental compliance regulation, and the case law isn't particularly well defined as to whether or not those kinds of liabilities constitute claims. We have considerable more case law with regard to Superfund liabilities and I'll address those primarily.

Superfund was enacted in 1980 as the Comprehensive Environmental Response Compensation and Liability Act. And it was a result of the public attention that Love Canal drew and the problem associated with orphan waste sites, hazardous waste sites that were abandoned, and the problems that they create and how clean up of those waste sites are addressed. And it was quite a surprise, I think, to the manufacturing community and subsequently to their insurance carriers as to how that liability operated, because it created liability for what was in the past, legal, lawful waste disposal practice.

A good example is the Hardage Waste Site in Oklahoma. That is a Superfund site listed on the National Priority List. It's a fairly large site and it was the only licensed hazardous waste disposal facility in the entire state of Oklahoma and the generators that are connected to that site and now have potential responsibility for that site were all obeying the law when they sent their waste to that particular facility. In fact, they had no alternative but to send their waste to that facility. Years later, in 1980, what was formerly a lawful practice has now become the subject of a civil liability.

And it gives rise to an irony. I have a cartoon, I think, that illustrates it to some extent. I hope you can see it. It is a carton of two rats living in their home. And the first says to the second, "Clean it up? Clean it up? Criminee, it's supposed to be a rathole." We have changed our perspective quite a bit as to the responsibility for hazardous waste management, and what was state of the art, even ten years ago, is now essentially illegal. And the Hardage Waste Site is a good example of that.

I think that it is important for the insurance community to understand the issues that face their policyholders. You have a good faith obligation to respond to your coverage obligations under your policies. And so it is helpful to understand where your policyholder is coming from when he begins to address Superfund liability.

Well, Superfund imposes liability principally upon four parties; current owners and operators of a hazardous waste facility, and the prior owners and operators of a hazardous waste facility that were owning or operating the facility when hazardous waste disposal occurred. The third category is probably by far the most numerous category of responsible parties which is the category of generators, those who have arranged for disposal of their hazardous waste at a third party site or facility. Finally, those who accepted hazardous waste to transport it to a facility are also potentially liable as transporters of that waste under Superfund.

Now the liability that becomes attached, to the four parties that we've identified here, is a liability that has been determined by the courts. The statute itself did not set the standard of liability in the statute and the courts quickly determined, based upon the wording of the statute, that liability should be imposed upon a responsible party without regard to fault, without regard to negligence, without regard to any mishandling or mistreatment of the hazardous waste.

All that the court has to do to impose liability upon a generator or transporter is to establish, basically, three or four elements. One is that a generator send hazardous waste to the facility. Now a hazardous waste has a fairly complicated definition and there's a wide range of chemicals that fall within the definition. If a generator has sent a hazardous substance to the site, and there has occurred at that site a release of a hazardous substance...it doesn't have to be the same substance...it can be a material that some other generator transported to that site, but if there has been a release at the site and if the government or some other party has incurred a response cost to remedy that release, then Superfund liability attaches. And it attaches without any strict proof.

When I was first in practice I became heavily involved in defending these actions against the U.S. Government. And it was mind boggling, to a defense lawyer, to realize that the generator had very little to argue. In one case, particularly, the client had contracted to send his waste to Cleveland. It ended up though, instead, in Cincinnati and ended up on property that became a Superfund site. Well, the contract that that party had didn't shield it from Superfund liability, because it had a hazardous substance at the site, there were releases of hazardous materials at that site and response cost was incurred. And there was very little to litigate.

As a result, you'll see more and more, that the manufacturing community is not litigating these claims. They form defense efforts to talk about other substantive issues as to whether a remedy is required at the site, what is the government's settlement proposal, and how can the settlement proposal be brought down to a more reasonable number.

The liability is also joint and several. And what that means, simply, is where a particular harm occurs and you can not divide up who is responsible for the harm, then the liability is imposed upon every party for entire harm. So you may have twenty potentially responsible parties at the site, 20 PRPs at the site, and there is a ground water contamination problem composed of a number of chemicals that anyone of those parties may have sent to the site. It's impossible, literally, to determine what party is responsible for how much of the contamination. So the court imposes a joint and several liability. And what it means is that one party becomes responsible for the entire clean-up. I think current estimates are that the average Superfund site costs about 35 million dollars, between 25 and 35 million dollars to remedy. And the prospect that any one PRP alone may be responsible for that entire amount is a sobering thought. It's a sobering thought also for the insurance carrier that covered that PRP.

So, the liability is retroactive, even for what was formerly lawful activity. It's joint and several and it's strict. And it creates a real problem for the manufacturing industry.

Subsequently, it has created a real problem for the carriers as well because in order to finance remediation at these sights, the policyholders had to go to their comprehensive general liability carriers for help. And there is some basis for them to do that. Now, you may or may not be aware that there are a host of coverage issues that attend an environmental insurance claim. And I'm not going to go through all of them right now. We simply don't have time for that kind of detail. I do want to touch on a couple of them though that may have an impact upon you as you work and try to set reserves and try to understand the nature of this kind of liability.

I think a critical issue is to understand the defense, whether the clean-up costs, response costs of the Superfund site, are insurable damages. I would venture an opinion that I think that this issue is favoring the policyholder, as I speak today. There have been a number of decisions and I've noted them in the outline that has been provided, as some representative decisions. There are a couple federal circuits, particularly, the fourth circuit and the eighth circuit, which held that clean-up costs at a Superfund site are in the nature of complying with an injunction, and that, in complying with an injunction, the damages are equitable in nature, as opposed to legal damages...actual physical damage to a third party. In the past, there was a large body of case law, which held that there are no insurable damages, if you are being sued under a theory of injunction. For example, you've constructed a billboard and your neighbors asked you to take it down and you refused and then you are being sued under a theory of injunction to enforce dismantling of the billboard. That kind of action in the past has not been insurable. It really doesn't cause damage to a third party. You're just asked to perform an activity that otherwise you don't want to do.

Well, the Superfund statute really has created a hybrid between legal damages and equitable damages, because one of the primary enforcement mechanisms is to sue for injunction. The federal government will try to enjoin generators from leaving their waste at a site. It will force them to come and pick up that waste and perform other remedial activities at that site. There is no question that the nature of that act may be an injunction. On the other hand, there is also no question that the damages that result from the original disposal activity is actual physical damage to property, the property of others. It may be property of the commonwealth, property of the public and it may be natural resources. But there is no question that it is property damage. And property damage is typically defined in the CGL policy as physical injury to or destruction of tangible property during the policy period.

When you look at that relatively plain language you would think that if I have to go in and clean up ground water or clean up soil, at a third party site, that what I have is property damage, physical injury to property of someone else. It certainly is not my property. And so this issue triggered a host of cases which litigated this particular issue and I would say that most of the state courts exclusively favor the pro-insured position, which is that the government's property interest is sufficient to establish property damage or will satisfy the definition of property damage, according to the layman's understanding. And, therefore, the courts won't get bogged down in this technical legal argument, as to whether the damages are equitable or legal.

There is a fairly recent decision from the Supreme Court of California, which I think is going to have a lot of influence upon other courts across the country, which held that in California a policyholder suing its carrier for insurance coverage will be entitled to coverage for a Superfund claim, if there are no other policy defenses at issue. In other words, the insurers in California no longer have a threshold defense that CGL policies don't cover Superfund damages. California has ruled to the contrary and I imagine that we will probably see an increase in the amount of claims out of California as a result. More and more cases, I think, are following that line and I think that the carrier will still raise the argument, as a threshold argument, but without much persuasive force. I'm not involved in litigation anymore and I deal with carriers on a private basis. We try to negotiate settlement. We try to avoid litigation. But, I can almost guarantee that when I sit down with a carrier, for the first time, one of the issues that is raised is our policies just don't cover Superfund damages. Well, that is an argument that the insurers still can raise and they will raise it. I think that compared to some of the other policy defenses that the carriers may have it is a relatively weak one. However, it does have compromise value. It does have negotiation value. And from our end of the table, representing the policyholder, we recognize that and deal with it accordingly.

Another issue that comes up that will affect how you attempt to reserve these claims is the issue of trigger of coverage. For example, suppose you have a policyholder who is deposing of waste at a site over a twenty year period, let's say, 1960 to 1980 and then in 1989 receives a PRP letter, a letter issued under Section 104 of Superfund which says, the EPA has information that connects you to the site. The letter requires further information from your own records as to what you sent there. Several issues are raised for the policyholder initially. Well, what did I send there? And when did I send it? And what carriers do I put on notice of this potential claim? It may not be a claim at this point. It certainly is an occurrence and I have an obligation to notify my carriers, over a twenty year period, actually a thirty year period, from 1960 to 1989.

The courts have taken conflicting positions on this issue, just like all the other issues as well. And the pro-insured perspective would seem to be to maximize coverage, that is, the trigger of coverage that spans the entire problem period, from the date of first disposal to the date of discovery or notice from the U.S. Government or from the state government that there is a problem. And that would be a continuous trigger theory. A majority of courts would seem to hold that a portion of that theory is correct, that exposure or disposal is the trigger of coverage, that if you disposed of waste from 1960 to 1980, twenty years of coverage are at risk.

Now I sighted a case in your materials, the Continental case from the eighth circuit, which takes this position. Three years ago, the court said that was the majority view. It's hard to say if that still is the majority view, but what you want to understand is that a good many policyholders out there perceive that as being the majority view. And, therefore, they will attempt to engage all their carriers on the risk...in this hypothetical problem from 1960 to 1989...to discuss financing for the particular claim.

The pro-insurer perspective would seem to be that manifestation or discovery of the problem is the trigger. And that carrier on the risk, when the initial PRP letter comes in, would be the carrier to respond.

There are some benefits to the insurance carrier with that kind of trigger. The claims are coming in now and you have protections in your policies, an absolute pollution exclusion which would tend to negate coverage for this kind of clean-up. So a policyholder is generally looking to get a trigger prior to 1985, or prior to 1980 if they can. The insurance carrier normally will try to establish a trigger after 1985, after an absolute exclusion is in effect.

There are some troubles, though, with that particular approach for the insurance community. I think Amy may address that to some extent. But that is the problem that the carriers and the policyholders face with regard to allocating the trigger of coverage. Let's assume, the policyholder has two dozen different claims ranging in disposal periods from 1950 up to 1990 and has both a period of primary coverage and a period of self-insured coverage and in that self-insured coverage has aggregate deductibles. How can you begin to sort through all those claims and assign a value to them? And how will you know if you are going to be exhausting a self-insured aggregate retention in a particular policy year? I think that's the next wave of issues that we will face in this area.

Claims will be paid...some are being paid, suits are being won...so the carriers are paying out on these claims. So they have to reserve for them. And they are going to have to wrestle with the issue of the self-insured retention. But, that's next wave and I'd be happy to entertain some questions on that. We represent a number of policyholders with self-insured retentions and we have to reserve those losses for our clients and we can give you the benefit of our insights and how we are approaching them so that you can at least understand, again, the policyholder perspective.

I think early on there was a knee-jerk reaction of policyholders in trying to establish coverage for their claims to immediately file litigation. And there is an enormous amount of litigation across the country on the issue. That litigation has led to highly uncertain results for both the insurance community and the manufacturing community and there is a high degree of uncertainty as to who is going to win in any given case. I think after that initial wave of litigation, the manufacturing community has decided to take a more cost effective approach to this. They are more and more hesitant to charge right into litigation. They want to get a good feel themselves as to what the down side and the upside is of a particular coverage suit. And so what I'm finding is, in the work in which we are involved, is that the clients are hiring firms like ours to help them assess what the liabilities are, to put a handle on the amount that they may be exposed to, to try to reconstruct what the past coverage is if they can't find the policies, to evaluate their coverage, and to see what the possibilities are of obtaining recovery under those policies for the liabilities that they have. And so you have, I think, a fairly sophisticated approach of analyzing, first of all, what the issues are, what the percentages of recovery may be and then engaging the carriers in private discussions to try to reach a certain result, which I know from my experience, is something that the insurance community desires.

So what you'll have are policyholders, which will look for their strongest claims and look for their best coverage, and consider what jurisdiction an insurance coverage dispute might be brought in to analyze the strength of those claims and the strength of that coverage. They'll try to analyze the probable state law, which will apply...in whatever jurisdiction they may end up in, what the insurance carriers are involved and what their practice is in handling these kinds of claims. It's been my experience that some carriers encourage settlement, are very quick to engage in discussions and are very quick to try to get out. Other carriers resist and resist vehemently to the last possible defense. A lot of carriers are going under and so if there coverage gaps because of insolvencies it becomes an issue, not only for the policyholder but for other carriers as well, whether any stepdown provisions, in excess policies may apply.

So finally a cost benefit analysis is conducted and a conclusion is reached as to what is the feasibility of pursuing the carriers, maybe a particular carrier, maybe all the carriers. Now, whatever the decision is, I think that you can be confident that you will continue to see the claims. The insurance community has received, at first what was a favorable decision from the Michigan Supreme Court. The court found the pollution exclusion unambiguous and held that it bars coverage for any but sudden and accidental occurrences disposal where sudden has a temporal element. A release has to have happened within a brief period. And in that particular case, a two week period of waste release was deemed by the court to not be sudden enough. However, carriers will still face liabilities, for releases before the pollution exclusion was in effect, because in this country, generally, it didn't come into effect until 1970 at the earliest and usually not until 1971, 1972 or 1973. So you have a host of policies out there, which are still at risk. And you've got other states, which have taken a pro-policyholder view of pollution exclusion, as well.

If you are in Wisconsin, as opposed to Michigan, your standard pollution exclusion may not be worth very much and so a threshold battle becomes, what state law is going to apply to a particular claim. Now we're at the very beginning of an enormous problem. And there are a number of trial lawyers out there who are very good in representing the policyholders and obtaining results. And they take a very impassioned viewpoint of their policyholder's position.

I think that it is an issue that will ultimately be resolved, in large part, by compromise. Ultimately, I think, twenty or twenty-five years down the road that these environmental claims will be handled just like routine first party property claims are handled today. They'll be complicated. They'll be technical, to be sure, but the case law will be well developed enough that we will be able to assess what the potential exposure is to the carrier and to the policyholder.

Right at the moment though, we're in something of a different situation, when, I think, we can illustrate with a cartoon. If you can see it, it's a gunfight and it looks like one of those gunfighters has borne the bad end of a number of fights in the past. And his adversary says, "Make your move, Bart. If you're feeling lucky." To the extent that carriers and policyholders resort to litigation, they are relying, in a large part, upon the skills of their lawyers, but also, in a large part, on life, because there is a whole host of factors which you can not reasonably assess. It is my belief...the reason why I left private practice and am now involved in the line of work of trying to negotiate settlements...that reasonable people can sit at a table and put a value on these claims and reach an agreement on how they are to be funded.

I appreciate the opportunity to speak to you. I think Bill will have quite a bit to add to what I have already discussed, but particularly on the technical end of things. And if you have any questions, certainly I would be happy to entertain them.

MR. GULLEDGE: Let's see if we can do this with minimum disruptions so the sound system doesn't squeak. Okay. I'm still going to step on the cord, I just know it.

As you heard my name is Bill Gulledge. I am not an actuary and so you're going to get a little different perspective on the environmental issues, environmental claims, costs of compliance, and some things that I've experienced over the last fifteen years. My background is more on the technical side, so I've worked on actual clean-up plans on trying to develop pollution liability insurance programs. Over the last four years I've spent some time trying to bridge that gap between engineers and actuaries to get them a little bit closer together and improve the science of all this, if you will. I've also had a fair amount of experience with policy analysis and policy development on environmental legislation, federal legislation especially. So I'm going to talk a little bit today, also, about some things that I think are going to happen in the future. There's a lot of attention being paid to the waste disposal laws, Superfund and RCRA, but there are other happenings in the environmental area that we may see translated to new policy and new legislation.

So, first of all, let's talk about costs. What do I mean by costs of environmental liability? Well, I've divided it up into two big, broad categories -- is current operations...what you have got going on now and past operations. Now, for insurance companies, what I'm going to talk about today is some factors that you can think about, and identify some areas where you are going to get hit with costs. For you policyholders, I'm going to be doing the same thing, but I'm also going to provide a little bit of information concerning how do you manage your environmental risk. How can you do it a little bit better?

Let's talk about current operations first of all and I've broken it down into two categories...compliance costs and what I call risk reduction costs.

Compliance costs are pretty easy, straightforward. We've had those since the early 1970's and the first environmental legislation. The Clean Air Act of 1970, and the Federal Water Pollution Control Act of 1972 amended existing laws on the federal level. Back then, in the early '70s, we were concerned about smoke. We were concerned about sulfur dioxide. We were concerned about broad types of air pollutants. We were also concerned about water quality. Remember the river in Cleveland caught fire and everybody was concerned about water quality throughout the nation...surface water quality. What we weren't concerned about were toxics, groundwater, underground storage tanks, or any of those issues that are now current. They didn't even surface back then. They were not environmental legislation issues.
Compliance costs are those costs that you incur to comply with the environmental regulations, no matter where they are. They can vary significantly from state to state. Each state has the option of making the federal regulation more stringent. And that has happened a lot in the waste disposal area. It is going to happen more in the Clean Air Act, as the new Clean Air Act amendments are implemented.

Risk reduction costs. What are those? Well, they may not be related to compliance at all. They are sort of an off-shoot of compliance. If you are going to comply, yes you are reducing your environmental risk, but you can still be in compliance and still not be tremendously acceptable environmental risk depending on the operation and the site. And one thing that you have to learn, when you look at environmental legislation and regulations recognize that they are compromises. They were developed as political compromises and technically you may do something else to reduce risk that may not be related to compliance at all. I'm going to come back to this and give you some examples as I go on.

Let's talk about the second category, past operations. What do I mean by past operations? Those are things that, as you heard earlier, may have been acceptable fifteen, twenty, thirty years ago, but are no longer acceptable today. There is liability still associated with those past operations. CERCLA is the best example, Superfund. Everybody hates Superfund. I don't know anybody who really likes Superfund. It doesn't work for anybody, really. It's a compromise. It's a very cumbersome system. It is constantly being reviewed, but it's a reality and it costs a lot of money. That's an exposure for past operations. And third party liability...I've put that in past operations. Third party liability obviously pertains to current operations as well, but past operations is where the costs tend to go up on third party liability. I'm talking about toxic torts, as an example, somebody claiming they were damaged because they worked in a chemical facility, a chemical manufacturing facility for twenty years and now they've come down with cancer. Therefore, it is a problem. Or somebody...even a better example is somebody living in a community nearby and there is an increased rate of miscarriages or cancer of some sort in the community and they are claiming that they have been damaged by the chemical facility that has been in place in the last twenty years. A perfect example is the Mississippi River corridor in Louisiana, where there are some suits pending right now.

So those are some of the issues in a broad overview that I'm going to talk about. Let's go back to compliance now, specifically...talk about where are you getting hit? What are the rising costs of environmental compliance? How much is this beginning to cost? And why is that happening?

First of all, you have the first phenomenon. This has been known for a long time, but now we are seeing it confirmed, in terms of actual dollars being spent for capital expenditures and operation and maintenance to achieve compliance. It's removing the 95th to 99th percentile of pollutants. Not only are we moving into more exotic pollutants, but more and more substances that are coming under control, toxic pollutants. The Clean Air Act is a perfect example. We went from the regulation of five hazardous air pollutants to the regulation now of several hundred. But in doing that we have to remove 95 to 99% of that pollutant from a emission source. This pollutant removal orientation is happening all across the board in the environmental arena. And we find out that there is a certain level of expenditure associated with removing the first 90%. It's the next amount, when you get up into the 95th and 99th percentile that you get into the exponential cost to achieve compliance. And it's not just equipment. It could be product substitutions. It could be management programs that have to be instituted. It could be transaction and record keeping expenses. That's the other big phenomenon we've seen in the increase in compliance costs. People are having to hire staffs to keep up with environmental management and regulation. It is very, very complicated. There is stuff coming out in the Federal Register everyday. In addition, there are state regulations. Localities are instituting their own regulations.

So environmental compliance costs are rising just to keep up the increasing volume of environmental regulation. And then you've got law suits, transaction costs associated with law suits that are filed, positions that your own company may want to take, record keeping expenses are rising, and now we have community right to no know requirements. If you produce above a certain amount of a particular pollutant, you have to file a toxic release inventory form under Section 313 of CERCLA. If you do that then you've got to keep an annual inventory of the amount of the substance you are using and the amount of the substance you are releasing. It is a big record keeping expense.

We have complexity. Not only, as I mentioned, are we getting to the 95th and the 99th percentile, we've got complexity of regulations increasing as well. Now we're starting to see the multimedia impacts in the new legislation that they are trying to regulate. As an example, EPA may be trying to take care of problems experienced under the Clean Water Act by putting a provision in the Clean Air Act that may relate to water emissions. In this case, it happens to be Great Lakes pollution. They have sulfur dioxide or emissions from power plants that go into the Great Lakes and, where do you regulate these emissions? Are you going to regulate these under the Clean Water Act? No. Congress decided that the Clean Air Act was up for amendment this year so they put the provisions in it.

Emissions trading is a perfect example of the complexity. It is very, very complex and I'm going to use Southern California as an example. If some of you are from Southern California you are well aware of the ozone non-attainment problem in the South Coast Basin. It is very, very severe and they are talking about very stringent controls on their emissions down in the South Coast Air Quality District of Southern California. Well, emissions trading and buying and selling of credits, financial transactions, are becoming a big business down there. You buy a certain amount of pollution or the ability to pollute to a certain level and you trade it with somebody else who doesn't need it. Or in the case maybe you need the emission credits. You may be trying to put in a new process and you need to buy so many tons of SO2 or carbon dioxide or whatever the case may be. You may find somebody who has a surplus permitted amount and you change places. You buy and sell emission credits. It is a complex area of environmental management. You have to set a value for your emission credits. What's the value of your emission credit for certain pounds or tons per pollutant? It's a whole other stock or commodities market being created. You buy and sell emission credits. Put it on the market. What price do I get today? There are brokers that are doing this now and it is going to be an increasing phenomenon.

Well, there's no guarantee that you are going to reduce all major environmental risks by spending money on environmental compliance.

Compliance and risk don't translate real well. And politics play a role in it, as I mentioned. This is an example that I think everyone is familiar with or you might remember it. Times Beach, Missouri is what I'm going to talk about.

Times Beach, Missouri is a classic example of politics getting involved and risks not relating to compliance. Okay. You have Times Beach, Missouri. You have a guy out there, he goes out and sprays the roads with waste oil, used oil nowadays, not waste oil. Used oil...and the contains PCBs and some other substances. People don't like it, they start complaining and finally somebody finally blows the whistle. Okay.

In the meantime, President Reagan is sitting in the White House, having just got there, and all he can read about on page one of The New York Times and The Washington Post is "Pollution: Times Beach, Missouri/Cancer Risk." People are complaining. People are getting sick. We've got a big problem here. He calls in the current EPA administrator, Ann Gorsuch. I don't remember her other name. And she comes in, along with Rita Lavell...remember Rita...she went to prison...and Rita and Ann come in, sit down with Ronald Reagan and he says, I want to get Times Beach off page one. Period. No one really knows what the risks are out there. Reagan indicates in complying with CERCLA we've got to do something, but I want it off page one. So, Ann says, okay Mr. President, we'll come up with some alternatives and we'll get back to you in about a week. He says, no...like two days, tomorrow or something, you know. I want to see something. So they spend a couple of all-nighters over at EPA in the office of solid waste and the people that are responsible for Superfund and they come back and they say, okay Mr. President we have prepared a plan to evaluate the risk. We are going to sample everywhere, take all these core samples of the contaminated soils. We are going to find out really what the exposure is and then we are going to equate that exposure to true risk and we can tell everybody whether it is safe or not. Reagan goes, no, no, no, no...that's not going to get me off page one and Times Beach off page one. I want to know how we are going to do that, period. So finally one of the people from the office of solid waste speaks up and says, buy the town. Boom! What an idea! We're going to buy the town no matter what the environmental risk is and it'll disappear from page one. Guess what happened? They bought it. The federal government, all of us, bought Times Beach, Missouri, bought out the property holders... environmental risk was never entered into that picture. Never entered into that equation. It got it off of page one, but that's how you deal with some of these political pollutants. (Laughter) That's how you deal with some compliance issues. (Laughter) Okay, that wasn't a ringing endorsement of EPA or something like that, but you know.

Let me talk about environmental management to reduce risks. First of all, these are some things that we are beginning to see that may not relate to compliance. They do in a way, but not always. You find that there are specialized environmental management programs. The first category is property transaction assessments. I do a lot of these. I've done these in the past. I'm still doing a lot of these. And what happens is you have a buyer and a seller. It's usually the buyer who wants to know what the environmental risks are on a particular piece of property that he is evaluating that he's going to buy. And you do what is called a Phase One Environmental Assessment, which means you go out and walk around the property. You ask people a lot of questions. You examine the records on a local, state, and federal level related to that piece of property and you translate that to an environmental risk saying, well, we think this is here and this is here and by the way may be you need to drill some holes out here based on the results of our Phase One Assessment. But Phase I environmental assessments are becoming common place with banks that are looking at mortgages for commercial operations. And I'm working with a group right now that it working on developing a standard for doing property transaction assessments for environmental exposures. This is still a very new area, development of a standard so that everybody does Phase I assessments the same way and there's consistency across the board. Then you can measure environmental risk using this information.

Specialty compliance audits. Those are audits that are done on very specific issues. It could be a waste disposal operation. It could be hazardous waste removal. It could be the fact that you are a generator and you send your waste off site. You want to audit the transporter that is taking your waste. You may want to audit where the waste is going and take a look at that particular operation. Waste disposal audits are fairly commonplace. That may be the only thing that you are worried about, so you don't do a full blown environmental audit, you just do that particular specific application.

Pollution prevention and waste minimization audits are becoming more and more commonplace among manufacturing concerns of all sizes, from small to much larger. They are looking at a way to actually get rid of the exposure or reduce the total exposure up front rather than have an environmental risk. It could be an on-site risk or an off-site risk that they are a little worried about. They could be in perfect compliance today, but they are now going beyond compliance and are looking at pollution prevention. They know there's going to be pollution prevention requirements in the future so they are looking at it from a go-forward basis.

You have environment, health and safety reviews. These were usually done separately. You have, especially for large manufacturing operations, separate departments; one environment, one safety, one health. Nowadays people are looking at this organization because the regulations are getting so complex and they all interrelate. People are looking at managing these risks in terms of one entity. We'll do environment, health and safety reviews all at once, all in one entity. And what that means is you have to have project management, an overall team leader, who is a good manager and can get audit information and get his team out there. He is supplemented by team specialists in different areas. The guy who knows about public safety and the guy who knows about worker safety is not going to be the same guy who knows about environmental exposures in most cases. They haven't been trained the same way. But you need both of those disciplines on your team. And so this is becoming more commonplace as you look at manufacturing facilities or even commercial establishments that are doing whole environment, health and safety reviews.

Green audits. New phenomenon. In Canada and in Europe, you can get green seals on your products that you produce or on some service that you offer. It means that you are ecologically clean and approved and biodegradable and all that good stuff. Well, people are auditing that now. They're talking about how do you audit this particular function because you can go out and see how well you're complying or well how well you are achieving the green seal of approval of the regulatory authority that may be involved. We don't have that much in the United States yet, but it is very commonplace up in Canada and over in Europe.

And finally environmental management audits. These are becoming a kind of audit on a macro level. It could be a large corporation that has many, many different operating divisions and many different properties and types of properties. Most likely they are producing many different products. They are going to ask how effective is our environmental management program in terms of identifying environmental risk? Taking care of problems? Complying with all environmental laws and regulations? Complying with corporate policies and goals that we created in the environment, health and safety area? You can audit that whole function and there is a whole protocol that is being developed by the Institute for Environmental Auditing related to environmental management program auditing. Again, a standard is being worked on and established in this area.

Certification and training of auditors is becoming a larger issue. The environmental profession is not as well advanced as actuaries or CPAs or any of that. We just don't have that kind of a program in place yet. So in retaining an individual, you really have to be careful of their credentials and their experience and what they're doing. Many states now are talking about certifying environmental auditors, and having continuing education training programs. There are a number of professional associations that are looking at certification. Certification does help the profession...does help our profession, in terms of making it more credible, in making the results, I think, a little bit more consistent across the board...the level of quality of environmental work a little bit more consistent across the board.

Okay. Let me skip down to insurance. I'm going to come back to costs. Briefly, let me mention insurance other than underground storage tanks. That's a separate issue. I'm going to hit that a little bit later. Insurance for environmental risks has been very limited. I'm talking about on-site disposal coverage. Third party liability coverage has been more available in the past, but insuring on-site damages is very, very limited. AIG has been a big player in this area for several years and it still is a big player and you can still purchase coverage from the American International Group, AIG.

The other group that has been involved is Reliance National. Reliance through ECS, Environmental Compliance Services, in Downington, Pennsylvania has offered on-site disposal coverage. And it is now available as well. There are a number of smaller, new companies that are getting involved with property transaction coverages. In other words, remember that audit that I talked about, property transaction audit, there are some companies that are talking about insuring the results of that property transaction audit. Hartford Steam Boiler is one company that has been examining it real closely. They happen to own Radian Corporation, which is a big environmental consulting group. And so if Radian does the work than Hartford Steam Boiler will insure the results of the work.

First Environmental out in California has been a group that's just offering this coverage for specific, unique situations. But by and large, most of the coverages that have been available have been for underground storage tanks. That is because there have been government requirements in that particular area.

Let me talk about timing and cost of pollution events quickly. I've identified, on this particular overhead, some of the steps where you incur cost for Superfund and CERCLA. Some of these items include identifying responsible parties, and doing a preliminary site assessment...there's cost associated with that. Of course, the legal expenses and transaction costs can get monumental and astronomical depending on the complexity of the site, how many PRPs you have, and how willing you are to negotiate or not negotiate. Then you have the so-called RI/FS process. That's Remedial Investigation Feasibility Study. It's a regulatory requirement under CERCLA and they are expensive to do. I have a big problem with the way the government handles this particular step. RI/FS documents cost anywhere from half a million dollars on up per site, and they tend to be done in cookie-cutter fashion. You evaluate all the technologies for possible clean-up actions. And you make your recommendation on selecting a technology. My problem with it is that all the RI/FS reports use the same process. They all evaluate each technology over and over and over again. The government doesn't have a way...a technology clearing house if you will...for making this step much, much easier and a lot less costly. Then there's clean-up costs. It can take years before you get down to the clean-up process and mounting clean-up costs. Then, there is waste removal - the bulldozers step. And that is making sure it is done right.

Then you have closure and monitoring expense. Once you are off the site or once you think you are done, the site has to be closed and you have to monitor for thirty years thereafter or more. And so, you've got an expense associated with that.

And, finally, you've got the whole financial responsibility issue. There is still liability associated with that site, no matter what stage you are in, in the clean-up process. It could be from early on, in terms of identifying responsible parties, all the way through to closure and beyond.

Currently there are very limited incentives to reduce the time it takes to get from one step to the next and to reduce the cost associated with the entire process. That is because Congress, in its infinite wisdom in creating the Superfund program and CERCLA, went into very detailed procedures in the legislation of what has to be done. And so we have one of the problems...there is very, very little incentive to try to reduce costs, under the current regulatory scheme. And a lot of people are starting to look at that now.

Timing for clean-up? I wrote it as a question. How many years do you have? How long are you going to live? It can get almost that bad with some sites. And it varies, of course, by the type of site. If you've only got a simple site with two or three PRPs and they know who they are and everybody agrees on what they want to do, sometimes you can negotiate with the regional office of EPA and start cleaning up very soon. And it can be done very, very quickly. Then you get into the operation and maintenance and monitoring years later. You can clean one up probably in two to three years that way. On the other hand, if you are going to argue and decide who is going to be enforced against and who is going to pay for clean-up and damages and what percentage they are going to pay, and what kind of model they are going to use to allocate costs and risk, and how you are going to evaluate health exposures, and everything else, you could be there forever. It's not an easy system. It is something that has to be managed very, very carefully.

Okay. Quickly, underground storage tanks. I know there is a lot of interest in this topic, so I thought I'd single it out just for a little bit more discussion. First of all, you have to understand that there are regulatory requirements. You have to register your tanks. You supposedly have had to register your tanks for several years now. I continue to run into owners that have not registered their tanks yet. The government does not like that at all. But you have to register them. It is a requirement. Then there are technical requirements for underground storage tanks and financial responsibility requirements for underground storage tanks. I could do a whole seminar on these topics, so I'm not going to go into any detail. There are federal and state reporting requirements. If you do have a release, there are corrective action procedures that have to be taken into account and observed. For the most part, the federal corrective action procedures are not that burdensome. It is the states that add on to the complexity. That is where you get into trouble -- operating in each state. Each state can set different clean-up levels. It is a nightmare for some of us working in different states, because some states accept one level of soil contamination. Other states won't accept it at all.

Remediation costs vary by the time of the release, the product that has been released, the location of the release, and what state you are in or what locality. What do I mean by that? A release is, defined by how much you've released and how long it's gone on. If it's only several hundred gallons it may not be that bad, depending on the type of soil in the environment, but if it's gone on for twenty or thirty years and it's been a slow leak in piping you could be looking at a very costly clean-up of several million dollars.

I'll give you a perfect example of this. Yesterday I did one for $5,000. I managed a clean-up...it was a

$5,000 clean-up. Easy, very easy. It was up in Baltimore and it was a heating oil tank that had failed a precision test back in May. We went down yesterday and excavated it. Very little soil contamination. We took a device called a photoionization detector out there, sniffed some soil. Literally, sniffed the soil for total petroleum hydrocarbons. And if you don't find a whole lot, close the hole up, you're done. We got the tank out of there, closed the hole up and it was less than $5,000. That was an easy one, but that does not happen very often. That's the low end of spectrum...about $5,000. And typical soil contamination remediation will cost you $50,000 to $60,000 on up. If you contaminate groundwater then you are going to get into several hundred thousand dollars very, very easily. So it is very, very costly. And it's been a problem for many, many years.

Major causes of petroleum storage tank releases are piping leaks and spills and overfills. It's not just the tank itself. Yesterday's case was the tank itself. But in a lot of cases it is not. For most instances, the leaks are not in the tank.

There is a need to reduce regulatory review time and speed up clean-ups for underground tank releases. We are seeing several states that are holding the process up by review time, by trying to read into everything. Michigan is a perfect example where the system does not work at all. So we are spending some time in working with another professional group that is working on developing a guide manual for corrective action. We can hopefully speed these things up and still achieve protection of human health and the environment.

The regulation has fostered a new generation of ASTs, Aboveground Storage Tanks. Many people are going to aboveground tanks to get around the below ground tank regulations. And you can see that all around the country. The code for aboveground tanks has been recently approved. What I mean by that is fire codes. ASTS are now allowed in many areas.

And, finally, financial responsibility is not a reality. Period. What do I mean by that? Well, insurance has only played a very minor role in terms of fulfilling financial responsibility needs. State funds have come along and been created, but they are too new and too inexperienced and no one knows whether there is enough money in these state funds to take care of all the releases that are being reported. Preliminary evidence indicates that current funding levels are insufficient. There isn't enough money in some of these state funds in order for them to handle all the releases and all of the claims that are being reported for underground tanks. It depends on how the state fund is structured and the eligibility requirements for payment. Many of them have spent quite a lot of money and achieve very little results. And they are going to be spending a lot more money. So my conclusion on this is financial responsibility is just not a reality. Insurance has been available for underground storage tanks. There are probably ten to twelve insurance companies now offering coverage for underground tanks. The type of coverage differs from company to company, but the biggest problem insurers are having right now is that they can't compete with state funds. They can't charge a premium for something that is usually almost free within the state, state funds reimbursement for clean-ups.

So insurance...it is kind of a cycle. EPA complains that insurance companies have not stepped up to bat for this particular exposure. EPA has indicated that insurers are saying they won't insure old tanks, you have to be a new system, and other such requirements. But on the other hand, the insurance companies are faced with trying to compete with state funds, and it just doesn't work.

Finally, new trends and I'll quit at that. First of all, environmental regulations are going to begin to evolve more into a performance based system. What do I mean by that? Nowadays, EPA tends to get involved in each individual operation, and a lot of states get involved. Each individual aspect of claims, or clean-ups are being approved. It adds to the cost. It adds to the bureaucracy. What we are going to see in the future and Congress is aware of this is that EPA should set a performance goal. You have to clean-up to a certain level or you have to achieve a certain performance in the way that you happen to be releasing environmental emissions. It would be up to you to achieve that level, more flexibility in achieving that level and using both technology and management techniques. Financial incentives and financial responsibility would also be used in terms of achieving those performance clean-up levels. And then the counterpart of this, designed to keep everybody honest, would be a stronger public component. In other words, you'd have more public review meetings, but EPA would back off the individual project review steps. It's kind of complicated. It's a little bit technical, but it has been a major factor in increasing the costs for environmental liabilities related to past disposal actions.

Liability apportionment is under review under CERCLA. There is more and more talk about this up on Capitol Hill. The insurance companies, of course, have been talking about it. A lot of people have been talking about it. How do we need to reform Superfund? What amendments should be introduced? Well, one of the big issues is the whole liability apportionment scheme and the timing it takes to assign liability. This is coming under review. I think there is going to be a detailed study authorized by Congress to take a look at it. It may take a couple of years, but I think liability apportionment and transaction costs are going to get a real hard look in terms of who is responsible, cost, timing, the whole works.

And, finally, RCRA re-authorization is up this year. What does that mean? That means municipal landfills are going to get more stringent regulations when it comes right down to it. Municipal landfills are going to get regulated the same way as hazardous waste disposal sites and you are going to see more and more CERCLA sites. The so-called current operations, RCRA disposal sites, are going to become Superfund sites as time goes on, by the volume and type of wastes that they've received over the years.

With that, my time is up.

MS. BOUSKA: You've now heard some of the issues from both the legal side and the technical side. Now, the plot thickens. Let's assume that you go home and back to work. There you are, sitting in your office, peacefully gazing into your crystal ball, not disturbing anyone, and the CFO comes in. She chit-chats for a couple of minutes, drops a computer printout on your desk, and says, "You know, we have twenty-five thousand of these precautionary notices on waste sites, and if each one of them uses one occurrence limit, it will take three times our surplus. We're a little worried. Why don't you decide what kind of reserve we should hold for this? This is important, so take all of the time you need .... even a couple weeks. Oh, and we'd like you to sign the statement of opinion this year." Then, on the way out of your office, she turns around and says, "You do remember that we don't have any corporate E&O coverage, don't you?"

After seven years in this area, I can tell you that a few seconds of sheer panic would not be inappropriate at this moment. There are, however, some pluses. First, the assignment that you have just gotten is incredibly interesting. Second, it is incredibly important. And, third, depending on your personality type, you have one of two options: You can either opt for long-term disability with a mental-mental claim or you can have guaranteed job security. I mention job security because what you just heard is that very little pollution actually goes away, it just moves from place to place. You take it out of the Valley of the Drums and put it in a RCRA Landfill, where, sooner or later, it's going to leak again. This makes new liabilities, and the cycle starts again.

So you decide to look at the problem. What did I mean when I said that it is incredibly important? Why is your CFO worried? A year ago, I testified before a House subcommittee regarding U.S. insurers' potential liabilities for hazardous waste sites. We tried to use reasonable numbers, but this was just a "thought experiment," and certainly every number can be contested. In the low scenario, the possible liabilities of the U.S. primary industry, on a discounted net basis, are about $26 billion. (See Exhibit 1) Please note that these numbers are more than a year old and are due to be updated.

Standards & Poors believes that most of this liability from Superfund waste sites will be absorbed by twenty-five companies, although this is not to say that all other companies will escape without claims. These twenty-five companies had group surpluses totalling approximately $50 billion. This is obviously not good news, unless you are from another company and your competitive situation may be improved drastically.

So this is the kind of pressure you are working under. Your first job is to attempt some quantification. What are insurance companies doing with this problem? As far as we can tell, the primary job of quantification is usually given to the claims department, normally with the assistance of specialized lawyers.

Actuaries do not immediately come to mind in this context for two reasons: First, because there is no meaningful historical data. And second, because it is asserted that every waste site claim is unique because there are issues of fact, and so all that "actuarial stuff" is meaningless. With respect to the first point, it is certainly true that there is much that we don't know. What are the areas of uncertainty? They include the underlying costs and the share of those costs that your insured may have to pay. You also don't know if the courts will find that your company's policies covered the incident. If they did, you don't know which policies you are going to pay it under. You don't know what the payout pattern is, although you do suspect that the pattern will be quite long. (Your payment triangles may show zeroes for twenty evaluation points and then $1 million, $9 million ... the trend is not looking good.) You also don't know how your reinsurance is going to apply.

With respect to IBNR: you don't know what fraction of the universe of PRPs (potentially responsible parties) have reported their claims to you. You don't know the ultimate number of sites that will be handled under Superfund or by the states. You don't know if remediation costs are getting higher or lower. And you don't know if you will be seeing "venue shopping" in the coverage litigation, although you probably can reasonably assume that they will seek sympathetic jurisdictions. In short, almost anything that, as an actuary, you want to know, you don't know. And one more thing that I think is very important: When Superfund comes up for renewal in 1994 and then probably again in about 2000, Congress might just make the law and its liabilities all go away. Because of the slow pace of cleanups and the high associated transaction costs, Superfund is very unpopular with some people, including some members of Congress. This is an important point to keep in mind.

However, I believe that it is possible to deal with this question in a meaningful way on an actuarial basis. Certainly you do have to involve your claims staff and their lawyers, but you can go further. We are approaching the problem with a very large simulation model based on the notifications that a company has received. In some cases, fairly good estimates of remediation costs are available. We let the model pick the cost shares based on whether the insured PRP is a "big" or "little" company. ("Big" companies pay more.) The program makes coverage decisions, based on historical cases, by state. We let it create and adjudicate third-party cases, and so on through the issues, running the whole simulation multiple times.

I had hoped to have results to report, but as you all know, if it doesn't take longer and cost more than you expected, it isn't research. What I can tell you is our preliminary results have astonished us on two bases: One is the relatively low level of costs that it generated for the particular insurance company we were looking at. The second is the low level of variance. We are seeing very little process variance and much less parameter risk than expected. We think the lack of process variance is due, primarily, to the layer that we are looking at. We believe that, because it is a low working layer of reinsurance, any relevant claims tend to fully exhaust the layer.

We have also discovered that the trigger is very important. It is imperative that you and your company understand the effect of the trigger selection that you are espousing in court. For instance, if you are a new company and you wrote business primarily in the 1980s, you do <u>not</u> want a manifestation trigger. If you wrote back in the 1950s and 1960s, you <u>do</u> want a manifestation trigger. If you are an excess carrier, you might consider sacrifices to the waste site gods to avoid a manifestation trigger. Of course, you want to assert the trigger most advantageous to you, but, in the end, the courts will decide which policies will pay.

After quantification — however it is done — comes the question of what reserves to actually hold. Approaches that companies are taking include an easy one: Ignore it. Maybe it will all go away in 1994. In the meantime, particularly if you are a high-level reinsurer, you probably won't even have many requests for large payments.

Another interesting approach is to consider these costs to be extra-contractual obligations, i.e., take the position that "We never wrote this coverage. There is no loss obligation until the judge's gavel falls and tells us we have to pay. That's the trigger. When I hear that, I'll put up a loss reserve. In the meantime, my coverage hasn't been triggered because I never wrote it."

Other companies seem to be taking the position that "Maybe it's not a loss reserve, but we're prudent people, so we'll set aside a little surplus and fund two years' worth of anticipated payments."

Or maybe you're reserving only the DJA costs (i.e., coverage litigation costs). These costs can be enormous and they are being paid now. (An interesting side question is to consider where such reserves should be recorded: Coverage litigation costs are not normally reserved as loss expense on line 2 of page 3 of the Annual Statement, but it appears that DJA costs are frequently recorded there.)

Stair stepping is a tried and true method from asbestos reserves: "It has been a good year, so we'll add $20 million; it's been a bad year, so we won't add any." Or perhaps there is a target that is reviewed frequently, and funded incrementally on a regular basis.

Having decided to hold reserves for waste site claims, you then face the issue of discounting. It takes twelve years, on average, from listing to delisting, for a Superfund site, to say nothing of the preliminary years of litigation or the thirty years that it will take to scrub the groundwater. Should you discount the reserves for interest? Statutory accounting procedures frown on it. Should you discount them for political risk? Superfund may go away, and, if you are setting an expected value reserve, there is certainly an argument that you should take renewal uncertainties into account.

Alternatively, you can insist on full-value, full-dollar reserves. You may want to consider the effect on your company's solvency, but that is always a possibility.

Is there any guidance for you in this area? Remember that your name is going to go on the statement of opinion. Let's explore that. How many people looked through the papers you got when you registered? At least three. How many noticed that there was a copy of the Principles Regarding P&C Reserves? Good. How many people read it? One, two, three. What did it say about pollution or toxic torts or mass torts or latent claims? Let the recorder show that there was silence in the room. That's the right answer. Nothing. Exactly zero. I've read it many times and it gives you absolutely no guidance. So being innovative you said to yourself, "As long as this is a going concern, we can fund the claims out of profits. Valuation only becomes a problem when you want to sell your insurance company or do a portfolio transfer." So you read the Statement of Principles Regarding P&C Valuations, and found that it was at least mentioned there. It says that large latent losses are "a risk." Unfortunately, this may already be obvious to a company that is facing potential losses larger than its surplus.

Although it is not used for statutory accounting, the most relevant source of guidance seems to be FAS 5, which says that you should put up a reserve for liability if it is both probable and quantifiable. If it is probable but not quantifiable, you disclose it. This is very straightforward, until you start to ask what "probable" and "quantifiable" mean, although at this point it seems difficult to argue that insurers will pay nothing. This is particularly true since, according to the General Accounting Office, the industry is already paying out over $100 million dollars a year related to waste site claims.

Is it quantifiable? I would argue that expected minimum values can be quantified using a simulation model and assistance from your claims staff and their lawyers. Maximum values remain difficult in most cases.

And, in the end, you have professional obligations, which you cannot take as lightly as some of my remarks have indicated. You have, and your company has, obligations to its policyholders. What is the policyholder going to think, who buys a policy from your company next year, thinking that it is a solid organization, and finds that, in a few years, his or her claim isn't paid because all of the money has gone to cleanup the Hardage-Criner site, or Kin-Buc or Stringfellow? There are similar obligations to shareholders and stock purchasers, who assume that what they read in your 10K is a fair portrayal. SEC attention to environmental disclosures has certainly increased in recent years. Exhibit 2 contains environmental disclosures from some of the larger stock insurance companies as examples of how they are responding.

In the midst of these substantial competing pressures, your company, its environmental claims specialists, its lawyers, its management and you have to make decisions with relatively little information. This is clearly an area where discussion would be helpful, and now is a good time to start.

Exhibit 1

US INSURERS' LIABILITIES ARISING FROM INACTIVE HAZARDOUS WASTE SITES: ILLUSTRATIVE SCENARIOS

	Cost Category	"Low" Scenario	"Medium" Scenario	"High" Scenario
	Gross Cleanup Costs	$ 60 B	$ 200 B	$ 750 B
	Adjusted Cleanup Costs *	$ 36 B	$ 120 B	$ 450 B
	Insurers' Percentage	10 %	50 %	90 %
(1)	Insurers' Cleanup Costs	$ 4 B	$ 60 B	$ 405 B
	Costs to defend PRPs (% of gross cleanup)	10 %	20 %	30 %
	Coverage Litigation Costs (% of gross cleanup)	40 %	20 %	10 %
(2)	Insurers' Litigation Costs	$ 30 B	$ 80 B	$ 300 B
	Third Party/ PRP Defense	$ 25 B	$ 75 B	$ 200 B
	Insurers' Percentage	20 %	60 %	90 %
(3)	Insurers' Third Party Costs	$ 5 B	$ 45 B	$ 180 B
	Natural Resources / PRP Defense	$ 10 B	$ 50 B	$ 200 B
	Insurers' Percentage	20 %	60 %	90 %
(4)	Insurers' Natural Resources Costs	$ 2 B	$ 30 B	$ 180 B
	Insurers' Gross Total	$ 41 B	$ 215 B	$ 1065 B
	Percentage Retained	90 %	70 %	40 %
	Insurers' Net Total	$ 37 B	$ 150 B	$ 426 B
	Discount Multiplier (8% discount rate)	70 %	60 %	50 %
	Insurers' Net Present Value	**$ 26 B**	**$ 90 B**	**$ 213 B**

* removing 30% "orphans' share", 5% federal facilities and 5% self-insured.

Aetna - 1990

"The table below shows the increases attributable to prior accident years. The majority of these increases was for losses and related expenses for product liability and toxic substance risks attributable to Commercial Property-Casualty policies written prior to 1978."

Additions to Reserves for Prior Accident Years

(Millions) (Pretax)	Commercial Property-Casualty	Reinsurance
1990	$65	$15
1989	$116	$28
1988	$312	$53

Aetna - 1989

"The table below shows the increases attributable to prior accident years. The majority of these increases was for recurring losses and related expenses for product liability and toxic substance risks attributable to policies written prior to 1978.

Reestimation of Reserves for Prior Years

(Millions) (Pretax)	Aetna Property-Casualty Lines*	American Re-Insurance Operations
1989	$174	$28
1988	$326	$53
1987	$227	$111

* At least 90% of the 1989, 1988 and 1987 additions to Aetna's property-casualty reserves are attributable to commercial property-casualty lines."

Chubb - 1990

"The uncertainties relating to asbestos and toxic waste claims on insurance policies written many years ago are exacerbated by judicial interpretations of coverage that in some cases have tended to erode the clear and express intent of such policies and by expanded theories of liability. The industry is engaged in extensive litigation over these coverage issues. The outcome is not easily predictable. Management considers the reserves established for these claims to be adequate based on facts currently known and the current state of the law. However, given the expansion of coverage and liability by the courts in the past and the possibilities of similar interpretations in the future, an indeterminable amount of additional potential liability could exist under adverse conditions.

During 1990, we experienced overall favorable development of $34 million on loss reserves established as of the previous year end. This compares with favorable development of $14 million and $42 million in 1989 and 1988, respectively. In each of these three years, we substantially increased reserves relating to asbestos and toxic waste claims. Further increases in 1991 and future years are possible as legal issues concerning these claims are clarified."

Chubb - 1989

"The uncertainties relating to asbestos and toxic waste claims on insurance policies written many years ago are exacerbated by judicial interpretations of coverage that have tended to erode the clear intent of such policies and by expanded theories of liability. The industry is engaged in extensive litigation over these coverage issues. The outcome is not easily predictable. Management considers the reserves established for these claims to be adequate based on facts currently known and the current state of the law. However, given the expansion of coverage and liability by the courts in the past and the possibilities of similar interpretations in the future, an indeterminable amount of additional potential liability exists under adverse conditions.

During 1989 and 1988, we experienced overall favorable development of $14 million and $42 million, respectively, on reserves established for losses incurred in previous years. These amounts compare with reserve strengthening of $97 million in 1987. In each of the last three years, we substantially increased reserves relating to asbestos and toxic waste claims. Further increases in 1990 and future years are possible as legal issues concerning these claims are clarified."

CIGNA - 1990

"Most major property and casualty insurers, including CIGNA, have been subject to asbestos-related and environmental pollution claims that involve significant unresolved issues regarding liability, policy coverage and other matters. CIGNA has established reserves for reported asbestos-related and environmental pollution claims and for unreported asbestos-related claims under certain policies with limits that are likely to be exhausted. The ultimate liabilities for other asbestos-related and environmental pollution claims, and the expenses of litigation relating to unreported and most reported claims, cannot reasonably be estimated. Consequently, charges for such claims are expected to be reflected in future results of operations. Asbestos-related losses totaled $67 million in 1990, compared with $55 million and $42 million in 1989 and 1988, respectively. Environmental pollution losses were $39 million, $38 million and $34 million in 1990, 1989, and 1988, respectively."

CIGNA - 1989

"In addition, most major property and casualty insurers, including CIGNA, have been subject to asbestos-related and environmental pollution claims that involve significant unresolved issues regarding liability, policy coverage and other matters. As a result of these uncertainties, the amounts and timing of asbestos-related and environmental pollution unreported claims, and related litigation expenses for unreported and most reported claims, cannot reasonably be estimated. Consequently, charges are expected to be reflected in future results."

Exhibit 2
Sheet D

Travelers - 1990

"Increased claim costs have not been offset fully by price increases and additions to incurred claim and claim settlement expense reserves on prior accident years were needed in both 1990 and 1989.

The insurance industry is involved in extensive litigation concerning policy coverage because of court decisions that have expanded insurance coverage beyond original policy intent. Travelers is part of the industry segment affected by these issues and continues to receive claims alleging liability exposures for asbestos, toxic waste and other hazardous substances. The majority of policies involved in these claims were issued prior to the mid-1970's. In relation to claims that may arise as a result of these court decisions that expand policy coverage and theories of liability, Travelers carries on a continuing review of its reserving techniques, overall reserve position and its reinsurance. Based on the most recent reviews management believes adequate provision has been made for these potential liabilities based upon the facts and current legal interpretation."

Travelers - 1989

"Certain of Travelers subsidiaries are involved in litigation with respect to claims arising with regard to insurance coverages that are taken into account in establishing benefit reserves. On insurance contracts written many years ago, Travelers continues to receive claims asserting alleged injuries and damages from asbestos and other hazardous and toxic substances.

In relation to these claims, Travelers carries on a continuing review of its overall position and its reserving techniques and reinsurance. The latest review confirms that adequate provision has been made for any obligations now foreseen. It is management's opinion that the ultimate resolution of all claims arising from hazardous and toxic substances will not have any material adverse effect on the consolidated financial position of Travelers."

1991 CASUALTY LOSS RESERVE SEMINAR

6F: LOOKING BEYOND THE NUMBERS

Moderator & Panelist

Robert S. Miccolis
Reliance Reinsurance Corporation

Panel

Tom M. Eversman
PSM Insurance Companies

Walter C. Wright, III
William M. Mercer, Inc.

Recorder

Maria Mattioli
Reliance Insurance Company

ROBERT MICCOLIS: Session 6F, Looking Beyond the Numbers. This session is being recorded. There is handout in the back. They may have all been taken. If you want to leave business cards at the end, we'll get you copies.

My name is Bob Miccolis. I'm an actuary with Reliance Reinsurance in Philadelphia. I'm going to be your moderator and narrator for this session.

To my immediate left is Walt Wright. He's a Principal and Consulting Actuary with Mercer in New York. And to my far left is Tom Eversman who is VP Corporate Planning and Actuarial at Public Service Mutual in New York City.

Walt is a Fellow of the Casualty Actuarial Society and has done a lot of work in the loss reserving area. Tom is in charge of the actuarial areas, reporting to him at Public Service Mutual, but he's not, himself, an actuary.

As you'll see here, we've got a little different set-up than the normal table. We had to turn it around. And you'll see why in a little bit.

In this session we're going to talk about looking beyond the numbers. A lot of the other sessions talk about the numerical side and how to analyze the numbers, how to display the numbers. We're going to go beyond that and more into the qualitative side. The first time this type of issue comes up is in the basic track in the session called "Considerations". We're going to take that a little bit further and give you some illustrations of how to get the qualitative information when you are doing the analysis. We're going to discuss what you should know before, during and after any kind of numerical analysis. And we're going to talk about things that can't be easily quantified. Things that you have to work hard to incorporate into any analysis.

The way we're going to do this is in a role playing format, by using two skits. We have two acts. I think you'll enjoy this. This is the fourth year we've done this. Last year we added Act Two. We're going to go through some of the structured ways to ask questions and to seek out information. The handout is a questionnaire, also referred to as an interview guide. We're going to use that in Act Two.

We'd like you to come away from this session with four major points. First, that whoever is going to do the loss reserve analysis has to ask a lot of questions and has to have a good understanding of the company's operations, underwriting, claims, data processing, finance and accounting. They have to know all the key functions and have a good understanding of what's going on. The second thing is that you have to look at all those areas and continue to ask questions about what's going on in those areas. The third item is that you have to ask even more questions. The fourth major point is that you have to investigate and look for and try to identify changes, even though people won't tell you that they changed, you have to find out what did change.

Now the comments in the two skits we're going to do apply both to people doing work from the inside and people coming in from the outside as an outside consultant, an accountant or an independent actuary.

Act One is a consulting set-up. Tom is going to play the company financial officer and Walt is the outside consultant and he's coming in for the first time to look at and ask questions about the company's reserves. We're going to look at and comment on what the good things that we should do and what is illustrated in the skit and some of the mistakes that are going to come up. So I'll start with Tom and Walt.

TOM EVERSMAN: Nice to meet you Walt. How was your trip in?

WALTER WRIGHT: (Unaware that Tom is lighting a cigarette.) Tom, it was very good, except I got stuck in the smoking car on Amtrak. I had a miserable trip down here. I just can't believe how rude those smokers can be to be contaminating a car that the rest of the people are on. (Laughter) Nothing personal, Tom. (Laughter) Certainly I think anybody should be able to smoke in their office.

TOM EVERSMAN: That's okay, Walt. (Laughter)

WALTER WRIGHT: Particularly one of my clients, Tom. Well, we better get down to business, Tom. I haven't had much of chance yet to get familiar with Upstart Insurance Company. What can you tell me about the history and organization of Upstart.

TOM EVERSMAN: Let's see, Walt. That was a short cigarette. Upstart was founded in 1925 as primarily a workers' compensation writer. In the '40s and '50s we got into forms of general liability and then into the '60s and early '70s, as packaging became more popular, we got into packages. I'd say most of that is related to habitational types of business.

WALTER WRIGHT: You mentioned multi-peril and habitational. Exactly what lines of business do you write and how are these distributed, for example, how are they distributed by line and by state?

TOM EVERSMAN: I'd say about half our business is package. About 15% is comp and 15% auto, again, related to the habitational types of risk. That's on the commercial line side. We've started breaking into personal lines a bit. It's not a major book but we hope to diversify with that. I'd say about 80% of the business is New York, primarily New York City. And the rest of it is in the New England states, maybe the Mid Atlantic states as well.

WALTER WRIGHT: The SMP business that you're writing. Could you be more specific about the type of business that you're writing?

TOM EVERSMAN: Sure. Well, that is our biggest book. I would say 70% of that is condos, co-ops, luxury apartment houses, maybe 15% is restaurants. Maybe another 10% is light manufacturing, and then a little miscellaneous stuff.

WALTER WRIGHT: What's the miscellaneous stuff?

TOM EVERSMAN: Miscellaneous is probably mercantile, maybe a little bit of products. Would you like an extract on that?

WALTER WRIGHT: For the miscellaneous class?

TOM EVERSMAN: Sure.

WALTER WRIGHT: No, I don't think that'll be necessary, Tom. But, I would like to have more information on your major categories of business; the dwellings, the restaurants, the manufacturing business. If you could give me a history of let's say the last five years of premiums to start with in each of those major categories by state that would be useful.

TOM EVERSMAN: Sure.

ROBERT MICCOLIS: Well, Walt almost got killed on the cigarettes, didn't he? Note that Walt didn't get off track on the minuscule data and on that miscellaneous business. He stuck to his guns to try to get the major classes and the major focus of the business of the company.

TOM EVERSMAN: Walt, what are you going to do with this information once we dig it up?

WALTER WRIGHT: Well, I'm going to use the incurred loss development method to estimate what your reserves should be.

TOM EVERSMAN: The incurred method...what makes you think that will work for us?

WALTER WRIGHT: Well, I'm from Ernst, Deloitte, Anderson House...(Laughter)...the largest of the big, three accounting firms...(Laughter)...and that's the method we always use.

TOM EVERSMAN: But how do you know it'll work? I mean, how do you know...you don't know that much about our company.

ROBERT MICCOLIS: Watch out here. Walt is getting himself into real hot water. He's mentioned a particular method in an interview. Maybe he can get out of this though.

WALTER WRIGHT: Tom, you're absolutely right. It's premature of me to tell you ahead of time what method I'm going to be using. I'll probably use the incurred loss development method. It's a very basic method and I'm sure it's something that I'll use when I do my preliminary analysis. But really the major reason I'm here today is to be gathering information from you to determine what methods and what adjustments to those methods might be appropriate as

I review your data. So you can be assured, Tom, I'm not just going to stick to some cookbook approach. I'll be basing my methods on your data.

TOM EVERSMAN: Great.

WALTER WRIGHT: What can you tell me about the underwriting of your business, guidelines and procedures and so forth?

TOM EVERSMAN: Well, the business is produced through independent agents. We have some large accounts, nothing national. The large agents might produce maybe up to 8% of the business, but there are only a couple of those. We follow ISO. We follow the NCCI on comp. And I guess the guidelines are pretty well documented.

WALTER WRIGHT: Can I get a copy of those guidelines?

TOM EVERSMAN: Sure.

WALTER WRIGHT: Have there been any changes to the underwriting guidelines in the last five years, for example?

TOM EVERSMAN: No, I wouldn't say so.

WALTER WRIGHT: So the printed guidelines that you're going to get a copy of...they should have a date of 1986 or prior, since there haven't been any changes in the last five years.

TOM EVERSMAN: It seems to me that the last update was around '87. I doubt that they've really changed from the prior.

WALTER WRIGHT: Well, could I get a copy of guidelines that preceded the 1987 guidelines?

TOM EVERSMAN: I'll see what we can dig up.

WALTER WRIGHT: That's good, Tom. I think that it is important for me to try to determine just what did change in 1987. You mentioned that you use ISO rates for your SMP business. How do you evaluate those rates in terms of deciding whether they are appropriate for your business?

TOM EVERSMAN: Well, we look at the ultimate accident projections and see if it makes sense relative to the rates.

WALTER WRIGHT: Can you give me a history of the rate changes?

TOM EVERSMAN: Sure. We can do that.

WALTER WRIGHT: What about rating plans? Do you use schedule rating plans, for example?

TOM EVERSMAN: Oh, yes.

WALTER WRIGHT: And you have a history of the credits that you've used?

TOM EVERSMAN: Yes. They've been about 5% over time.

WALTER WRIGHT: Do you have a report, Tom, that would give me that information?

TOM EVERSMAN: Well, it would be pretty hard to develop statistically for the SMP book. It just really doesn't lend itself to that.

WALTER WRIGHT: But you did say that the credit has been consistent at about 5% over time. How do you know that, Tom, if you don't have documentation for that?

TOM EVERSMAN: Well, that's based on what the underwriters say...based on their internal audits.

WALTER WRIGHT: Well, I realize the underwriting managers aren't in today, but can you check with the underwriting department and get some documentation for those numbers?

TOM EVERSMAN: I'll see what we can find. Why are you so interested in schedule credits, Walt?

WALTER WRIGHT: Well, on the train down here today I did have a chance to look at your annual statement. And looking at the loss ratios in Schedule P for your multi-peril business, I noticed that for the last couple of years you're anticipating a significantly reduced loss ratio. It was really such a dramatic decrease that I wanted to make sure that I gather enough information to be able to evaluate that. So I'm very much interested in anything that might affect those loss ratios.

ROBERT MICCOLIS: Note here that Walt's doing pretty well. He did his homework on preparing for the Schedule P question. He noted that SMP was a big part of the company's book. He went through the annual statement and saw something happening to the loss ratios and he was trying to get that information out of Tom. But he didn't stick strictly to his set of questions. He looked ahead and he looked at the published information in the annual statement to see how he could use it in his investigations.

WALTER WRIGHT: Tom, I haven't really had a chance to look much at the other lines of business yet, so I don't know what detailed pricing information I'll require, but it might turn out that I'd like detailed pricing information on your other lines of business. Will that be available?

TOM EVERSMAN: Surprisingly enough it is easy for GL and we can give you a rate history for the other lines.

WALTER WRIGHT: Okay. Very good. That'll be fine. Have there been any other major changes, Tom, that might have affected your SMP book of business?

TOM EVERSMAN: Well, when the market tightened, oh, in '85 or '86, really around '86, we started to use that as an opportunity to really re-underwrite the book and concentrate on what the underwriters called the preferred risks. I know I've looked at statistics and I'd say about half or a third to half of the units have dropped off since '86, so I guess it must be true. In fact, we got out of a pretty large program of mercantile business, things like major department stores.

WALTER WRIGHT: Well, these department stores...you quit writing them and you cancelled them in 1986? You got off them completely?

TOM EVERSMAN: Definitely. Yes.

WALTER WRIGHT: That's interesting. Was it a major segment of your business prior to that?

TOM EVERSMAN: Well, let's see, they're about 5% now. They might have been 20 to 25% before that.

WALTER WRIGHT: Wow! That's really a big portion. I'm glad to know, Tom, that you had a change there. That's very important information for me.

ROBERT MICCOLIS: Surprise, surprise! No changes in underwriting guidelines in the last five years, but a third of the accounts disappeared and 25% of the business went down to 5%. Walt didn't get an answer to his first question, but he persisted as part of asking the specific question about SMP and found out that there was a major change in underwriting. If he had only gotten those '87 underwriting guidelines, he wouldn't have picked up the change and he wouldn't have known that the prior history included the mercantile business.

WALTER WRIGHT: Tom, we touched briefly on the fact that you use ISO rates and that you do some analysis of the ISO rates to determine how they should apply to your business. Can you tell me more about that?

TOM EVERSMAN: Well, let's see. As I said, we do use ISO loss costs. And we do some schedule crediting. Those are on, I guess you'd say, the preferred risks. For standard business, we write that through our subsidiary, Quick Start Insurance.

WALTER WRIGHT: I'm sorry. You said you have a sub, Quick Start?

TOM EVERSMAN: That's right.

WALTER WRIGHT: Gee, I didn't realize that.

ROBERT MICCOLIS: Another surprise. Walt asked Tom to describe the company. It had been in business since 1925, just writing a few lines of business. Now we get down to rates and find out there's another company. If Walt had looked through the annual statement all the way to the back, he would have seen the organization chart and saw that there was Quick Start and Upstart, part of the same organization.

WALTER WRIGHT: Tom, are you aware of any other significant changes that I should be aware of?

TOM EVERSMAN: Well, you mentioned reviewing Schedule P...you might want to know about the reinsurance commutation that we did.

WALTER WRIGHT: What can you tell me about that?

TOM EVERSMAN: Well, a couple of years ago it looked like one of our reinsurers in our mutual casualty program was going under. They came forward to us as an effort to save themselves and proposed a commutation. We thought about it, analyzed it and we did it. Basically, we booked that into the Schedule P just crediting the outstanding losses and crediting the paid losses.

WALTER WRIGHT: I'm not quite sure that I understand that, Tom. Crediting outstanding losses and crediting the paid losses? Can you clarify that for me?

TOM EVERSMAN: Sure, well, you know, when we had the reinsurance set-up, we had a reinsurance recoverable on outstanding, which is a debit, so we credited that to offset it. And then when they paid us we have a credit for reinsurance recoverable paids. We booked that. It's very simple.

WALTER WRIGHT: I guess I still don't understand, Tom. Can you explain that a little bit more simply?

TOM EVERSMAN: And very slowly. (Laughter) Basically, we took down the ceded that was up, so we credited the losses. You know, ceded is usually a debit and then credit is an increase to the outstanding.

WALTER WRIGHT: Yes. But you have got to realize that actuaries aren't accountants so...I need to go over this slowly.

TOM EVERSMAN: I just became aware of that. (Laughter)

WALTER WRIGHT: A lot of people don't realize the difference, Tom.

TOM EVERSMAN: Well, the debit's on the left and the credit's on the right.

WALTER WRIGHT: Okay.

TOM EVERSMAN: Debit, credit...fight, fight, fight. (Laughter)

WALTER WRIGHT: Okay. I was referring to the difference between accountants and actuaries, but we won't get into that now.

TOM EVERSMAN: Alright. What do you want to know, Walt?

WALTER WRIGHT: Well, can you just go over it one more time to make sure I understand that? Or maybe I could repeat it back to you. Let me see.

TOM EVERSMAN: Let's try that.

WALTER WRIGHT: You commuted the reserves. Since you took the loss reserves back, you increased the loss reserves.

TOM EVERSMAN: That's right.

WALTER WRIGHT: And so that's what you mean when you say you credited the ceded reserves.

TOM EVERSMAN: You're getting there. (Laughter)

WALTER WRIGHT: Okay. (Laughter) Then, of course, you were paid for taking these reserves back.

TOM EVERSMAN: Hopefully.

WALTER WRIGHT: And that payment...you reflected that by reducing your paid losses.

TOM EVERSMAN: You got it.

WALTER WRIGHT: And that's what you mean when you say you credited your paid losses.

TOM EVERSMAN: Right!

WALTER WRIGHT: Okay. So you credited your paid losses and you credited your ceded reserves.

TOM EVERSMAN: Exactly.

WALTER WRIGHT: I think I do understand, Tom. And that's the way it appears in your annual statement for 1990?

TOM EVERSMAN: That's exactly right.

WALTER WRIGHT: I'm glad to know that.

ROBERT MICCOLIS: Boy, this was tough. Did anybody understand Tom the first time? Debits and credits...Walt was looking for his accounting book. He figured that wouldn't work. Obviously this had a big impact and he had to figure out what happened. Walt could have taken some notes and said, I'll come back to this later, but he persisted in trying to get Tom to come up with some sort of simple description of what happened and actually how Schedule P might be affected. But now, he's got to go a little further, because he's got to know what development data he's going to get...whether it is going to be before the commutations or after the commutations.

WALTER WRIGHT: Tom, the claim department operations often have a major impact on the data that I'm looking at when I do a loss reserve review. What can you tell me about Upstart's claim operations?

TOM EVERSMAN: Well, I doubt that that's had much of an impact. It's been pretty consistent. A long tenure management. The former claims VP retired after probably fifty years, somewhere in 1985 or 1986. Then there's a new guy that came in. He's pretty aggressive. He had pretty formal training at a major carrier. I remember that he just felt that the adjusters weren't all that aggressive about setting up reserves. So I think, you know, now that I think about it, he really implemented a program to do some case reserve strengthening...get them up faster.

WALTER WRIGHT: Do you think that they did strengthen the case reserves in the process?

TOM EVERSMAN: Yes, I do.

WALTER WRIGHT: But I don't think so, Tom.

TOM EVERSMAN: Why do you say that?

WALTER WRIGHT: Well, one thing I looked at this morning was the ratio of your paid losses to your incurred losses. And if what you said really happened, then I should see those ratios decreasing as case reserves increased. But I don't see that happening, Tom, so I don't see how it could be the case.

TOM EVERSMAN: I've got memos that say that we did. (Laughter)

WALTER WRIGHT: All I can tell you, Tom, is what I saw. But, you know, thinking about it I guess I'm missing something. There is a possibility that that would have happened. If I'm looking at the ratios of paid losses to incurred losses, then really there's two pieces I should be looking at, the numerator and the denominator. You're saying that the incurred losses, that is the denominator, increased?

TOM EVERSMAN: That's right.

WALTER WRIGHT: Because of the case reserve strengthening. I'm saying that I didn't see any change in the ratios of paid to incurred, so maybe something happened with the paid losses. Is there anything that might have happened to have caused the paid losses to speed up?

TOM EVERSMAN: I don't think so.

WALTER WRIGHT: What about claim department case loads, for example? Have they changed over time?

TOM EVERSMAN: Well, I know this guy came in and he had sort of a formula approach to allocating cases based on their degree of complexity, whether the claim was in suit or not in suit. And I know he divvied up claims separately...I don't think that would have had much of an affect.

WALTER WRIGHT: Have there been any mandates to the claim department personnel? That they should speed up claims processing, for example? Pay the easier claims? Did anything like that happen?

TOM EVERSMAN: Well, you know the new guy prefers to pay claims at a higher value today then theoretically the present value of some future higher value tomorrow. I don't think it would have much of an affect.

WALTER WRIGHT: I agree. It doesn't seem like that would have a very dramatic impact on the loss payments.

TOM EVERSMAN: I can't see it.

WALTER WRIGHT: Well, I'm still puzzled then, Tom. If you want me to give full credit to the fact that case reserves have been strengthened...and I don't see that in the paid to incurred ratios, then I need to do some more investigation. I'm wondering if I could talk to your claim adjusters. Maybe they have some insight in terms of how the claim payments might have been sped up.

TOM EVERSMAN: Boy, would that be a waste of time.

WALTER WRIGHT: Well, I think it's really important though, Tom. I really would like to talk to them.

TOM EVERSMAN: At $400 an hour, I'm sure you would. (Laughter) But, you know, all they're going to do is say I'm getting $4.00 an hour and they're just going to sit there and complain and whine and, you know, besides that the claims VP is out for a couple of weeks.

WALTER WRIGHT: You say the claims adjusters will be whining. What would they have to whine about?

TOM EVERSMAN: Anything. (Laughter) Any change. These are some of the most stubborn people in the world. They never want to give up a buck, for one thing, which is great, but they don't want to deal with change so, I mean, the last time we had a change it was this IAS system in the New York Courts.

WALTER WRIGHT: The IAS system? I'm not familiar with that, Tom. What was that all about?

TOM EVERSMAN: It was called the Individual Assignment System. And basically, the New York Court System was a real bogged down mess and it's a real bottleneck. Any suit claims that we had or any other company, for that matter, went into a central court calendar. All the cases were funneled through that calendar. Once a case got ready enough to go for trial, then they'd assign it to an individual judge who might have another case. He might be on vacation. So, you know, it was real, real slow. So what they did was, they said well, you know, as the number of cases grows, New York said, let's get rid of the calendar and divvy up all the cases to individual judges. Now you've got these judges managing their own case loads. When they got the assignments, they freaked out at the volume of cases. So they said, you know, let's move these cases. So they were really pushing both the plaintiffs and the carriers to settle out of court. Now that I think about it, that probably did speed up our settlement.

WALTER WRIGHT: That sounds like it, Tom. That could be the missing piece of information. It certainly would have an impact on causing the paid losses to increase. Could you give me some documentation for that so I'll have a better understanding of just exactly what took place and what the timing was?

TOM EVERSMAN: I know it was published. I'll see what I can dig up.

WALTER WRIGHT: Thank you.

ROBERT MICCOLIS: Note here Walt really had to dig and dig, back and forth to get his information. Reserves were strengthened, at least that's what the memo said, but something had happened to the claim counts. And Walt couldn't see that in advance. He finally got Tom to see the light and come up with his own explanation of what might have happened.

WALTER WRIGHT: Well, Tom, I think that pretty much wraps things up for now. Your secretary is getting a copy of your most recent actuarial reserve analysis for me. I'll take that information back to my office and start my preliminary evaluation. After I finish that I'll probably need to come back and sit down with you a bit longer to go over any new questions that arise.

TOM EVERSMAN: Yes, hopefully before your rates go up. (Laughter)

WALTER WRIGHT: Well, okay, Tom.

TOM EVERSMAN: Anytime.

WALTER WRIGHT: Good talking to you.

TOM EVERSMAN: Good to talk to you, Walt.

ROBERT MICCOLIS: Let's look at some of the high points of the skit. There were good things and bad things out of the interview. On the good side, Walt was persistent, almost to a fault, but he had to get his information someway. Now if Walt had just asked for the data and started his analysis he wouldn't have realized that something was wrong, that something couldn't easily be explained. He may have used the old SMP data and come up with inappropriate tail factors, because it had the mercantile business in there. Walt also asked for documentation. The important thing here is that he didn't just ask for it, but he has to follow up and make sure he gets it and makes sure that he gets it in the right amount of detail. Walt realized that the methods he was going to use, both in his question asking and in the actual analysis, have to be flexible. They have to reflect the changes in the operation of the company. Walt asked for clarifications of any terms he didn't understand, the accounting treatment of the commutation, the IAS system and the other things that he personally didn't have a background in. He weeded out the immaterial data and other things that didn't seem relevant.

Well, what didn't he do right? Well, he went through the interview process somewhat haphazardly. His outline seemed to be roughly, let me get the company's background, let me get some information on the organization, look at underwriting and claims. He didn't have his questions organized in any kind of systematic fashion, although even if he was better organized the skit illustrated that you can't just necessarily ask the questions in the order you have them written down. Sometimes the answers don't come out that way.

Tom mentioned a commutation program. Obviously, Upstart bought reinsurance. If Walt had looked through the annual statement some more and looked through Schedule F, he would have seen that they bought reinsurance. But he didn't ask any questions about that ceded reinsurance program.

Loss adjustment expenses. We didn't hear anything about them, whether they were included in the case reserves or whether they were separately posted as a bulk reserve. Also the process by which claims are reported or recorded, we didn't hear any questions on that. And that's usually an important area.

The areas of data processing and accounting were not looked into in any depth. There were not even any initial questions. Even though Walt asked for the latest actuarial analysis, he didn't get into how IBNRs were established and how they were set up on an accounting basis.

Now the handout that was piled up in the back was pulled together from several different sources. We put it together in what we thought was a reasonable order. We're going to go through the second skit to illustrate how some of those questions could be used inside a company.

Tom Eversman is going to introduce Act Two and I'm going to enter the stage.

TOM EVERSMAN: This would be a good time for an actuarial joke, but I don't have any except for maybe two. (Pointing to Bob and Walt) (Laughter) In the second skit I play the new Chief Actuary at Shifting Sands Mutual. I've just joined Shifting Sands from Belly Up Fire and Marine. (Laughter) My predecessor at Shifting Sands left the company very quietly over some reserve problems. Bob and Walt are my two associates and I've left them stewing in my office over my first review of their actuarial work.

WALTER WRIGHT: Gee, Bob, we never had to go through a review like this before.

ROBERT MICCOLIS: Yea. In the past, we just gave our results to senior management. What does this new guy know about reserving anyway?

WALTER WRIGHT: I'm worried, Bob. If he doesn't know anything about reserving, he's probably going to have us redo things the way they did them at Belly Up Fire and Marine. I just hate wasting all that time. He probably has no idea the time and effort that goes into our analysis.

ROBERT MICCOLIS: Yea. The two of us do the work of at least three people.

TOM EVERSMAN: (To audience: The Three Stooges) Walt, Bob. Glad I had a chance to review this. It's a pretty interesting report.

WALTER WRIGHT: Well, Tom, I'm not sure what questions you're going to have. We've done our analysis the same way that we've always done it. In the past we never discussed it in detail with your predecessor. After we agreed on the methods there were never any issues.

TOM EVERSMAN: No issues? You call a 80 million dollar reserve increase in one quarter, not an issue? (Laughter) I've got to get into your analysis. I mean, I've got to get to the root of this problem.

ROBERT MICCOLIS: Well, Tom, we think the numbers speak for themselves. (Laughter)

TOM EVERSMAN: As I said, I've really got to get comfortable with your analysis. I mean, you know, I have to present this stuff to the management committee on Monday. You know, I just can't go in and say, "See this paper, it has 80 million dollars on it and it speaks for itself." (Laughter) That just isn't going to fly. And I need to get more background. I really want to know, you know, what kind of qualitative factors you may have put into your analysis? I've got a questionnaire here that I picked up at the Casualty Loss Reserve Seminar. Have you guys ever seen this?

ROBERT MICCOLIS: No.

WALTER WRIGHT: No. Can't say that we have.

TOM EVERSMAN: I've circled some questions in it...you know, I thought we might go through that. We used this at Belly Up Fire and Marine. It was a pretty good source of just documenting the thought process. I know something about Shifting Sands organization. I've been here long enough for that. What do you know about changes in the organization that have occurred in the past?

WALTER WRIGHT: Well, ever since the last turn in the underwriting cycle, I noticed the underwriting and field operations staff has been cut.

ROBERT MICCOLIS: Yea. We had that claims study three or four years ago that said we ought to increase the claims staff.

WALTER WRIGHT: They're always making system changes now, but I'm not really sure what they've done at the staff level. They always seem to have an awful lot of people over there.

TOM EVERSMAN: Have you guys thought about what these changes might have done, what the impact might be?

ROBERT MICCOLIS: No.

WALTER WRIGHT: No.

TOM EVERSMAN: Well, we may have to come back to this. It's pretty important. Why don't we go on? Let's take a look at Section C. How do you guys keep on top of what's happening in the underwriting area?

ROBERT MICCOLIS: Walt, if you're always having lunch with Harry, our underwriter, do you get a lot of information out of him?

WALTER WRIGHT: Well, we do have lunch about once a month. I try to get the scoop on their programs. But he's always complaining about his IBNR allocations. Whenever I ask him about underwriting issues he just tells me they write nothing but the cream of the crop.

TOM EVERSMAN: Did you say crop? (Laughter) Okay. Let's go on. Do you get the underwriters procedures or guidelines?

ROBERT MICCOLIS: Well, I've seen them, but we're really not sure what to do with them.

WALTER WRIGHT: They've got all this information about "excluded classes" and "refer to home office." It's all qualitative. There's no easy way to work it into our numbers.

TOM EVERSMAN: Did you think about comparing the guidelines over time, maybe? You know, what changes have occurred? Look for changes in the field underwriting authority that might impact things? Changes in the impact of the staff levels?

Have you guys gotten into an underwriting audit?

WALTER WRIGHT: Are you kidding? Even if we wanted to they wouldn't let us.

TOM EVERSMAN: Let's just go on. Let's look at questions three and four, here. What about the mix of business? Has that changed at all?

ROBERT MICCOLIS: Well, in comp we stopped writing that long-haul trucking business last year.

WALTER WRIGHT: The only thing that I'm aware of is that big effort in the small business marketing area to go after tanning salons and it's really been growing.

ROBERT MICCOLIS: Yea. They're really going to get burned. (Laughter)

TOM EVERSMAN: Okay. Let's go on to question eight. How do we reserve for the residual market?

WALTER WRIGHT: Well, Tom, we basically don't reserve for that. Accounting does that. They just book what's reported to them.

ROBERT MICCOLIS: We do have the Minnesota comp pool in our data and the South Carolina JUA. We haven't been able to get them out of our data.

TOM EVERSMAN: But, you know, like...

WALTER WRIGHT: Well, there are a few exceptions. And, of course, with our systems department you can never really be sure what's in there. (Laughter)

TOM EVERSMAN: But, how have you evaluated the reserves for pools, residual market stuff?

WALTER WRIGHT: Like I told you, Tom. The residual market reserves are handled by accounting and they book what's reported to them.

TOM EVERSMAN: But accounting is not actuaries. And we must do some sort of evaluation on those reserves. I mean, it's our responsibility. I have to sign the damn certification. And how do we find out what's in the database? Let's try question nine. (Laughter) Pricing does a lot with this stuff. I mean, there is the change to ISO loss costs. They must be working with this data. Have we looked at the impact of the pricing assumptions on our reserving?

ROBERT MICCOLIS: Well, I'm not really sure what that has to do with reserving.

TOM EVERSMAN: Well, like don't you use methods that rely on earned premium, like the Bornhuetter-Ferguson?

WALTER WRIGHT: Well, we use a variation called the Ron II method. (Laughter)

TOM EVERSMAN: But, you know, don't you use pricing or relative pricing to pick initial expected loss ratios?

WALTER WRIGHT: Well, actually no, Tom. Because the approach that I use is first to do a loss development method to get a set of ultimate loss ratios and then I plug those into the Ron II method.

TOM EVERSMAN: But doesn't that give you the same answers?

WALTER WRIGHT: Yes, Tom. That's the beauty of it. (Laughter) I'll tell you senior management loves to see the consistency of the two methods. (Laughter)

ROBERT MICCOLIS: It really increases their confidence.

TOM EVERSMAN: It's not the Three Stooges, it's Laurel & Hardy. (Laughter) Let's go on to question ten. How do we monitor pricing levels?

ROBERT MICCOLIS: Do we do it for personal?

WALTER WRIGHT: Yes. For auto, for example, we have rate changes by state, by year, both indicated and approved.

ROBERT MICCOLIS: And for our commercial book we have price monitoring systems that keep track of percent of manual premium.

TOM EVERSMAN: What about workers' comp and SMP? That seems to be where we are having our reserve problem.

WALTER WRIGHT: For comp it's all bureau rates. The package business is all priced in pieces, the schedule credits, the deductible credits. They make it almost impossible to keep track of them.

TOM EVERSMAN: You know, I got a report from the President on pricing. It's an underwriting report, but have you guys ever seen it?

ROBERT MICCOLIS: No.

WALTER WRIGHT: No. It looks like a pretty convenient summary of pricing activity.

TOM EVERSMAN: We'll have to get you on the distribution. It might be worth your while to look at that history. Let's look at question eleven. Have we compared the data between, you know, what we use in reserving with that for pricing?

ROBERT MICCOLIS: Well, pricing...they look at all that classification data and they look at all the competitors rates on product line basis, not even by annual statement.

WALTER WRIGHT: In our reserving analysis, we have to support the annual statement, so we can't use that pricing data.

TOM EVERSMAN: But, have the two ever been reconciled?

ROBERT MICCOLIS: Well, once in awhile we have to come up with something to answer questions from regulators.

WALTER WRIGHT: We always seem to be able to come up with some kind of a response. (Laughter)

TOM EVERSMAN: I know they've been doing a lot of work on workers' compensation pricing and looking at ultimates. Does the incurred to date match for workers' comp? I mean, that's where we have our problem

ROBERT MICCOLIS: Well, you know Tom, one of our actuarial students recommended comparing that. Maybe we ought to reconsider it.

TOM EVERSMAN: Maybe we ought to promote the actuarial student. (Laughter) Let's move on to claims. I know that they have regular meetings and we used to have them at Belly Up. Have we got any history of, you know, settlement rates, for example?

WALTER WRIGHT: Not yet, but I'm expecting it either later today or tomorrow.

TOM EVERSMAN: Well, that could very well have an impact on these reserve indications of yours.

ROBERT MICCOLIS: Well, gee, Tom, we've only been doing this for two months. We're really not quite sure how to handle this yet.

WALTER WRIGHT: We're definitely planning to do it for the fourth quarter review and we'll be able to incorporate any changes in settlement rates into our analysis then.

TOM EVERSMAN: But this is the third quarter. We've got an 80 million dollar reserve issue. We're not sure if these numbers are going to hold together. There's a lot of loose ends in the analysis. You haven't answered these questions. I've got a President that I have to deal with who is concerned about these numbers and, obviously, the impact on earnings per share. We know that comp is the big problem. And it's at least half of the increase in the reserves. If you are going to get this additional claims information tomorrow, you might want to work with that.

WALTER WRIGHT: Well, we'll rework the numbers and see if we can get them down some. (Laughter)

TOM EVERSMAN: Well, I've got a management meeting next week and I think we ought to get together on Monday and see what your revised indications are.

ROBERT MICCOLIS: Okay. That means working the weekend, I guess. (Laughter)

TOM EVERSMAN: Well, you know the idea is not just to get the numbers down. What we are really looking for is the right number. You know, I think if you focus on the workers' comp for the third quarter with the other lines pricing changes...decreases...you know the reserve changes there might not be a surprise.

ROBERT MICCOLIS: Tom, we haven't talked about this other stuff in the questionnaire, about ceded reinsurance, systems, accounting.

WALTER WRIGHT: Couldn't we work on things in the fourth quarter?

TOM EVERSMAN: I think we'll have to. You guys have never been to a loss reserve seminar?

WALTER WRIGHT: No.

ROBERT MICCOLIS: No.

WALTER WRIGHT: The questionnaire seems interesting though. We just haven't attended any seminars. We've been on a real tight budget for the last several years. We're only allowed to go to one meeting a year.

TOM EVERSMAN: Well, you ought to go to this. I'm sure you'd rather go to Boca than D.C., but it's a great meeting. I got this questionnaire out of a session called "Looking Beyond The Numbers." It was a great meeting. They've got some other good stuff too.

WALTER WRIGHT: Well, we'll plan to go next year then Tom.

ROBERT MICCOLIS: Great.

TOM EVERSMAN: Well, you guys, I will leave you to work on this over the weekend and I'll call you in the office to make sure that it's going well. (Laughter)

ROBERT MICCOLIS: Okay. I hope you enjoyed that. We're going to go on a little bit and I'm going to ask Walt and Tom to give their personal thoughts and experiences about the overall process and with dealing with this type of qualitative information. And Tom is going to start? Or Walt?

TOM EVERSMAN: I just have a couple of more generic comments about the type of interchange that we've had and that is, in my experience, there are two things, communications and relationships with the departments. If you are in a company, build relationships with people in claims, people in underwriting, people in MIS. If you are a consultant and you're repeating a relationship with a company, build the same relationships. And the amount of information you get out of that is tremendous. It's essential. We at PSM have quarterly meetings with our claims department and it usually reveals something pretty interesting. You know, some change that they may have made that we'll know about in advance of our analysis.

(End of Side One)

...that's the story of sitting down with a bunch of triangles and saying, okay, this is going to be a piece of cake. We'll walk through it. And one year we did our projection of our suit claims, the subject of this skit, and everything was great and you flip along and all the development factors are terrific and you get out here on the tail and there's like a 1.1 factor after 1's for years. And it's like, you know, what are we doing with this? We had just met with the claims department. They had an annual inventory that they filled us in on all that. Oh yea, the files matched to the statistical runs and everything is great. One thing that they didn't tell us was that they had changed their inventory to include whether or not the proper indicator was on the claim, as to whether it was in suit. And they fixed a whole bunch of them. There was like a hundred claims. It wasn't much, but they fixed them all at one time and it just blew the projections out of the water. Things like that, you know, you get into it and it just sort of ruins your day when you are in the middle of analysis. So, you know, the more you can talk to these people. Sit down with them as often as possible. Even, you know, hallway conversations you pick up things that will help you with your analysis. It is really vital.

WALTER WRIGHT: Okay. I'd like to just offer five non-technical common sense tips. I think they all kind of tie in to the first skit that Tom and I did this morning.

Number one. Be prepared. Start with a comprehensive list of questions like the ones that we're passing out in the room today. Otherwise, you'll risk overlooking a whole line of questioning, such as ceded reinsurance or changes in a company's data processing procedures. Further, if the quality of your analysis is ever brought into question, having a comprehensive list of questions in your work papers may serve as documented evidence that you began your analysis in accordance with sound actuarial principles. So to be professional, be prepared. Use this questionnaire.

Number two. Don't be afraid to ask dumb questions. Ask for definitions, clarifications, explanations. Your role is to obtain information, not to show how knowledgeable you are. Don't let your ego get into the way. If you did not understand something, ask. If you're not sure if you understand something, ask. Even if you do understand it doesn't hurt to ask. In fact, by playing dumb you may find out things that otherwise you'd never learn. So ask dumb questions and learn all you can.

Number Three. Focus on the important issues. Don't get side tracked on irrelevant issues, no matter how interesting they may be to you. As you gather information, sort the important issues from the immaterial and keep probing the important issues. If you don't go through this sifting process, you're apt to end up with a lot of information, but little in-depth understanding of the critical items. So keep your focus on the important issues. Keep narrowing the focus of your inquiry in order to reach the best professional opinion that you can.

Number Four. Be persistent. Don't be overly concerned that your questions might be annoying. Your analysis will be judged by its thoroughness, not by whose feathers you ruffled. Be persistent in requesting what you believe is important. To do your job right you need to dig and to probe. If the specific wording in a commutation agreement appears to be important to you, don't be satisfied until you get a copy of it. If data on large losses is important, but not readily available, don't be satisfied until you receive it. Be persistent, so that your final opinions will be based on all the important information.

Number Five. Plan to ask a second round of questions. After you gather your initial information you should begin your numerical evaluation. But keep in mind that this may be a preliminary analysis. As you do your calculations, new issues will surface. Then you can focus your investigation and ask another series of questions if necessary. You have no obligation to stick with your preliminary findings. Your obligation is to go through the iterations necessary to be satisfied that your estimate is the best that you can develop. So recognize at the outset that a second round of questions may be necessary.

To summarize. Be prepared. Don't be afraid to ask dumb questions. Focus on the important issues. Be persistent. And plan to ask a second round of questions. I think these five simple tips will help ensure that you perform your job as an actuary.

ROBERT MICCOLIS: Thanks, Walt. The questionnaire that we gave out really, in some context, could be used as an interview guide. In another context, it could be used as a checklist. And that's what Walt and Tom are trying to illustrate.

You're not necessarily going to be able to take those questions and hand them over to somebody in a company and say, give me answers to all these questions. But, in some cases, you'll have to give some of the questions so that information can be collected and put together.

Now, we always have a problem with this session, unlike the other sessions that go overtime. We have a few more comments, but we'd like to get comments from the audience and any personal experiences that people would like to share. We don't have a whole lot more, but we would like to get some people's individual experiences. So, while you're thinking about that, do I have any volunteers. Come up to the microphone. Tell us your name and affiliation.

QUESTION: Hi. My name is Phil Presley. I'm an independent actuary. My question is, because I've faced the kind of problems that you're talking about, you don't really get answers, say, from the head of claims department and so forth. How do you face that problem?

ROBERT MICCOLIS: Do you want to try?

WALTER WRIGHT: Well, I think...of course, in this skit, the way it was designed we just showed me interviewing one person.

QUESTION: Yes.

WALTER WRIGHT: Normally, in any loss reserve evaluation, we would expect that if it's an independent actuary that's brought in, and likewise if it's an in-house actuary doing the evaluation, there would be meetings with each of the major departments...the claim department, the underwriting department, the data processing, etc. And I think anybody using this questionnaire that we passed out will find that to use that effectively they really should work through each department. Now in doing that, if you start with the department heads you'll often sense areas where it is probably better to try to go the next step and poke around more at the next level to try to develop more information. I think the key thing is you want to develop enough information so that you're satisfied that you have a basic understanding of the company's operations.

ROBERT MICCOLIS: One of the things that's worked for me is setting something up where it was part of the process to actually look at claim files. Now, physically looking at the claim files you only get certain information not being a claims person, but then you had to be able to talk to somebody about the claim file. So in talking to somebody about the particular claim files, you get information about how they look at the claim because they are focused on an individual file. So spending a day looking at claim files with access to the adjusters who were handling the claim files, gives you information about how they are setting reserves, how they're paying reserves, without asking them a series of interview questions. You're just more practical down to an individual file.

QUESTION: Is there any practical purpose in going back historically and attempting to establish how they set the reserves, say, five years ago?

ROBERT MICCOLIS: Well, if you're looking at incurred analysis you have to try to go back and find out what changes they've had and in some cases where there has been wholesale, rearrangements of staff and procedures, I mean, that creates an actuarial problem and you can't rely on that data.

QUESTION: True.

ROBERT MICCOLIS: But at least you know that. At least you have the information to know why. You can't rely on it.

QUESTION: Thank you.

ROBERT MICCOLIS: Let's have another volunteer.

QUESTION: I'm Gail McDaniels from Chuckerson Insurance of New York. I believe we recently...did the training NAL exam with the state of New York and the actuary who did the exam acquired, basically, all the information on the list, you know, that you've given. So the fact that I keep all this documented in my files means I don't have to do it again, when the state comes around to do the training NAL exam.

TOM EVERSMAN: That's a really excellent point. We are in the course of an exam by the state of New York and we've done, over the past year or two years, a much better job of documenting the changes that occur in data over time. The things that we talked about here about the case reserve strengthening and the increase...or acceleration in paids really happened in my company. It was a nightmare, because you didn't know which way to interpret the data. And it was really tough several years ago to prove the point or at least bring it out. Now we've got that documented and we submitted all of that too. It helps.

ROBERT MICCOLIS: There was another comment in one of the years past that it is sometimes helpful, when doing this, especially if it's done in an interview talking to someone, to have two people on the question-asking side. Sometimes doubling up seems a little overkill, but what it does is to help the interview dynamics and one person can be asking the questions while the other person is paying attention to the answers. And it actually helps the interview go smoother and get finished better with getting more information. So that with two people there it is a little easier to get through it and they can cycle back and forth if one didn't pick it up maybe the other picked up an inconsistency and can get it taken care of, rather than three days later having to realize that something was missed.

Any more questions or experiences?

WALTER WRIGHT: I'm just wondering, Bob, in the audience there must be a number of company actuaries, a number of consultants, a number of non-actuaries. I'm wondering, for example, for the consultants, if...I would think that they might have some input on the problems that they bump into.

QUESTION: Janet Cappers. Well, we make an effort to talk to our claims people on a regular basis. And recently, in a number of lines of business, we've seen almost no incurred losses or they've actually been negative. And so we keep going to the claims department and saying, you must be weakening the reserves. What are you doing differently? And we, of course, get the standard answer, oh, we have this review schedule. We see them every six months. Well, it's only recently, I'd say in the past month, that we've discovered that the difference is that the reinsurance claims department, which is separate, has all of a sudden really gotten active in trying to clean-up the reinsurance part of the business and that's why we're seeing almost no activity. Now we've got to go back and start figuring out, can we sort this out to find out what was happening on the underlying business, if we can take out all of the reinsurance activity transactions?

ROBERT MICCOLIS: Thank you. There was another session at the seminar on presentations to management. And one of the things illustrated here is that management really needs to understand what is going on, especially if there's a change. And it's only by digging and trying to get the information, trying to find out what's happening in claims and ceded reinsurance and in the other areas, that you'll have an explanation for why any blip in the experience is occurring. And since they are responsible for running the company, they really need that information and they look to us as professionals to provide them that information.

Do we have some more questions?

QUESTION: Mine isn't really a question, but I work for a somewhat small company in Illinois and at reserving time we'll deal with the claims department, underwriting department, MIS department and sometimes I find that I feel like I'm a policewoman, you know, that's out there saying, what are you doing here and often times the people in those areas get very defensive about you coming in asking questions about, are you doing anything wrong. And I wondered if other people experience that. It's not like, oh, here comes the actuary...you know.

TOM EVERSMAN: I've certainly experienced the same thing. It's like the example I gave with the suit claims. You're right in the middle of analysis and you run down there and say, what are you doing? Yea. You're in the middle. You've got to get a job done. That's why it's a lot better to take the time and it's hard, you know...it's easier to coast, but to take the time to get down there, in between, and just like, you know, what's going on. You pick up a lot more and then you kind of know what to expect. You know, if in this case they had said, gee, we're going to do an inventory and we're going to check suit status, I would have immediately said, I bet you I'm going to find a blip. You know, and then it would have been there and I could go down there and say, does this look reasonable, instead of running them with a piece of paper and saying, it's 1.1 here...what is going on?

WALTER WRIGHT: I think as a consultant coming in from the outside to a company, it is perhaps often easier to meet with the people. When you're in a company I suspect often if you have not been in the habit of meeting with these other departments, then the first time kind of breaking through perhaps can be difficult. Within a lot of companies I think the actuaries will meet with the other departments on a regular basis and really over time develop close enough relationships in the various departments that those other departments then are not only used to answering questions but are often even proactive and will let the actuaries know ahead of time the changes and so forth that they are making. And I think that whole process then gets to be a lot easier.

ROBERT MICCOLIS: One of the things that also came up in a question in the past was whether things should be in writing. Whether the questions should go out in writing and the answer should come back in writing. And as you can see from the skit, sometimes you won't get information if it's all in writing. But, one suggestion was to try to do a combination of asking some questions in writing, some questions in meetings or in interviews and then provide back to that individual what is your understanding of it is in writing. So they get back in writing what your understanding of what you've found and what you've discussed with them, so then they can react to that and say, no that's all wrong or yes, that's right. That way you have a mechanism for cycling back without having to have more questions and more interviews and more meetings.

Other questions, comments? Here comes one.

QUESTION: I'm Hank Gartland with USAA and I think we have a pretty good rapport with our claims system, but the one thing that we seem to have a problem with is when it comes to handling or setting reserves for bad faith claims. Everything when it has to do with bad faith claims is sort of a secret. And a lot of this handed on little pieces of paper is placed away in a drawer and you just have a horrible time getting information out of our attorneys about bad faith, because I think they're afraid that if they frontally have any records on these bad faith claims, they are admitting that we do, in fact, have an exposure there. Do any of you have any ideas or have you had similar experiences with this? Or have any ideas of how we can alae the fears of some of our claims handlers and attorneys regarding this?

ROBERT MICCOLIS: I guess I would ask a question of the audience at first. I would suspect that there are probably...within companies different ways of accounting for bad faith claims. I suspect some companies will account for them with the losses, where other companies might separate them and count them as kind of a business expense outside of the loss reserving process. I'm wondering if anybody can comment on that or if there are any accountants in the group, whether they can comment on what they see with their clients.

COMMENT FROM AUDIENCE: (Inaudible - Not at microphone)

ROBERT MICCOLIS: It's within the loss adjustment expenses or other expenses?

COMMENT FROM AUDIENCE: Yes.

ROBERT MICCOLIS: Loss adjustment expenses.

COMMENT FROM AUDIENCE: Right.

ADDITIONAL COMMENT FROM AUDIENCE: (Not at microphone) ...loss adjustment expense (inaudible) have the problem of getting the information (inaudible).

ROBERT MICCOLIS: One thing when it comes to information and files that are kept, I know that in some claims departments they actually keep the files locked up and only certain people have access. And what I've done is say, well, put me in a room and let me look at the files and I won't write down the name of the cases. And they can look at whatever papers I have. They can review the papers before they're given to me for my files. And we'll label it something else. We won't call it bad faith claims, we'll call it other loss adjustment expense to alleviate their concerns of that problem. It will be labeled something else and there won't be any memos on particular cases. And there won't be any memos on the particular reason for that expense, but internally people will know what it is.

QUESTION: (Not at microphone) I just have to comment (Inaudible) client. Our first meeting is (inaudible) for the fire actuarial report. I think (inaudible) that's one point. And another is if the changing actuary...find out why. A lot of time (inaudible) not satisfied with (inaudible).

ROBERT MICCOLIS: Those are good, good comments. Anybody else? Questions? Comments? Stories to tell?

QUESTION: (Not at microphone) Going back to the first skit, I have a question. Do you think a consulting actuary should look at the overall (inaudible) part of the questionnaire (inaudible) my reaction to that would be, that's a line of business in

Schedule P that doesn't incur a Schedule P penalty on page 3. Data doesn't (inaudible) and inflate the surplus (inaudible) say what the company surplus was, but that could be one (inaudible).

ROBERT MICCOLIS: Well, I think that any consultant doing a loss reserve evaluation for a company needs to be very much aware of what the surplus position of the company is and so forth in its recent and future...expected future financial results will be. The way that that is worked into the specific loss reserve opinion is kind of another question, but certainly in a situation where you realize that the surplus is pretty thin, then things that you observe in the way the company is allocating reserves within Schedule P and so forth are clearly...I shouldn't say clearly, but they certainly are apt to be done with that motive of improving surplus. And you should be aware of that and determine whether that makes sense.

Okay. I don't see anymore hands up. I thank you. We got done a little bit early here. One of your sessions that actually gets out early.

LOSS RESERVE QUESTIONNAIRE

A. PURPOSE

This questionnaire is intended to develop information on:

- The major internal and external factors affecting the analysis and establishment of loss and loss expense reserves
- The general methods currently used to establish the company's loss and loss expense reserves
- The data needed to evaluate the company's reserves

B. BACKGROUND AND ORGANIZATION

1. Briefly describe the company's operations. Include a brief history of the development of the organization in terms of its primary purpose and fields of activity.

2. Provide an organization chart and a description of the major functional responsibilities at each level including both branch and home office areas. Include the number of employees in each functional area. Describe any significant changes in the functional structure of the organization or in staffing levels in the past few years.

3. Describe the company's major business segments. Include a profile of the company's business by major segment in terms of types of insureds, geographical distribution, lines of insurance, limits and deductibles, and any special coverages offered. Provide information by segment on the number of policies written and direct/net written premiums for the past five years.

C. UNDERWRITING AND PRICING

1. Describe the underwriting management organization. Who is responsible for underwriting overall and for each major business segment?

2. Describe the underwriting process for each major business segment and any changes in underwriting that have occurred over the last five years. Furnish information about the following areas:
   - Underwriting manuals, written underwriting procedures, and risk selection guidelines
   - Underwriting authorities (internal and external)
   - Rating methods and procedures including classification systems

- Rating plans (e.g., experience rating, schedule rating, retro plans) and dividend plans
- Excluded classes, maximum limits, eligibility requirements, etc.
- Underwriting reviews
- Audits, inspections, or other reports

3. Describe each major business segment in terms of the underwriting characteristics (by line or by program) over the last five years. Indicate any major shifts in business, canceled programs, and any significant changes in coverage terms or pricing. Also, describe any major changes prior to the latest five years for any long-tail lines of insurance.

4. Provide a profile of premium volume for each major business segment as follows:
   - By state and major cities
   - By size of risk
   - By major risk class
   - By rating plan including retros and variable dividend programs

   Have there been any significant shifts in the composition of these profiles within the past several years?

5. Describe any large or special risks that are not characteristic of the book of business.

6. Describe any material changes in policy forms and provide a copy of non-standard policy language.

7. Have there been any changes in policy term, e.g. six month policies vs. annual? Are any policies written for a term longer than one year?

8. How is business recorded for assigned risks (or other residual market mechanisms)? Has the company experienced any major changes in this area?

9. Describe how the company establishes its rates and price levels for each major product line including the use of bureau rates and deviations. Have there been any changes in these ratemaking procedures? Indicate the extent to which market conditions have dictated previous and current rate levels.

10. Outline any price monitoring systems in place for the past three to five years. How is the level of premium adequacy determined for the past two to three years? Have any corrective actions in pricing or underwriting been taken in the last three years?

11. Compare the data used for ratemaking with the data used for loss reserving.

D. CLAIMS OPERATIONS AND CASE RESERVING

1. Describe the claims organization and the distribution of responsibilities for administration, investigation, litigation, case reserving, settlement, and salvage/subrogation. Discuss any significant changes in the claims operations that have occurred in the past several years.

2. Describe the procedures for monitoring and settling claims including the use of outside adjusters and for handling litigated claims including the selection and monitoring of outside defense counsel. Briefly discuss the claims administrative process including initial reporting, review (diary) system and settlement authority levels. Provide a copy of the claims procedures manual and any bulletins or memos relating to claims procedures.

3. Discuss the average caseloads of the claims personnel. Have caseloads changed materially over the past several years? What has been the claims backlog situation and how is it controlled? Indicate the performance measures used to evaluate the claims personnel, particularly any quantitative factors that relate to number of cases settled, average settlement amount, and settlement amount vs. case reserve.

4. Describe the company's specific guidelines or objectives in setting case reserves. Have there been any changes in these guidelines over time?

5. Are any claims reserved through the use of formulas? If so, describe the types of claims using formulas, the formulas, and any changes to the formulas over time.

6. Discuss how the company sets case reserves in terms of their current value (if the case were to settle today) and projected ultimate settlement value (allowing for future inflation). Indicate any historical changes or developments that may have had an effect of the historical reserve patterns.

7. How are case reserves established when a claim is first reported? Are there any cases that use initial formula (average) reserves, "no reserve" or "one dollar" reserves. How are incidents recorded?

8. Discuss the procedures used to review or audit case reserves. Are claim files evaluated by an independent consultant or outside party? If so, how often?

9. Has there been an audit of the claims department? If so, outline the results of this audit.

10. Do the case reserves include a provision for allocated loss adjustment expenses? Is there a separate case reserve for these expenses? When are these expenses usually paid?

11. How does the company test the adequacy of its case reserves?

12. What has been the company's philosophy and practice on settling claims vs. a rigorous defense? Any changes in this area?

13. Describe any special procedures or guidelines for very large or catastrophic claims or for unusual claims (asbestos, DES, environmental impairment or other toxic torts).

14. Have there been any noticeable changes in:
    - settlement rates
    - reporting patterns
    - claim litigation rates
    - average settlement costs
    - number of small vs. large claims
    - number or amount of reserve changes
    - number of questionable or fraudulent claims
    - number of claims closing with no payment?

15. Describe the process for establishing IBNR (or bulk) reserves. Outline the methods used to establish Annual Statement loss reserves (including IBNR) for each line of insurance. Provide supporting documentation for the Annual Statement reserves including any internal or external studies, audit reports or actuarial analyses of the company's reserves. How often are reserve reviews conducted?

16. Describe and supply documentation for the determination of allocated and unallocated loss expense reserves.

E. CEDED REINSURANCE

1. Describe in the company's external ceded reinsurance program(s) by line or major business segment. Provide the following information by year:
   - use of treaty and facultative reinsurance
   - use of excess of loss and pro-rata reinsurance
   - use of portfolio transfers
   - major reinsurers
   - retention amounts
   - reinsurance limits (layers)
   - use of aggregate deductibles, aggregate limits, loss ratios caps
   - treatment of allocated loss adjustment expenses

- details on any reinsurance subject to retrospective or loss-sensitive rating where additional premiums are possible
- details on contingent commission arrangements

What major changes have been made to the ceded reinsurance covers over time?

2. Have there been any commutations of the company's ceded reinsurance? If so, describe the details of the transactions.

3. Has the company evaluated the collectibility of its ceded reinsurance? If so, describe the portions that are considered uncollectible, the basis for that determination, and how the uncollectible reinsurance has been recorded.

4. Describe how reinsurance recoveries are recorded for paid losses, case reserves and allocated loss adjustment expenses. Can historical loss development statistics be produced on both a gross and net basis?

5. Is there any unresolved litigation regarding the company's ceded reinsurance? If so, outline the nature of the litigation and the potential magnitude of the recoveries.

F. SYSTEMS AND ACCOUNTING

1. When are the data files closed at the end of the various accounting periods? Have there been any changes in these procedures?

2. Have there been any changes in the data processing system that have caused changes in the rate at which claims are processed and entered on the books?

3. Have there been any material changes in coding or data processing procedures that would affect the consistency of the loss payment or reserve data over time?

4. To what extent are the loss reserve data audited or verified against source documents, Annual Statements, or other company reports?

5. Does the company utilize a "fast-track" procedure for certain claims? If so, how are such claims defined and has the definition changed over time?

6. Does the loss development history include payments that have been made but were not yet entered into the data system? If so, how are these payments recorded to accident period, line of business, etc. How are such payments reported in the Annual Statement?

7. When partial payments are made, are the case reserves automatically reduced by the amount of the payment? Is it possible for an outstanding case reserve to be negative?

8. How are deductible reimbursements recorded? Are loss payments reduced by actual received reimbursements and do case reserves reflect expected duductible reimbursements? How are allocated loss adjustment expenses affected by deductibles?

9. Provide the definition of a "claim" as treated by the system. Indicate how multiple claimants from a single accident or occurrence are handled and how claims are recorded for each coverage (e.g., BI and PD).

10. How are reopened claims coded with respect to the report date of the original claim and the date of reopening?

G. EXTERNAL ENVIRONMENT

Describe any recent changes in each of the following areas that you believe may affect your underwriting or claims. If applicable, specify the lines or business segments affected.

1. Legal and judicial (specify state(s) if applicable)
2. Statutes or regulations (specify state(s) if applicable)
3. Social climate

4. Economic (e.g., rate of inflation)
5. Competition (particularly how it relates to pricing decisions and quality of business)

H. SPECIALS

Has the company had any significant business that falls into the following categories:

- Managing general agents (MGA's) or underwriting managers
- Reinsurance assumed
- Excess coverages (e.g., umbrella liability)
- Financial guaranty insurance
- Financial reinsurance (loss reserve buy-outs or loss portfolio transfers)
- Pools and associations
- Fronting for self-insurance, captives, risk retention groups, etc.
- Professional liability, errors and omissions (E & O), Directors and Officers (D & O), medical malpractice

1991 CASUALTY LOSS RESERVE SEMINAR

6G: REGRESSION METHODS IN LOSS RESERVING

Moderator

Robert J. Finger
Milliman & Robertson, Inc.

Panel

Tapan S. Roy
Liscord, Ward & Roy, Inc.

MR. FINGER: This is session 6G, Regression Methods in Loss Reserving, and I'm Bob Finger. I'm a consulting actuary with Milliman & Robertson, and I will be the moderator.

The abstract that went out in early June was a little bit different than the session that we intended, and I hope everybody didn't come to hear about the Kalman Filter and boot strapping.

We are going to talk about loss reserving and the abstract that's in the program guide that you received here is the correct one. And I apologize for any problem. The session we wrote up, I think, we'll have next year, but we were just a year ahead.

Handouts at the back. If they are all gone, just give us a business card. We can give you some more. This session is being recorded. If people have questions, please use the microphones so that we can pick up what the question is. At the end of the session, please hand in your evaluations. Also, I'm reminded to say that the opinions expressed here are not necessarily the opinions of the sponsoring organizations.

Now, what I'd like to do is give some part of an extended introduction to regression methods, discuss them from a practical standpoint, and then Tapan Roy will give the bulk of the presentation and get into more of the mathematics and the nitty gritty.

I think the first question that comes to mind is: Why doesn't everybody use regression all the time? And first of all, what is regression? Okay. I'd say it's basically just a statistical approach to loss reserving, for stochastic modeling. Why doesn't everybody use regression? I list four reasons here.

The first one and the last one really tie together, but I'd say, basically, there's a problem that the methodology is very difficult. Something that we aren't used to using, necessarily, even though we're, basically, using statistics, we're statisticians, but it's a level above, maybe, what we normally do. It ties together with my fourth reason, which is the models that are currently available tend to be fairly simplified. And so if we had a more complex model, the methods get even more difficult. I think that that's the reason that regression isn't used more often.

The biggest question I would have is: Does regression actually work? My second question. Three years ago we did an advanced case study at the CLRS. We had four people analyze a difficult data set and come up with their estimate of what the answer should be. One of those methods was a regression method. There were three others that were more traditional methods.

In Session 7G, just after lunch, we're going review what's happened to the first three years of that development. And as it turned out, so far, the regression method hit pretty much on the head. And one of the traditional methods hit pretty much on the head. And two of the traditional methods didn't work too good. If we look at that particular data set, we know that the answer isn't in after three years. We really are not very far along. So it could be that the future will be a lot different.

I think another reason that regression isn't used a lot is that it's very difficult to explain. As actuaries, we always have to explain what we're doing. We have to explain to regulators, to underwriters, to accountants, to top management. Regression methods are just much more difficult to explain.

Okay. In terms of modeling, I think regression models have to develop at least four additional aspects before we get a good solid model that we can use all the time. Let's look at the typical loss development triangle. For this purpose, I have accident years going down and development years going across.

The problems that are difficult, usually, are the two corners of the triangle. So in the upper right-hand corner we've got what we might call tail factors. And in the lower left-hand corner we've got the most recent accident in that year.

Normally, when we do tail factors from a traditional basis, we either make a guess or we look at industry factors or we use a broader base of information. If we're down at the lower left-hand corner, we may use exposures or loss ratios, or the Bornhuetter-Ferguson.

I think for regression to really work well, we have to blend all of those things into the same model. And one way of doing this would be to use some kind of a Bayesian approach, where we would have some prior information about what the tail would look like or some prior information on pure premiums or loss ratios.

Another thing that I think we have to develop in a good regression model would be the use of claims development or claim count development, as opposed to just payments. Most of the models that exist are looking just at the payments made from an accident year and a development year. We obviously have some additional information if we know how many claims have been closed per period. So we want to build that in.

And a fourth thing that I think we ought to add, too, is the information that is available on case reserves. So if somehow we could build that in, that would help us. So I think if we took the standard regression model now, where we're modeling payments, we add to it the other information that we have, case reserves, tail factors, pure premiums, things like that, and if we can somehow develop the mathematics to put it all together, then we'll have a very good model. And I think it's something that will be used.

Now, what are the advantages of doing regression? Basically, it's just a more scientific process. We do things with rigor. We do stochastic modeling, and we realize that we've got random variables that we're trying to model. I think an important advantage is really the second and third factors that I've listed there, that go together, that we can set up an integrated model of all of the developments and then, when we estimate our parameters, they're consistent with all of the data.

I think that's a potential advantage of regression models. The difficulty of course is that when we look at the whole triangle, it may be developed out of a lot of different processes. There may be things that are changing. The coverage is changing. The book of business is changing, and we need a good way of trying to build in those changes into our model.

Another potential advantage of regression models is they tend to have fewer parameters. We explain all the past experience by, maybe, two or three or four different parameters. If we look at a traditional model, we've got 20 different things that we're trying to estimate. Generally speaking, in statistics, the fewer parameters we have when we project ahead, we're going to have a smaller standard error or better prediction. So we generally want to have fewer parameters.

Another potential advantage, I think, with regression methods is that we can come up with a better estimate of what the variability in our projection is. I think this is a fairly difficult area, though, to get the mathematics out, because when we model things, we're looking at the past. We're explaining the past. When we're projecting things, we're going off into the future, and a good explanation of the past doesn't necessarily mean a good explanation of the future. So our variability of end results in the future could be quite different.

Originally, I listed flexibility as an advantage of regression. I'm not sure that it really is, because of the difficulties in the mathematics. Finally, when we set up models in a statistical context, I think we look for things like, say, bias, or we're really estimating things like the mode of the distribution rather than the mean, things like that. I think if we take a more scientific approach, we tend to think more clearly about what we're actually doing.

Now, given that regression methods can help us do some of these things. How, in a traditional sense, do we actually do some of these things now? Why is what we do not absolutely terrible? And I think there are several things that explain that. First of all, we just look at a lot more information. As an analyst, if we have a lot of experience, we can intuitively try to put all of the different information together and come up with something that looks like a reasonable answer, even though it may not be exactly what we get using a statistical approach.

Okay. Now, I think before regression methods are widely used, we will need a lot more research and development by the actuarial profession. And the different areas I see are these. First of all, just in the modeling area, I think we need better models of loss development. With two or three parameters, we need to explain payment patterns or development patterns, depending on what we're using, like average claim payments over time or whatever.

Another aspect of modeling is trying to put all of the information into one structure and, then, solving for that. So putting in the case reserves, putting in the claims closing patterns, if we can put all of that into one structure and get a good answer, then, I think we'll be on our way.

Another area, I think, where we need a lot of development is the mathematics of estimating parameters. Once we get a much more complicated model, we need to be able to do the mathematics. We need to be able to do things that give us a good practical result.

Another area is estimating the predictive error. The more complicated the model, the more difficult it is to decide what the actual error is. What I've done here is put down three different types of errors.

First is a specification error, which is whether or not we've selected the right model. Usually it's very difficult to know whether we've got the right model or not. I think Stuart Klugman said in a session that if we knew what the right model was, we would have used it. So we're never really going to have a good idea what the specification error is.

The estimation error -- typically statistical methods will give us some kind of an answer for how accurate our parameter estimates are. So we have some basis there. Obviously the more complicated the model is, the more difficult it is to come up with that, but there's some hope of doing that.

Finally, statistical error -- we could call it just the process variance, we can usually measure it from the actual data. The difficulty is that when we go out into the future, we don't necessarily know that we're going to have the same process.

So, in summary, I think that regression methods, potentially, can be a lot better for us as actuaries. We can come up with better estimates. The two main areas of benefit that I see are having one integrated model that explains everything. We can estimate parameters that are consistent and explain all of the data. And the other basic advantage is that we can develop better confidence intervals, better measures of prediction error.

Now the main part of this presentation is going to be done by Tapan Roy, and he is a Vice President and Partner of Liscord, Ward & Roy. He's been there for 12 years. He has four Master's degrees from Yale in Statistics, Operations, Research, and Business Administration. And for 15 years he was director of research at Travelers. And for the last 10 years or so, he's been developing regression models applicable to casualty actuarial topics. So, Tapan.

MR. ROY: Can everybody hear me in the back? Good! I have distributed a handout. Did everybody get one? Okay!

Some of the basics of regression techniques have been covered by Bob. What I choose to do is identify for you some of the things that can go wrong, and the kind of analysis that is required to identify and correct them. The most difficult part of modeling is structure identification.

Due to the shortness of time, I shall rapidly go over some of the things in your handout, and touch upon some important concepts you should be aware of. If I have some time at the end, I will show you some computer outputs. Now, --- how many of you have used regression techniques in your work? Well, --- how many of yo are happy with the results? All right.

I'm going to flip over some pages that are quite basic, but let me point out a few important things. One of the first things you should consider is data organization even before you begin the analysis. Now remember that in regression you are trying to identify and then mathematically capture the underlying pattern in the data. This suggests that unless there is a systematic pattern, no technique will allow extrapolation. We can extrapolate, but the results will be meaningless. There are many ways in which data can be organized. The various options available to you are suggested on the page titled Data Organization. The whole issue of whether regression is going to work, in truth whether any method is going to work, is completely a function of how strong an underlying pattern exists. Now don't forget that traditional methods of development factors, or chain and ladder methods, are single parameter, period to period, regressions using ratios instead of least squares to do the estimation. Therefore data organization is common and important to any technique, and I'm sure you already knew that.

The next thing I want to point out to you is that there are regression techniques, and then there are regression techniques. Regression is a means and not an end. Not all regressions produce similar results, and they can be used and also abused. The whole issue of regression methods revolves around selection of variable and identification of model structure. For instance if you use a linear model and your colleague uses a non-liner model, and both of you have used regression techniques, the resulting extrapolations may not be the same. So it is not regression technique that is at issue. What is at issue is how well we use the tools of regression.

I am perturbed, that we have a tendency to model data and take the results at face value, and not conduct validation in more sophisticated ways. Perhaps I may be able to convince you with this analogy. In the pharmaceutical industry, before a new drug gets on the market, the firm has to go through three phases. The first is the experimentation phase, the second is the test phase, and the third is the double blind test done to convince the FDA of the efficacy of the medication.

In statistical modelling too, in the engineering environment, there are generally three phases. The first phase is the training phase, or what an engineer would consider experimentation with a training set. The second is what they call a fit set. The third is what they call the validation set. the training set is used to develop the structure of the model, the fit set to independently estimate the parameters using the identified structure, and validation set is used to see how well the model performs during forecasting. The tradeoff in losing some of the data in model development will be paid off by creating more robust models. So it may be worth your while to leave of the first few or last few diagonals in your model development phase, and use them to see how well the model projects these diagonals, before you use them for forecasting to ultimate.

There are a variety of different methods to project triangles to ultimate that have been developed, and I have listed some of them for you. I cannot review them all today. As suggested by Bob in his earlier presentation, it would be nice if sometime in the future we could take all these methods, including the traditional methods, and evaluate their effectiveness. If there were some ways in which you could classify data by some characteristics and also classify models based on their special features, and then ask if there may not be some way to match methods with data, based on some criteria of appropriateness.

Now let us look at another aspect of the data that is intriguing. We notice that the data is triangular in nature. It turns out that mathematicians, statisticians, econometricians, and others doing data analysis, are well versed in dealing with random data and also time series. They may even be experts handling data in the form of matrices. Triangulation throws a monkey wrench in most of the standard techniques developed to analyze time series or even multi-variable time series.

I am not going to do a dissertation on how we end up with triangular data. All of you are familiar with the reasons for such a data structure. But let me add some character to the data. The dimension that we called the development dimension is where the same accident period or the same exposure period is developing over time. The other dimension is between rows, which we have called the underwriting dimension, where different exposure periods are being added to the triangle. The third is along the diagonal, which is the calendar or claim adjusting dimension, where a new diagonal is added to the triangle. You can now speculate how each of the dimensions is affected by external forces and internal policy considerations.

I began to sort out the important issues by noticing that there was much in common with applications called Analysis of Variance (ANOVA) in Statistics. Now how many of you are familiar with Analysis of Variance? Okay.

Analysis of Variance, conceived by Sir Ronald Fisher, was developed to conduct agricultural experiments to determine optimal conditions to maximize yield. The object was to find the best type and levels of fertilization, the levels of irrigation, levels of sunlight and other incendiary variables that affect yield. What was done is the following: A grid was set up in a field with a certain number of rows and columns.

Along the rows were assigned different levels of irrigation and along the columns were assigned levels of fertilizer, and the yields were observed. Various questions could now be answered. For example, are the rows and columns independent? Meaning, is some combination of water and fertilization likely to produce a greater yield than the level of water and fertilizer individually? What contribution is made to the yield by each treatment? What mathematical function best describes the experimental results? etc...

If you observe the insurance data carefully, you will notice similarities. There are exposure or underwriting effects along the rows, there are development effects along the columns. In addition we have diagonal effects, which might be considered the claim settlement effect or calendar effect. This suggests that in our agricultural experiment one other treatment was applied along the diagonal.

In Analysis of Variance, in order to do estimation without bias, experiments are setup so that there are equal amounts of data along each treatment level, which would happen if the experimental grid is rectangular. Such an experiment is said to be balanced. Unfortunately, in our case that does not happen. For instance this level here in the corner has only one data point, and as Bob has pointed out, we can have problems with corners with any simultaneous estimation procedure. This isn't because the corners are special in any way, it is because there are not sufficient data there. In Analysis of Variance this is said to be an unbalanced design. The design is not balanced, in that every effect does not have an equal number of data points.

Another curious thing that happened during the agricultural experiments is that when the experiments were repeated on another plot of land, the results would not reproduce. This raised questions whether other uncontrolled factors were affecting the result. We can imagine the experiment going something like this. The same experiment is being repeated, but underneath the soil there happens to be a ledge of rock that has a certain contour. Since the ledge pattern does not replicate in every block, it contaminates the results. What we wish to do is account for this external variable that is affecting the result. If you can measure the contour of the rock for example, in terms of the depth of the rock, then you can account for the variable that is affecting the data. When you bring in an external variable into an Analysis of Variance, it is called Analysis of Covariance (ANCOVA).

One of the facts that we do agree about is that there are indeed external variables that affect insurance data. In addition to development, there are economic conditions that affect the data such as inflation, price levels, wages, etc. So, if you can bring in economic indices for a particular coverage, for example crash parts index into auto comprehensive data, or a medical cost index into workers' compensation, they begin to play the same role as the rock ledge in the agricultural experiment. The contour of the indices can be applied along any of the three dimensions. You can think of certain indices that affect the claim adjustment process, and other indices that affect the exposure or growth dimension of the data.

I'm sure you consider external indices in your analysis. You may do a trend analysis of the ultimate after development, or you might say that since the data is medical coverage data and the medical index is going up at a rate of 10 percent, we should consider a 10 percent trend in data. Unfortunately, that is not the way the data will behave. In economics we have what is known as elasticity. Right? How many of you are familiar with elasticity? Okay. Elasticity is nothing more than determining by what percent the dependent variable changes for a one percent change in an independent variable. This means that even though the medical index may change by 10 percent, it doesn't imply that the data will change by 10 percent; it could be 12 percent. It measures the sensitivity of the data to external economic conditions. The nice thing about using an econometric model is that if you use external indices explicitly, the coefficients turn out to be elasticities, if the data is properly defined.

Looking at this foil on the screen for instance, if you have an economic index that is running in this dimension here, and you use these economic indices, you can fill in this whole area, here. The parameters are optimized and you do not have to project in two steps, i.e. project to ultimate and then do some trend analysis, which may not be the best unbiased forecast. A singular econometric model therefore can be used for reserving and rate making, since you can project beyond the boundaries of the triangle data. Any questions on this?

QUESTION: Obviously there is some variance associated with the independent variables, how is that accounted for in the analysis....? (Inaudible)

MR. ROY: Although there are many ways of conducting an Analysis of Covariance, there exists something called a design matrix. The design matrix is made up of zero/one variables. They define how the row and column effects are occurring. These zero/one variables are not random variables. The external index variables used for the purpose of fitting are assumed to be given, we know the CPI for the last five years say, and they are considered to be deterministic. The problem occurs in the forecasting, and not in model development. Since you are forecasting into the future, the indices also have to be forecast. How good is the forecast of the CPI if it is used as a covariate? This is a typical problem faced by econometricians that you now will have to face. But then, you do something very similar. You project to ultimate, and then conduct some trend analysis on the ultimate values. Right? And then you extrapolate based on the chosen linear or exponential trend. Just because it is easy to forecast time, meaning six, seven, eight, follows one, two, three, four, and five, doesn't mean that you have gained any advantage if the data behavior is dependent on external economic forces and not time. What is important are the elasticities. What is the rate of change in the cost for changes in certain economic indices? The government forecasts of optimistic, pessimistic and normal scenarios are available, and you can judge the loss forecast under these scenarios. You can also do sensitivity analysis based upon projected scenarios of your own.

Now one other thought that is important. What is the difference between using triangular data for doing reserves, and using the same data for doing rates, other than for the fact that in rate making we have to trend the data into the future? The difference is that in reserving you are in an adaptive mode, in that you graduate the reserve on a regular basis, say every quarter, to estimate the deficiency or redundancy and make rates and it is published, it becomes finalized. You do not get a second chance at revaluation. Therefore, if you have one shot at doing a forecast you should be, shall I say, a lot more diligent about getting the answers right. Unfortunately, I see a lot more analysis going into reserve valuation, than into innovative techniques to project losses for rate valuation.

In addition to using external indices in econometric analysis, every once in a while you will find what are called discontinuities in the data. Discontinuities occur from various causes. A particular accident year could be aberrant due to an unusual occurrence, say a sever earthquake. The development for that year could be quite different from the other years. Such an intervention would be considered to be a spike intervention. There are other interventions that can affect more than one contiguous row, say from open underwriting for two years. The intervention would be considered a box intervention. Merger of data from two sources could create a step intervention. There are many other types of interventions in the data such as ramp, point, and group interventions. These help you to account for discontinuities of various sorts that invariably present themselves in the data.

Ultimately you account for all of the sources of information in the functional form of the data behavior, meaning that the data is some function of development effect along columns, exposure or underwriting effect along rows, calendar or claim adjustment effect along diagonals, external indices that are the covariates, plus the interventions which account for the discontinuities. Once you have the functional form, and the design structure of the independent variables, you get into what we call the estimation phase.....

QUESTION: Can intervention go in any direction?

MR. ROY: Yes, in addition to row intervention, you can have diagonal intervention. For example, there might be a change in claim adjusting philosophy. There could also be a company dictum saying, "Hey, get rid of these claims, do whatever you need to do to settle them." In some sense the process has changed at that point, and you would have an intervention.

To return to where we were, what you are really trying to do is capture what is going on in the outside world in some kind of a mathematical basis. Once we have the basis for the functional form, we want to estimate the describing parameters. Having done the estimation, we wish to evaluate how well the model behaves, meaning whether it is structurally sound. If it is not structurally sound, what do we do next? Is there a process for improving the model? What we have tried to do is lay them all out for you in the handout.

Once you have created a candidate model, after exhausting all the knowledge that you have garnered about the data; the corporate process, the external covariates, and the interventions, you enter the parameter estimation phase. When we talk about regressions, we are really talking about the process of parameter estimation. There are all kinds of regressions, least-square regression, minimum absolute value regression, robust regression, ridge regression. All of these deal with the process of estimation that assign to the parameters certain statistical characteristics, dealing with unbiasedness and efficiency.

Now in the estimation process itself, we can use apriori information about the parameters. When we have some knowledge about the parameters they can be brought in explicitly into the estimation process. This is where we begin to talk about Bayesian techniques, Kalman filters, Credibility based regression, Boot strap methods. These are nothing more than taking prior information about parameters and integrating them into the estimation process, so don't be intimidated when you hear these esoteric terms.

Next we get to the notion of goodness of fit. It is a measure of how well the model has fit the data. And then, we get to the notion of verification. If you don't like the result of verification, having gone through the training, fit, and validation sets, you might have to go back to consideration of an alternative model structure. Any questions about what we have covered so far?

QUESTION: How would the training set be different from the fit set......? (Inaudible)

MR. ROY: There are various ways in which you can do that. In this diagram, you can use this part as the training set, this part as the fit set and this part as the validation set. You can also randomly assign claim numbers into three different sets and create three triangles for the same coverage. It doesn't matter how you prefer to create your three sets. Do you understand the distinction between the usage of the sets?

QUESTION: I have another problem with that. When I take a look at the triangles, it is something like about...10 or fewer diagonals. Is that big enough to do what you propose....(Inaudible)

MR. ROY: You are absolutely right in that if you are working with small sets of data, you may have problems with model estimation. But, if you are working with quarterly data and you have five or six years of data, you might be able to do some of the things I suggest.

QUESTION: Also you're thinking that there may be some sort of intervention in data when you are validating. There's always potentially one there.

MR. ROY: Yes, there is always potentially one there. We'll talk about it later, in that if you don't know there is an intervention, can the analysis identify for you if there is aberrant behavior in the row? Yes, we will talk about outliers later.

QUESTION: (Inaudible)

MR. ROY: The nice thing about these techniques, is that it is immaterial what the data looks like. You can have triangles, trapezoids, pentagons, data with holes in the middle, and you can still fit. It will give you answers. How good, is another question. Because they can seriously influence the result, at times you will throw away bad data points to improve the credibility of the model.

Let's talk now about goodness of fit. In this diagram we have data set Y, and the independent variable X, and this mathematical structure. Let's say after some structure choices, I end up with these two lines of fit, and say I use R square as a measure of goodness of fit. Are you all familiar with R square? In a nutshell R square measures the amount of variability in the data that has been captured by the model. Now, what do you think is the R square of each of these two models? They are the same. So here we have two lines, which have exactly the same R square, but pointing in different directions.

Interestingly, Prof. Anscombe at Yale has created some sets of data which are really weird. When you look at the data sets they are going every which way. When you fit linear regressions to the data, they end up giving you exactly the same statistic. This is a problem we have to face, even after you have a model with a high R square, it doesn't necessarily mean it is going to be a good predictor. Therefore a model that is best in terms of fit, is not necessarily best for prediction. This issue exists for all models, including traditional models. Just because we don't calculate measures of fit in development ratio methods, doesn't mean they do not exist.

QUESTION: Do you get these results because the model is not stable, or are there other reasons for it... (Inaudible)

MR. ROY: It may be because there is still some structure left over that hasn't been captured, or the data did not have a strong pattern to be captured. It is not the specification of the model that's important, but how good the characteristics of the residuals are, that determines a good model. And, that is why I emphasize that the answer is in the residuals.

Now, when we say the answer is in the residuals, what do we mean? By the way, residual analysis is something you can do with any model, including traditional models. It is not a feature of regressions only. Moreover, traditional development methods can be set up as a regression models, providing you with efficient estimates and all of the diagnostic tools we will talk about later.

What we really wish to do is what is called Error Analysis. Error is defined as the deviation between the data and the model. It is the difference between the data values and the model estimates of those values. We would like to see the errors to be completely random. In this diagram, if the plot of errors has a structure like this, you have a bias in the model. We have plotted the errors against the estimated values. If we have errors that flare, you have heterogeneity in the model, meaning that certain portions of the data have more variability than other parts, and therefore not of equal credibility. If you have error structure that looks like this, you have specification error, meaning that the model has not completely captured the structure underlying the model. Now what does one do, when the errors are not random.....

QUESTION: I have a question about this, and it is probably because of a problem I had with some other statement you made in the beginning. Obviously what you want is for the residuals to be IID (Independent and Identically Distributed), and that sort of thing.

MR. ROY: That's correct.

QUESTION: I find it hard to believe that cumulative data will have some kind of an IID error structure.

MR. ROY: You are absolutely right, yes.

QUESTION: Does that mean that you should not use regression with cumulative data?

MR. ROY: Regression is only a tool, you can use it with any data. The issue is how to use regression when the data is highly autocorrelated.

QUESTION: Yes, and one of the things you will discuss later on will tell us what to do about that?

MR. ROY: Well, I'll try. Now, think about it this way. In econometrics...and those of you who are familiar with Box-Jenkin's techniques will appreciate this...How many of you are familiar with Box-Jenkins?

In Box-Jenkins, one of the things you are required to do to make the data stationary before applying the autoregressive and moving averages to it, is to difference the data. You can take the first difference of the data before you begin the modeling. In fact you can take second difference too if stationarity has not been achieved. So, taking differences is a very important concept in econometrics.

Now, what is the difference between incremental and cumulative data? Incremental data is nothing more than the first difference of the cumulative data. The degree of differencing that will be required is a part of the model building process.

Bad models come about as a result of three important flaws in regressional model building. They are multi-collinearity, influence functions, and parsimony.

If you have several external indices, multi-collinearity occurs when two or more of the indices are highly collinear with each other. Including collinear data makes the model highly unstable. You may not be aware that traditional development factors can be highly collinear and covariate terms can play havoc with the forecasts. If you end up with a model using factors that are highly collinear, the standard error of the forecast becomes huge. As the collinearity approaches unity, the standard error approaches infinity, resulting in a next to useless model. So you should identify multi-collinearity and discard multi-collinear variables. The problem can be explained thus. If there are two variables that are highly collinear and the first variable explains some part of the data variability, then if the second variable attempts to explain the same variability already explained, the amount of information in the residual left for the second variable to explain is nearly zero. In the extreme if the first variable explains the data variability completely, the residual information will be zero. Bringing in the second variable is like looking for correlation with a vector of zeros. Mathematically, the problem is analogous to dividing by zero or a number close to zero, and that is why the results are so unstable. You should be very careful about multi-collinearity problems in your analysis.

The second is the problem of influence. Influence functions identify how much influence a single data element has on the parameters of the model. You will be suprised how sensitive model parameters are to changes in a single observation, strategically placed. To identify these killer data points we need to conduct influence analysis.

Ideally, we would like all the points to have equal influence on the model, meaning that the contribution of each observation is exactly the same. If one observation significantly affects the model, then that particular observation is highly influential. In this diagram, one bad point here, or one bad point here can completely throw the model. We would like to identify them and account for them.

QUESTION: Have you determined if they are not an artifact or real change in the underlying structure of the data......(Inaudible)

MR. ROY: Okay. That's a good question. How do we know that the point is an extreme random outcome, or indeed a specific change that should be kept as part of the data. You don't. What you do know is that it is an influential point, demanding that you learn more about it. You should try and find out what this point is all about. Although it is real behavior, meaning that it is just an artifact of the real world, it does not mean it should have an extraordinary influence on the model. Actuaries face that all the time. Trimming data is a major activity. As a matter of fact, one of the things you often do is limit the data to stabilize it. Using basic limits data is an attempt to neutralize the influence of extreme data points. Trimming data can lead to other kinds of threshold problems, but it does stabilize the model behavior. Influence analysis does not tell you what to do, but does identify for you those particular points that seem to have an unusual influence on the model, indicating that its contribution to the model specification is significantly greater than that made by other points.

And the last is parsimony. Less is more. Small is beautiful. How many times have we heard these phrases? Nowhere are they more true than in model building. Parsimony means that you want to have the best model with the fewest number of parameters estimated. Now, one of the characteristics of modeling is that you can always keep adding variables, and powers of variables, to improve the fit, and keep doing it till you get very high R squares. But, does it mean you will get good forecasts? The important issue is not good fits, but good forecastability. Now how many of you are familiar with degrees of freedom? How many of you understand degrees of freedom? The idea of parsimony is intimately entwined with the notion of degrees of freedom. Having established good error structure, the more degrees of freedom you have in the model, the better is its ability to forecast.

Now think of degrees of freedom in the following manner. This is an idea that completely eluded me throughout my university years. I could never figure out the usefulness of knowing the degrees of freedom.

Let's think about it this way. Let's say we have three points. We actuaries do wonders fitting functions to a few points and forecasting from them. If you draw a trend line through them, you have a slope and an intercept. Now how many points do you need to draw a straight line? Yes, you need two points. Now if you use up two points, how many points are left? One, and the number of points that are left are the degrees of freedom. This is a very elementary example. The loss of degrees of freedom is associated with the minimum number of points necessary to completely specify the model. Therefore what does the degrees of freedom connote? You can think of the degrees of freedom as the number of extra data points left over to validate the model. Having established the model, how well do the rest of the points cluster around the equation, to tell me that: Yes, this particular function is indeed what this data is all about. You define degrees of freedom as the number of independent points left over to validate the model developed. In parsimony, you want the fewest number of parameters, so that you have the greatest number of degrees of freedom as validation.

Therefore, in any model building attempt, we should avoid multi-collinearity, and influence data, and develop the most parsimonious model possible that has an error structure that is homogeneous, normally distributed, and independent.

We are a little short of time so let me go over a few items of importance quickly. If the structure is not acceptable, you can go about improving the model in one of two ways. One is by changing the functional form of the model, another is by using transformations.

Power transformations are very useful, in that you analyze the power of the data. This means that you take the data and square it, or take its square root, or its reciprocal, or the log of the data. Now, transformations are not something unusual. As an analogy, suppose you are interested in doing a study to determine what affects the results of 100 meter dash. You have clocked various times of say 9 seconds, 10 seconds, 8 1/2 seconds, etc. You also collect data as to the surrounding conditions, the training of each runner, the diet, the ground condition, the type of running shoes, etc. You can do a lot of regressional analysis. People who handicap horses do this type of analysis. If however, you take the reciprocal of the time, that is 100 divided by the time, as the variable of interest, what do you get? You get speed, right? Now, what prevents me from doing an analysis on speed and not elapsed time? Now if you did the analysis with elapsed time, and I did the analysis with reciprocal of time, who is right? Who has the better model?

One of the things, you should try when the residuals don't satisfy the test, is transformation. You can just raise the data to some power, positive or negative. Box-Cox have suggested a more subtle transformation. The form of the transformation is in this diagram. Now what is the purpose of going through all this? There are two reasons for this. Look at the denominator which is the geometric mean raised to one less power than the numerator. The result of the scaling is to define the data in the original units. For example, if you square the time in the 100 meter dash, data is not being measured in meters any more, they are being measured in square meters. The divisor brings the units of measure back to meters, even after the transformation has been made. This means that you can still do comparisons from data set to data set, because they are being measured in the same units. The rest of the stuff in the formulation, such as the minus one, helps as the value of lambda approaches zero. It happens that as lambda tends to zero the transformation tends to the log of the data. Thus the logarithmic transformation is a special case of the power transformation when the value of lambda is zero.

There is a whole range of transformations you can try from -4 to +4 in increments of a quarter, and choose the model that provides the best test statistics. That is one way of doing it. It turns out that there is a better way.

In one of the pages in the handout, you will find the formula for the likelihood function for the lambda. The best lambda to select is obtained when this function is maximized. There is also a test of transformability. This test looks at the residuals in the analysis of covariance, and identifies if there is some structure left in the residual that can be captured by transformation. So between the test of transformability and the maximum likelihood function for lambda, you can arrive at an optimal transformation. This is one way of capturing structure that may be left over in the residuals.

If there is still some structure left over, you may consider transforming the independent variables. Instead of using the inflation index, you could have used some power of the inflation index. What power should you use for each of the independent variables? There are techniques that are available to inform you. They are identified in your handout. A simple technique is the Dolby analysis. The other is the Box-Tidwell technique. The Box-Tidwell is nice in that the process is iterative, that gradually seeks out the best transformations to use with the independent variables.

So an efficient way of getting a good model is trying Box-Cox transformation on the loss data, and Box-Tidwell transformation on the independent variables. Moreover, you can set it up in a way that the computer algorithm can seek them out. Having chosen a model, you can analyze the residuals.

I am sorry we are running out of time. I have listed for you in the handout the various tests one does to satisfy the veracity of the model. The various tests are; test for fit, test for structure, test for transformability, test for normality, test for homogeneity, test for autocorrelation, and test for influence data.

For each test there are a number of test statistics that can be calculated. For tests of fit, you can conduct an F test, Mallow's test, and Akaike's test to maximize the information content. For tests of transformability, you have Tukey's test and then obtain the maximum likelihood of the lambda. To test for structure, there are a number of non-parametric tests like the run test, and also Anscombe's test. For normality, there are a number of tests, some more complicated than others. There is Kolmogorov-Smirnov test, Cramer-Von Mises test, Anderson-Darling test, Shapiro-Wilk test, and many more. For test of homogeneity there is Box test, Bartlett test, Max-Min Variance ratio test, Fligner-Killeen test, and Levene Analysis of Variance. To test for independence you can use Durbin-Watson test, and the Box-Pierce test. To identify the influence observations, you can calculate the number of standard deviations, conduct the Pearson-Chandra Shekar single outlier test, the Hawkins Backward Elimination test, and/or calculate Cook's statistic.

To identify influence data, the most important is Cook's statistic. What the test does is something very simple. It takes the data and estimates the regression parameters. It then takes one data point out and reestimates the parameters, to judge how much the parameters have changed by omission of the point. A test is conducted to see if the change is significant, and the process is repeated for every single data point. As it turns out if Cook's statistics is greater than one, the data point is highly influential. You may wonder if it is not a time consuming process to reestimate parameters for every single point. Don't worry, algorithms have been developed so that all of the statistics can be developed in one pass, or just one run.

You may be speculating if the process I have outlined is a rather complicated and exhausting process, to be done every quarter or every time you obtain a new diagonal. No! You search out the best structure once, when you conduct you experiment with the training, fit, and validation sets. Once you have a satisfactory model that meets the test requirements, it becomes the accepted model for the insurance line or coverage. All you do is reestimate the parameters including the new diagonal, just as you would reestimate development factors including the new diagonal. You may wish to look at the residuals to see if the real world is structurally changing, in which case you may have to adapt at some future juncture. But once you have identified a satisfactory model, it should be no more work than analysis with traditional models. Traditional models, that is development ratio type models, can be set up as regression models, and all of the tests for validation of forecastability can be conducted on a regular basis. I am sorry I could not show you some computer output. I would have liked to show you how you pick your first model, what you look for, and how you improve on the model, until you have a validated model for use. There is lots more I would have liked to tell about this subject, but we are out of time. So, until next time...Thanks.

CASUALTY LOSS RESERVE SEMINAR

WASHINGTON D.C.

SEPTEMBER 1991

ECONOMETRIC METHODS IN LOSS RESERVING

Tapan S. Roy

Vice President and Partner

Liscord, Ward & Roy, Inc.

ALTERNATIVE MODELS

VALUE TAIL

TIME TAIL	SHORT	LONG	
	I	II	SHORT
	III	IV	LONG

I. AVERAGE
II. CASE BASIS
III. STATISTICAL
IV. ECONOMETRIC

DATA ORGANIZATION

LOSSES

		CUMULATIVE	INCREMENTAL
AGGREGATE	INCURRED		
	PAID		

		CUMULATIVE	INCREMENTAL
AVERAGE	INCURRED		
	PAID		

CLAIMS

		CUMULATIVE	INCREMENTAL
AGGREGATE	REPORTED		
	PAID		

LOSS RESERVING METHODS

1. DEVELOPMENT RATIOS
- **a. Project Development Ratios**
  - **i. Average**
  - **ii. Regress Development ratios**
    - **Linear Regression**
    - **Exponential Regression**
    - **Exponential Smoothing**
- **b. Weight Development Ratios**
  - **i. Dollar based weights**
  - **ii. Frequency based weights**
  - **iii. Time based weights**
  - **iv. Exponential weights**
    - **Fixed weight**
    - **Tracking signals**

2. SEPERATION METHODS
- **a. Arithmetic**
  - **i. Linear extrapolation**
  - **ii. Exponential extrapolation**
- **b. Geometric**
  - **i. Linear extrapolation**
  - **ii. Exponential extrapolation**

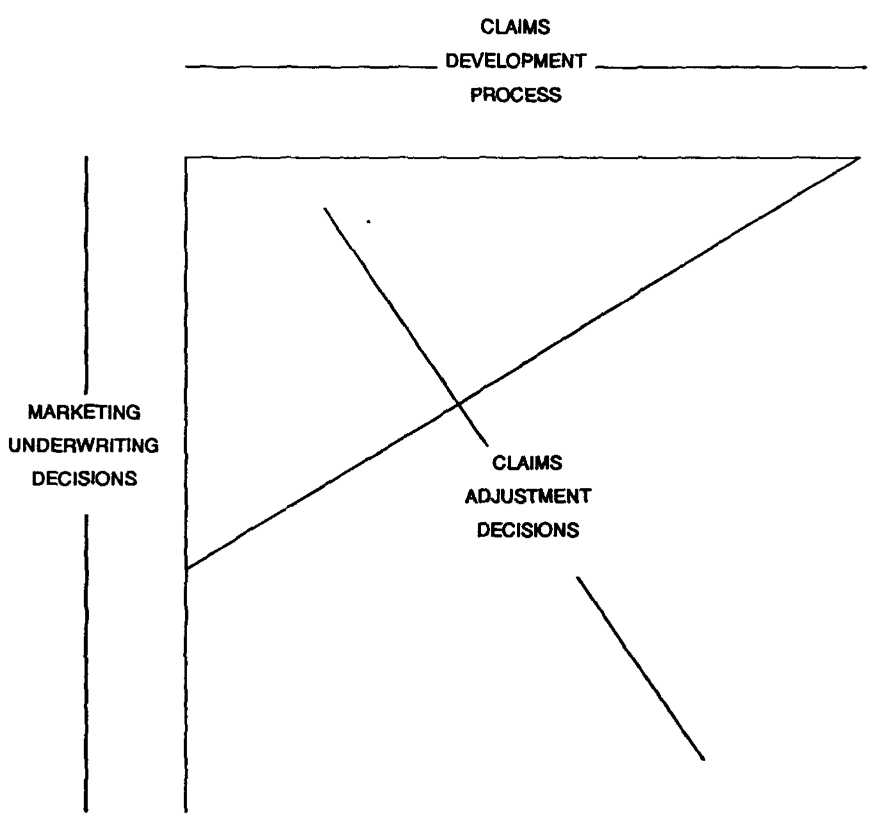
3. LEAST SQUARE METHODS
- **a. De Vylder hypothesis**
- **b. Log Linear regression**

4. CREDIBILITY BASED METHODS
- **a. De Vylder**
- **b. Mack**
- **c. Straub**
- **d. Kalman Filter**

5. ECONOMETRIC METHODS
- **a. Roy**

6. OTHER METHODS
- **a. Reid**

DIRECTIONAL EFFECTS



MODEL

ANALYSIS

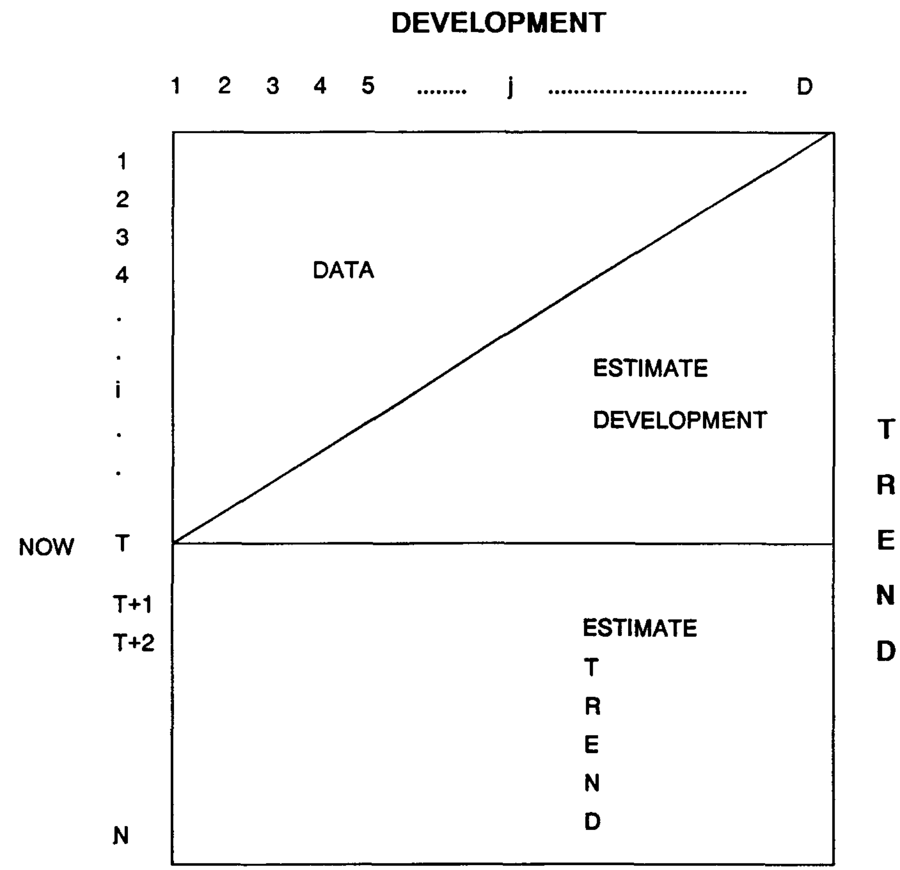
OF

VARIANCE

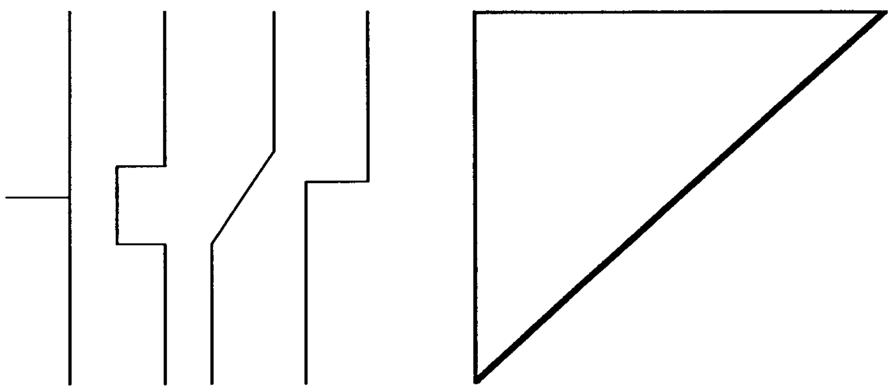
MODEL

ANALYSIS OF COVARIANCE

PROJECT CHARACTERISTIC TRIANGLE

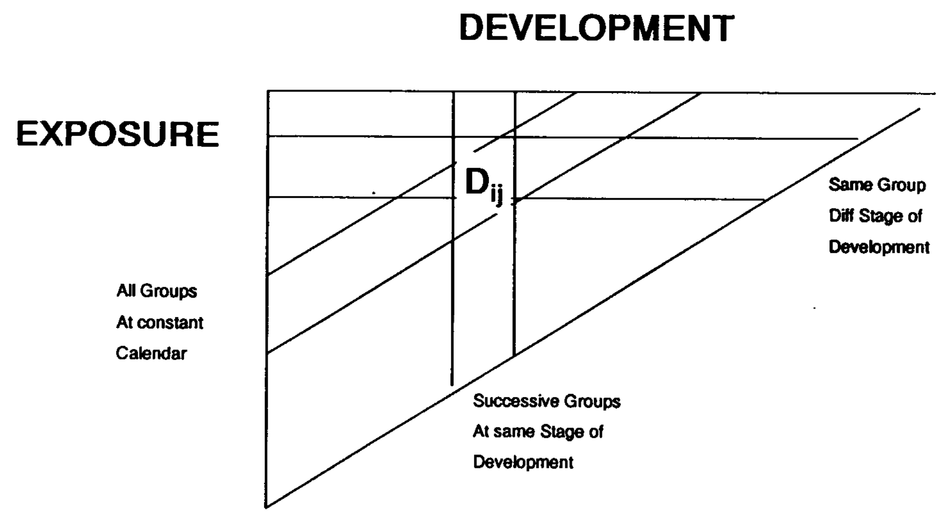


INTERVENTION TYPES

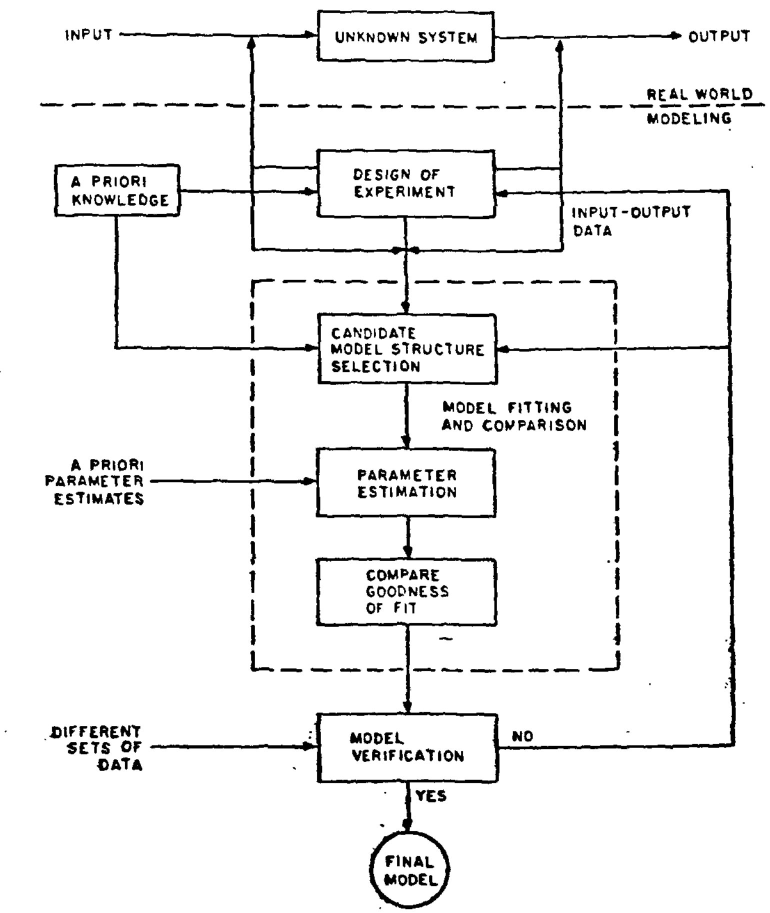


Spike
Box
Ramp
Step

ECONOMETRIC



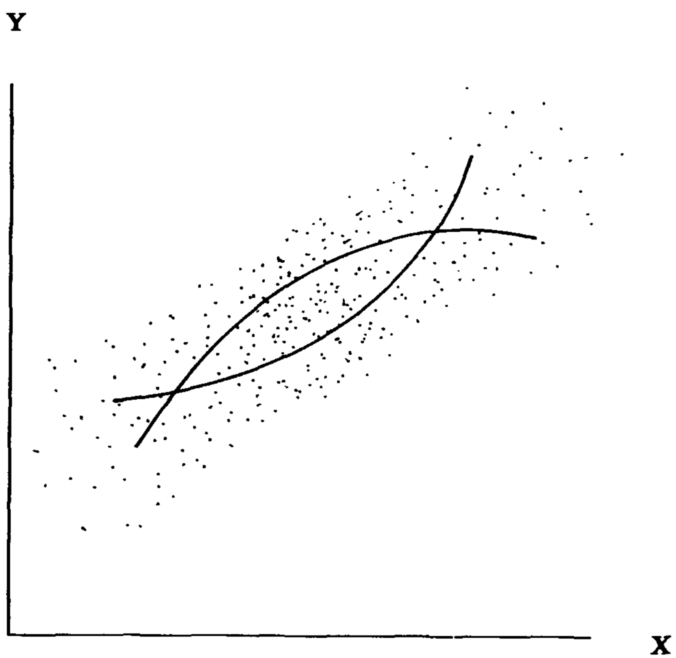
DATA = f (D; E; C; INDICES;INTERVENTION)



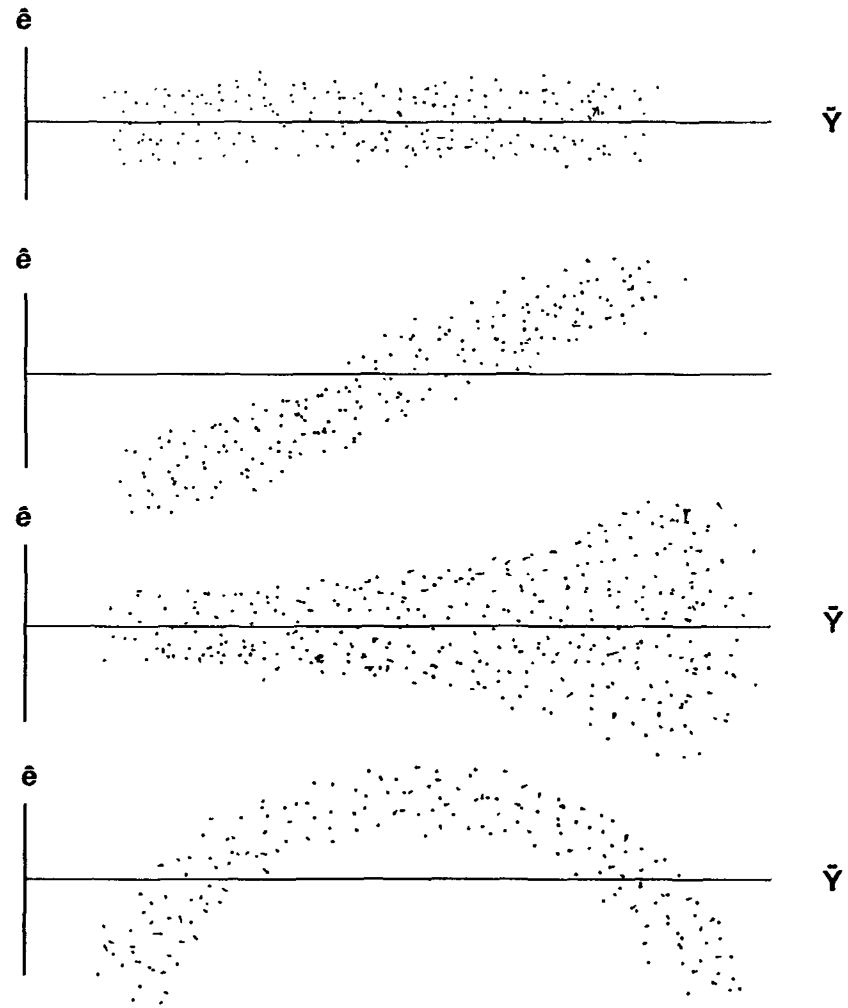
ILL CONDITIONING

1. MULTICOLLINEARITY
2. INFLUENCE FUNCTION
3. PARSIMONY

REGRESSION STRUCTURE



ERROR ANALYSIS



DESIDERATA

1. STRUCTURE
2. NORMALITY
3. HOMOGENEITY
4. INDEPENDENCE

TRANSFORMABILITY

INTRINSICALLY LINEAR

$$D = a \; X_1^{b} \; X_2^{c}$$

INTRINSICALLY NON-LINEAR

$$D = a + b^{X_1} + c^{X_2}$$

DATA TRANSFORMATION

POWER TRANSFORMATION

$$Y=D^{\lambda}$$

BOX-COX TRANSFORMATION

$$Y=\frac{D^{\lambda}-1}{\lambda \dot{D}^{\lambda-1}}$$

TRANSFORMS INDEPENDENT VARIABLES

DOLBY

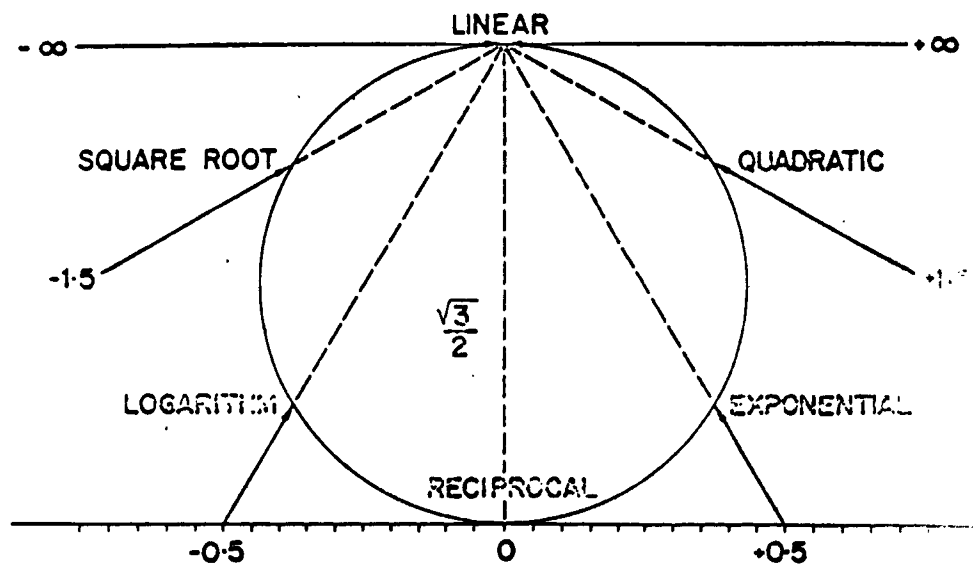
BOX TIDWELL

DOLBY STEROGRAPH

$$A=0.5+\left[0.5\frac{\Delta E_3+\Delta E_2}{\Delta E_3-\Delta E_2}-0.5\frac{\Delta E_2+\Delta E_1}{\Delta E_2-\Delta E_1}\right]$$

WHERE

X	E	Δ	Δ^2
X_0	E_1		
		ΔE_1	
$X_{.25}$	E_2		$\Delta^2 E_1$
		ΔE_2	
$X_{.75}$	E_3		$\Delta^2 E_2$
		ΔE_3	
X_1	E_4		



Sterographic Mapping of A Onto a Circle

BOX-TIDWELL TRANSFORMATION

$$W_j = \begin{cases} X_j^{\alpha_j}, & \alpha_j \neq 0 \\ \ln X_j, & \alpha_j = 0 \end{cases}$$

Iterative process to estimate α_j

Start $\alpha_j^0 = 1$

$$Y = \beta_0 + \Sigma \beta_j W_j$$

Create: $Z_j = W_j \ln W_j$

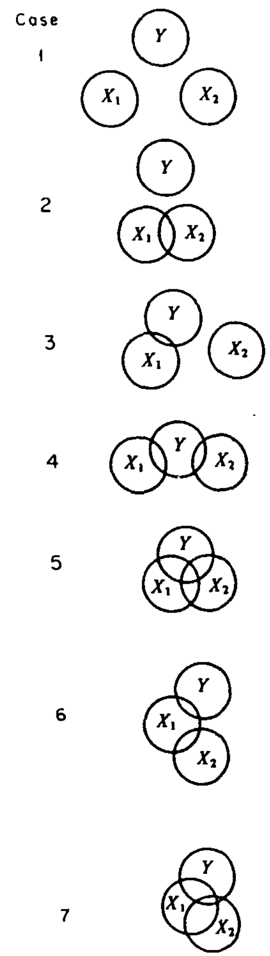
Estimate: $Y = \beta_0^* + \Sigma \hat{\beta}_j^* W_j + \Sigma \hat{\gamma}_j Z_j$

If $\hat{\gamma}_j$ *are large in absolutes then need transformation*

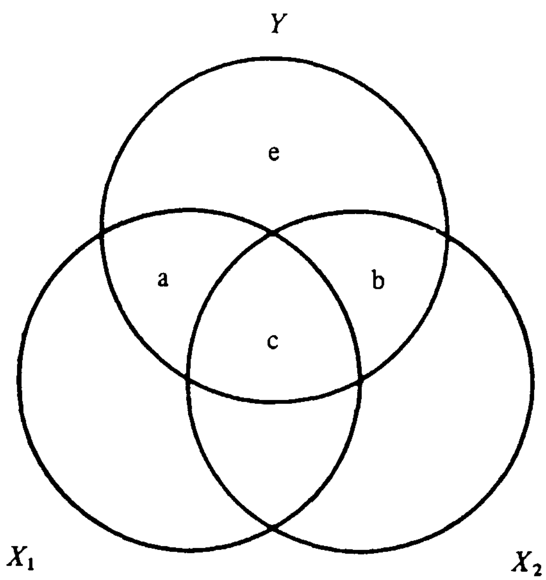
$$\hat{\alpha}_j^1 = \left(\frac{\hat{\gamma}_j}{\beta_j} + 1 \right) \times \hat{\alpha}_j^0$$

Iterate: $W_j = X_j^{\hat{\alpha}_j}$

Usually stabilizes in one iteration.



Ballantines representing different relationships of *Y* and two IVs.



$r^2_{Y1} = a + c$ $\qquad$ $r^2_{Y2} = b + c$

$$R^2_{Y\cdot 12} = a + b + c$$

$$sr_1^2 = r^2_{Y(1\cdot 2)} = R^2_{Y\cdot 12} - r^2_{Y2} = a,$$

$$sr_2^2 = r^2_{Y(2\cdot 1)} = R^2_{Y\cdot 12} - r^2_{Y1} = b.$$

$$pr_1^2 = r^2_{Y1\cdot 2} = \frac{R^2_{Y\cdot 12} - r^2_{Y2}}{1 - r^2_{Y2}} = \frac{a}{a + e},$$

$$pr_2^2 = r^2_{Y2\cdot 1} = \frac{R^2_{Y\cdot 12} - r^2_{Y1}}{1 - r^2_{Y1}} = \frac{b}{b + e}.$$

The ballantine for X_1 and X_2.

STATISTICAL TESTS FOR REGRESSION MODELS

TESTS FOR FIT

TESTS FOR TRANSFORMABILITY

TESTS FOR STRUCTURE

TESTS FOR NORMALITY

TESTS FOR HOMOGENEITY

TESTS FOR AUTOCORRELATION

TESTS FOR INFLUENCE DATA

TESTS FOR FIT

F TEST

MALLOWS C_p STATISTIC

AKAIKE AIC STATISTIC

TEST FOR TRANSFORMABILITY

TUKEY'S TEST FOR NONADDITIVITY

MAXIMUM LIKELIHOOD STATISTIC

$$L_{max}(\lambda) = -\frac{1}{2} n \ln \left(\textit{Residual } SS/n\right) + (\lambda - 1) \sum_{i=1}^{n} \ln D_{ij}$$

TEST FOR STRUCTURE

ANSCOMBE TESTS

RUNS TEST

TEST FOR NORMALITY

KOLMOGOROV-SMIRNOV TEST

CRAMER-VON MISES TEST

ANDERSON-DARLING TEST

SHAPIRO-WILK TEST

TEST FOR HOMOSCEDASTICITY

BOX TEST

BARTLETT TEST

MAX-MIN VARIANCE RATIO TEST

FLIGNER-KILLEEN

LEVENE ANALYSIS OF VARIANCE

TEST FOR AUTOCORRELATION

DURBIN-WATSON TEST

BOX-PIERCE TEST

TEST FOR INFLUENCE DATA

STANDARDIZED DEVIATION

PEARSON-CHANDRA SHEKAR SINGLE OUTLIER TEST

HAWKINS BACKWARD ELIMININATION

COOK'S STATISTIC

$$d_i = \frac{(B_{(i)} - \hat{B})'(X'X)\,(\hat{B}_{(i)} - \hat{B})}{(p+1)\,\sigma^2}$$

1991 CASUALTY LOSS RESERVE SEMINAR

7A: COMMON PITFALLS IN RESERVE ANALYSIS

Panel

Ralph L. Rathjen
Tillinghast/Towers Perrin

Hank Youngerman
The Wyatt Company

MR. YOUNGERMAN: In this session, we're going to discuss what can happen if you use some of the techniques that have been presented earlier in the seminar, but you don't pay attention to some of the nuances of the data. In effect, a little knowledge is a dangerous thing, and we're going to try to round that out a little bit by giving you the rest of the picture.

I'm going to take a couple of the slides here a little bit out of order. The handout that you have is just a copy of the slides that you're going to see up on the screen. So you can look at either one. There's one of my exhibits that has a couple of small corrections on it.

(Slide)

This is Exhibit 7, and the way we originally structured the presentation, we were going to go through some of the pitfalls that kind of build up to this, but I decided I'd take it first and then show how these axioms of claim settlement can influence your reserve calculations. These are called axioms, but they're very true. They are real things that happen. They're not just theoretical possibilities.

The first axiom is that small easy claims tend to close quickly and larger claims tend to close more slowly, just something that tends to happen, especially in the liability lines, but generally speaking, the less dollars are involved, the less effort a claimant wants to put into pursuing a claim, the less effort an insurance company wants to put into defending it, and those claims get off the books quickly.

The larger, more complex claims generally involve more dollars, have a bigger difference of opinion, and take longer to roll into and out of the system.

The second axiom is that most claims close for less than their final case reserve, but that, in the aggregate, you still see upward development on claims. One way of looking at that is that when a claim finally closes, unless it's closed but a jury says "This is the value," typically, it closes because at some point in time both parties think that they got a good deal.

A claimant thinks he's getting a little more than he might otherwise get, and the insurance company thinks they're paying a little less than they thought they were going to have to or what an insurance company thinks its payment is going to be as its case reserve. So they typically close a claim because they think they're getting a little bit of a good deal.

We'll see how the fact that each individual claim closes on a beneficial basis for the company doesn't mean that, in the aggregate, you're going to have savings in your reserves.

The third axiom is, to an extent, a function of the first, that the book of closed claims contains a larger proportion of small short-tailed claims than the book of outstanding claims.

It just follows from the first that if you close the small claims more quickly, at any given point in time, the body of outstanding claims you have is going to be more heavily weighted toward these claims that are moving through the settlement process more slowly. The first pitfall flows from the first axiom of claims settlement. All of these pitfalls we're going to talk about, we're going to put a statement up, and we're going to show a statement that seems kind of reasonable, and then we're going to show, in the subsequent example, why it's not. So the pitfalls, if you will, are false statements.

The first false statement is that the average value of claims closed during a given calendar period is a good estimate of the average value of the claim still open at the end of that period.

(Slide)

In this example, for convenience, we'll ignore the problem of IBNR. We'll say, for example, that this is, perhaps, a report year, and, therefore, we don't have to worry about claims that are truly IBNR, truly incurred but not reported.

This is a fairly typical settlement pattern, and if you look at column 3, you see that in the first year -- well, actually columns 2 and 3 -- in the first year, you settle, perhaps, 40 percent of your claims, 16,500 out of the 38,000 for an average value of $300. In the second year after settlement, ages 12 to 24 months, you settle most of the remainder, not nearly all. The average cost goes up somewhat to $700.

Then you take that big jump in the third year. Now, the claims you're settling are the ones that are getting progressively tougher and tougher to settle, costing more and more, and the average goes up year by year. That's where we come back to on the first pitfall, that you close the smaller claims more quickly.

Well, at the end of the first year, you might take a somewhat naive view and say, "Well, I've settled a lot of my claims. The average cost was $300. I'm going to take the remainder of my claims, column 8, the 21,500 remaining claims, multiply that by $300. That's my average cost. The reserve I'm going to need is about $6 million," and that's the reserve that you might put up, and you'd be dead wrong, because you've already closed the easy claims. You've already closed the $300 claims.

The claims that you're going to close in the future are going to cost anywhere between $700 and $8,800, grouping them on average, and column 9 calculates the average of all the remaining claims to be closed.

In the first year, it's $1,227 in this example, and then it takes a big jump the following year, because by this time, you've settled the 90 percent of your claims that are going to settle for reasonable values in the overall scheme of things.

So by the end of the second year, the average claim that you've closed, column 6, is $511. The average size of a claim remaining to be closed is over 4,300, a factor of 8. This pitfall is something that you can indeed fall into.

I got a call from an auditor of a client of mine just at the end of last week who said, "We've done exactly this calculation. We've calculated the claims that this entity has closed, and we don't understand why you have such a big reserve remaining, because we think it only needs to be about a sixth of the size that you've calculated," so I went into exactly this discussion with them. So that's one of the things that you have to watch out for.

The second pitfall flows from the second axiom, that the savings on closed claims is a good estimator of the savings remaining in the aggregate reserves.

(Slide)

What this slide poses is ten hypothetical claims working the way through the settlement process. So we'll say that all of these claims are open as of the end of the first year, or you could say they're all reported on December 31, 1980.

Then the underlined values across the tableau show the year in which the claim is closed. It's a little hard to read for the even numbered claims, but I think you can pick it up. The other thing is that emerged savings at the bottom is a little confusing. Those are all negatives. You might want to think of it as an emerged deficiency in the reserves and convert the negative to a positive.

So, in this example -- and once again, the fact is that we've put those examples together using, admittedly, numbers that we've just sort of come up to illustrate the point, but I really believe in every case that the values we're using are indicative of what you'll run into in the real world.

So you can see, in this example, once again, the easy claims close first. During the first year, you close claims numbers 2, 4, and 6. Well, two of those claims started with a reserve of $50, and the other one started with a reserve of 10. The small claim closed without payment. The other two, the initial reserve was a little high.

Of course, once again, it makes sense that you'd have an easier time closing a claim where your initial reserve was high, because, remember, the individual case reserves only represent a claims adjuster's best estimate, but a claims adjuster's estimate is certainly no better than an actuary's estimate, and I think we all know there is some elements of trial and error in an actuarial estimate.

So once again, in this example, you would look at your case reserves, and you'd say, "Well, gee, we took these claims that we closed in the first year, and we settled them, on average, for 64 percent less than the claims adjusters put up on them. Gee, those claims adjusters must be way, way off. In fact, I think I'll take all my case reserves and knock them down 64 percent, and that's the number I'll put on my statement."

Once again, you've run into a big, big problem, because what typically is taking place in the claims settlement process is that at the same time some of your claims are moving down and getting settled, some of your claims are moving up, and those are the ones that aren't getting settled.

So even though, in this example, we had a significant savings on the three claims we closed, in the aggregate, the remaining claims developed upward by more than enough to offset that. We saved $70. We had a $70 total savings on the claims that closed; yet, when we calculated everything on an incurred basis, it went up by $200, from 940 to 1,140. There was an emerged deficiency of about 20 percent. The cause of that, all attributes to claim No. 9. We had two $50 claims that settled at 20. We also had a $50 claim that suddenly we think is going to cost 250. If the adjusters can be wrong on the high side, they can certainly be wrong on the low side.

Then the second year, pretty much the same thing happens. We take some claims and save some money. Claim 7, we thought it would be $100. It closes with no payment. Claim 1, we had $50 up. We closed it for 20, but, meanwhile, you still have the ongoing process. You still have the other claims developing upward. You've got claims 8 and 9, and those are the big claims, and those are the ones that, ultimately, are going to cost you.

So, basically, every time you close a claim, it seems like you're having some savings against your final reserve, and, indeed, for the first two years, you might have savings against your initial reserve a lot of time, but it's still true that the few large cases that are developing upward and getting out of hand drive the total of your estimate, and you're typically, even if you see savings on individual claims, in the aggregate, you're going to see a deterioration in your reserve position.

The third pitfall we're going to talk about has to do with the payment patterns for allocated loss adjustment expense versus paid losses. The simple fact is that there is no necessary reason why the payment patterns on these two items should necessarily be the same.

Allocated loss adjustment expense consists principally of legal fees paid to outside attorneys, and therefore, the rate at which you pay for legal assistance is going to depend on the nature of the claims.

I guess what I should say is it depends more on the nature of the legal process as it attributes to the body of claims that you're looking at. The legal fees can either be incurred more quickly or more slowly than the actual payments to claimants. So, like everything, we'll look at an example of some figures that are dummied up.

(Slide)

These might be thoroughly typical numbers for a line like automobile bodily injury where most of the claims tend to settle fairly quickly, but the legal expenses tend to dribble in more slowly. In this particular example, we've got five years of claims, and the payment pattern for both the allocated LAE and the paid losses are the same in each year.

Most of the losses get paid in the early part of the process. Most of the legal expenses, well, they get pushed out a little further. So, in the aggregate, here, the ALAE is 3.95 percent of the losses paid, but during the first year it runs at a much lower rate, 1.5, and then it escalates 3.5 percent, 7 percent, 10 percent.

As I say, this might be typical of a line like auto BI where typically, a lot of the claims close fairly quickly. A lot of the claims close without the involvement of an attorney on either side.
So, as a consequence, the $15,000 you have in that first year that you're paying against the million dollars you've paid in loss is probably because you see that the claim won't close quickly. The company retains an attorney. The attorney write a letter to the claimant's attorney. They write a letter back. They set a court date, and it just kind of sits there for a while.

Now, the important thing to realize in this particular tableau is that even though you're paid patterns are predictable on both the allocated and the indemnity, the paid patterns aren't the same. So if you wanted to take a snapshot in time of what your future payments would be, what you do is you draw a diagonal from top right to bottom left, your typical development triangle, and that would show what the paid is, but then the bottom right-hand corner of that triangle, that's what remains to be paid.

I think you can see that if you were to draw that kind of lower right-hand corner triangle, you'd have a bigger proportion of the allocated remaining to be paid than you would have the indemnity. The way that these numbers are calculated, the needed reserve on the indemnity would be, say, at the end of 1984, you'd have $2 million plus 500,000, plus 300,000 remaining to be paid on '84, which would be 2.8 million.

You'd have 800,000 on '83, and 300,000 on '82. That's a total of 3.9 million. If you take the corresponding figures from the paid LAE development exhibit, you'd have a remaining paid of 230,000. When you work that all out, it comes to somewhere in the order of around 6 percent as opposed to the 4 percent that you're paying in total.

So you can't take the same ratio that you apply in the long term on a paid basis and apply it to your reserves. It's important to be aware that this kind of thing can go in the opposite direction. Another line of business that I work somewhat heavily with is directors' and officers' liability. Directors' and officers' claims, there's no such thing as an easy, simple D&O claim.

As soon as there's a claim, there is lawyers on each side, there is motions for discovery, there is depositions, there is everything a lawyer can do to think of and keep the litigation process going, and meanwhile, it's typically several years before you pay a dollar in indemnity, if, indeed, you wind up paying anything at all.

So in the D&O line, it would be my experience that, in fact, the ratio of unpaid ALAE to unpaid indemnity is probably lower than the paid ratio. You have to look at your data in the long term and make sure you know which direction it's going to go.

Pitfall No. 4 has to do with the importance of the tail factor. Now, the tail factor is that factor that you stick on the end of the development triangle to say, "Well, I've only got 12 years-worth of development history. I know that there is going to be some development after age 12. Well, gee, what's it going to be? Is it going to be a half a percent or 1 percent or 2 percent? I don't know. I think I'll just stick a number on there that seems right. It doesn't make much difference anyway."

The pitfall here is the fact that it does make a lot of difference. On the numerical slide I'm going to put up in a second. It's a little hard to follow the numbers, so I'll just try to kind of focus on a few of them and get the point across.

(Slide)

These would be fairly typical development factors for a casualty line of business, and you can see you've got your link ratio, your age to age link ratios, the annual factors, and then those are multiplied to get the cumulative factor.

Down at the bottom, there's a sensitivity analysis. Let's say you want to calculate your age 2 to 3 factor. There's all different sorts of ways you can do that. You can take an average of 4 points, 8 points, all your points. You can take arithmetic means, geometric means. You can drop the high and low. You can drop your outliers.

There are so many different things you can do, and you're going to sit there fretting and sweating and eventually you'll say, "Okay. I like the number 1.412," and you might say, "Well, yeah, maybe another method calculates 1.437," and you think, "Well, which one am I going to use? I'm really not sure."

So eventually you've put in all that effort. You decide to use 1.412. Now, in this example, it works out that if you change that 1.412 by a factor of .025, something less than a 2 percent change in the development, you get a change in your total reserve, in this example, of about $12,000.

Now you look at some of your other factors, and the point here is that a much smaller change in the other factors can lead to a much bigger change in your final reserve. When you take the age 6 to 7 factor, a change of .015 from 1.084 to 1.099, is going to have a much bigger effect than the seemingly larger change on the earlier year. That gives you a change of about $26,000.

Then, when you get out to your tail factor, a change of 1 percent on the tail factor has twice a big an effect as a change of 2 and a half points on the age 2 to 3 factor. The reason why this happens is that each one of your accident years, in this example, from '74 through '89, at some point in time is going to be age 16, and at some point in time, it's going to pick up that tail factor.

When you put in your tail factor, what you can see is you take that cumulative column, and every number in that cumulative column is going to be multiplied by your tail factor; whereas, if you change that 1.412, the only thing that's going to change is your results on the two most recent accident years, '88 and '89.

So, you've got a total reported loss of $1.5 million, and that tail factor is going to affect every dollar of that 1.5 million; whereas, if you change the age 2 to 3 factor, that's only going to affect the two most recent years, a total of about 120,000.

So that 2 to 3 factor is only going to hit about 8 percent of your reserves; whereas, the tail factor is going to hit them all. So you have to be somewhat careful. You have to make some sort of a guess as to what a tail factor is going to be, but you have to be very careful about what you use, because it has a lot of impact. It has a disproportional impact to what you might ordinarily think.

Pitfall No. 5: Loss ratios dependent reserving methods can be used when premiums are discounted. When I talk about loss ratio dependent methods, I'm talking about any sort of method where you start with an estimate of the ultimate losses and work backward.

You might use a straight loss ratio method where you say, "I believe our loss ratio is going to be 80 percent; therefore, if the reported losses to date are 45 percent of premiums, I'll put up 35 percent for an IBNR."

It might be something like the Bornhuetter-Ferguson method, where you estimate your IBNR as 8 percent of your expected losses. The problem here is that you have to make sure that your estimate of the final losses, the expected losses, is reasonable.

When we talk about losses or premiums being discounted, you can think of it either of two ways, and both of them are equally applicable. One is to say that when you've done your pricing, you've already discounted it for investment income, and the other is to say, when you've done your pricing, you've discounted it because it doesn't matter what it costs. If the guy next door is selling a policy for $200, you can't sell it for $500.

Now, some of what I'm going to do here would probably be heresy to insurance company executives and underwriters who will swear, "Oh, no. We don't take account of investment income." The simple fact is that I was reading one of the trade magazines last week, and it listed 25 large insurers' first half operating results, and exactly two of them had combined ratios under 100.

So if the other 23 truly don't discount for investment income, it would seem to me like they'll be out of business within the year, either that or they've got some very stupid stockholders who like losing money.

The simple fact is that premiums are discounted for investment income, and anyone who tells you different is just blowing the same smoke that the insurance industry has been blowing for the last 20 years. So much for editorial statements. It's a good thing I don't work for an insurance company. It's great what you can say after you become a consultant.

(Slide)

You could very well run into this problem, when you're a reserving actuary, and you go to top management, and let's start with the alleged pricing budget. This is the pricing budget that the pricing actuary brings into the CFO or the CEO, and the CFO says, "We're not going to discount for investment income."

So the pricing actuary says, "Well, okay. Then here's my budget, 65 cents for losses, 30 cents for expenses, and that old standby, the 5 percent margin for profit and contingencies."

Now you, you're the reserving actuary, and you come in, and you've done a Bornhuetter-Ferguson, and you've explained to the CEO what the Bornhuetter-Ferguson is and how it works, and he seems all fine and well and good on that, and then you tell him, "Well, but we think the expected loss ratio is 80 percent," and he says, "Well, where did you come up with that number? I thought the pricing actuary told me it was 65?"

When you give him this little display, and you say that, "Well, the premium's a dollar, and the investment income is 15 cents, and when you work it all down to it, you're still making a 5 percent profit."

As he's very unpolitely showing you the door and telling you that you've got to go back and reduce the reserves because this can't possibly be right, as you're listening all the way to the unemployment office, you'll have the solace of knowing that you've done it the right way.

In all seriousness, the principal problem that you've got here is that you can't just blindly go on some sort of an arbitrary budget that's been established for a loss ratio or for losses. You have to make sure that the assumptions you're using in any loss ratio method are realistic in light of the way that the rates were set.

There are a few ways that you can do this. Probably, the best single one is to look at your own company's pricing history. If, for example, if inflation has been running 6 percent a year, and your company's prices have been increasing 6 percent a year, and that's been true for the last ten years, it's a reasonably good bet that your loss ratio is going to be whatever it's been for the last ten years. At least that's a good number to start with.

So once again, you have to be careful, when using a loss ratio dependent method, that you use figures that are realistic and just budgeted figures. So at the bottom we've shown here,if you had, in this example, if you had $1 million-worth of premium, you were using a Bornhuetter-Ferguson at 24 months with a loss development factor from 24 to an ultimate of 2, you'd be off in this case by $65,000 on your IBNR, and, in short, you're off by half of the distortion in your expected losses.

That's due to the fact that the premiums are, in fact, being set after consideration of investment income or competition or whatever you care to call it.

(Slide)

Pitfall No. 6 has to do with the effect of -- the slide says "Loss development factors can be used without adjustment on small claim volumes." When we talk about adjustment, we're talking about adjustment for the effect of individual large losses, for the fact that you may have a specific retention, a certain amount per claim that you retain, and you have to be careful. Sometimes you have to make adjustments for that.

I am going to talk about this in two kind of different ways: One, it has to do with the effect on a company with a small volume, and the other with an effect of a company where you have a somewhat larger body of data.

(Slide)

There's a typo on the overhead, and it's corrected on the handout. In this case, we're going to look at a company that's had exactly four claims in the last year, and lest you think that that's an unrealistic number, in some of the start-up clients that I work for, four claims would be a lot to have in the first year.

Let's say you looked at some sort of external data. You, obviously, can't do anything on your own with four claims, and you say that the age 15 months to ultimate development factor is 3, and, in this particular case, it's a new company, it's a start-up company. They are only writing limits of $200,000. They've reinsured the rest.

Their four claims are 10,000, 20,000, 100,000, and 500,000, and when you apply the per claim limitation, you get $330,000, and you develop that upward by a factor of 3, and that's where the typo is on the overhead. It should say 330,000 times 3 is 990,000, and that's your ultimate reserve.

Then they ask, "Is this sensible?" It certainly doesn't seem very sensible to me that you've got two small claims and two big claims, and, it's impossible. You can't have $990,000 of loss on only four claims, when you have a limit of 200,000 per claim.

There are two techniques. Let's look at the second one first, and that is to limit each developed claim to the per claim limitation. This is what I typically do. So some of the calculations at the bottom are inaccurate. 100,000 times 3 is not 200,000, it's 300,000. When do you your reserve analysis, you'd put it in at a value of 200,000.

The claim that's already exceeded your per claim retention you simply carry that at its $200,000 value. So in this particular case, you might use a figure of $490,000. Now, Ralph and I had a discussion about this the other night. We both kind of agreed that if you just capped this, you're actually going to have a slight downward bias in your claim amounts.

The figure probably should theoretically be somewhat higher than $490,000, but, as a practical matter, 490,000 is certainly going to be a much, much, much better estimate than 990,000, which is total nonsensical. For all intents and purposes, 490, I think, is going to be a pretty good estimate.

(Slide)

We're going to jump way ahead here, because we've decided to move something from a different part of the presentation. This is slide 19.1. Is that even in here?

A PARTICIPANT: I don't believe this slide is included in the handout.

MR. YOUNGERMAN: I don't think this slide is in the handout, but this is what you would want to do when you have a larger volume of data to work with. Once again, we've done an example here where each year is the same. You have exactly two claims, and one of those claims starts out small and increases, and the other is already over your retention, which, in this slide, is $75,000, and you get the same development pattern in each year.

If you move down to the middle of the slide, you can see at the very bottom we've calculated development factors on a limited basis. We haven't calculated development factors on an unlimited basis, but it's pretty clear that your development factors would be much higher on an unlimited basis, and that's going to be pretty much a truism of claims settlement.

It's conceivable that it would not work out that way, but, as a practical matter, development factors, on a limited basis, are always going to be higher than they would be on an unlimited basis.

One thing that you have to be careful of, especially if you're using industry development factors, say you're working with the ISO loss development factors on a basic limits basis that you might get out of an Insurance Services Office's filing.

Well, if they're doing development from basic limits, and you're doing development, say, on a $300,000 limit, if basic limit is 25,000, you can't use those development factors on a direct correspondence basis because the basic limits factors are going to be too low.

So, in this example, as you can see, when you have enough data that you can actually come up with your own development, if you're calculating your reserves on a limited basis, what you want to do, and it's very important, in fact, to do is to calculate the development factors on a limited basis, and, basically, we're just doing everything apples to apples.

(Slide)

This is the second part of that slide, and, really, it just shows you that if you applied the development, if you calculate the development factors on a limited basis and apply them to the limited losses, at the bottom, you come out with the figure that you would expect, and at the top it shows that you wind up with a discrepancy, if you apply limited development factors to an unlimited basis or vice-versa.

The way we get into most of these pitfalls is because of the primary reserving assumption, which is the conditions have not changed. When you talk about things changing, there are really two kinds of changes that affect reserving. One is changes over time in the overall body of the claim data you're looking at.

For example, if your claim department changes its philosophy about how to reserve claims, if they speed things up, if they slow things down, one thing that you always have to look at, if you do your reserves on a quarterly basis, you always have to bump up your development factors at year end.

The reason is, claim processing slows down in the last half of December. That's just a fact, that with people taking time off for the holidays, with Christmas parties and what have you, things don't get processed as quickly the last quarter of the year. It all gets caught up in January, but that's just an example of somewhere where you have to be aware of how things can change, even if it seems like they've stayed the same.

The other kind of change that you have is some of the changes we talked about in the first couple pitfalls where even though the company is doing things the same way, the nature of the body of claims changes over time.

If you settle the small, easy claims quickly, a given body of claims, say all the claims from report year 1990, that body of claims changes over time. You can't assume that everything remains static. You have to take account of the way it changes. A lot of the pitfalls come from a breakdown in the assumption that things don't change, either because you failed to identify internal or external changes that are taking place, or you haven't quite measured them properly.

So, obviously, the question then is how do you avoid these pitfalls? Well, we've showed you some of the techniques that you can use.

(Slide)

This last slide for this part of the presentation is really just sort of general comments, things that you need to think about when you're setting your reserves.

The first is to know your claim and underwriting departments. You have to know what they're doing, and have you to have a line of communication that's open with them so that not only do you need to go and ask them, "Are you doing things differently?" but you need to have the confidence they'll come to you when they change how they're doing things.

The second thing to do is to develop statistical indicators such as closing ratios, the ratio of claims closed in a given period to a ratio of claims that are open, how you do incurred ratios, report year runoffs, changes in the average paid claim, the average reserve, the average total incurred claim size.

These are things that will give you a red flag, if there are some changes taking place. You can develop a computer system that will just pop up these reports, and then, before you go to do your reserve analysis, you look at them. You see if there is anything unusual taking place here. It's a warning to you that maybe there is something in your method that you maybe need to reconsider.

Look at different reserving methodologies: very important. Most of the pitfalls that we've looked at will only come about if you use one particular method or another; for example, when we talked about the inadequacy of premiums, if your premiums are discounted. That's only going to take place if you're using some sort of a loss ratio based method. A loss development triangle approach wouldn't reflect that.

If you were relying, primarily, on the Bornhuetter-Ferguson method, but you did a loss development triangle as well, it would at least give you something to compare against and something that will warn you, "Hey, there might be a problem in the method I'm using."

Some of the methods here, paid and incurred, no matter which one you prefer, if you have the data, you should always put together triangles on a paid and incurred method then see how the two of them differ.

What can be particularly revealing is if you see a big change in the reserve from one year to the next on one of those bases or the other. If the number indicated by the paid development jumps, it says that they've accelerated claim payments in the claim department. Well, that's your red flag. Maybe you should over and ask why they're doing something different on payments, they're doing anything different on reserves.

The last one would be to perform reasonableness checks, retrospective tests and sensitivity analysis. Take your reserve reports from last year or three years ago, six years ago. Are you today where you thought you would be reserving? We'd all like to have a crystal ball, but of course we don't, but how close or how far off are you? If you're too far off, especially if you're far off in a consistent way, that probably says that there is something taking place that you haven't really taken account of.

Separate frequency and severity analyses. If your reserves are pretty stable or just increasing along with inflation, you might think that you don't really need to reflect anything, but suppose your frequency is going down, but your severity is increasing? Well, that's going to lead you up against the pitfall we talked about, in terms of per loss limitations.

If your severity is rising, you may be in a situation where your loss development factors aren't reasonable anymore. Compare your loss ratios to expected loss ratios based on pricing and pure premium to poor company accident year loss ratios. Just don't kind of blindly go on one or the other. Use all the information you have available.

So that concludes this half. Now, what Ralph Is going to do is he's going to take you through a case study where we're going to talk about some of the specific pitfalls and some of the techniques and the ways that you can use the things we've talked about to stay out of trouble, in terms of setting your reserves too high or too low.

MR. RATHJEN: Thank you, Hank. The first case study that we're going to cover today involves an assignment where you're asked to review experience from five accident years, and you are given paid loss development triangles and incurred loss development triangles; two of the more common methods used in reserve analysis, and you're asked to use the data and come up with an estimate and provide that estimate to management.

(Slide)

In our first slide, here, we have a common paid loss development triangle, as you're all familiar with, and without benefit of knowing what's going on behind the numbers and the forces that are acting upon these numbers, we go through our normal paid loss development technique. We calculate report to report factors as shown on the slide here, and we come up with averages.

For today's discussion, we will select the arithmetic averages of the various indications between 12 and 24 months, 24 to 36 months, and so forth. We come up with selected report to report factors, and, of course, we've attended the common pitfalls in reserve analysis session of the Casualty Loss Research seminar and recall that Pitfall No. 4 involved the lack of tail factors or the fact that tail factors are not that important in development.

Seeing that we have paid development here, we know from our incurred development that the 1984 accident year is already at $172,000. We can estimate, as noted in the footnote, an assumed tail factor for paid development of 1.139. We'll cover the incurred loss development triangle shortly here.

A PARTICIPANT: This is as far as we could go with this enhancement of the original recording. Unfortunately, we were not able to pick up the last 15 to 20 minutes, but this is the bulk of it, and this is the end of this cassette.

COMMON PITFALLS IN RESERVE ANALYSIS

PITFALL # 1

THE AVERAGE VALUE OF CLAIMS CLOSED DURING A GIVEN CALENDAR PERIOD IS A GOOD ESTIMATE OF THE AVERAGE VALUE OF THE CLAIMS STILL OPEN AT THE END OF THAT CALENDAR PERIOD.

EXHIBIT 1

ACCIDENT YEAR 1975 ----- COMPARISON OF AVERAGE PAID & OUTSTANDING CLAIMS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	INCREMENTAL			CUMULATIVE			HINDSIGHT		
YEAR OF DEVELOP	PAID LOSSES (000'S)	# CLAIMS CLOSED	AVG PAID LOSS	PAID LOSSES (000'S)	# CLAIMS CLOSED	AVG PAID LOSS	NEEDED RESERVE (000'S)	# OPEN & IBNR CLAIMS	AVERAGE RESERVE
1 (12/75)	4,950	16,500	300	4,950	16,500	300	26,390	21,500	1,227
2 (12/76)	12,880	18,400	700	17,830	34,900	511	13,510	3,100	4,358
3	3,780	1,400	2,700	21,610	36,300	595	9,730	1,700	5,724
4	2,310	550	4,200	23,920	36,850	649	7,420	1,150	6,452
5	1,470	300	4,900	25,390	37,150	683	5,950	850	7,000
6 (12/80)	1,430	260	5,500	26,820	37,410	717	4,520	590	7,661
7	1,040	160	6,500	27,860	37,570	742	3,480	430	8,093
8	900	120	7,500	28,760	37,690	763	2,580	310	8,323
9	780	100	7,800	29,540	37,790	782	1,800	210	8,571
10 (12/84)	480	60	8,000	30,020	37,850	793	1,320	150	8,800
* * *	1,320	150	8,800						
ULTIMATE	31,340	38,000	825	31,340	38,000	825	0	0	0

COMMON PITFALLS IN RESERVE ANALYSIS

PITFALL # 2

THE SAVINGS ON CLOSED CLAIMS IS A GOOD ESTIMATOR OF THE SAVINGS IN THE REMAINING AGGREGATE RESERVES.

EXHIBIT 2

CASE RESERVE DEVELOPMENT
ACCIDENT YEAR 1980

CLAIM NUMBER	INCURRED LOSSES @ 12/80	12/81	12/82	12/83	12/84	12/85
1	30	50	20	20	20	20
2	50	20	20	20	20	20
3	50	50	40	20	20	20
4	50	20	20	20	20	20
5	100	100	75	0	0	0
6	10	0	0	0	0	0
7	100	100	0	0	0	0
8	250	350	500	1,000	500	500
9	50	250	500	500	1,000	1,150
10	250	200	200	200	200	200
TOTAL	940	1,140	1,375	1,780	1,780	1,930
EMERGED SAVINGS		-21%	-46%	-89%	-89%	-105%

CAL YEAR	CLAIM #'S CLOSED	INITIAL RESERVE	FINAL RESERVE	PAID ON CLOSURE	% SAVINGS INITIAL RESERVE	% SAVINGS FINAL RESERVE
1981	2, 4, 6	110	110	40	64	64
1982	1, 7	130	150	20	85	87
1983	3, 5	150	140	20	87	86
1984	8	250	1,000	500	(100)	50
1985	9, 10	300	1,200	1,350	(350)	(13)
TOTAL		940	2,600	1,930	(105)	26

COMMON PITFALLS IN RESERVE ANALYSIS

PITFALL #3

THE CALENDAR YEAR RATIO OF PAID ALAE TO PAID LOSS REPRESENTS THE RELATIONSHIP OF THE NEEDED ALAE RESERVE TO THE NEEDED LOSS RESERVE.

EXHIBIT 3

ESTIMATING ALAE RESERVES

INCREMENTAL PAID LOSSES ($ 000'S)

ACC YR	MONTHS OF DEVELOPMENT 12	24	36	48	ULT
1980	1,000	2,000	500	300	3,800
1981	1,000	2,000	500	300	3,800
1982	1,000	2,000	500	300	3,800
1983	1,000	2,000	500	300	3,800
1984	1,000	2,000	500	300	3,800

NEEDED RESERVE
$ 3,900

INCREMENTAL PAID ALAE ($ 000'S)

ACC YR	MONTHS OF DEVELOPMENT 12	24	36	48	ULT
1980	15	70	35	30	150
1981	15	70	35	30	150
1982	15	70	35	30	150
1983	15	70	35	30	150
1984	15	70	35	30	150
ALAE / LOSS	1.5%	3.5%	7.0%	10.0%	3.95%

NEEDED RESERVE
$ 230

CY PAID ALAE = 15 + 70 + 35 + 30 = 150

CY PAID LOSSES = 1,000 + 2,000 + 500 + 300 = 3,800

CY PAID ALAE / PAID LOSS (150 / 3,800) : = 3.95 %

ALAE RESERVE BASED ON CY RATIO: 3.95% X 3,900 = 154

ACTUAL NEEDED RESERVE = 230

RESERVE DEFICIENCY = 49.4 %

PITFALL # 3: THE CALENDAR YEAR RATIO OF PAID ALAE TO PAID LOSSES REPRESENTS THE RELATIONSHIP OF THE NEEDED ALAE RESERVE TO THE LOSS RESERVE

EXHIBIT 4

COMMON PITFALLS IN RESERVE ANALYSIS

PITFALL # 4

THE 'TAIL FACTOR' IN LOSS DEVELOPMENT IS OF RELATIVELY MINOR IMPORTANCE IN THE RESERVE SETTING PROCESS.

INCURRED LOSS DEVELOPMENT FACTORS

ACC YEAR	INCURRED LOSSES @ 12/89	DEVELOP PERIOD (YRS)	INCURRED LOSS DEV FACTOR ANNUAL	INCURRED LOSS DEV FACTOR CUMUL	ULTIMATE INCURRED	IBNR
1989	43,700	1 : 2	1.971	8.152	356,242	312,542
1988	79,200	2 : 3	1.412	4.136	327,571	248,371
1987	133,400	3 : 4	1.358	2.929	390,729	257,329
1986	185,100	4 : 5	1.252	2.157	399,261	214,161
1985	174,000	5 : 6	1.105	1.723	299,802	125,802
1984	126,100	6 : 7	1.084	1.559	196,590	70,490
1983	102,500	7 : 8	1.073	1.438	147,395	44,895
1982	106,600	8 : 9	1.064	1.340	142,844	36,244
1981	70,500	9 : 10	1.055	1.259	88,760	18,260
1980	77,700	10 : 11	1.047	1.193	92,696	14,996
1979	83,800	11 : 12	1.039	1.139	95,448	11,648
1978	87,400	12 : 13	1.031	1.096	95,790	8,390
1977	91,400	13 : 14	1.024	1.063	97,158	5,758
1976	67,000	14 : 15	1.017	1.038	69,546	2,546
1975	50,800	15 : 16	1.011	1.021	51,867	1,067
1974	41,800	16 : ULT		1.010	42,218	418
TOTAL	1,521,000				2,893,917	1,372,917

SENSITIVITY ANALYSIS

DEVELOP PERIOD	ANNUAL LOSS DEV FACTOR ORIGINAL	ANNUAL LOSS DEV FACTOR REVISED	ANNUAL LOSS DEV FACTOR CHANGE	TOTAL IBNR ORIGINAL	TOTAL IBNR REVISED	TOTAL IBNR CHANGE
2 : 3	1.412	1.437	0.025	1,372,917	1,384,992	12,075
6 : 7	1.084	1.099	0.015		1,399,513	26,596
16 : ULT	1.010	1.020	0.010		1,398,032	25,115
16 : ULT	1.010	1.000	(0.010)		1,343,389	(29,528)

COMMON PITFALLS IN RESERVE ANALYSIS

PITFALL #5

LOSS-RATIO DEPENDENT RESERVING METHODS CAN BE USED WHEN PREMIUMS ARE DISCOUNTED.

EXHIBIT 5

TRUE — PRICING BUDGET:

PREMIUM	$1.00
INVESTMENT INCOME	$ .15
	$1.15
EXPENSES	.30
LOSSES	.80
	$1.10
PROFIT	$ .05

ALLEGED — PRICING BUDGET:

PREMIUM	$1.00
EXPENSES	$ .30
LOSSES	$ .65
	$ .95
PROFIT	$ .05

RESERVE CALCULATION
(BORNHUETTER - FERGUSON)

PREMIUM	$1,000,000	$1,000,000
EXP.LOSS RATIO	80%	65%
EXPECTED LOSSES	$800,000	$650,000
IBNR% @24 MOS.	50%	50%
IBNR	$400,000	$325,000

C O M M O N   P I T F A L L S   I N

R E S E R V E   A N A L Y S I S

PITFALL #6

LOSS DEVELOPMENT FACTORS CAN BE USED WITHOUT ADJUSTMENT ON SMALL CLAIM VOLUMES.

EXHIBIT 6

PER-CLAIM LIMIT = $200,000

AT AGE 15, LDF = 3.000

	UNLIMITED	LIMITED
CLAIM AMOUNTS:	$ 10,000	$ 10,000
	20,000	20,000
	100,000	100,000
	500,000	200,000
	$630,000	$330,000

$330,000 x 3 = $990,000

I S   T H I S   S E N S I B L E ?

TECHNIQUES

1. BE SURE LDF'S WERE CALCULATED BASED ON LIMITED LOSSES.

2. LIMIT EACH DEVELOPED CLAIM TO PER-CLAIM LIMIT, E.G.:

$ 10,000	X	3.000	=	$ 30,000
$ 20,000	X	3.000	=	$ 60,000
$100,000	X	3.000	=	$200,000
$200,000	X	3.000	=	$200,000
				$490,000

EXHIBIT 7

KEY AXIOMS OF CLAIM SETTLEMENT

1. SMALL, 'EASY' CLAIMS TEND TO CLOSE QUICKLY; LARGER CLAIMS GET CLOSED MORE SLOWLY.

2. MOST CLAIMS GET CLOSED FOR LESS THAN THEIR CASE RESERVE, BUT THE RELATIVELY FEW ADVERSE LARGE CLAIMS GENERALLY MORE THAN OFFSET THIS FAVORABLE DEVELOPMENT.

3. THE BOOK OF CLOSED CLAIMS CONTAINS A MUCH LARGER PROPORTION OF SMALL, SHORT-TAILED CLAIMS THAN THE BOOK OF OUTSTANDING CLAIMS.

EXHIBIT 8

RESERVING PITFALLS

RESERVE ANALYSES START WITH THE IMPLICIT ASSUMPTION THAT THINGS HAVE <u>NOT CHANGED.</u>

PITFALLS GENERALLY ARISE FROM A <u>BREAKDOWN</u> IN THIS ASSUMPTION :

FAILURE TO IDENTIFY INTERNAL OR EXTERNAL CHANGES

IMPROPER ASSESSMENT OF THE IMPACT OF CHANGES IN THE DATA OR IN THE RESERVING METHODOLOGY

EXHIBIT 9

AVOIDING OR MINIMIZING PITFALLS

KNOW YOUR CLAIM AND UNDERWRITING DEPARTMENTS

DEVELOP STATISTICAL INDICATORS

- CLOSING RATIOS
- PAID - TO - INCURRED RATIOS
- REPORT YEAR RUN-OFFS
- AVERAGE PAID / RESERVE / INCURRED CLAIM SIZE

EXAMINE DIFFERENT RESERVING METHODOLOGIES

- PAID METHODOLOGY
- INCURRED METHODOLOGY
- COUNTS X AVERAGE METHODOLOGY
- REPORT YEAR METHODOLOGY

PERFORM REASONABLENESS CHECKS

- RETROSPECTIVE TESTS AND SENSITIVITY ANALYSES
- FREQUENCY AND SEVERITY ANALYSES
- COMPARE LOSS RATIOS TO :
    - EXPECTED LOSS RATIOS BASED ON PRICING & PURE PREMIUM
    - INDUSTRY (PEER CO'S) ACCIDENT YEAR LOSS RATIOS

SLIDE 10

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

PAID DEVELOPMENT METHOD

Accident	Cumulative Paid Losses				
Year	12	24	36	48	60
1984	$50,000	$90,000	$126,000	$131,000	$151,000
1985	58,000	103,000	145,000	192,000	
1986	67,000	118,000	188,000		
1987	77,000	136,000			
1988	100,000				

	Paid Development Factors				
	12-24	24-36	36-48	48-60	
1984	1.800	1.400	1.040	1.153	
1985	1.776	1.408	1.324		
1986	1.761	1.593			
1987	1.766				
Average	1.776	1.467	1.182	1.153	
Cumulative	4.044	2.277	1.552	1.313	1.139 *

NOTE:

1.(*) Tail Factor = Incurred Loss / Paid Loss
= $172,000 / $151,000 = 1.139

SLIDE 11

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

PAID DEVELOPMENT METHOD

Accident Year	Cumulative Paid Loss	Cumulative Paid Loss Dev. Factor	Ultimate Loss	Indicated Reserve
1984	$151,000	1.139	$171,989	$20,989
1985	192,000	1.313	252,096	60,096
1986	188,000	1.552	291,776	103,776
1987	136,000	2.277	309,672	173,672
1988	100,000	4.044	404,400	304,400

Total Indicated Reserve =	$662,933
Carried Reserve =	$1,000,000
Indicated Redundancy =	$337,067
=	33.7%

SLIDE 12

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

INCURRED DEVELOPMENT METHOD

Accident Year	Cumulative Incurred Losses 12	24	36	48	60
1984	$81,000	$155,000	$167,000	$172,000	$172,000
1985	100,000	193,000	271,000	290,000	
1986	124,000	381,000	374,000		
1987	237,000	510,000			
1988	314,000				

	Incurred Development Factors 12–24	24–36	36–48	48–60	
1984	1.914	1.077	1.030	1.000	
1985	1.930	1.404	1.070		
1986	3.073	0.982			
1987	2.152				
Average	2.267	1.154	1.050	1.000	
Cumulative	2.748	1.212	1.050	1.000	1.000

SLIDE 13

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

INCURRED DEVELOPMENT METHOD

Accident Year	Cumulative Inc. Loss	Cumulative Inc. Loss Dev. Factor	Ultimate Loss	Paid To Date	Indicated Reserve
1984	$172,000	1.000	$172,000	$151,000	$21,000
1985	290,000	1.000	290,000	192,000	98,000
1986	374,000	1.050	392,700	188,000	204,700
1987	510,000	1.212	618,120	136,000	482,120
1988	314,000	2.748	862,872	100,000	762,872

Total Indicated Reserve =	$1,568,692
Carried Reserve =	$1,000,000
Indicated Deficiency =	$568,692
=	56.9%

SLIDE 14

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

REVISING PAID LOSS PROJECTIONS FOR CHANGES IN DISPOSAL RATES

Accident Year	Cumulative Paid Claims 12	24	36	48	60	Ultimate
1984	1,305	2,175	2,523	2,755	2,842	2,900
1985	1,239	2,065	2,390	2,626		2,950
1986	1,140	2,010	2,280			3,000
1987	1,068	1,922				3,050
1988	992					3,100
						3,150

	Claims Disposal Rates 12	24	36	48	60
1984	0.450	0.750	0.870	0.950	0.980
1985	0.420	0.700	0.810	0.890	
1986	0.380	0.670	0.760		
1987	0.350	0.630			
1988	0.320				

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

ADJUSTED PAID DEVELOPMENT METHOD

Accident Year	Cumulative Adjusted Paid Losses 12	24	36	48	60
1984	$35,556	$74,000	$93,000	$127,250	$151,000
1985	44,190	91,750	125,909	192,000	
1986	56,421	110,966	188,000		
1987	70,400	136,000			
1988	100,000				

	Adjusted Paid Development Factors 12–24	24–36	36–48	48–60	
1984	2.081	1.257	1.368	1.187	
1985	2.076	1.372	1.525		
1986	1.967	1.694			
1987	1.932				
Average	2.014	1.441	1.447	1.187	
Cumulative	5.677	2.819	1.956	1.352	1.139

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

ADJUSTED PAID DEVELOPMENT METHOD

Accident Year	Cumulative Paid Loss	Adjusted Cumulative Paid Loss Dev. Factor	Ultimate Loss	Indicated Reserve
1984	$151,000	1.139	$171,989	$20,989
1985	192,000	1.352	259,584	67,584
1986	188,000	1.956	367,728	179,728
1987	136,000	2.819	383,384	247,384
1988	100,000	5.677	567,700	467,700

Total Indicated Reserve = $983,385

Carried Reserve = $1,000,000

Indicated Redundancy = $16,615

= 1.7%

SLIDE 17

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

REVISING INCURRED LOSS PROJECTIONS
FOR CHANGES IN CASE ADEQUACY

Accident Year	Open Claims 12	24	36	48	60
1984	1,097	591	377	145	58
1985	1,121	827	561	325	
1986	1,050	815	720		
1987	1,087	786			
1988	1,113				

	Average Case Reserves 12	24	36	48	60
1984	$28	$110	$109	$283	$362
1985	37	109	225	302	
1986	54	323	258		
1987	147	476			
1988	192				

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

ADJUSTED INCURRED DEVELOPMENT METHOD

Accident Year	Adjusted Average Case Reserves 12	24	36	48	60
1984	$97	$244	$196	$283	$362
1985	111	281	225	302	
1986	128	323	258		
1987	147	476			
1988	192				

	Adjusted Incurred Losses 12	24	36	48	60
1984	$156,030	$234,343	$199,761	$172,035	$171,996
1985	182,603	335,279	271,225	290,150	
1986	201,217	381,245	373,760		
1987	236,789	510,136			
1988	313,696				

	Development Factors 12-24	24-36	36-48	48-60	
1984	1.502	0.852	0.861	1.000	
1985	1.836	0.809	1.070		
1986	1.895	0.980			
1987	2.154				
Average	1.847	0.880	0.966	1.000	
Cumulative	1.570	0.850	0.966	1.000	1.000

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

ADJUSTED INCURRED DEVELOPMENT METHOD

Accident Year	Cumulative Inc. Loss	Adjusted Cumulative Inc. Loss Dev. Factor	Ultimate Loss	Paid To Date	Indicated Reserve
1984	$171,996	1.000	$171,996	$151,000	$20,996
1985	290,150	1.000	290,150	192,000	98,150
1986	373,760	0.966	361,052	188,000	173,052
1987	510,136	0.850	433,616	136,000	297,616
1988	313,696	1.570	492,503	100,000	392,503

Total Indicated Reserve =	$982,317
Carried Reserve =	$1,000,000
Indicated Redundancy =	$17,683
=	1.8%

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #1

COMPARISON OF ULTIMATES

Accident Year	Adjusted Paid Ultimate	Adjusted Incurred Ultimate
1984	$171,989	$171,996
1985	259,584	290,150
1986	367,728	361,052
1987	383,384	433,616
1988	567,700	492,503
Total	$1,750,385	$1,749,317

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

UNLIMITED INCURRED LOSS DEVELOPMENT

Accident	Months of Development									
Year	12	24	36	48	60	72	84	96	108	120
1980	$2,128	$5,423	$11,654	$17,322	$24,654	$27,325	$29,845	$30,513	$30,987	$31,268
1981	2,465	6,722	10,592	16,854	23,654	29,325	31,984	33,932	34,965	
1982	1,865	5,265	12,654	19,135	25,465	28,632	29,895	31,684		
1983	2,065	7,565	16,247	23,247	26,699	30,984	32,985			
1984	1,716	5,922	10,547	16,987	21,355	24,984				
1985	1,936	6,060	12,654	18,655	22,654					
1986	2,322	6,262	12,098	17,655						
1987	2,165	5,925	13,655							
1988	1,914	6,065								
1989	2,213									

	Development Factors									
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	
1980	2.548	2.149	1.486	1.423	1.108	1.092	1.022	1.016	1.009	
1981	2.727	1.576	1.591	1.403	1.240	1.091	1.061	1.030		
1982	2.823	2.403	1.512	1.331	1.124	1.044	1.060			
1983	3.663	2.148	1.431	1.148	1:160	1.065				
1984	3.451	1.781	1.611	1.257	1.170					
1985	3.130	2.088	1.474	1.214						
1986	2.697	1.932	1.459							
1987	2.737	2.305								
1988	3.169									
Average	2.994	2.048	1.509	1.296	1.160	1.073	1.048	1.023	1.009	
Cumulative	16.156	5.396	2.635	1.746	1.347	1.161	1.082	1.032	1.009	1.000

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

NET INCURRED LOSS DEVELOPMENT

Accident	Months of Development									
Year	12	24	36	48	60	72	84	96	108	120
1980	$1,702	$4,067	$8,158	$11,259	$14,792	$15,975	$16,295	$16,295	$16,295	$16,295
1981	1,972	5,042	7,414	10,955	14,192	15,268	15,497	15,497	15,497	
1982	1,492	3,949	8,858	12,438	15,279	16,318	16,644	16,644		
1983	1,652	5,674	11,373	15,111	16,019	17,301	17,474			
1984	1,373	4,442	7,383	11,042	12,813	13,812				
1985	1,549	4,545	8,858	12,126	13,592					
1986	2,159	5,323	9,678	13,241						
1987	2,013	5,036	10,924							
1988	1,780	5,155								
1989	2,058									

	Development Factors									
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	
1980	2.390	2.006	1.380	1.314	1.080	1.020	1.000	1.000	1.000	
1981	2.557	1.470	1.478	1.295	1.076	1.015	1.000	1.000		
1982	2.647	2.243	1.404	1.228	1.068	1.020	1.000			
1983	3.435	2.004	1.329	1.060	1.080	1.010				
1984	3.235	1.662	1.496	1.160	1.078					
1985	2.934	1.949	1.369	1.121						
1986	2.465	1.818	1.368							
1987	2.502	2.169								
1988	2.896									
Average	2.785	1.915	1.403	1.196	1.076	1.016	1.000	1.000	1.000	
Cumulative	9.781	3.512	1.834	1.307	1.093	1.016	1.000	1.000	1.000	1.000

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

DEVELOPMENT OF NET INCURRED ULTIMATES

Accident Year	Cumulative Inc. Loss	Cumulative Inc. Loss Dev. Factor	Ultimate Loss	Paid To Date	Indicated Reserve
1980	$16,295	1.000	$16,295	$15,969	$326
1985	15,497	1.000	15,497	14,257	1,240
1985	16,644	1.000	16,644	14,480	2,164
1985	17,474	1.000	17,474	13,106	4,368
1985	13,812	1.016	14,033	7,858	6,175
1985	13,592	1.093	14,856	7,428	7,428
1986	13,241	1.307	17,306	7,788	9,518
1987	10,924	1.834	20,035	8,014	12,021
1988	5,155	3.512	18,104	2,716	15,388
1989	2,058	9.781	20,129	403	19,726

Total Indicated Reserve = $78,354

Carried Reserve = $83,000

Indicated Redundancy = $4,646

= 5.6%

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COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

INCURRED LOSS DEVELOPMENT LIMITED TO 100K

Accident Year	Months of Development 12	24	36	48	60	72	84	96	108	120
1980	$1,702	$4,067	$8,158	$11,259	$14,792	$15,975	$16,295	$16,295	$16,295	$16,295
1981	1,972	5,042	7,414	10,955	14,192	15,268	15,497	15,497	15,497	
1982	1,492	3,949	8,858	12,438	15,279	16,318	16,644	16,644		
1983	1,652	5,674	11,373	15,111	16,019	17,301	17,474			
1984	1,373	4,442	7,383	11,042	12,813	13,812				
1985	1,549	4,545	8,858	12,126	13,592					
1986	2,090	5,010	8,469	11,476						
1987	1,949	4,740	9,559							
1988	1,723	4,852								
1989	1,992									

	Development Factors 12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	
1980	2.390	2.006	1.380	1.314	1.080	1.020	1.000	1.000	1.000	
1981	2.557	1.470	1.478	1.295	1.076	1.015	1.000	1.000		
1982	2.647	2.243	1.404	1.228	1.068	1.020	1.000			
1983	3.435	2.004	1.329	1.060	1.080	1.010				
1984	3.235	1.662	1.496	1.160	1.078					
1985	2.934	1.949	1.369	1.121						
1986	2.397	1.690	1.355							
1987	2.432	2.017								
1988	2.816									
Average	2.760	1.880	1.402	1.196	1.076	1.016	1.000	1.000	1.000	
Cumulative	9.505	3.444	1.832	1.307	1.093	1.016	1.000	1.000	1.000	1.000

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

INCURRED LOSS DEVELOPMENT LIMITED TO 500K

Accident Year	Months of Development									
	12	24	36	48	60	72	84	96	108	120
1980	$1,915	$4,610	$9,323	$12,992	$17,258	$18,581	$19,399	$19,593	$19,593	$19,593
1981	2,219	5,714	8,474	12,641	16,558	19,941	20,790	20,998	20,998	
1982	1,679	4,475	10,123	14,351	17,826	19,470	19,432	19,626		
1983	1,859	6,430	12,998	17,435	18,689	21,069	21,440			
1984	1,544	5,034	8,438	12,740	14,948	16,989				
1985	1,742	5,151	10,123	13,991	15,858					
1986	2,159	5,323	9,678	13,241						
1987	2,013	5,036	10,924							
1988	1,780	5,155								
1989	2,058									

	Development Factors									
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	
1980	2.407	2.022	1.394	1.328	1.077	1.044	1.010	1.000	1.000	
1981	2.575	1.483	1.492	1.310	1.204	1.043	1.010	1.000		
1982	2.665	2.262	1.418	1.242	1.092	0.998	1.010			
1983	3.459	2.021	1.341	1.072	1:127	1.018				
1984	3.260	1.676	1.510	1.173	1.137					
1985	2.957	1.965	1.382	1.133						
1986	2.465	1.818	1.368							
1987	2.502	2.169								
1988	2.896									
Average	2.798	1.927	1.415	1.210	1.127	1.026	1.010	1.000	1.000	
Cumulative	10.778	3.852	1.999	1.413	1.168	1.036	1.010	1.000	1.000	1.000

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

ADJUSTED DEVELOPMENT OF NET INCURRED ULTIMATES

Accident Year	Cumulative Inc. Loss	Adjusted Cumulative Inc. Loss Dev. Factor	Ultimate Loss	Paid To Date	Indicated Reserve
1980	$16,295	1.000	$16,295	$15,969	$326
1981	15,497	1.000	15,497	14,257	1,240
1982	16,644	1.000	16,644	14,480	2,164
1983	17,474	1.000	17,474	13,106	4,368
1984	13,812	1.016	14,033	7,858	6,175
1985	13,592	1.093	14,856	7,428	7,428
1986	13,241	1.413	18,710	7,788	10,922
1987	10,924	1.999	21,837	8,014	13,823
1988	5,155	3.852	19,857	2,716	17,141
1989	2,058	10.778	22,181	403	21,778
			Total Indicated Reserve =		$85,365
			Carried Reserve =		$83,000
			Indicated Deficiency =		$2,365
			=		2.8%

COMMON PITFALLS IN RESERVE ANALYSIS

CASE STUDY #2

COMPARISON OF ULTIMATES

Accident Year	Incurred Ultimate	Adjusted Incurred Ultimate
1980	$16,295	$16,295
1981	15,497	15,497
1982	16,644	16,644
1983	17,474	17,474
1984	14,033	14,033
1985	14,856	14,856
1986	17,306	18,710
1987	20,035	21,837
1988	18,104	19,857
1989	20,129	22,181

1991 CASUALTY LOSS RESERVE SEMINAR

7C: CLAIMS MANAGEMENT PERSPECTIVES

Moderator

Michael L. Toothman
Tillinghast/Towers Perrin

Panel

Margaret Wilkinson Tiller
Tiller Consulting Group

Michael G. Zipkin
Consultant

Recorder

Jon W. Michelson
Tillinghast/Towers Perrin

MR. TOOTHMAN: I guess we can go ahead and get started. It's just about 1:30, and if we start a moment early, I guess that won't be something you'll object to too much. Some of you are probably anxious to catch an airplane or catch a train or walk home, whatever you do.

This is section 7C, Claims Management Perspectives. We're going to do something a little bit different today than a lot of the sessions that you've seen. We're going to have a little skit for you. We didn't really choreograph. We don't have a very good stage. We're just going to role play some, but, in doing so, we hope to demonstrate some points about the interaction of the claims function and the actuarial function that we hope will be helpful to you.

There are a couple housekeeping items, and let me touch on those real quickly first. This is the last session of the seminar. So please fill out your registration forms, not only for this session, but for those previous sessions where you haven't turned them in and the big sheet for the whole seminar. There is an eight and a half by eleven page that is on the entire seminar that the committee would like very much to receive from you in addition to those cards you have on each seminar.

Secondly, we will have time for questions and answers after our performance. This section is being recorded. For that purpose, when you ask your questions, if you would please go to the microphone in the aisle and identify yourselves and your company affiliation, that would be helpful when we do the transcript.

With those housekeeping items out of the way, let me set the stage for our skit and introduce our players to you. Our fictitious company is Professional Reliable. It's a company that writes one line of business, physicians' and surgeons' insurance. The points that we're going to make through this skit are irrespective of the line of business. They would apply equally well to workers' compensation, general liability, virtually any line.

This company has been in business five years. It's in its sixth year of operation now. Things have been going quite well. We have set up our fictitious company as one of the bedpan mutuals that was formed in the '70s and early '80s. So if you want to try to put it in context, you might imagine that we're in the mid-'70s or the mid-'80s, when trends are still going up at a pretty rapid clip.

The new entrants into this market were making lots of money or at least felt that they were. There was lots of money coming in the door, and there wasn't much going out the door yet. So things looked pretty good.

Our company is headed by a chief executive officer who is a former physician. He has entered the insurance industry at the request of a lot of his colleagues who thought that they could do better if they banded together and provided their own insurance carrier, and he was the right guy to do it.

He'd been in the medical profession for a long period of time. Malpractice rates were going up. It was a good time to get out of the medical profession, and now he could be a success at another profession as well.

I'm going to play the role of the chief executive officer. My name is Mike Toothman. I'm a Fellow of the Casualty Actuarial Society, a Member of the American Academy, a Fellow of the Canadian Institute of Actuaries, and currently president-elect of the CAS and therefore on the boards of the CAS and the American Academy.

Let me introduce our other players, in their order of appearance. We're doing a little typecasting here. Margaret Tiller will play the role of the consulting actuary. In real life, she plays the role of a consulting actuary. She is President of Tiller Consulting Group, which specializes in actuarial and environmental risk services.

She is located in St. Louis. She's a Fellow of the Casualty Actuarial Society, an Associate of the Society of Actuaries, a Members of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries.

Margaret also is a CPCU and has the Associate in Risk Management designation from the Insurance Institute of America. She's been a pretty prolific writer and is the author of one of the chapters of the CAS textbook.

Our claims consultant, also another bit of typecasting, (he's a claims consultant in his real life as well), is Mike Zipkin, who currently is a president of his own firm in Albuquerque, New Mexico. Previous to that, he was head of the Tillinghast claims consulting practice, located here in Washington.

Mike has a Bachelor of Arts degree and a J.D. degree. He's an associate in claims of the Insurance Institute of America and has had a long and very fruitful career in the claims field both with major carriers and as a consultant.

With that, the stage is set. You know our players. Let's raise the curtain on the first act. Previous to the first scene, I have been in touch with Mike and Margaret by telephone. I've not met them before. This is their first visit to the company. I have provided them with some information.

As I said, the previous five years have gone very well, but now my auditors have told me that I have a reserve deficiency of $25.5 million, and they've issued a qualified opinion. That has not made me a happy camper, and I've asked Margaret and Mike to provide me with a second opinion.

MR. TOOTHMAN: Margaret, Mike, I'm glad that you're here today. It's good to see you, and I'm really looking forward to your visit. As you know, the news I had from our auditors was not good at all, and I'm really looking forward to your analysis and to you reducing this reserve number a great deal.

MS. TILLER: Well, it's nice to be here, Mike. I can't promise that we'll reduce the number, but I can promise that we will, hopefully, come up with the best estimate for your company.

MR. TOOTHMAN: I hope so. That will be a low number. I can assure you that will be the best estimate for my company.

MS. TILLER: I think we mean "best" in slightly different ways.

MR. TOOTHMAN: Okay.

(Slide 1)

MS. TILLER: Let's start by reviewing what your company was holding and what the auditor did. You were holding nothing. The auditor thinks that you should be holding $25.5 million.

MR. TOOTHMAN: As you're aware, we write physician and surgeon insurance. It's a claims-made policy form, and we've had some of the best attorneys in the country look at the policy language. It's very tight. By definition, there's no IBNR in claims-made policies.

MS. TILLER: Well, now, there are two components of IBNR, the reserve for unreported claims, which you do not have, because your policy language is so tight, but there is also something called "Case Reserve Development." We'll get into that a bit more later. Let's continue with the auditor's analysis.

(Slide 2)

This is a triangle that shows the experience of your company. Starting out in the first year, you had earned premium of $10 million, and at the end of that first year, your reported losses, which are the payments plus the case reserves for the open claims, were $5 million.

Twelve months later, they had risen to $7 million. At three years, they had risen to $8.4 million, et cetera. So every year, we're adding a diagonal to this triangle, and, as you can see, over time, in both directions, the numbers are increasing.

MR. TOOTHMAN: This is the same thing the auditor showed me, isn't it?

MS. TILLER: That's exactly right. We're just repeating their analysis to be certain you understand it. The next thing that they did was to look at the report-to-report ratios. (Slide 3) This shows what percentage increase there is going from the 12-month to the 24-month data.

You'll see, for example, looking at the 12- to 24-month column, that there was about a 40 percent increase in reported losses for years one, two, and three, and then, all of a sudden, in year four, it went up dramatically to 1.72, or a 72 percent increase, and then it dropped again in report year five.

In fact, if you look at those last two diagonals, you can see a big increase followed by a big decrease. Now, the auditors didn't really make any comments about this. They simply took the arithmetic average of the numbers in the columns to come up with what they thought would be the appropriate report-to-report ratios. They also assumed that there would be no development after 72 months, based on some insurance industry data.

MR. TOOTHMAN: Margaret, I don't want to interrupt you too much, but I do want to comment on that, because the auditors said the same things to me, and I want you to realize that we aren't like the rest of the insurance industry. That's why we started this company. We think we can do things a whole lot better than the insurance industry is doing them, and we don't think they know this business as well.

We're run by physicians, and we know medical malpractice better. So the use of industry data gives me some concern. I'm hoping that you can look at our own data, and you'll see that these reserve numbers aren't necessary.

MS. TILLER: Well, we'll certainly give that every consideration. Let's continue. What we try to do is to, essentially, square the triangle. We want to understand how the losses will develop so that, for the more recent years, we can understand what the ultimate losses are going to be.

(Slide 4)

Again, the auditors have assumed that 72 months is ultimate. Normally, what you do is fill in the triangle, and then you keep going to the right. They assumed that at 72 months losses would be as high as they would go. Now, let's talk about how we get to those ultimate values.

(Slide 5)

We take the reported losses at the latest evaluation, the ones from the last diagonal, and we multiply them by development factors to ultimate. So if we want the numbers at 12 months to go to ultimate, we have to multiply them by a lot of factors, 12 to 24 months, 24 to 36, 36 to 48, etcetera.

What is shown here is the cumulative factor for all of those. We multiply the reported losses by the cumulative development factors to get the ultimate losses, and then we compare that to earned premium. You can see, based on the auditors' analysis, there has been a big deterioration in your loss ratios.

MR. TOOTHMAN: It doesn't make much sense, does it Margaret? It seems crazy to me.

MS. TILLER: Well, there are some pertinent facts that the auditors did not reflect. For example, you changed your retention from \$100,000 to \$250,000 per occurrence in Policy Year 5.

MR. TOOTHMAN: I'm glad you noticed that. That ought to make a real big difference. See, we realized how profitable this business was going to be, so we decided we ought to keep more of that profit for ourselves.

MS. TILLER: Well, we won't argue about whether or not you're going to make any more money yet. Let's continue reflecting some of these additional items.

(Slide 6)

Normally, when you have a higher retention, it takes longer for the reported losses to reach their ultimate value. So we've increased the loss development factor for Policy Years 5 and 6 to reflect the change in retention. What that ends up with is an IBNR that's now \$30.9 million or \$5.4 million higher than what the auditors' suggested.

MR. TOOTHMAN: Holy cow, Margaret, this is going the wrong direction! I asked you to come in here and get us lower numbers. You're getting \$6 million more than the auditors have.

MS. TILLER: Well, you hired us to give you a second opinion, and we're not done yet, but we're working on our second opinion. One problem with the loss development analysis is the impact of the large development factors on unusually large claims.

It's possible that there may be some unusually large claims in Policy Years 5 and 6.

(Slide 7)

There is a different analysis that we can do that will help counteract that impact. It's called the "Bornhuetter-Ferguson" technique. What we do here is try to replace the expected experience with actual experience. To get what we expect, we're going to go back to your earned premium and assume a loss ratio of 1.05.

MR. TOOTHMAN: Margaret, I want to understand what you're doing, but I guess I don't understand that 1.05. That makes it look like you're starting with the presumption that we're going to lose money.

MS. TILLER: Well, your rates are based on discounted losses. You've discounted them for anticipated investment income. However, when you set reserves, you need to use an undiscounted loss rate. So this is consistent with your rating policy.

MR. TOOTHMAN: This doesn't presume we're going to lose money right at the beginning of your analysis?

MS. TILLER: No, because we're assuming that the investment income will more than offset the underwriting loss.

MR. TOOTHMAN: Okay.

MS. TILLER: We are assuming interest rates stay up. We used the loss ratio and earn premium to calculate the expected losses, and then we apply the reporting pattern, in this case, the percentage that we expect not to be reported, to come up with the IBNR. That brings the IBNR number down to $22.3 million. We can add the IBNR numbers to what's actually been reported, divide by earned premium, and come up with loss ratios which still look like they're deteriorating.

MR. TOOTHMAN: Can you explain that to me a little bit? Because the exhibit that you've got here makes it look like you still think we've lost money in at least the last two or three years.

MS. TILLER: Well, it's entirely possible that you have, but there are some areas where we need to do some better analysis. For example, there is a problem using earned premium. We'd rather use an exposure base, such as numbers of physicians and surgeons.

MR. TOOTHMAN: Will that help reduce the answer?

MS. TILLER: Well, I can't promise, but it will certainly help us get a better projection.

MR. TOOTHMAN: Well, $22.3 million is a lot better than $30.9 million, and it's even a little bit better than $25.5 million, Margaret, but if getting this exposure base will help you, I'll certainly do that. I think we have that information.

MS. TILLER: Well, as I mentioned earlier, there seems to have been some changes in the reporting pattern that may have been due to changes in claim handling practices. So we've asked Mike Zipkin to get involved to determine what happened and what the ultimate impact of any changes might be.

MR. TOOTHMAN: Margaret, I appreciate that you've brought Mike along because any expertise that we can bring to this problem will be wonderful. I follow what you've done, and it's similar to what our auditors did, and your answer isn't that much different either, but it really just doesn't make sense to me.

We started this company five years ago. We haven't paid out much in losses so far. We've got a lot more in premium than we've paid in losses. We've hired the best claims people and the best attorneys that we could find. We've got this claims-made form, which all of our attorneys say is a really good form. I thought that meant no IBNR, and the auditors are telling me $25.5 million. You're telling me somewhere between $22 and $30 million. I just don't understand it.

I did my own study, and I want to show it to you, because we only had 100 cases open at the end of last year. When I looked a couple weeks ago at the end of July, we had closed 50 of those cases in the last seven months.

(Slide 8)

You can see by this slide that those cases had reserves at the end of the year of $750,000. They closed for $625,000. That's a 20 percent redundancy. I think we must have that redundancy in the rest of our cases, too.

MR. ZIPKIN: Excuse me a minute, Mike.

MR. TOOTHMAN: Yes, Mike.

MR. ZIPKIN: Let me add something here. What you see as a discrepancy between what you're saying and what Margaret is saying is really not a discrepancy. You're talking about case basis reserving, and she's talking about actuarial reserving, and the two are two different subjects entirely.

MR. TOOTHMAN: I'm saying that we're 20 percent redundant, and she's saying I'm insolvent. It sounds like a discrepancy to me. Can you explain that to me?

MR. ZIPKIN: The point is that she's talking about the actuarial reserving process. You're talking about the claim reserving process, and they are two entirely different processes.

MR. TOOTHMAN: Can you explain that to me, Mike?

MR. ZIPKIN: Yes, I will explain it to you, in terms of one of your own particular cases.

(Slide 9)

This is one of your own cases that we've already looked at. As you can see, the left-hand margin (the vertical margin) represents the value of this claim. You started at $3,500. You ended up at $115,000 in reserves, and it settled for about $105,000.

MR. TOOTHMAN: That's just like all the others I looked at. It settled for less than it was reserved for.

MR. ZIPKIN: Yes. The problem is that early on, if your claim department had put $115,000 on this case, we would have looked at it askance. We would have looked at it as inappropriate. To put $115,000 on this case in the beginning, in our opinion, would have been singularly inappropriate because the value of the case was not $115,000 in the beginning.

In the beginning, you had minor injuries. In the beginning, you had very questionable malpractice circumstances, but your claim department could not have foreseen that. Your claim department has a tendency, as all claim departments do, to err on the low side, to not put up reserves unless they can prove the value of the case in that amount. They couldn't prove the value of the case in the amount of 115,000 or $105,000 in the beginning of this case, because the facts known at that time didn't warrant that kind of reserve.

MR. TOOTHMAN: This exhibit makes it look like they put different values on it at different points in time.

MR. ZIPKIN: They did put different values on it at different points in time. In conjunction with the investigative development of the case, the facts got worse. They were told by your defense counsel that the doctor had altered his medical records.

Now, you beg your doctors not to do that. You beg your doctors not to touch their medical records. This doctor didn't cheat or steal or anything of that kind, but what he did do was to go over his records and to straighten them out. Your attorney was adamant that, in the minds of a jury, that could be interpreted as changing the medical records, which is a definite no-no.

MR. TOOTHMAN: Mike, I hear that something called "stair-stepping reserves" is a bad thing, and this kind of looks like that. Is that what this is?

MR. ZIPKIN: No. This is what we call "adverse development." As more facts became known, the value of the case was changed to reflect the newly known facts. Stair-stepping is a periodic increase in case reserves not based on facts. It's purpose is to get case reserves that are too low up to the correct value gradually. Stair-stepping results in case reserves that do not reflect all known facts until the cases are close to or at settlement.

MR. TOOTHMAN: Well, Mike, I understand what you're saying, but I guess the bottom line is, if these numbers are right, we might as well close up shop. I mean, we can't take a $22 million --

MS. TILLER: Well, let's not be hasty. We need to understand the changes in case reserving practices. If you are reserving cases at their appropriate value more quickly, then we'll be able to change the analysis. That should reduce the IBNR estimate, but it will not reduce it to zero.

MR. TOOTHMAN: Well, how do we go about doing that, Margaret?

(Slide 10)

MR. ZIPKIN: In conducting a claim review, which will take about two weeks, we interview claim management and supervisory personnel. We review claim files. We review your claim procedures, and the statistical data that will appeal to the actuaries.

(Slide 11)

Now, in interviewing your claim management and supervisory personnel, we will talk to them about their claim practices with the understanding that they may not realize they have changed their claim practices to accommodate your own particular needs.

MR. TOOTHMAN: Okay. Go on.

MR. ZIPKIN: For example, we look for changes in law legislation affecting liability, of legal defenses or damages. I can assure you that when your state legislatively moved from contributory negligence to comparative negligence, it changed the way you reserve your cases. Cases that formerly had no value at all, which represented about half of your cases, now have a value and have to be reserved for that value. So your claim manager sat down with your claim people and talked to them about changing their reserves in conjunction with the legislative legal changes that your state enacted when it moved from contributory negligence to comparative negligence, jury verdict patterns, higher awards, and so forth.

We look for evidence of changes in that direction produced externally to your claim department by higher jury verdict awards. We look for changes in procedures and practices for reporting reserving or closing of claims. Obviously, if you have changed your procedures for reserving your cases, we want to examine that and to determine what influence that has on the bottom line being evaluated by your actuaries.

MR. TOOTHMAN: Okay.

MR. ZIPKIN: Changes in personnel work loads and claim department organization are changes that we would look for. Obviously, if you have change -- if older, more experienced claim people have left the company and been replaced by less experienced claim people -- case reserving changes can take place.

MR. TOOTHMAN: Well, Mike, I'll be happy to have you look at all this. I don't think I can hold out much hope for you finding anything significant. We've had the same claims staff, essentially, since we started the company. The same man has been running the claims department. I think you'll find him to be a very experienced claims executive, but if it will help us get a handle on this problem, I'm all for it. You said it would take about two weeks?

MR. ZIPKIN: It takes about two weeks to conduct the study, given the personnel that we use.

MR. TOOTHMAN: Is there anything I need to do to help you with that study?

MR. ZIPKIN: Yes. The study takes place in a highly interactive and involved manner. So you need to talk to your claim department and tell them that we're coming.

MR. TOOTHMAN: Well, I'll take you down and introduce you to them right now, and I assure you you'll get their cooperation. Margaret, is there anything else you need to do?

MS. TILLER: Yes. There are several other areas we'd like Mike to look into. For example, we think your allocated expenses look high, and we want to be sure that they're reasonable.

MR. TOOTHMAN: Okay. Do I need to give you anything to help with that?

MS. TILLER: Just the claim department's cooperation.

MR. TOOTHMAN: You'll have it. I assure you of that. Well, let's go down there now, and I'll introduce you to the claims department, and I'll look forward to seeing you again in a couple of weeks, after you've had a chance to do your study.

MR. ZIPKIN: There's only one thing, Mike, and that is that Margaret has asked me to look at your reinsurance recoverable area also.

MR. TOOTHMAN: Okay. Well, that will be fine.

Let's take a break right now, just for a minute, and review where we are while Mike and Margaret go off to do their study. Our chief executive officer has had a successful medical career. He's had five years as president of this company, and things were really going pretty well.

As I said at the beginning, lots of money coming in, not very much money going out. Investment bankers were calling on me all the time to play golf with me and tell me how they can help me invest all of our money. I was a legend in my own time, in the eyes of my peers within the medical community, and now, all of a sudden, this news has me worried.

There is certainly concern about what will happen to the insurance company. There is also a lot of emotion involved, because I was a hero, and now I'm not so sure if things are as good as they appear, and if this is wrong, what else might be wrong, and what is there I really don't know about this business anyway?

So it's a very emotional and personal situation for me. Anyway, Mike and Margaret have been off doing their review. I am really hopeful that the answer will change a lot when they come back. They have finished their claim study, so let's move forward two weeks, and we'll raise the curtain on Scene II and see what happens.

Margaret, Mike, I'm glad to see that you're back. I hope that your experience with my claims people has been a rewarding one, and I'm looking forward to some good news. I hope you've brought me some.

MS. TILLER: Well, we have news.

MR. ZIPKIN: We have some good news, and we have some claim news, Mike.

MR. TOOTHMAN: In my profession, we'd say that your bedside manner could use some improvement, but why don't you tell me what your news is.

MR. ZIPKIN: Well, let me show you a slide that will shed light on your finding of redundancy on closed claims.

(Slide 12)

You can recall that I told you that you were talking about closed claims as a matter of case basis reserving, while Margaret was talking about the actuarial reserving process. You have to take both into account at the same time. That's the important thing that you have to understand. You must take into account not only the closed claim information, where you had $750,000 in reserves and you settled the cases for $625,000, which is a reduction of 20 percent or a redundancy of 20 percent in the settlement amounts compared to the reserves.

MR. TOOTHMAN: Right.

MR. ZIPKIN: Whereas, on your still open cases that we looked at, you went from $1 million in 12/31 at the end of Year 6 to 1.5 million at the end of Year 7. You must take both into account at the same time. That's what Margaret is doing. She's measuring the adverse development on the still open cases against what you have paid on the closed claims.

You can't just look at closed claims. This is what you and your claim department simply must understand. You must look at the continued development of the still open cases, as we have done. As this slide reflects, when you measure both the redundancy on the closed claims and the continued development on the still open cases, your adverse development appears.

MR. TOOTHMAN: So you're saying I had $125,000 of savings on the closed cases but a $500,000 increase in the reserves on the open cases?

MR. ZIPKIN: Right.

MR. TOOTHMAN: Okay. I understand.

MR. ZIPKIN: When you go from point A to point B, during the same period of time that you closed those cases, you had a redundancy on those closed claims, but you had an adverse development on the still open claims of $500,000.

MR. TOOTHMAN: Can you explain to me why that happened?

MR. ZIPKIN: This next slide is an example of why it happened.

(Slide 13)

There are is six of the cases that you have on your books today. They are representative of almost all of cases that we looked at. The first six columns deal with the file numbers, the date of accident, the report date, the initial reserve, the changes in the initial reserve, and the dates of those changes.

Look at the last two columns. You will find substantial increases in reserves occurring in June, July, and August of the same year. That has to be due to more than just coincidence, and when we confronted your claim department, they told us the same thing they told you.

Your claim manager, who I have known since 1955, and he has been on board since you started this company, says he hasn't changed anything, but when we showed him this information, he had to admit that this was due to more than just coincidence, that you would have substantial reserve changes in the same period of time in the same year.

You could recall that just before this period of time, in May of this year, that you got hit with some very substantial verdicts. One case in particular, where you planned on paying nothing, you paid $2 million.

MR. TOOTHMAN: I remember that case. That was the Blake case.

MR. ZIPKIN: Yes, it was the Blake case. And as a result of that case, your claim department supervisors reviewed all of their claims, and one at a time they increased the reserves to avoid being hit by those bombs again.

MR. TOOTHMAN: I wasn't very happy about that case.

MR. ZIPKIN: No. You were not very happy about that case. As a matter of fact, you hit your claim department over the head with a two-by-four on several occasions citing that case, and they were adamant that they were not going to let that happen again.

MR. TOOTHMAN: So they went through and increased the reserves on all these other cases?

MR. ZIPKIN: Yes. They went through and increased the reserves on all these other cases, but they did it one case at a time, and the aggregate result was not known.

MR. TOOTHMAN: Doesn't that mean that we'll now be redundant? That we won't have this development in the future?

MR. ZIPKIN: Our opinion is they effected a one-time only but permanent change in cases reserves. They were putting up higher reserves earlier in the lives of the cases. The cases we looked at were properly reserved. We don't think your claim department is doing a bad job.

MS. TILLER: But what this translates into, from an actuarial point of view, is that the last diagonal that we looked at is now going to represent the new pattern for your company.

(Slide 14)

If we go back to the report-to-report ratio triangle that we had, we can see the large increase very clearly between the end of Year 4 and the end of Year 5, and then the numbers on the last diagonal between the end of Year 5 and end of Year 6 are what we think will be the new pattern in the future.

(Slide 15)

So we go through now and do the analysis using the new pattern. We again go through the same process of trying to square the triangle. It does now appear that, in fact, based on your own data, 60 months is ultimate. So clearly we don't think there will be any development after 72 months.

(Slide 16)

We're going to go back to the development technique, because one of the things that we did was to look to see if there were any particularly large claims in Years 5 and 6. Fortunately, the one that closed for such a large amount was in one of the earlier years, so you only got hit from $100,000 of it. Your excess insurer, however, was not very happy.

Using the reported losses and the new development factors, we now come up with an IBNR estimate of $11.5 million. Also, you will notice that what we thought was deteriorating business, in fact, is not. The loss ratios are very stable, and they are very close to what you're writing to, the 105 percent.

MR. TOOTHMAN: So as I understand it, you're telling me that we are accomplishing our underwriting objectives?

MS. TILLER: Yes, you definitely are, but you do still need to hold an IBNR reserve for the normal case reserve development process.

(Slide 17)

To summarize, you are holding nothing. The auditor thought that you should be holding $25.5 million. Our opinion, after Mike's diligent work looking at the claims operation, is that a more appropriate number would be $11.5 million.

MR. TOOTHMAN: Well, Margaret, thank you. $11.5 million is a lot better than $25.5 million, and I guess you've opened my eyes a little bit, and thank you, Mike. I guess I do see now that even though we've got a claims-made policy, there is need for additional reserves, and thank you for that understanding of the claims process. You said you were going to look at some other things. Will that help us get this number even lower?

MS. TILLER: Well, it might help you in the future, because there are some things that you can change that will improve the loss experience. For example, we had asked Mike to look at the allocated expenses.

MR. ZIPKIN: We looked at your allocated expenses from the standpoint of the amount of independent adjuster expenses that you incur and your legal expenses. What we found was that you are incurring independent adjuster expenses that you don't need to incur, and that you are incurring legal expenses that you don't need to incur. This does not mean that your independent adjusters or your lawyers are doing a bad job. It means that they are doing what you want them to do, but you're asking them to do too much. Now, for controls on these areas of claim expense, I would refer you to this slide:

(Slide 18)

Limitations on independent adjuster investigations, limitations on legal expense, limitations on investigation and legal documentation, and the direct involvement of your claims staff personnel.

What I mean by these areas is that you are dumping cases on independent adjusters. You are not controlling the amount of investigations. Your claim department admits that it is doing these things. It is assigning cases to independent adjusters properly, but it is dumping cases on those independent adjusters. It is not giving them instructions on controlling the amounts. We're not talking about nickels and dimes here.

So the claim department is not controlling the amounts of the investigation that is being conducted by these independent adjusters. It is not saying to the independent adjuster, "Do this for me. Send me the results of your work and your bill," and then closing the file.

On the legal side, on the lawyer's side, it is routinely ordering pretrial depositions and interrogatory material this thick. We found interrogatories, for example, in the file that were this thick, and then, on top of that, we found letters from lawyers explaining what that was all about. Nobody ever reads the deposition material, but your paying for it, and that adds up to an enormous amount of money in a very short amount of time.

The only thing they're reading is the letters from the lawyers. So just get the letters from the lawyers. Don't get the deposition and the interrogatory material.

The involvement of staff claim personnel: By that I mean that your claims staff personnel is assigning to the legal staff activities that they can do themselves at no cost to you, but you're paying through the nose on a file-by-file basis for information that you don't need obtained by legal personnel when your staff claim personnel can obtain that same information for you.

MR. TOOTHMAN: It sounds like we ought to change the way we're handling some of these claims, then.

MR. ZIPKIN: Yes.

(Slide 19)

MS. TILLER: And this will amount to a real savings. Let's look at your current situation. Right now the reserves are split about two-thirds indemnity, one-third allocated expenses. So the total projection we have is the sum of the two: $93.6 million. You're holding as cases reserve for indemnity of $30.4 million and two-thirds of the $11.5 million IBNR is allocated to losses (which gives you $7.7 million), the total held for indemnity is $38.1 million.

If you continue to have expenses that are 50 percent of losses, that's going to be $19.1 million. If you can reduce that to 40 percent or $15.2 million, you'll save almost $4 million.

MR. TOOTHMAN: Is that realistic?

MR. ZIPKIN: Yes. I can assure you that it's not only realistic, it's achievable, and I can sure as heck study this area for you for less than $3.9 million.

MR. TOOTHMAN: That's great. I'd like to do something that will save us something in the future. That's wonderful. I think we'd like to go ahead with that, then. How do we proceed?

MR. ZIPKIN: What you need from us is a proposal. What you need is specialists who come in. I know of one or two specialists who can come in and do a legal analysis for you as to ways to cut down on your legal expense in a manner which your claim department will accept. What you need from us is a proposal which sets out for you how we intend to proceed, who we will use, and how much it will cost you.

MR. TOOTHMAN: When can you get that to me, Mike?

MR. ZIPKIN: I can get it to you in about a week.

MR. TOOTHMAN: That will be great. If that's going to save me $4 million, I'd like to see your proposal. That would be wonderful. Now, Margaret, you said there were a couple other things you wanted to look at?

MS. TILLER: Right. We had Mike look at reinsurance recoveries. Do you want to comment on that?

MR. ZIPKIN: We looked at two questions regarding reinsurance recoveries. One is, how does your company get information as to what is recoverable and what is not recoverable, and two, how do you go about recovering that information? And based on that information, how do you go about recovering the money from the reinsurer.

Where you have both functions in your claim department, we get very nervous, and so should you, because where we find both functions in the same claim department, we know that there's going to be a lot of money left on the table.

MR. TOOTHMAN: Is it the aggregate recoveries that you're concerned about, Mike?

MR. ZIPKIN: Yes, primarily the aggregates, but also the information about the individual recoveries.

MR. TOOTHMAN: And where do you suggest that that be done?

MR. ZIPKIN: We suggest it be done in an accounting department or an accounting function in some manner. The way you're doing it is entirely appropriate.

MR. TOOTHMAN: We're already handling it in the correct fashion is what you're saying?

MR. ZIPKIN: Yes.

MR. TOOTHMAN: Okay. Good.

MR. ZIPKIN: You're handling it in the correct fashion, because the information is being passed on to your claim department by your accounting department, which is telling your claim department how much money to go after.

MR. TOOTHMAN: Well, it sounds like we got that one under control then.

MR. ZIPKIN: Yes, you do.

MR. TOOTHMAN: Is there anything else, Margaret?

MS. TILLER: No, that's it.

MR. TOOTHMAN: Well, I want to thank you. I'm sorry that we've had to take this hit now and have had to go through it in this fashion, but I guess I've learned something about the reserves that we need on a claims-made policy, and Mike, we'll look forward to your proposal, and hopefully, you can show us how to save some money on the claims expense. Thank you very much for coming in today.

That's the end of our skit. As I say, the company is fictitious. The situation, although placed in a medical malpractice context, is comparable to those that we see in the context of almost every other line of business frequently. The individual problems that we saw within this company are usually not all seen in the same company. I used to say that we hadn't seen them all in one company at one time, but I think since then, Margaret and Mike and I have each had examples where we probably have, because they're very common. These are the kinds of problems that we see almost all the time. Almost every time we do a claims review, you can count on one or two of these problems appearing.

So we've provided a few illustrations of how the claims function impacts on the actuarial function. If you don't understand what's going on in the claims department, you can't really do a proper job of reserving.

Now, Margaret, I know you have a couple other points you'd like to summarize. Why don't you go ahead.

(Slide 20)

MS. TILLER: Okay. If you're planning to do a claim audit and an actuarial study (this may sound elementary), do the claim audit first.

I actually saw a situation one time in which someone, not me, did an actuarial study, and, in fact, even commented on how readily available the data were and how they seemed to be exactly what was requested. It turned out, when the claim audit was done three months later, that 25 percent of the information was wrong due to keypunching errors. The reason the actuary didn't see it was because the errors were random, and so some were up and some were down. It was a serious problem.

What the claim audit can do is, first of all, check the accuracy of the claim runs. There are always going to be some mistakes, but you want to find out what the order of magnitude is of those.

Are the excess and reinsurance recoveries being handled properly? As Mike mentioned, if you have the claim department handling your excess recoveries, particularly if there is an aggregate involved, you may be missing some potential recoveries.

Are the case reserves reasonable given the information available at the point in time in which the cases are set? There will be normal case reserve development, but you want to make sure that the case reserves are reasonable every time there's a change.

And then, why have they been changed? Is it because new information has come in, or has new information come in that indicates they should have been changed and they weren't changed? What exactly is happening with the case reserving process? Is there some sort of a diary system?

Is there anything that would impact the numbers that you're seeing for your actuarial analysis, such as the change in the processing procedure? People used to see big changes when they would go from a manual processing system to an automated system.

What's hard to believe is that in the year 1991, I have a couple smaller insurance company clients that are still using a manual claims system. So at some point I expect they will convert, and then we'll have to look out for that sort of change.

(Slide 21)

If you suspect a problem with the claim handling, and I use the word "problem" in quotes because anything unusual is really what I mean, do the claim audit first. For example, if you know the claim department changed the claim handling procedures, if you know that they've changed the philosophy, do a claim audit. Just because they got hit by one particular claim, and a memo came out saying "You will reserve cases more conservatively," doesn't mean the change actually happened.

There was one situation I was involved with where management swore there had been a major change in the philosophy. I didn't see it in the numbers. We sent the claim auditor in to look at it, and he came back and said -- the reaction of the claim department was "Oh, we get those memos all the time. We just sort of stick them in a file somewhere. We don't pay any attention to that." Meanwhile, the CEO of this company really honestly thought there had been a change.

Have there been changes in personnel? You don't just have to look for experienced people leaving and people with less experience coming in. It can simply be the normal process of rotating personnel through the various stages of the department.

I had one client who kept insisting nothing was different, not procedures, no philosophy. It turns out that of the seven people handling claims in a particular situation, five of them were new that year and were experienced people but not with that company. Different people who are supposedly using the same philosophy of reserving can still have some leeway that can make a difference.

Have there been any changes in law or jury verdict patterns that you're aware of that might impact the claim procedures? If there is anything that you suspect, before you do the actuarial analysis, it's helpful to have information from a claim audit first.

(Slide 22)

Then, of course, there's the after-the-fact claim audit. I'm fighting with one of my clients about that right now, because I see exactly the pattern that we were looking at in the slide, except we only see the bump up. I don't have the next diagonal yet, and I won't until December 31st, to see if, in fact, it's going to come down.

I keep saying, "Well, we can find out now if we do a claim audit," the client keeps saying, "Oh, just wait until December 31st." And I say, "But I have to sign your reserve statement this year." So it was an interesting fight. We're not done.

You may discover what you think is a problem, and you don't know how to interpret it. If you just saw that increase, could it be because cases were under-reserved, and they were brought up to the appropriate level? Could it be that they were an appropriate level all along, and the claim department has reacted inappropriately and gone too far, and now the cases are over-reserved?

Could it be simply that there was a change in the processing system? You need to get some information about what's happening, because often, when you see something unusual, there are several interpretations. Has the claim reporting pattern changed? Has the claim closure pattern changed? What about the case reserving pattern? What about the payment pattern? Maybe it's simply that payments are getting made faster because the check processing system has been changed.

Mike Toothman always gives me a hard time about the next one. The change expected based on conversation with management not seen. It's not the management that we don't see, it's the change that we don't see. I just gave you an example where management swears there has been a change, and, in fact, we don't see one.

We gave you an example of the inappropriateness of closed claims studies. We see them all the time. This is a company's favorite way of looking at case reserve adequacy. As soon as a claim adjuster knows that a case is very likely going to be settled for a certain amount, that's new information about the case. They're doing their job if they then move the case reserve up to that amount and, perhaps, even a little bit more. So it's not unusual to see a savings at closure. In fact, I would be surprised if you did a closed claims study that showed an increase.

There may also be some changes in the loss adjustment expense ratios. You not only need to worry about what's happening with the allocated expenses, but what's happening with the unallocated expenses.

I once had a client who decided that they were going to take their claim department expenses and treat their claim department as an independent consultant to them, even though they, in fact, were not. The client was going to charge all the time and expense of their own claim department to the claims.

So if you looked at their Schedule P, all of a sudden their unallocated loss reserves vanished because they had no unallocated expenses anymore. They were all allocated expenses. Unfortunately, they did not proportionately increase the allocated expenses, but the fact that there was no unallocated reserve tipped me off that there was a problem.

You may find that you don't actually need to do a claim audit. Sometimes, the people that you're working for will know what the answer is. I saw what looked like a dramatic slowdown in claim closure for one of my clients, and I called them up, and I said, "What is happening?" And he said, "Oh, I can tell you exactly what's happening. We have seven positions. We normally have six filled, and there is one usually in the process of being filled, but this last year has been awful, and three of the positions have been vacant all year.

"We're processing the checks, but we don't have anybody to actually take the time to close the claim. So we weren't seeing that little savings on closing that we usually see. We were looking at a large number of claims that simply weren't being closed."

So sometimes just asking questions can get you the answers.

The point is that you need to be very careful when you're looking at numbers, and anything that looks the slightest bit unusual really needs to be investigated. The key, of course, when you're trying to estimate reserves, is are any of these changes permanent, or are they a one-time situation?

MR. TOOTHMAN: In my own practice, I have personally found the claims consultant to be very helpful. I don't use them in every study, and you don't always need to, but there are many situations where we find that it is useful to have the claims consultant in to help understand what's going on in the claims department.

I've often found it useful to have the claims people do their work at the same time that I'm at the company to gather the information that we need for the actuarial study. I can get some feedback directly from the claims personnel. They finish their report and provide it to me about the time that we've got all our data entered into the computer and we're ready to do an analysis.

So as we're getting numbers out and starting to look at triangles, we've gotten input from the claims people that sometimes will help explain what's going on. As Margaret pointed out, there are times when you don't think you're going to need a claims analysis, and you start looking at the triangles, and something is going on, and you can tell something is going on, but you don't know what it is. That, oftentimes, is a signal that you need to get the claims people involved.

You could have a similar skit talking about effects of the operations of the company in other departments on the reserve analysis as well. We could go through an example with the effects of the underwriting department, underwriting changes.

Our goal here has been to illustrate the interaction of a claims function with the actuarial department, but the real message, perhaps for the entire Loss Reserve Seminar and certainly from this session, is that there is no black box. You can't just crank out reserves by putting the numbers into the computer and seeing what comes out the other end.

In fact, I believe that reserve analysis is one of the best tools that management has to understand what is happening within the company; that you can use the reserve analysis to really understand where the company is achieving profitability and where it isn't, to measure the impact of changes in a claims department, changes in the underwriting function, changes in the marketing function, in many cases.

We need to really think, as we look at our numbers. I think the greatest value that the actuary can provide to management is to help them run their business better and to
understand what's really happening in the company. The reserve review is a very, very good way of doing that. It's a very useful tool when used in that fashion, I believe.

With that, our presentation is complete. If there are questions, we would love to entertain them. There may be some points raised by the skit that you'd like to ask about or some other questions about the claims function. If so, please try to use the microphone and identify yourself, if you would. It will help us when we do the transcript.

MS. KUBRICK: My name is Judy Kubrick, and I'm an auditor, and I guess my question has to do with if the auditor and/or the actuary, if there are two in conjunction, determines a claims audit is appropriate in the case, what kind of sampling of claims files and things like that is appropriate, and does it make sense to have the company maybe do their own internal audit and have the claims consultant come in and sample that?

MR. TOOTHMAN: Do you want to try that, Mike?

MR. ZIPKIN: It would be cheaper to have the company do its own review, obviously, and to have the consultant review the reviewer's work. We attempt to resolve that issue by doing a statistical analysis of the data that's important to the actuary and to the CEO and then to sample that data, but the answer is that a sampling technique is the best way to proceed.

I would say that looking at claims files themselves is not the answer to the question. The issue is what claim files are we talking about and to do a sampling of those files. I would say that a sampling of less than 10 percent is not a good sampling.

MR. TOOTHMAN: Judy, if I may, I have usually found it to be more valuable to have someone from outside the claims department, just because you get a fresh viewpoint, a fresh perspective.

Sometimes the people within the claims department are too close to the forest, if you will. They're used to looking at claims one at a time and not looking at the entire picture. The independent claims consultants that do this for a living are used to going in, and they are usually used to finding what the actuaries are looking for, seeing the impact on the aggregate picture.

The exception of that would probably be in some big companies where there are very large claim departments, and you really could have independence within the claims department. That might work very well then. In terms of size, with some small companies, our claims consultants look at every open claim and sometimes every closed claim, depending on the size.

MS. TILLER: I have one client right now with 50 claims a year. The auditor comes in and looks at every single one of them.

MS. KUBRICK: Well, I'm involved right now with a client, a small company. It's a relatively new company; it's about a year and a half old. We recommend that they do 100 percent. We had an outside consultant come in, and it was determined that the files, as far as reasonability of case reserves, really, they all needed to be looked at.

They had new people on board, and that was one of their problems, that they didn't have adequate people before and now they did. So we recommended that they do 100 percent, and now we have the claims consultant coming in once a week to sample what they have done.

In that situation, I really didn't have a problem with it, but I guess, in some other clients that are much larger that would have thousands of claim files --

MR. TOOTHMAN: It wouldn't be realistic to look at all of them in that case.

MS. KUBRICK: Or to have the outside person do it, because they'd be there for a long time, and I'd never know what kind of sampling, how much to do.

MR. TOOTHMAN: Mike has suggested 10 percent, and that probably makes sense. I guess what you really need, though, is a sufficient number where you can see the patterns in how the claims are handled, and, in some cases, it might be 100 percent, and in some cases you might say 100 or 500 files will be sufficient even if it's smaller than 10 percent. Would you agree with that, Mike?

MR. ZIPKIN: Yes. I would say that a 10 percent sampling of all your outstanding cases, if you were that large company that you're referring to, would be appropriate, but in no case would I look at more than a couple hundred files.

MS. TILLER: The only thing you can do is look at, for example, all claim files where the payments plus reserves are over $100,000 and then do a sampling of the other open claims. You also need to look at a few closed claims too, because you want to see what the relationship is between the initial reserve, the final reserve, and the closure.

MS. KUBRICK: As an auditor, one of the things we've also done is a subsequent disbursements test, and we make sure that the actuary is finding this in their numbers, because sometimes, in the smaller companies, they never raise the reserve up until the date they're going to pay it, and then they raise it and close it to meet the subsequent disbursements test, if it was understated.

MR. TOOTHMAN: Particularly, if you're trying to test for a change in procedure, we've often found it useful to look at files that are handled at different points in time. If you're looking at something that happens when the claim is open, look at claims that got reported last year during a one-month period and a similar month this year, or, if it's something that happens at closing of claims, maybe look at claims that are closed last year at a certain time and then a comparable point this year to see if there is a difference in how things are being handled now.

Any other questions? The skit is crystal clear? Well, we'll be done early, then. Thank you for your attention. I'd like to thank Mike and Margaret, and please leave your evaluation forms before you leave the hotel. Thank you.

Claims Management Perspectives

A TWO-ACT SKIT

CAST
(in order of appearance)

Chief Executive Officer: Michael L. Toothman
Consulting Actuary: Margaret W. Tiller
Claims Consultant: Michael G. Zipkin

Slide 1

PROFESSIONAL RELIABLE

Summary of IBNR Indications

($Millions)

	Held	Audit	Indicated Inadequacy
Physician & Surgeons	0.0	25.5	25.5

Slide 2

PROFESSIONAL RELIABLE

Physicians and Surgeons

($Millions)

Report Year	Earned Premium	12 Mos.	24 Mos.	Reported 36 Mos.	Losses @: 48 Mos.	60 Mos.	72 Mos.
1	10.0	5.0	7.0	8.4	9.6	10.3	10.3
2	12.0	6.0	8.4	10.1	12.9	12.5	
3	14.0	7.0	9.8	13.9	15.1		
4	16.0	8.0	13.7	15.8			
5	18.0	12.0	15.6				
6	20.0	13.0					

Slide 3

PROFESSIONAL RELIABLE

Physicians and Surgeons

Report-to-Report Ratios

Report Year	12/24	24/36	36/48	48/60	60/72	72/Ult.
1	1.40	1.20	1.14	1.07	1.00	
2	1.40	1.20	1.28	.97		
3	1.40	1.41	1.09			
4	1.72	1.15				
5	1.30					
Selected						
Average:	1.44	1.24	1.17	1.02	1.00	1.00
Cumulative:	2.13	1.48	1.19	1.02	1.00	1.00

Slide 4

PROFESSIONAL RELIABLE

Physicians and Surgeons

($Millions)

Report Year	Earned Premium	Reported Losses @ 12	24	36	48	60	72
1	10.0	5.0	7.0	8.4	9.6	10.3	10.3
2	12.0	6.0	8.4	10.1	12.9	12.5	12.5*
3	14.0	7.0	9.8	13.8	15.1	15.4*	15.4*
4	16.0	8.0	13.8	15.8	18.5*	18.9*	18.9*
5	18.0	12.0	15.6	19.3*	22.6*	23.1*	23.1*
6	20.0	13.0	18.7*	23.2*	27.2*	27.7*	27.7*

*Projected

Slide 5

PROFESSIONAL RELIABLE

Physicians and Surgeons

Projection Method (000's)

Report Year	Earned Premium	Reported Losses	Loss Development Factor	Estimated Ultimate Value: Losses	Estimated Ultimate Value: Loss Ratio
1	$10,000	$10,300	1.00	$ 10,300	103.0%
2	12,000	12,500	1.00	12,500	104.2
3	14,000	15,100	1.02	15,402	110.0
4	16,000	15,800	1.19	18,856	117.8
5	18,000	15,600	1.48	23,085	128.3
6	20,000	13,000	2.13	27,702	138.5
	$90,000	$82,300		$107,845	119.8%

IBNR = $107,845 - 82,300 = $25,545

Slide 6

PROFESSIONAL RELIABLE

Physicians and Surgeons

Projection Method (000's)

Report Year	Earned Premium	Reported Losses	Loss Development Factor	Estimated Ultimate Value: Losses	Estimated Ultimate Value: Loss Ratio
1	$10,000	$10,300	1.00	$ 10,300	103.0%
2	12,000	12,500	1.00	12,500	104.2
3	14,000	15,100	1.02	15,402	110.0
4	16,000	15,800	1.19	18,856	117.8
5	18,000	15,600	1.60	24,960	138.7
6	20,000	13,000	2.40	31,200	156.0
	$90,000	$82,300		$113,218	125.8%

IBNR = $113,218 - 82,300 = $30,918

Slide 7

Physicians and Surgeons

Bornhuetter-Ferguson Method (000's)

Report Year	Earned Premium	Initial Expected Loss Ratio	Initial Expected Losses	Unreported Percentage	IBNR	Reported Losses	Estimated Ultimate Value Losses	Estimated Ultimate Value Loss Ratio
1	$10,000	1.05	$10,500	0%	$ 0	$10,300	$ 10,300	103.0%
2	12,000	1.05	12,600	0	0	12,500	12,500	104.2
3	14,000	1.05	14,700	2	288	15,100	15,388	109.9
4	16,000	1.05	16,800	16	2,723	15,800	18,523	115.8
5	18,000	1.05	18,900	38	7,088	15,600	22,688	126.0
6	20,000	1.05	21,000	58	12,250	13,000	25,250	126.3
	$90,000				$22,348	$82,300	$104,648	116.3%

Slide 8

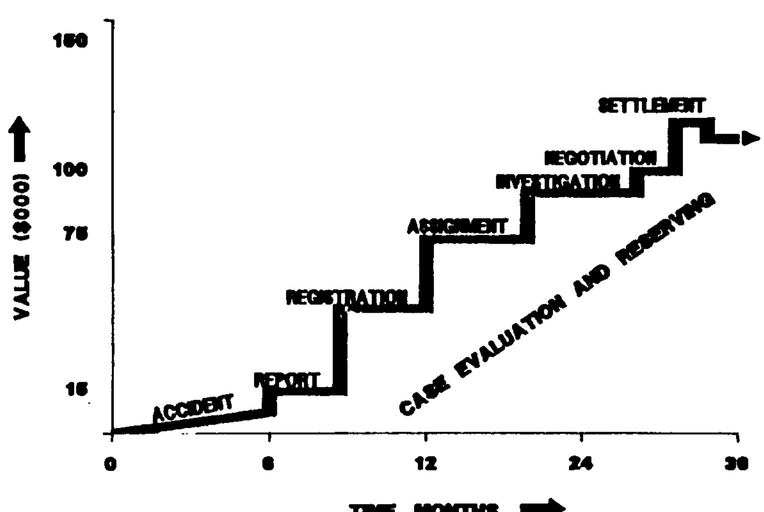
PROFESSIONAL RELIABLE

Physicians and Surgeons Liability Study of Reserve Adequacy

50 Cases Closed in Last Seven Months

12/31 Estimated Value	**750,000**
Closed Value	**625,000**
Reserve Redundancy	**20 %**

Slide 9



Slide 10

Claim Review

- Interview Claim Management and Supervisory Personnel
- Review Claim Files
- Review Claim Procedures, Practices, Statistical Data

Slide 11

Claim Review

- Includes Review of Changes in:
  - Law or Legislation Affecting Liability, Legal Defenses, or Damages
  - Jury Verdict Patterns (Higher Awards, etc.)
  - Procedures/Practices for Reporting, Reserving, or Closing Claims
  - Personnel, Workloads, Claim Department Organization

Slide 12

PROFESSIONAL RELIABLE
Physicians and Surgeons Liability
Study of Reserve Adequacy
100 Cases Open @ 12/31 Year Six

	Value @	
	12/31 Year Six	7/31 Year Seven
50 Cases Closed	750,000	625,000
50 Cases Open	1,000,000	1,500,000
100 Cases	1,750,000	2,125,000
	+21%	

Slide 13

CLAIM FILE REVIEW

Professional Reliable

File	D/A M/Y	D/R M/Y	Initial Reserve	Subsequent Reserve Change to: Amt.	Date M/Y	Amt.	Date M/Y
043216	3/3	4/3	15,000	30,000	6/3	90,000	6/5
057392	2/3	6/3	20,000	–	–	60,000	8/5
068973	2/3	8/3	20,000	80,000	1/4	100,000	7/5
084010	2/3	10/3	15,000	50,000	12/3	72,000	6/5
099691	12/2	10/3	15,000	–	–	35,000	6/5
103201	1/3	10/3	15,000	25,000	6/4	32,500	6/5

Slide 14

PROFESSIONAL RELIABLE

Physicians and Surgeons

Report-to-Report Ratios

Report Year	12/24	24/36	36/48	48/60	60/72	72/Ult.
1	1.40	1.20	1.14	1.07	1.00	
2	1.40	1.20	1.28	.97		
3	1.40	1.41	1.09			
4	1.72	1.15				
5	1.30					
Selected						
Average:	1.44	1.24	1.17	1.02	1.00	1.00
Cumulative:	2.13	1.48	1.19	1.02	1.00	1.00
Selected						
Average:	1.30	1.15	1.09	.97	1.00	1.00
Cumulative:	1.58	1.22	1.06	.97	1.00	1.00

Slide 15

PROFESSIONAL RELIABLE

Physicians and Surgeons

($Millions)

Report Year	Earned Premium	Reported Losses @ 12	24	36	48	60	72
1	10.0	5.0	7.0	8.4	9.6	10.3	10.3
2	12.0	6.0	8.4	10.1	12.9	12.5	12.5*
3	14.0	7.0	9.8	13.8	15.1	14.6*	14.6*
4	16.0	8.0	13.8	15.8	17.2*	16.7*	16.7*
5	18.0	12.0	15.6	17.9*	19.6*	19.0*	19.0*
6	20.0	13.0	16.9*	19.4*	21.2*	20.5*	20.5*

*Projected

Slide 16

PROFESSIONAL RELIABLE

Physicians and Surgeons

Projection Method (000's)

Report Year	Earned Premium	Reported Losses	Loss Development Factor	Estimated Ultimate Value Losses	Estimated Ultimate Value Loss Ratio
1	$10,000	$10,300	1.00	$10,300	103.0%
2	12,000	12,500	1.00	12,500	104.2
3	14,000	15,100	0.97	14,647	104.6
4	16,000	15,800	1.06	16,748	104.7
5	18,000	15,600	1.22	19,032	105.7
6	20,000	13,000	1.58	20,540	102.7
	$90,000	$82,300		$93,767	104.2%

IBNR = $93,767 - 82,300 = $11,467

Slide 17

PROFESSIONAL RELIABLE

Summary of IBNR Indications

($Millions)

	Held	Audit	2nd. Opinion
Physicians & Surgeons	0.0	25.5	11.5
Indicated Inadequacy		25.5	11.5

Slide 18

Control of Claim Expense

- Limitations on Independent Adjuster Investigations
- Limitations on Legal Expense
- Limitations on Investigation and Legal Documentation
- Direct Involvement of Staff Claim Personnel

Slide 19

PROFESSIONAL RELIABLE
Physicians and Surgeons Liability
Analysis of Claim Expense

CURRENT PROJECTION				POTENTIAL SAVINGS		
Indemnity	=	$62.4		Indemnity Case Reserves	=	$30.4
Expense	=	31.2	(50%)	Indemnity IBNR	=	7.7
						$38.1
				Expense @ 50%		19.1
				Expense @ 40%		15.2
				Difference		$3.9

Slide 20

If Planning To Do Claim Audit and Actuarial Study, Do Claim Audit First.

Information Provided:

- Accuracy of Claim Runs
- Excess/re-insurance recoveries properly handled
- Reasonability of Case Reserves
- Changes

Slide 21

If Suspect "Problem" With Claim Handling, Do Claim Audit First

- Changes in Procedures
- Changes in Philosophy
- Changes in Personnel
- Changes in Law/Jury Verdict Patterns

Problems Discovered During Actuarial Study Requiring Claim Audit To Determine Interpretation

- Changes in Claim Reporting Pattern
- Change in Claim Closure Pattern
- Change in Case Reserving Pattern
- Change in Payment Pattern
- Change Expected Based on Conversation With Management Not Seen (need to be permanent)
- Discuss Inappropriateness of Closed Claim Studies
- Change in LAE Ratios

1991 CASUALTY LOSS RESERVE SEMINAR

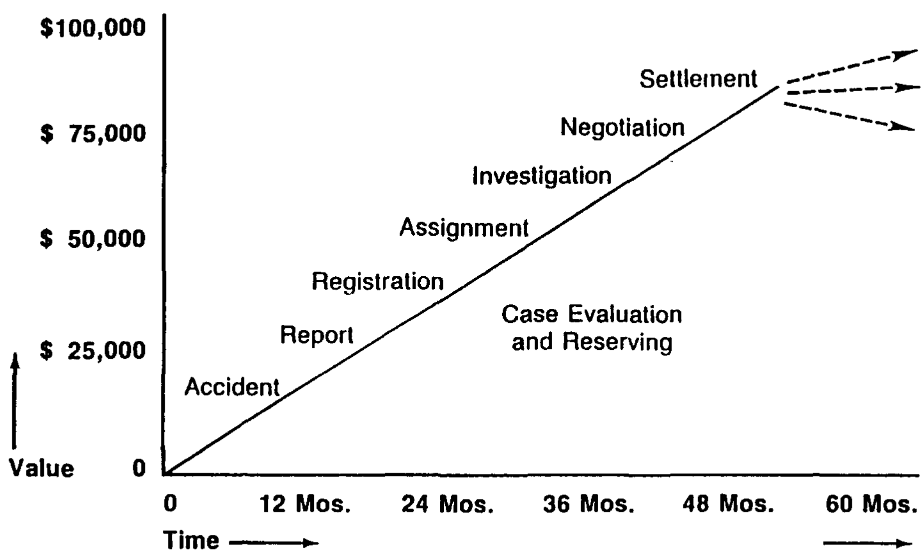
7C: CLAIMS MANAGEMENT PERSPECTIVES

Michael G. Zipkin
Consultant

TOTAL LOSS RESERVES

- Case Reserves
- Supplemental Reserves (for Future Development on Known Claims)
- Reopened Claims Reserves
- IBNR (Incurred but Not Reported)
- IRBNR (Reported but Not Recorded)

CASE BASIS RESERVING



CLAIM REVIEW

- Interview Claim Management and Supervisory Personnel
- Review Claim Files
- Review Claim Procedures, Practices, Statistical Data

DEPARTMENT OPERATIONS

- Law or Legislation Affecting Liability, Legal Defenses, or Damages
- Jury Verdict Patterns (Higher Awards, etc.)
- Procedures/Practices for Reporting, Reserving, or Closing Claims
- Personnel, Workloads, Claim Department Organization
- Adoption of New Programs to Control Loss Costs and Loss Adjustment Expenses

COMMON MISCONCEPTIONS

- Case Reserve "Strengthening"
- "Redundant" Case Reserves
- "Stepladder" Case Reserving
- Claim Department Programs to Improve Control over Loss Costs and Expenses

CONTROL OF CLAIM EXPENSE

- Limitations on Independent Adjuster Investigations
- Limitations on Legal Expense
- Limitations on Investigation and Legal Documentation
- Direct Involvement of Staff Claim Personnel

1991 CASUALTY LOSS RESERVE SEMINAR

7F: TAX ISSUES RELATED TO LOSS RESERVING

Moderator

Jon S. Roberts
Clarendon Insurance Group

Panel

Richard N. Glaser
Coopers & Lybrand

Owen M. Gleeson
Financial Analysis & Control
Systems Corporation

MR. ROBERTS: Good afternoon to what hopefully will not be a very taxing session, or at least as taxing as...well. Rich is one of our first speakers. He is going to be telling a joke at the beginning of his. I don't want to give it away. So I'll leave the humor for the two tax experts that we have here.

First I have to introduce myself. My name is Jon Roberts. I'm Vice President of Clarendon Insurance Group in New York. I'm an Associate of the Casualty Actuarial Society, Member of the American Academy of Actuaries. I'm a member of the Tax Committee of the NAII. Taxes are something of a hobby for me. I moderate here. I'm your moderator. I'm not really going to speak. I don't know that the position of moderator is in this case. This is not exactly a debate between these two gentlemen on my left here, but I am the moderator nevertheless.

I'm going to introduce Rich first, and Owen second. First I have to attend to some administrative details. I must first ask the question if there is anyone from the Internal Revenue Service or from the U.S. Treasury Department in the audience? (Laughter) It's a serious question. And if you could be honest by raising your hand. Okay. Who isn't from these organizations? (Laughter) I'm trying to get you to do a little interaction here. Why don't we start with you in the front row, you could stand up first and just tell us your name and where you're from. (Laughter) Now you know how it feels to be a speaker. Anyway, got that adrenaline pumping, huh?

Okay. Another reminder that this session is being recorded. Anything you say will be...no. And one last point is that Owen Gleeson's slides will not be available at this session, but if you give him your business card, you'll be hearing from him for a long time. (Laughter) Seriously, he will send you his slides. He has been so generous as to extend this offer to yourselves. So if you want Owen's slides you've got to give him you business card.

Now I will introduce our two tax experts. First we have, on your left in the middle, between the three of us, Richard Glaser. Rich is a senior manager in Coopers & Lybrand's New York City insurance tax practice. Before joining Coopers & Lybrand, Rich spent ten years in the insurance industry primarily involved with financial and merger and acquisition activities. He is a frequent speaker on insurance tax issues. Rich is both an attorney and a CPA and a member of the New Jersey and Pennsylvania bars.

Next, to his left, is Owen Gleeson. Owen is a consultant to the insurance industry on taxes, loss reserves and financial planning. He currently markets financial planning software. He is a Fellow of the CAS and a Member of the American Academy of Actuaries and he has spoken frequently to just about every industry association I can think of, NAII, MAMIC, the list goes on. Any industry association that you can think of he has probably made some type of presentation before them.

Now I'll do a quick overview, which I wrote on the transparency over there.

(Slide)

I have to use the wireless mike. Hopefully it's turned on. But the session is being recorded so if these particular comments, because they're not so important, if they don't get in to the recording, it doesn't really matter anyway. (Laughter) I wonder if you could help me fill out this chart. Statutory accounting: when you fill out your annual statement, do you discount loss reserves? Do we have loss reserve discounting in the annual statement?

COMMENT FROM AUDIENCE: Just workers' compensation.

MR. ROBERTS: Just workers' compensation. No other lines? Okay. But, generally (Laughter) okay, the answer is...not generally. Not yet. You're not supposed to anyway. What about GAAP? Generally the answer is no. Well, let's put it this way, GAAP generally follows the annual statement treatment: if you discount on your annual statement, that is usually carried over to GAAP statements.

I've been slipped a mike. Now they can hear me. It's terrible.

COMMENT FROM AUDIENCE: There you go.

MR. ROBERTS: Okay. Now for tax accounting. Do we discount reserves?

COMMENT FROM AUDIENCE: Yes.

MR. ROBERTS: Yes.

COMMENT FROM AUDIENCE: That's why we're here.

MR. ROBERTS: Yes. Now how about salvage and subrogation? do we accrue for it?

COMMENT FROM AUDIENCE: No.

MR. ROBERTS: No? No for what? (Laughter) No for statutory accounting?

COMMENT FROM AUDIENCE: No problem we can't cure.

MR. ROBERTS: Are you sure?

COMMENT FROM AUDIENCE: Yes.

MR. ROBERTS: Let me put it this way.

COMMENT FROM AUDIENCE: Recoverables are recoverables.

MR. ROBERTS: Recoverables? In other words, not converted to cash yet. We've got a gentleman up front who is very, very sure, but (Laughter) a lot of companies accrue for it anyway. But you're not supposed to. (Laughter) And if you are, we know who you are and where you live.

Now how about for GAAP?

COMMENT FROM AUDIENCE: Yes.

MR. ROBERTS: Yes. that's a good comment. You're supposed to. So, on an undiscounted basis...you are supposed to accrue for generally accepted accounting principles -- Rich, you're a CPA?

MR. GLASER: That's correct.

MR. ROBERTS: It's a requirement in fact, you must accrue for GAAP. That's GAAP accounting. Now for tax accounting, salvage and subrogation, do you have to accrue? Again, this is why you are here. But the answer, again, is yes. Not only yes, but actually in this case accrual is discounted a little bit. The speakers will get into it.

Now I'm going to throw the session over to Rich.

Presentation by Richard N. Glaser:

Identification and Accounting for Salvage and Subrogation in Light of Tax Law Changes -- Overview of Changes

There have been a number of efforts on the part of government to require property/ casualty companies to accrue salvage and subrogation for tax purposes. In 1947, regulations proposed requiring accrued salvage and subrogation to be a reduction of the losses incurred deduction. There was an outcry in the industry, and, as a result, the proposed regulations were dropped. It is, however, interesting to note the industry's position at that time. Essentially it was three fold.

First, there would be an increased administrative burden: capturing and tracking the data was something that was going to be difficult to do. Secondly, the amount of salvage recoverable was too speculative to be estimated accurately, and thirdly, the only difference between accruing salvage and accounting for salvage when collected was a matter of timing. Companies would pay the same tax in the long run. Although these three arguments were impressive back in 1947, they have lost some of their luster in 1991.

In 1973, after a number of other courts had dealt with the issue of salvage and subrogation, the Court of Claims considered the accrual issue in Continental Insurance v. U.S. In that case, the Court basically held that if the company was doing business in at least one jurisdiction in which the accrual of salvage and subrogation was prohibited for annual statement purposes, that company did not have to accrue salvage and subrogation for tax purposes. It essentially put the issue to rest for a number of years although from time to time it would crop up.

The Tax Reform Act of 1986 introduced the concept of loss reserve discounting. As part of that Act, there was a mandate codified that the Secretary would promulgate regulations dealing with the accrual of salvage and subrogation. In 1987, in response to this mandate, the Treasury promulgated regulations. These were temporary and proposed regulations, and they required that all property/casualty companies accrue salvage and subrogation for tax purposes beginning in 1988.

This again generated an industry outcry, the basis of which was technical. The mandate to the Secretary was part of Internal Revenue Code (Code) Section 846, the section that deals with loss reserve discounting. The Treasury promulgated the salvage and subrogation regulations under Code Section 832, which sets out how a property/casualty company calculates taxable income.

Code Section 846 consists of two basic pieces: loss reserve discounting and the attendant fresh start. Section 832 does not involve discounting or fresh start. Therefore, the industry maintained that the Treasury had no authority to promulgate the salvage and subrogation regulations under Section 832. Since the industry argument had merit, the Treasury, in Announcement 88-99, postponed the effective date for requiring accrual of salvage and subrogation from 1988 to 1989, and provided that companies not already in compliance by 1989 would be required to file a change of accounting request with their 1989 tax returns.

In 1989, the effective date was again postponed to 1990. Taxpayers who had already complied could file amended returns to reverse the accrual of salvage and subrogation in those earlier years.

To eliminate future disputes, Treasury finally sought legislation to deal with the accrual of salvage and subrogation and obtained it in the Revenue Reconciliation Act of 1990 (1990 Act) with a salvage accrual provision estimated to create a five-year, $600 million increase in property/casualty insurance industry taxes.

Under the 1990 Act, property/casualty insurance companies are now required to reduce their deduction for losses incurred by estimates of salvage and subrogation recoverable, effective for tax years beginning after December 31, 1989. Any company required to change its method of accounting for salvage from a cash basis to an accrual basis shall treat the change as a change of accounting method initiated by the company with the consent of the Treasury. The impact of this accounting method change would be phased in over a four-year period, and there would be a fresh start forgiveness of 87% of the December 31, 1989 discounted accrued salvage. This fresh start concept is similar to the fresh start given in 1986 when property/casualty companies were required to begin discounting loss reserves. Additionally, the 1986 fresh start provision was taken from the 1984 tax act dealing with life insurance companies.

The 1990 Act provided the following. A permanent forgiveness of income (fresh start) is granted for 87% of the discounted amount of salvage recoverable as of December 31, 1989. This amount will never be included in taxable income. The remaining 13% generally will be taken into income ratably over four years. However, for those companies that had already reduced their losses incurred deduction for salvage recoverable prior to 1990, i.e., had already included their fresh start in taxable income in prior years, 87% of the discounted estimate of salvage recoverable as of the end of 1989, will be deductible ratably over the next four years.

The clear intent of Congress, as described in its committee reports, was to put all companies on a level playing field, and it is clear that Congress intended all salvage and subrogation should receive a fresh start.

In March 1991, the Treasury issued proposed regulations which were cumbersome, ambiguous, and essentially generated two new issues. One, how should the salvage and subrogation be discounted? There were two methods offered: the salvage receipt patterns developed by the IRS, ostensibly from Bests' Aggregates and Averages, or loss reserve discounting patterns. Two, the proposed regulations provided a safe harbor; however, it was not identified as a safe harbor and actually sounded as if it were a requirement. The regulations provided that if a company was taking the position that salvage had been accrued in prior years, the company needed to disclose in the 1989 annual statement the amount of salvage and subrogation implicitly netted in the reserves, or, alternatively, file a supplementary statement with state regulators by July 15, 1991 disclosing this information.

Finally, on August 8th of this year, the IRS issued Revenue Procedure 91-48 to assist taxpayers in preparing their 1990 tax returns. In this document, the IRS took several controversial positions. First, the position was taken that a taxpayer must treat all salvage and subrogation as either accrued for tax purposes at December 31, 1989 or not accrued as of December 31, 1989. The Revenue Procedure did not contemplate the situation where a taxpayer, for certain lines of business, may have accrued salvage by implicitly netting that salvage against loss reserves, and, for other lines, accrued no salvage. Most companies did not, based on the Continental decision, explicitly accrue salvage and subrogation for tax purposes. Many taxpayers did, however, establish reserves that some way implicitly netted salvage and subrogation against loss reserves. A common methodology used by companies for establishing reserves is to utilize paid (net of salvage) triangles, thereby extrapolating a reserve calculation that is smaller than the reserve that would be calculated had gross paids been used.

As mentioned previously, this may have been done for certain lines of business and not for others. Therefore many taxpayers are in essence partial netters since some of their reserves are net of salvage; some are not.

The IRS position is that a taxpayer is either entirely a grosser or a netter. If a taxpayer is treated as having accrued all of its salvage as of December 31, 1989, it would receive the 87% deduction -- but only for salvage that was actually accrued. Therefore, if the taxpayer had some lines of business with reserves not implicitly reflecting salvage, the taxpayer would lose the fresh start on that salvage because the 87% deduction would only be granted for the implicit salvage. Alternatively, if the taxpayer's reserves are assumed to reflect no implicit salvage; i.e., the reserves are all at gross, 13% of that amount will be taken into income over four years. That means the taxpayer would take into income 13% of salvage that has already been taken into income in previous years. Either way, the taxpayer would not be receiving the benefits intended by the statute.

One can best understand and analyze Revenue Procedure 91-48 by dealing with the universe of companies as either full grossers, full netters or partial netters. Once again, a full grosser is a company that has loss reserves established with no netting of salvage, implicit or explicit. A full netter is a company that has netted all its salvage against loss reserves, either explicitly or implicitly. A partial netter is a company that has done some of both.

A company that is a full grosser has the easiest job. The company merely has to calculate a salvage figure as of December 31, 1989, discount it using either the salvage receipt patterns published by the IRS in its Revenue Procedure or use the same discount factors used to discount loss reserves for tax purposes.

The taxpayer then takes 13% of the discounted salvage figure and brings it into taxable income equally over four years. Going forward, the full grosser would simply calculate its accrued salvage from year to year and the difference will be a plus or minus to the losses incurred deduction.

The full netter will also calculate a December 31, 1989 salvage figure, discount it, and 87% of that figure will be a pro rata deduction on the tax return over four years. Netters, however, do not have the option of using the salvage receipt patterns or loss reserve discounting patterns for discounting salvage. The netter must use the loss reserve discounting patterns. In addition, the netters must file a statement with their return that provides historical data: tax return reserves as of December 31, 1988 and 1989, the amount of salvage that was implicitly netted in those numbers, the gross amount of reserves and the amount of salvage received in 1989.

The partial netter, as mentioned previously, will be treated as either a grosser or a netter. Many taxpayers have taken the position that the IRS is incorrect in its position, and that if one looks to the Code and the accompanying committee reports, it is clear that the level playing field is what was anticipated by Congress. Congress did not anticipate that a company could not have implicit salvage and other salvage at the same time. A number of companies have departed from the Revenue Procedure and have disclosed their contrary positions in their 1990 tax returns.

The second most controversial issue presented by the IRS' Revenue Procedure probably has a greater impact than the categorization of all companies as either all netters or grossers. It is the position that the Treasury has taken that deals with the strict statutory construction of the Internal Revenue Code and is best illustrated as follows:

Prior to the 1990 salvage and subrogation tax law change, the losses incurred deduction was essentially a two-step calculation. One began with losses paid and to that was added/subtracted the change in discounted loss reserves between the beginning and the end of the year. This produced the losses incurred for tax purposes.

If a company were a netter with reserves of 100 in its annual statement but implicit in that 100 was salvage of 20, the nominal reserve would have been 120. The pre-1990 formula, assuming a 10% discount rate, would result in a 90 reserve for tax purposes. Therefore, the losses incurred deduction would be losses paid plus 90.

Post-1990, the losses incurred deduction again begins with paid losses. Since there is 20 of implicit salvage and a discount factor of 10%, salvage income of 18 (20 x 90%) is added to losses paid. Then the loss reserve component is added; however, if the annual statement is referred to as the Code requires, 100 will be the figure reflected. 100 will discount to 90. The losses incurred deduction has three components: paid losses, plus 18 of income on the accrual of salvage, minus 90 from the increase in reserves. The result is a net deduction of 72. What really has happened here is that salvage is taken into account twice for tax purposes -- the full 20 in arriving at statutory reserves and then an additional 18 in the salvage component of losses incurred deduction with the new formula.

This is clearly not what Congress anticipated. The Treasury Department maintains that they are bound by the way the Internal Revenue Code reads. Based on a strict statutory interpretation, that is not an argument without merit. It can be perceived as a "negative" loophole. There are a number of areas in the tax law where there exists such apparent conflict. In such cases, the underlying intent of the provision is often referred to. The underlying intent in the case of salvage and subrogation accrual appears clear.

One might suggest legislation to correct the error, however, given today's budgetary constraints and given the fact that there is probably going to be more fresh start benefit to insurance company taxpayers than the Congress had originally anticipated in enacting the legislation, correcting legislation appears unlikely. A court case may be the manner in which this issue is ultimately resolved.

Three additional provisions in Revenue Procedure 91-48 merit discussion. To attempt to alleviate the double netting of salvage described above, the IRS has provided that if the taxpayer wishes, it could choose to apply for the change of accounting in 1991 rather than 1990. What this does is to allow the netting taxpayer to prepare a 1991 annual statement with reserves of 120 instead of 100. However, this reduces a company's surplus -- an action most companies are reluctant to take.

The second provision is a safe harbor election. Again, for netters, if a company is willing to file a statement by September 16 with the state insurance regulators disclosing the extent of salvage implicitly netted in its reserves, the company would be IRS audit-proof on the 87% deduction, barring fraud.

The third provision is a self-policing annual calculation intended to operate as an anti-abuse rule. The rule applies if either the safe harbor election or the deferral of the change of accounting election is made by a company. Each year, the company would calculate two items. One, based on the amount of salvage received subsequent to December 31, 1989 relating to all pre-1990 accident years, a fresh start amount is calculated. To this amount is added the remaining accrual amount. If the company correctly estimated salvage back in 1989, theoretically the total calculated each year would be the same. If the subsequent calculation is lower than the number used to base the original fresh start on, the excess fresh start benefit taken has to be given back. For example, if in 1995 it is determined that the fresh start benefit that was calculated was overestimated by 100, 100 is added back into income in 1995, with no interest going back to the earlier year.

Another issue which needs to be addressed is the question of what is salvage and subrogation? There is no clear definition in the tax law. There are descriptions but no definition. There is also no clear definition in statutory accounting law -- again, descriptions, but no definition. Most state laws are also relatively ambiguous. For example, assume one is in a state that under tort law adopts the concept of comparative liability or comparative negligence. Suppose an insurance claims person working with a workers' compensation claim reviews a claim and estimates the loss to be 100. The claims person also knows that based on the nature of the accident, 50 will be received from some third party. Ultimately, the insurance company will be required to pay 50. That claims person may establish a reserve of a 100 and expect a salvage of 50, or alternatively, that claims person may simply establish a reserve of 50. The question to ask is, what is the company's obligation? One has to look at the contract and determine what the obligation is. Who has the right to recover from the third party? It is not always clear.

Another example is in the surety business. If one takes claims against third parties as a definition of subrogation, does the insured count as a third party or is the insured necessarily excluded from that definition? Suppose the situation involves a performance bond and the insured posts a $100,000 bond. Assume that the general contractor defaults in his contractual obligation and assume that it will require $100,000 to complete the job. Does one have a $100,000 claim and a $100,000 of subrogation or does one have a zero reserve? The surety insurer will maintain that it has a $100,000 loss and a $100,000 of salvage.

In closing, it is clear that the issue of salvage and subrogation involves a significant amount of complexity and requires that one become familiar with an area of tax law that, in the past, has merited a lesser amount of attention.

Thank you.

MR. ROBERTS: Just a comment. Those of you in the back are already leaving... (Laughter)...so...I was going to invite them to come into the front. We persecute those in the front row first and then...no, no, no...the seats are just as good as anywhere else. So sit wherever you'd like.

MR. GLEESON: Okay, I'm going to be relatively brief in my remarks today, because I actually want to hear everything that Richard Glaser has to say on this subject. But when we were discussing putting together this program, it seemed the most significant feature of this latest adjustment on the tax law is accruing for salvage and subrogation. Not much has been written in the literature, so I thought that I would say a few words on this today. So that will the sole focus of this part of my presentation and that is accruing for unpaid, that is to say, uncollected salvage and subrogation.

There are three basic methods that I'll discuss. the first is the development method. The second is what we might call a ratio method. And the third is a method that could be termed an additive method.

(Slide)

The data displayed in Exhibit A is the data that we will need for the development method. This is simply a triangle of data consisting of cumulative salvage and subrogation amounts, organized by accident year and calendar year. For example, the figure 2100 in the lower left hand corner there, is the amount of salvage and subrogation received on accident year 1990 losses as of year end 1990. the number just above that is 2060 and this is the amount received from the accident year 1989 as of the end of the calendar year 1989. The number to the right of the 2060 is 2950. This is the amount of salvage and subrogation received on 1989 accidents though the end of the year following the accident year, that is to day, 1990. Now, as you can see, if we read up the lowest of the diagonals we have a cumulative salvage and subrogation amounts from the various accident years as of year end 1990. The diagonals above this one is the cumulative salvage and subrogation received from the various accident years as of the year end 1989. So that would be the next diagonal or the second diagonal up.

For most lines of business this type of data can be extracted directly from the annual statement for the calendar years 1989 and following. Some of the short tail business, notably auto physical damage, displays only a two year development, as I'm sure that you know. In this exhibit we have four diagonals displayed. this effectively assumes that the company has been able to extract the data in a similar format for the prior calendar years 1988 and 1987.

Now the database in this format is used to calculate average period to period development factors. For example, the sum of the salvage and subrogation received through the end of the accident year for accident years 1987, 1988, 1989 is 5510. That is to say the sum of 1620, 1830 and 2060. thus, the first development factor is 1.454. That is 8010 divided by 5510. the other sums in respective development factors are shown at the bottom of the exhibit. We could use the raw data indication shown on the line labeled "weighted average," but in practice, most actuaries would select smooth development factors based on the raw data indications before calculating the age to ultimate factors. and that's what we have done here.

(Slide)

The selected development factors are shown on the second to last line in this exhibit. And then these are accumulated from right to left. For example, 1.051 is the product of 1.02 and 1.03 and 1.114 is the product of the 1.051 and the 1.060. It is a very standard type of calculation. Having calculated the development factors, we are now ready to estimate the amount of salvage and subrogation that was unpaid salvage and subrogation as of December 31, 1990. And this is in Exhibit B.

The cumulative salvage and subrogation received as of year end 1990 is arranged by accident year in column 2. this is the lowest diagonal on Exhibit A. The development factors are posted in column 3. Again, they were extracted from the previous exhibit. These two columns are then used to estimate the amount of unpaid salvage and subrogation by accident year as shown in column 4. That is to say, we do the multiplication that is indicated in footnote A. The total for all of these accident years...this is something that you might note here, because I'm going to come back and make a remark about this later on...is 10,212 and is shown at that bottom of column 4.

Now before going on to the next method...I've arranged these methods in order of my ascending preference...I want to make a few comments about the development method. The general form of this methodology will be familiar to many of you here, particularly all of the actuaries in the room. This is similar to the development methods applied to paid losses or incurred losses in loss reserving. But as you know, one of the problems with this method is that in a situation like paid loss development we have very high initial development factors. That is to say, in this case, in the case of salvage and subrogation, the amount received with in the accident year is usually relatively small. We'll see actual figures in a few minutes. And by this I mean, small in comparison to the amount that will ultimately be received.

You might note that the first year development factor, in this example here, is 2.733 and this is an indicator of the leverage that we have here. A large development factor for the least mature of the accident years leads to instability in the projection of the ultimate amounts and uncertainty in the amount of unpaid salvage and subrogation. In addition to this, the ultimate salvage and subrogation is usually only a few percent of the incurred losses. This means that we're working with a body of data that generally has very little in the way of credibility.

In this type of environment, where we are dealing with leverage data having limited credibility, a development method such as we've outlined here can prove to be very unreliable. Because of this I would prefer to use a method that has more stability. An example of this is the ultimate ratio method and we can start that by looking at Exhibit C-1.

(Slide)

This method starts by examining the ratio of salvage and subrogation received...

(End of Side One)

...and a salvage and subrogation received as of a given date. This, again, is the type of data that can be extracted directly from the annual statement.

As you can see, from the data on Exhibit C-1 and C-2...you want to put up C-2 for a second?

(Slide)

The more mature years show an ultimate ratio of salvage and subrogation to incurred losses in the area of about 3%. This is fairly convincing but we are really comparing different accident years at different points in time. So we can rearrange this data as we have on Exhibit D to show the progression in the ratios as the individual accident years age.

Now when the data is arranged, as we have it in this exhibit, we can see that the ratios for the individual accident years are similar at each point in the development periods. For example, the AY + 6 ratios are approximately 2.8, for each of the accident years for which we have data. The AY +5 ratios are about 2.7 and the AY = 4 ratios are about 2.5 and so forth. From this data arrangement and from the way that the data behaves we can conclude that we are dealing with a relatively homogenous data with respect to the accident years. That is to say, we can conclude that each of the accident years is developing in approximately the same fashion.

So we could conclude from that the ultimate ratio of salvage and subrogation received to incurred losses for all of the accident years will be drawn from the same general population and should more or less the same for each of the accident years. I say that now but in a minute we'll have some industry data to look at which may make you rethink that.

(Slide)

Now in this case, what I've done is to choose 3% as the ultimate ratio of salvage and subrogation to incurred loses for all of the accident years. This is used to estimate the uncollected salvage and subrogation as shown on Exhibit E.

The calculations here are fairly mechanical once we have established the ultimate ratio. The 3% figure is applied to the incurred losses for each of the accident years to give us an estimate of the ultimate amount of salvage and subrogation collected for each year. The amount collected to date for each of the accident years is posted in the next column. This is one that says "Received, S&S at 12/90." This is subtracted from the projected ultimate to establish the uncollected amounts. As you can see, the total for all years is approximately the same as the amount obtained to use in the development method. It is about 10.5 million in this case.

One drawback of this method is that, in practice, different years show widely varying ultimate ratios. For example, the average of the ultimate ratios for the oldest accident year, that would be AY + 8 in the example that I've constructed here, might be 3% but we could find that the ratio for some of the earlier years has already exceeded those figures, so we obviously can use 3%. Alternatively, the developed ratio for an immature year could be so low that it would be unlikely that the ultimate ratio would ever reach the 3%.

To partially remedy this problem, we could vary this method to allow choosing of slightly different ratios for the individual immature years.

Jon, could you go back to the previous exhibit, that would be D, for a minute?

For example, in this instance, we might choose 2.95 for the 1983 accident year, 3.05 for the 1984 accident year and then 3.0 for the 1985 accident year, because of the development at given points in time. Some of these ratios look like they might be higher or lower than the average 3%. For the later accident years, the data is really too immature and shows too little variation to choose other than 3%, so that is what we will do. Here we will just imply choose 3% in each of the years and then...let's go back to E...alright, so we've chosen the 3%. We've done our calculation and then we got the 1050. As I said, this I think is an improvement over the development method but it still has its problems. And what I'd actually like to do is to use another method which has less in terms of problems.

The data needed for this method is about the same as that of the previous method, but the data is used in a different way. We start with a column of incurred losses and two columns of cumulative salvage and subrogation received as of two consecutive year ends. The columns of salvage and subrogation are differenced to obtain incremental salvage and subrogation amounts received in a given calendar year and arranged by accident year.

Let's look at the experience of the 1990 calendar year. The entries in the second row show that he salvage and subrogation received for the 1989 accident year through the end of 1990 is 2050. The amount of salvage and subrogation for this accident year through the end of 12989 is 2060. The difference between these two numbers is 890 and is the amount of salvage and subrogation, obviously received in the calendar year 1990 from the accident year 1989.

The next number down the column is 540. This is the amount of salvage and subrogation received in 1990 from the accident year 1988. The rest of the numbers in this column are obtained in the same year.

In the final column we see the rations of the amounts received to the incurred losses for the respective accident years. The numbers in this example indicate that a substantial amount of salvage and subrogation is received in the accident year. This example has mixed property and casualty aspects to it. But there is quite a bit of salvage and subrogation received in the subsequent years. Now that sum of the ratios, that's 2.89 for 1990, in a given calendar year is an indication of the ultimate amount that would be received for a given accident year. We could also use these sums as the measure of whether the amounts of salvage and subrogation received are changing from one calendar year to the next. As you'll see here, we have 2.89 and 3.09. It sort of goes up and down and there's no trend in this example.

(Slide)

Now to get a good estimate of the ratios for accrual purposes, we want to rearrange the data as shown in Exhibit G. Now what I did was I extracted the ratios from the previous two exhibits, the 1990 and 1989 and 1988 experience, averaged them, then selected smooth values. Then what we do is we take the selected column and accumulate that up from the bottom and post that in the cumulative column. Finally, to get the estimate of the amount outstanding or uncollected, for each of the accident years, we take the ratios, if we look at the cumulative column up there we have 3.1 and then 2.0, 2.5 and so forth reading down. We post those next to the incurred losses for the years...the accident years 1990 through 1983 and perform our multiplication. The effect of the multiplication gives us the unpaid, or that as to say, uncollected salvage and subrogation from each of those accident years.

This particular method, the additive method, is much more stable than the first method. It does not rely on judgement as much as the second method does. Of the three methods I strongly favor method over either of the other two. It is fairly stable and it gives you indications of what is happening in the accrual from one year to the next. Could we look at H-1?

(Slide)

So those are the methodologies that I wanted to outline here. The example that I put together was a...I used data that was extremely stable to put that together. As a matter of fact, what it was, was I just made it up (Laughter) so that it would be stable as opposed to actually using real data and then having to explain sway problems. We'll see some more realistic data on Exhibit H-1.

In August, we wrote to about 20 of our customers and asked them to send in their 1989 and 1990 Schedule P's so that we would have a good database. We got about 22 responses and about 15 of the companies were usable in the auto liability line. Now, this data, as I said, was extracted from the Schedule P's and were used to form the ratios here. What these are, are the ratios of salvage and subrogation collected up to a given point in time, to direct incurred losses.

One characteristic of the data here is that the collection of salvage and subrogation in the auto liability line is very slow. You can see that in the first year in Company One, about a quarter of a percent is collected by the end of the first year. By the end of the second year, the figure is almost three times that amount. But in the more mature years, the average is over 1.6%, that is to say, 1.6% of the direct incurred losses is collected or offset by salvage and subrogation. That is about six times the amount collected by the end of the accident year and if we were thinking in terms of development factors you can see that we would have a very large development factor for this company.

Similar observations hold for the rest of the companies in the example. And, again, this supports the remarks that I made earlier about the high projection factor. So I would not use a loss development method or a development method for accruing for salvage and subrogation.

Now another feature of the data that is worth noting is that for the older years, in some instances, the ratios seem to be very low. Let me see if I can pick out...well, look at Company Six, for example. AY + 9, we have .18%. In the final year, Company Eight, we have .1% and above that we have zero. And a small percent in the ultimate years for Company Nine. I don't actually know what happened in this data, but I think that when companies put their 1989 Schedule P together, they did not have good data from old years so they put in what they had. As a result that the ratios from the older years is probably not going to be too helpful to you.

Now also worth noting is the variation between accident years for even the larger companies. We've got very large and very small companies in this example. That would be one, two, and ten on this page and then thirteen.

(Slide)

One, two...let me see...ten. There ratios are not dissimilar. But one of the most striking features of this data is the variation between companies. Two companies, 8 and 15, which would be on the other exhibit, show ultimate ratios of salvage and subrogation to incurred losses on the order of 5%. Now when I put this data together and I looked at some of these rations, incidentally the lowest ultimate ratios are in the order of 10 to 25 hundredths of a percent, the significant variation from one company to another could probably be caused by two things. One is that some companies do not aggressively pursue salvage and subrogation. That's a fairly well known fact. If your company is exhibiting low ratios you might want to think about that.

The very high ratios are sort of hard for me to explain away. And it occurred to me that perhaps these companies might be using an incorrect definition of salvage and subrogation when they were putting this together.

For auto physical damage we see similar variation in terms of collection rates and ultimate collected rations throughout the industry.

One other exhibit that I was gong to look at, and if we ever...and if we get this back on we'll put it up, but what it is, and it's not important that you see it right at the moment, but I took the 1990 industry data from the 1991 Bests' Aggregates and Averages and developed similar ratios that we had seen here for the different lines. Auto liability looked much like the three or four larger companies that I highlights here. Ultimate ratios for medical malpractice were around .345.

General liability, about .5 and workers' compensation about 1.32. We could turn this on...did it come back by itself? This is amazing. I have a car that does this. (Laughter) The interior lights in my wife's car will come on when they want to. (Laughter) So "m not unfamiliar with this.

The industry figures in what Rich referred to as the "old Schedule P lines" shows very, very slow collection rates. And one problem that I think that companies have in this area is that the industry figures are probably not reliable in terms of supporting what your company is doing. It seems to me that there is too much variation throughout the industry.

Could you put on Exhibit J? J would be good.

This was extracted, again, from Bests' Aggregates and Averages and as industry data...it shows you the very slow collection in medical malpractice, GL and workers' compensation...I guess workers' compensation. Well, I was going to say, that probably has the maximum leverage, but medical malpractice is right up there with it.

From looking at this data and from hearing what I've heard from several companies, I would say, that there are many companies in the industry is when they did their accrual for the tax return probably put in an amount that was too low.

MR. ROBERTS: Well, it looks like the role of the actuary is expanding, isn't it? Not just loss reserves and everything, not we've got to accrue salvage and subrogation and all these other things. The actuary is going to have a very significant impact into, not only just loss reserving, but taxes that insurance companies pay. Maybe we're going to have a tax actuary for P&C.

And everyone want sot cut out early, but before I do that I'm going to open it up for questions. Take your potshots at the mike. This is being recorded, so when the transcripts come out, if you don't use the mike we won't be able to figure out what the question was. Those of you too timid to verbally express their questions are more than welcome to write their questions down and have an agent bring them forward to the front and we'll read the question aloud here and try our best. So any questions? One over there.

QUESTION: Rich. For company that's a netter...for coming 1991 year, there's the problem as you specified with the IRS basically stating that they're assuming that your annual statements are gross of salvage. What do you recommend to companies to do in this situation who are netters right now, so that they don't take the hit to surplus?

MR. GLASER: It's a good question. It's not one that needs to be taken lightly or can be taken lightly. Most commentators, including Coopers & Lybrand, feel that the Treasury position is a controversial and aggressive one. Most commentators, included Coopers & Lybrand, acknowledge that it is not entirely a position without merit. I hope and I believe that ultimately the issue is going to get resolved in favor of the taxpayer, because I'd be shocked if a court would allow a taxpayer to get hit so badly based on something that clearly is not the intent of the law. And I alluded to it earlier, but I had said that one can look at the underlying intent of an Internal Revenue Code provision if one needs to do so to understand what it means. Well, that isn't allowed typically where a code provision is unambiguous on its face. And how does one determine whether the Section 846 says that in discounting loss reserve, you look for the annual statement reserve. Arguably that's a very straightforward statement and you know what the reserve is. It's right on the face of the statement and that's the number you look at. The problem is if you look at that provision in conjunction with the rule regarding salvage and subrogation, it becomes ambiguous. That's an issue for a court to decide, but I think that on an equitable basis the taxpayer and has the better position. I think that everybody knows what the intent was and if a court could see its way to agreeing that there is some ambiguity there, because there's a conflict of sorts between provisions of the code, and one goes to the underlying intent, this case of law that would support the proposition that the intent will decide the day.

Many of my clients in this position...what we recommend they do is to take the approach I've just described to you, which is look to the nominal reserve not the reserve that' on the face of the annual statement, however, it needs to be disclosed on the face of the tax return to avid penalties. So, we've don that in a number of cases. We've disclosed on a return that we are taking this position at odds with the IRS and unless there is some legislative answer to this, my guess is that there will be a court case. And as you know, Jay, anything you go into court, the answer is never going to be clear, but I think that we have...I'd rather have our facts than the government's facts.

MR. ROBERTS: Any others? Everyone does want to go home. Oh, to ahead.

MR. GLEESON: In the write-up for the session there were several things listed. The first one was discussion the salvage and subrogation rules that have been developed. And there are two other items, one of which was making a decision on electing to use company patterns versus paid out patterns that were promulgated by the Treasury Department. I have some material on that, but what we had agreed to do today was to start the program looking at salvage and subrogation and focusing solely on that and if we has any time left over to focus on this other item too.

For those of you who want to hear what our thoughts are on that, if you can give me your card I will send you what I have written on that one.

There was one other item too, Jon. What was that?

MR. ROBERTS: Yes. The deductibility of premiums. Again, here at the panel we took the position that premium deductibility for premiums paid to captive insurance companies is not necessarily a tax issue related to loss reserving. For those of you who would like to ask questions about it, again, please feel free to ask. I mean we've got fifteen minutes for you to get out early and go home. Yes.

QUESTION: Since we have time, I have a comment with regard to some of Owen's projections. There are a couple of things...I believe that a Bornhuetter-Ferguson approach can work very well on your development and it would be a good alternative projection method. Second cut, that is with the expected ultimate ratio and the amount expected to be recovered as of a particular year.

MR. GLEESON: That would be almost a combination of methods one and two.

QUESTION: Second comment is that I think that the reason that you see such strange variation in the auto liability is the fact that you're combining so many separate coverages in there. There may be a lot of opportunities of salvage and subrogation in the personal injury protection and the amount that a particular company has would vary considerably by the concentration in which states it writes. In addition, to that, I believe there may be an impact due to the various comparative negligence laws.

MR. GLEESON: I think that's a good point. The companies that showed extremely high ratios in the auto liability figures that I have posted there, did have a concentration of business in each case in one given state.

QUESTION: Tom Levy. I have two questions for Richard. One is, in terms of how you're advising your clients with respect to the expenses that are incurred, to say, subrogated claim. How would that be? Do you know? Are you presumably reducing the anticipated salvage and subrogation for the expenses that you have to incur?

MR. GLASER: Actually Owen was discussing this morning and I think he has the answer.

MR. GLEESON: Tom, your questions was on expenses, in terms of salvage and subrogation.

QUESTION: Right. Say you have a workers' compensation claim and there's a third party involved that's (inaudible) and you go after and sue them. You've incurred some expenses to recover those dollars. And the question is, is the anticipated subrogation amount gross of the expenses that you'd have to incur to ever cover that amount?

MR. GLEESON: Okay. I'm going to be answering that question, based on work that I did over fifteen years ago in the salvage and subrogation area. And it was my understanding, at the time, that the statutory requirements were that the expenses incurred in collecting salvage and subrogation would be netted against those amounts and it would not be included as part of either allocated or unallocated loss adjustment expense. So, if you exclude them from that category, then when you are doing your accrual it would seem that you should anticipate the collection expenses in the accrual process. That's my reaction.

QUESTION: That's how you are advising your clients on that issue?

MR. GLEESON: I'm not a tax expert in regard, in spite of what Jon said...

MR. GLASER: Actually that issue has not been raised by any of my clients, but I would answer the question, before doing any research, with simply...unless there's something to the contrary, we follow the annual statement even in these days. And if annual statement accounting is, as Owen has just described it, that's (inaudible) accounting practice, I think that's the approach I would take with the tax return. I think I have plenty of support in that and there is nothing in the 1990 Act nor in the committee reports that deal with that issue directly. I'd rely on the accuracy of the annual statement, in other words, to follow the annual statement in that regard.

QUESTION: And one additional question, again, back on the definition of salvage and subrogation. Especially for workers' compensation there appears 5that there is a lot of salvage and subrogation anticipated showing up in the annual statements for the workers' compensation line. I suspect some of that might be second injury fund recoveries and some of these large deductible programs, deductible recoveries. Could you discount on that as well?

MR. GLASER: It's a good question. A good comment. It goes back to the issue of what is salvage? And that salvage you have to be recovery from a third party. If it is a deductible, can it be included in salvage? Again, definitionally no one really knows the answer, but I think the thought process is, and we have thought about this issue, if it is merely a deductible and it's on a recovery against a third party, rather it be a pool or otherwise, it is arguably not salvage. If it is a recovery from anybody or anyone else other than the insured, I think there is a strong argument that it is salvage. And the problem with that analysis is...it goes back to my surety issue where the insurance posted a bond. If one uses the third party criteria, as (inaudible) for salvage, it falls apart and it just becomes difficult, along I can make a lot of arguments shy the deductible is very different from a performance (inaudible).

The answer to your question is deductibles are probably not salvaged. Anything else is.

Exhibit A

Method #1 - Development Approach

Calculation of Development Factors

Salvage and Subrogation Received

Accident Year	AY+0	AY+1	AY+2	AY+3	AY+4	AY+5	AY+6	AY+7	AY+8
1979	X	X	X	X	X	X	X	X	2,090
1980	X	X	X	X	X	X	X	2,240	2,310
1981	X	X	X	X	X	X	2,380	2,480	2,580
1982	X	X	X	X	X	2,500	2,610	2,700	2,800
1983	X	X	X	X	2,580	2,760	2,890	2,950	
1984	X	X	X	2,580	2,800	3,010	3,250		
1985	X	X	2,470	2,860	3,160	3,330			
1986	X	2,200	2,780	3,170	3,450				
1987	1,620	2,400	3,000	3,450					
1988	1,830	2,660	3,200						
1989	2,060	2,950							
1990	2,100								
	5,510	7,260	8,250	8,540	8,540	8,270	7,880	7,420	X
	X	8,010	8,980	9,480	9,410	9,100	8,750	8,130	7,690
Wtd. Avg.		1.454	1.237	1.149	1.102	1.066	1.058	1.032	1.036
Selected		1.450	1.250	1.150	1.100	1.070	1.060	1.030	1.020
Accum.		2.733	1.885	1.508	1.311	1.192	1.114	1.051	1.020

Method #1 - Development Approach (continued)

Exhibit B

Calculation of Salvage and Subrogation Recoverable

(1) Accident Year	(2) S + S Rec@12/90	(3) Development Factor	(4) [a] Recoverable S+S@12/90
1990	2,100	2.733	3,639
1989	2,950	1.885	2,611
1988	3,200	1.508	1,626
1987	3,450	1.311	1,073
1986	3,450	1.192	662
1985	3,300	1.114	376
1984	3,250	1.051	166
1983	2,950	1.020	59
			10,212

(a) Col.4 = Col. 2 X (Col. 3 - 1)

Method #2 - Ultimate Ratio Approach

Exhibit C-1

Experience through year end 1990

Accident Year	Incurred Losses	S + S Rec@12/90	Ratio Sal and Sub to Inc. Loss
1990	200,000	2,100	1.05
1989	182,000	2,950	1.62
1988	165,000	3,200	1.94
1987	150,000	3,450	2.30
1986	137,000	3,450	2.52
1985	124,000	3,330	2.68
1984	113,000	3,250	2.88
1983	103,000	2,950	2.86
1982	93,000	2,800	3.01

Experience through year end 1989

Accident Year	Incurred Losses	Actual S + S Rec@12/89	Ratio Sal and Sub to Inc. Loss
1989	182,000	2,060	1.13
1988	165,000	2,660	1.61
1987	150,000	3,000	2.00
1986	136,000	3,170	2.31
1985	124,000	3,160	2.55
1984	113,000	3,010	2.67
1983	103,000	2,890	2.81
1982	93,000	2,700	2.90
1981	85,000	2,580	3.04

Exhibit C-2

Method #2 - Ultimate Ratio Approach (continued)

Experience through year end 1988

Accident Year	Incurred Losses	S + S Rec@12/88	Ratio Sal and Sub to Inc. Loss
1988	165,000	1,830	1.11
1987	150,000	2,400	1.60
1986	137,000	2,780	2.03
1985	124,000	2,860	2.31
1984	113,000	2,800	2.48
1983	103,000	2,760	2.68
1982	93,000	2,610	2.81
1981	85,000	2,480	2.92
1980	77,000	2,310	3.00

Experience through year end 1987

Accident Year	Incurred Losses	S + S Rec@12/87	Ratio Sal and Sub to Inc. Loss
1987	150,000	1,620	1.08
1986	137,000	2,200	1.61
1985	124,000	2,470	1.99
1984	113,000	2,580	2.28
1983	103,000	2,580	2.50
1982	93,000	2,500	2.69
1981	85,000	2,380	2.80
1980	77,000	2,240	2.91
1979	70,000	2,090	2.99

Exhibit D

Method #2 - Ultimate Ratio Method (continued)

Evaluation Year

Accident Year	AY+0	AY+1	AY+2	AY+3	AY+4	AY+5	AY+6	AY+7	AY+8
1979	X	X	X	X	X	X	X	X	2.99
1980	X	X	X	X	X	X	X	2.91	3.00
1981	X	X	X	X	X	X	2.80	2.92	3.04
1982	X	X	X	X	X	2.69	2.81	2.90	3.01
1983	X	X	X	X	2.50	2.68	2.81	2.86	
1984	X	X	X	2.28	2.48	2.67	2.88		
1985	X	X	1.99	2.31	2.55	2.68			
1986	X	1.61	2.03	2.31	2.52				
1987	1.08	1.60	2.00	2.30					
1988	1.11	1.61	1.94						
1989	1.13	1.62							
1990	1.05								

Exhibit E

Method #2 - Ultimate Ratio Approach (continued)

Estimate of Uncollected Salvage and Subrogation

Selected Ultimate Ratio = 3.0%

Accident Year	Incurred Loss	Ultimate S + S	Received S+S@12/90	Unpaid S+S@12/90
1990	200,000	6,000	2,100	3,900
1989	182,000	5,460	2,950	2,510
1988	165,000	4,950	3,200	1,750
1987	150,000	4,500	3,450	1,050
1986	137,000	4,110	3,450	660
1985	124,000	3,720	3,330	390
1984	113,000	3,390	3,250	140
1983	103,000	3,090	2,950	140
				10,540

Exhibit F-1

Method #3 - Additive Method

Calendar Year 1990 Experience

Accident Year	Incurred Loss	S+S Rec. thru12/90	S+S Rec. thru12/89	S+S Rec. in 1990	Ratio of Incr.S+S Rec. to Inc.Loss
1990	200,000	2,100	-0-	2,100	1.05
1989	182,000	2,950	2,060	890	.49
1988	165,000	3,200	2,660	540	.33
1987	150,000	3,450	3,000	450	.30
1986	137,000	3,450	3,170	280	.20
1985	124,000	3,330	3,160	170	.14
1984	113,000	3,250	3,010	240	.21
1983	103,000	2,950	2,890	60	.06
1982	93,000	2,800	2,700	100	.11
					2.89

Calendar Year 1989 Experience

Accident Year	Incurred Loss	S+S Rec thru12/89	S+S Rec. thru12/88	S+S Rec. in 1989	Ratio of Incr.S+S Rec. to Inc. Loss
1989	182,000	2,060	-0-	2,060	1.13
1988	165,000	2,660	1,830	830	.50
1987	150,000	3,000	2,400	600	.40
1986	137,000	3,170	2,780	390	.28
1985	124,000	3,160	2,860	300	.24
1984	113,000	3,010	2,800	210	.19
1983	103,000	2,890	2,760	130	.13
1982	93,000	2,700	2,610	90	.10
1981	85,000	2,580	2,480	100	.12
					3.09

Exhibit F-2

Method #3 - Additive Method (continued)

Calendar Year 1988 Experience

Accident Year	Incurred Loss	S+S Rec. thru12/88	S+S Rec. thru12/87	S+S Rec in 1988	Ratio of Incr.S+S Rec. to Inc. Loss
1988	165,000	1,830	-0-	1,830	1.11
1987	150,000	2,400	1,620	780	.52
1986	137,000	2,780	2,200	580	.42
1985	124,000	2,860	2,470	390	.32
1984	113,000	2,800	2,580	220	.20
1983	103,000	2,760	2,580	180	.18
1982	93,000	2,610	2,500	110	.12
1981	85,000	2,480	2,380	100	.12
1980	77,000	2,310	2,240	70	.09
					3.08

Exhibit G

Method #3 - Additive Method (continued)

Averaging and Selection of Ratios

Ratio of Salvage and Subrogation to Incurred Loss

1990 Exp.	1989 Exp.	1988 Exp.	Avg.	Selected	Cummulative
1.05	1.13	1.11	1.10	1.1	3.1
.49	.50	.52	.50	.5	2.0
.33	.40	.42	.38	.4	1.5
.30	.28	.32	.30	.3	1.1
.20	.24	.20	.21	.2	.8
.14	.19	.18	.17	.2	.6
.21	.13	.12	.15	.2	.4
.06	.10	.12	.09	.1	.2
.11	.12	.09	.11	.1	.1

Estimate of Uncollected Salvage and Subrogation

Accident Year	Incurred Losses	Factor Unpaid S + S	Unpaid S + S
1990	200,000	2.0	4,000
1989	182,000	1.5	2,730
1988	165,000	1.1	1,815
1987	150,000	.8	1,200
1986	137,000	.6	822
1985	124,000	.4	496
1984	113,000	.2	226
1983	103,000	.1	103
			11,392

Exhibit H-1

RATIOS OF SALVAGE AND SUBROGATION
TO INCURRED LOSSES
VARIOUS COMPANIES
AUTO LIABILITY

Period	Co. 1	Co. 2	Co. 3	Co. 4	Co. 5
AY+0	.25	.29	.01	.04	.01
AY+1	.72	.59	.12	.12	.04
AY+2	1.18	.67	.14	.17	.09
AY+3	1.28	.73	.09	.21	.09
AY+4	1.11	.93	.20	.34	.13
AY+5	1.23	.99	.29	.41	.19
AY+6	1.77	1.20	.25	.37	.32
AY+7	1.91	1.29	.24	.54	.21
AY+8	1.44	.98	.27	.81	.21
AY+9	1.55	.81	.20	.95	.92

Period	Co. 6	Co. 7	Co. 8	Co. 9	Co. 10
AY+0	.17	.18	.14	.64	.34
AY+1	.35	.27	.88	1.65	.74
AY+2	.56	.28	1.62	2.22	.99
AY+3	.65	.19	2.16	2.12	1.04
AY+4	.28	.17	4.00	2.08	1.09
AY+5	.14	.14	4.08	1.27	1.08
AY+6	.64	.14	4.54	.33	1.04
AY+7	.83	.11	2.95	.23	.98
AY+8	.35	.09	-0-	.14	.92
AY+9	.18	.17	.01	.08	.93

Exhibit H-2

Ratios of Salvage and Subrogation
To Incurred Losses
Various Companies
Auto Liability

Period	Co. 11	Co. 12	Co. 13	Co. 14	Co. 15
AY+0	.30	.35	.50	.13	1.01
AY+1	.86	.71	.93	.38	3.15
AY+2	1.26	.87	1.05	.63	4.58
AY+3	1.84	.88	1.05	.74	5.14
AY+4	2.09	1.30	1.12	.75	5.02
AY+5	1.80	1.46	1.21	.71	5.23
AY+6	1.61	1.19	1.27	.83	4.98
AY+7	1.60	1.07	1.29	.98	4.81
AY+8	1.77	1.47	1.33	1.03	5.01
AY+9	1.69	1.55	1.37	.97	5.45

RATIOS OF SALVAGE AND SUBROGATION
TO INCURRED LOSSES
VARIOUS COMPANIES
AUTO PHYSICAL DAMAGE

Exhibit I

Period	Co. 1	Co. 2	Co. 3	Co. 4	Co. 5
AY+0	13.0	3.8	8.2	14.4	.8
AY+1	25.4	7.2	16.7	24.7	8.0

Period	Co. 6	Co. 7	Co. 8	Co. 9	Co. 10
AY+0	2.8	10.7	13.1	4.5	6.2
AY+1	4.8	25.6	53.7	9.1	12.1

Period	Co. 11	Co. 12	Co. 13	Co. 14	Co. 15
AY+0	8.1	6.3	6.4	7.6	5.5
AY+1	14.9	11.1	12.8	17.3	9.5

RATIOS OF SALVAGE AND SUBROGATION
TO INCURRED LOSSES
INDUSTRY
VARIOUS LINES OF BUSINESS

Exhibit J

Period	AL	CMP	HO	MM	GL	WC
AY+0	.49	.34	.20	.01	.05	.03
AY+1	1.12	.85	.57	.03	.11	.13
AY+2	1.62	1.16	.78	.02	.14	.32
AY+3	1.62	1.66	1.00	.08	.21	.55
AY+4	1.85	1.54	.97	.26	.29	.84
AY+5	1.79	1.60	1.05	.40	.40	1.04
AY+6	1.65	1.65	1.20	.46	.39	1.18
AY+7	1.70	1.77	1.16	.41	.46	1.29
AY+8	1.53	1.91	1.17	.45	.55	1.35
AY+9	1.59	2.33	1.13	.47	.53	1.32

Period	APHD
AY+0	6.49
AY+1	11.86

EXHIBIT A

ELECTION OF PAYMENT PATTERNS
- INDUSTRY VERSUS COMPANY -

- GUIDING PRINCIPLE

"MAXIMIZE PRESENT VALUE OF DEDUCTIONS"

- CERTAINTY VS UNCERTAINTY

- HIDDEN COSTS

ELECTION OF PAYMENT PATTERNS
- INDUSTRY VERSUS COMPANY -
EXAMPLE #1

EXHIBIT B-1

Period	Payout Pattern Industry	Payout Pattern Company	Discount Factors Industry	Discount Factors Company
AY+0	25.9176%	27.0000%	78.8100%	84.6331%
AY+1	28.6066%	30.5000%	73.6761%	82.8627%
AY+2	13.3314%	14.0000%	69.8075%	82.8025%
AY+3	7.7423%	8.5000%	66.6465%	83.6561%
AY+4	4.4748%	5.0000%	65.0881%	86.2058%
AY+5	3.5037%	4.5000%	63.3961%	88.8749%
AY+6	1.8842%	4.0000%	64.1345%	91.5559%
AY+7	1.7264%	3.5000%	64.8606%	93.5664%
AY+8	1.5013%	2.0000%	65.8220%	96.0473%
AY+9	0.6226%	1.0000%	69.4426%	96.0473%
AY+10	0.6226%	0.0000%	73.4920%	96.0473%
AY+11	0.6226%	0.0000%	78.0534%	96.0473%
AY+12	0.6226%	0.0000%	83.2331%	96.0473%
AY+13	0.6226%	0.0000%	89.1698%	96.0473%
AY+14	0.6226%	0.0000%	96.0473%	96.0473%
AY+15	7.5759%	0.0000%	96.0473%	96.0473%

EXHIBIT B-2

ELECTION OF PAYMENT PATTERNS
- INDUSTRY VERSUS COMPANY -
EXAMPLE #1

Period	Tax Benefit Industry	Tax Benefit Company	Present Value Industry	Present Value Company
AY+0	(7,205)	(5,225)	(6,933)	(5,028)
AY+1	1,994	1,833	1,776	1,633
AY+2	1,203	1,109	993	915
AY+3	901	760	688	581
AY+4	668	559	472	395
AY+5	649	420	425	275
AY+6	704	288	427	175
AY+7	595	166	334	93
AY+8	332	71	173	37
AY+9	159	18	77	9
AY+10	0	0	0	0
AY+11	0	0	0	0
AY+12	0	0	0	0
AY+13	0	0	0	0
AY+14	0	0	0	0
AY+15	0	0	0	0
Total :	0	(0)	(1,568)	(915)

1991 CASUALTY LOSS RESERVE SEMINAR

7G: ADVANCED CASE STUDY

Moderator

Robert J. Finger
Milliman & Robertson, Inc.

Panel

David F. Mohrman
Tillinghast/Towers Perrin

ADVANCED CASE STUDY

Session 7G

Description of Data Set

The data is medical payments on workers' compensation claims from a state fund. The statute covers all medical expenses related to the injury, for the lifetime of the worker. There have not been any significant changes in the statutes during the period of the data. There is no fee schedule. Some cost containment measures have been introduced within the past several years.

Measures of exposure include the lost-time claim count and the statewide average weekly wage.

The assignment is to estimate liabilities on both an undiscounted and discounted basis.

MEDICAL PAYMENTS ($000's)

DEVEL YEAR	CALENDAR YEAR OF PAYMENT 79	80	81	82	83	84	85	86	87	88	89	90
1	33623	34305	38363	43325	43247	51686	53746	53470	60199	68505	68808	58763
2	33364	37525	38761	41358	41501	49843	61979	75914	84574	94237	107961	124451
3	9358	11267	14911	15654	16568	16958	19625	26333	32646	35181	40916	52431
4	6431	6535	8886	11396	11952	12386	13481	15391	19002	24599	25315	30079
5	4600	5672	6590	8618	10491	10918	11018	11670	13062	16762	20733	22774
6	4621	4299	5747	6923	8313	10478	10550	10617	11372	12194	15075	19668
7	3578	4575	4869	6220	7207	7984	10251	10599	10758	10671	11363	14220
8	2884	3467	5222	5477	6645	6604	8214	9962	9925	9978	9877	10921
9	2396	2897	3820	5795	5669	6671	7285	8529	9831	10015	9481	9182
10	2089	2408	3333	4502	6107	5833	6601	7202	8201	9625	9580	8762
11	2043	2132	2626	3810	5039	6272	5760	6484	7045	8304	9419	8959
12	1849	1987	2233	3025	4040	4218	6095	6117	6729	6863	7451	8763
13	1840	2053	2606	2679	3120	3688	4431	6180	5847	6418	6518	7306
14	1584	1735	2172	2848	2678	3177	4032	4787	6055	5929	6108	6164
15	1120	1582	2060	2482	3204	2694	3301	3992	4802	5910	5910	5293
16	1114	1227	1698	2440	2540	3065	2591	3411	3957	4695	5731	5257
17	1240	1216	1318	1965	2489	2697	3383	2697	3394	3692	3963	5609
18	997	1182	1340	1524	2013	2538	2698	3512	2926	3333	3920	3902
19	854	1121	1341	1520	1607	1962	2641	2610	3474	2638	2965	3294
20	883	1000	1312	1465	1916	1520	2235	2576	2666	3391	2714	2700
21	828	888	1033	1304	1766	1587	1560	2024	2750	2471	2615	2325
22	547	820	1137	1294	1579	1550	1748	1690	1945	2517	2256	2412
23	536	691	965	1214	1325	1400	1700	1612	1613	1880	2287	2030
24	506	554	623	994	1104	1378	1376	1814	1528	1559	2046	2268
25	254	591	633	690	1163	1162	1371	1392	1844	1555	1464	1683
26	332	250	743	692	696	1032	1317	1455	1392	1848	1502	1278
27	332	338	402	794	683	600	999	1249	1352	1273	1440	1279
28	347	377	390	356	816	647	618	1023	1140	1189	1184	1457
29	251	347	422	450	400	779	702	782	990	1108	1110	1077
30	140	353	299	424	376	397	810	641	754	925	1178	1199
31	177	139	309	308	506	514	390	754	671	688	1099	1074
32	142	188	147	368	352	366	500	416	804	901	580	842
33	73	113	192	130	288	338	442	455	330	633	805	482
34	135	64	131	191	125	359	270	473	392	392	531	537
35	62	162	60	142	257	173	298	256	414	397	286	536
36	85	64	173	81	195	303	115	414	227	476	353	290
37	69	86	73	188	60	184	269	115	326	225	376	323
38	52	58	46	79	226	54	154	299	152	257	182	401
39	34	48	74	34	58	333	54	161	247	139	280	189
40	16	36	65	61	149	54	291	58	198	131	93	212
41	69	13	27	91	24	32	53	278	83	256	147	84
42	0	60	11	14	66	45	53	43	310	61	330	150
43	23	1	11	6	41	62	73	32	63	261	49	135
44	2	37	1	54	6	32	49	83	35	57	374	49
45	32	1	27	0	8	5	49	33	74	37	50	323
46	16	13	7	30	0	10	5	63	32	24	34	16
47	4	13	15	0	31	1	1	6	48	34	82	11
48	0	2	2	15	29	30	1	1	5	3	50	57
49	0	0	0	0	16	20	6	0	6	4	4	97
50	9	0	0	0	2	40	16	0	0	2	5	2
51	3	3	0	0	0	0	32	38	0	1	5	5
52	4	5	3	0	0	0	0	20	17	0	0	1
53	2	4	4	3	1	0	0	0	28	22	0	6
54	3	34	1	6	4	0	0	0	0	23	24	1
55	0	11	3	4	6	3	0	0	0	0	10	26
56	9	0	4	2	22	7	4	0	0	0	0	0
57	0	11	0	5	2	5	6	4	0	0	0	0
58	1	1	18	0	0	7	0	1	0	0	0	0
59	15	0	0	7	0	0	2	0	1	0	0	0
60	20	17	2	0	0	0	0	1	0	1	0	0
TOTAL	121598	134578	157259	183057	198728	224701	255251	289739	326236	364290	396639	431355

EXPOSURE DATA

ACC YEAR	LOST-TIME CLAIM COUNT (M)	STATEWIDE AVERAGE WKLY WAGE
90	51.0	441.7
89	51.3	424.7
88	50.0	408.4
87	46.8	392.7
86	44.5	380.3
85	43.9	371.5
84	40.5	356.1
83	33.7	341.7
82	33.2	327.2
81	36.8	310.2
80	38.8	285.3
79	44.1	265.6
78	42.0	247.2
77	40.1	232.2
76	38.5	215.8
75	36.7	197.8
74	41.4	185.9
73	38.5	175.4
72	32.7	164.5
71	30.9	159.8
70	32.1	151.5
69	34.5	146.2
68	32.2	137.4
67	31.4	128.6
66	32.7	125.3
65	31.4	120.1
64	30.3	115.6
63	30.5	110.4
62	30.6	107.4
61	30.1	103.6
60	32.4	101.7
59	32.4	
58	28.0	
57	32.5	
56	35.5	
55	35.0	
54	31.6	
53	32.4	

DEVEL YEARS	PROJECTION #1 88	89	90	TOTAL
2–5	171,064	87,565	54,050	312,679
6–10	49,814	53,839	61,597	165,250
11–15	31,285	33,198	35,558	100,041
16–20	18,127	20,614	22,521	61,262
21–25	11,683	12,958	14,017	38,658
2–25	281,973	208,174	187,743	677,890

DEVEL YEARS	ACTUAL 88	89	90	TOTAL
2–5	170,779	86,964	52,853	310,596
6–10	52,483	55,376	62,753	170,612
11–15	33,424	35,406	36,485	105,315
16–20	17,749	19,293	20,762	57,804
21–25	9,982	10,668	10,718	31,368
2–25	284,417	207,707	183,571	675,695

DEVEL YEARS	RATIO 88	89	90	TOTAL
2–5	1.002	1.007	1.023	1.007
6–10	0.949	0.972	0.982	0.969
11–15	0.936	0.938	0.975	0.950
16–20	1.021	1.068	1.085	1.060
21–25	1.170	1.215	1.308	1.232
2–25	0.991	1.002	1.023	1.003

DEVEL YEARS	PROJECTION #2 88	89	90	TOTAL
2–5	166,272	81,058	49,496	296,826
6–10	49,839	55,503	64,163	169,504
11–15	33,085	37,769	42,366	113,219
16–20	17,945	21,105	24,160	63,210
21–25	10,211	11,764	13,196	35,171
2–25	277,352	207,198	193,380	677,930

DEVEL YEARS	ACTUAL 88	89	90	TOTAL
2–5	170,779	86,964	52,853	310,596
6–10	52,483	55,376	62,753	170,612
11–15	33,424	35,406	36,485	105,315
16–20	17,749	19,293	20,762	57,804
21–25	9,982	10,668	10,718	31,368
2–25	284,417	207,707	183,571	675,695

DEVEL YEARS	RATIO 88	89	90	TOTAL
2–5	0.974	0.932	0.936	0.956
6–10	0.950	1.002	1.022	0.994
11–15	0.990	1.067	1.161	1.075
16–20	1.011	1.094	1.164	1.094
21–25	1.023	1.103	1.231	1.121
2–25	0.975	0.998	1.053	1.003

DEVEL YEARS	88	PROJECTION #3 89	90	TOTAL
2-5	175,629	89,679	54,739	320,047
6-10	63,509	70,446	80,530	214,485
11-15	34,350	40,563	47,358	122,270
16-20	18,453	21,922	25,605	65,980
21-25	10,953	12,840	14,462	38,255
2-25	302,893	235,450	222,693	761,036

DEVEL YEARS	88	ACTUAL 89	90	TOTAL
2-5	170,779	86,964	52,853	310,596
6-10	52,483	55,376	62,753	170,612
11-15	33,424	35,406	36,485	105,315
16-20	17,749	19,293	20,762	57,804
21-25	9,982	10,668	10,718	31,368
2-25	284,417	207,707	183,571	675,695

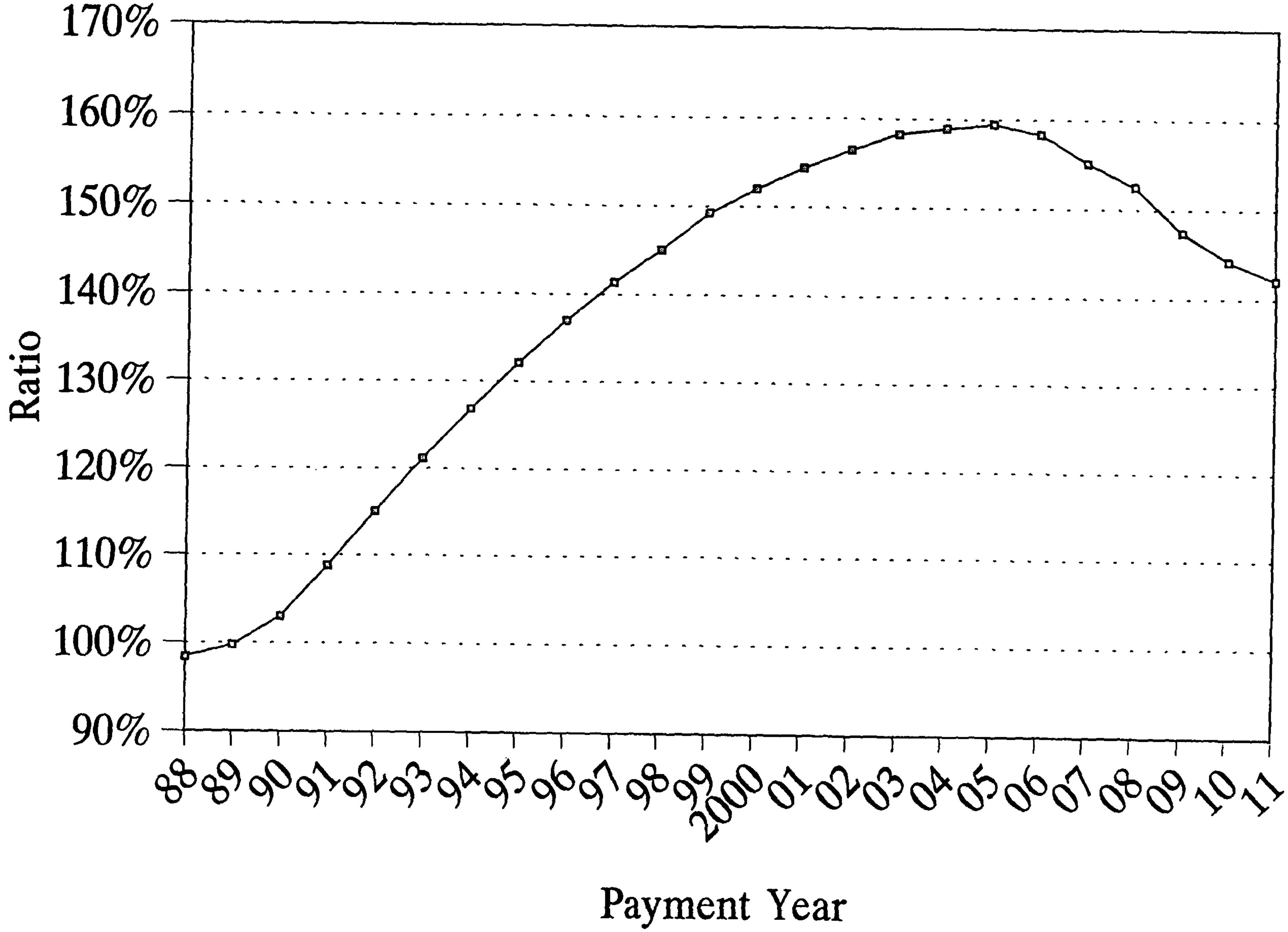
DEVEL YEARS	88	RATIO 89	90	TOTAL
2-5	1.028	1.031	1.036	1.030
6-10	1.210	1.272	1.283	1.257
11-15	1.028	1.146	1.298	1.161
16-20	1.040	1.136	1.233	1.141
21-25	1.097	1.204	1.349	1.220
2-25	1.065	1.134	1.213	1.126

DEVEL YEARS	PROJECTION #4 88	89	90	TOTAL
2–5	167,120	86,163	52,307	305,589
6–10	56,752	63,641	74,656	195,049
11–15	36,059	40,718	46,047	122,823
16–20	19,785	23,092	27,114	69,990
21–25	11,915	14,300	15,980	42,195
2–25	291,630	227,913	216,103	735,647

DEVEL YEARS	ACTUAL 88	89	90	TOTAL
2–5	170,779	86,964	52,853	310,596
6–10	52,483	55,376	62,753	170,612
11–15	33,424	35,406	36,485	105,315
16–20	17,749	19,293	20,762	57,804
21–25	9,982	10,668	10,718	31,368
2–25	284,417	207,707	183,571	675,695

DEVEL YEARS	RATIO 88	89	90	TOTAL
2–5	0.979	0.991	0.990	0.984
6–10	1.081	1.149	1.190	1.143
11–15	1.079	1.150	1.262	1.166
16–20	1.115	1.197	1.306	1.211
21–25	1.194	1.340	1.491	1.345
2–25	1.025	1.097	1.177	1.089

COMPARISON OF PROJECTIONS
Ratio of Projection #2 to #1



MEDICAL COST INDEX

	COMMODITIES		PROFESSIONAL SERVICES		OTHER		COMPOSITE			TOTAL	
WEIGHTS	0.088		0.373		0.539						
YEAR	INDEX	CHANGE	INDEX	CHANGE	INDEX	CHANGE	INDEX	CHANGE	UTILIZATION	INDEX	CHANGE
1967	100.0		100.0		100.0		100.0		1.000	100.0	
1968	100.2	0.2%	105.3	5.3%	109.8	9.8%	107.1	7.1%	1.030	110.4	10.4%
1969	101.3	1.1%	112.3	6.6%	120.4	9.7%	115.5	7.8%	1.061	122.5	11.0%
1970	103.6	2.3%	119.7	6.6%	129.7	7.7%	123.4	6.9%	1.093	134.8	10.1%
1971	105.4	1.7%	127.5	6.5%	140.2	8.1%	132.0	7.0%	1.126	148.6	10.2%
1972	105.6	0.2%	132.1	3.6%	145.6	3.9%	136.7	3.5%	1.159	158.4	6.6%
1973	105.9	0.3%	136.4	3.3%	153.9	5.7%	142.6	4.4%	1.194	170.3	7.5%
1974	109.6	3.5%	148.2	8.7%	172.3	12.0%	157.1	10.1%	1.230	193.2	13.4%
1975	118.8	8.4%	164.5	11.0%	196.9	14.3%	177.0	12.7%	1.267	224.2	16.0%
1976	126.0	6.1%	179.4	9.1%	218.5	11.0%	194.6	10.0%	1.305	253.9	13.3%
1977	134.1	6.4%	194.1	8.2%	244.2	11.8%	214.3	10.1%	1.344	288.0	13.4%
1978	143.5	7.0%	208.8	7.6%	267.6	9.6%	232.9	8.7%	1.384	322.4	12.0%
1979	153.8	7.2%	226.8	8.6%	296.4	10.8%	255.7	9.8%	1.426	364.6	13.1%
1980	168.1	9.3%	252.0	11.1%	330.1	11.4%	284.3	11.2%	1.469	417.5	14.5%
1981	186.5	10.9%	277.9	10.3%	366.9	11.1%	315.1	10.8%	1.513	476.6	14.1%
1982	205.7	10.3%	301.5	8.5%	421.9	15.0%	354.2	12.4%	1.558	551.8	15.8%
1983	223.3	8.6%	323.0	7.1%	464.4	10.1%	386.0	9.0%	1.605	619.4	12.2%
1984	239.7	7.3%	347.7	7.6%	487.9	5.1%	409.4	6.1%	1.653	676.6	9.2%
1985	257.0	7.2%	367.4	5.7%	516.7	5.9%	433.5	5.9%	1.702	737.9	9.1%
1986	273.6	6.5%	390.9	6.4%	562.6	8.9%	467.7	7.9%	1.754	820.1	11.1%
1987	292.5	6.9%	417.5	6.8%	602.5	7.1%	500.4	7.0%	1.806	903.7	10.2%
1988	312.0	6.7%	446.6	7.0%	657.4	9.1%	541.7	8.3%	1.860	1,007.7	11.5%
1989	336.3	7.8%	475.5	6.5%	732.8	11.5%	593.7	9.6%	1.916	1,137.6	12.9%
1990	365.1	8.6%	508.0	6.8%	807.5	10.2%	647.3	9.0%	1.974	1,277.4	12.3%

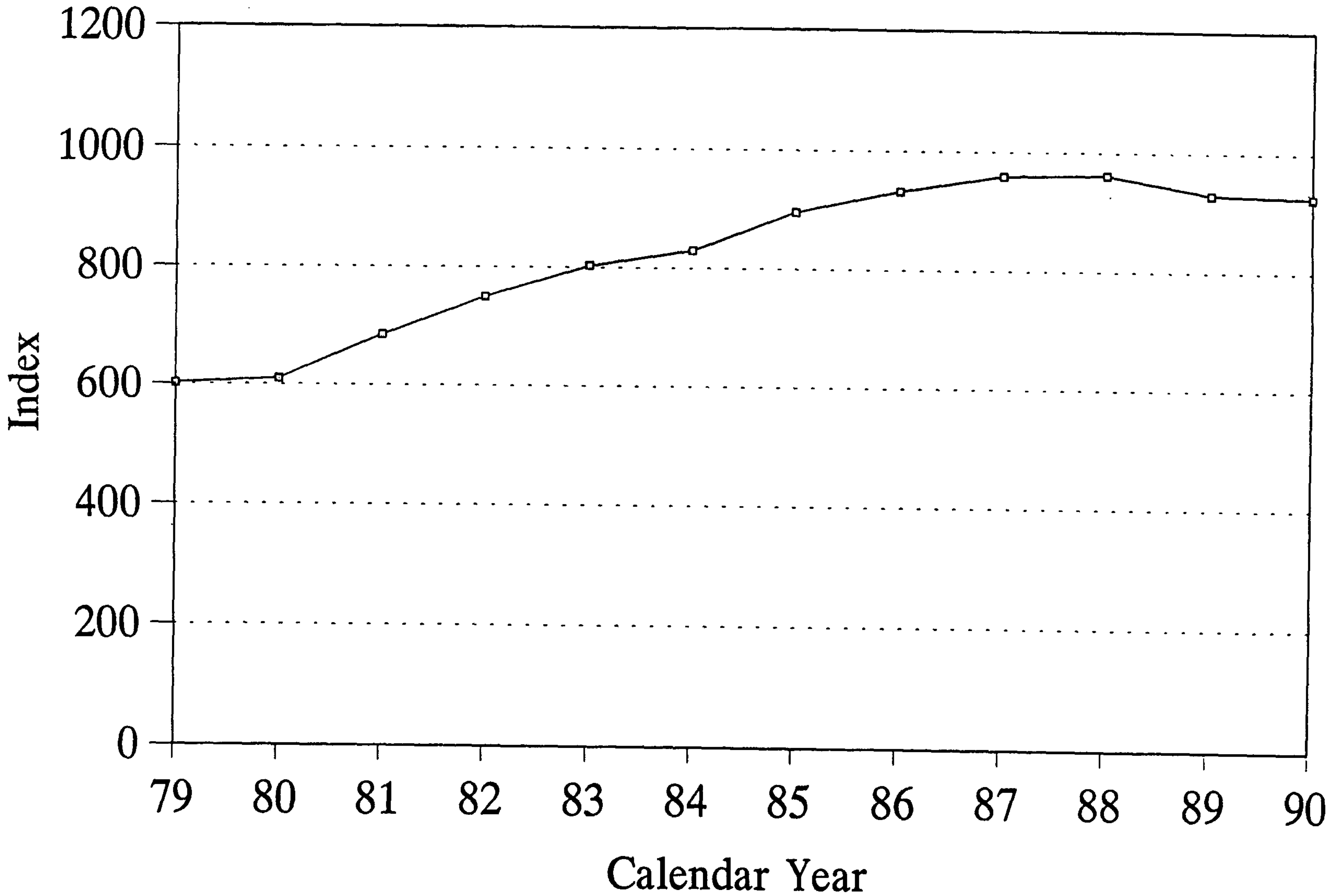
NOTES:
1. INDEX FROM US DEPT OF LABOR CPI DETAIL REPORT
2. WEIGHTS BASED ON FUND EXPERIENCE
3. COMPOSITE EQUALS SUM OF WEIGHT TIMES INDEX FOR 3 COMPONENTS
4. UTILIZATION ASSUMPTION OF 3% PER YEAR
5. TOTAL EQUALS COMPOSITE TIMES UTILIZATION

INDEXED MEDICAL PAYMENTS

CALENDAR YEAR OF PAYMENT

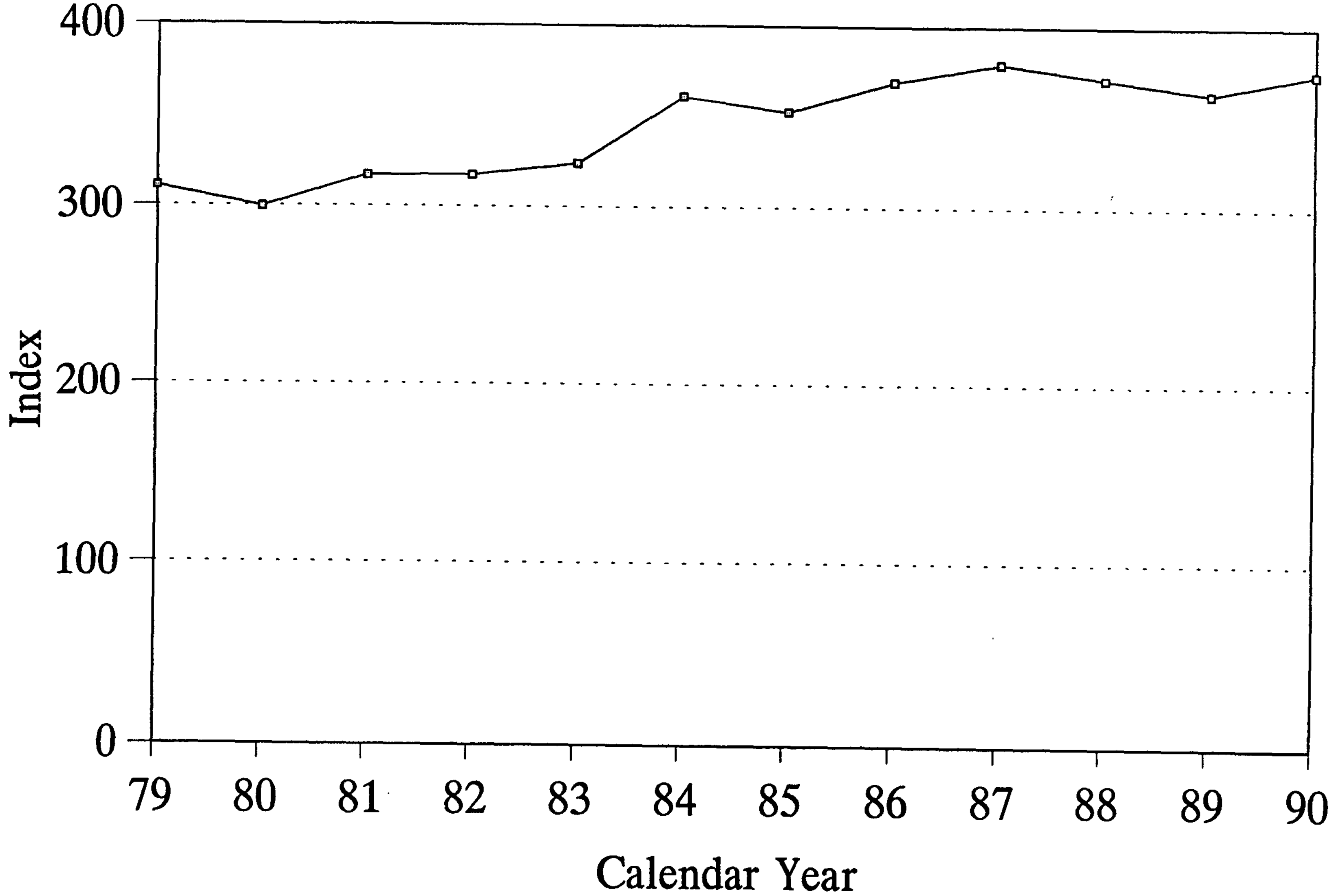
DEVEL YEAR	79	80	81	82	83	84	85	86	87	88	89	90
INDEX	2.557	2.843	3.151	3.542	3.860	4.094	4.335	4.677	5.004	5.417	5.937	6.473
1	298.1	311.0	330.9	368.4	332.5	311.8	282.4	256.9	257.1	252.9	225.9	178.0
2	310.6	299.3	317.1	317.3	323.9	361.3	353.1	369.7	379.8	371.7	363.7	374.8
3	91.3	94.4	107.3	113.9	116.6	124.8	134.4	139.0	148.6	145.9	147.3	162.0
4	65.3	57.3	67.1	73.0	79.8	82.2	93.7	97.7	93.8	103.4	95.8	99.3
5	49.0	51.8	52.2	57.9	61.6	68.7	69.1	75.2	77.5	76.4	79.5	79.1
6	43.6	41.2	47.4	48.7	51.3	58.0	62.7	61.7	68.5	66.8	62.7	69.2
7	36.3	38.9	42.1	45.6	46.6	46.4	53.6	58.4	58.4	59.3	56.8	54.2
8	34.5	31.7	40.0	42.1	44.7	40.2	45.1	48.3	51.1	50.1	50.1	50.1
9	30.3	31.2	31.5	39.5	40.0	42.3	41.9	43.4	44.6	47.7	43.4	42.7
10	25.4	27.4	32.4	33.0	38.2	38.8	39.6	38.4	39.0	40.3	41.6	36.8
11	23.2	23.4	27.0	32.9	33.9	37.0	36.2	36.0	35.1	36.5	36.0	35.7
12	22.5	20.3	22.1	27.6	32.0	26.8	34.0	35.6	34.9	31.6	29.9	30.7
13	22.9	22.4	24.0	23.6	26.2	27.6	26.6	31.9	31.8	30.8	27.4	26.9
14	18.9	19.4	21.4	23.3	21.6	25.1	28.4	26.6	29.2	29.8	26.7	23.7
15	13.9	17.0	20.8	21.8	24.1	20.5	24.6	26.1	24.9	26.4	27.1	21.2
16	14.4	13.7	16.5	21.9	20.4	21.7	18.6	23.6	24.2	22.5	23.3	22.1
17	15.9	14.1	13.3	17.0	20.5	20.5	22.6	18.0	22.0	20.8	17.3	20.9
18	12.7	13.6	14.0	13.7	15.9	19.7	19.3	21.8	18.2	19.9	20.2	15.7
19	11.1	12.9	14.0	14.2	13.3	14.7	19.4	17.3	20.1	15.2	16.2	15.6
20	10.7	11.7	13.6	13.6	16.4	11.8	15.8	17.5	16.5	18.1	14.2	13.5
21	10.0	9.6	10.9	12.0	15.0	12.8	11.5	13.2	17.5	14.2	12.8	11.2
22	7.6	8.9	11.1	12.1	13.4	12.4	13.3	11.5	11.9	14.8	11.8	10.8
23	6.4	8.7	9.5	10.6	11.4	11.2	12.9	11.4	10.3	10.6	12.3	9.7
24	5.6	6.0	7.1	8.7	8.8	11.2	10.4	12.7	10.1	9.2	10.5	11.2
25	2.8	5.9	6.2	7.0	9.3	8.8	10.5	9.7	12.1	9.5	7.9	8.0
26	4.1	2.5	6.6	6.0	6.4	7.8	9.4	10.3	9.1	11.2	8.3	6.3
27	4.0	3.8	3.6	6.3	5.4	5.2	7.1	8.2	9.0	7.7	8.0	6.5
28	4.2	4.1	3.9	2.9	6.0	4.9	5.1	6.8	7.0	7.3	6.5	7.4
29	3.0	3.8	4.1	4.0	3.0	5.4	5.0	6.0	6.1	6.3	6.2	5.4
30	1.7	3.8	2.9	3.7	3.1	2.8	5.3	4.2	5.4	5.3	6.1	6.2
31	2.1	1.5	3.0	2.7	4.0	4.0	2.6	4.5	4.1	4.5	5.7	5.1
32	1.7	2.0	1.4	3.2	2.8	2.8	3.7	2.5	4.5	5.1	3.5	4.0
33	0.9	1.2	1.9	1.1	2.3	2.5	3.1	3.1	1.9	3.3	4.2	2.7
34	1.6	0.7	1.3	1.7	1.0	2.7	1.9	3.1	2.5	2.1	2.5	2.6
35	0.7	1.8	0.6	1.2	2.1	1.3	2.1	1.7	2.6	2.3	1.4	2.3
36	1.0	0.7	1.7	0.7	1.6	2.3	0.8	2.7	1.4	2.7	1.9	1.3
37	0.8	0.9	0.7	1.6	0.5	1.4	1.9	0.8	2.0	1.3	2.0	1.6
38	0.6	0.6	0.5	0.7	1.8	0.4	1.1	2.0	0.9	1.5	0.9	1.9
39	0.4	0.5	0.7	0.3	0.5	2.5	0.4	1.1	1.5	0.8	1.5	0.9
40	0.2	0.4	0.6	0.5	1.2	0.4	2.1	0.4	1.2	0.7	0.5	1.0
TOTAL	1210.5	1220.1	1333.0	1436.2	1459.1	1502.6	1531.2	1559.1	1596.5	1586.5	1519.5	1478.3
1-2	608.7	610.3	647.9	685.8	656.3	673.1	635.5	626.7	636.9	624.7	589.6	552.8
3-10	375.8	373.8	420.0	453.8	478.9	501.6	540.0	562.0	581.4	589.9	577.2	593.4
11-20	166.2	168.6	186.7	209.5	224.3	225.3	245.6	254.5	257.1	251.6	238.3	226.0
21-30	49.5	57.0	66.0	73.3	81.8	82.3	90.3	94.1	98.4	96.0	90.4	82.6
31-40	10.2	10.4	12.4	13.8	17.7	20.3	19.7	21.9	22.7	24.3	24.0	23.4
3-40	601.7	609.8	685.1	750.4	802.7	829.6	895.7	932.5	959.6	961.8	929.9	925.4

INDEXED PAYMENTS
Years 3-40



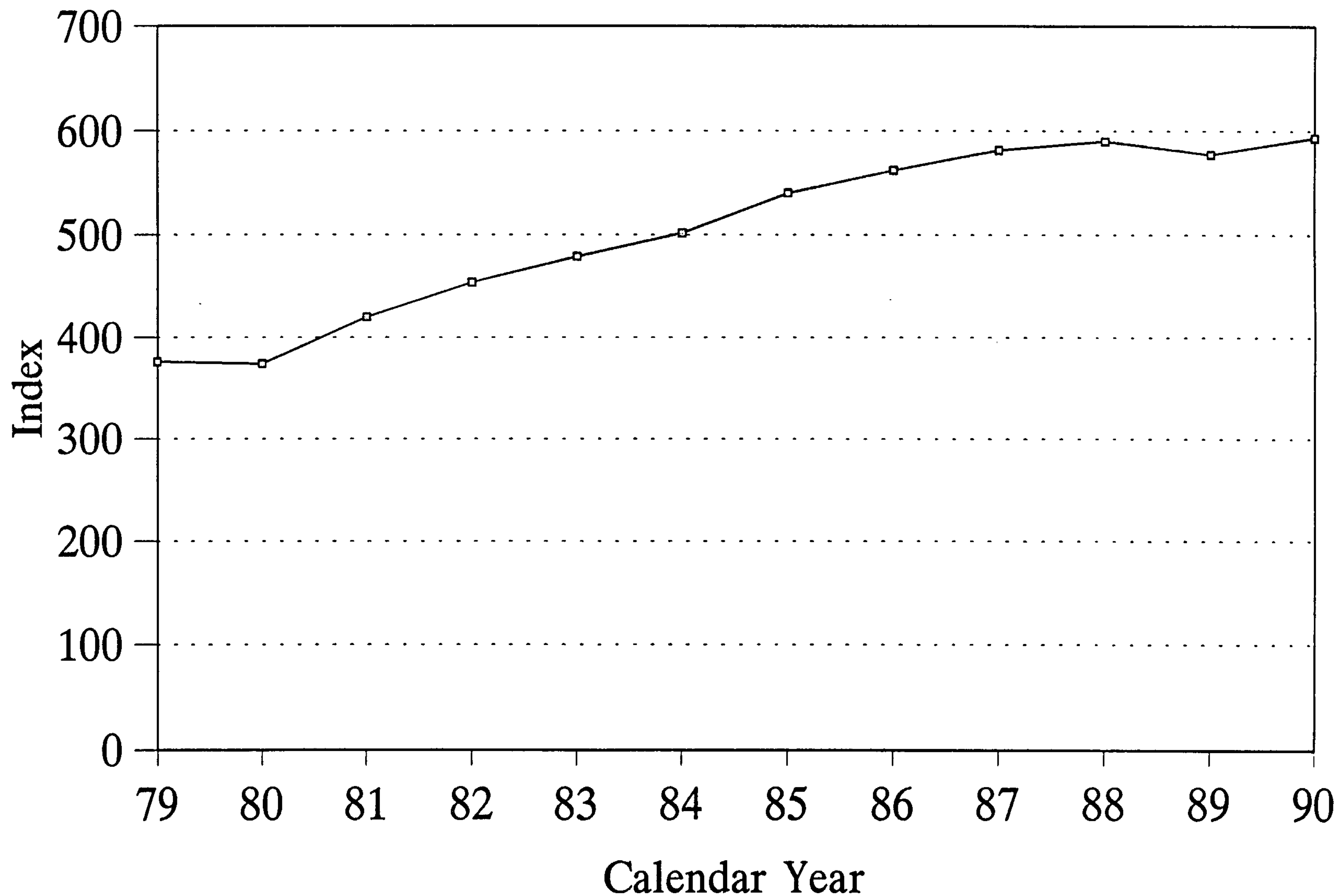
Adjusted for CPI, Lost-time Claim Count.

INDEXED PAYMENTS
Year 2



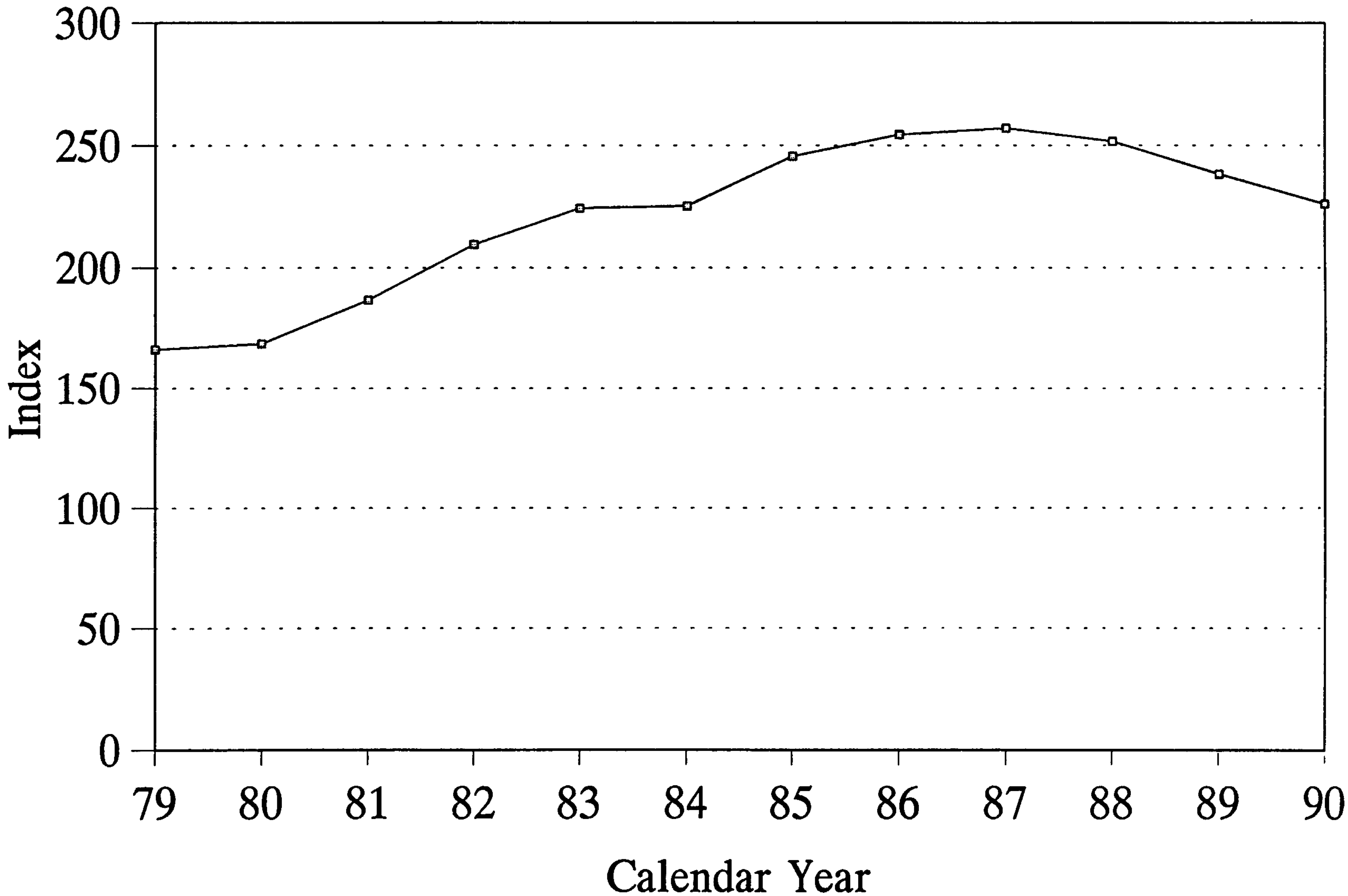
Adjusted for CPI, Lost-time Claim Count.

INDEXED PAYMENTS
Years 3-10



Adjusted for CPI, Lost-time Claim Count.

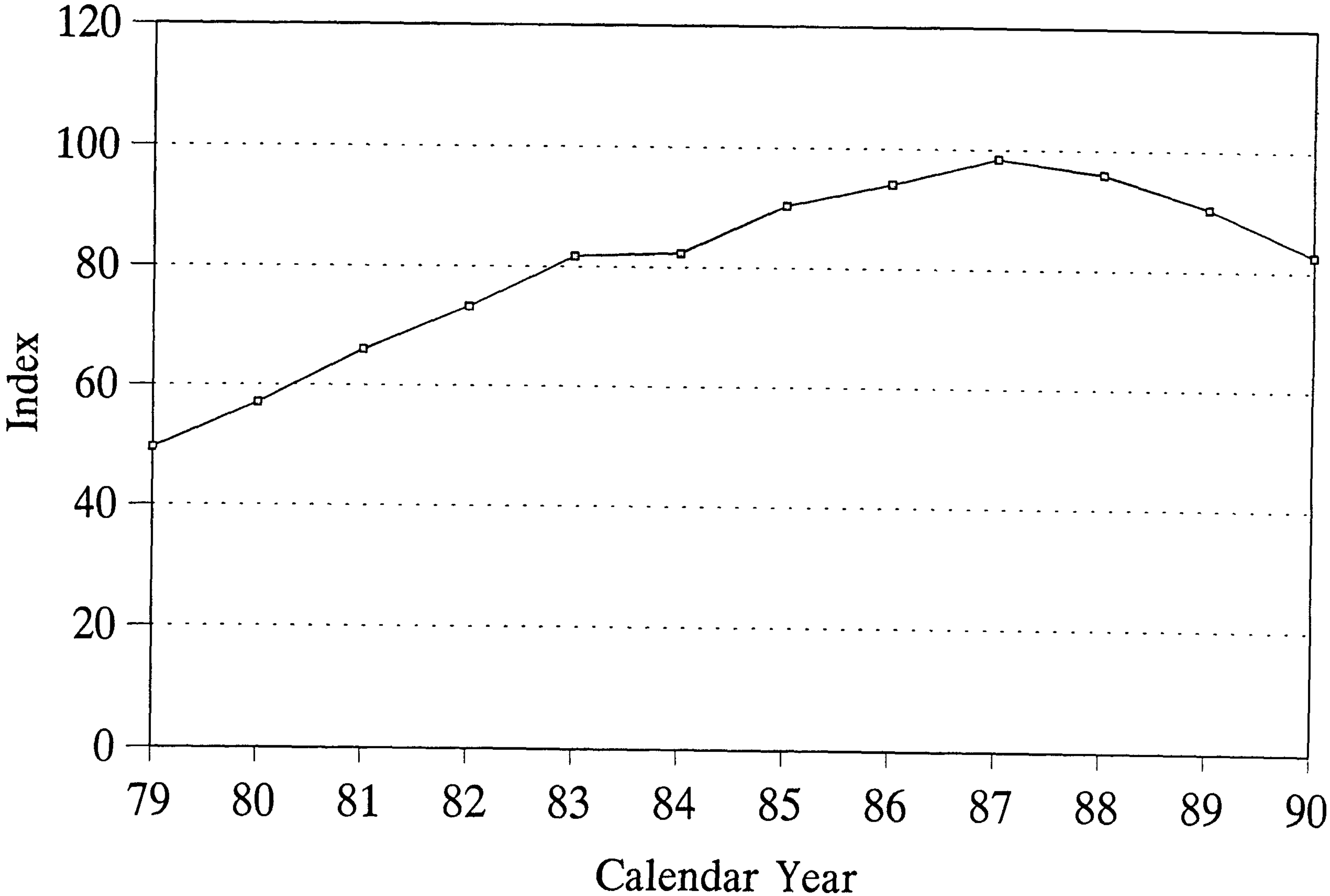
INDEXED PAYMENTS
Years 11-20



Adjusted for CPI, Lost-time Claim Count.

INDEXED PAYMENTS

Years 21-30



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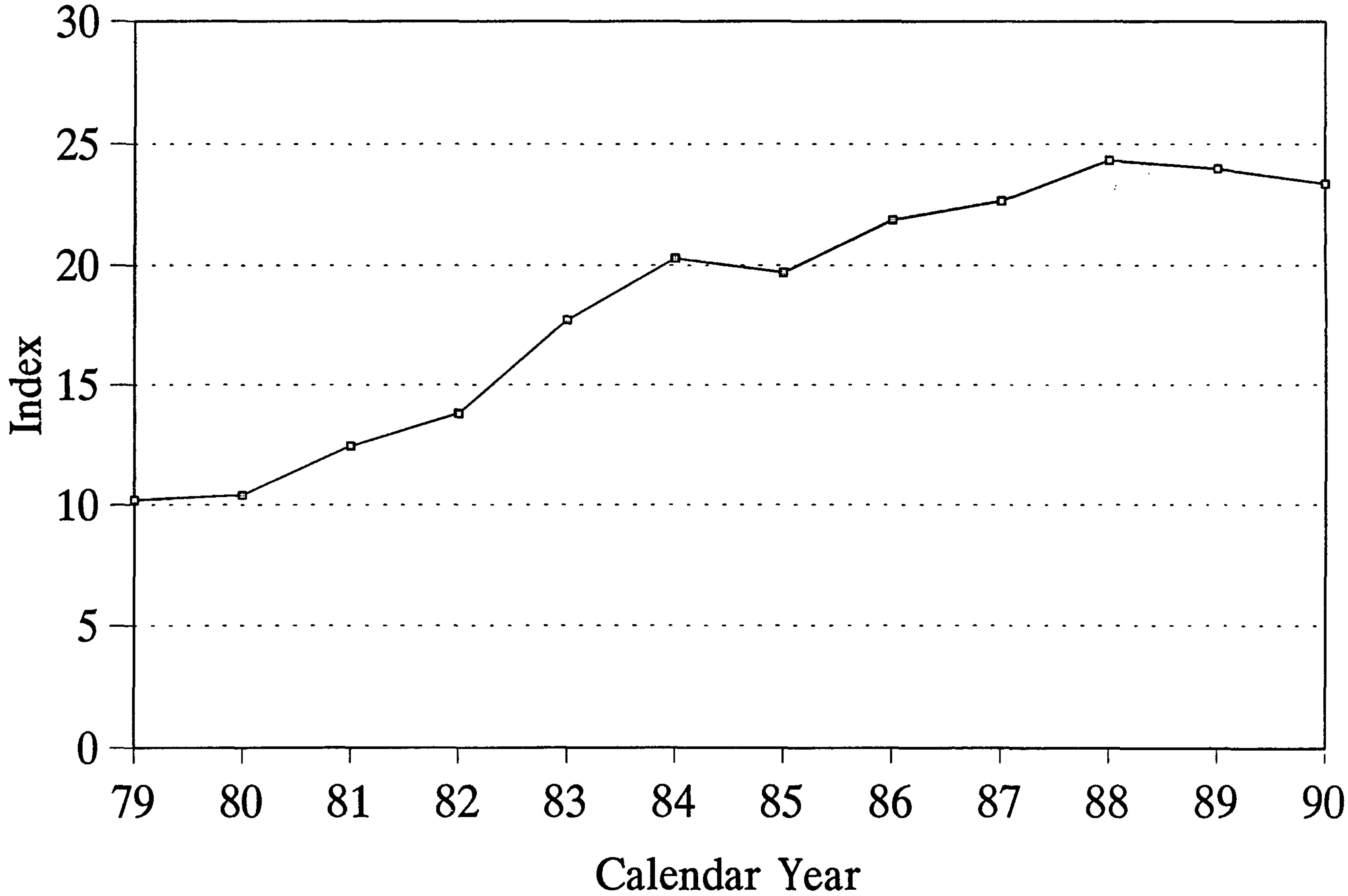
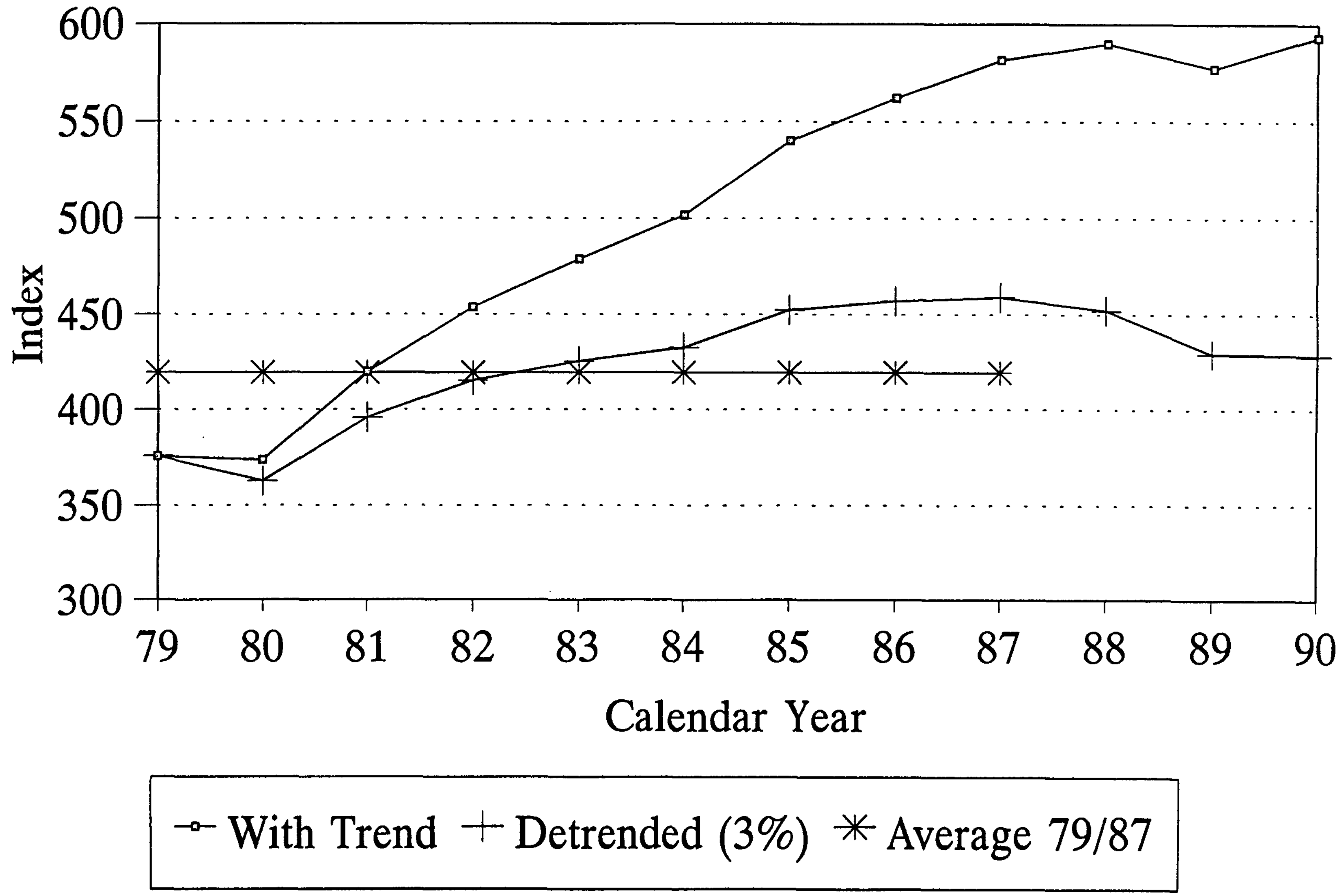
Adjusted for CPI, Lost-time Claim Count.

INDEXED PAYMENTS
Years 31-40



Adjusted for CPI, Lost-time Claim Count.

INDEXED PAYMENTS
Years 3-10



Adjusted for CPI, Lost-time Claim Count.
Adiusted for Additional 3% Trend.

INDEX FACTORS

DEVEL YEARS	PROJECTION 88	89	90	TOTAL
2-5	371.3	160.8	87.1	619.2
6-10	132.4	132.4	132.4	397.2
11-15	80.3	80.3	80.3	240.9
16-20	51.1	51.1	51.1	153.3
21-25	31.1	31.1	31.1	93.3
2-25	666.2	455.7	382.0	1503.9

DEVEL YEARS	ACTUAL 88	89	90	TOTAL
2-5	381.8	172.5	93.0	647.3
6-10	139.8	132.2	128.8	400.8
11-15	81.2	75.4	69.1	225.7
16-20	50.5	46.6	43.7	140.8
21-25	30.4	28.2	25.3	84.0
2-25	683.7	455.0	360.0	1498.7

DEVEL YEARS	RATIO 88	89	90	TOTAL
2-5	0.972	0.932	0.937	0.957
6-10	0.947	1.002	1.028	0.991
11-15	0.989	1.065	1.161	1.067
16-20	1.012	1.096	1.169	1.089
21-25	1.022	1.102	1.229	1.111
2-25	0.974	1.002	1.061	1.003

MEDICAL RESERVE CALCULATION
ACCIDENT YEAR 1990

ESCALATION= 1.01
INVESTMENT INCOME= 1.09

PAYMENT YEAR	ESCALATION	INDEXED PAYMENTS	DISCOUNTED RESERVE FACTOR	INFLATION	UNDISCOUNTED RESERVE FACTOR
1991	1.0100	370.1	373.77	1.0900	407.41
1992	1.0201	151.7	154.79	1.1881	183.90
1993	1.0303	99.5	102.53	1.2950	132.78
1994	1.0406	78.3	81.52	1.4116	115.07
1995	1.0510	66.2	69.62	1.5386	107.11
1996	1.0615	56.8	60.28	1.6771	101.10
1997	1.0721	50.1	53.69	1.8280	98.15
1998	1.0829	44.6	48.29	1.9926	96.21
1999	1.0937	39.6	43.26	2.1719	93.96
2000	1.1046	36.0	39.82	2.3674	94.27
2001	1.1157	30.7	34.28	2.5804	88.45
2002	1.1268	28.3	31.94	2.8127	89.83
2003	1.1381	26.8	30.46	3.0658	93.39
2004	1.1495	24.9	28.63	3.3417	95.67
2005	1.1610	22.7	26.30	3.6425	95.79
2006	1.1726	19.7	23.10	3.9703	91.73
2007	1.1843	18.6	22.01	4.3276	95.26
2008	1.1961	15.6	18.70	4.7171	88.20
2009	1.2081	15.3	18.48	5.1417	95.01
2010	1.2202	12.7	15.51	5.6044	86.90
2011	1.2324	12.5	15.36	6.1088	93.85
2012	1.2447	10.9	13.53	6.6586	90.12
2013	1.2572	10.3	12.93	7.2579	93.87
2014	1.2697	8.4	10.70	7.9111	84.64
2015	1.2824	8.6	11.04	8.6231	95.19
2016	1.2953	7.4	9.56	9.3992	89.90
2017	1.3082	7.1	9.24	10.2451	94.67
SUB-TOTAL			1359.34		2992.45
OTHER YEARS			61.41		1494.63
TOTAL			1420.75		4487.08
	COUNT		51.0		51.0
	1990 INDEX		6.473		6.473
	RESERVE ($Millions)		469.02		1481.29

MEDICAL RESERVE CALCULATION

INFLATION INDEX=	6.473
ESCALATION=	1.01
INVESTMENT INCOME=	1.09

ACCIDENT YEAR	CLAIM COUNT	DISC'D RESERVE FACTOR	DISC'D RESERVE AMOUNT --($MM)--	UNDISC'D RESERVE FACTOR	UNDISC'D RESERVE AMOUNT --($MM)--
1990	51.0	1420.75	469.0	4487.08	1481.3
1989	51.3	1036.62	344.2	3705.76	1230.6
1988	50.0	874.62	283.1	3214.38	1040.3
1987	46.8	766.44	232.2	2820.26	854.4
1986	44.5	680.51	196.0	2483.43	715.3
1985	43.9	607.54	172.6	2189.58	622.2
1984	40.5	544.73	142.8	1932.11	506.5
1983	33.7	489.26	106.7	1704.95	371.9
1982	33.2	439.83	94.5	1504.10	323.2
1981	36.8	395.92	94.3	1326.69	316.0
1980	38.8	355.95	89.4	1169.05	293.6
1979	44.1	321.70	91.8	1031.18	294.4
1978	42.0	290.17	78.9	908.33	246.9
1977	40.1	260.53	67.6	798.31	207.2
1976	38.5	233.05	58.1	700.24	174.5
1975	36.7	208.09	49.4	613.41	145.7
1974	41.4	186.32	49.9	537.48	144.0
1973	38.5	165.89	41.3	469.63	117.0
1972	32.7	148.62	31.5	410.96	87.0
1971	30.9	131.85	26.4	358.00	71.6
1970	32.1	117.84	24.5	312.48	64.9
1969	34.5	104.20	23.3	271.37	60.6
1968	32.2	92.30	19.2	235.63	49.1
1967	31.4	81.10	16.5	203.74	41.4
1966	32.7	71.87	15.2	176.64	37.4
1965	31.4	62.55	12.7	151.85	30.9
1964	30.3	54.55	10.7	130.55	25.6
SUB-TOTAL			2842.0		9553.7
OTHER YEARS			67.7		151.3
TOTAL			2909.7		9705.0

NOTE: RESERVE = COUNT x FACTOR x INDEX.

Advanced Case Study

Presented to CLRS by David Mohrman, ***Tillinghast, a Towers Perrin company***

September 1991

Forces Acting on Medical Claims

- Duration
  - Short-term procedures vs. long-term maintenance
  - Medical-only claims vs. claims with indemnity benefits
- Inflation
- Mortality
- Recovery

Basic Methodology

- Explanatory model
- Analyze counts and average values
  - Acting forces are different
  - Separates utilization issues from dollar inflation
- Explicitly recognize effects of mortality
- Estimate inflation using regression techniques
- Use paid claim counts and incremental-paid dollars

Analysis of Paid Claim Counts

- Goal is determination of future paid counts
  - How many?
  - When?
- Claim persistency is used
  - Ratio of claimants receiving benefits in consecutive intervals
  - Similar to mortality

Example: Claim Count Persistency

(Claim counts in thousands)

	Claim Payment Interval			
Accident Year	*1*	*2*	*3*	*4*
1987	168.2	159.4	52.7	23.8
1988	173.8	180.5	51.8	–
1989	181.6	178.4	–	–
1990	140.0	–	–	–

Example: Claim Count Persistency

Persistency	*1–2*	*2–3*	*3–4*
1987	0.948	0.330	0.452
1988	1.038	0.287	–
1989	0.983	–	–
1990	–	–	–
Selected	1.000	0.277	0.530
Expected Mortality	0.986	0.987	0.986
Supplemental Persistency	1.014	0.281	0.537

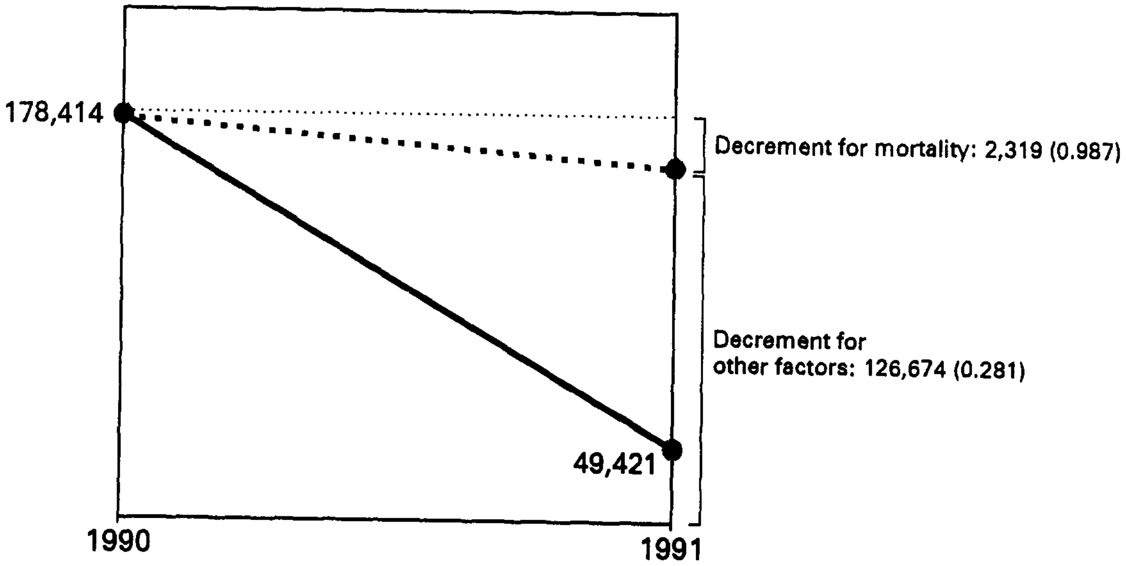
Claim Count Persistency

- Persistency separated into two components:
  1) Mortality
  2) All other
     - Late reportings
     - Recoveries
     - Benefit termination
     - Other
- Data indicates that mortality is the only remaining factor after 35 years

continued...

Claim Count Persistency *(continued)*

Accident Year 1989



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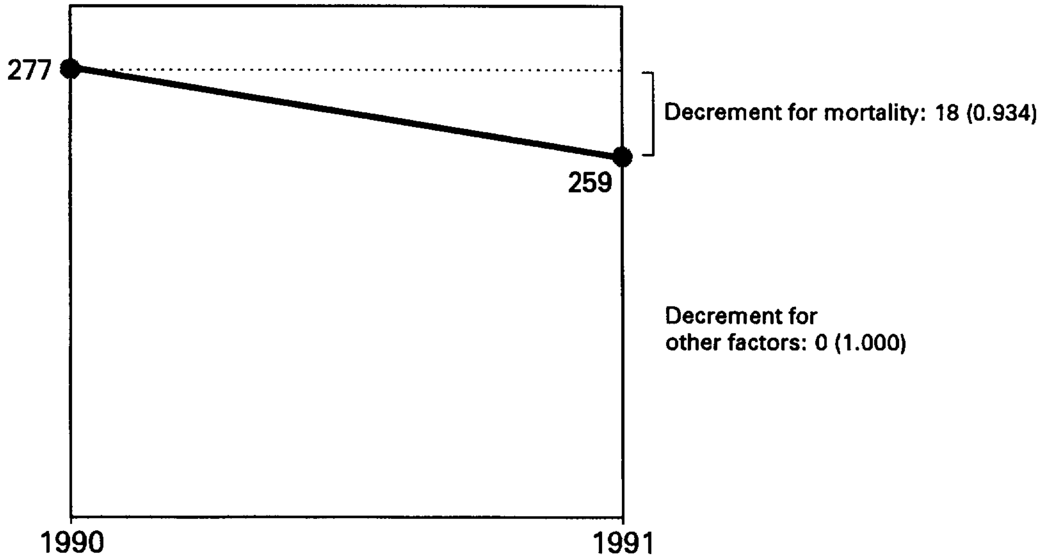
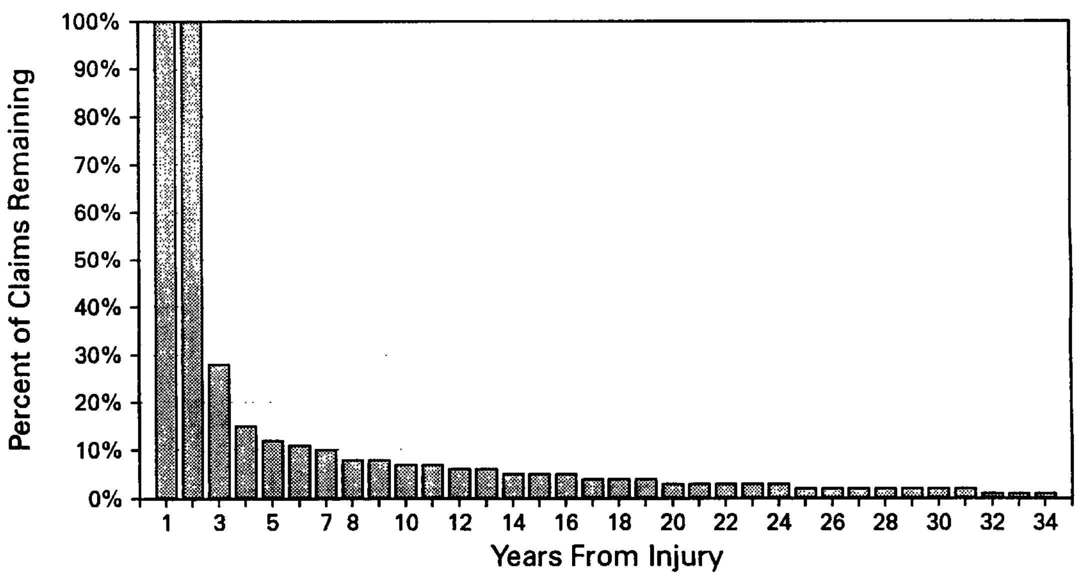
Claim Count Persistency *(continued)*

Accident Year 1957



Percent of Claims Remaining
(Year 1 = 100%)



Average Paid Claims
Factors to Consider

- Inflation
- Changing utilization
- Claim types
- Other

Average Value Model

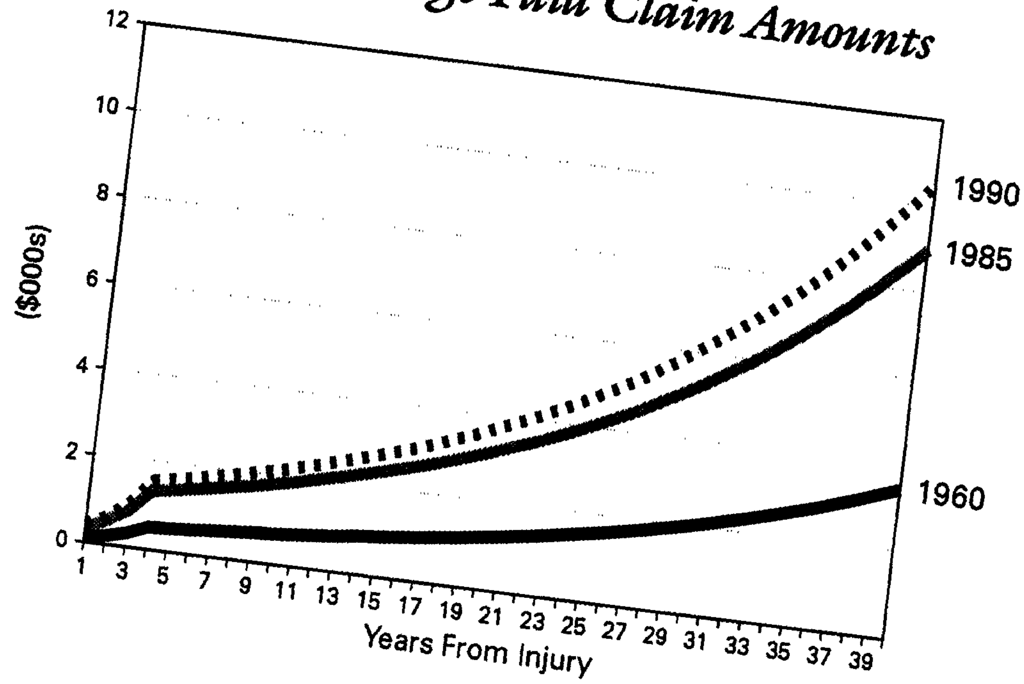
$$\text{Severity} = \$221.44 \cdot 1.039^{(\text{Cal. Yr.} - 1984)} \cdot 1.497^{(\text{Min}\{\text{Val.},4\})} \cdot 1.014^{(\text{Max}\{0,\text{Val.}-4\})}$$

$R^2 = 97.2\%$

Features:

- Has inflation component (indication is 3.9% per year)
- Two factors for changes in claim types and utilization
  - Claim severity increases 49.7% per year through fourth valuation
  - 1.4% per year after fourth valuation
- Fits well

Projected Average Paid Claim Amounts



The Answer

- Multiplying projected claim counts and projected severities produces future cash flow
- *Undiscounted* $8.4 billion
  Discounted (7.0%) 3.4 billion
  Discounted (9.0%) 3.0 billion

Outstanding Issues

- Accident-year 1990 claim counts
- Medical payment backlog
- Severity trends
- Discount rate

Conclusion

- Explanatory model
  - Decomposes factors which determine timing and amount of payments
  - Good for altering assumptions or sensitivity testing
    1) changes in inflation rate
    2) changes in discount rate
- Method works equally well with indemnity claims
  - In fact, average paid-claim analysis is simpler

A SHORT NOTE ON POST-SAMPLE PREDICTIVE TESTING OF MODEL IDENTIFIED AT YEAR END 1987 FOR OHIO STATE FUND WORKER'S COMPENSATION MEDICAL PAYMENTS

SESSION 7G, CLRS 1991

Ben Zehnwirth, Ph.D., A.I.A., F.S.S.
Insureware Pty. Ltd.,
15 Sidwell Avenue,
East St. Kilda,
VIC 3183 AUSTRALIA

Tel: +61 3 527 3084
Fax: +61 3 527 2349

THE PAPER "ANALYSIS OF WORKER'S COMPENSATION MEDICAL PAYMENTS - OHIO STATE FUND" GIVEN IN SESSION 6G AT THE 1988 CLRS IS APPENDED TO THIS NOTE

0. INTRODUCTION

FORECASTS FOR CALENDAR YEARS 1988, 1989 AND 1990, BASED ON MODEL IDENTIFIED AT YEAR END 1987, MATCH WELL WITH THE ACTUAL EXPERIENCE

In Session 6G of the 1988 CLRS held in Atlanta, I presented a paper entitled "Analysis of Worker's Compensation Medical Payments - Ohio State Fund". The paper is appended to this note.

The purpose of the present short note is twofold. Firstly, to conduct a comparison of the forecast payments, as given in the paper, with the actual experience. Secondly, to review the numerous benefits to be afforded by utilising the stochastic **MODELLING FRAMEWORK** that has been advocated by the author for a number of years.

The reader should bear in mind that the current **MODELLING FRAMEWORK** advocated by the author is much friendlier, is more powerful and is more flexible than the one employed to analyse the medical payments loss development arrays more than three years ago.

1. REVIEW OF MODEL IDENTIFIED AT YEAR END 1987 AND ITS DEFICIENCIES

The model identified for year end 1987 is described in Section 4 of the paper.

The model has a number of components:

- A smooth curve representing the base development of the 'payments';
- A parameter alpha for each accident year representing the level for that year in % terms;
- Three separate inflation parameters.

The model is stochastic, equivalently, it is a regression model. That is, for each cell in the loss development array, we identify (or fit) a lognormal distribution for the normalised payment. The log (normalised payment) has a normal distribution with mean lying on the surface determined by the parameters and variance determined by the estimated variance s-squared given in Appendix D7 of the paper.

The stochastic nature of the model implies that any comparison of forecasts with the actual experience should be (at least) in the context of standard errors.

The identified model had some glaring deficiencies -

- the smooth (Hoerl) curve is not flexible enough to capture the base run-off (after adjusting for calendar year and accident year trends). Note the systematic curvature in residuals against development year displayed in Appendix D5 of the paper. We also had to omit the first two development years and hence the correction described on page 15 of the paper;
- there were trend changes in the earlier calendar years that were not modelled. See residual plot given in Appendix D6 of the paper.

2. COMPARISON OF FORECASTS WITH EXPERIENCE

The accuracy of predictions within the sample is captured by such statistics as AIC and SSPE and diagnostic and formal tests including residual displays, outlier analysis, normality testing, validation and stability testing.

The important question however, is whether the identified model can predict <u>outside</u> the sample. Success in this respect is much more convincing than the attainment of a 'good fit' within the sample, since the model is being validated against a set of completely fresh observations.

The Table below gives the post-sample period experience for the calendar years 1988, 1989 and 1990, and the forecasts and standard errors taken from Appendix D7 of the paper. Note the 'correction' described on page 15 of the paper.

<u>Most importantly</u>, the forecasts are based on zero future economic inflation and 2.49% (± 0.81%) future superimposed inflation. This means that the model forecasts <u>may be</u> slightly too high. How much too high depends on the average wages for calendar years 1988, 1989 and 1990 which were <u>not</u> made available to the author by the time this note went to publication. It may also be that superimposed inflation has slowed down recently. In any case, given that the model involves lognormal distributions that are skewed to the right, we would expect more than 50% of the observations to be below the mean forecast. The expected number(s) can be determined from the standard errors.

Additionally, we should obtain forecasts based on zero future economic inflation and use the forecast future liability stream with the standard errors to implement an investment strategy that focuses on asset liability matching.

TABLE

OHIO STATE FUND WORKER'S COMP. MEDICAL PAYMENTS

COMPARISON OF ICRFS MODEL FORECASTS AS AT YEAR END 1987 WITH PAYMENTS FOR YRS 1988, 1989 AND 1990

Paymnt. Yr.	1988	ICRFS model		1989	ICRFS model		1990	ICRFS model	
Acci. Year	Paid	Forecast	S.E.	Paid	Forecast	S.E.	Paid	Forecast	S.E.
1987	94237	93590	6273	40916	37520	4565	30079	30365	3719
1986	35181	34155	4124	25315	27641	3354	22774	23685	2898
1985	24599	25722	3105	20733	22404	2678	19668	19580	2398
1984	16762	17597	1878	15075	15632	1682	14220	14237	1548
1983	12194	12322	1261	11363	11223	1160	10921	10409	1088
1982	10671	10208	1022	9877	9468	958	9182	8905	912
1981	9978	9466	936	9481	8903	890	8762	8466	858
1980	10015	9058	887	9580	8613	854	8959	8264	831
1979	9625	8760	842	9419	8404	818	8763	8123	803
1978	8304	7595	722	7451	7341	707	7306	7139	698
1977	6863	6648	618	6518	6465	609	6164	6320	606
1976	6418	5950	552	6108	5817	547	5293	5712	546
1975	5929	5266	490	5910	5171	487	5257	5098	488
1974	5910	5826	553	5731	5744	552	5609	5682	554
1973	4695	4597	435	3963	4548	436	3902	4514	439
1972	3692	3828	356	3920	3799	358	3294	3780	362
1971	3333	3472	322	2965	3455	325	2700	3447	330
1970	2638	3076	288	2714	3068	291	2325	3067	296
1969	3391	3154	292	2615	3153	297	2412	3158	302
1968	2471	2810	260	2256	2815	264	2030	2825	270
1967	2517	2582	239	2287	2592	244	2268	2605	250
1966	1880	2334	217	2046	2346	222	1683	2362	228
1965	1559	2038	190	1464	2052	195			
1964	1555	1919	180						
	284417	281974	11765	207707	207808	9826	183571	187743	9000
	Paid	Forecast	S.E.	Paid	Forecast	S.E.	Paid	Forecast	S.E.

3. BENEFITS AND ADVANTAGES OF THE (LATEST) MODELLING FRAMEWORK

- Development factor models:

  Incorporation of a rich family of development factor models that involve straight line segments or trends, equivalently, age-to-age development factors to represent the systematic development. Straight line segments (or development factors) are much more flexible than a smooth curve constrained by three parameters. The user determines a parsimonious curve comprising straight line segments.

- Model updating:

  Once a model has been identified to year end 1990, say, it can be updated and forecast tracking conducted effortlessly and efficiently after the 1991 data is added to the array. There is no need to analyse the past again!

- Security margin:

  The models produce predictive distributions and so predictive intervals are readily derived.

- Asset/Liability matching:

  Future liability stream produced by the model represents pertinent information for asset/liability matching.

- Sensitivity analysis:

  What if analysis may be conducted effortlessly and efficiently.

- Models:

  Models contain information or assumptions. The models have a straight forward interpretation in terms of a number of components, viz,

  - Base development year trends;
  - Level for each accident year;
  - Trend between every two calendar years.

  Any calendar year trend is projected onto both the development year and accident year - that is a theorem and is the property that holds true for every triangle.

The last component of the model which is just as important, if not more, than the first three, is the distribution of the observations about the trends. Typically on a logarithmic scale it is assumed to be normal but not necessarily with a constant variance.

- <u>Assumptions</u>:

  All model assumptions are tested.

For any further information, <u>please</u> do not hesitate to contact the author.

ANALYSIS OF WORKER'S COMPENSATION MEDICAL PAYMENTS - OHIO STATE FUND

SESSION 6G

Ben Zehnwirth, A.I.A., F.S.S.
BSc(Hons), M.Sc., PhD.

1. INTRODUCTION AND SUMMARY

In the present report we analyse the worker's compensation medical payments data supplied by the Ohio State Fund.

The primary objective is to analyse the data for the purpose of providing projections of outstanding reserves for each of the accident years 1964 to 1987.

Stochastic (probabilistic) models are used to explain the behaviour of the loss development array in order to:

* separate the random component in the data from the systematic component;
* identify and estimate any heterogeneity in the data;
* identify and estimate changes in payment (calendar) year inflation;
* identify and estimate changing trends across accident years;
* separate changing payment year trends from changing accident year trends.

Separate analyses were conducted of the:

(i) incremental paid losses array adjusted for both (economic) inflation and exposures;
(ii) incremental paid losses array adjusted only for exposures;
(iii) incremental paid losses array adjusted only for (economic) inflation.

The loss development array (i) was of primary interest since it facilitates the identification and estimation of superimposed (social) inflation and the separation of payment year trends from accident year trends. Arrays (ii) and (iii) were also analysed in order to prove that the identified (varying parameter stochastic) model:

* separates payment year trends from accident year trends;
* provides consistent estimates of payment year inflation in the data analysed.

By way of summary, we have identified and estimated social inflation of :

(i) -2.54% (±0.72%) from payment (calendar) years 1971-1977;
(ii) 7.29% (±0.72%) from payment years 1978-1983, and
(iii) 2.49% (±0.81%) from payment years 1984-1987.

However, there are substantial changes in trends across accident years. For example, from accident year 1979 to accident year 1980, there is a downward trend of 10.5% (±4.55%). For any set of contiguous payment years for which superimposed inflation is constant, development factors are homogeneous across accident years. That is, payments develop in the same systematic pattern.

Payment year trends are necessarily correlated with accident year trends. Moreover, apart from superimposed inflation, there is a slight increase in the tail.

Most of the variation (94.1%) in the payments is explained by:

* changing social inflation;
* changing trends across accident years;
* systematic development over development years.

The remaining 5.9% of the variation in the payments represents the random component. Projections (forecasts) and standard errors have been derived for each accident year subdivided according to development year. The various projections are presented and discussed in Sections 4 and 6.

2. DATA (Appendix A)

2.1 DATA SUPPLIED

The data sets supplied include:

* incremental paid losses by calendar year (1979 to 1987) for 60 accident years (Appendix A1);
* cumulative paid losses by calendar year (1967 to 1987) for the latest 30 accident years (Appendix A2);
* various measures of exposure and state-wide average weekly wage (Appendix A3).

2.2 DATA ANALYSED

Using the cumulative paid losses array, an <u>incremental paid losses</u> array was created based on payment years 1968 to 1987 and accident years 1963 to 1987.

The incremental paid losses array is presented in Appendix A4.

Since it is commonly recognised that it is important to identify and estimate the superimposed (social) inflation in the data, the incremental paid losses are brought to current value terms using inflation factors based on the state-wide average wage.

Appendix A5 presents the inflation factors and Appendix A6 presents the inflation adjusted incremental paid losses array. The payments are in mid 1987 $ value.

Exposures represent the 'relative' volume of business written in each accident year. We adjust each accident year's payments according to the corresponding exposure in order to make accident years compatible in terms of levels of payments. We use 'payroll' as a measure of <u>relative</u> exposure. Appendix A7 presents the 'normalised' payments. The normalised payments in Appendix A7 are the payments in Appendix A6 divided by the corresponding exposure. Using exposures is a form of adjustment. The models that we identify and estimate also adjust for any changing trends across accident years, so that exposures are only important in that they may reduce the forecast standard error, that is, the uncertainty associated with the estimates of outstandings. Moreover, they are also relevant in separating payment year trends from accident year trends.

Finally, we analyse the 'normalised' payments presented in Appendix A7 in order to identify and estimate superimposed inflation and in passing also analyse the (unadjusted) normalised payments and the adjusted non-normalised payments <u>in order to demonstrate the consistency, accuracy and power of our model</u>.

Before discussing the preliminary exploratory analysis, we provide a description of the terms <u>standard error</u> and <u>uncertainty</u>.

<u>Standard Error and Uncertainty</u>

Since an estimate is based on information obtained from a 'sample', it is subject to sampling variability; that is, it differs from the figure that would have been produced if all the population values had been observed. A measure of the likely difference is given by the standard error. There are about two chances in three that a sample estimate will differ by less than one standard error from the true figure that would have been obtained if all population values had been observed, and about nineteen chances in twenty that the difference will be less than two standard errors. The standard error measures the uncertainty associated with the estimate. The same arguments apply to the standard error of a mean forecast.

3. PRELIMINARY ANALYSIS (Appendix B)

3.1 PLOTS

In order to obtain some preliminary ideas of what <u>indications</u> there are in the data, we plot (graph) the data in a number of different ways.

(i) Appendix B1 presents a plot of normalised payments for accident year 1968 against delay (development year). The peak is at development year 0, payments drop very quickly and the tail is heavy. Between accident years 1976 and 1977, the peak changes from development year 0 to development year 1 (Appendix B2). The letter 'N' represents a (normalised) payment in respect of accident year 1976, whereas the letter 'O' represents a (normalised) payment in respect of accident year 1977. By accident year 1986, the payment in delay 1 is substantially above delay 0 (Appendix B2).

(ii) Appendix B2 also gives a plot of the logarithms of the normalised payments against delay. By examining the logarithms of the payments, we derive some insight of the % variability in the data. The different letters represent different accident years : A for 1963, B for 1964, etc.

The last plot reveals five outliers (unusual observations), viz., values at (accident year 1963, delay 5); (1963,13); (1964,5); (1965,4) and (1966,3). Further analysis reveals that some other observations in payment years 1968 and 1969 are also outliers, so that it was decided to omit these two early payment years. Accordingly, the only outlier in the array, payment years 1970 to 1987 and accident years 1963 to 1987 is at (1963,13). Note how small this observation is (see Appendix A4).

The plot also reveals that the highest % variability in the data is between development years 9 to 13.

By way of summary,

* there is a distinct downward trend in normalised payments for development year 0 (Appendix A7);
* there is a distinct upward trend in normalised payments for development year 1 (Appendix A7);
* payment years 1968 and 1969 and the observation for accident year 1963, delay 13 are outliers. See Appendix B3 for plot of logarithms of payments against delay without the first two payment years.

Appendix B3 also presents a plot of the payments against delay for the two accident years 1963 and 1964. Note that the 'run-off' increases at around delay 13 and 14, confirming the new bout of payment year inflation commencing around the payment year 1978. See Section 3.2 for a discussion on changing payment year inflation.

We therefore analyse the data Appendix B4 (which has payment years 1968 and 1969 omitted), omitting the first two development years and accident year 1963, delay 13. This means that we have to make an adjustment to only one forecast, viz., accident year 1987, delay 1.

3.2 TRENDS AND STRUCTURE (Appendix C)

In order to obtain some preliminary ideas of the structure (systematic patterns) in the data, we estimate a model that assumes:

* homogeneity in development factors across accident years;
* constant inflation across payment years.

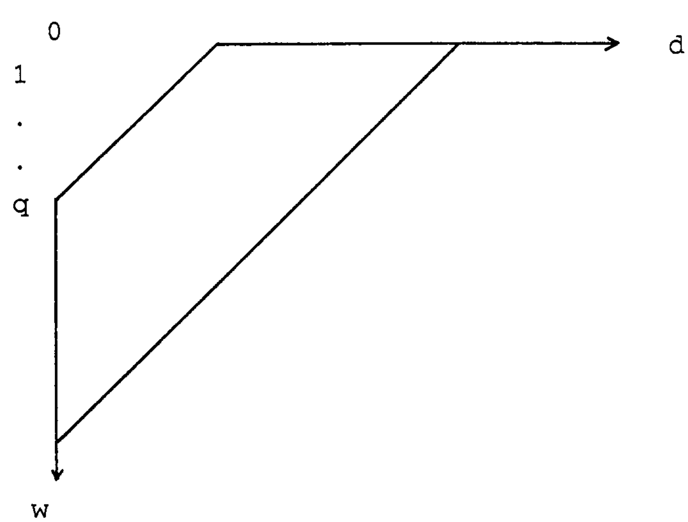
We subsequently examine displays of the observed (logarithmic) payments about the fitted model. The distribution of the observations about the fitted model (surface) should be random if the two assumptions:

* homogeneity of development factors;
* constant inflation,

are valid. Otherwise, any systematic departure from randomness facilitates the identification of systematic trends.

We estimate the model:

$$y(w,d) = \log[p(w,d)] = \alpha + \beta*\log(1+d) + \gamma*d + \iota*(w+d-q) + \varepsilon$$



where;

w is the variable denoting accident year, w=1,2,...,25;
d denotes delay (development year), d=0,1,2,...,24;
t denotes payment year, t=5,6,...,25;
p(w,d) is the normalised payment in respect of accident year w and delay d.

The data starts at payment year q=5 and note that the variable t (representing payment year) = w+d.

The parameter α (alpha) represents the base level of the curve (surface).

The parameters β (beta) and γ (gamma) represent the 'smoothed' development factors.

The parameter ι (iota) represents the annual (force of) inflation (in the payment year direction).

Appendix C1 presents some of the (regression) results. We note:

(i) the parameter β (beta) is negative and the parameter γ (gamma) is positive. This is indicative of not only a heavy tail, but an increasing tail;
(ii) average annual (force of) payment year inflation is 3.25% $\pm$ 0.2% . The parameter <u>iota</u> measures inflation.

We now examine the residuals (observed - predicted), given in Appendix C2, in order to identify and estimate systematic departure from homogeneity:

(i) residuals against delay are in good shape;
(ii) residuals against payment years indicate inflation from 1970 to 1977 is much less than the average of 3.5%; from 1977-1983 is much more than the average of 3.5%, and from 1984 to 1987, perhaps a little less than 3.5%.

Note that changing payment year inflation implies that development factors are not homogeneous. We formally tested whether changes in inflation are statistically significant. The formal testing did confirm our diagnostic testing.

After adjusting for the three separate inflation rates, we still have changing trends across accident years. That is, the 'levels' between some contiguous accident years jump up and down significantly. (Payment year trends are necessarily correlated with accident year trends.)

4. THE BEST IDENTIFIED MODEL (Appendix D)

We have identified a (varying parameter) stochastic model that has three different inflation rates and adjusts for changing trends across accident years.

Each accident year has three parameters α (alpha), β (beta) and γ (gamma). Each payment year has an ι (iota) (inflation) parameter.

1. The β (beta) and γ (gamma) parameters are the same for each accident year. They represent the smoothed <u>base</u> development factors.
2. Each accident year has a level (α (alpha)) parameter. The α parameters adapt from year to year according to values given in Appendix D1.
3. There are three different iota (inflation) parameters, one for each of the periods 1971-1977, 1978-1983 and 1984-1987. See Appendix D3.

Much of the variability in the payments, viz., 94.1%, is explained by the <u>systematic</u> components in the data, viz.,

(i) changing payment year inflation rates;
(ii) changing trends across accident years, and
(iii) systematic development of the payments over development years.

Indeed the correlation between the observed (logarithmic normalised) payments and model payments is 0.97 ($\sqrt{.941}$). (See Appendix D4).

The % random (variability) in the payments about the systematic structure is just under 9% (8.91%).

Appendix D1

Here is presented the estimates of the base development factors β (beta) and γ (gamma) and also the levels α (alpha) for each accident year. Each accident year has the same base development factors. The parameter γ (gamma) is positive indicating a slight increase in the tail.

Appendix D2

Changes in α (alpha) represent changes in % levels between any two contiguous accident years. For example, the changes in % (force of) level from accident years 1974 to 1975 is -17.0% $\pm$ 3.20%. The Table gives all the % changes between any two contiguous accident years. The T-ratios measure the significance of the trends.

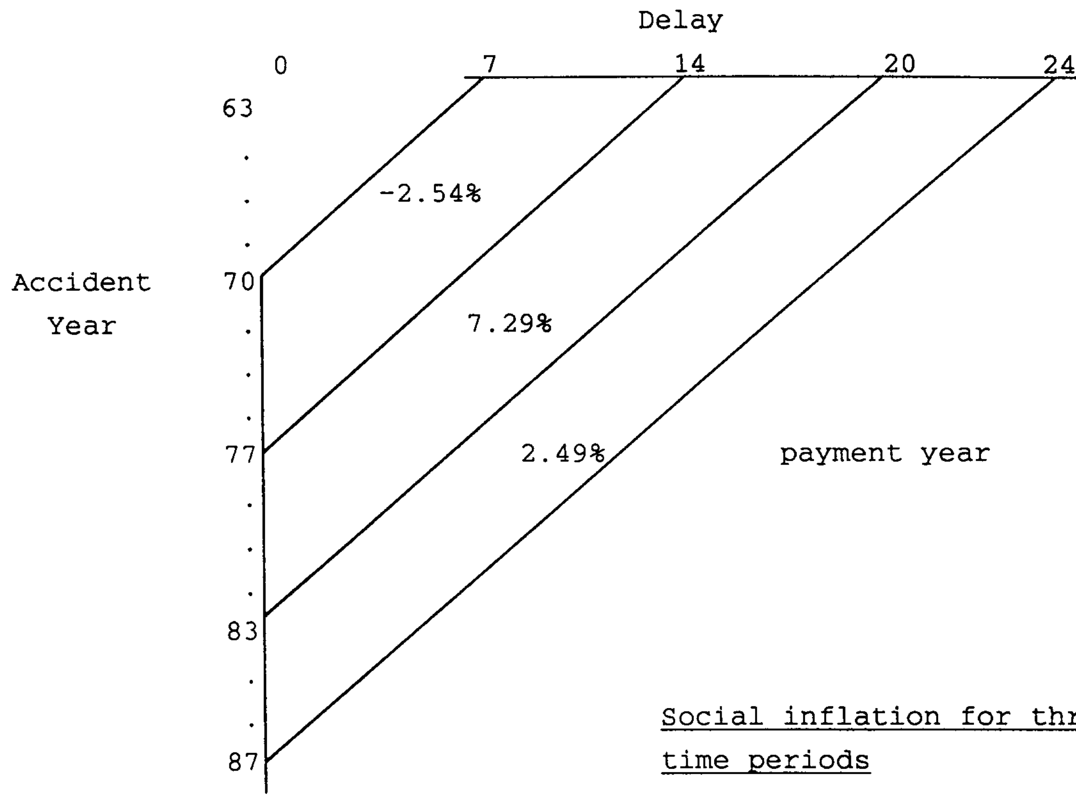
Appendix D3

Here we present the three different payment year inflation estimates:

1971 - 1977	-2.54% $\pm$ 0.72%
1977 - 1983	7.29% $\pm$ 0.69%
1983 - 1987	2.49% $\pm$ 0.81%

The T-ratios corresponding to the difference in iotas (inflation rates) measure the significance of the changes. Changes from 1977 to 1978 and 1983 to 1984 are both significant.

We also tested formally the hypothesis that inflation rates change between 1976 to 1977. The hypothesis was rejected.



<u>Social inflation for three time periods</u>

If we want to compute the trend, say, from an observation corresponding to accident year 1978, delay 3, to accident year 1979, delay 4, we compute it as follows:

(i) inflation is 7.2% (±0.69%) (See Appendix D3);

(ii) trend from accident year 1978 to 1979 (see Appendix D2) is 3.8% (± 3.45%). Therefore total trend is 11% (± approximately 4.14%)

For the same accident years, but delay 6, the payment year inflation is 2.49%.

Appendix D4

Here we present some additional regression output.

Explanations

--- R-squared denotes the proportion of the variation in the data explained by the model. It is also the square of the correlation between observed and expected;

--- S-squared is the mean square error and S is the root mean square error.

Appendices D5 and D6

If the estimated model captures all the structure (systematic components) in the data, then the observed 'payments' should be distributed randomly about the estimated (fitted) surface. We present residuals (observed - predicted) in the three directions delay, accident year and payment year. The plots against accident year and payment year look great. The one against delay is not too good, especially at delay 2. However, (i) since S-squared = 0.0079, all the observations are very close to the estimated surface, and (ii) the residuals at delay 2 for the most recent payment years are very close to zero.

Appendix D7

This appendix presents:

(i) each observed inflation adjusted payment (OBS);
(ii) each expected model payment (EXP);
(iii) forecasts for each accident year subdivided according to development year (right side of stair-case corresponding to

EXP row);

(iv) standard errors of each individual forecast (below each forecast);

(v) total forecast (outstanding) for each accident year and associated standard error (right hand column);

(vi) total forecast (payment) to be made in each future payment year in respect of all the accident years and associated standard errors (bottom row);

(vii) total outstanding with associated standard error (bottom right hand corner).

The second page of this Table should be juxtaposed at the right of the first page.

Recall that you need to ignore development years 0 and 1 and the observation 1963, delay 13. Forecasts are based on an assumed future (superimposed) social inflation of 2.49% ± 0.81%.

<u>The forecast for accident year 1987 delay 1 is incorrect</u>. See discussion below.

Note that the quality of fit is very high and that the variation in the observed payments is mirrored in the forecasts.

For example, the forecast for accident year 1980, delay 9, is slightly less than that for accident year 1979, delay 9, although payment year inflation is at 2.49%. This is because from accident year 1979 to accident year 1980, there is a <u>downward</u> trend of 10.5% (± 4.55%) in the normalised payments. This kind of behaviour is also in the data (see Appendix A7). The forecast standard errors are of paramount importance. They incorporate all the uncertainties in the parameter estimates <u>including</u> the standard error associated with future superimposed inflation. (There is <u>no</u> need to produce forecasts based on different future superimposed inflation scenarios.)

Appendix D8

Here we present a quality of fit table comparing the original inflation adjusted payments with the model expected payments. For each accident year and for each payment year, we compute the ratio of the difference in total observed and total expected to the total expected. The quality of fit is high.

Adjustment to forecast for accident year 1987, delay 1.

Since we are not using any of the data in development year 1, we need to adjust the forecast for 1987, delay 1, as follows:

Standardised residual squared for accident year 1986, delay 1
= 45.075749 .
Therefore, standardised residual = 6.7138 .
Therefore, residual = 6.7138 * S (S=0.0891)
= 0.5982

Adjusted forecast = 51456 * exp(0.5982) = 93590 .

Adjusted standard error = 6273 * exp(0.5982) = 11410 .

Based on the normalised payments (Appendix B7) there is no trend in the last two accident years.

Therefore, total for payment year 1988 = 281974 .
Total for accident year 1987 = 513351 .

Total outstanding for all years = 2733829 .
Standard error of total = 177565 .
The forecast (standard) error = 6.5% of forecast.

(All the above payments are in $000's).

The Table below presents the outstandings for each accident year, and payments to be made in each future payment year required for future cash flow planning.

TABLE 4.1

OUTSTANDING RESERVES

(Payments are in $000's)

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1964	1919	1988	281974
1965	4090	1989	207808
1966	7042	1990	187743
1967	10403	1991	173282
1968	14148	1992	162017
1969	19030	1993	152759
1970	21589	1994	144711
1971	27729	1995	137891
1972	34167	1996	131548
1973	45196	1997	125546
1974	62296	1998	119349
1975	60566	1999	112430
1976	72866	2000	106494
1977	85836	2001	100304
1978	102386	2002	93852
1979	122071	2003	86943
1980	129113	2004	79454
1981	136391	2005	72193
1982	146642	2006	65139
1983	173562	2007	58142
1984	237807	2008	50464
1985	323621	2009	40657
1986	382011	2010	28269
1987	513351	2011	14859
TOTAL	2733829		2733829

The payments are extracted from Appendix D7.

5. COMPARISON WITH UNADJUSTED INCREMENTAL PAID LOSSES

A separate analysis was conducted of the unadjusted (for economic inflation) normalised payments.

Appendix E1 presents the payment year inflation estimates. The Table below presents inflation estimates based on the two separate analyses and also gives the inflation rates (based on wages) used to adjust the data.

Column (5) estimates are taken from Appendix E1 and represent model estimates of inflation based on the unadjusted normalised payments. These estimates are very close to those obtained in column (4).

TABLE

Payment years (1)	Average wage inflation(%) (2)	Estimated social inflation(%) (3)	Sum of Economic and estimated social (%) (4)=(2)+(3)	Estimated (social plus economic)(%) (5)
1971-77	6.29	-2.54 (±0.72)	3.75	3.87 (± 0.70)
1978-83	6.64	7.29 (±0.72)	13.93	14.15 (± 0.68)
1984-87	3.53	2.49 (±0.81)	6.02	5.44 (± 0.79)

A separate analysis was also conducted of the inflation adjusted (non-normalised) incremental paid losses array given in Appendix A6. Estimates of superimposed (social) inflation were different to those derived from the corresponding normalised payments, since these also incorporated the trend in exposures. However, forecasts were the same.

6. RESERVES AND OUTSTANDINGS

We have analysed the inflation adjusted data and accordingly our forecasts are <u>not</u> inflated according to future inflation in the economy, nor are they discounted for investment return.

Inflation rates based on AWE (Average Weekly Earnings) have been:

1987	3.3%
1986	2.4%
1985	4.3%
1984	4.2% .

Average inflation in the economy has been 3.53% in the last four years.

It is not terribly important to be able to forecast the future inflation in the economy since the technique of immunisation or matching can be used to hedge against fluctuations in (economic) inflation.

Table 4.1 presents forecasts based on 2.49% social inflation with no allowance for either future inflation in economy or investment return.

We also produce forecasting tables for the following cases:

(a) future economic inflation 3.5% (Appendix F1);
(b) future economic inflation of 3.5% and future investment return of 9% (Appendix F2);
(c) future investment return of 9% (Appendix F3).

In actual fact, the future liabilities should be discounted for what may be the difference between investment return and inflation in the economy.

The three Tables below are reproduced from Appendices F1-F3.

TABLE 6.1

OUTSTANDING RESERVES BASED ON 3.5%
FUTURE ECONOMIC INFLATION

(Payments in $M's)

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1964	2	1988	287
1965	4	1989	219
1966	7	1990	205
1967	11	1991	195
1968	15	1992	189
1969	21	1993	185
1970	24	1994	181
1971	32	1995	178
1972	40	1996	176
1973	54	1997	174
1974	76	1998	171
1975	75	1999	167
1976	92	2000	164
1977	110	2001	160
1978	133	2002	155
1979	162	2003	148
1980	174	2004	140
1981	186	2005	132
1982	203	2006	123
1983	244	2007	114
1984	338	2008	102
1985	465	2009	85
1986	552	2010	61
1987	723	2011	33
TOTAL	3744		3744

TABLE 6.2

OUTSTANDING RESERVES BASED ON 3.5%
FUTURE ECONOMIC INFLATION AND 9%
INVESTMENT RETURN

(Payments in $M's)

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1964	2	1988	287
1965	4	1989	192
1966	7	1990	165
1967	9	1991	145
1968	12	1992	128
1969	16	1993	115
1970	18	1994	103
1971	23	1995	94
1972	27	1996	85
1973	35	1997	77
1974	48	1998	69
1975	45	1999	62
1976	53	2000	56
1977	61	2001	50
1978	72	2002	44
1979	84	2003	39
1980	87	2004	34
1981	91	2005	29
1982	96	2006	25
1983	112	2007	21
1984	152	2008	17
1985	206	2009	13
1986	244	2010	9
1987	348	2011	4
TOTAL	1853		1853

TABLE 6.3

OUTSTANDING RESERVES BASED ON
9% INVESTMENT RETURN

(Payments in $M's)

ACCI YEAR	FORECAST RESERVES	PMNT YEAR	FORECAST RESERVES
1964	2	1988	272
1965	4	1989	183
1966	6	1990	151
1967	9	1991	128
1968	11	1992	110
1969	15	1993	95
1970	16	1994	83
1971	20	1995	72
1972	24	1996	63
1973	30	1997	55
1974	40	1998	48
1975	38	1999	42
1976	44	2000	36
1977	50	2001	31
1978	58	2002	27
1979	68	2003	23
1980	70	2004	19
1981	72	2005	16
1982	76	2006	13
1983	88	2007	11
1984	119	2008	9
1985	162	2009	6
1986	192	2010	4
1987	285	2011	2
TOTAL	1500		1500

Forecasts beyond development year 24

Payments made 25 years subsequent to occurrence of accident represent 2% to 3% of the total payments made in the first 25 years. In respect of this long tail, the discounted (at 9%) value is at most $20M. This is incorporated in the standard error, in any case.

7. SUMMARY AND CONCLUSIONS

In view of the scientific framework in which the analysis was conducted, results based on the inflation adjusted payments are consistent with results based on the (unadjusted) payments.

Superimposed (social) force of inflation in the three periods are:

Payment years	Inflation
1971 - 1977	-2.54% (± 0.72%)
1978 - 1983	7.29% (± 0.72%)
1984 - 1987	2.49% (± 0.81%)

Within each period, development factors are homogeneous across accident years. However, there are substantial changes in trends across accident years. Moreover, the payments in the tail increase slightly.

The adaptive property of the model allows us to separate changing payment year trends from changing accident year trends - no other model can do that! The fact that results based on unadjusted payments are consistent with results based on adjusted payments provides ample evidence that the model captures whatever systematic structures there exist in the data.

The estimated model explains the payments process extremely well (only 9 parameters) and presents an incredibly high quality fit. Moreover, the adaptive nature of the model facilitates the pooling of information across years resulting in reduced forecast standard error of only around 6%.

It is important to add a margin to the mean forecast based on the standard error. For example, if the reserve is computed as mean forecast + 1 * standard error then the probability that the eventual payout exceeds the reserve is 17%. Without the margin the probability is 50%.

MEDICAL PAYMENTS ($000's) CALENDAR YEAR OF PAYMENT

DEVEL YEAR	79	80	81	82	83	84	85	86	87
1	33623	34305	38363	43325	43247	51686	53746	53470	60199
2	33364	37525	38761	41358	41501	49843	61979	75914	84574
3	9358	11267	14911	15654	16568	16958	19625	26333	32646
4	6431	6535	8886	11396	11952	12386	13481	15391	19002
5	4600	5672	6590	8618	10491	10918	11018	11670	13062
6	4621	4299	5747	6923	8313	10478	10550	10617	11372
7	3578	4575	4869	6220	7207	7984	10251	10599	10758
8	2884	3467	5222	5477	6645	6604	8214	9962	9925
9	2396	2897	3820	5795	5669	6671	7285	8529	9831
10	2089	2408	3333	4502	6107	5833	6601	7202	8201
11	2043	2132	2626	3810	5039	6272	5760	6484	7045
12	1849	1987	2233	3025	4040	4218	6095	6117	6729
13	1840	2053	2606	2679	3120	3688	4431	6180	5847
14	1584	1735	2172	2848	2678	3177	4032	4787	6055
15	1120	1582	2060	2482	3204	2694	3301	3992	4802
16	1114	1227	1698	2440	2540	3065	2591	3411	3957
17	1240	1216	1318	1965	2489	2697	3383	2697	3394
18	997	1182	1340	1524	2013	2538	2698	3512	2926
19	854	1121	1341	1520	1607	1962	2641	2610	3474
20	883	1000	1312	1465	1916	1520	2235	2576	2666
21	828	888	1033	1304	1766	1587	1560	2024	2750
22	547	820	1137	1294	1579	1550	1748	1690	1945
23	536	691	965	1214	1325	1400	1700	1612	1613
24	506	554	623	994	1104	1378	1376	1814	1528
25	254	591	633	690	1163	1162	1371	1392	1844
26	332	250	743	692	696	1032	1317	1455	1392
27	332	338	402	794	683	600	999	1249	1352
28	347	377	390	356	816	647	618	1023	1140
29	251	347	422	450	400	779	702	782	990
30	140	353	299	424	376	397	810	641	754
31	177	139	309	308	506	514	390	754	671
32	142	188	147	368	352	366	500	416	804
33	73	113	192	130	288	338	442	455	330
34	135	64	131	191	125	359	270	473	392
35	62	162	60	142	257	173	298	256	414
36	85	64	173	81	195	303	115	414	227
37	69	86	73	188	60	184	269	115	326
38	52	58	46	79	226	54	154	299	152
39	34	48	74	34	58	333	54	161	247
40	16	36	65	61	149	54	291	58	198
41	69	13	27	91	24	32	53	278	83
42	0	60	11	14	66	45	53	43	310
43	23	1	11	6	41	62	73	32	63
44	2	37	1	54	6	32	49	83	35
45	32	1	27	0	8	5	49	33	74
46	16	13	7	30	0	10	5	63	32
47	4	13	15	0	31	1	1	6	48
48	0	2	2	15	29	30	1	1	5
49	0	0	0	0	16	20	6	0	6
50	9	0	0	0	2	40	16	0	0
51	3	3	0	0	0	0	32	38	0
52	4	5	3	0	0	0	0	20	17
53	2	4	4	3	1	0	0	0	28
54	3	34	1	6	4	0	0	0	0
55	0	11	3	4	6	3	0	0	0
56	9	0	4	2	22	7	4	0	0
57	0	11	0	5	2	5	6	4	0
58	1	1	18	0	0	7	0	1	0
59	15	0	0	7	0	0	2	0	1
60	20	17	2	0	0	0	0	1	0
TOTAL	121598	134578	157259	183057	198728	224701	255251	289739	326236

CUMULATIVE PAYMENTS ($MM)

EVALUATION DATE

DEVEL YEAR	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
1	10.72	11.00	13.14	13.84	15.32	16.15	19.28	17.25	20.85	22.25	23.13	30.93	33.62	34.31	38.36	43.33	43.25	51.69	53.75	53.47	60.20
2	18.27	17.60	19.92	23.99	24.89	26.56	29.48	33.52	38.14	38.69	44.02	48.93	64.29	71.15	73.07	79.72	84.53	93.09	113.67	129.66	138.04
3	18.91	22.04	21.07	23.24	27.99	28.84	30.61	33.89	39.33	45.77	45.20	51.42	58.29	75.56	86.06	88.72	96.29	101.78	112.72	140.00	162.31
4	19.02	20.32	22.54	22.98	25.40	30.73	31.52	33.54	37.33	43.18	50.72	49.87	57.85	64.82	84.45	97.46	100.67	109.12	115.27	128.11	159.00
5	19.53	20.50	21.55	23.94	24.62	27.43	32.91	33.67	36.22	40.49	46.62	54.99	54.47	63.52	71.41	93.07	107.95	111.59	120.14	126.94	141.17
6	19.04	19.72	21.21	22.73	25.28	26.27	29.27	34.82	35.85	38.42	43.10	49.74	59.61	58.77	69.27	78.36	101.38	118.42	122.14	130.76	138.31
7	18.95	20.01	20.53	22.25	23.75	26.56	27.74	30.93	36.86	37.67	40.73	45.67	53.32	64.19	63.64	75.49	85.54	109.36	128.68	132.74	141.52
8	20.57	19.89	20.63	21.52	23.22	24.93	27.91	29.12	32.61	38.46	39.55	42.76	48.55	56.79	69.41	69.12	82.14	92.15	117.58	138.64	142.66
9	20.59	21.59	20.45	21.42	22.46	24.23	26.03	29.17	30.49	34.14	40.33	41.23	45.16	51.45	60.61	75.20	74.78	88.81	99.43	126.11	148.47
10	18.52	21.29	22.13	21.21	22.35	23.46	25.28	27.09	30.36	31.54	35.77	41.96	43.32	47.56	54.78	65.11	81.31	80.62	95.41	106.63	134.31
11	19.49	19.16	21.80	22.81	22.08	23.29	24.44	26.29	28.01	31.47	33.02	37.53	44.00	45.45	50.19	58.59	70.15	87.58	86.38	101.89	113.68
12	19.83	19.86	19.62	22.37	23.58	22.92	24.23	25.39	27.23	28.80	32.61	34.37	39.38	45.99	47.68	53.22	62.63	74.36	93.68	92.49	108.62
13	17.83	20.29	21.26	20.07	23.08	24.30	23.82	25.18	26.26	28.00	29.86	33.72	36.21	41.43	48.60	50.36	56.34	66.32	78.80	99.56	98.34
14	16.84	18.20	20.75	21.66	20.64	23.72	25.08	24.60	26.07	26.62	28.89	30.74	35.30	37.95	43.60	51.44	53.04	59.51	70.35	83.58	105.91
15	17.23	17.16	18.51	21.26	21.16	21.14	24.39	25.80	25.32	26.91	27.52	29.75	31.86	36.89	40.01	46.09	54.65	55.74	62.81	74.35	88.38
16	17.73	17.57	17.44	18.82	21.79	21.64	21.71	25.09	26.54	25.98	27.83	28.50	30.36	33.09	38.58	42.45	48.63	57.71	58.33	66.22	78.30
17	15.59	17.84	17.85	17.74	19.19	22.30	22.11	22.20	25.74	27.18	26.83	28.72	29.74	32.06	34.41	40.55	44.93	51.32	61.10	61.02	69.62
18	12.09	15.84	18.09	18.17	18.13	19.50	22.36	22.54	22.67	26.31	27.36	27.56	29.72	30.92	33.42	35.93	42.56	47.47	54.02	64.61	63.95
19	10.85	12.24	16.03	18.35	18.54	18.44	19.81	23.37	22.99	23.04	26.91	28.59	28.41	30.84	32.26	34.94	37.54	44.52	50.11	56.63	68.08
20	9.81	10.95	12.38	16.24	18.66	18.58	18.80	20.10	23.80	23.37	23.48	27.48	29.47	29.41	32.15	33.73	36.86	39.06	46.76	52.69	59.30
21	8.71	9.91	11.11	12.51	16.47	19.01	19.21	19.13	20.34	23.83	23.77	23.92	28.31	30.36	30.45	33.45	35.49	38.44	40.62	48.78	55.44
22	9.02	8.78	10.04	11.27	12.64	16.72	19.42	19.57	19.41	20.57	24.22	24.18	24.47	29.13	31.50	31.74	35.03	37.04	40.19	42.31	50.73
23	6.48	9.21	8.84	10.15	11.45	12.82	16.99	19.69	19.84	19.62	20.81	24.61	24.72	25.16	30.09	32.71	33.07	36.43	38.74	41.80	43.92
24	6.60	6.55	9.30	8.91	10.27	11.61	12.96	17.19	19.90	20.04	19.87	21.01	25.12	25.27	25.78	31.09	33.82	34.44	37.81	40.56	43.33
25	6.94	6.58	6.62	9.39	8.98	10.38	11.80	13.10	17.33	19.64	20.36	20.14	21.26	25.71	25.90	26.47	32.25	34.98	35.82	39.20	42.40
26	7.03	7.01	6.65	6.66	9.47	9.07	10.49	11.93	13.21	17.44	19.87	20.56	20.47	21.51	26.45	26.60	27.17	33.28	36.30	37.27	40.59
27	5.82	7.10	7.04	6.71	6.71	9.58	9.13	10.57	12.03	13.31	17.56	20.07	20.89	20.81	21.92	27.24	27.28	27.77	34.28	37.54	38.62
28	4.57	5.84	7.16	7.07	6.77	6.75	9.69	9.19	10.63	11.19	13.39	17.68	20.42	21.27	21.20	22.27	28.06	27.93	28.39	35.30	38.68
29	3.70	4.58	5.87	7.21	7.13	6.87	6.79	9.77	9.22	10.68	11.26	13.49	17.93	20.76	21.67	21.65	22.67	28.84	28.63	29.17	36.29
30	3.50	3.70	4.61	5.89	7.29	7.18	6.98	6.84	9.34	9.26	10.75	11.32	13.63	18.28	21.15	22.10	22.03	23.07	29.65	29.27	29.92

EXPOSURE / INVESTMENT DATA

ACC YEAR	LOST-TM COUNT --------- (M)	STATEWIDE AVERAGE WKLY WAGE	INSURED PAYROLL ($B)	PREMIUM @ PRES RATES ($MM)	INVEST INCOME ROR
87	44.1	392.7	39.91	862	7.9%
86	43.2	380.3	37.25	828	8.0%
85	42.3	371.5	35.54	813	9.1%
84	39.6	356.1	33.25	774	10.2%
83	33.1	341.7	30.99	702	9.5%
82	32.8	327.2	30.04	698	10.1%
81	36.3	310.2	29.94	737	10.1%
80	38.5	285.3	28.19	738	9.4%
79	43.8	265.6	26.46	754	9.1%
78	41.8	247.2	25.48	718	8.2%
77	40.0	232.2	22.71	657	7.3%
76	38.5	215.8	21.43		
75	36.7	197.8	19.89		
74	41.4	185.9	19.38		
73	38.5	175.4	17.83		
72	32.7	164.5	16.25		
71	30.9	159.8	15.23		
70	32.1	151.5	15.20		
69	34.5	146.2	14.96		
68	32.2	137.4	13.67		
67	31.4	128.6	12.86		
66	32.7	125.3	12.33		
65	31.4	120.1	11.18		
64	30.3	115.6	10.29		
63	30.5	110.4	9.42		
62	30.6	107.4	9.15		
61	30.1	103.6	8.74		
60	32.4	101.7	8.97		
59	32.4				
58	28.0				
57	32.5				
56	35.5				
55	35.0				
54	31.6				
53	32.4				

APPENDIX A4

INCREMENTAL PAID LOSSES ($ 000'S)

DELAY

ACC. YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1963						190	810	990	940	1000	980	950	870	360	900	980	1240	1180	1340	1470	1760	1550	1700	1820	1840
1964					1480	710	1040	970	1010	1050	1010	940	770	890	860	1110	1220	1340	1520	1920	1580	1750	1610	1530	
1965				1910	730	1180	1020	1180	1100	1060	920	790	1060	880	1120	1230	1320	1520	1610	1520	1560	1690	1610		
1966			3770	500	1400	1340	1280	1350	1250	1190	1110	1140	1110	1580	1590	1690	1970	2010	1960	2240	2020	1950			
1967		6880	3470	1910	1640	1650	1470	1380	1370	1050	1480	1350	1840	1740	2060	2440	2480	2540	2640	2580	2750				
1958	11000	8920	3320	2160	2030	1840	1660	1680	1530	1630	1760	1850	2050	2170	2490	2540	2690	2700	2610	2670					
1969	13140	10850	4000	2740	2180	1910	2040	1600	1870	1630	2040	1990	2610	2840	3210	3060	3390	3510	3470						
1970	13840	11050	3950	2680	2150	2180	1820	1880	1580	2090	2130	2230	2680	2680	2700	2590	2690	2930							
1971	15320	11240	4050	2930	2680	2200	2310	2030	2400	2400	2630	3030	3120	3170	3300	3410	3400								
1972	16150	13330	4410	3440	3160	2610	2570	2880	2900	3330	3810	4040	3690	4030	4000	3950									
1973	19280	14240	5810	3850	3440	3120	3580	3470	3820	4500	5040	4210	4440	4780	4800										
1974	17250	20890	7630	4950	4270	4620	4580	5220	5790	6110	6270	6100	6180	6050											
1975	20850	17840	5510	4670	4600	4300	4870	5480	5650	5840	5760	6110	5850												
1976	22250	21770	7400	6430	5670	5750	6220	6650	6670	6500	6480	6730													
1977	23130	25800	9360	6530	6590	6930	7200	6610	7280	7200	7050														
1978	30930	33360	11270	8890	8620	8310	7980	8220	8530	8200															
1979	33620	37530	14910	11400	10490	10470	10260	9960	9830																
1980	34310	38760	15650	11950	10920	10550	10600	9920																	
1981	38360	41360	16570	12830	11020	10620	10760																		
1982	43330	41500	16950	13490	11670	11370																			
1983	43250	49840	19630	15390	13060																				
1984	51690	61980	26330	19000																					
1985	53750	75910	32650																						
1986	53479	84570																							
1987	60200																								

PMNT YEAR	INFLATION FACTORS
1968	2.8580
1969	2.6860
1970	2.5920
1971	2.4570
1972	2.3870
1973	2.2390
1974	2.1120
1975	1.9850
1976	1.8200
1977	1.6910
1978	1.5890
1979	1.4790
1980	1.3760
1981	1.2660
1982	1.2000
1983	1.1490
1984	1.1030
1985	1.0570
1986	1.0330
1987	1.0000

INFLATION ADJUSTED DATA ($ 000'S)

DELAY

ACC. YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1963						543	2175	2566	2309	2387	2194	2006	1726	655	1521	1557	1833	1623	1696	1764	2022	1709	1796	1880	1840
1964					4229	1907	2695	2383	2410	2350	2133	1865	1401	1504	1366	1641	1678	1696	1824	2206	1742	1849	1663	1530	
1965				5458	1960	3058	2506	2816	2462	2238	1826	1437	1792	1398	1656	1692	1671	1824	1849	1676	1648	1745	1610		
1966			10774	1343	3628	3292	3055	3022	2661	2362	2020	1927	1763	2336	2187	2139	2364	2309	2161	2367	2086	1950			
1967		19663	9320	4950	4029	3938	3291	2914	2719	1911	2502	2145	2721	2394	2607	2928	2849	2801	2790	2665	2750				
1968	31438	23959	8605	5307	4845	4119	3505	3334	2784	2756	2796	2736	2820	2747	2988	2918	2967	2853	2695	2670					
1969	35294	28123	9828	6540	4881	4033	4049	2912	3162	2590	3017	2738	3304	3408	3688	3375	3583	3625	3470						
1970	35873	27149	9428	6000	4540	4327	3312	3179	2669	3091	2930	2823	3216	3079	2978	2737	2778	2930							
1971	37641	26829	9067	6188	5319	4004	3906	3225	3549	3302	3329	3636	3584	3496	3488	3522	3400								
1972	38550	29845	9313	6828	5751	4413	4083	4259	3990	4215	4572	4641	4070	4259	4132	3950									
1973	43167	30074	11532	7007	5817	4957	5294	4774	4836	5400	5790	4643	4693	4937	4800										
1974	36432	41466	13886	8370	6785	6832	6302	6608	6948	7020	6915	6447	6383	6050											
1975	41387	32468	11008	7420	6803	5916	6165	6576	6503	6441	6088	6311	5850												
1976	40495	36813	11758	9509	7801	7279	7464	7640	7357	6976	6693	6730													
1977	39112	40996	13843	8985	8342	8316	8272	7290	7694	7437	7050														
1978	49147	49339	15507	11254	10344	9548	8801	8688	8811	8200															
1979	49723	51641	18876	13680	12053	11548	10844	10288	9830																
1980	47210	49070	18780	13730	12044	11151	10949	9920																	
1981	48563	49632	19038	14151	11648	10970	10760																		
1982	51996	47683	18695	14258	12055	11370																			
1983	49694	54973	20748	15897	13060																				
1984	57014	65512	27198	19000																					
1985	56813	78415	32650																						
1986	55234	84570																							
1987	60200																								

NORMALISED DATA

DELAY

ACC. YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1963						57	230	272	245	253	232	212	183	59	161	165	194	172	180	187	214	181	190	199	195
1964					411	185	261	231	234	228	207	181	136	146	132	159	163	164	177	214	169	179	161	148	
1965				488	175	273	224	251	220	200	163	128	160	125	148	151	149	163	165	149	147	156	144		
1966			873	108	294	267	247	245	215	191	163	156	143	189	177	173	191	187	175	192	169	158			
1967		1529	724	384	313	306	255	226	211	148	194	166	211	186	202	227	221	217	216	207	213				
1968	2299	1752	629	388	354	301	256	243	203	201	204	200	206	200	218	213	217	208	197	195					
1969	2359	1879	556	437	326	269	270	194	211	173	201	183	220	227	246	225	239	242	231						
1970	2360	1786	620	394	298	284	217	209	175	203	192	185	211	202	195	180	182	192							
1971	2471	1761	595	406	349	262	256	211	233	216	218	238	235	229	229	231	223								
1972	2372	1836	573	420	353	271	251	262	245	259	281	285	250	262	254	243									
1973	2421	1686	546	392	326	278	296	267	271	302	324	260	263	276	269										
1974	1879	2139	716	431	350	352	325	340	358	362	356	332	329	312											
1975	2080	1632	553	373	342	297	309	330	326	323	306	317	294												
1976	1889	1717	548	443	364	339	348	356	343	325	312	314													
1977	1722	1805	609	395	367	366	364	321	338	327	310														
1978	1928	1936	608	441	405	374	345	340	345	321															
1979	1879	1951	713	517	455	436	409	388	371																
1980	1674	1740	566	487	427	395	388	351																	
1981	1622	1657	635	472	389	366	359																		
1982	1730	1587	622	474	401	378																			
1983	1603	1773	669	513	421																				
1984	1714	1970	818	571																					
1985	1598	2206	918																						
1986	1482	2270																							
1987	1508																								

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    NORMALISED DATA VS. DELAY FOR ACCIDENT YEAR 1968
2300.+   *
     -
     -
     -
     -
1774.+     *
     -
     -
     -
     -
1248.+
     -
     -
     -
     -
 721.+
     -       *
     -
     -         * *
     -             * *
 195.+                 * * * * * * * * * * * * *
      ---+---------+---------+---------+---------+---------+
        0.0       5.0      10.0      15.0      20.0      25.0
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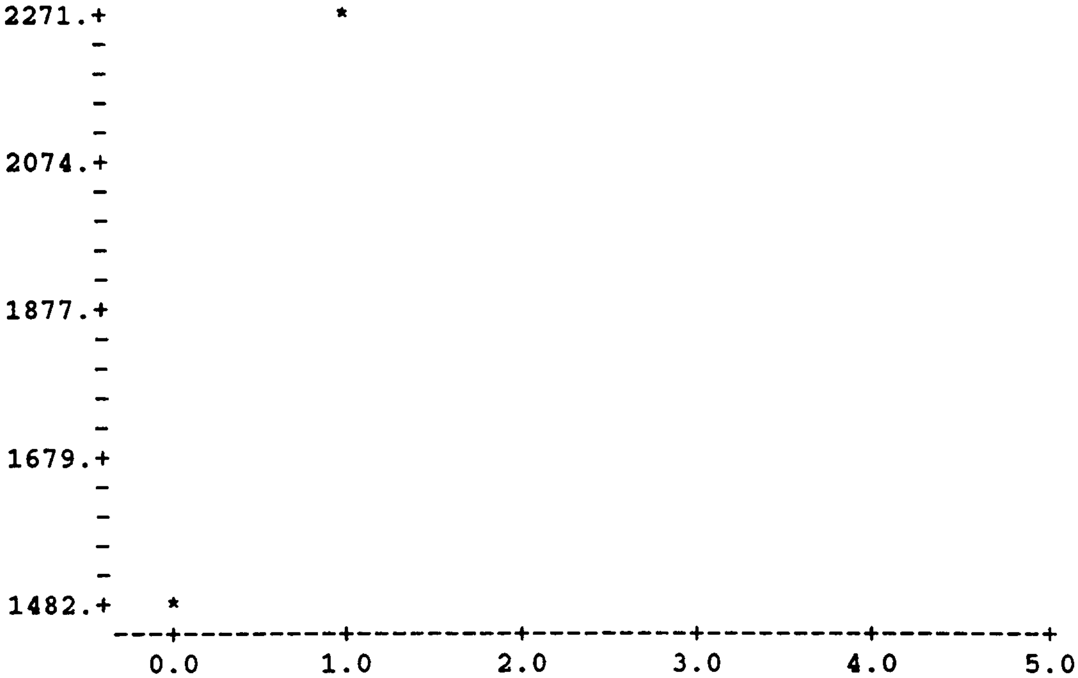
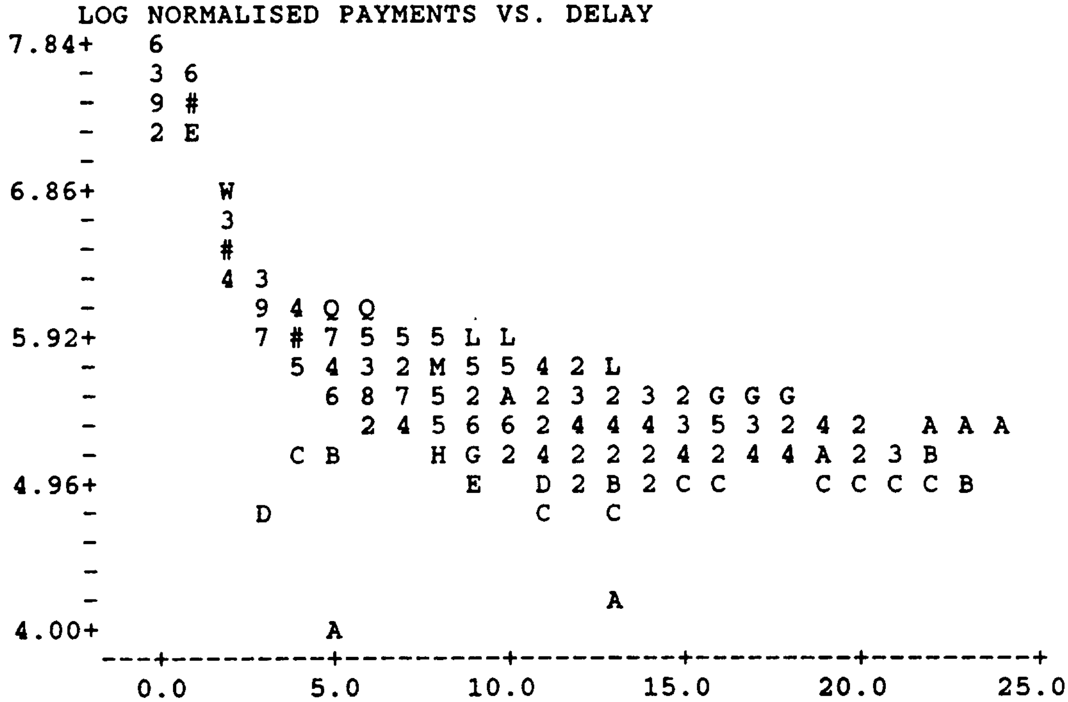
    NORMALISED DATA VS. DELAY FOR ACCIDENT YEARS 1976-1977
1890.+   N
     -      O
     -   O  N
     -
     -
1495.+
     -
     -
     -
     -
1100.+
     -
     -
     -
     -
 705.+
     -         O
     -         N
     -            N
     -            O  2  O  O  N
 310.+                  N  N  O  2  2  2  N
      ---+--------+--------+--------+--------+--------+-----
        0.0      3.0      6.0      9.0     12.0     15.0
```

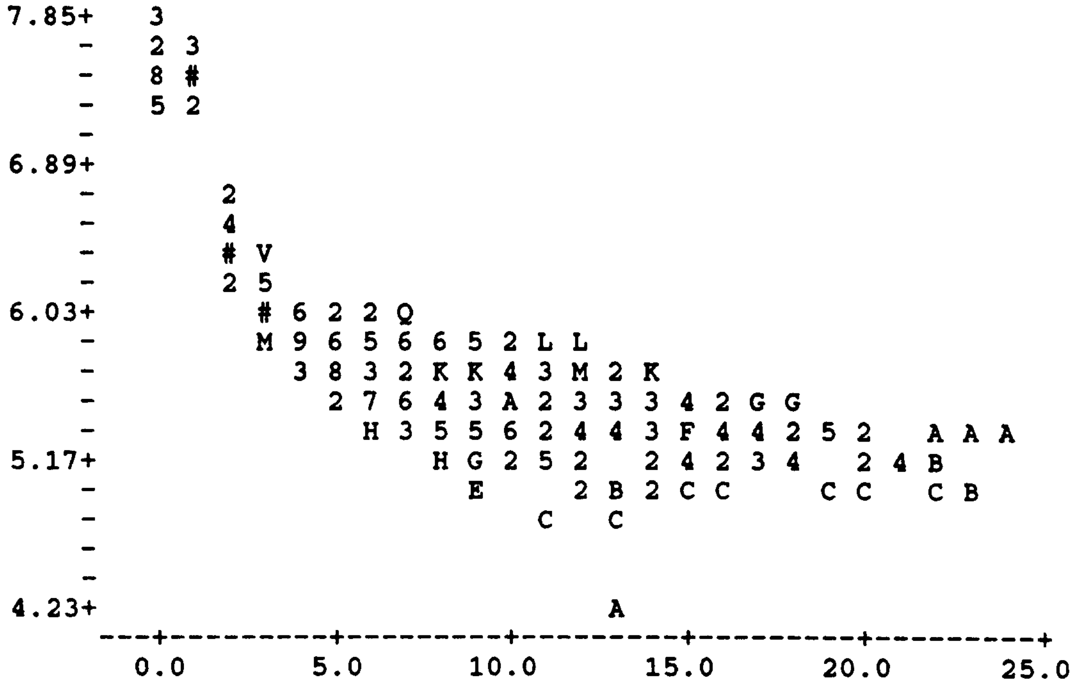
NORMALISED DATA VS. DELAY FOR ACCIDENT YEAR 1986



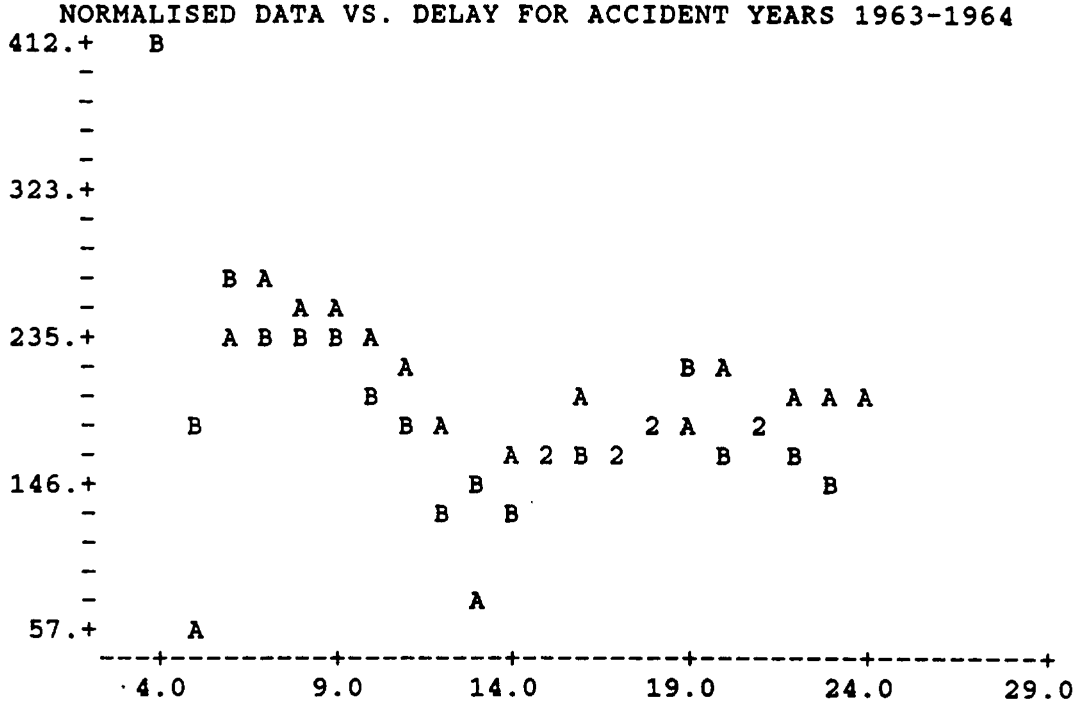
LOG NORMALISED PAYMENTS VS. DELAY



LOG NORMALISED PAYMENTS VS. DELAY



NORMALISED DATA VS. DELAY FOR ACCIDENT YEARS 1963-1964



NORMALISED DATA

DELAY

ACC. YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12
1963								272	245	253	232	212	183
1964							261	231	234	228	207	181	136
1965						273	224	251	220	200	163	128	160
1966					294	267	247	245	215	191	163	156	143
1967				384	313	306	255	226	211	148	194	166	211
1968			629	388	354	301	256	243	203	201	204	200	206
1969		1879	656	437	326	269	270	194	211	173	201	183	220
1970	2360	1786	620	394	298	284	217	209	175	203	192	185	211
1971	2471	1761	595	406	349	262	256	211	233	216	218	238	235
1972	2372	1836	573	420	353	271	251	262	245	259	281	285	250
1973	2421	1686	646	392	326	278	296	267	271	302	324	260	263
1974	1879	2139	716	431	350	352	325	340	358	362	356	332	329
1975	2080	1632	553	373	342	297	309	330	326	323	306	317	294
1976	1889	1717	548	443	364	339	348	356	343	325	312	314	
1977	1722	1805	609	395	367	366	364	321	338	327	310		
1978	1928	1936	608	441	405	374	345	340	345	321			
1979	1879	1951	713	517	455	436	409	388	371				
1980	1674	1740	666	487	427	395	388	351					
1981	1622	1657	635	472	389	366	359						
1982	1730	1587	622	474	401	378							
1983	1603	1773	669	513	421								
1984	1714	1970	818	571									
1985	1598	2206	918										
1986	1482	2270											
1987	1508												

ACC. YEAR	13	14	15	16	17	18	19	20	21	22	23	24
1963	69	161	165	194	172	180	187	214	181	190	199	195
1964	146	132	159	163	164	177	214	169	179	161	148	
1965	125	148	151	149	163	165	149	147	156	144		
1966	189	177	173	191	187	175	192	169	158			
1967	186	202	227	221	217	216	207	213				
1968	200	218	213	217	208	197	195					
1969	227	246	225	239	242	231						
1970	202	195	180	182	192							
1971	229	229	231	223								
1972	262	254	243									
1973	276	269										
1974	312											

REGRESSION TABLE

PARAMETER ESTIMATES

ACCI YEAR	ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1963	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1964	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1965	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1966	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1967	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1968	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1969	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1970	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1971	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1972	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1973	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1974	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1975	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1976	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1977	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1978	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1979	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1980	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1981	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1982	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1983	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1984	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1985	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1986	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54
1987	7.055	0.0766	92.05	-0.904	0.0569	-15.89	0.021	0.0060	3.54

PARAMETER ESTIMATES

PMNT YEAR	IOTA	S.E.	T-RATIO	DIFFERENCE IN IOTA	S.E.	T-RATIO
1971	0.0325	0.0020	15.85			
1972	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1973	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1974	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1975	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1976	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1977	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1978	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1979	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1980	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1981	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1982	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1983	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1984	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1985	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1986	0.0325	0.0020	15.85	0.0000	0.0000	0.00
1987	0.0325	0.0020	15.85	0.0000	0.0000	0.00

W E I G H T E D   R E S I D U A L   D I S P L A Y S

```
WEIGHTED STANDARDISED RESIDUALS VS. DELAY
 2.5+       2
    -                     2 L
    -       L         A       L L
    -       H           2   2     L
    -       K                 M                 B A
 1.2+       2             3   2   K G E G G
    -         G F   B 4 4 N 3 N M J K   2 E
    -       2 E   E Q 2 2 O 2   K G 2 G F   2 A E     A
    -       V F   3 O D C P   K 5   E 3   F A E     A   A
    -       O 3 2 2 6 P   J   I F I I   2 A B D   A
-0.1+   # # 3 2 4   2 3 2 C   B   3   A   D F     B
    -       N     4 3 3 2   2 F H 2 2     B   F B
    -       2 3 3 2 S   I 2 2       H 2 B H 2
    -       T 2 3   I   2 I               C     D   B
    -         2 2 4 J     H 2 G C     H H
-1.3+         2 U 2         D 2   B C C C     C   2
    -         O 2   H 2       D                 C     B
    -                 G   G     B   B               C
    -                           D
    -                   H
-2.6+                     E   C   C
     ---+---------+---------+---------+---------+---------+
       0.0       5.0      10.0      15.0      20.0      25.0
```

```
WEIGHTED STANDARDISED RESIDUALS VS. PAYMENT YEARS
 2.5+   F G
    -       A                     L L
    -   A           L                 L L
    -     A H A                 L K       L
    -             K               2     M
 1.2+         2 A               2 2 M G 2 W
    -   B   4             A   L J 3 2 3 2 4
    -   E B E   2             Q 4   2 4 4 3
    -   C F   3   A       E   3   3 3 2 3 3
    -     2 D 2 I 2       2 3 J 4 Q 2 3 R I
-0.1+   3 2 2 3 5 5 4 4 3 4 3 4 4 3 3 3 3 3
    -     C     E 2   2 2 2 4 2 2 2 2 R   F
    -           G D K F L 4 B 3 P 2 3 U   3
    -           H   F 3     2 P C R T   2
    -             C I 2 J 2 2 O     S H 3 T
-1.3+               D B 3 C 2 2     C T C 2
    -               H 2 I   O         2 T B
    -               2   2                 C
    -                   D
    -                   H
-2.6+               2   C
     ---+---------+---------+---------+---------+---------+
      70.0      75.0      80.0      85.0      90.0      95.0
```

REGRESSION TABLE

PARAMETER ESTIMATES

ACCI YEAR	ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1963	7.309	0.0645	113.37	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1964	7.258	0.0624	116.34	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1965	7.217	0.0600	120.33	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1966	7.235	0.0574	126.09	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1967	7.273	0.0545	133.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1968	7.273	0.0545	133.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1969	7.273	0.0545	133.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1970	7.204	0.0553	130.29	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1971	7.294	0.0550	132.53	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1972	7.294	0.0550	132.53	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1973	7.348	0.0603	121.94	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1974	7.462	0.0626	119.15	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1975	7.292	0.0646	112.84	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1976	7.292	0.0646	112.84	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1977	7.292	0.0646	112.84	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1978	7.251	0.0728	99.61	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1979	7.289	0.0774	94.23	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1980	7.184	0.0842	85.33	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1981	7.081	0.0892	79.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1982	7.053	0.0947	74.45	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1983	7.092	0.1012	70.06	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1984	7.234	0.1096	66.02	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1985	7.366	0.1261	58.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1986	7.366	0.1261	58.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56
1987	7.366	0.1261	58.41	-0.884	0.0377	-23.46	0.018	0.0070	2.56

ALL PARAMETERS ARE SIGNIFICANT

DIFFERENCES IN PARAMETER ESTIMATES

ACCI YEAR	ALPHA	S.E.	T-RATIO	BETA	S.E.	T-RATIO	GAMMA	S.E.	T-RATIO
1964	-0.051	0.0150	-3.41	0.000	0.0000	0.00	0.000	0.0000	0.00
1965	-0.041	0.0148	-2.77	0.000	0.0000	0.00	0.000	0.0000	0.00
1966	0.018	0.0150	1.19	0.000	0.0000	0.00	0.000	0.0000	0.00
1967	0.038	0.0150	2.51	0.000	0.0000	0.00	0.000	0.0000	0.00
1968	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1969	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1970	-0.069	0.0259	-2.65	0.000	0.0000	0.00	0.000	0.0000	0.00
1971	0.090	0.0256	3.50	0.000	0.0000	0.00	0.000	0.0000	0.00
1972	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1973	0.054	0.0304	1.79	0.000	0.0000	0.00	0.000	0.0000	0.00
1974	0.114	0.0352	3.25	0.000	0.0000	0.00	0.000	0.0000	0.00
1975	-0.170	0.0320	-5.31	0.000	0.0000	0.00	0.000	0.0000	0.00
1976	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1977	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1978	-0.041	0.0300	-1.38	0.000	0.0000	0.00	0.000	0.0000	0.00
1979	0.038	0.0345	1.11	0.000	0.0000	0.00	0.000	0.0000	0.00
1980	-0.105	0.0455	-2.31	0.000	0.0000	0.00	0.000	0.0000	0.00
1981	-0.103	0.0509	-2.01	0.000	0.0000	0.00	0.000	0.0000	0.00
1982	-0.028	0.0556	-0.51	0.000	0.0000	0.00	0.000	0.0000	0.00
1983	0.038	0.0620	0.62	0.000	0.0000	0.00	0.000	0.0000	0.00
1984	0.142	0.0714	1.99	0.000	0.0000	0.00	0.000	0.0000	0.00
1985	0.132	0.0917	1.44	0.000	0.0000	0.00	0.000	0.0000	0.00
1986	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00
1987	0.000	0.0000	0.00	0.000	0.0000	0.00	0.000	0.0000	0.00

PARAMETER ESTIMATES

PMNT YEAR	IOTA	S.E.	T-RATIO	DIFFERENCE IN IOTA	S.E.	T-RATIO
1971	-0.0254	0.0072	-3.53			
1972	-0.0254	0.0072	-3.53	0.0000	0.0000	0.00
1973	-0.0254	0.0072	-3.53	0.0000	0.0000	0.00
1974	-0.0254	0.0072	-3.53	0.0000	0.0000	0.00
1975	-0.0254	0.0072	-3.53	0.0000	0.0000	0.00
1976	-0.0254	0.0072	-3.53	0.0000	0.0000	0.00
1977	-0.0254	0.0072	-3.53	0.0000	0.0000	0.00
1978	0.0729	0.0069	10.54	0.0984	0.0067	14.65
1979	0.0729	0.0069	10.54	0.0000	0.0000	0.00
1980	0.0729	0.0069	10.54	0.0000	0.0000	0.00
1981	0.0729	0.0069	10.54	0.0000	0.0000	0.00
1982	0.0729	0.0069	10.54	0.0000	0.0000	0.00
1983	0.0729	0.0069	10.54	0.0000	0.0000	0.00
1984	0.0249	0.0081	3.07	-0.0481	0.0080	-6.04
1985	0.0249	0.0081	3.07	0.0000	0.0000	0.00
1986	0.0249	0.0081	3.07	0.0000	0.0000	0.00
1987	0.0249	0.0081	3.07	0.0000	0.0000	0.00

ALL PARAMETERS ARE SIGNIFICANT

(REGRESSION OUTPUT CONTINUED)

S = 0.0891 S-SQUARED = 0.0079 S-SQUARED(SCI) = 0.0516

S(0) = 0.0891 S(0)-SQUARED = 0.0079 DELTA = 0.0000

R-SQUARED = 94.1 PERCENT N = 260 P = 8.9

AIC = -510.73 AIC(SCI) = -33.64

	ESTIMATED PERCENTAGE CHANGE IN LEVEL	STANDARD ERROR
1963-1987	5.81	16.01
ANNUAL	0.24	0.63

W E I G H T E D   R E S I D U A L   D I S P L A Y S

```
  WEIGHTED STANDARDISED RESIDUALS VS. DELAY
 2.5+       H                           A
    -       L
    -       2                   E
    -                     A A A   D   E       B
    -       M             B B M     G     G     A
 1.2+       3               4 2     A   G   G
    -       3   J     C   2 L   3   F A E E E
    -       4     H 3 3 6 3 2 2 3 2 2   D A A   E     A
    -       3 2 I   2 4 3 4 O L   K 2 2 F     2
    -         2   2   2 3 2 G   H 4   2 B F B D     A   A
-0.1+   # #   2 F 5 3 P 2     2 J A   2   2       B
    -         3 2   2 2 J   2   2 I 2   I   F     A
    -         2 4   4   K   C E   H H C   2   F
    -         2 5 6 2 2   I I K             2   B
    -         2   C L O       2 D       2       D
-1.4+         F   2   2 H           B H             B
    -         E 3 M       G     B                 C
    -         O     C             C           C   D
    -           D                               C
    -                         C                     C B
-2.7+                     E
     ---+---------+---------+---------+---------+---------+
       0.0       5.0      10.0      15.0      20.0      25.0
```

```
  WEIGHTED STANDARDISED RESIDUALS VS. ACCIDENT YEARS
 2.5+   A             H
    -                         L
    -           E   G       K
    -   3 B   D E
    -   A 2         2           2
 1.2+   A       E 2 2   I 2 K     N     Q
    -   2   2   3 2       2   L 2   O             V
    -   3 2 2 2 2 3 4 H   2 K L M 4   2 2 2 2
    -   A B   2 E F 2 H 2 2 2 3 2 N 2 P Q R   T U   W
    -   4 3   2 2 4 G 3   2   L   N O         T
-0.1+   A 2   3 E 3 G 2 6 4 3 2 2 3 2 3 3 3 3 2 3 2 2 2 Y
    -   A   C D 2 F   H 4 J 2 2     O       S 2
    -       3 D E F G 5   J 2   M       Q R     U
    -     3 C D     G   3   2 L M 2 O 3 Q R S     V
    -       2 2     G 2       L M   O P
-1.4+     2   D   F G 2 I   K
    -     B C   2   G         L M   O
    -       3 D                     O
    -       C D
    -     B 2
-2.7+           E
     ---+---------+---------+---------+---------+---------+
      63.0      68.0      73.0      78.0      83.0      88.0
```

```
    WEIGHTED STANDARDISED RESIDUALS VS. PAYMENT YEARS
 2.5+       H             A
    -               L
    -     G       K       E
    -       A A A         D     E B
    -         B B     M           2     2
 1.2+   F     I       2 F     Q J 2   G   2
    -       C   J A J 2 A O     F E 3 E V M
    -       B 2 C 4   G N F 3 3 4 S N 3 7 3
    -       G   D 2   2   B D J 3 3 3 3 3 5
    -   A A   2   2   B   4 2 F 2 F   4   4
-0.1+   2 2 4 2 4 2 4 4 2 4 2 4 4 3 4 5 5 2
    -         E E   D 2   C 2 L   2 3 3 2 I
    -       D G H C 2   2   C 2 2 H 2     3
    -   B B     G   I     2 3 2 2 4 4 S   V
    -   C               2   2 3     O   2
-1.4+     2         G   4             H B
    -   E E         B   2   M O         C
    -     C             C   O       C     D
    -   D                             C
    -               C                     2
-2.7+               E
     ---+---------+---------+---------+---------+---------+
      70.0      75.0      80.0      85.0      90.0      95.0
```

F O R E C A S T I N G   O U T P U T

ASSUMED FUTURE INFLATION =	0.0249
STANDARD ERROR =	0.0081
ESTIMATED PERCENTAGE CHANGE IN LEVEL =	5.81
STANDARD ERROR =	16.01

EXPECTED PAYMENTS/OBSERVED PAYMENTS +--------+ FORECAST MEAN PAYMENTS/STANDARD ERRORS

(PAYMENTS IN $ 000'S)

YEAR														
1963	EXP:								2547	2277	2059	1878	1726	1596
	OBS:								2566	2310	2387	2194	2006	1727
1964	EXP:							2922	2576	2304	2083	1900	1746	1615
	OBS:							2696	2383	2411	2351	2133	1866	1401
1965	EXP:						3430	2970	2619	2342	2117	1932	1775	1641
	OBS:						3059	2506	2817	2463	2239	1826	1438	1792
1966	EXP:					4444	3754	3250	2867	2563	2318	2114	1943	1982
	OBS:					3629	3292	3055	3023	2661	2362	2020	1928	1764
1967	EXP:				5760	4692	3963	3432	3027	2707	2447	2233	2264	2309
	OBS:				4951	4029	3939	3291	2915	2719	1911	2503	2145	2721
1968	EXP:			7757	5969	4862	4107	3556	3136	2805	2536	2553	2588	2640
	OBS:			8605	5307	4846	4120	3506	3335	2785	2756	2797	2736	2821
1969	EXP:		11939	8276	6368	5188	4382	3794	3346	2993	2985	3005	3047	3108
	OBS:		28123	9828	6540	4881	4034	4049	2912	3162	2590	3017	2738	3304
1970	EXP:	20557	11043	7655	5890	4798	4053	3510	3095	3054	3047	3067	3109	3172
	OBS:	35873	27150	9429	6001	4541	4327	3312	3179	2670	3091	2931	2823	3216
1971	EXP:	21958	11795	8177	6291	5126	4329	3749	3648	3600	3591	3615	3665	3739
	OBS:	37641	26830	9068	6188	5320	4004	3906	3226	3550	3302	3330	3636	3585
1972	EXP:	22839	12269	8505	6544	5331	4503	4303	4187	4131	4121	4148	4206	4090
	OBS:	38550	29846	9314	6828	5751	4414	4084	4260	3990	4216	4572	4642	4070
1973	EXP:	25800	13860	9608	7393	6023	5613	5363	5219	5149	5137	5171	4997	4859
	OBS:	43168	30075	11533	7007	5817	4958	5295	4775	4836	5400	5791	4644	4693
1974	EXP:	30646	16463	11413	8782	7894	7357	7029	6840	6749	6733	6459	6242	6069
	OBS:	36432	41467	13887	8370	6785	6833	6302	6609	6948	7020	6916	6448	6384
1975	EXP:	25862	13893	9632	8177	7350	6850	6545	6369	6285	5975	5732	5539	5387
	OBS:	41387	32469	11008	7421	6803	5917	6165	6576	6503	6442	6088	6312	5850
1976	EXP:	27165	14593	11162	9476	8518	7939	7585	7381	6941	6600	6332	6119	5950
	OBS:	40495	36813	11759	9510	7802	7280	7464	7641	7357	6976	6694	6730	552
1977	EXP:	28066	16635	12723	10802	9710	9049	8647	8019	7541	7171	6879	6648	6465
	OBS:	39113	40996	13843	8985	8343	8316	8273	7291	7695	7438	7050	618	609
1978	EXP:	32508	19268	14737	12512	11247	10482	9546	8853	8326	7917	7595	7341	7139
	OBS:	49148	49339	15508	11255	10344	9548	8802	8689	8811	8200	722	707	698
1979	EXP:	37734	22366	17107	14524	13056	11597	10561	9795	9212	8760	8404	8123	7899
	OBS:	49724	51641	18876	13680	12053	11548	10845	10289	9830	842	818	803	795
1980	EXP:	38924	23072	17648	14984	12837	11402	10384	9631	9058	8613	8264	7987	7768
	OBS:	47211	49070	18780	13731	12045	11151	10950	9920	887	854	831	817	809
1981	EXP:	40135	23791	18199	14726	12616	11207	10206	9466	8903	8466	8123	7851	7636
	OBS:	48564	49632	19039	14151	11648	10970	10760	936	890	858	837	823	817
1982	EXP:	42114	24966	18200	14727	12618	11208	10208	9468	8905	8468	8125	7853	7638
	OBS:	51996	47684	18696	14259	12055	11370	1022	958	912	881	859	846	839
1983	EXP:	48575	27444	20008	16190	13872	12322	11223	10409	9791	9311	8933	8635	8398
	OBS:	49694	54974	20749	15898	13060	1261	1160	1088	1037	1001	977	962	954
1984	EXP:	61609	34810	25379	20538	17597	15632	14237	13206	12421	11812	11334	10955	10655
	OBS:	57014	65513	27199	19000	1878	1682	1548	1453	1386	1338	1305	1283	1272
1985	EXP:	77148	43594	31785	25722	22040	19580	17833	16541	15559	14796	14197	13723	13348
	OBS:	56814	78415	32650	3105	2678	2398	2206	2068	1968	1896	1845	1810	1789
1986	EXP:	82895	46843	34155	27641	23685	21041	19165	17777	16722	15903	15260	14751	14347
	OBS:	55235	84570	4124	3354	2898	2601	2396	2250	2145	2070	2016	1981	1960
1987	EXP:	91056	51456	37520	30365	26020	23116	21055	19531	18372	17473	16767	16208	15765
	OBS:	60200	6273	4565	3719	3220	2895	2671	2512	2398	2317	2260	2222	2201
TOT.FOR PMNT YRS:		239840	207808	187743	173282	162017	152759	144711	137891	131548	125546	119349	112430	
STANDARD ERRORS:		11765	9826	9000	8656	8561	8603	8719	8891	9074	9253	9386	9424	

1963	EXP:	1483	1385	1432	1487	1548	1616	1691	1773	1776	1782	1792	1804	0
	OBS:	655	1522	1557	1834	1624	1696	1764	2022	1710	1797	1880	1840	0
1964	EXP:	1501	1546	1599	1660	1728	1804	1888	1887	1890	1896	1906	1919	1919
	OBS:	1505	1367	1642	1679	1696	1824	2206	1743	1850	1663	1530	180	180
1965	EXP:	1683	1734	1794	1861	1938	2023	2018	2017	2020	2027	2038	2052	4090
	OBS:	1398	1656	1692	1671	1824	1850	1677	1649	1746	1610	190	195	285
1966	EXP:	2033	2094	2166	2248	2341	2329	2323	2322	2326	2334	2346	2362	7042
	OBS:	2337	2188	2140	2364	2309	2162	2368	2087	1950	217	222	228	424
1967	EXP:	2368	2440	2524	2619	2599	2586	2579	2578	2582	2592	2605	2623	10403
	OBS:	2394	2608	2928	2850	2802	2790	2665	2750	239	244	250	257	573
1968	EXP:	2708	2790	2886	2854	2832	2818	2811	2810	2815	2825	2840	2859	14148
	OBS:	2747	2988	2918	2967	2854	2696	2670	260	264	270	277	286	743
1969	EXP:	3188	3284	3237	3202	3178	3162	3154	3153	3158	3170	3187	3209	19030
	OBS:	3408	3688	3375	3583	3626	3470	292	297	302	310	319	330	991
1970	EXP:	3254	3195	3149	3115	3091	3076	3068	3067	3073	3084	3100	3122	21589
	OBS:	3079	2978	2738	2779	2930	288	291	296	303	311	320	331	1155
1971	EXP:	3655	3588	3537	3499	3472	3455	3447	3446	3452	3465	3484	3508	27729
	OBS:	3497	3488	3523	3400	322	325	330	337	345	355	366	380	1460
1972	EXP:	3998	3925	3870	3828	3799	3780	3771	3770	3777	3791	3812	3838	34167
	OBS:	4260	4132	3950	356	358	362	368	376	386	398	412	427	1829
1973	EXP:	4749	4663	4597	4548	4514	4491	4481	4480	4488	4505	4530	4562	45196
	OBS:	4938	4800	435	436	439	445	454	465	477	492	509	528	2601
1974	EXP:	5933	5826	5744	5682	5639	5612	5598	5597	5608	5629	5660	5700	62296
	OBS:	6050	553	552	554	560	569	581	596	613	633	656	680	3693
1975	EXP:	5266	5171	5098	5044	5005	4981	4970	4969	4979	4998	5025	5061	60566
	OBS:	490	487	488	492	499	509	521	535	552	571	592	615	3512
1976	FOR:	5817	5712	5632	5572	5530	5503	5491	5490	5501	5522	5553	5592	72866
	STE:	547	546	549	555	564	575	590	607	626	648	672	699	4325
1977	FOR:	6320	6207	6120	6055	6010	5981	5967	5967	5979	6002	6035	6079	85836
	STE:	606	606	610	618	629	643	660	680	702	727	754	784	5272
1978	FOR:	6979	6854	6758	6687	6636	6605	6590	6590	6603	6629	6666	6714	102386
	STE:	695	696	702	712	725	741	761	783	808	836	867	901	6771
1979	FOR:	7723	7585	7479	7400	7345	7310	7294	7294	7309	7337	7379	7432	122071
	STE:	792	795	803	815	830	849	872	897	926	958	993	1031	8454
1980	FOR:	7595	7459	7355	7278	7224	7190	7174	7174	7189	7217	7258	7311	129113
	STE:	808	811	819	831	847	866	889	915	943	975	1010	1048	9408
1981	FOR:	7466	7332	7230	7154	7101	7068	7053	7053	7068	7096	7136	7188	136391
	STE:	816	820	828	840	856	876	898	924	953	984	1019	1057	10206
1982	FOR:	7468	7335	7233	7157	7104	7071	7055	7056	7071	7099	7139	7191	146642
	STE:	838	842	850	863	879	898	921	946	975	1007	1042	1080	11211
1983	FOR:	8211	8065	7953	7869	7811	7775	7758	7759	7775	7806	7850	7908	173562
	STE:	953	957	966	979	996	1017	1042	1070	1102	1137	1175	1217	13741
1984	FOR:	10418	10232	10090	9985	9911	9865	9844	9845	9866	9905	9962	10034	237807
	STE:	1269	1273	1283	1299	1320	1346	1377	1412	1452	1496	1544	1596	20091
1985	FOR:	13051	12818	12640	12509	12416	12359	12332	12334	12360	12410	12481	12572	323621
	STE:	1779	1778	1787	1802	1825	1855	1891	1932	1980	2033	2091	2155	32819
1986	FOR:	14028	13779	13588	13447	13348	13287	13259	13260	13289	13343	13419	13518	382011
	STE:	1951	1952	1962	1981	2007	2041	2081	2127	2180	2238	2303	2373	38868
1987	FOR:	15415	15142	14933	14778	14670	14603	14572	14574	14607	14666	14751	14859	471217
	STE:	2192	2195	2208	2230	2261	2299	2345	2397	2457	2523	2595	2675	47944
		106494	100304	93852	86943	79454	72193	65139	58142	50464	40657	28269	14859	2691695
		9480	9466	9375	9181	8867	8515	8129	7706	7164	6304	4629	2675	177565

TABLE OF OBSERVED AND EXPECTED BY YEAR
(WEIGHTED)

ACC. YEAR	EXPECTED (PAYMENTS IN $000'S)	OBSERVED	DIFFERENCE	%ER	PMNT YEAR	EXPECTED (PAYMENTS IN $000's)	OBSERVED	DIFFERENCE	%ER
63	30169	32436	2267	7	63				
64	34449	33945	-504	-1	64				
65	37942	34913	-3029	-7	65				
66	45416	43638	-1778	-3	66				
67	53126	52911	-215	0	67				
68	62209	63454	1245	2	68				
69	65743	68207	2464	3	69				
70	60254	60023	-231	0	70	26860	25505	-1355	-5
71	63810	63021	-789	-1	71	30514	29656	-858	-2
72	65864	68482	2618	3	72	33081	35423	2342	7
73	73945	74486	541	0	73	35963	37391	1428	3
74	87499	88552	1053	1	74	38867	39537	670	1
75	73841	75085	1244	1	75	42559	45893	3334	7
76	78053	79212	1159	1	76	46079	46428	349	0
77	80541	77234	-3307	-4	77	50016	51863	1847	3
78	83620	81156	-2464	-2	78	58296	54519	-3777	-6
79	85853	87121	1268	1	79	67857	69128	1271	1
80	76886	76576	-310	0	80	79095	74648	-4447	-5
81	66953	66569	-384	0	81	92275	89595	-2680	-2
82	56754	56380	-374	0	82	105478	106032	554	0
83	50070	49707	-363	0	83	118951	118749	-202	0
84	45917	46199	282	0	84	126936	124871	-2065	-1
85	31785	32650	865	2	85	136508	136617	109	0
86	0	0	0	0	86	150941	154733	3792	2
87	0	0	0	0	87	170422	171370	948	0

PARAMETER ESTIMATES

PMNT YEAR	IOTA	S.E.	T-RATIO	DIFFERENCE IN IOTA	S.E.	T-RATIO
1971	0.0387	0.0070	5.50			
1972	0.0387	0.0070	5.50	0.0000	0.0000	0.00
1973	0.0387	0.0070	5.50	0.0000	0.0000	0.00
1974	0.0387	0.0070	5.50	0.0000	0.0000	0.00
1975	0.0387	0.0070	5.50	0.0000	0.0000	0.00
1976	0.0387	0.0070	5.50	0.0000	0.0000	0.00
1977	0.0387	0.0070	5.50	0.0000	0.0000	0.00
1978	0.1415	0.0068	20.94	0.1029	0.0066	15.68
1979	0.1415	0.0068	20.94	0.0000	0.0000	0.00
1980	0.1415	0.0068	20.94	0.0000	0.0000	0.00
1981	0.1415	0.0068	20.94	0.0000	0.0000	0.00
1982	0.1415	0.0068	20.94	0.0000	0.0000	0.00
1983	0.1415	0.0068	20.94	0.0000	0.0000	0.00
1984	0.0544	0.0079	6.88	-0.0871	0.0078	-11.20
1985	0.0544	0.0079	6.88	0.0000	0.0000	0.00
1986	0.0544	0.0079	6.88	0.0000	0.0000	0.00
1987	0.0544	0.0079	6.88	0.0000	0.0000	0.00

ALL PARAMETERS ARE SIGNIFICANT

F O R E C A S T I N G   W I T H   I N F L. / D I S C.

YEAR	FUTURE INFLATION RATE (PERCENT)	FUTURE DISCOUNT RATE (PERCENT)
1988	3.5000	0.0000
1989	3.5000	0.0000
1990	3.5000	0.0000
1991	3.5000	0.0000
1992	3.5000	0.0000
1993	3.5000	0.0000
1994	3.5000	0.0000
1995	3.5000	0.0000
1996	3.5000	0.0000
1997	3.5000	0.0000
1998	3.5000	0.0000
1999	3.5000	0.0000
2000	3.5000	0.0000
2001	3.5000	0.0000
2002	3.5000	0.0000
2003	3.5000	0.0000
2004	3.5000	0.0000
2005	3.5000	0.0000
2006	3.5000	0.0000
2007	3.5000	0.0000
2008	3.5000	0.0000
2009	3.5000	0.0000
2010	3.5000	0.0000
2011	3.5000	0.0000

EXPECTED PAYMENTS/OBSERVED PAYMENTS +---------+ FORECAST MEAN PAYMENTS/STANDARD ERRORS
(PAYMENTS IN $M)

YEAR																											
1963	E:								3	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	0
	O:								3	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	0
1964	E:							3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	O:							3	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	0	0
1965	E:						3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4
	O:						3	3	3	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	0	0	0
1966	E:					4	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	7
	O:					4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0
1967	E:				6	5	4	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	11
	O:				5	4	4	3	3	3	2	3	2	3	2	3	3	3	3	3	3	3	0	0	0	0	1
1968	E:			8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	15
	O:			9	5	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	1
1969	E:		12	8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	21
	O:		28	10	7	5	4	4	3	3	3	3	3	3	3	4	3	4	4	3	0	0	0	0	0	0	1
1970	E:	21	11	8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	24
	O:	36	27	9	6	5	4	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	1
1971	E:	22	12	8	6	5	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	5	32
	O:	38	27	9	6	5	4	4	3	4	3	3	4	4	3	3	4	3	0	0	0	0	0	0	0	0	2
1972	E:	23	12	9	7	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	40
	O:	39	30	9	7	6	4	4	4	4	4	5	5	4	4	4	4	0	0	0	0	0	0	0	1	1	2
1973	E:	26	14	10	7	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	6	6	6	54
	O:	43	30	12	7	6	5	5	5	5	5	6	5	5	5	5	0	0	0	1	1	1	1	1	1	1	3
1974	E:	31	16	11	9	8	7	7	7	7	7	6	6	6	6	6	6	6	6	7	7	7	7	8	8	8	76
	O:	36	41	14	8	7	7	6	7	7	7	7	6	6	6	1	1	1	1	1	1	1	1	1	1	1	5
1975	E:	26	14	10	8	7	7	7	6	6	6	6	6	5	5	5	6	6	6	6	6	6	7	7	7	8	75
	O:	41	32	11	7	7	6	6	7	7	6	6	6	6	0	1	1	1	1	1	1	1	1	1	1	1	4
1976	E:	27	15	11	9	9	8	8	7	7	7	6	6	6	6	6	6	7	7	7	7	7	8	8	8	9	92
	O:	40	37	12	10	8	7	7	8	7	7	7	7	1	1	1	1	1	1	1	1	1	1	1	1	1	6
1977	E:	28	17	13	11	10	9	9	8	8	7	7	7	7	7	7	7	7	8	8	8	8	9	9	9	10	110
	O:	39	41	14	9	8	8	8	7	8	7	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
1978	E:	33	19	15	13	11	10	10	9	8	8	8	8	8	8	8	8	8	9	9	9	9	10	10	11	11	133
	O:	49	49	16	11	10	10	9	9	9	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
1979	E:	38	22	17	15	13	12	11	10	9	9	9	9	9	9	9	9	10	10	10	10	11	11	12	12	13	162
	O:	50	52	19	14	12	12	11	10	10	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	12
1980	E:	39	23	18	15	13	11	10	10	9	9	9	9	9	9	9	10	10	10	10	11	11	11	12	12	13	174
	O:	47	49	19	14	12	11	11	10	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	13
1981	E:	40	24	18	15	13	11	10	10	9	9	9	9	9	9	9	10	10	10	10	11	11	12	12	13	13	186
	O:	49	50	19	14	12	11	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	15
1982	E:	42	25	18	15	13	11	10	10	10	10	9	9	10	10	10	10	10	11	11	11	12	12	13	13	14	203
	O:	52	48	19	14	12	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	16
1983	E:	49	27	20	16	14	13	12	11	11	11	11	11	11	11	11	11	12	12	12	13	13	14	14	15	15	244
	O:	50	55	21	16	13	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	21
1984	E:	62	35	25	21	18	16	16	15	15	14	14	14	14	14	15	15	15	16	16	17	17	18	19	19	20	338
	O:	57	66	27	19	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	30
1985	E:	77	44	32	26	23	21	20	19	19	19	18	18	19	19	19	19	20	20	21	22	23	23	24	25	26	465
	O:	57	78	33	3	3	3	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4	5	49
1986	E:	83	47	35	29	26	24	22	21	21	21	20	20	21	21	21	22	22	23	23	24	25	26	27	28	29	552
	O:	55	85	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	5	5	5	59
1987	E:	91	52	40	33	29	27	25	24	24	23	23	23	23	24	24	25	25	26	27	28	29	30	31	32	33	680
	O:	60	6	5	4	4	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	5	5	5	6	6	73
TOT PAY RS:			244	219	205	195	189	185	181	178	176	174	171	167	164	160	155	148	140	132	123	114	102	85	61	33	3701
STAND ERRS:			12	10	10	10	10	10	11	12	12	13	13	14	15	15	15	16	16	16	15	15	15	13	10	6	272

F O R E C A S T I N G   W I T H   I N F L. / D I S C.

YEAR	FUTURE INFLATION RATE (PERCENT)	FUTURE DISCOUNT RATE (PERCENT)
1988	3.5000	9.0000
1989	3.5000	9.0000
1990	3.5000	9.0000
1991	3.5000	9.0000
1992	3.5000	9.0000
1993	3.5000	9.0000
1994	3.5000	9.0000
1995	3.5000	9.0000
1996	3.5000	9.0000
1997	3.5000	9.0000
1998	3.5000	9.0000
1999	3.5000	9.0000
2000	3.5000	9.0000
2001	3.5000	9.0000
2002	3.5000	9.0000
2003	3.5000	9.0000
2004	3.5000	9.0000
2005	3.5000	9.0000
2006	3.5000	9.0000
2007	3.5000	9.0000
2008	3.5000	9.0000
2009	3.5000	9.0000
2010	3.5000	9.0000
2011	3.5000	9.0000

EXPECTED PAYMENTS/OBSERVED PAYMENTS +---------+ FORECAST MEAN PAYMENTS/STANDARD ERRORS

(PAYMENTS IN $M)

YEAR																											
1963	E:								3	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	0
	O:								3	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	0
1964	E:							3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	O:							3	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	0	0
1965	E:						3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4
	O:						3	3	3	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	0	0	0
1966	E:					4	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	7
	O:					4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0
1967	E:				6	5	4	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	9
	O:				5	4	4	3	3	3	2	3	2	3	2	3	3	3	3	3	3	3	0	0	0	0	1
1968	E:			8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	12
	O:			9	5	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	1
1969	E:		12	8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	16
	O:		28	10	7	5	4	4	3	3	3	3	3	3	3	4	3	4	4	3	0	0	0	0	0	0	1
1970	E:	21	11	8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	18
	O:	36	27	9	6	5	4	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	1
1971	E:	22	12	8	6	5	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	2	2	23
	O:	38	27	9	6	5	4	4	3	4	3	3	4	4	3	3	4	3	0	0	0	0	0	0	0	0	1
1972	E:	23	12	9	7	5	5	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	2	27
	O:	39	30	9	7	6	4	4	4	4	4	5	5	4	4	4	4	0	0	0	0	0	0	0	0	0	1
1973	E:	26	14	10	7	6	6	5	5	5	5	5	5	5	5	5	4	4	4	4	4	3	3	3	3	3	35
	O:	43	30	12	7	6	5	5	5	5	5	6	5	5	5	5	0	0	0	0	0	0	0	0	0	0	2
1974	E:	31	16	11	9	8	7	7	7	7	7	6	6	6	6	6	5	5	5	4	4	4	4	4	3	3	48
	O:	36	41	14	8	7	7	6	7	7	7	7	6	6	6	1	1	0	0	0	0	0	0	0	0	0	3
1975	E:	26	14	10	8	7	7	7	6	6	6	6	6	5	5	5	4	4	4	4	4	3	3	3	3	3	45
	O:	41	32	11	7	7	6	6	7	7	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	3
1976	E:	27	15	11	9	9	8	8	7	7	7	6	6	6	5	5	5	4	4	4	4	4	3	3	3	3	53
	O:	40	37	12	10	8	7	7	8	7	7	7	7	1	1	0	0	0	0	0	0	0	0	0	0	0	3
1977	E:	28	17	13	11	10	9	9	8	8	7	7	6	6	6	5	5	5	4	4	4	4	3	3	3	3	61
	O:	39	41	14	9	8	8	8	7	8	7	7	1	1	1	1	0	0	0	0	0	0	0	0	0	0	4
1978	E:	33	19	15	13	11	10	10	9	8	8	7	7	6	6	5	5	5	5	4	4	4	4	3	3	3	72
	O:	49	49	16	11	10	10	9	9	9	8	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	4
1979	E:	38	22	17	15	13	12	11	10	9	9	8	7	7	6	6	5	5	5	4	4	4	4	4	3	3	84
	O:	50	52	19	14	12	12	11	10	10	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	5
1980	E:	39	23	18	15	13	11	10	10	9	8	7	7	6	6	5	5	5	4	4	4	4	4	3	3	3	87
	O:	47	49	19	14	12	11	11	10	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	6
1981	E:	40	24	18	15	13	11	10	9	8	7	7	6	6	5	5	5	4	4	4	4	4	3	3	3	3	91
	O:	49	50	19	14	12	11	11	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	6
1982	E:	42	25	18	15	13	11	10	9	8	7	6	6	5	5	5	4	4	4	4	4	3	3	3	3	3	96
	O:	52	48	19	14	12	11	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	7
1983	E:	49	27	20	16	14	12	10	9	8	7	7	6	6	5	5	5	4	4	4	4	3	3	3	3	3	112
	O:	50	55	21	16	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	8
1984	E:	62	35	25	21	17	14	13	11	10	9	8	7	7	6	6	6	5	5	5	4	4	4	4	4	3	152
	O:	57	66	27	19	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12
1985	E:	77	44	32	25	20	17	15	13	12	11	10	9	8	8	7	7	6	6	6	5	5	5	5	4	4	206
	O:	57	78	33	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
1986	E:	83	47	33	26	21	18	15	13	12	11	10	9	8	8	7	7	6	6	6	5	5	5	5	4	4	244
	O:	55	85	4	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
1987	E:	91	50	35	27	22	18	16	14	12	11	10	9	9	8	8	7	7	6	6	6	5	5	5	5	4	305
	O:	60	6	4	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29
TOT. P YRS:			234	192	165	145	128	115	103	94	85	77	69	62	56	50	44	39	34	29	25	21	17	13	9	4	1810
STAND ERRS:			11	9	8	7	7	6	6	6	6	6	5	5	5	5	4	4	4	3	3	3	2	2	1	1	102

FORECASTING WITH INFL./DISC.

YEAR	FUTURE INFLATION RATE (PERCENT)	FUTURE DISCOUNT RATE (PERCENT)
1988	0.0000	9.0000
1989	0.0000	9.0000
1990	0.0000	9.0000
1991	0.0000	9.0000
1992	0.0000	9.0000
1993	0.0000	9.0000
1994	0.0000	9.0000
1995	0.0000	9.0000
1996	0.0000	9.0000
1997	0.0000	9.0000
1998	0.0000	9.0000
1999	0.0000	9.0000
2000	0.0000	9.0000
2001	0.0000	9.0000
2002	0.0000	9.0000
2003	0.0000	9.0000
2004	0.0000	9.0000
2005	0.0000	9.0000
2006	0.0000	9.0000
2007	0.0000	9.0000
2008	0.0000	9.0000
2009	0.0000	9.0000
2010	0.0000	9.0000
2011	0.0000	9.0000

EXPECTED PAYMENTS/OBSERVED PAYMENTS +---------+ FORECAST MEAN PAYMENTS/STANDARD ERRORS
(PAYMENTS IN $M)

YEAR																										
1963	E:								3	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	0
	O:								3	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	0
1964	E:							3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	O:							3	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	0	0
1965	E:						3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4
	O:						3	3	3	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	0	0	0
1966	E:					4	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	6
	O:					4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0
1967	E:				6	5	4	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	2	2	2	2	9
	O:				5	4	4	3	3	3	2	3	2	3	2	3	3	3	3	3	3	3	0	0	0	0	0
1968	E:			8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	11
	O:			9	5	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	1
1969	E:		12	8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	15
	O:		28	10	7	5	4	4	3	3	3	3	3	3	3	4	3	4	4	3	0	0	0	0	0	0	1
1970	E:	21	11	8	6	5	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	16
	O:	36	27	9	6	5	4	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	1
1971	E:	22	12	8	6	5	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	2	2	2	2	20
	O:	38	27	9	6	5	4	4	3	4	3	3	4	4	3	3	4	3	0	0	0	0	0	0	0	0	1
1972	E:	23	12	9	7	5	5	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	2	2	2	2	24
	O:	39	30	9	7	6	4	4	4	4	4	5	5	4	4	4	4	0	0	0	0	0	0	0	0	0	1
1973	E:	26	14	10	7	6	6	5	5	5	5	5	5	5	5	5	4	4	4	3	3	3	3	2	2	2	30
	O:	43	30	12	7	6	5	5	5	5	5	6	5	5	5	5	0	0	0	0	0	0	0	0	0	0	2
1974	E:	31	16	11	9	8	7	7	7	7	7	6	6	6	6	6	5	5	4	4	3	3	3	3	2	2	40
	O:	36	41	14	8	7	7	6	7	7	7	7	6	6	6	1	0	0	0	0	0	0	0	0	0	0	2
1975	E:	26	14	10	8	7	7	7	6	6	6	6	6	5	5	5	4	4	3	3	3	3	2	2	2	2	38
	O:	41	32	11	7	7	6	6	7	7	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	2
1976	E:	27	15	11	9	9	8	8	7	7	7	6	6	6	5	5	4	4	3	3	3	3	2	2	2	2	44
	O:	40	37	12	10	8	7	7	8	7	7	7	7	1	0	0	0	0	0	0	0	0	0	0	0	0	2
1977	E:	28	17	13	11	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3	3	3	2	2	2	2	50
	O:	39	41	14	9	8	8	8	7	8	7	7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3
1978	E:	33	19	15	13	11	10	10	9	8	8	7	6	6	5	5	4	4	3	3	3	3	2	2	2	2	58
	O:	49	49	16	11	10	10	9	9	9	8	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	3
1979	E:	38	22	17	15	13	12	11	10	9	8	7	7	6	5	5	4	4	4	3	3	3	2	2	2	2	68
	O:	50	52	19	14	12	12	11	10	10	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	4
1980	E:	39	23	18	15	13	11	10	10	9	8	7	6	5	5	4	4	3	3	3	3	2	2	2	2	2	70
	O:	47	49	19	14	12	11	11	10	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	5
1981	E:	40	24	18	15	13	11	10	9	8	7	6	5	5	4	4	3	3	3	3	2	2	2	2	2	2	72
	O:	49	50	19	14	12	11	11	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5
1982	E:	42	25	18	15	13	11	10	8	7	6	6	5	4	4	4	3	3	3	2	2	2	2	2	2	1	76
	O:	52	48	19	14	12	11	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5
1983	E:	49	27	20	16	14	12	10	8	7	6	6	5	4	4	4	3	3	3	2	2	2	2	2	2	1	88
	O:	50	55	21	16	13	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6
1984	E:	62	35	25	21	17	14	11	10	8	7	6	6	5	5	4	4	3	3	3	3	2	2	2	2	2	119
	O:	57	66	27	19	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	9
1985	E:	77	44	32	25	19	16	13	11	10	8	7	7	6	5	5	4	4	4	3	3	3	3	2	2	2	162
	O:	57	78	33	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	15
1986	E:	83	47	33	24	19	16	13	11	10	8	7	7	6	5	5	4	4	4	3	3	3	2	2	2	2	192
	O:	55	85	4	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	18
1987	E:	91	49	33	24	19	16	13	11	10	8	7	7	6	5	5	4	4	4	3	3	3	2	2	2	2	243
	O:	60	6	4	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	23
TOT. P YRS:			230	183	151	128	110	95	83	72	63	55	48	42	36	31	27	23	19	16	13	11	9	6	4	2	1458
STANDARRRS:			11	9	7	6	6	5	5	5	4	4	4	3	3	3	3	2	2	2	2	1	1	1	1	0	74