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EFFECT OF LOSS RESERVE MARGINS IN CALENDAR YEAR RESULTS

RAFAL J. BALCAREK

Introduction

As almost everyone knows all estimates have some margin of error and as loss reserves consist of estimates they are likely to contain some inaccuracies. Inaccuracies in loss reserves will, of course, have an effect on calendar year results, especially in lines of insurance such as auto bodily injury, general bodily injury and workmen's compensation, where loss reserves are very large when related to annual earned premiums.

It is also fairly obvious that calendar year results appear to be taken very seriously by most of the people connected with the insurance business. In fact, they are becoming more important as the narrow profit margins make it necessary to watch closely the trends so that a swift action can be taken if a deterioration sets in. There is a large number of insurance publications that summarize calendar year results by company, by line, and by state. These results are studied very closely and from them, no doubt, important conclusions are drawn. A nagging question is how valid are these conclusions if the calendar year results on which they are based contain major distortions due to factors which have little to do with the current underwriting experience.

Although it is generally recognized that, theoretically at least, the effect of loss reserve margins could be very large, there is a lack of published studies on the subject. A possible reason may be the non-availability of relevant figures relating to the industry's reserves. Some companies may have figures relating to their own performance. However, they treat such figures as confidential and would not think of having them published.

A contributing factor is that a study of reserves is not in itself the most rewarding subject. Generally, it takes years before various estimates and conclusions can be satisfactorily substantiated to the practical people

running the insurance companies. By that time the conclusions may have lost most of their original urgency. One can indulge here in a bit of whimsical fantasy and imagine an actuary approaching the harassed chief executive in the big private office in 1966 to give him the startling news that as a result of reserve margin changes the 1957 automobile loss ratio for the company was understated by 5.4 points. More often than not, the chief executive may be busy trying to figure out ways to explain gently to his board of directors the company's latest loss ratios, and one could only speculate on his reaction to this timely bit of information.

There is in existence a tacitly accepted theory that the influence of reserve margins on calendar year results is unimportant as long as a given company maintains a consistent reserve policy. A company with a conservative policy incorporates large reserve margins in new claims which act as a penalty on the current calendar year results. However, if such a policy is pursued consistently year after year the company will enjoy a considerable amount of favorable development on old cases which will practically offset the penalty on new cases. After all, what goes in must come out. A similar reasoning can be pursued in regard to a company with a less than conservative reserve policy. Hence considerable penalties or benefits to calendar year results can only arise if a company changes its reserve policy from conservative to less conservative or vice versa.

There is such an amount of logic in this argument that one is more than ready to accept its validity. On the other hand, a theory should fit the facts if it is to have practical value. While analyzing reserves for one of his former employers, the writer determined that year after year there were substantial distortions in calendar year results due to changes in reserve margins. At the same time the claim people vigorously denied and even resented any imputation that they kept changing their reserve policy. Before questioning their veracity or competence one should first determine what was the industry's performance in regard to reserve margins. This paper presents an attempt to throw some light on the subject.

Basis of this Study

The amount of benefit or penalty to the calendar year results due to loss reserve margins will be determined by two things:

(1) Adequacy of reserves on losses incurred during the current year.

(2) Development of prior years' losses during the current year.

It occurred to the writer that by the use of the published figures in Schedule P—Part 5 of the annual statement one could obtain an estimate of such a benefit or penalty for the Schedule P lines of coverage. We can, for example, check the original amount of auto bodily injury losses incurred during 1959 and see what they were four years later. This gives us an indication of the reserve margin included in 1959 losses. At the same time we can compare the incurred losses for the available prior years at 12-31-58 and 12-31-59, which would give us the development during 1959 of losses incurred during the preceding 4½ years. A combination of these two results would give us an indication of the penalty or benefit incurred as a result of changes in reserve margins during a particular calendar year.

At this point, it may be useful to calculate the effect of reserve margin changes on 1959 auto bodily injury calendar year results for one (Company I) of ten companies studied in this report. According to Schedule P, Part 5 of the 1959 annual statement, the incurred auto bodily injury losses at December 31, 1958 for accident years 1958 and prior amounted to $64,209,448 (sum of the amounts in the last but one column). At December 31, 1959 the incurred losses for the same accident years amounted to $63,100,892. This means that during the calendar year of 1959 the losses for prior years showed a favorable development of $1,108,556 which, related to the calendar year earned premium of $21,871,159, benefited the loss ratio by 5.1 points.

The incurred loss at December 31, 1959 for accident year 1959 amounted to $13,304,524. Consulting the 1963 annual statement we see that these losses at December 31, 1963 amounted to only $11,694,360, a decrease of $1,610,164. This means that the auto bodily injury incurred losses for the accident year 1959 were originally overstated by $1,610,164 which resulted in a penalty of 7.4 points to 1959 calendar year loss ratio.

Thus the total effect of reserve margin change on 1959 auto bodily injury calendar year results for Company I was an estimated penalty of 2.3 points (i.e. 7.4—5.1). The reported calendar year loss ratio was 55.2% and the loss ratio adjusted for the penalty is 52.9%.

No representation is being made that the obtained estimate is 100% accurate. After all, there may be additional developments beyond the fifth year. However, it is suggested that the five-year period is sufficiently long to account for the bulk of the reserve developments; consequently, the indications obtained should correspond quite closely to the unavailable "final" benefits or penalties.

EXHIBIT 1

CALENDAR YEAR EFFECT OF LOSS RESERVE MARGIN CHANGES DURING 1953-1960

% OF EARNED PREMIUM

Company	Auto Bodily Injury		General Bodily Injury		Workmen's Compensation	
	Average	Range	Average	Range	Average	Range
A	2.0	5.6	3.3	7.8	2.8	9.0
B	7.3	28.4	7.3	31.8	5.2	17.3
C	4.3	13.3	4.2	17.8	2.4	8.9
D	1.9	8.1	2.3	10.2	3.4	13.1
E	2.0	9.1	6.1	19.4	3.2	11.1
F	3.5	10.7	4.1	13.6	2.3	9.0
G	3.5	11.2	3.0	9.1	3.0	10.8
H	3.1	9.3	3.4	9.4	4.4	17.6
I	2.7	12.9	3.0	10.1	2.5	8.4
J	2.9	13.4	3.9	11.5	1.2	3.7
Average	3.3	12.2	4.1	14.1	3.0	10.9

The figures used in this report relate to reserve margins for auto bodily injury, general bodily injury and workmen's compensation of ten large stock writers during calendar years 1953—1960. In 1960 their earned premiums amounted to $445,000,000 for auto bodily injury, $210,000,000 for general bodily injury, and $300,000,000 for workmen's compensation. The actual indications have been related to earned premium and the results are summarized in Exhibit 1 and Exhibit 2.

Main Findings

Over the complete period of eight years the net penalty due to changes in safety margins expressed as a percentage of earned premium amounted to 0.4% for auto bodily injury, 0.5% for general bodily injury and —0.5 for workmen's compensation. This demonstrates that our theory that the reserve margins have an insignificant effect on calendar year results is basically correct if one takes a sufficiently long period of time. However, if one confines himself to the more usual period of time like one calendar year the impact of reserve margins becomes more pronounced. Exhibit 1 shows the ranges in which the loss ratio effect of reserve margin fluctuates from year to year for each of the ten companies. In addition, the average annual effect of loss reserve fluctuations is also presented.

The figures in Exhibit 1 indicate that while the effect of reserve margins differs to quite an extent among the various companies, there is no single case where the effect is so small that it could be ignored. The ranges appear to be frequently in excess of ten points, which means that when comparing two calendar year loss ratios for the same company it would not be unusual to have changes in reserve margins account for more than ten points of the difference between these loss ratios. In case of genuine bad luck the range could amount to about half of the permissible loss ratio.

The shifts in reserve margins can also affect the inter-company comparisons. Exhibit 2 shows the extent of this effect by computing the range between the individual companies for each of the calendar years under review.

It appears from the figures in Exhibit 2 that a comparison of calendar year loss ratios of various companies has some serious defects. Even a difference as large as ten points may be nothing more than an erratic result of shifts in reserve margins.

A question could be asked whether these changes in reserve margins in each of the three lines do not offset each other; that is, a company may

EXHIBIT 2

CALENDAR YEAR EFFECT OF LOSS RESERVE MARGIN CHANGES OF INDIVIDUAL COMPANIES – % OF EARNED PREMIUM

Calendar Year	Auto Bodily Injury			General Bodily Injury			Workmen's Compensation		
	Low	High	Total Range	Low	High	Total Range	Low	High	Total Range
1953	–0.7	7.3	8.0	–2.4	10.6	13.0	–0.6	10.8	11.4
1954	–4.7	6.1	10.8	–1.0	8.9	9.9	–6.1	4.9	11.0
1955	–11.1	1.5	12.6	–7.7	13.1	20.8	–5.8	4.6	10.4
1956	–12.7	1.9	14.6	–21.2	1.1	22.3	–6.8	–0.1	6.7
1957	–3.2	15.7	18.9	–3.7	8.7	12.5	–5.9	5.8	11.7
1958	–0.6	8.2	8.8	–6.4	8.7	15.1	–2.9	3.8	6.7
1959	–3.5	2.6	6.1	–6.5	5.2	11.7	–6.9	1.4	7.8
1960	–5.5	1.1	6.6	–9.1	5.2	14.3	–7.2	1.5	8.7

have a shift towards lower reserve margins in auto bodily injury while at the same time the reserve margins for general bodily injury and workmen's compensation may go up by an equivalent amount.

A calculation of correlation coefficients between the loss ratio effects in the three lines gave the following results:

$\sigma_x = 4.37$	$\text{cov}_{xy} = 12.82$	$\gamma_{xy} = +0.57$
$\sigma_y = 5.14$	$\text{cov}_{xz} = 10.33$	$\gamma_{xz} = +0.62$
$\sigma_z = 3.80$	$\text{cov}_{yz} = 9.50$	$\gamma_{yz} = +0.49$

where

x = Loss ratio effect in auto bodily injury

y = Loss ratio effect in general bodily injury

z = Loss ratio effect in workmen's compensation

n = 80

All three correlation coefficients are highly significant. They indicate that if a company has a shift towards lower reserve margins in auto bodily injury the chances are that general bodily injury and workmen's compensation reserves will follow a similar pattern.

This result is not altogether unexpected as the claim examiners for all the three lines usually work closely together in the same department and are subject to the same influences and controls.

A close inspection of the three lines shows that there are some years when practically all of the companies reduced their reserve margins while there are other years when the reverse was true and nearly everybody was raising the margins. There is no doubt that these indications raise some disturbing implications as rate-makers use both loss development factors and calendar year results in their various rate making formulas; consequently the swings in reserve margins could find their way into the manual rate changes. One could put forward an argument that our results were obtained by the use of a very small sample and the annual changes in the average loss ratio effect for the ten companies combined are nothing more than the usual sampling errors. This hypothesis can be checked by the use of the analysis of variance, treating each calendar year as a sample and testing for significance of its average loss ratio effect. The calculations are as follows:

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
	Auto Bodily Injury		
Between calendar years	7	588.34	84.05
Error	72	937.50	13.02
Total	79	1,525.84	
	General Bodily Injury		
Between calendar years	7	570.92	81.56
Error	72	1,552.54	21.56
Total	79	2,123.46	
	Workmen's Compensation		
Between calendar years	7	411.42	58.77
Error	72	790.95	10.99
Total	79	1,202.37	

The values of F for the three lines amount to 6.46, 3.78 and 5.35 respectively. All of them are highly significant. Therefore, it appears unlikely that the annual changes in the average loss ratio effect for the ten companies combined are a result of sampling errors.

A question remains whether insurance companies use their reserve margins to stabilize their results. The writer realizes that many people regard with horror the idea that one should adjust reserve margins according to the size of the loss ratio. Yet emotions are a poor basis for making sound business judgments. Looking at the matter from a logical point of view, there does not seem to be anything objectionable in increasing reserve safety margins during years of good underwriting results. Conversely, there should be no objections to reductions of these margins in time of poor experience in order to soften its impact, as long as the loss reserves are fully adequate and the company has a sufficient amount of surplus for the type and amount of business it conducts. This certainly makes more sense than the action of the majority of companies which penalized their auto bodily injury experience by increasing their reserve margins during their worst year. Action of such a nature may be interpreted as a suicidal tendency which definitely is not a sound business practice.

A comparison of standard deviations for the actual and adjusted loss

ratios for each company may give some idea as to the relation between the loss reserve margins and the fluctuations in calendar year experience. If in the case of an individual company the actual loss ratios have a higher standard deviation than the adjusted loss ratios, this would indicate that reserve margin changes aggravated the fluctuations; on the other hand if the adjusted results have a higher deviation the reverse would be true. The relevant figures are shown in Exhibit 3.

The figures indicate that each of the lines had a different experience. In auto bodily injury six companies show a larger standard deviation for reported results, while four show a larger standard deviation for adjusted results. For general bodily injury eight companies have larger standard deviations for reported results. In the case of workmen's compensation, the result is reverse, as eight companies have a smaller standard deviation on reported results.

Conclusions

The main conclusion is that loss reserve margins for the major casualty lines are basically unstable and exert an appreciable influence on calendar year results. In the comparison of the experience of an individual company for one year with that of prior years, or with the experience of other companies, the changes in reserve margins may, on occasion, be the most important single factor responsible for the observed differences.

There is evidence that in the case of an individual company loss reserve margins for the three lines of business have a tendency to move in the same direction at the same time. In addition there is also evidence that the companies tend to go together in raising or lowering their loss reserve margins.

The companies do not appear to enjoy a great measure of success in controlling their loss reserve margins to their best advantage. This is one of the most pressing problems because in times of poor underwriting experience companies cannot afford erratic changes in loss reserve margins to contribute to their adverse results and thus compound their difficulties.

EXHIBIT 3

STANDARD DEVIATIONS

Company	Reported Loss Ratios			Adjusted Loss Ratios		
	Auto B.I.	General B.I.	Workmen's Compensation	Auto B.I.	General B.I.	Workmen's Compensation
A	5.34	2.32	3.71	6.95	2.49	5.00
B	12.78	7.79	3.84	9.86	5.80	5.34
C	8.65	4.89	3.53	6.79	3.24	4.39
D	3.37	4.91	3.10	5.07	3.40	4.66
E	4.80	7.81	6.06	4.91	4.20	6.77
F	7.26	4.96	3.37	6.78	2.97	4.25
G	6.32	3.28	1.97	8.04	3.80	3.90
H	6.32	6.21	4.98	6.30	1.75	3.84
I	8.65	6.28	5.48	7.23	4.92	3.81
J	6.12	4.89	3.53	4.83	2.69	3.73

AUTO BODILY INJURY

RESERVE ADEQUACY CHANGES EXPRESSED AS % OF EARNED PREMIUM

TABLE 1A

COMPANY	LOSS RATIO EFFECT OF ADEQUACY MARGIN IN CURRENT YEAR RESERVE								LOSS RATIO EFFECT OF DEVELOPMENT OF PRIOR YEARS' RESERVE DURING								COMBINED LOSS RATIO EFFECT OF CHANGES IN RES. MARGINS DURING							
	1953	1954	1955	1956	1957	1958	1959	1960	1953	1954	1955	1956	1957	1958	1959	1960	1953	1954	1955	1956	1957	1958	1959	1960
A	+2.3	+4.0	+2.0	+0.9	+1.4	+1.5	+2.3	+1.5	+2.3	-0.2	-1.7	-1.9	+0.3	-1.0	+0.3	-0.4	+4.6	+3.8	+0.3	-1.0	+1.7	+0.5	+2.6	+1.1
B	+9.9	+7.7	-5.2	-10.8	+1.3	+7.2	+1.8	-0.6	-4.8	-11.2	-5.9	-1.9	+14.4	-5.8	-5.3	-4.9	+5.1	-3.5	-11.1	-12.7	+15.7	+1.4	-3.5	-5.5
C	-2.3	-4.2	-9.1	-12.8	-2.6	-1.7	+1.9	-2.8	+3.7	+0.4	+4.8	+5.5	+8.6	+6.1	-0.6	-2.7	+1.4	-3.8	-4.3	-7.3	+6.0	+4.4	+1.3	-5.5
D	+7.2	+10.1	+7.9	+8.8	+5.9	+5.8	+4.5	+3.9	-0.2	-7.1	-8.7	-6.9	-7.0	-6.4	-4.5	-3.1	+7.0	+3.0	-0.8	+1.9	-1.1	-0.6	+0.0	+0.8
E	+1.2	+4.5	+2.5	+2.2	+1.9	+4.6	+5.1	+2.7	-1.9	+1.6	-2.1	-3.3	-5.0	-2.4	-4.9	-5.3	-0.7	+6.1	+0.4	-1.1	-3.0	+2.2	+0.2	-2.6
F	+2.8	+6.7	-0.2	-4.4	+2.0	+4.2	+1.6	-1.8	-1.2	-3.7	-5.3	-1.1	+3.2	-2.1	-2.0	-3.1	+1.6	+3.0	-5.5	-5.5	+5.2	+2.1	-0.4	-4.9
G	+3.7	+3.8	+1.6	-1.9	-5.5	-1.6	+0.8	-1.7	+3.6	-1.3	-4.7	-1.2	+2.3	+6.0	-0.4	-2.2	+7.3	+2.5	-3.1	-3.1	-3.2	+4.4	+0.4	-3.9
H	-1.8	+1.9	+2.0	-2.8	-0.1	+4.6	+3.8	+1.3	+5.4	+2.5	-0.5	-0.6	+2.6	+1.3	-5.1	-3.4	+3.6	+4.4	+1.5	-3.4	+2.5	+5.9	-1.3	-2.1
I	+6.6	+4.3	+1.7	+0.7	-0.1	+5.3	+7.4	+8.6	-6.4	-9.0	-4.5	-2.8	-0.8	+2.9	-5.1	-9.1	+0.2	-4.7	-2.8	-2.1	-0.9	+8.2	+2.3	-0.5
J	+4.1	+3.6	-0.3	-4.8	+2.6	+1.5	+0.4	-0.3	-1.4	-4.9	-1.4	-0.9	+5.1	-1.4	-2.2	-1.9	+2.7	-1.4	-1.7	-5.7	+7.7	+0.1	-1.8	-2.2
AVERAGE	+3.4	+4.2	+0.3	-2.5	+0.7	+3.1	+3.0	+1.1	-0.1	-3.3	-3.0	-1.5	+2.4	-0.3	-3.0	-3.6	+3.3	+0.9	-2.7	-4.0	+3.1	+2.8	0.0	-2.5

GENERAL BODILY INJURY

TABLE I B

RESERVE ADEQUACY CHANGES EXPRESSED AS % OF EARNED PREMIUM

COMPANY	LOSS RATIO EFFECT OF ADEQUACY MARGIN IN CURRENT YR. RESERVE							
	1953	1954	1955	1956	1957	1958	1959	1960
A	+2.6	+6.7	+8.8	+6.5	+3.6	+2.7	+6.7	+7.2
B	+16.7	+19.3	+14.0	-4.4	-2.5	+7.4	+0.1	+0.0
C	+0.1	-0.7	-4.1	-5.0	+3.7	+1.6	-0.7	-5.5
D	+7.9	+8.4	+9.0	+8.5	+9.9	+5.6	+5.5	+5.6
E	+0.4	+7.7	+13.5	+7.0	+7.6	+12.8	+7.0	+5.3
F	+0.7	+4.1	-0.9	-3.4	+2.2	-1.1	+4.3	-2.4
G	+4.5	+10.7	+7.1	+3.0	+3.8	+1.0	+4.6	+10.4
H	+0.1	+2.9	+3.7	+1.5	+3.5	+5.0	+2.2	-2.3
I	+8.5	+6.8	+7.1	+5.4	+4.7	+7.2	+10.1	+9.6
J	+2.7	+2.5	+1.8	-2.4	+0.8	+3.6	-2.2	-4.8
AVERAGE	+4.4	+6.8	+6.0	+1.7	+3.7	+4.6	+3.8	+2.3

COMPANY	LOSS RATIO EFFECT OF DEVELOPMENT OF PRIOR YEARS' RESERVE DURING							
	1953	1954	1955	1956	1957	1958	1959	1960
A	-0.6	-0.6	-2.9	-8.2	-5.2	-3.4	-3.7	-2.0
B	-6.1	-16.1	-12.2	-16.8	-0.6	+1.3	-6.6	-3.2
C	-2.5	-0.1	-0.5	+2.5	+5.0	-0.7	-3.5	-3.6
D	-4.1	-6.5	-6.4	-7.4	-8.7	-12.0	-6.5	-5.5
E	+5.7	+1.2	-0.4	-13.3	-10.6	-8.5	-12.2	-7.4
F	-0.4	-2.2	-6.8	+0.5	+3.7	-2.7	+0.2	-3.0
G	+1.2	-5.2	-7.7	-6.4	-3.8	+0.8	-7.2	-6.2
H	+4.9	-0.3	-0.6	-3.7	-0.4	-2.0	-6.1	-2.1
I	-6.6	-6.1	-6.0	-9.5	-8.5	-1.2	-4.5	-8.5
J	-0.2	-3.5	-3.4	-3.3	+4.5	-0.7	-4.0	-1.1
AVERAGE	-0.9	-3.9	-4.7	-6.6	-2.4	-2.9	-5.5	-4.3

COMPANY	COMBINED LOSS RATIO EFFECT OF CHANGES IN RESERVE MARGINS DURING							
	1953	1954	1955	1956	1957	1958	1959	1960
A	+2.0	+6.1	+5.9	-1.7	-1.6	-0.7	+3.0	+5.2
B	+10.6	+3.2	+1.8	-21.2	-3.1	+8.7	-6.5	-3.2
C	-2.4	-0.8	-4.7	-2.5	+8.7	+0.9	-4.2	-9.1
D	+3.8	+1.9	+2.6	+1.1	+1.2	-6.4	-1.0	+0.1
E	+6.1	+8.9	+13.1	-6.3	-3.0	+4.3	-5.2	-2.1
F	+0.3	+1.9	-7.7	-2.9	+5.9	-3.8	+4.5	-5.4
G	+5.7	+5.5	-0.6	-3.4	+0.0	+1.8	-2.6	+4.2
H	+5.0	+2.6	+3.1	-2.2	+3.1	+3.0	-3.9	-4.4
I	+1.9	+0.7	+1.1	-4.1	-3.8	+6.0	+5.2	+1.1
J	+2.5	-1.0	-1.6	-5.7	+5.3	+2.9	-6.2	-5.9
AVERAGE	+3.5	+2.9	+1.3	-4.9	+1.3	+1.7	-1.7	-2.0

WORKMEN'S COMPENSATION — TABLE 1 C

RESERVE ADEQUACY CHANGES EXPRESSED AS % OF EARNED PREMIUM

COMPANY	LOSS RATIO EFFECT OF ADEQUACY MARGIN IN CURRENT YEAR RESERVE							
	1953	1954	1955	1956	1957	1958	1959	1960
A	+3.3	+5.2	+1.5	+0.7	+0.8	-1.3	-3.2	-2.4
B	+16.7	+15.2	+7.4	+0.4	+6.3	+6.4	+1.9	-0.7
C	+4.5	+1.7	-0.8	-4.2	-1.6	-2.9	+0.6	-7.0
D	+11.3	+13.5	+10.8	+9.4	+6.5	+6.6	+5.0	+1.7
E	+9.3	+10.0	+9.0	+1.6	+8.7	+9.6	+8.9	+4.9
F	+2.2	+5.0	-2.9	-4.1	+3.8	+0.4	+0.9	-1.4
G	+8.3	+13.6	+11.4	+9.0	+3.4	+5.0	+4.9	+3.1
H	+6.6	+5.2	+9.6	+1.6	-0.1	+3.9	+3.7	+2.2
I	+6.9	+6.0	+10.5	+8.9	+8.3	+10.2	+9.1	+4.7
J	+5.7	+5.7	+3.1	+2.1	+4.5	+3.0	+0.7	-0.8
AVERAGE	+7.5	+8.1	+6.0	+2.5	+4.1	+4.1	+3.3	+0.4

COMPANY	LOSS RATIO EFFECT OF DEVELOPMENT OF PRIOR YEARS' RESERVE DURING							
	1953	1954	1955	1956	1957	1958	1959	1960
A	+1.4	-2.1	-5.8	-1.9	-1.4	-1.6	-0.7	+3.9
B	-6.2	-16.2	-12.8	-6.3	-0.7	-6.5	-8.3	-6.1
C	-2.8	-3.9	-2.9	+1.0	+1.6	+3.9	-1.0	-0.2
D	-1.9	-9.2	-12.6	-10.2	-10.2	-8.4	-7.6	-4.1
E	-6.9	-8.7	-6.0	-6.9	-2.9	-11.4	-10.4	-9.6
F	-2.8	-4.3	-2.9	+1.4	-0.6	-2.1	-1.3	-1.7
G	-5.5	-8.7	-13.3	-12.2	-9.3	-5.7	-8.0	-4.9
H	+4.2	-7.2	-5.0	-8.4	-4.4	-0.1	-2.3	-3.7
I	-7.1	-12.1	-9.6	-10.7	-7.8	-8.9	-10.9	-11.8
J	-5.6	-5.9	-5.1	-2.2	-3.2	-5.4	-3.1	+0.1
AVERAGE	-3.3	-7.8	-7.6	-5.6	-3.9	-4.6	-5.4	-3.8

COMPANY	COMBINED LOSS RATIO EFFECT OF CHANGES IN RES. MARGINS DURING							
	1953	1954	1955	1956	1957	1958	1959	1960
A	+4.7	+3.1	-4.3	-1.2	-0.6	-2.9	-3.9	+1.5
B	+10.5	-1.0	-5.4	-5.9	+5.6	-0.1	-6.4	-6.8
C	+1.7	-2.2	-3.7	-3.2	-0.0	+1.0	-0.4	-7.2
D	+9.4	+4.3	-1.8	-0.8	-3.7	-1.8	-2.6	-2.4
E	+2.4	+1.3	+3.0	-5.3	+5.8	-1.8	-1.5	-4.7
F	-0.6	+0.7	-5.8	-2.7	+3.2	-1.7	-0.4	-3.1
G	+2.8	+4.9	-1.9	-3.2	-5.9	-0.7	-3.1	-1.8
H	+10.8	-2.0	+4.6	-6.8	-4.5	+3.8	+1.4	-1.5
I	-0.2	-6.1	+0.9	-1.8	+0.5	+1.3	-1.8	-7.1
J	+0.1	-0.2	-2.0	-0.1	+1.3	-2.4	-2.4	-0.7
AVERAGE	+4.2	+0.3	-1.6	-3.1	+0.2	-0.5	-2.1	-3.4

AUTO BODILY INJURY- CALENDAR YEAR LOSS RATIOS

TABLE 2 A

COMPANY	REPORTED LOSS RATIOS							
	1953	1954	1955	1956	1957	1958	1959	1960
A	52·8	53·9	59·2	63·9	69·6	64·0	64·4	59·5
B	55·9	58·9	63·3	66·5	99·6	77·2	71·0	70·6
C	54·6	55·0	59·9	65·9	81·3	69·8	65·0	55·1
D	59·7	56·7	61·7	67·1	67·1	62·1	61·9	59·2
E	51·2	60·7	61·4	63·9	63·9	65·6	60·4	53·5
F	50·8	54·8	54·4	60·3	74·6	64·9	66·7	59·1
G	59·6	56·8	61·5	69·1	75·2	71·8	66·3	58·5
H	57·4	61·2	63·5	65·3	76·8	74·1	65·2	60·1
I	40·5	38·6	49·0	57·4	62·8	62·9	55·2	54·3
J	55·5	55·1	60·2	61·8	75·6	63·5	59·2	57·7
AVERAGE	53·8	55·2	59·4	64·1	74·7	67·6	63·5	58·8

	LOSS RATIOS ADJUSTED FOR CHANGES IN RESERVE MARGINS							
	1953	1954	1955	1956	1957	1958	1959	1960
	48·2	50·1	58·9	64·9	67·9	63·5	61·8	58·4
	50·8	62·4	74·4	79·2	83·9	75·8	74·5	76·1
	53·2	58·8	64·2	73·2	75·3	65·4	63·7	60·6
	52·7	53·7	62·5	65·2	68·2	62·7	61·9	58·4
	51·9	54·6	61·0	65·0	66·9	63·4	60·2	56·1
	49·2	57·8	59·9	65·8	69·4	62·8	67·1	64·0
	52·3	54·3	64·6	72·2	78·4	67·4	65·9	62·4
	53·8	56·8	62·0	68·7	74·3	68·2	66·5	62·2
	40·3	43·3	51·8	59·5	63·7	54·7	52·9	54·8
	52·8	56·5	61·9	67·5	67·9	63·4	61·0	59·9
	50·5	54·2	62·1	68·1	71·6	64·7	63·6	61·3

GENERAL BODILY INJURY - CALENDAR YEAR LOSS RATIOS

TABLE 2 B

COMPANY	REPORTED LOSS RATIOS							
	1953	1954	1955	1956	1957	1958	1959	1960
A	41.0	42.6	43.8	38.1	39.4	44.6	44.2	45.0
B	57.8	48.2	44.8	37.5	52.5	65.4	51.0	51.8
C	39.1	41.7	37.5	46.2	53.0	47.0	46.3	39.7
D	49.6	50.8	49.1	50.4	44.2	38.8	41.7	38.4
E	54.6	54.8	59.2	43.5	49.6	47.0	36.5	37.1
F	38.9	41.2	35.3	42.2	48.9	44.4	48.5	35.2
G	49.4	44.6	43.5	41.9	44.3	47.1	42.2	37.9
H	51.4	49.9	47.1	45.3	49.2	47.0	39.7	37.8
I	31.2	31.6	36.9	36.2	36.8	49.0	48.1	40.5
J	39.5	38.2	41.5	35.1	51.1	45.8	37.7	38.0
AVERAGE	45.2	44.4	43.9	41.6	46.9	47.6	43.6	40.1

COMPANY	LOSS RATIOS ADJUSTED FOR CHANGES IN RESERVE MARGINS							
	1953	1954	1955	1956	1957	1958	1959	1960
A	39.0	36.5	37.9	39.8	41.0	45.3	41.2	39.8
B	47.2	45.0	43.0	58.7	55.6	56.7	57.5	55.0
C	41.5	42.5	42.2	48.7	44.3	46.1	50.5	48.8
D	45.8	48.9	46.5	49.3	43.0	45.2	42.7	38.3
E	48.5	45.9	46.1	49.8	52.6	42.7	41.7	39.2
F	38.6	39.3	43.0	45.1	43.0	48.2	44.0	40.6
G	43.7	39.1	44.1	45.3	44.3	45.3	44.8	33.7
H	46.4	47.3	44.0	47.5	46.1	44.0	43.6	42.2
I	29.3	30.9	35.8	40.3	40.6	43.0	42.9	39.4
J	37.0	39.2	43.1	40.8	45.8	42.9	43.9	43.9
AVERAGE	41.7	41.5	42.6	46.5	45.6	45.9	45.3	42.1

WORKMEN'S COMPENSATION - CALENDAR YEAR LOSS RATIOS

TABLE 2C

COMPANY	REPORTED LOSS RATIOS								LOSS RATIOS ADJUSTED FOR CHANGES IN RESERVE MARGINS							
	1953	1954	1955	1956	1957	1958	1959	1960	1953	1954	1955	1956	1957	1958	1959	1960
A	65.0	56.5	59.9	65.3	62.4	63.3	67.3	68.7	60.3	53.4	64.2	66.5	63.0	66.2	71.2	67.2
B	66.0	55.0	56.6	63.4	66.3	62.7	61.6	63.6	55.5	56.0	62.0	69.3	60.7	62.8	68.0	70.4
C	55.5	56.1	57.9	62.0	64.7	62.7	65.6	61.4	53.8	58.3	61.6	65.2	64.7	61.7	66.0	68.6
D	65.7	58.9	56.2	62.5	61.7	62.0	66.4	61.8	56.3	54.6	58.0	63.3	65.4	63.8	69.0	64.2
E	58.3	49.3	53.4	54.2	65.4	60.1	69.2	58.5	55.9	48.0	50.4	59.5	59.6	61.9	70.7	63.2
F	59.0	58.7	64.8	65.7	68.4	59.8	63.1	65.0	59.6	58.0	70.6	68.4	65.2	61.5	63.5	68.1
G	63.8	58.1	61.2	60.2	60.3	61.1	59.9	64.9	61.0	53.2	63.1	63.4	66.2	61.8	63.0	66.7
H	66.2	53.2	64.1	55.8	57.2	63.6	68.3	62.7	55.4	55.2	69.5	62.6	61.7	59.8	66.9	64.2
I	59.1	48.5	66.4	64.6	59.0	64.5	63.2	56.3	59.3	54.6	65.5	66.4	58.5	63.2	65.0	63.4
J	58.8	57.9	64.2	66.4	67.0	60.9	66.7	65.8	58.7	58.1	66.2	66.5	65.7	63.3	69.1	66.5
AVERAGE	61.8	55.2	60.5	62.0	63.3	62.1	65.1	62.9	57.6	54.9	62.1	65.1	63.1	62.6	67.2	66.3

DISCUSSION BY L. H. LONGLEY-COOK

The accuracy of loss reserves is of great importance at the present time and company actuaries are giving more and more attention to the many problems involved in the proper determination of reserves, particularly for liability losses. It seems well to stress that reserves are definitely in the field of actuarial rather than accounting work because, as with ratemaking, we are concerned with analyzing past events so that we may determine from them what is likely to occur in the future. So long as losses are adequately reserved, there is little danger, except as a result of fraud, of the insolvency of an insurance company and the consequent suffering of claimants who are unable to collect under the policies the companies have issued.

Rightly, many regulatory officials are giving more attention to the adequacy of the reserves of companies in this age of inadequate and even nonexistent profit margins, and at least one state is asking that the adequacy of loss reserves shall be certified by a qualified actuary. Unfortunately, the property-liability insurance companies are under considerable pressure to reduce the margins in their reserves to such narrow limits that there is no proper protection against the variations between estimates and final results which are inevitable in all actuarial forecasts. These pressures come from two sources. The first is the Internal Revenue Service who in their drive to collect the maximum income tax do not appear to appreciate fully the need for safety margin in reserves. The second source is a recent development. Attorneys representing the American Trial Lawyers Association have been opposing properly indicated rate increases with many unsupportable claims, among them the claim that companies overestimate their unpaid losses so as to obtain more than adequate rate increases. These outside pressures, combined with the understandable desire of underwriters and management to show profitable results in a time when many lines have been unprofitable, have inevitably led to the careful review by many companies of their reserves and, as a result, the safety margins in reserves are, I believe, smaller than they were in the past. If this view is accepted, the 1965 results of many companies were less favorable than the published figures.

The paper presented this spring by Mr. Balcarek is particularly welcome because our recent *Proceedings* contain so little discussion of this important topic. The lesson to be learned from this paper is that haphazard variation in the adequacy of reserves from year to year can very seriously affect the underwriting results of a company and, hence, completely wrong underwriting and production plans for the future can easily result from

lack of proper attention to reserves. On the other hand, except in the case of rapid production growth, reasonable safety margins in reserves will not have much effect on underwriting results if the margins are consistently maintained.

In planning a reserve system for liability insurance, there seem to be two basic rules which I have never seen written down, although they have been repeated to me by my elders on numerous occasions. The first is that individual underwriters must not set their own reserves, particularly the incurred but not reported reserves and special reserves, since there may be too much temptation to lower reserving standards to compensate for a bad underwriting year. This follows from the general premise that if you are to be judged by your performance, it must be measured objectively. In the same way, a student cannot grade his own answers to essay type examinations. The second is that while individual claim adjusters must be corrected if they consistently set excessive or inadequate reserves, the results of loss development studies used to determine the overall adequacy of company case reserves must never be divulged to claim adjusters as this will lead inevitably to changes in individual case reserving practices. Such changes will exaggerate the previous indications when future tests are made and can lead to a snowballing result. It will take months before any great reliance can be placed on the reserve tests.

I, myself, incline to loss deficiency reserve technique described in Mr. Tapley's paper of 1956* rather than the more usual practice of modifying the incurred but not reported reserves for the over or understatement of case reserves. I believe that with a computer and more sophisticated techniques, excellent and consistent reserves can be developed; but whatever reserving method is used, reserve developments must be continuously and most carefully studied if satisfactory results are to be achieved.

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* *PCAS, Vol. XLIII,* p. 166.

BUDGETING: A SYSTEM FOR PLANNING AND CONTROLLING EXPENSES

ROBERT B. FOSTER

William F. Dowling's paper "Budgeting by Casualty Insurance Companies" was presented to this Society in May of 1942. He noted that some twenty years before budgeting was primarily used to control governmental appropriations and expenditures. He also reported on a survey which showed that about one-third of the companies were budgeting expenses in relation to a forecast of income. Budgeting had come of age and he was certain the time had come for its widespread use by casualty insurance companies.

Unfortunately, budgeting has not achieved the role predicted for it. Indeed the lack of progress is clearly evident in Francis Perryman's summation of a CAS seminar on "Modern Systems of Expense Control" held in 1958:

> "All in all, I think the companies are using what they call a modern system of expense control but which is the old time New England thrift, just watching the store a little more closely, in this time of bad underwriting results."

Progress has also been notably slow in the development of cost accounting systems the need for which was first described in our *Proceedings* in 1916 by Claude Scattergood and numerous times since.

The lack of progress is perhaps attributable to a lack of appreciation of the potential benefits and the fact that most accounting systems are hard pressed to satisfy statutory requirements. At such time as the accounting burden is shifted to the computer an opportunity is created to remedy the latter deficiency. This paper is presented with the hope that it will create an appreciation of the potential benefits of budgeting for the current generation of actuaries who may never have read Dowling's paper but may now be encouraged to do so.

Expense control has much the same connotation as thought control. It sounds unpleasant and undemocratic. Budgeting doesn't have a very good image either. For this reason, as well as to be more descriptive, budget systems are sometimes called management planning and control systems. The emphasis is on planning but the real payoff is in the control that can come from the planning. "The old time New England thrift"

linked with planning in a sound budget system can produce results. Consider two examples:

The key to General Motors success, according to a recent report,[1] is "cost awareness in every detail up and down the managerial ladder" and a budget system in which "top management expects and gets detailed reports from division people on performance as measured against agreed upon goals."

The improved profit performance of Eastern Air Lines has been described[2] as the result of careful planning in place of penny pinching. "The biggest single thing that turned Eastern around last year," said Senior Vice President Arthur D. Lewis, "was that we stopped telling our people they had to do something and started telling them, 'Here's the way we're going and here's where you fit into it.' "

Features of the more successful systems in operation today are:

1) a heavy accent on detailed planning related to long term profit objectives;
2) involvement and support of all levels of management;
3) identification of unit costs for reasonably homogeneous repetitive activities;
4) an examination of all expenses for their "cost effectiveness";
5) a detailed analysis of significant differences between actual and planned results to establish cause.

The inadequacies in budget systems may arise from any of the following:

1) lack of chief executive support;
2) lack of understanding of system;
3) little or no planning;
4) lack of a focus on profit;
5) little or no flexibility;
6) poorly defined responsibilities.

Slogans to the contrary, a company should know what it is doing right (and what it is doing wrong). It should know what policies are profitable

[1] *Business Week*—May 8, 1965.
[2] *Business Week*—March 13, 1965.

and in which geographic areas. It should know how adequate the rate levels are by state by line of insurance and by class. It should know the kind and volume of business of each of its producers and how profitable their business has been and is likely to be. It should also "know" what is likely to happen in the marketplace in the next five to ten years. What changes in claim frequencies and average claim costs can be expected? What should we do to achieve the best results possible over the long pull and in the coming year?

Management should evaluate the reasonableness of plans in relation to past results. Plans that are too ambitious may be suspect from the start and accordingly lack the full support required for maximum performance. Overly conservative plans may be achieved but the company has been deprived of gains that should have been made and flabbiness may develop that will hurt when the going gets tough.

The overall plan must be made up of detailed plans in which the objectives are translated into requirements for each of the responsibility centers (organizational entities) within the company. The head of each responsibility center should participate to the extent that he can contribute in those areas in which he is uniquely qualified.

The production potential of the company should first be assessed. This should be based on information and recommendations furnished by each field office. A determination should then be made as to the best areas for expansion and in which areas contraction is advisable. It is in this process that knowledge about the company's sources of profits and losses is applied so as to reach a marketing plan with optimum profit possibilities.

The marketing or production plan must be in a form that makes it possible for the head of each responsibility center to determine the center's work load or role in meeting the objectives. Responsibility center heads who receive service from other responsibility centers should obviously transmit their needs before the service center heads can determine their work loads.

With the company's objectives translated into the work load for his area of responsibility each center head is in a position to determine his manpower needs. These can be converted to expense dollars for salaries, salary increases, and overtime which make up the bulk of budgetable expense. Other expense requirements such as travel, toll calls, supplies, postage, dues and fees and equipment rental can also be estimated.

The quality of performance should be specified since this may affect the staffing and expense requirements. It may be possible to economize

where quality of performance or speed can be diminished without adverse effect. It makes no sense to pay the price for processing on a current basis work that is more economically handled by allowing backlogs to accumulate during peak periods.

It is considered desirable to charge centralized services to the users of the service since the users determine the volume of service provided. Where this is done it is important that the user have a voice in setting the specifications for the job to be done. This service is then "purchased" at a predetermined rate per unit of work.

By giving primary attention to the cost of processing an additional unit of work a method of allowing more budget dollars for more work is found which produces a more equitable basis for judging performance since, in most cases, the volume cannot be controlled by the head of the unit responsible for processing the work. Because of overhead costs it is apparent that wide shifts in volume will affect unit costs—and this fact must be considered—but within a narrow range of volume it is simpler and sufficiently accurate to ignore the oversimplification. This is called variable budgeting and introduces flexibility in the budget system.

The budgets for each responsibility center should be reviewed by the next higher level of management. In this review it is necessary to distinguish between those efforts and expenses necessary to meet the current year's profit objectives and those aimed at longer range goals. Whatever adjustments are made in these budgets, such as may result from projects eliminated, slowed down or deferred, there should be an understanding and acceptance by the individual responsible for achieving the agreed-upon budget results. He should accept the fact that he has contracted to produce specific results and will be held accountable for their achievement. In this way budgeting provides a communications network for translating company objectives and for transmitting them.

The effectiveness of the budget system is diminished where management fails to delegate its authority for planning and execution. Delegation is facilitated with a budget system because it provides a means of identifying responsibilities and measuring performance. Budgeting can then be made a basic part of the management job rather than an exercise for allocating expenses.

While planning is the major part of budgeting it is in fulfilling the plan that the benefits are realized. Monthly reports compare results—expenses and accomplishments—with the plans. The variances from plan indicate differences between actual and planned results and, if significant, should be

investigated. When the reasons are found, appropriate administrative action should be taken. Reports measure the performances of all the heads of responsibility centers which are accumulated for presentation to succeedingly higher levels of management. The president gets a report which identifies the results achieved by each department head who reports to him. As the plans for the year are carried out the emerging strengths and weaknesses can be traced to their sources.

Budgeting stimulates expense control because the head of each responsibility center knows what is expected of him. He is in the best position to take appropriate steps on a day to day basis to insure favorable results. Concern for expenses is communicated to each individual in the company. It becomes obvious that efficient operations are essential to improve budget performance. More effective use of everyone's time is seen to be directly related to the achievement of company goals.

The way management uses its budget system is important. If problems are not investigated and variances are not taken seriously the system is of little value. On the other hand, too much dependence on quantitative results and variances without looking for the underlying causes can lead to inappropriate action and create fear and mistrust of the system.

Blind faith in the system is not enough. As Charles R. Mortimer, General Foods Chairman, said at Columbia in 1965 while agreeing that there must be goals, plans, and organization for a large company to prosper, the essential ingredient is the "right kind of man." He added, "right decisions are what build profits and produce growth, and decisions can only be made by men."[3]

Perhaps the most compelling argument in favor of a system for controlling expenses through planning directed at specific profit goals, evaluating the resources needed to accomplish them, and reporting results which are identified with the responsibilities for achieving them is to consider the consequences of failing to do so.

DISCUSSION BY PAUL M. OTTESON

Mr. Foster's paper stresses the importance and necessity of a system of planning which will permit comparison and subsequent analysis of variations between actual results and planned results.

The lack of progress in the insurance industry concerning development of cost accounting and budget systems is attributed to two reasons:

[3] *Business Week*—May 1, 1965.

(1) lack of appreciation of the value of results, and (2) the burden of statutory accounting requirements. It seems that there might be more valid and basic reasons for this lack of progress; multiple line operations, package policies, and variations in rate levels and exposure bases might create such obstructions to homogeneity that planned results based on meaningful standards are difficult to establish. The unique characteristics of insurance operations are not considered in the paper.

Examples of how budgeting paid off are from an airline and an automobile company. An example from an insurance company together with discussion as to how success was accomplished would be more convincing.

The basis for determining the standards of planned results agreed upon between the head of each responsibility center and the next higher echelon of management could well have been explored in greater depth. Establishment of these standards is the heart of the problem; of particular interest would be the relative emphasis given to negotiating and engineering.

The subject of expense analysis and control is difficult particularly in multiple line operations. The author's appraisal of the importance of the problem is correct and further studies in greater depth would be of great value to the Casualty Actuarial Society.

AUTHOR'S REVIEW OF DISCUSSION

I am exercising the option to comment on the review of my paper by Paul Otteson because it gives me another opportunity to interest the members of the Society in a subject which has long been neglected.

Mr. Otteson believes that the difficulty in establishing planned results based on meaningful standards is a more valid reason for the lack of progress in the insurance industry in the development of cost accounting and budget systems than the two reasons which I cited. He goes on to say that the establishment of the standards is the "heart" of the problem. Unfortunately I find myself placed in the position of having to explain a concept which is found in the paper written by William Dowling* entitled "Budgeting in Casualty Insurance Companies." My paper is concerned with the need for a system and not with the techniques which might be appropriate in the various areas of insurance company operations. I share with Mr. Otteson the thought that standards are difficult to establish while differing with him on the importance of this point as it relates to being a major reason

* *PCAS, Volume XXVIII.*

for the industry's lack of progress in developing systems for planning and controlling expenses.

The two reasons I cited had to do with the lack of appreciation on the part of the industry of the value to be obtained from such a system and the burden of statutory accounting requirements. I believe the computer affords companies the means to do the job if management wants the job done.

At the time that Mr. Dowling's paper was written it was a much greater problem to develop an economically feasible system. Indeed the reviewer of Mr. Dowling's paper, Mr. W. B. Bailey,* concluded by saying that he felt "the usefulness of a budgetary plan would hardly justify the expenditures required."

My paper was intended as a brief overall description of a modern budgeting system in which considerable emphasis is placed on planning and relating expenses to the achievement of specific objectives. With several companies now developing such systems it is hoped that continuing interest in this subject will be shown by this Society.

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* *PCAS, Volume XXIX.*

GENERAL LIABILITY INSURANCE RATEMAKING

JEFFREY T. LANGE

"In its present shape it is not the only possible world"
—Paul Klee

Liability insurance is designed to protect an individual against the possibility that he will be held responsible in a court of law for injury to another's person, property, or other interests. The property owner is held responsible for accidents happening on his property if negligence can be established or legal liability exists by statute. Similarly, the contractor is held responsible for accidents that result from his operations, and the manufacturer for accidents arising from the use of his product, while the professional may even be held liable for the advice he gives. The insurance for these diverse forms of liability is provided by several lines of insurance which are generally grouped together under the title "Liability Other Than Automobile," or "General Liability Insurance." Manuals of rules and rates for general liability insurance are published by the National Bureau of Casualty Underwriters, by the Mutual Insurance Rating Bureau, and by several independent insurance companies. These rules and rates are also the basis of the liability rates appearing in the multi-peril manuals published by the Multi-Line Insurance Rating Bureau and the various state fire rating bureaus.

The rating techniques used by the general liability underwriter are in some ways similar to those used by fire underwriters despite their superficial antitheses. Both liability and fire insurance premiums are determined by a complex process in which the rates are influenced by the business of the insured occupying the premises and by risk characteristics that modify the hazard (e.g., the existence of elevators); however, the actuarial procedures used to establish the rates charged by the general liability underwriter are closely related to the other casualty lines rather than property insurance. The determination of the overall rate level change closely resembles the procedure used for automobile liability insurance, while the determination of class rates mixes techniques borrowed from both automobile and workmen's compensation ratemaking with some unique procedures. Unlike many other lines of insurance, there is no single general liability insurance rate filing in a given state. Individual rate filings are made for each subline of general liability insurance and for each coverage. The filings for individual sublines differ considerably from each other because the form of liability insured under each of them is quite different:

therefore, some knowledge of the coverage provided by the various sublines is essential in understanding the ratemaking procedures.[1] It should be noted that the ratemaking techniques discussed in this paper are those developed and used by the National Bureau of Casualty Underwriters. Similar procedures are used by the Mutual Insurance Rating Bureau in their filings.

Lines of Insurance

Although each liability line corresponds to a particular type of liability hazard, there is some overlap between lines for a particular hazard. The basic liability hazard is generally considered to be the liability which arises out of the existence of the premises occupied by the insured and his operations. There are four ways of providing this coverage:

1. Owners', Landlords' and Tenants' (OL&T) covers the liability which arises out of the existence of the premises and *necessary and incidental* operations.
2. Manufacturers' and Contractors' (M&C) covers the liability which arises out of the existence of the premises and *all* operations.
3. Farmers' Comprehensive Personal Liability (FCPL) covers premises, farm operations, and personal liability of the insured.
4. Comprehensive Personal Liability (CPL) covers premises and personal liability but not business operations of the insured.

Each of the four is a basic coverage component, or part, which is separately rated and which may be purchased by the insured as a separate policy or as an integral part of a broader liability package. The typical commercial risk would need either the OL&T or the M&C coverage; in addition, CPL coverage might be added to the basic policy by endorsement to cover the personal liability of the owner of the business.

OL&T and M&C coverages do not include liability hazards which may be separately identified and rated; for example, an OL&T policy would not cover liability imposed by a workmen's compensation statute. Such hazards may be covered by separate policies and/or by other coverage components in the basic general liability policy. In the following list those hazards which may be covered in a general liability insurance policy are listed first (items 1-7) and are followed by hazards which are covered in other liability policies. (There are other liability hazards which are generally not covered by insurance, e.g., liability resulting from war, revolution,

[1] Magee, J. H., *General Insurance* (Richard D. Irwin, 1964). Seventh ed., chap. 15.

etc.) In a few cases, a part of the hazards mentioned below is covered in the basic policy (e.g., some automobile liability coverage is given in an OL&T policy). A discussion of the details of the insuring agreements and exclusions is beyond the scope of this paper, but the following list is specific enough to indicate what type of hazard is covered by each liability line:

1. Liability arising out of the existence and use of elevators located on the premises of the insured (Elevator Liability Insurance).
2. Liability arising from the use of products sold or distributed by the insured or from operations of the insured after the insured has relinquished control over the operations (Product Liability Insurance).
3. Liability arising out of the operations of independent contractors employed by the insured (Owners' or Contractors' Protective Insurance).
4. Liability assumed by the insured under written agreement (Contractual Liability Insurance).
5. Liability resulting from the sale of alcoholic beverages (Liquor Law Liability).
6. Liability resulting from sprinkler leakage, etc. (Water Damage Liability).
7. Liability resulting from the rendering of (or failure to render) medical care or professional service (Professional Malpractice Liability).
8. Liability imposed by workmen's compensation statute (Workmen's Compensation Insurance).
9. Liability arising out of the ownership of an automobile (Automobile Liability Insurance).
10. Liability arising out of the ownership of aircraft (Aircraft Liability Insurance).
11. Liability resulting from the operation of an atomic reactor, the production of nuclear energy, etc. (Nuclear Energy Liability).

Class Rating

The variation in hazard presented by the diverse risks seeking to purchase general liability insurance necessitates a wide range of rates. Schedule rating of the type used in fire insurance rating is unknown in the general liability field. Individual risk rating techniques similar to those which apply for workmen's compensation are used for general liability insur-

ance. In addition, the experience rating plan applicable in most states provides credits and debits for certain general management characteristics such as cooperation with the insurance company. A majority of the liability risks do not develop premium and loss experience of sufficient volume to have any significant degree of credibility, and therefore fail to qualify for the application of rating plans. As a result, in most cases neither experience nor schedule rating techniques can be used to tailor the manual rate to the individual risk; therefore, general liability underwriters have relied upon the use of a large number of manual classifications in order to arrive at a premium for an individual risk which as closely as possible represents the hazard of that risk, and which needs little further modification for most risks. The rates for these numerous classes may be varied by state, or even by city, depending upon the nature of the coverage provided. For example, the class rates for Owners', Landlords' and Tenants' subline vary by rate territory, resulting in a total of over 30,000 individual manual rates.

The multiplicity of classifications coupled with the large number of sublines, each covering a specific type of liability insurance, results in a rating technique which, in end result, parallels fire schedule rating even though the techniques employed seem quite different. A typical fire rating schedule provides an extensive list of credits and debits which are used to modify the basic class rate for the risk; these credits and debits reflect various risk characteristics which have some bearing on the hazard. In rating an individual risk for general liability insurance, there is no one basic manual rate and no lengthy list of credits or debits. Instead there are a number of manual rates which apply to the risk; these rates reflect various liability hazards (line of insurance) as well as risk type and characteristics (class rates). For example, in rating the liability insurance of the owner of an individual building, the underwriter might first have to apply several different OL&T rates to provide the basic premises coverage. The section of the building used as a store by the owner would take a higher rate than that used for offices. A section of the building occupied by a tenant would be rated a still lower rate. Having applied the appropriate OL&T rates reflecting type of occupancy and location, the underwriter would then rate any other public liability hazard. For example, the owner would be charged separately for any elevators on the premises, and for the hazard resulting from products he sells. In each case, it might be necessary to use more than one class rate. The overall general liability premium reflects those risk characteristics which tend to increase or lessen the hazard, just as the overall fire premium does; however, for liability

insurance this has been accomplished by a schedule of coverages and by the use of a number of class rates for each coverage rather than a schedule of credits and debits modifying a single class rate.

There is one more significant difference between the fire and liability approaches. Whereas the credits and debits used for fire insurance must of necessity be established on a judgment basis, the various class rates used in rating liability risks may be established statistically. To assess statistically the credits and debits of a fire rate schedule, it would be necessary to apportion each individual fire loss among those risk characteristics which contributed to the loss. Since many factors influence the loss, and as the loss is destructive, this is impossible. Liability losses, on the other hand, usually result from a specific accident at a single location. Such a loss can generally be assigned to a particular subline and class.

Setting rates for the individual classes within each of the sublines is in many respects comparable to attempting to determine statistically the appropriate credits and debits in a fire rating schedule. Since the latter is considered impossible, it should not be surprising that the former is somewhat abstruse.

RATEMAKING

Each of the various general liability insurance sublines is considered independently for ratemaking purposes. The sublines are further subdivided by coverage: bodily injury, property damage, medical payments, and personal injury coverages are each rated independently. In addition, the basic limits experience is reviewed separately from excess limits. Manual rates are generally published for limits of $5,000 per person and $10,000 per accident for bodily injury coverage and $5,000 per accident for property damage coverage.[2] These rates are generally termed basic limits rates, and the charges for limits of liability above basic limits are referred to as excess, or increased limits, rates. The rate filings discussed in the following sections are filings of basic limits manual rates; therefore, premiums exclude any charges for excess limits coverages and losses are limited to basic limits (e.g., if a claimant were paid $15,000, only the first $5,000 would be included in the basic limits losses and the remaining $10,000 would be considered excess losses). The determination of excess limits charges is quite

[2] For Professional Malpractice Liability Insurance basic limits are $5,000 per person and $15,000 in aggregate. For Product bodily injury liability, and for certain property damage liability sublines, aggregate limits apply in addition to the limit per accident.

different from the determination of the basic limits rates, and a discussion of excess limits ratemaking is beyond the scope of this paper.

The ratemaker is presented with the problem of setting basic limits manual rates for a particular coverage and a particular subline. With a limited volume of statistical data, he must revise several thousand individual rates. In most cases, there are so many classes that a number of years of experience would be necessary to obtain credible experience for individual classes even on a countrywide basis. As liability loss levels are sensitive not only to inflationary trends but also to changes in the legal climate, the ratemaker should rely only on the latest data in setting rates. Finally, in many cases he must develop rates that vary by state and even by city. The result is a two-fold dilemma: to assure credibility many years of statistics should be used, but to assure responsiveness only the latest data should be used; to assure credibility the statistics for broad geographic regions should be used, but to assure responsiveness to the local situation statistics should be analyzed by state and city.

This dilemma has been solved by a rather involved procedure. The latest experience of all classes on a combined basis is used to establish the overall rate change needed in a particular state (or countrywide). This rate change is distributed by rate territory (if any) using a longer experience period. The resulting overall rate changes are then used to develop class rates by means of a procedure which gives recognition to class experience both in the state and countrywide. The complex procedures used to establish class rates for the various sublines represent an attempt to give recognition to the experience of individual classes whose data has very low credibility. This is accomplished by grouping similar classes and analyzing the experience of each group of classes in the state and the experience of the individual classes countrywide. For a typical subline the individual class rate results from an analysis of the class experience on a countrywide basis, the experience of similar classes in the state during the past five years, the experience of all classes in the rating territory during the last five years, and the experience of all classes in the state during the last year or two. The exact method of accomplishing this varies by subline of insurance.

Determination of Overall Rate Level

The first step in the development of manual rates for a subline of insurance is to determine the overall rate change. For the major sublines this is usually done on a statewide basis while for the minor sublines it is done on a regional or countrywide basis. While the ratemaking procedures

are not identical for the various sublines, it is possible to make certain general statements which hold true for most sublines.

For most of its rate filings the National Bureau uses the experience of members, subscribers, and some other companies; however, some filings include the experience of the Mutual Insurance Rating Bureau. Experience is tabulated on a policy year basis and the loss ratio method is used in ratemaking. A comparison is made between basic limits incurred losses and the premiums at present manual rates, which are computed by multiplying the earned exposures for each class in each territory by the appropriate basic limits manual rate.

The reported losses include all allocated loss adjustment expense; for ratemaking purposes they are multiplied by 1.16 to reflect unallocated loss adjustment expense. This countrywide factor is obtained from the Insurance Expense Exhibit by taking the three year average of the ratios of unallocated loss adjustment expenses to the sum of losses and allocated loss adjustment expense.[3] The losses must be adjusted to the present cost level since they will be compared to premiums at present rates. This is accomplished in two steps: first, these losses must be adjusted for subsequent changes in the level of reserves and for incurred but not reported losses, i.e., for loss development; second, the losses must be adjusted to reflect changes in the level at which claims are being paid, i.e., for the trend in average paid claim costs.

The calculation of loss development factors is accomplished in the manner outlined by Stern in "Rate Making Procedures for Automobile Liability Insurance."[4] It should be noted that for certain general liability sublines (e.g., Professional Malpractice) the loss development factors are much more significant numerically than are those shown in the example in Stern's paper.

The calculation of average paid claim cost trend factors is carried out as outlined by Benbrook in "The Advantages of Calendar—Accident Year Experience and the Need for Appropriate Trend and Projection Factors in the Determination of Automobile Liability Rates."[5] For those lines of

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[3] Separate reporting of allocated and unallocated loss adjustment expenses are required in a supplement to the Insurance Expense Exhibit.

[4] Stern, P. K., "Ratemaking Procedures for Automobile Liability Insurance," *PCAS Vol. LII*, p. 162.

[5] Benbrook, P., "The Advantages of Calendar-Accident Year Experience and Need for Appropriate Trend and Projection Factors in the Development of Automobile Liability Rates," *PCAS Vol. XLV*, p. 20. The actual calculation of a trend factor is outlined in a discussion of Mr. Benbrook's paper by R. Lino, *PCAS Vol. XLVI*, p. 301, and in Stern, op. cit., p. 172.

insurance where the exposure basis is payroll, sales, or receipts, no trend factor has been used in the past because the exposure base itself rises during periods of inflation.

At least five years of premium and loss experience at present level are available for the determination of the overall rate level change; however, in order to achieve responsiveness it is customary to use a weighted average of the loss ratios for the latest two years with weights of 30% for the earlier year and 70% for the later year. This average loss ratio is adjusted by the factor reflecting the change in the level of average paid claim costs, and it is then credibility weighted with the expected loss ratio, i.e., the provision in the rates for losses and loss adjustment expenses. The resulting loss ratio is divided by the expected loss ratio to obtain the indicated rate change.

The expected loss and loss adjustment ratio is obtained as it is in all liability lines by substracting from unity the total service and overhead expense provisions in the manual rates. For some expense items the actual amount will vary by line, i.e., inspection costs for elevator liability insurance are much greater than in other general liability lines. Taxes may differ by state, while the 5% provision for underwriting profit and contingencies is constant for all liability insurance lines in most states. These expense provisions are grouped under the following headings (with typical percentages shown in parenthesis): total production cost (25%); administration (8.5%); inspection, exposure audit, and bureau (4.5%); taxes, licenses, and fees (3%); underwriting profit and contingencies (5%).

Credibility is based upon the number of claims in the last two years. The standard for 100% credibility is 683 claims which corresponds to 95% probability of being within 7.5% of the true value for a Poisson process (see L. H. Longley-Cook, "An Introduction to Credibility Theory").[6] Partial credibilities are obtained from a table based upon the formula

$$Z = \sqrt{(\text{number of claims}) \div 683}$$

The calculation of the overall rate change may be expressed algebraically as follows:

WLR = weighted average of the loss ratios for the two most recent years

ELR = expected loss ratio

[6] Longley-Cook, L. H., "An Introduction to Credibility Theory," *PCAS Vol. XLIX*, p. 200.

T = trend factor
Z = credibility

$$\text{Rate change} = \frac{WLR \times T \times Z}{ELR} + (1.00 - Z)$$

The numerical example in Exhibit 1 illustrates the determination of the overall rate change. The actual data was drawn from a recent OL&T filing in an average sized state. As is frequently the case in general liability insurance ratemaking, the proposed rate change is somewhat less than the indicated rate change. At the rating bureaus, the proposed change is generally selected by the underwriters after a review of the indicated rate change and the individual components of the rating formula.

Classification Rates

Having established the overall rate change statewide, the next question is: How shall each class rate in each territory be modified in order to achieve the desired overall change—how should the rate change be "distributed"?

Most states are divided into rating territories for only one major subline—Owners', Landlords' and Tenants' Liability; for many other major general liability sublines, only the two or three largest states are subdivided into rate territories and for some lines, several states are combined into one rate territory.

General liability sublines are subdivided into a number of risk classifications. The two major sublines—Owners' Landlords' and Tenants', and Manufacturers' and Contractors'—are subdivided into 264 and 192 classes respectively. Due to the number and diversity of these classes, it is impossible to use countrywide differentials to a single base class (as is done for private passenger automobile insurance). While some recognition must be given to the classification experience by state in setting the rates, the experience for individual classifications by state is too sparse to permit the use of a classification relativity procedure like that used in workmen's compensation insurance.

Although there are differences in the methods of analyzing class and territory experience, the essential features are the same. The term territory relativity (or classification relativity) is generally applied to this analysis because its aim is to establish how much the individual territory (or class) differs from the average. The experience of each territory (or class) is used to the extent it is credible; the complement of credibility is applied to our "prior estimate" of the experience for that territory (or

EXHIBIT 1

DETERMINATION OF OVERALL RATE CHANGE

(1) Policy Year	(2) Premium at Present Manual Rates	(3) Basic Limits Incurred Losses Incl. all Loss Adj.	(4) Loss Development Factor	(5) Incurred Losses Including Development (3)×(4)	(6) Number of Claims	(7) Loss Ratio (5)÷(2)
1959	473,553	239,430	.98	234,641	468	.495
1960	514,836	261,620	.98	256,388	621	.498
1961	541,217	286,624	.98	280,892	501	.519
1962	593,528	312,510	.98	306,260	589	.516
1963	662,678	366,816	.99	363,148	598	.548
Total	2,785,812	1,467,000		1,441,329	2,777	.517

(8)	Weighted loss and loss adjustment ratio at present rates (30% 1962 + 70% 1963)	.538
(9)	Factor to adjust losses for average claim cost changes in subsequent 33 months based on average paid claim cost data	1.061
(10)	Product (8) × (9)	.571
(11)	Expected loss and loss adjustment ratio	.540
(12)	Credibility based on policy years 1962-1963 number of claims	1.000
(13)	Indicated change [(10) ÷ (11)] × (12) + [1.00 − (12)]	1.057
(14)	Proposed statewide rate level change	+5%

class). The average experience of all territories receives the remainder of the credibility in a territory relativity; the average for all similar classes or the countrywide experience for that class receives it in a class relativity. Algebraically, the index representing the relative experience of the ith territory (or class) may be represented as follows:

$$\text{Index} = FLR_i \div \left[\left(\sum_{i=1}^{n} P_i \times FLR_i\right) \div \sum_{i=1}^{n} P_i\right]$$

where P_i = the premium at present rates in the ith territory

FLR_i = The formula loss ratio for the ith territory

$FLR_i = Z_i \times LR_i + (1 - Z_i) \times SLR$

Z_i = credibility for the ith territory (based upon the number of claims during the past five years)

SLR = statewide average loss ratio

LR_i = loss ratio for the ith territory

In the following example, the five year loss ratios shown in column three were obtained by dividing the basic limits incurred losses (including all loss adjustment) by the premium at present manual rates:

Territory or Class (1)	Premium at Present Rates for the latest year (2)	5 Year Loss Ratio (3)	Credibility (4)	Formula Loss Ratio (5)	Index (6)
1	$ 75,203	.506	.40	.519	.961
2	69,373	.485	.60	.502	.930
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
Total or Average	662,678	.527	1.00	.540	1.000

The indices developed in the last column are a measure of how much better or worse the individual loss ratio is than the average. These indices can be multiplied by the overall rate change to determine territory (or class) rate changes to be applied to the present rates. For some lines of insurance such indices are computed independently by territory (all classes combined) and by class group (all territories combined), and a composite index is used to develop class rates within each territory.

Although the experience of major classifications will have some credibility by state, the experience of most classes will have little or no credibility by state; therefore, for several sublines, classifications have been divided into groups in which they are related to base classifications by differentials. In the classification relativity, the experience of the class group is treated as a single class and an index is developed for the group as a whole. This index multiplied by the territory rate change is used to modify the group average rate which is divided by the average differential to obtain the base rate. Class rates are determined by multiplying the base rate by the class differentials. The differentials themselves are developed from countrywide statistical experience.

A different way of using countrywide data to overcome low credibility by class by state is the introduction of "national loss ratios" in the classification relativity within an individual state. The natonal loss ratio is simply the countrywide loss ratio for the class. In the classification relativity the complement of the class credibility is applied to the class national loss ratio (adjusted to the overall state rate level) instead of the experience of all classes in the state.

Other variations in the manner of obtaining class rates are possible. In fact, each of the major sublines uses a different procedure for establishing class rates. The manner of establishing class rates is the major difference between the ratemaking procedure for each of the sublines, as the method for establishing the overall rate change for each subline varies only in minor details. For every subline, the procedure has the same general pattern: the class experience is used to the extent it is credible, and the complement of credibility is applied to the "prior estimate of the class experience." The procedural variations may best be studied by reviewing the key exhibits from the rate filings for several sublines. Attention is first directed to the two major bodily injury insurance rate filings. Following a detailed discussion of these filings the distinguishing features of ratemaking for other sublines are discussed. It should be noted that the ratemaking techniques discussed are the standard ones employed in almost all states but that some states, notably New York, employ slightly different techniques.

RATE FILINGS

Owners', Landlords' and Tenants' Bodily Injury Liability Insurance

This is the largest of the general liability sublines and probably best illustrates general liability ratemaking. The basic rate filing includes ap-

proximately 130 rate classes, including classes with several different exposure bases: area, frontage, pupil day (schools), admissions (theatre), and miscellaneous bases.[7] Rates for this subline vary not only by class but also by rate territory (of which there are almost 150). An overall rate change is established in each state using the method set forth in the previous section: the weighted average of the basic limits loss ratios for the two most recent years is adjusted for the trend in average paid claim costs and then, after reflecting credibility, compared to the expected loss ratio.

The overall rate change is then distributed by rate territory using a relativity procedure like that described in the last section. The five year average basic limits loss ratio,[8] computed using premium at present rates for each rate territory, is first credibility weighted with the statewide five year average loss ratio. This formula loss ratio is then divided by the average formula loss ratio in the state to obtain a measure of how much better or worse each individual territory is than the statewide average. The statewide rate change is multiplied by these territorial indices to obtain the indicated rate change for each territory. This two-stage rating procedure makes possible the use of the latest two years of experience for development of the statewide rate change while using a longer experience period in each territory where the statistical data is sparser and hence less credible. Credibility weighting, as explained above, permits inclusion of the experience of territories too small to be rated independently. The numerical example in Exhibit 2 illustrates this procedure:

Having established the needed rate changes by territory, the ratemaker must now determine the appropriate adjustment for each class. Since individual class experience by territory and state (and even countrywide for some classes) is so thin as to be unreliable, individual classes are grouped, based upon inherent hazard, about certain large classes for ratemaking purposes. The major class in each group is called the base class and the rates for the other classes are related to the rate for the base class through the use of countrywide rate relationships or differentials. For example, the eleven school and church classifications are grouped together with the church class as the base classification. The differentials relating the rate for each individual class to the base class are developed from an

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[7] Separate rate filings are made for certain minor OL&T classes which present unusual hazards (e.g., amusement parks).

[8] In large states only three years of data are used in setting rates by territory.

EXHIBIT 2

DETERMINATION OF PROPOSED RATE CHANGES BY TERRITORY

OL&T Bodily Injury Liability

(1) Territory	(2) Basic Limits Premium at Present Rates Pol. Yr. 1963	(3) Loss & Loss Adj. Ratio Pol. Yrs. 1959-1963	(4) Credibility Pol. Yrs. 1959-1963	(5) Formula Loss & Loss Adj. Ratio	(6) Indices (5) ÷ Tot. (5)	(7) Proposed Territory Rate Change Factor (6) × 1.050
01	382,054	.474	1.00	.474	.894	.839
02	108,201	.575	.70	.561	1.058	1.111
03	172,423	.634	1.00	.634	1.196	1.256
Total	662,678	.527		.530	1.000	1.050

Formula loss ratio = (3)(4) + [1.00 − (4)][total (3)]

analysis of countrywide statistical experience. A list of the classification groups is set forth below:

OL&T CLASSIFICATION GROUPS

Group Number	Number of Classes	Major Types of Classes Included in Group
1	3	Apartments and hotels
2	4	Offices and office buildings
3	11	Candy stores, salesrooms, etc.
4	8	Grocery stores, department stores
5	1	Supermarkets
6	2	Restaurants, bars
7	28	Clubs, pools
8	22	Miscellaneous
9	6	Hospitals, rest homes
10	11	Schools, churches
11	21	Theatres, halls
12	15	Storekeepers[9]

Within each state, the experience of the 12 classification groups is analyzed on a statewide basis using a relativity procedure similar to that used in computing territorial rate changes. The five year average basic limits loss ratio at present rates is computed for each class group. The loss ratio for the group is credibility weighted with the loss ratio for all classes to obtain a formula loss ratio. The group's formula loss ratio is compared to the statewide average formula loss ratio for all classes to determine whether the group's experience has been better or worse than average. The effect of this class grouping procedure is to permit a selected group of classes to develop its own level of rates, as a group, within the framework of the state's overall experience indications. Individually, each class would have taken a rate reflecting more closely the statewide change for all classes combined, because of its limited credibility, if this grouping procedure were not used. Exhibit 3 illustrates the method outlined above.

The group indices developed above show how much the rates for an individual class group should be changed relative to the average; the individual class differential for a class within a group reflects the proper relationship among classes; the territorial rate change combines the needed

[9] The term "storekeepers" refers to a liability insurance package; see the Owners', Landlords' and Tenants' Liability Insurance Manual, National Bureau of Casualty Underwriters, p. 211 ff.

EXHIBIT 3

DEVELOPMENT OF GROUP INDICES

OL&T Bodily Injury Liability

(1) Classification Group	(2) 1963 Premium at Present Rates	(3) 1959-1963 Basic Limits Loss & Loss Adj. Ratio	(4) Credibility	(5) Formula Loss Ratio	(6) Group Index
1	75,203	.506	.40	.519	.961
2	69,373	.485	.60	.502	.930
3	116,457	.607	.80	.591	1.094
4	57,458	.558	.60	.546	1.011
5	61,326	.737	.70	.674	1.248
6	44,185	.544	.40	.534	.989
7	49,861	.576	.50	.552	1.022
8	93,467	.390	.50	.459	.850
9	25,227	.528	.30	.527	.976
10	23,333	.420	.40	.484	.896
11	16,586	.494	.60	.507	.939
12	30,202	.474	.40	.506	.937
Total	662,678	.527	1.00	.540	1.000

overall increase with indications of the individual territory. All that remains is to combine these elements of the class rate change.

The present average rate for the class group in each territory is computed by dividing the premium at present rates for the class group by the exposures. The proposed average rate for the group is equal to this present average rate times the territory rate change times the group index adjusted for an overall rate change produced by the group indices in the given rate territory. (The group indices are computed on a statewide basis; hence, although they are balanced on a statewide basis, they need not be balanced in any given territory.) By dividing the proposed average rate by the average differential, we obtain the base rate for the group. The base rate times the class differentials gives the proposed class rates.

CALCULATION OF RATES FOR GROUP 1 IN TERRITORY 01
OL&T BODILY INJURY LIABILITY

(1) Group 1 present average rate	.400
(2) Index for Group 1	.961
(3) Rate change for Territory 01	.940
(4) Adjustment for change produced by group index in rate territory[10]	.998
(5) Group 1 proposed average rate, (1)×(2)×(3)×(4)	.360
(6) Group 1 average differential	1.200
(7) Group 1 base rate, (5)÷(6)	.300
(8) Class rates, (7)×(Class differential)	
a) Base class (differential 1.00)	.300
b) Other classes (differential .50)	.150
(differential 2.00)	.600

Manufacturers' and Contractors Bodily Injury Liability Insurance

This is the second largest general liability insurance subline. As the statistical data are of smaller volume than for OL&T certain modifications are necessary in the ratemaking procedure. Rates are currently established on a statewide basis in all states except New York, which is divided into two rate territories. In order to achieve sufficient credibility for ratemaking it is necessary to group the experience of several of the smaller states in establishing overall rate changes.

[10] $[\sum_{i=1}^{n} (\text{Index}) \ (P_i)] \div \sum P_i$ where the summations are carried out by group within each territory.

The overall statewide rate change is established in a manner identical to that for OL&T except that a trend factor is not used for M&C. The exposure basis for M&C is payroll, which tends to rise and fall with the business cycle in a manner similar to average paid claim costs.

As there are rate territories in only one state, the next step is the distribution of the rate change by class. M&C classes fall into three natural divisions: manufacturing, contracting, and all other. This division of classifications into industry groups parallels that used in workmen's compensation insurance because most M&C classes correspond (in definition) to some workmen's compensation class. Each of these industry groups is further subdivided into classification groups.

The determination of classification rates and group indices is similar to the procedure used for OL&T. The two major exceptions are the subdivision of classes on two bases—industry group and class group—and the use of national loss ratios. These modifications of the procedure used for OL&T are necessary for two reasons. First, the volume of M&C experience is less than that of OL&T; hence, the credibility for each M&C class group will be smaller, and in fact most class groups will have much less than 100% credibility in each state. Second, the differences within any state in relative hazard among the various types of M&C risks are greater than the differences among the various OL&T risks.

For OL&T the principal hazard arises out of the existence of the premises, while for M&C the principal hazard may come from the existence of the premises (e.g. a manufacturing risk), or from the operations performed away from the premises (a servicing risk), or equally from both (a contracting risk). Thus, the measure of difference in hazard due to the location of the premises is more important for OL&T than for M&C where the principal hazard may arise from the operations of the risk away from the premises; hence, for OL&T most states are divided into rate territories while for M&C they are not. On the other hand, the measurement of differences in hazard among classifications (and groups of classifications) is more vital for M&C than for OL&T since there is a greater diversity in type of hazard among classes. As the volume of experience is limited for M&C, it is necessary to construct a rating procedure which makes the greatest possible use of experience by class.

The differences between the OL&T and M&C rating method involve the following problem: if the class group lacks 100% credibility, to what should the complement of credibility be applied? If we cannot rely on the data developed for the class group, what data should be used to esti-

mate the rate change for the class group? For OL&T, the answer was the experience for all classes; however, this would be inappropriate for M&C with its diverse risk types. Two answers seem possible. The experience for the class group for some broader geographic region (perhaps the entire country) might be used, or the experience of some broader group of classes in the given state might be used.

M&C ratemaking techniques used in the past have incorporated specific instances of both of these possibilities. The following paragraphs describe a ratemaking procedure which has been suggested for use in the future. It includes the techniques used in past M&C rate filings augmented by some borrowed from recent OL&T rate filings.

The distribution of the rate change by class is carried out in two steps. First, the rate change is apportioned among the three industry groups. Then, the change is distributed among the class groups within each industry group.

One novel technique incorporated at several stages of the calculations is a three-way credibility weighting procedure. The credibility for a given class group is applied to the loss ratio for that group and the complement of credibility is applied to the average of two other loss ratios: the national loss ratio for the group and the statewide average loss ratio for some broader group of classes.

This technique is illustrated by distribution of the rate change by industry group. Before the national loss ratios can be used in the calculations they are adjusted to the average level of the experience in the state. This step eliminates any bias which might be introduced by the use of countrywide data reflecting an average loss level different from that in the state. These adjusted national loss ratios are computed by multiplying the national loss ratio by the ratio of the average state loss ratio to the average national loss ratio. Algebraically, the calculations may be represented as follows:

P_i = State premium for industry group i
LR_i = State loss ratio for industry group i
NLR_i = National loss ratio for industry group i
NLR'_i = Adjusted national loss ratio for industry group i

$$NLR'_i = NLR_i \cdot \left(\sum_{i=1}^{n} P_i \times LR\right) \div \left(\sum_{i=1}^{n} P_i \times NLR_i\right)$$

Z_i = Credibility for industry group i
FLR_i = Formula loss ratio for industry group i

EXHIBIT 4

DETERMINATION OF INDUSTRY GROUP RATE CHANGES

M&C Bodily Injury Liability

Industry Group	1963 Premium at Present Rates	1959-63 Basic Limits Loss & Loss Adjustment Ratio			1959-63 Credibility	Formula Loss Ratio	Index	Industry Group Rate Change
		State	National	Adjusted National				
Manufacturing	379,817	.578	.527	.540	1.00	.578	1.070	1.124
Contracting	212,740	.482	.523	.536	.80	.492	.911	.957
All Other	70,121	.461	.496	.508	.70	.478	.885	.929
Total	662,678	.535	.522	.535		.540	1.000	1.050

$$FLR_i = Z_i\, LR_i + (1 - Z_i) \times [NLR'_i + (\sum_{i=1}^{n} P_i \times LR_i) \div \sum_{i=1}^{n} P_i] \div 2$$

$$\text{Index} = FLR_i \div (\sum_{i=1}^{n} P_i \cdot FLR_i \div \sum_{i=1}^{n} P_i)$$

The rate change for each industry group is determined by multiplying the index for the group by the statewide rate level change. In the numerical example in Exhibit 4, a 5% statewide rate change has been assumed:

The rate changes by industry group are then distributed among the classification groups using a very similar three-way credibility weighting procedure. The formula loss ratio is computed by applying the credibility to the class group loss ratio and applying the complement of credibility to the mean of the adjusted national loss ratio for the class group and the *industry group* loss ratio for the state. A group index is obtained by dividing the class group formula loss ratio by the average industry group formula loss ratio. The rate change for the group equals the product of the industry group rate change and the group index. From this point on class rates (Exhibit 5) are obtained by multiplying the class group rate change by the present average rate, and dividing the product by the average differential. The resulting base rates times the class differentials yield the class rates.

Elevator Bodily Injury Liability Insurance

Rate making for this line is distinctive in two major respects: the special treatment in ratemaking afforded inspection costs, and the mixture of loss ratio and pure premium techniques in rating. Inspections are a major feature of elevator insurance; in fact, the cost of inspections exceeds the cost of paying claims. Inspection costs, unlike loss costs, are not subject to chance variation. Like other expenses, they are computed on a countrywide basis; however, inspection expenses do vary by type of elevator. An individual rate is determined from the inspection pure premium which applies uniformly countrywide by type of elevator, from the loss pure premium which varies by state by type of elevator, and from the countrywide percentage provision for expenses other than inspections.

Although the individual class rates are computed using the pure premium approach, the overall state rate change (Exhibit 6) is computed using the loss ratio approach. The method used is identical to that described for other lines except for the treatment of inspection cost. A two year weighted average loss ratio is adjusted for trend and credibility as under the standard procedure. To this rate level (or formula) loss ratio

EXHIBIT 5

DETERMINATION OF CLASS RATE CHANGES

M&C Bodily Injury Liability

Class Group	1963 Premium at Present Rates	1959-63 Basic Limits Loss & Loss Adjustment Ratio			1959-63 Credibility	Formula Loss Ratio	Index	Class Group Rate Change
		State	National	Adjusted National				
Manufacturing								
1	75,203	.506	.556	.569	.40	.547	.945	1.062
2	69,373	.485	.512	.524	.60	.511	.883	.992
3	116,457	.607	.529	.542	.80	.598	1.033	1.161
4	57,458	.558	.541	.554	.60	.561	.969	1.089
5	61,326	.737	.492	.504	.70	.678	1.171	1.316
Sub Total	379,817	.578	.527	.540		.579		1.124
Contracting								
6	44,185	.544	.512	.524	.40	.519	1.051	1.006
7	49,861	.576	.524	.537	.50	.543	1.099	1.052
8	93,467	.390	.537	.550	.50	.453	.917	.878
9	25,227	.528	.488	.500	.30	.502	1.016	.972
Sub Total	212,740	.482	.523	.536		.494		.957
All Other								
10	23,333	.420	.457	.468	.40	.447	.939	.872
11	16,586	.494	.490	.502	.60	.489	1.027	.954
12	30,202	.474	.530	.543	.40	.491	1.032	.959
Sub Total	70,121	.461	.496	.508		.476		.929
Grand Total	662,678	.535	.522					1.050

EXHIBIT 6

DEVELOPMENT OF PROPOSED RATE LEVEL CHANGE

Elevator Bodily Injury Liability

(1) Policy Year	(2) Basic Limits Premium at Present Rates	(3) Basic Limits Incurred Losses Incl. Loss Adjustment	(4) Number of Claims	(5) Basic Limits Loss & Loss Adjustment Ratio (3) ÷ (2)	(6) Policy Year Weights	(7) Weighted Loss & Loss Adj. Ratio Σ[(5) × (6)]
1962	$437,748	$104,564	163	.239	30%	.220
1963	467,375	99,302	144	.212	70%	

(8)	Expected loss, loss adjustment, and inspection cost ratio	.564
(9)	Present provision for inspection costs	.361
(10)	Present provision for loss and loss adjustment, (8) – (9)	.203
(11)	Proposed provision for inspection costs	.384
(12)	Weighted loss and loss adjustment ratio, Col. (7)	.220
(13)	Factor to adjust losses for average claim cost changes in subsequent 33 months based on average paid claim cost data	1.092
(14)	Product, (12) × (13)	.240
(15)	Credibility based on policy year 1962-63 number of claims	.60
(16)	Rate level loss ratio, (14) × (15) + (10) × [1.00 – (15)]	.225
(17)	Proposed loss, loss adjustment, and inspection cost ratio, (11) + (16)	.609
(18)	Proposed rate level change, [(17) ÷ (8)] – 1.000	+8.0%

is added the proposed provision for inspection costs,[11] expressed as a ratio to premium. The combined loss and inspection ratio is compared to the expected provision to produce the proposed overall rate level change.

In the development of the class rates, the loss and inspection portions of the rate change are treated independently. Actual loss pure premiums are compared to underlying loss pure premiums to determine indicated changes by class. These indicated changes are credibility weighted with the average indicated change for all classes combined using the standard credibility weighting procedure. From these formula changes indices are computed by comparing the change for the individual class to the change for all classes. (The resulting indices correspond to the indices computed by class group for other lines.) The indices are multiplied by the proposed change in the loss provision in the rates (the statewide rate level, or formula, loss ratio divided by the provision for losses) and the product is applied to the underlying loss pure premiums. The resulting loss pure premiums are added to the proposed countrywide inspection pure premiums by class to obtain the loss and inspection pure premium for the class which is divided by the provision for losses and inspections to obtain the proposed manual rate. An example of these calculations is shown in Exhibit 7.

Product Bodily Injury Liability Insurance

The rating procedure currently used for this line is interesting in that it is the same as the procedure used for all lines with a relatively low premium volume but a large number of classifications. Rates are established on a countrywide basis using a two step procedure: first the overall rate change is computed, and then this change is distributed by classification.

The overall change is established using a technique like that for M&C: a two year average loss ratio is credibility weighted with the expected loss ratio and the result is divided by the expected loss ratio to obtain the overall rate change. The distribution of this change by class follows the procedure set forth in the first section of this paper: the five year average loss ratio for each class (or group of classes) is credibility weighted with the five year average for all classes to obtain a formula loss ratio; the formula loss ratio is divided by the average to obtain indices to which the overall rate change is applied to obtain rate changes by class.

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[11] The provision in the rate for inspection costs is obtained by comparing the sum of the exposures by class times the inspection pure premiums with the premium at present rates.

EXHIBIT 7
DEVELOPMENT OF PROPOSED CLASSIFICATION RATES
Elevator Bodily Injury Liability

(1) Class Code	(2) Pol. Yr. 1963 No. of Elev.	(3) Pres. Manual Rate	Countrywide Inspection Pure Premium (4) Pres.	(5) Prop.	Loss and Loss Adj. Pure Premiums (6) Underlying Present Rate (3) × E.L.R. (a) − (4)	(7) Actual Pol. Yrs. 1959-1963 Combined	(8) Indicated Change (7)/(6)
002	16	$ 63.00	$26.70	$26.70	8.83	4.20	.476
005	51	164.50	58.50	75.00	34.28	75.74	2.209
006	162	43.50	20.00	23.60	4.53	22.99	5.075
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
Total	6,659				14.14	12.73	.900

DEVELOPMENT OF PROPOSED CLASSIFICATION RATES
(Continued)

(1) Class Code	(8) (7)/(6)	(9) Credibility No. of Claims Pol. Yrs. 1959-1963 Combined	(10) Formula Change (8) × (9) + Total (8) × [1.0 − (9)]	(11) Index (10)/Total (10)	(12) Col. (11) on Proposed Loss Level (b)	(13) Formula Loss & Loss Adj. Pure Premium (6) × (12)	(14) Prop. Manual Rate (c) (5) + (13) / E.L.R. (a)
002	.476	.10	.858	.910	1.009	8.91	$ 63.00
005	2.209	.20	1.162	1.232	1.366	46.83	216.00
006	5.075	.30	2.153	2.283	2.530	11.46	62.00
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
Total	.900		.943				

(a) Expected loss, loss adjustment, and inspection cost ratio = .564

(b) Column (12) = Column (11) × $\frac{\text{Proposed provision for loss and loss adjustment, .225}}{\text{Present provision for loss and loss adjustment, .203}}$ = 1.1084

(c) Rounded to the nearest dollar

The Product rate filing differs from other filings of this type in that it includes two sections which are actually almost independent filings. Separate overall rate changes and class relativities are computed for completed operations classes and for all other classes. Countrywide statistics are used in most of the filing; however, separate rates are established for a few classifications in New York by using New York statistics.

Comprehensive Personal Liability

This is a personal liability package that was introduced several years prior to the Homeowners' package. It is chiefly interesting from the ratemaking viewpoint in that it is an exception to the loss ratio ratemaking techniques used for other lines. Rates are generally established on a statewide basis using a pure premium approach. A formula pure premium is established statewide in the same way as a formula loss ratio is computed; i.e., a two year average pure premium reflecting trend is credibility weighted with the underlying pure premium. The sum of the formula pure premium and an expense constant is divided by the appropriate expected loss ratio to obtain the indicated rate. (If the rate is sufficiently large no expense constant is included in the calculations.) An identical procedure is used for Farmers' Comprehensive Personal Liability Insurance.

Professional Malpractice Liability Insurance

These sublines differ from most other general liability sublines in that they have a very small premium volume and few rate classes. Rates for these sublines often vary substantially by state because the public's attitude toward bringing malpractice suits to court varies widely from one region to another. Although malpractice cases are quite common in most states there are some states in which such cases are virtually unknown.

The paucity of data has precluded the adoption of any standard ratemaking formula. In general, basic limits losses reflecting loss development are divided by premium at present manual rates in order to obtain basic limits loss ratios for a period of from five to ten years. An overall rate change is determined based upon these loss ratios and a large measure of underwriting judgment. Classification relationships are usually determined on a countrywide or regional basis after a review of loss ratios and other relevant information.

Physicians and Surgeons: The overall rate change is determined separately for each state. Rate realtionships among classes are determined on a countrywide basis.

Dentists: Same as Physicians and Surgeons.

Lawyers: Same as Physicians and Surgeons.

Druggists: Rates are established for two groups, each made up of a number of states, with separate overall rate changes and rate relationships in each group.

Hospitals: States are grouped according to the immunity status of hospitals in the state. There are three groups: states in which charitable hospitals enjoy complete immunity from liability suits for malpractice, states where the immunity is only partial, and states in which there is no immunity. Overall rate changes are established more or less independently for each group. In addition, several large states are rated apart from these groups.

Miscellaneous Medical Malpractice Classifications: The malpractice manuals display rates for a number of classifications which develop almost no premium volume at this time. These rates are established on a countrywide basis from a review of basic limits loss ratios using a large measure of underwriting judgment.

Other Lines

There are a number of other general liability sublines. Most of the other bodily injury rate filings resemble the Product rate filing: rates are established on a countrywide basis with a classification relativity like that used for Product. Property damage liability insurance is usually rated on a countrywide basis, and most such filings closely resemble the Product bodily injury filing. The exception is the Manufacturers' and Contractors' property damage filing which is similar to the M&C bodily injury filing.

Special Multi-peril Policy Program

The liability rates appearing in the commercial package policy manuals that have been published in recent years are based upon the rates appearing in the various general liability insurance manuals. SMP liability rates are generally developed for a single limit of liability applicable to both bodily injury and property damage coverages in excess of basic limits, and are often computed on a three year basis, rather than on an annual basis. They are developed using the ordinary manual rates (R), increased limits factors (I), single limit discount (D), and term discount (T) along with an overall package discount (P) developed on a judgment basis for the program in question.

Package rate $= P \times T (D \times I_{BI} \times R_{BI} + D \times I_{PD} \times R_{PD})$ where P,T, and D are expressed as multipliers equal to unity minus the actual discount.

It is interesting to note that although SMP liability rates are still developed directly from the corresponding general liability rates, the SMP experience data is not included in the general liability ratemaking process.

CONCLUSION

The general principles that underlie ratemaking for all general liability lines are the same as those used for other casualty lines. Both premiums and losses are adjusted to current levels; care is taken to reflect trends in the development of claims and their costs. Class rates are determined after a formula analysis of the statistics for individual classes and groups of classes with credibility playing a major role. Most differences between ratemaking for general liability and ratemaking for other casualty lines (and most differences among general liability sublines) are manifested in minor details of procedure. The unique features of general liability ratemaking are the grouping of classifications about certain base classifications for the determination of class rates, and the credibility weighting of state and national data to obtain estimates of a class group's experience in an individual state.

General liability ratemaking procedures are in a constant state of flux. The use of classification groups in rating OL&T was introduced in 1961 and the procedure was modified in 1963. Credibility weighting procedures involving national loss ratios have been used sporadically for OL&T and M&C over the last ten years. In many of its details the procedure described in this paper for M&C represents a departure from past procedures. The various techniques described are examples of the ratemaking procedures used for general liability insurance and do not represent the final method, or only method, of rating the sublines involved.

It is interesting to note that the diverse and changing procedures used for general liability insurance ratemaking have produced very satisfactory results in the past. National Bureau member companies have shown an underwriting profit for these sublines in eight of the last ten years, and achieved an average profit of 4% in the last decade.

DISCUSSION BY PHILIP PRESLEY

One of the more tedious and even discouraging tasks facing the student preparing himself for an actuarial career is gaining an understanding of the various ratemaking systems being used in property and casualty

insurance. His search for the rationale and background behind the numerous steps in the ratemaking process may take him through rate filings (assuming he can readily obtain them) and through thick files. Even then he may not have all of his questions answered. A paper such as Jeffrey Lange's "General Liability Ratemaking" is therefore indeed welcomed. Here, a single source provides a broad outline of the ratemaking systems used in a major line of insurance, and in turn gives direction for further research and study.

After reading Mr. Lange's paper, one does not envy the task confronting the general liability ratemaker. The small volume of experience with which he must work would seemingly preclude any meaningful application of "scientific ratemaking." For example, in the illustration of the overall O. L. & T. rate change calculation in "an average sized state," the premium in the latest policy year is only $662,678. I am sure that a large number of companies write more automobile premium than this in single rating territories, and many times this amount in single states. Yet, this volume might well be considered insufficiently credible to use as a sole base for their own rates.

The magnitude of these problems becomes even more apparent when one considers that these relatively small volumes of premium may be spread, in the case of O. L. & T., over as many as 264 risk classifications as well as several rating territories. It is ample tribute to the various methods developed over the years by the people at the N.B.C.U. and other rating organizations, when it can be said that an underwriting profit has been realized in the general liability sublines in eight of the last ten years. Few other casualty lines can make such a boast. I might add that this fact about the profitability of general liability insurance becomes especially intriguing in the face of Mr. Lange's comment relative to the proposed statewide rate level change for his O. L. & T. example: "As is frequently the case in general liability insurance ratemaking, the proposed change is somewhat less than the indicated rate change."

The problem of low credibility classes or territories is, of course, common to almost all lines of casualty and property insurance. In the field of workmen's compensation, for example, studies are currently being made in an attempt to make the rates of the no credibility or "non-reviewed" classifications more responsive to their own experience. A partial step in this direction was taken, as noted in R. M. Marshall's "Workmen's Compensation Insurance Ratemaking" (1961 revision), when the credibility criteria were lowered. However, there is still a residuum of classifications in

each state which receive little direct credit for their own experience. The final answers have not yet been found and much work still remains to be done. We can hope that approaches such as those used in general liability ratemaking will generate ideas which can be applied to other lines.

While Mr. Lange has presented us with a very valuable addition to our *Proceedings,* I would be failing in my obligations as a reviewer if I, as a student, did not also comment on its shortcomings. A paper such as this, which will be used as a text for those entering the actuarial profession and as a reference source for those who wish to learn more about general liability ratemaking, should have each important step in the procedure accompanied by appropriate exhibits and examples. This allows the reader to work through the various steps, effectually recreating the rate revision as he reads through the material. Ideally, it should show all of the information which would be contained in a typical rate filing, as well as appropriate supplementary information, even if this were to be, as in the present case, for a single subline.

In his apparent quest for brevity and conciseness, Mr. Lange unfortunately omitted many details which would have permitted a greater appreciation and understanding of general liability ratemaking. He stated, for example, that the calculation of the loss development factors followed the procedures outlined by Phillipp Stern in "Ratemaking Procedures for Automobile Liability Insurance"[1].

With reference to the exhibit showing the determination of the overall O. L. & T. rate change, however, this reference to the calculation of loss development factors does not answer many of the questions which come to mind, especially to students of the Society. For example, the four policy years 1959 to 1962 all have the same loss development factor. Does this mean they are at the same valuation? If not, what are the respective valuations? Another question might be to what valuation are these losses developed? Finally, we might inquire what data is used to calculate the loss development factors. Is it countrywide or regional or state O. L. & T. experience? Does it include other sublines, say M. & C.?

While the answers to these questions may be relatively obvious to many actuaries, to students like myself they may not be quite so clear. Unfortunately, the material contained in this paper is insufficient to draw any definite conclusions. Two other examples come to mind:

1. First, the description of the average paid loss trend factors is lim-

[1] *PCAS, Vol. LII* (1965), page 139.

ited to a reference to Paul Benbrook's paper in the *Proceedings*[2] and Richard Lino's review.[3] The calculations shown in those sources are designed primarily for calendar-accident year data, however. While the transition to a policy year base would not be particularly difficult for the reader to make, it would have been helpful had an actual calculation been shown. And, as in the case of the loss development factors, there is no indication as to what paid loss experience is used.

2. Secondly, it is not intuitively obvious why some sort of trend factor should not be used for those sublines where the exposure base is payroll. While inflationary pressures admittedly affect both claim costs and wages, the effect is not necessarily the same. Claim values are tied in part to medical costs which have been spiraling at a rate much greater than the economy as a whole. The outlook in the near future is perhaps even worse. Pain and suffering awards have been increasing rapidly. While the use of basic limits losses does have a truncating effect on the inflationary increase in claim costs, the payroll limitation has a similar effect on payroll, especially in the handful of states still using the $100 rule. These problems have undoubtedly received the attention of the staff and committees of the National Bureau, but it would have been informative to give a more expanded treatment to this problem.

In spite of the above examples and the other areas in which one might have wished a more detailed treatment, Mr. Lange has presented a valuable paper for both students and actuaries, providing good insights into the problems and procedures of general liability ratemaking. Such papers have, however, the discouraging tendency to become outdated in an amazingly short time. As Mr. Lange says in his conclusion, "General liability ratemaking procedures are in a constant state of flux." We sincerely hope that he will provide us with frequent supplements to this paper.

DISCUSSION BY S. C. DU ROSE

The author presents an explanation of general liability insurance rate making and rate filing procedures of the National Bureau of Casualty Underwriters. To this extent, the paper is of substantial value to the student or other interested person.

In my initial reading of the paper, I was bothered by the absence

[2] *PCAS, Vol. XLV* (1958), page 20.
[3] *PCAS, Vol. XLVI* (1959), page 301.

of a definition of the terms used by the author. For example, the term "line of insurance" apparently is used at the beginning of the paper in the same sense as the term "subline of insurance" in the latter part of the paper. It would have been most helpful in my reading if the author had in the beginning presented a statement of the purpose and scope of the paper and a statement or definition of the terms to be used.

In respect to the author's discussion of rating techniques and class rating I believe that he has inadvertently broadened the scope beyond that which can be treated effectively in a single dissertation. Several points which are important to an understanding of the rationale are left unexplained. In some cases, he tended to be too general or nonspecific in the use of terms in places wherein a specific statement or precise term would be required to make the statement accurate or convey the proper meaning. As an example, the author makes the statement that liability and fire insurance rates "are influenced by the business of the insured occupying the premises. . . ." In my opinion, it would be more correct to state that rates are influenced by the "hazard" of the insured. The hazard is the quantity that the rate attempts to measure. Reference is made to "liability" imposed by workmen's compensation insurance statutes. A more precise description might be to use the phrase "obligation imposed by the Workmen's Compensation Insurance Statutes." In its common usage, liability contemplates payment for injury as a result of negligence of the insured whereas workmen's compensation insurance is founded on the premise that payment be made irrespective of negligence.

In the discussion of class rating, the author states that the experience rating plan applicable in most states provides credits and debits for certain general management characteristics. I believe that a more accurate explanation would be that a premium modification based on management characteristics is provided by the schedule rating plan. The experience rating plan would generally provide for premium modification based on a formula which involves the premiums and losses developed by the risk in a specified period of time.

The author attempts to draw a parallel or analogy with fire insurance rating schedules. Apparently he is referring to the Mercantile Schedule commonly used in the eastern part of the United States, but he has failed to so identify the schedule to which he refers. While his rationalization may be accurate and true in respect to the Mercantile Schedule, in my opinion it is not appropriate with respect to the Analytic System for the Measurement of Relative Fire Hazard, otherwise known as the Dean

Schedule, which is used in some 20 midwestern states. His discussion may be somewhat more appropriate in relation to the General Basic Schedule in use in several western states but probably still lacking the degree of accuracy or precision desirable.

The opportunity to explain or define the basis for conclusions presented are frequently overlooked. The author states that it is considered statistically impossible to determine the appropriate credits and debits in a fire rating schedule, but he offers no statement or explanation as to why this may be true. In a similar fashion, he states that "Individual risk rating techniques similar to those which apply for Workmen's Compensation are used for general liability insurance" without identifying the specific individual risk rating techniques to which he is referring.

In general, there is no description or explanation of the exposure base to which the rate is applied to produce premium. That which is given is usually nonspecific. No mention is made of the rate making problems involved with the use of fixed exposure bases such as area or frontage. I believe that this paper would be much more crisp and informative and to the point if the author would have presented a brief discussion of the various exposure bases and how such are involved in the rate making process.

The rate making procedure suggested for manufacturers and contractors liability insurance which incorporates a national loss ratio factor would appear to be vulnerable to attack on the basis that loss ratio reflects the relationship of premiums to losses but does not necessarily reflect the emergence of or trends in claims and losses. If the suggested plan were to be followed, the rate level of a given state would be pitched to the degree of inadequacy or excessiveness of rate levels of other states without consideration of the existence of a correlation between rate levels and loss costs.

It is my opinion that the presentation suffers by reason of the inclusion of the author's attempt to rationalize or compare general liability insurance rate making with fire or workmen's compensation insurance rate making. The paper does have value and is a contribution to the works of the Society in respect to the discussion of general liability insurance rate making.

AUTHOR'S REVIEW OF DISCUSSION BY MR. DU ROSE

Mr. S. C. Du Rose has made a number of suggestions for the improvement of my paper on general liability insurance ratemaking. Since most

of his suggestions are of a stylistic nature, I will simply attempt to explain briefly the motivation for the phraseology used in each instance.

Mr. Du Rose mentions the nonspecificity of my terms, exemplified in the phrase that liability and fire insurance rates "are influenced by the *business** of the insured occupying the premises." The classification plan for the various general liability coverages identifies classes by type of business, e. g. meat market, department store, etc., and makes no mention of the differing hazards involved. My phraseology was drawn directly from this source. Similarly, the exclusion of workmen's compensation coverage is mentioned under the General Rules exclusions of the General Liability Manual in the following words:

> "any obligation for which the insured or any carrier as his insurer may be held *liable** under any workmen's compensation, unemployment compensation, or disability benefits law . . ."[1]

My own stylistic considerations caused me to use parallel phrasing at the beginnings of several paragraphs, and the word "liability" appears in all of these, including the one mentioning the workmen's compensation exclusion.

Mr. Du Rose points out that my statement about the use of the experience rating plan would be more correct by referring to it as the schedule rating plan. There is no separate schedule plan for general liability insurance; rather there is a schedule rating section in the General Liability Experience and Schedule Rating Plan.

I am pleased to find that Mr. Du Rose agrees with my analogy between general liability ratemaking and fire rate schedules, at least for some schedules. His criticism as to the incomplete appropriateness of this relationship is well-taken, but we are at least in theoretical agreement about the accuracy of my point with respect of the Mercantile Schedule for fire insurance rating in use in the East.

My lack of explanation or definition at various points may be justified by my assumption of familiarity with other papers on related subjects in the *Proceedings*. Opinions as to whether or not it is statistically possible to determine the appropriate credits and debits in a fire rating schedule have been exhaustively treated by Mr. Kenneth L. McIntosh in his paper in Volume XLVIII of the *Proceedings,* in which he states: "Any suggestion that the charges and credits of any fire rating schedule are or can

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* Mr. Lange's italics.

[1] *Manuals of Liability Insurance.* (National Bureau of Casualty Underwriters) p. 3.

be rigorously computed from actuarial data would be absurd under present circumstances."[2] Similarly, the matter of exposure bases is the subject of Mr. Paul Dorweiler's presentation of 1930,[3] still required reading for students taking the Society's fourth Associateship examination.

Finally, Mr. Du Rose's criticism of the national loss ratio used in Manufacturers' and Contractors' ratemaking perhaps stems in part from a misunderstanding of the adjusted national loss ratio. The M & C portion of my paper states in part:

> "Before the national loss ratios can be used in the calculations, they are adjusted to the average level of the experience in the state. This step eliminates any bias which might be introduced by the use of countrywide data reflecting an average loss level different from that in the state."

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[2] McIntosh, K. L. "Mathematical Limits to the Judgment Factor in Fire Schedule Rating." *PCAS XLVIII*, p. 131.

[3] Dorweiler, P. "Notes on Exposures and Premium Bases". *PCAS XVI*, p. 319.

THE 1965 STUDY OF EXPENSES BY SIZE OF RISK

GEORGE D. MORISON

INTRODUCTION

This report is a chronological presentation of the steps taken from the time of the first indication that a study of expenses was in the offing until, three years later, the deliberations of no less than six committees culminated in a complete revision of the expense provision used in workmen's compensation ratemaking.

By so chronicling these actions and interspersing an explanation or opinion, where necessary, for a more complete picture, a coherent description of the expense study by size of risk is made available in a single, most accessible source. To complete the presentation, without impeding unnecessarily the flow of the narrative, those documents which contain the most important details of the study are provided in the Appendix.

BACKGROUND

In 1949 a study of expenses by size of risk was undertaken by the insurance industry, at the behest of the National Association of Insurance Commissioners, to obtain information against which the existing graduation of expenses, applicable to workmen's compensation, could be measured. The background and details of this study are ably described by M. H. McConnell in "The Expense Study By Size of Risk" published in Volume XXXIX of the *Proceedings* of the Casualty Actuarial Society. Notable results of this earlier study include, in workmen's compensation, the introduction of the Three-Year Fixed Rate Program and the wider acceptance of expense constants.

In 1961, and again in 1962, in approving workmen's compensation rate revisions, the New York Insurance Department commented on the need for another study of expenses by size of risk. In letters from the Superintendent of Insurance to the general manager of the New York Compensation Insurance Rating Board, approving these two rate revisions, the following statements were made:

> "While some recognition has been given to reduced costs, this is an area which should be given further study. Further research into the expense problem, along with the continuing study of the ratemaking process is expected of the Compensation Insurance Rating Board."

> "We believe it is necessary that the Board formulate and submit in

the coming months a new program which will reexamine Workmen's Compensation expenses as they appear in the ratemaking process."

The Rates Committee of the New York Compensation Insurance Rating Board, recognizing that expenses are countrywide in scope and application, adopted a resolution, on June 22, 1962, recommending, to the "appropriate rating organizations," that steps be taken to implement a study of expenses by size of risk. The National Council on Compensation Insurance accepted this assignment, expanded its Special Committee on Ratemaking from six to ten members for purposes of this study, and (several months thereafter) unobtrusively began referring to this group as the Committee to Study Expenses by Size of Risk. The National Council's agreement to undertake such a study of expenses was duly reported to the National Association of Insurance Commissioners in a letter from the general manager to the chairman of the Fire, Marine, Casualty and Surety Committee, dated December 4, 1962, and identified as Exhibit A in the Appendix which follows.

Shortly after this report of the National Council was accepted at the December 1962 NAIC meeting, a Subcommittee of Technicians was appointed to represent the Commissioners for this study. On formation, this subcommittee was chaired by New York and included representatives from Connecticut, Florida, Massachusetts, Minnesota and Texas.

PRELIMINARY MEETINGS

On January 29, 1963, this recently appointed F-3 Subcommittee of the Fire, Marine, Casualty and Surety Committee of the National Association of Insurance Commissioners met with the National Council Committee to Study Expenses by Size of Risk. At this meeting the industry representatives were asked to prepare a statement on the scope of the proposed study. On April 1, 1963, such a statement was sent to the New York Insurance Department with the following points optimistically expressed:

1. The study will include workmen's compensation, automobile liability, and general liability. (The lines of insurance other than workmen's compensation had been added voluntarily by the National Bureau of Casualty Underwriters and the Mutual Insurance Advisory Association.)

2. All members of the National Council with compensation writings in excess of $5,000,000 will be requested to participate in the study. Companies may submit data on a "group" basis.

3. Commissions, loss adjustment expense, and investment expense will be excluded.
4. For workmen's compensation, companies may use their country-wide distribution of premiums by size of risk which was prepared for the National Council 1962 study.
5. Paid expenses, rather than incurred, will be studied.

There then followed a two-page extract from the 1949 study of expenses by size of risk outlining proposed methods of allocating and distributing various types of expenses. Two notes were appended to justify the conclusion that loss adjustment expense and commissions should be excluded.

This industry statement led to questions by the NAIC representatives which were discussed at another joint meeting on May 23, 1963. This meeting resulted in an expanded industry presentation, dated June 11, 1963 (Exhibit B), designed to resolve the lingering doubts in the minds of the F-3 members. Painstaking effort was expended in trying to convince the NAIC subcommittee, through this industry statement, that commissions should not be included in the study of expenses by size of risk. The main thrust of the arguments centered around the budgetary nature of the provision for acquisition costs in ratemaking. When the F-3 group met in Seattle on June 18, representatives of the National Association of Insurance Agents, the National Association of Insurance Brokers, and the National Association of Casualty and Surety Agents made personal appearances to urge the exclusion of commissions from the forthcoming study. These efforts proved fruitless, however, when the parent Fire, Marine, Casualty and Surety Committee, with two of fourteen representatives dissenting, accepted its subcommittee's report which insisted that commissions be studied.

It is reasonable to conclude that the Barrett-Russo controversy which had been raging in New York played a part in the subcommittee's intransigence in this matter of commissions. The Barrett-Russo legislation, it will be recalled, amended the New York Insurance Law in such a way that the most recent year's paid commissions for New York business would be considered in ratemaking. This requirement effectively quashed the budgetary approach to production costs. Sponsored by agents' associations in an attempt to prevent unilateral commission reductions by the companies, this legislation became effective on April 30, 1960, was renewed annually thereafter until April 1, 1963 when the Senate Insurance Committee failed to send the renewal bill to the full Senate for action. Although the legisla-

tion itself was no longer in effect when the NAIC met in June 1963, the memory of the debate over this fundamental concept certainly endured.

PREPARATION OF THE CALL

At any rate, the industry committee reluctantly agreed to include total acquisition cost by size of risk and proceeded to prepare the call. Late in March 1964, the instructions for reporting workmen's compensation data were submitted to the F-3 Chairman while the remaining details for general liability and automobile liability were still being deliberated in committee. Meanwhile, the F-3 Chairman raised several questions on the conduct of the study. In trying to answer one of these questions, concerning the recognition of individual risk expense modifications, the Rating Program Committee of the National Bureau of Casualty Underwriters came to the conclusion than an expense study by size of risk for the liability lines in this period of intense competition would be an exercise in futility. To be of any value, a study of expenses must relate to standard premium, but the difficulty of determining such premium, risk-by-risk, because of the widespread use of expense modification and schedule rating plans, was considered disproportionate to the – at best – questionable value of any such study. This conclusion was transmitted to the NAIC subcommittee which agreed that complexities deriving from the inclusion of the third party lines should not delay the vital study on workmen's compensation.

At an April 21, 1964 meeting of the Committee to Study Expenses by Size of Risk with representatives of the NAIC subcommittee, convened to discuss the procedural questions raised by the Subcommittee of Technicians, it was agreed that a single report of expenses by size of risk from a group of companies would be acceptable even though the members of the group might operate on a different basis. While such a provision had been included by industry from the start, the concern, at this late date, was the expanding area of participating business by members of company groups traditionally referred to as non-participating. As a practical matter, however, since certain of such groups file a single Insurance Expense Exhibit and the total of the expenses to be reported by size was to come directly from the Insurance Expense Exhibit, any dissection of a group Expense Exhibit would have been undertaken retrospectively and would possess doubtful validity.

Finally, it was agreed that compliance with the F-3 Subcommitee's request for completion of the study in advance of the December 1964 NAIC meeting would be impossible. Further, the expense of processing the sig-

nificant block of policies effective in January 1965 could be included in the sampling study if a December deadline were foregone. In order, however, to present results to the NAIC in June of 1965, it was necessary to use the figures reported in the 1963 Insurance Expense Exhibit since the 1964 Exhibit was not due until May 1, 1965.

With all parties thus in agreement on the general procedures to be followed, the National Council, on July 2, 1964, sent to all members and subscribers the call to obtain expense data by size of risk (Exhibit C).

COMPILATION OF RESULTS

When all the results of the companies' studies were compiled by the National Council, it developed that 15 stock companies or groups of companies and a like number of non-stock carriers had responded to the call. The total direct standard earned premium for these 30 entities amounted to $1.2 billion for 1963. This figure represents almost 80% of the industry total for that year. To the NAIC subcommittee's remark of April 28, 1965 that this study was a painstaking and expensive cost accounting review, everyone who took part in the study would readily agree.

With the aggregate figures available, the special Committee to Study Expenses by Size of Risk reassembled and, in two meetings (April 14 and June 3, 1965) with the aid of a subcommittee, prepared a report which was later submitted to the Subcommittee of Technicians. This industry report (Exhibit D) was intended simply to analyze the results of the study; it did not recommend any specific application of these results. The report was meant to pave the way for what might ultimately be proposed in the way of a revised expense program.

Among the more important points included in this preliminary industry report was a reminder that the purpose of the expense study by size of risk was to compare the reported graduation of expenses with that underlying the rating system. Implicit in this comment was the conviction – apparently not shared by the Technicians – that the total expenses reported in this study, those for calendar year 1963, were not to be used – unaltered – to establish expense requirements for ratemaking. The NAIC subcommitee, on the other hand, in its preliminary report submitted at the June 1965 meeting, suggested a specific program of expense provisions, premium discounts, and expense constants and pointed out that this program produced figures which would balance to the 1963 Insurance Expense Exhibit data of the non-stock companies which participated in the study.

Also included in the industry's preliminary report was a reaffirmation of the companies' belief that the total production costs reported by size of risk were of no practical significance because of the contractual relationship existing between agent and company. The Technicians' report indicated that they had reached the same conclusion. On this topic, their report said:

> "It was the . . . sense of the members that although the figures furnished for total production cost disclose historically applicable relative production cost by premium size, nevertheless production cost is affected by contractual agreements which are subject to individual negotiation; for this reason the Subcommittee believes it inappropriate to base absolute conclusions on such a volatile element of expense."

Finally, the industry report suggested that expense constants might be increased and the Three-Year Fixed Rate Program expanded because it produced such marked savings in expenses.

By the time the subcommittee met at the June 1965 NAIC convention and accepted the National Council presentation of the report prepared by the special Committee to Study Expenses by Size of Risk, the industry had recovered from its inadvertent omission, in said report, of any reference to transfer items, and the general manager of the National Council submitted, on that occasion, a supplementary statement repeating the traditional position of the companies that these expenses must be restored to their proper categories for ratemaking purposes.

TRANSFER

This entire transfer question is important enough to warrant a brief digression at this point. As early as June, 1948, when the Uniform Accounting Regulations were first promulgated, this matter of the definition of acquisition, field supervision, and collection expenses was debated. According to D. M. Pruitt's paper, "Uniform Accounting – A Study of Regulation," in Volume XXXVI of the *Proceedings* of the Casualty Actuarial Society, the inclusion in this expense group of such items as policywriting and collection was defended by the New York Insurance Department.* Its aim was to have this expense category embrace all those functions exclusively performed by the general agent, regardless of where or by whom performed, since, on business written by a general agent, such functions are automatically covered by the acquisition expense. Also, this Uniform

* A list of items transferred under Uniform Accounting will be found in Addendum B of Exhibit C in Appendix.

Accounting regulation was to apply to all types of companies, whatever their method of operation, so that, if policywriting were included, perforce, on general agents' business, policywriting must also be included even where little or no commission is paid.

Now, if the Insurance Expense Exhibit were solely an accounting document, there would be little cause for controversy but, because of the use to which these Expense Exhibit figures have been put, over the years, in developing the expense portion of the rates for the various lines of insurance, a more precise functional definition is required. Further, since the traditional concept of a general agency has largely been replaced by branch offices, staffed by company personnel, without (necessarily) reducing the commission paid, it is essential that these operations which may, in days gone by, have been performed by independent agents, be included with company expenses. The only way to guarantee such proper recognition of these incurred company expenses is to include them with general expense since total production cost, for ratemaking purposes, is a budgetary item; that is, the amount included in the rates for this cost is intended to reflect that which is provided in the various contracts entered into between the companies and the independent agents. Since this amount of commission to be paid is subject to change at any time – because it is contractual – the stock companies have steadfastly maintained that incurred commission figures on previously written policies are not necessarily a true indication of the amount to be paid in the future.

There should be no fear that the provision in rates for production cost might be overstated due to this non-recognition of previously incurred commission expense. Today's knowledgeable agent exerts a most effective check against such a possibility. Furthermore, if such expenses as those incurred in connection with advertising were included as a part of production costs, for ratemaking, it would be extremely difficult to convince an agent that the provision for production cost in the rates should exceed the maximum rate of commission ever to be paid an agent.

If agreement could be reached on the contention that even a flawless accounting document does not necessarily provide the ideal source of ratemaking statistics, then perhaps the controversy over the transfer program might wane.

REVISION OF EXPENSE PROVISION

After the two groups had presented their reports at the June 1965 NAIC convention, the stock company members of the Committee to Study

Expenses by Size of Risk set about the task of applying to the ratemaking formula for workmen's compensation whatever results might be obtainable from the study of expenses. This phase of the operation was undertaken by stock companies only, because the expense provision in the rates is based on indications for this class of carrier exclusively.

Early in its deliberations, this group agreed to several basic propositions, chief among which were:

1. The indications of the study of expenses by size of risk were to be used for relativity purposes only; the level of the expense need was to be based on the latest three years of data available, as compiled by the National Bureau of Casualty Underwriters, namely, 1962-1964.
2. The broadest possible base was to be used for the required premium distribution; this was the National Council's 1962 study.
3. In attempting to fit an expense program to the indications from the 1965 study, the three-year fixed rate policies were to be excluded because the program was still too new to have been fully exploited.

In applying these guidelines and working toward the ultimate objective, certain other adjustments to the data suggested themselves. Since average three-year incurred company expenses (payroll audit and other general expense) were to be used, the three-year average earned premium for those companies which reported said figures had to be used, and distributed on the basis of the 1962 National Council study of premiums by size (decision No. 2 above). Since, however, at the time such study of premiums by size was undertaken, the Three-Year Fixed Rate Program was still in its infancy, it was decided to redistribute premiums under $100 per year between one- and three-year terms on the basis of the relationship observed in the 1965 workmen's compensation study of expenses by size of risk. Also, it became apparent, before the committee had progressed very far, that a premium interval of $100 to $199 would be necessary; therefore, since such an interval was not available from the National Council study of premiums by size, the individual members of the committee derived such a division of the $100 to $499 premium size group from internal company data. The premium distribution, as finally derived, is shown in column (3) of Exhibit I.

Column (4) of Exhibit I shows the percentages of total standard premium, for each premium size group, as prepared by the National Council after its 1962 study, with the Under $100 and Three-Year Fixed Rate per-

EXHIBIT I

WORKMEN'S COMPENSATION STUDY OF EXPENSES BY SIZE OF RISK - 1965

(National Council 1962 Distribution of Risks by Premium Size
Adjusted to National Bureau 1962-1964 Premium Level)

NON-PARTICIPATING STOCK COMPANIES

Annual Premium Size (1)	Number of Policies (2)	Net Earned Standard Premium (000 omitted) (3)	% of Total (4)	Net E. S. P. Excluding $10 Expense Constant (000 omitted) (5)	Average Earned Standard Premium (6)
Under $ 100	573 333	$ 29 240	3.37	$ 23 507	$ 51
$ 100 - 199	253 161	38 569	4.45	36 037	152
200 - 499	272 069	89 062	10.26	86 341	327
500 - 749	80 144	49 369	5.69	49 369	616
750 - 999	39 946	34 793	4.01	34 793	871
1 000 - 4 999	93 561	199 471	22.99	199 471	2 132
5 000 - 24 999	16 854	168 931	19.47	168 931	10 023
25 000 - 49 999	1 871	63 251	7.29	63 251	33 806
50 000 - 99 999	797	51 538	5.94	51 538	64 702
100 000 - 249 999	420	61 256	7.06	61 256	145 977
250 000 and over	159	73 056	8.42	73 056	460 545
Sub-Total	1 332 315	858 536	98.95	847 550	644
Three-Year Fixed Rate	189 792	9 110	1.05	7 212	48
Total	1 522 107	$867 646	100.00	$854 762	$ 570

centages adjusted as described above, and the National Council's $100-$499 premium size divided into two components. The percentages of column (4) were applied to the total shown for column (3) which is derived on line 1 of Exhibit II, to produce the individual numbers in column (3).

Column (5) was derived by removing $10 per policy [column (2)] from the premiums of column (3) for all premium sizes less than $500. While $10 per year for each three-year fixed rate policy may be a slight overstatement of the expense constant income, the development of the

final expense program did not make direct use of the proportion of expenses assigned to these three-year policies.

Column (6) was taken from the study of expenses by size of risk to utilize the latest available data for this statistic.

Column (2) was derived by dividing the premiums of column (3) by the corresponding average sizes of column (6).

The next step entailed distributing the needed general administration and payroll audit expense, as derived from the National Bureau three-year average figure, augmented by the customary 0.5% transfer (Exhibit II), to premium size group on the basis of the expense reported for each of these size intervals in the recently completed expense study. Here, the sum of the ratios (to earned premium) of payroll audit, other general, and net transfer to other general was applied, by size group, to the premium distribution; the amounts so obtained were adjusted to produce the total needed expense. The results of these three steps are shown on Exhibit III in columns (2), (3), and (4) respectively.

It then remained merely to fit an expense program – expense constant plus manual rate provision – to this distribution of required expense income. A total of ten different combinations of expense loadings and expense constants was tested before a satisfactory balance between expense income and expense need, for each size group, was struck. All ten arrangements had one feature in common – expense constants greater than $10 for policies of less than $200, because it was for these premium sizes that the greatest expense deficiencies were observed. Inadequate expense income, from such small premiums, is much more dramatically corrected through this "policy fee" approach than through higher percentage loadings in the rates.

The program ultimately selected as producing the best fit incorporated expense constants of $17 for policies less than $200 and $10 for policies from $200 to $499, and a graded provision, for general administration and payroll audit, of 6.7% on the first $1,000 and 3.0% on premium in excess of $1,000. To complete the revised expense program a provision of 2.0%, formerly 2.5%, was proposed for inspection, boards and bureaus. This figure was based on the latest available data, compiled by the National Bureau of Casualty Underwriters, for non-participating companies entered in New York. The provision for this expense was continued as a flat percentage because the study of expenses by size of risk, as did its predecessor of 1949, gave no clear indication of a need for graduation in this expense.

CALCULATION OF INDICATED PROVISION FOR GENERAL ADMINISTRATION AND PAYROLL AUDIT

DATA FROM NON-PARTICIPATING STOCK COMPANIES ENTERED IN NEW YORK

		(000 Omitted)			
		1962	1963	1964	3-Year Average
(1)	Net Earned Standard Premium	$801 097	$874 070	$927 770	$867 646
(2)	Incurred General Administration and Payroll Audit Expense	46 550	49 589	49 023	48 387
(3)	"Transfer" (.005 x 854 762*)				4 274
(4)	Total Expense Need for General Administration and Payroll Audit [(2) + (3)]				52 661

* Net Earned Standard Premium excluding $10 Expense Constant, from Column (5) of Exhibit I

EXHIBIT III

WORKMEN'S COMPENSATION STUDY OF EXPENSES BY SIZE OF RISK - 1965

NON-PARTICIPATING STOCK COMPANIES

Annual Premium Size (1)	General Administration & Payroll Audit expense Need: Reported in 1965 Study (2)	(2) Applied to Exhibit I Premium Distribution (3) (000 omitted)	(3) Adjusted to 1962-64 Level (4)
Under $ 100	30.9 %	$ 9 035	$ 9 180
$ 100 - 199	10.3	13 146	13 357
200 - 499			
500 - 749	7.5	3 703	3 761
750 - 999	6.8	2 366	2 403
1 000 - 4 999	4.3	8 577	8 714
5 000 - 24 999	3.3	5 575	5 664
25 000 - 49 999	3.4	2 151	2 185
50 000 - 99 999	3.3	1 701	1 728
100 000 - 249 999	2.9	1 776	1 805
250 000 and over	3.0	2 192	2 226
Sub-Total		50 222	51 023
Three-Year Fixed Rate	17.7	1 612	1 638
Total		$51 834	$52 661

A special study undertaken by the National Council early in 1965, at the suggestion of its Actuarial Committee, indicated that the provision in rates for taxes, licenses and fees, other than state premium taxes, ought to be increased from 0.5% to 0.7%. This recommendation was therefore included as part of the revised expense program.

Since the expense study by size of risk indicated significantly lower expenses on three-year fixed rate policies than on one-year policies of similar size, it was apparent that greater use ought to be made of this historic product of the 1949 study. It was therefore decided to increase the premium eligibility for this program from $100 to $200 and to charge only two expense constants on these policies. As in the past, one expense constant would be waived if the three-year premium were paid in advance. These inducements to insureds to purchase three-year fixed rate policies meant that a risk of up to $200 could, under the new program, realize a reduction in its premium despite the rather sharp increase in expense constants. Where previously $30 in expense constants had been charged for three annual policies, a three-year fixed rate policy could now be purchased with expense constants of $17 or $34 depending on the mode of payment. The $4 increase in total expense constant, for three-year policies paid in installments, was partially offset by the reduction in rate level produced by this revised expense program.

After the necessary committee approvals for this package program were secured in the National Council, these revised expenses were included with the annual rate revisions filed in several states towards the close of 1965. No approvals were forthcoming, however, before the NAIC met in Miami at the end of November and received the final report of its Subcommittee of Technicians on the expense study by size of risk (Exhibit E in Appendix). This subcommittee report recommended, like the industry program, a graduated expense constant, but starting at $15 instead of $17. It also suggested a manual expense provision, for general administration, payroll audit, and inspection, boards and bureaus, of 7.8% which would drop to 4.8% for premium in excess of $1,000. Finally, the NAIC subcommittee gave tacit approval to the broadened eligibility for, and liberalized expense constant treatment of, the Three-Year Fixed Rate Program. The discrepancies between the industry and NAIC expense provisions are attributable mostly to the difference of opinion on the transfer idea and the use of a single calendar year's paid expenses to establish the needed level of expenses.

One more round of National Council committee meetings was required to rationalize the use of a $15 expense constant for policies of less than $200. To compensate for this reduction in expense income, the manual provision for general administration and payroll audit was increased from 6.7% to 6.9% and the provision for same on premium in excess of $1,000 was increased from 3.0% to 3.1%.

The combined effect of all these changes in expenses produced a permissible loss ratio of 60.0%, replacing the 59.6% used previously, and premium discounts as follows:

First	$	1,000	0.0%
Next		4,000	9.3
Next		95,000	14.6
Over		100,000	16.1

The degree to which this final revision of expenses and expense constants conforms to the requirements for each size of risk is shown on Exhibit IV. Column (2) on this exhibit is a downward accumulation of the figures appearing in column (4) of Exhibit III. The estimate referred to in the footnote, for premiums under $200, was derived graphically. The expense constant contribution to the general administration and payroll audit expense provision, as shown in column (4), is now derived by taking 77.3%* of the total expense constant collected. The increase of 0.2% in the tax provision necessitates a similar decrease in the amount of expense constant available for general administration and payroll audit.

A comparison of columns (2) and (6) on Exhibit IV indicates that, while the expense provision is most inadequate at those premium sizes where a $17 expense constant was originally proposed, the expense need vis-à-vis the expense provision for "All Risks" leaves little to be desired.

A comparison, at the several levels of premium, of the components of the revised expenses and those they replaced is shown on Exhibit V.

This new expense program has been included by the National Council with each rate revision filed since the end of 1965 and has yet to be disapproved in any state.

CONCLUSION

In retrospect, it is apparent that the cooperative efforts of representatives of industry and supervisory officials were well spent in refining the derivation and application of the expense components of workmen's compensation rates. It is also evident that these intensive studies have produced results which preclude the necessity of undertaking another project of such magnitude and such expense in the foreseeable future.

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* 100.0 — (Production + Tax + Profit)
Formerly: 100.0 — (17.5 + 2.5 + 2.5) = 77.5
Revised: 100.0 — (17.5 + 2.7 + 2.5) = 77.3

WORKMEN'S COMPENSATION STUDY OF EXPENSES BY SIZE OF RISK - 1965

NON-PARTICIPATING STOCK COMPANIES

GENERAL ADMINISTRATION AND PAYROLL AUDIT

Annual Premium Size (1)	Expense Need (000 Omitted) (2)	% of Total (3)	Expense Provision (000 Omitted) Expense Constant (4)	Rate Provision (5)	Total (4) + (5) (6)	% of Total (7)
Under $ 100	$ 9,180	18.0 %	$ 6,648	$ 1,622	$ 8,270	16.2 %
Under 200	15,000 *	29.4 *	9,583	4,109	13,692	26.8
Under 500	22,537	44.2	11,686	10,067	21,753	42.6
Under 750	26,298	51.5	11,686	13,473	25,159	49.3
Under 1,000	28,701	56.3	11,686	15,874	27,560	54.0
Under 5,000	37,415	73.3	11,686	25,613	37,299	73.1
Under 25,000	43,079	84.4	11,686	31,490	43,176	84.6
Under 50,000	45,264	88.7	11,686	33,522	45,208	88.6
Under 100,000	46,992	92.1	11,686	35,150	46,836	91.8
Under 250,000	48,797	95.6	11,686	37,065	48,751	95.5
All Risks	51,023	100.0	11,686	39,336	51,022	100.0

* Estimated

EXPENSE CONSTANT

Under $100	$15
$100 - 199	15
200 - 499	10

EXPENSE LOADING

1st $ 1,000	6.9%
Next 99,000	3.1
Over 100,000	3.1

EXHIBIT V

WORKMEN'S COMPENSATION STUDY OF EXPENSES BY SIZE OF RISK - 1965

NON-PARTICIPATING STOCK COMPANIES

COMPARISON OF EXPENSE PROVISIONS UNDER FORMER AND REVISED PROGRAMS

	1st $1,000		Next $4,000		Next $95,000		Over $100,000	
	Old	New	Old	New	Old	New	Old	New
Production	17.5%	17.5%	12.5%	12.5%	7.5%	7.5%	6.0%	6.0%
General Administration and Payroll Audit	7.0	6.9	3.5	3.1	3.5	3.1	3.0	3.1
Inspection, Boards and Bureaus	2.5	2.0	2.5	2.0	2.5	2.0	2.5	2.0
Loss Adjustment	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
Profit and Contingencies	2.5	2.5	2.2	2.2	2.3	2.1	1.9	2.1
Expected Losses	59.6	60.0	59.6	60.0	59.6	60.0	59.6	60.0
Tax	2.5	2.7	2.3	2.5	2.2	2.3	2.1	2.3
Premium Discount	-	-	9.0	9.3	14.0	14.6	16.5	16.1

APPENDIX

EXHIBIT A

LETTER FROM NATIONAL COUNCIL ON COMPENSATION INSURANCE TO NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

December 4, 1962

Honorable Cyrus E. Magnusson, Chairman
Fire, Marine, Casualty & Surety Committee
National Association of Insurance Commissioners

Dear Commissioner Magnusson:

Re: Workmen's Compensation-Analysis of Expenses by Size of Risk

Under date of May 16, 1951 the National Council on Compensation Insurance reported to a Special Subcommittee of the Workmen's Compensation Committee of the NAIC an analysis of workmen's compensation expenses by size of risk. The purpose of the analysis, as stated in the National Council's report, was to determine the degree to which expenses graduated in accordance with workmen's compensation rating programs corresponded to the actual distribution of expenses as measured by data obtained from individual company reports. At the June 1951 meeting of the NAIC, the Workmen's Compensation Committee, which has since been dissolved, accepted the report of its subcommitee, including the report of the National Council, and the consideration of the subject of expenses by size of risk was deemed completed.

In recalling this background, I would like to announce that pursuant to action taken by its authorized Committees, the National Council on Compensation Insurance is undertaking another analysis of expenses by size of risk for workmen's compensation insurance.

In the belief that the Fire, Marine, Casualty and Surety Committee is the appropriate Committee for the consideration of this matter, it is hereby offered as an item for the agenda of the Committee. If you should deem it desirable to appoint a Subcommittee as was done in connection with the earlier study, we would be most happy to cooperate with it.

Yours very truly,
George F. Reall
General Manager
National Council on Compensation Insurance

EXHIBIT B

LETTER FROM NATIONAL COUNCIL ON COMPENSATION INSURANCE TO NEW YORK INSURANCE DEPARTMENT

Re: Study of Expenses By Size of Risk

On April 1, 1963 we wrote to you outlining what the National Council Committee to Study Expenses by Size of Risk believed should be the scope of the proposed study of expenses by size of risk. Subsequently, a meeting of the Committee was held on May 23, 1963 at the offices of the National Council on Compensation Insurance at which certain members of the NAIC (F3) Subcommittee also were present as observers. After having had the benefit of an exchange of views with the members of the (F3) Subcommittee, the National Council Committee to Study Expenses by Size of Risk would like to amplify its views on the scope of the study:

(1) The study should embrace not only workmen's compensation insurance but automobile liability and general liability insurance as well. Representatives of the National Bureau of Casualty Underwriters and the Mutual Insurance Advisory Association have announced a decision on the part of their respective organizations to undertake a study of expenses by size of risk for automobile and general liability insurance, and they have expressed the desire that a special study be so organized as to make it possible to include such other lines of insurance. It was observed that there is frequently an underlying relationship between the liability and compensation lines and that studying them together would provide an overall control with respect to expense allocation. Furthermore, the additional information would be valuable and could be obtained at very little additional cost to the companies.

(2) As respects workmen's compensation, all member companies whose compensation premium writings are in excess of $5,000,000 will be requested to participate in the study. Because of the diversification of their business by size of risk and the substantial proportion of the total business they transact in each premium size bracket, the expense data developed by these companies should prove adequate to determine the degree of expense graduation by size of risk. In addition, smaller companies will be allowed to participate if they volunteer to furnish their data. Insurance companies in a "group" will be permitted to submit data on a group basis.

(3) Commissions, loss adjustment and investment expenses will be excluded.

(4) For each line of insurance a premium size schedule should be established according to standard earned premium per risk as follows:

Less Than	–	$100	5,000	–	$ 9,999
100	–	499	10,000	–	29,999
500	–	749	30,000	–	49,999
750	–	999	50,000	–	99,999
1,000	–	4,999	100,000	–	249,999
			250,000	–	and over

As respects workmen's compensation insurance, the 1962 study conducted by the National Council on Compensation Insurance which established a countrywide distribution of premium by size of risk may be used. It is not deemed necessary, for the purpose of an effective study of expenses by size of risk, that both premiums and expenses relate to the same period of time. The proposed procedure will materially accelerate the progress of the study since it is estimated that it would take approximately two years to study both premiums and expenses for a particular calendar year and, moreover, the expense of conducting such a detailed study would be considerable.

For other lines, the carrier should determine its own distribution of premium to conform with the premium size schedule for the period under study by the following method or equivalent:

(a) By using a recent policy year distribution with necessary adjustments,

or (b) By analysis of payroll audit earned premium data,

or (c) By analysis of written premium data on a sample basis.

(5) The analysis will be made on expenses paid rather than expenses incurred. It is believed that no significant distortion can result from this procedure since expense reserves are usually very small. Moreover, it would be extremely difficult, if not impossible, to provide reasonable allocations of outstanding expenses by size of risk. In any case, where paid expenses, for one reason or another, are not equivalent to incurred expenses, the company will be required to report such fact. In addition, every company will

be required to show the total General Expenses and Other Acquisition, Field Supervision and Collection Expenses on both a paid and incurred basis.

Notes: (1) At the time of the last study, the question of whether or not there is any significant difference by size of risk as respects claim expense for most casualty lines was explored. It was the opinion of the industry that there were no significant variations. In the course of the study a few companies actually undertook special research on this question, the results confirming this opinion.

It is felt that many elements have as much, if not more, influence on variations in claim expense than do mere variations in size of risk. For example, many large risks have widely dispersed small or medium size separate locations, the result being that the economies otherwise expected of a centralized operation are absent. Even with risks in one location, and of comparable size, there is the influence of the dispersion of injured employees. Again, the incidence of serious cases will affect claim costs and this is not a function of size.

Where there is an absence of good reason to believe that the results will be useful and significant, it is submitted that it would not be feasible to include claim adjustment expense in a study of expenses by size of risk.

(2) The purpose of an expense study by size of risk is to provide data which will be of assistance in establishing or modifying rates and rating plans. In this connection, it is appropriate to consider expenses in two categories (a) non-budgetary, those for which expense experience has some degree of relevancy and (b) budgetary, those for which ratemaking allowances are established on a prospective basis. In the first group are found such items as administration, audit and inspection – functions common to all types of insurance carriers, large and small, stock and non-stock.

In the second group, the budgetary items are those such as commissions, taxes and assessments. Yesterday's taxes and assessments are no guide to tomorrow's. Legislative action or some economic circumstance may change the requirements at any time. For example, a workmen's compensation security fund tax is an item which is levied intermittently depending upon the level of the fund. Obviously, any ratemaking provision based on the past

experience for this item would not be appropriate for prospective needs.

In the same philosophy, an allowance for commissions on a budgetary basis is the historically accepted method for these lines of business. The freedom to negotiate commission contracts has been firmly established, including the right to pay no commission at all, and a pattern of almost infinite variety has developed. Commission contracts vary by line, by state, by size of risk, and by type of agency. Commission scales vary according to whether the agent is a General Agent, Regional Agent, Broker or Producer, or a modification thereof. Commissions may vary between participating and non-participating policies, and may also be contingent upon underwriting profit. They also vary as to class of business in that the usual company commission contracts do not apply to assigned risks.

The combined commission experience for a group of carriers in any one year would be a meaningless average of all the different possibilities, representative of none and subject to immediate change at any time by contractual agreement.

Under the circumstances, no useful purpose would be served by inclusion of commissions in a study of expenses by size of risk. The varied pattern of commission payments makes the budgetary allowance the only practical approach for ratemaking and rating plans. Thus, such inclusion in the study would contribute nothing to its basic purpose and the considerable cost to the companies would be wasteful and uneconomic.

It is very difficult to obtain from existing records of most carriers paid commissions and paid premiums by state and by policy for the lines of insurance involving audited or adjustable premiums such as those under study. Agents' reports, which are the basic source of information as to commissions, relate exclusively to the transactions covered by the report. Such transactions may represent a deposit premium, a monthly or quarterly audit, an advance or refund following audit, or a retrospective adjustment. The several premium transactions relating to an individual policy may be spread over a period of time of more than a year. The report carries no information as to the total policy premium and it is extremely difficult to assemble the individual elements of the policy premium, because of the vast number of

transactions. Since the information is not readily available in the form necessary for study purposes, the complexity and expense of providing proper data would be disproportionately high in relation to any conceivable contribution commission by size of risk could make to the overall study of expenses.

EXHIBIT C

CIRCULAR LETTER FROM NATIONAL COUNCIL ON COMPENSATION INSURANCE TO ALL MEMBERS AND SUBSCRIBERS

July 2, 1964

Gentlemen:

Re: Special Call to Obtain Expense Data By Size of Risk

In our Circular Letter of January 20, 1964 to all members and subscribers the carriers were informed that the National Council was about to engage in a new study of expenses by size of risk. The preparation of this Call has been completed in cooperation with the National Association of Insurance Commissioners and a memorandum containing the instructions is attached.

Carriers whose 1963 premium writings are in excess of $5,000,000 are requested to participate. Participation by other carriers will be welcome if they should care to contribute this information. Be sure to indicate in the space provided in the acknowledgement form whether or not your company will be participating in the study.

The study is confined to workmen's compensation insurance and will not include automobile and general liability insurance as previously announced.

Carriers may report on a group or fleet basis if they so desire.

It is suggested that the study be completed by the end of the year in order to avoid conflict with the preparation of Annual Statements. In any event, all data must be submitted to the National Council on Compensation Insurance by not later than March 1, 1965.

Please feel free to submit any questions you may have pertaining to the Special Call. A special advisory committee has been established for the purpose of helping those carriers with questions about the details of making the study.

July 2, 1964

MEMORANDUM

Re: Minimum Requirements to Obtain Expenses by Size of Risk

(A) A premium size schedule should be established according to standard earned premium per risk as follows:

Less Than	–	$ 100	25,000	–	$ 49,999
100	–	499	50,000	–	99,999
500	–	749	100,000	–	249,999
750	–	999	250,000	–	And Over
1,000	–	4,999	3 Years Fixed Rate Policies		
5,000	–	24,999			

The 1962 study conducted by the National Council on Compensation Insurance which established a countrywide distribution of premium by size of risk, or any more recent complete policy year, may be used. It is not deemed necessary for the purpose of an effective study of expenses by size of risk that both premiums and expenses relate to the same period of time.

(B) The analysis will be made on expenses paid rather than expenses incurred. It is believed that no significant distortion can result from this procedure since expense reserves are usually very small. Moreover, it would be extremely difficult, if not impossible, to provide reasonable allocations of outstanding expenses by size of risk. In any case, where paid expenses for one reason or another, are not equivalent to incurred expenses, the company will be required to report such fact. In addition, every company will be required to show the total General Expenses on both a paid and incurred basis.

It is assumed that prior to the actual analysis of expenses by size of risk the carriers will have made certain allocations in accordance with the instructions and procedures required by uniform accounting regulations where applicable, namely,

1. Total salaries and other expenses will have been properly allocated among companies operating under the same management.

2. Within each company salaries and other expenses will have been properly allocated to:

(a) General Administration wherever incurred.

Note: Other Acquisition items reported as Administration items under uniform accounting regulations included in (a) above should be shown separately. For detailed description of transfer items refer to Addendum B attached.

(b) Acquisition and Field Supervision (including commissions) wherever incurred.

Note: Administration items reported as Other Acquisition under uniform accounting regulations included in (b) above should be shown separately. For detailed description of transfer items refer to Addendum B attached.

(c) Exposure Audit wherever incurred.

(d) Inspection, Bureau and Safety Engineering.

(e) Claims Investigation.

(f) Investment Expense.

3. For divisions 2(a) to 2(e), inclusive, salaries and other expenses will have been properly distributed to workmen's compensation insurance.

4. For workmen's compensation, salaries allocated to divisions 2(a) to 2(e), inclusive, will have been properly distributed to department.

The carrier should determine the distribution of salaries and expenses for workmen's compensation by size of risk. The distribution indicated for the divisions of department or functions listed below is a suggested method. If a carrier submits data determined in a different way, it should indicate the areas in which it deviated from the method outlined below. In determining the expenses to be distributed to size in these divisions, as a minimum requirement, traveling expenses should be added to the salary expense of each division. Other kinds of expenses may be distributed to the divisions in proportion to salary expenses of the divisions.

1. DISTRIBUTED BY SPECIAL RESEARCH (See Addendum A)
   - (a) Underwriting
   - (b) Actuarial and Statistical
   - (c) Individual Risk Experience
   - (d) Exposure Audit
   - (e) Inspection and Safety Engineering
   - (f) File
   - (g) Acquisition and Field Supervision Including Commissions
   - (h) Executive
   - (i) Data Processing

2. DISTRIBUTABLE ON THE BASIS OF PREMIUM
   - (a) General Accounting
   - (b) Taxes
   - (c) Bureau
   - (d) Advertising
   - (e) Corporate Legal

3. DISTRIBUTABLE IN PROPORTION TO EXPENSES OF DEPARTMENTS AND/OR FUNCTIONS SERVICED
   - (a) Personnel
   - (b) Comptroller
   - (c) Payroll (Company Payroll Department)
   - (d) Cafeteria
   - (e) Health and Welfare (Employee)
   - (f) Mail, Telegraph, Telephone, Messenger
   - (g) Printing and Photostating
   - (h) Purchasing and Supply

In establishing a program for expense allocation it must be realized that the method used to allocate an item of expense to a line of business need not be the same method of allocating the expenses for such item to size of risk. The company should use the method which it believes will provide the most accurate allocation of expenses to size of risk.

(C) Having determined the allocation of salaries and other expenses by department or function in accordance with the methods described above, the expenses by size of risk should be summarized and related to the premium distribution to obtain expense ratios by size of risk.

(D) In the conduct of the analysis the carrier should prepare legible worksheets and such records should be maintained in good order and should be available for examination.

ADDENDUM A

Special Research

Attached hereto are two exhibits to guide the carrier in the establishment of methods for distributing expenses of the items for which special research is required.

It should be stressed that differences in the organizations and procedures of carriers make it impossible to prescribe in detail the methods which must be used. It is possible only to state the basic objective and to illustrate appropriate approaches.

In general, the objective is to ascertain the portion of the total time of employees which risks in each size group require. These portions should be converted to salary expense, and the salary expense loaded for other expenses. It should be stressed that in making these determinations, actual time studies may not be necessary. In the survey of operations under consideration, efforts should be made to utilize available work unit statistics to apportion the time of employees to the various size groups.

Hence, the items for which special research is required should be broken down, if necessary, into components for which a method can be found of distributing expense. It is understood that premium is not precluded as the basis of allocation for either the entire function or a part of a function. The disposition of the exposure audit expense and the similar inspection and engineering expense is illustrated in Example 1.

In the use of sampling methods and time studies to obtain a means of distributing expenses, the carrier's knowledge of its own procedures and records will determine the extent and nature of the methods to be employed.

For some operations, such as the making of field audits, the average time per audit for each size group may be obtained from the auditor's time reports for a sample of policies in each size group. For other operations or groups of operations for which it is feasible to assemble samples of policies or units in various size groups for processing, it may be desirable to time the processing of such samples through the operating sections. Example 2 provides a description of the several steps which may be employed in using this form of sampling procedure.

EXAMPLE 1

ILLUSTRATION OF THE DISTRIBUTION OF EXPOSURE AUDITING EXPENSES

Item	Basis
(a) Field Audit Salaries and Expenses	(a_1) Sampling to determine number of field audits for various policy size brackets.
	(a_2) Time study or equivalent to determine time per audit for various policy size brackets.
	(a_3) Cost to be distributed in proportion to product of a_1 and a_2.
(b) Fee Audits	(b) Sampling to determine number and cost by policy size.
(c) Clerical Costs of Payroll Reports	(c_1) Sampling to determine number of payroll reports for the various policy size brackets.
	(c_2) Time studies or equivalent to determine time per payroll report for the various policy size brackets.
	(c_3) Cost to be determined in proportion to product of c_1 and c_2.
(d) Clerical Costs of Field and Fee Audits	(d_1) Time studies or equivalent to determine time per audit for the various policy size brackets.
	(d_2) Costs to be distributed in proportion to (a_1 + b) times d_1.
(e) Supervision and Miscellaneous Overhead	(e) To be distributed in proportion to foregoing costs by policy size.

DISTRIBUTION OF INSPECTION EXPENSES

Same as for exposure auditing. Time spent on "prospective" risks may be loaded as overhead on determined costs. Time spent on accident analysis for large risks to be distributed to size bracket groups by time studies or equivalent.

EXAMPLE 2

Operational Cost Study

The operational cost study of departments (or functional subdivisions) for which the influence of premium size is measurable by the methods to be described involves the following steps:

1. List the operations performed in each department (or functional subdivision), numbering and arranging them insofar as possible in chronological order.
2. Describe each operation briefly.
3. Indicate for which premium sizes the operation is (or is not) performed.
4. Determine the number of items (policies or units) that were serviced during the year under each operation. This can be obtained most readily by counting the items handled for a reasonable period of time, then projecting to an annual basis, recognizing known seasonal or other variations.
5. Estimate the number of employee work-hours spent during the year in performing each operation.
6. Estimate the salaries and expenses allocable to each operation.
7. Supervisory and executive time, salaries and expenses can be classified into four divisions – (a) that applying to a limited number of the operations performed in the department should be allocated exclusively to these operations in proportion to the distribution of the salaries of the supervised workers, (b) that applying to all of the operations performed in the department should be allocated in proportion to the distribution of the salaries of all of the workers in the department, (c) that involved in performing a specific operation should be classified as such and analyzed in the same manner as that of other workers in the department, and (d) unallocable executive time, salaries and expense, which, in the absence of a better basis, can be distributed in proportion to premiums.
8. In the case of operations that are recorded on the copy of the policy (or similar record) the number of operations per policy under each significant size bracket can be obtained by selecting representative samples of expired policies under each homogeneous classi-

fication, and by determining the average number of recorded operations under each classification. This procedure lends itself readily to the analysis of certain premium accounting and statistical operations in the case of companies which record each such operation on a copy of the policy. The distribution of the total number of policies serviced under each premium size was previously obtained. Multiply the number of policies in each homogeneous classification by the average number of operations performed under each classification during the year.

9. In the case of operations that are not recorded on the copy of the policy (or similar record) the number of operations under each significant size bracket can be obtained by (a) sampling the work handled during a significant period of time and (b) projecting these figures to an annual basis.

10. To determine the relative variation in time per operation, carefully select homogeneous groups of policies that are representative of the policies that are serviced under each significant size bracket, and attach time sheets to each of these groups. These sheets should identify each operation and provide space for indicating the time required to perform each operation on each group. "Representative" clerks should be selected and instructed to perform the operations under "normal" conditions and speed. Two or more homogeneous groups of items under each significant size group should be routed through the department, so that the representativeness of the individual samples can be checked. By this process, a time factor per operation can be obtained for each significant size bracket.

11. Having previously obtained the total number of operations performed in each homogeneous classification (Step 8 and 9), multiply the number of operations by the average time per operation developed in Step 10 to determine the time spent on each size group.

12. Develop the cost for each significant size group by distributing salaries and expenses in proportion to time spent, however, if large policies are handled by higher paid employees, use a different time to cost conversion factor for small, and large policies.

13. Develop the average cost per dollar of premium and per policy for each significant size group by dividing the total cost by the dollars of premium and number of policies respectively.

ADDENDUM B

Transfer Items Under Uniform Accounting Regulations

The following is a summary of items which had been transferred from "Other General Expenses" to "Acquisition, Field Supervision and Collection Expenses" under uniform accounting procedures:

Home Office expenses for purposes of acquisition, field supervision and collection, i.e., for any of the purposes enumerated in Uniform Accounting Regulations.

1. Policy writing.
2. Collection and accounting related to acquisition.
3. Compiling and distributing expiration lists.
4. Advertising and publicity (including required institutional advertising).
5. Receipt and paying of premiums and commissions, including handling of producer accounts.
6. Sales work by personnel operating out of the home office, including contact work for goodwill purposes.
7. Rendering service to agents and other producers.

Items which had been transferred from "Acquisition, Field Supervision and Collection Expenses" to "Other General Expenses" are as follows:

1. Cost of entering rates, premium, classifications and territory codes and other rating information on applications and daily reports from a rate manual or a rate card.
2. Quoting of rates by underwriters to brokers, assureds or prospects.

EXHIBIT D

NATIONAL COUNCIL ON COMPENSATION INSURANCE
REPORT OF THE SPECIAL COMMITTEE TO STUDY EXPENSE BY SIZE OF RISK
TO
NAIC SUBCOMMITTEE TO STUDY EXPENSES BY SIZE OF
WORKMEN'S COMPENSATION RISK

The National Council on Compensation Insurance informed the Fire, Marine, Casualty and Surety Committee of the National Association of Insurance Commissioners at its December, 1962 meeting that it was plan-

ning on conducting another study of expenses by size of risk. The preparation of a Special Call To Obtain Workmen's Compensation Expense Data ensued and the scope of the report was accepted by your Subcommittee at the June, 1964 NAIC meeting. The Call was released on July 2, 1964.

The purpose of the study is to compare the graduation shown by the data collected with the graduation of expenses currently underlying the rating system, including the expense constant amount.

In accordance with the April 1, 1963 and June 8, 1964 industry reports, and the NAIC Subcommittee reports of June 16, 1963 and June 8, 1964, it was agreed that the study would be based on paid workmen's compensation expenses for Calendar Year 1963 and would embrace the following items of expense:

(1) Inspection, Boards and Bureaus
(2) Payroll Audit
(3) Other General Expenses
(4) Total Production Cost

Responding to the Call were 52 non-participating stock carriers with a total annual direct standard earned premium of $679,253,621 representing 72% of the total non-participating stock premium volume. There were also 20 mutual carriers with an annual direct standard earned premium of $526,510,433 representing 90% of the total premium volume for mutual carriers. There are appended Charts I, II, III and IV which show the aggregate figures reported for each group and the expense percentages by premium size.

The results of this analysis for the non-participating stock companies are shown in the attached Chart V. Column (1) indicates the average premium per policy including the expense constant income. The analysis which follows assumes that a full $10 expense constant per policy under $500 was collected. However, for such policies the average expense constant income actually was slightly less than $10.

The provision for Administration and Payroll Audit reflected in Column (2) was obtained by applying first, the graded provisions of the current rating system which are: 7% for the first $1,000 of premium, 3.5% for the next $99,000 of premium, and 3% for premium amounts in excess of $100,000; plus, second, that portion of the expense constant allocated to General Administration and Payroll Audit for risks under $500. Keeping in mind that the purpose of the study is to compare the current graduation with the indicated graduation, the resulting expense

provision by size for all sizes of risks was prorated to produce the reported paid expenses for this item for all risks.

The provision for Inspection and Bureau in Column (3) was obtained by multiplying the average premium per policy (minus the $10 expense constant for policies under $500) by .025 and adjusting the total amount to the reported paid level.

Column (4) shows the total provision for the items of expense under consideration and is the sum of the figures shown in Columns (2) and (3). Column (5) reveals the reported paid expense per policy obtained by dividing the total reported paid expenses by the number of policies.

At the request of the NAIC, the total production costs were included in the study, and are shown in the attached Charts I and II. However, since rates of commission are a matter of contract between the companies and their agents, the companies believe that no meaningful comparison can be made between reported paid production costs and the amount available in the rating system.

The present program contemplates an expense graduation by size of risk with a $10 expense constant for risks under $500. The data produced by the Special Call reaffirm the soundness of the present program and, as a matter of fact, indicate that an expense constant of a higher amount and a higher point of application is justified.

The data for Three-Year Fixed Rate policies, as shown in Charts I and II, while rather thin due to the relative newness of the program and the short period studied for such risks, demonstrate that this program does help in making significant savings.

The second part of this analysis relates to reported data for non-stock carriers shown in the attached Charts III and IV.

The data compiled by the mutual companies indicate the following:

(1) The general program used to collect expenses from insureds is appropriate, i.e., an expense constant per policy for the smaller size policies plus a percentage of the standard premium which decreases as the size of such premium increases.

In Chart VI attached, a formula is developed using the same premium boundaries as are in effect under the current expense graduation program, which will reproduce the reported paid expenses of the mutual companies reasonably well by size of risk.

(2) In certain premium size areas, particularly in the smaller premium sizes, the data strongly suggest that the expense constants

WORKMEN'S COMPENSATION

ANALYSIS OF EXPENSES BY POLICY SIZE, CALENDAR YEAR 1963

Non-Participating Stock Carriers

(a) Annual Premium Size	(b) Number of Policies	(c) Direct Standard Earned Premium	(d) EXPENSES ANALYZED BY SIZE Inspection, Boards and Bureaus	(e) Payroll Audit	(f) Other General	(g) Total Production Cost	(h) Transfer To General Adm. From Other Acq.	(i) Transfer To Other Acq. From Gen. Adm.
Under $ 100	397,304	20,106,307	517,136	1,692,404	3,914,798	5,153,911	715,580	126,413
100 - 499	348,572	84,862,027	1,465,632	3,202,267	4,987,753	16,100,003	803,272	216,250
500 - 749	55,568	34,248,298	609,087	920,106	1,463,158	6,172,843	224,085	79,187
750 - 999	27,955	24,341,005	535,590	511,307	1,082,321	4,367,326	157,467	61,793
1,000 - 4,999	71,530	152,499,448	2,611,468	2,085,196	4,052,411	23,182,501	656,858	276,736
5,000 - 24,999	13,866	138,979,411	2,596,633	1,194,995	3,218,263	15,769,795	364,930	236,705
25,000 - 49,999	1,497	50,608,006	1,039,429	333,580	1,343,864	4,677,808	112,266	93,298
50,000 - 99,999	679	43,932,664	893,942	249,855	1,144,243	3,734,791	92,255	58,209
100,000 - 249,999	388	56,638,895	1,124,376	280,752	1,330,674	4,500,660	124,218	62,019
250,000 - and over	145	66,778,994	1,575,516	352,499	1,627,787	4,304,581	116,314	58,563
3 Yr.fixed rate policies	130,552	6,258,566	88,655	349,816	616,195	1,336,335	160,762	17,440
Total (Direct)	1,048,056	679,253,621				89,300,554		
Adjustment to Net Basis		-65,609,739				-1,831,229		
Total (Net)		613,643,882	13,057,464	11,172,777	24,781,467	87,469,325	3,528,007	1,286,613

General Expenses Incurred 49,123,560

CHART II

WORKMEN'S COMPENSATION

ANALYSIS OF EXPENSES BY POLICY SIZE, CALENDAR YEAR 1963

Non-Participating Stock Carriers

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
			EXPENSES ANALYZED BY SIZE					
Annual Premium Size	Number of Policies	Average Direct Standard Earned Premium	Inspection, Boards and Bureaus	Payroll Audit	Other General	Total Production Cost	Transfer To General Adm. From Other Acq.	Transfer To Other Acq.From Gen.Adm.
Under $ 100	397,304	51	2.6%	8.4%	19.5%	25.6%	3.6%	0.6%
100 - 499	348,572	243	1.7	3.8	5.9	19.0	0.9	0.3
500 - 749	55,568	616	1.8	2.7	4.3	18.0	0.7	0.2
750 - 999	27,955	871	2.2	2.1	4.4	17.9	0.6	0.3
1,000 - 4,999	71,530	2,132	1.7	1.4	2.7	15.2	0.4	0.2
5,000 - 24,999	13,866	10,023	1.9	0.9	2.3	11.3	0.3	0.2
25,000 - 49,999	1,497	33,806	2.1	0.7	2.7	9.2	0.2	0.2
50,000 - 99,999	679	64,702	2.0	0.6	2.6	8.5	0.2	0.1
100,000 - 249,999	388	145,977	2.0	0.5	2.3	7.9	0.2	0.1
250,000 - and over	145	460,545	2.4	0.5	2.4	6.4	0.2	0.1
3 Yr. fixed rate policies	130,552	43	1.4	5.6	9.8	21.4	2.6	0.3
Total (Direct)	1,048,056	648				13.1%		
Adjustment to Net Basis								
Total (Net)			1.9%	1.6%	3.6%		0.5%	0.2%

General Expenses Incurred 7.2%

WORKMEN'S COMPENSATION

ANALYSIS OF EXPENSES BY POLICY SIZE, CALENDAR YEAR 1963

Mutual Carriers

(a) Annual Premium Size	(b) Number of Policies	(c) Direct Standard Earned Premium	(d) EXPENSES ANALYZED BY SIZE Inspection, Boards and Bureaus	(e) Payroll Audit	(f) Other General	(g) Total Production Cost
Under $ 100	95,734	4,597,840	186,683	319,155	888,298	1,095,483
100 - 499	100,221	24,332,373	553,339	830,682	1,469,371	3,775,033
500 - 749	21,470	12,981,665	352,675	347,092	585,320	1,705,687
750 - 999	12,522	10,844,803	363,646	251,903	444,737	1,324,024
1,000 - 4,999	42,696	92,994,832	3,066,485	1,513,026	2,916,890	9,210,316
5,000 - 24,999	13,312	140,417,814	4,129,624	1,168,427	3,228,596	9,301,141
25,000 - 49,999	1,747	61,291,538	1,629,493	324,350	1,309,651	3,142,870
50,000 - 99,999	718	50,081,410	1,356,429	214,129	1,003,103	2,074,459
100,000 - 249,999	374	58,913,521	1,576,334	212,564	1,138,456	2,025,872
250,000 - and over	126	69,070,417	1,976,502	219,360	1,179,020	1,674,553
3 Yr. fixed rate policies	14,947	984,220	18,882	21,494	41,541	236,705
Total (Direct)	303,867	526,510,433				35,566,143
Adjustment to Net Basis		-37,694,729				- 540,574
Total (Net)		488,815,704	15,210,092	5,422,182	14,204,983	35,025,569

General Expenses Incurred 34,893,621

WORKMEN'S COMPENSATION

ANALYSIS OF EXPENSES BY POLICY SIZE, CALENDAR YEAR 1963

Mutual Carriers

(a)	(b)	(c)	(d)	(e)	(f)	(g)
			EXPENSES ANALYZED BY SIZE			
Annual Premium Size	Number of Policies	Average Direct Standard Earned Premium	Inspection, Boards and Bureaus	Payroll Audit	Other General	Total Production Cost
Under $ 100	95,734	48	4.1%	6.9%	19.3%	23.8%
100 - 499	100,221	243	2.3	3.4	6.0	15.5
500 - 749	21,470	605	2.7	2.7	4.5	13.1
750 - 999	12,522	866	3.4	2.3	4.1	12.2
1,000 - 4,999	42,696	2,178	3.3	1.6	3.1	9.9
5,000 - 24,999	13,312	10,548	2.9	0.8	2.3	6.6
25,000 - 49,999	1,747	35,084	2.7	0.5	2.1	5.1
50,000 - 99,999	718	69,751	2.7	0.4	2.0	4.1
100,000 - 249,999	374	157,523	2.7	0.4	1.9	3.4
250,000 - and over	126	548,178	2.9	0.3	1.7	2.4
3 Yr. fixed rate policies	14,947	60	1.9	2.2	4.2	24.1
Total (Direct)	303,867	1,733				6.8%
Adjustment to Net Basis						
Total (Net)			2.9%	1.0%	2.7%	

General Expenses Incurred 6.6%

WORKMEN'S COMPENSATION - ANALYSIS OF EXPENSES BY SIZE OF RISK

NON-PARTICIPATING STOCK COMPANIES

Annual Premium Size	(1) Average Premium Including Expense Constant	(2) Basic Provision in Rates Adjusted To Reported 1963 Paid Expenses: Administration and Audit	(3) Basic Provision in Rates Adjusted To Reported 1963 Paid Expenses: Inspection, Boards and Bureaus	(4) Basic Provision in Rates Adjusted To Reported 1963 Paid Expenses: Total (2) + (3)	(5) Reported Paid Expense Per Policy After Transfer
Under $ 100	50.61	10.54	.79	11.33	16.90
100 - 499	243.46	23.97	4.55	28.52	29.38
500 - 749	616.33	42.93	12.01	54.94	56.46
750 - 999	870.72	60.65	16.97	77.62	79.59
1,000 - 4,999	2,131.96	109.07	41.54	150.61	127.63
5,000 - 24,999	10,023.04	383.92	195.27	579.19	514.79
25,000 - 49,999	33,806.28	1,212.26	658.62	1,870.88	1,827.55
50,000 - 99,999	64,702.01	2,288.33	1,260.54	3,548.87	3,419.86
100,000 - 249,999	145,976.53	4,890.27	2,843.95	7,734.22	7,211.34
250,000 and over	460,544.79	14,281.16	8,972.45	23,253.61	24,921.06

CHART VI

WORKMEN'S COMPENSATION - ANALYSIS OF EXPENSES BY SIZE OF RISK

MUTUAL COMPANIES

PREMIUMS AND EXPENSES PER POLICY

Annual Premium Size	Number of Risks	Direct Standard Earned Premium	Expenses Excl. Tax & Loss Adj. Expense	Average Premium Adj. to Excl. $10 Exp. Const.	Average Expense Per Risk
Under $ 100	95,734	4,597,840	2,489,619	38.17	26.01
100 - 499	100,221	24,332,373	6,628,425	233.66	66.14
500 - 749	21,470	12,981,665	2,990,774	606.91	139.30
750 - 999	12,522	10,844,803	2,384,310	869.30	190.40
1,000 - 4,999	42,696	92,994,832	16,706,717	2,186.22	391.29
5,000 - 24,999	13,312	140,417,814	17,827,788	10,587.69	1,339.23
25,000 - 49,999	1,747	61,291,538	6,406,364	35,215.19	3,667.07
50,000 - 99,999	718	50,081,410	4,648,120	70,012.33	6,473.70
100,000 - 249,999	374	58,913,521	4,953,226	158,112.30	13,243.92
250,000 and over	126	69,070,417	5,049,435	550,229.63	40,074.88
3 Year Fixed Rate Policies	14,947	984,220	318,622	55.85[1]	21.32

DISTRIBUTION OF EARNED STANDARD PREMIUM BY SIZE GROUP

Annual Premium Size	DISTRIBUTION OF PREMIUM BY SIZE GROUP[2]			
	First $1,000	Next $4,000	Next $95,000	Over $100,000
0 - $ 999	50,541,060	-	-	-
1,000 - 4,999	42,696,000	49,850,039	-	-
5,000 - 99,999	15,777,000	63,108,000	171,636,410	-
Over 100,000	500,000	2,000,000	47,500,000	77,338,763
Total	109,514,060	114,938,039	219,136,410	77,338,763

FORMULA DISTRIBUTION OF EXPENSES BY SIZE GROUP EXCLUDING TAXES AND LOSS ADJUSTMENT EXPENSES

Annual Premium Size	Total Expenses	Expenses From $20 Expense Constant[3]	DISTRIBUTION OF EXPENSES EXCLUDING TAXES AND LOSS ADJUSTMENT EXPENSE BY SIZE GROUP			
			First $1,000	Next $4,000	Next $95,000	Over $100,000
0 - $ 999	14,493,128	4,368,993	10,124,135	-	-	-
1,000 - 4,999	16,706,717	-	8,539,200	8,167,517	-	-
5,000 - 99,999	28,882,272	-	3,155,400	10,349,712	15,377,160	-
100,000 and over	10,002,661	-	100,000	328,000	4,275,000	5,299,661
Total	70,084,778	4,368,993	21,918,735	18,845,229	19,652,160	5,299,661
Formula		19	.200	.164	.090	.069

1. $10 Expense Constant removed since most Three-Year Fixed Rate policyholders pay premiums annually.
2. Premium adjusted to exclude the effect of a $20 Expense Constant for risks under $1,000.
3. Determined by fitting a straight line to the under $1,000 data and loaded for tax and contingencies.

currently in effect are inadequate, and some adjustment in this area might require consideration.

The comments made by the stock companies pertaining to the Three-Year Fixed Rate policies apply with equal force to the mutual carriers. In addition, it does seem appropriate to consider some means of bringing more small risks under the Three-Year Fixed Rate Program.

Since the total expense requirements of the non-stock carriers are necessarily less than the total allowance provided in the rating system, it is not appropriate to process the data reported by the mutuals in the same manner as the stock company figures have been processed.

EXHIBIT E

FINAL REPORT OF NAIC SUBCOMMITTEE TO ITS PARENT COMMITTEE

Summary of Expenses by Size of Workmen's Compensation Risk Study

The Subcommitee's report adopted at the June, 1965 meeting of the National Association of Insurance Commissioners presented an analysis of the calendar year 1963 expenses reported to the National Council on Compensation Insurance. That study pointed toward the actuarial propriety of a $12 expense constant for risks under $1,000 with comparable adjustments in manual expense provisions as well as comparable adjustments for the contributions made by general expense toward premium discounts. Since that time, the National Council on Compensation Insurance, on behalf of the insurance industry, has restudied and re-evaluated the report of 1963 expenses.

The new study reflects a determination that expense constants be increased to $17 for risks under $200 of premium and the present $10 expense constant be continued for risks between $200 and $500 of premium. In achieving this, the National Council sought information from a special study to distribute policies recorded in the $100-$499 premium size bracket. (The Subcommittee has accomplished virtually the same results through an analysis of the graduations of policies, premiums and expenses by size implicit in the 1963 data.) In addition to this, the National Council has modified the 1965 study to reflect the earlier 1962 distribution of risks by premium size and has moved somewhat further away from 1963 actual expenses; it has used calendar years 1962-64 premiums in measuring expense needs.

It is to be noted that the modified study includes a transfer item into general administration and payroll audit expenses which was the subject of the Subcommittee's comments adopted in the June, 1965 report. In accordance with this position, such transfer elements were excluded from the study. On this basis, Table 1 attached presents a program consistent with the reported figures.

Recognizing the patent undesirability of unnecessarily adding expense constant charges to risks above $500 of premium and recognizing the feasibility of increasing the expense constant charges to risks under $200 of premium, the Subcommittee has re-evaluated the tentative study adopted at the June, 1965 N.A.I.C. meeting and has developed the statistical and actuarial indications of the 1963 expense experience of non-participating stock carriers which may be summarized as follows:

(1) For risks under $200 of annual premium size, an expense constant of $15.

(2) For risks from $200-$499, continuation of the present $10 expense constant.

(3) An indicated expense provision in manual rates for general expenses including inspection of 7.8% of premium.

(4) For that portion of premium of $1,000 or more, a reduction of 3.0% from the manual expense.

The Subcommittee notes that the National Council program incorporates the transfer item in its consideration of the "relativity of expense requirements by size of risk". If this item is appropriate, then its program is reasonably consistent with the reported figures, in terms of both relative and manual expense requirements; the effect of utilizing 1962 and 1962-64 information to adjust 1963 reported figures appears to be small.

It is believed that the Subcommittee's program is entirely consistent with the figures revealed by the 1965 expense study, recognizes the practicalities of charging expense constants to smaller risks and would permit the National Council on Compensation Insurance to implement its desired program for making it economical to insure risks under the three year fixed rate program.

WORKMEN'S COMPENSATION
ANALYSIS OF GENERAL EXPENSES BY SIZE, CALENDAR YEAR 1963
ALL NON-PARTICIPATING STOCK CARRIERS INCLUDED IN STUDY

Annual Premium Size	Average Direct Standard Earned Premium*	Total General Expense	77.5% x Expense Constant**	General Expense Excluding Expense Constant		Effect of 3.0% Reduction in Allowance ***
				Amount	As % of Standard Earned Premium	
Under $200	$ 64	$ 15.99	$ 11.63	$ 4.36	6.8 %	
200 - 499	309	30.77	7.75	23.02	7.4	
500 - 749	616	53.85	-	53.85	8.7	
750 - 999	871	76.17	-	76.17	8.7	
Under $1,000	168	22.87	9.85	13.02	7.8	7.8 %
1,000 - 4,999	2,131	122.31	-	122.31	5.7	6.2
5,000 - 24,999	10,023	505.55	-	505.55	5.0	5.1
25,000 - 99,999	43,447	2,300.05	-	2,300.05	5.3	4.9
100,000 or over	231,552	11,804.14	-	11,804.14	5.1	4.8
TOTAL ALL SIZES	640	46.76	9.02	37.74	5.9	5.9

* Excluding Expense Constants
** Expense Constant - $15 under $200
$10 for $200-$499
*** Allowance taken at 7.8% of the first $1,000 of Standard Earned Premium; reduction in allowance applies to that portion of premium over the first $1,000.

DISCUSSION BY FRANK HARWAYNE

Mr. Morison has given his account from the inside of the industry activities relating to the study of workmen's compensation expenses by size of risk. As a participant he apparently believes that two opposing sides were primarily engaged in a struggle on what and how information was to be developed which would support the then existing premium discounts, rather than in an effort to find out in what degree expenses are affected by the size of the risk. He covers the limitation of general expenses and speaks of "budgetary allowance," i.e., an amount which is included as a budgetary part of the total, irrespective of what actual expenditures may be. He describes the procedures in teleological terms rather than as a straightforward attempt to find out the facts. It is unfortunate that his exposition appears to be one-sided; students of the problem may discover from Moreland Commission Reports[1] and elsewhere[2] that reasonable individuals will not be prevented from criticizing a part of the expense allowance simply because insurers term it a "budgetary allowance."

In view of the industry's total resistance to the use of production cost figures in evaluating cost graduations and premium discounts the NAIC Technician's Subcommittee was unable to insist upon the development of meaningful statistics and was impelled to avoid absolute conclusions on this item. The NAIC Technician's Subcomittee pointed out that absolute conclusions on production costs could not be reached; this was set out as a preliminary to developing the most positive aspects of the study. It also removed the controversial "transfer" item which is predicated on the net difference between accounting definitions as they existed almost two decades ago and the current definition. Strangely enough, no progress has been made by the industry in carrying out the criticism implied by the transfer item that the present definition of terms is improper.

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[1] See Moreland Commissioner Charles S. Hamilton, Jr., *Administration of the Workmen's Compensation Law in the State of New York*, December 30, 1954, pp. 32-34. See also Moreland Commissioner Joseph M. Callahan, *Costs, Operations and Procedures under the Workmen's Compensation Law of the State of New York*, January 28, 1957, pp. 91-95, in particular, p. 94. "The figures show that the insurance companies are being allowed 0.9% more than they are actually paying for acquisition costs. Whatever may be the considerations involved in attempting to require a reduction in acquisition costs, e.g., broker's and agent's commissions, there would appear to be no justification for permitting the insurance companies an allowance in excess of what they actually pay."

[2] See for example Chairman Victor Borella's Report of the Governor's Workmen's Compensation Review Committee, *Review of Workmen's Compensation in New York State*, December, 1962, pp. 72-74.

Mr. Morison's description of the study is more one of a search for facts to maintain the status quo rather than, as the Technicians' Subcommittee believes, a search for facts to determine whether or not the status quo was proper.

An interesting aftermath to the study which Mr. Morison states "produced results which preclude the necessity of undertaking another project of such magnitude and such expense in the foreseeable future" is pointed up in the following statement submitted by a company which participated in the study:

"In studying this data, (analysis of expense by size of risk for policy year 1963 and analysis of size of policy for the calendar year 1963) it became immediately apparent that our former actuary had included, for the expenses classified as Inspection, Boards and Bureaus, only Bureau expenses in the company's analysis for policies carrying an annual premium size of $999 or less and that he had charged the entire Inspection expense to policies carrying an annual premium size of $1,000 and over. This error produces an expense understatement of approximately two percentage points for policies with a premium size of $999 or less and an expense overstatement of about .38% for policies carrying a premium size of $1,000 or more.

"We also noted that under the expenses classified as Payroll Audit there is apparently a misallocation of such expenses, particularly in the premium categories of $500 to $749 and $750 to $999. In the company study this is indicated at 1% and 0.7% respectively for the two premium size categories."

If respected participants in this study can now disown their own company's figures we can well ask whether or not Mr. Morison is correct in assuming no further study is necessary in the foreseeable future.

DISCUSSION BY PAUL A. VERHAGE

The paper provided by Mr. Morison gives us an excellent chronological summary of the progress and results of the 1965 expense study by size. This paper will remain a permanent record for members and students alike of the Casualty Actuarial Society of the difficult and time-consuming labors performed to bring the study to completion.

The author has placed the actual allocation techniques in a secondary position. He leaves this aspect of the study to be summarized in the circular letter from the National Council which suggested available allocation

procedures. A future valuable contribution to the Society *Proceedings* might be a more detailed description of the actual allocations used by an individual company in fulfilling the requirements of the expense study. This could well be tied in with a discussion of the general expense allocation philosophy used for the insurance expense exhibit.

As Mr. Morison has indicated, the third party liability lines were originally included in the expense study but were later deleted from the Special Call. As suggested, a major reason for this withdrawal was the difficulty in obtaining a realistic standard premium due to the effect of expense modification and schedule rating plans. In addition, other technical difficulties were foreseen which contributed to the decision to exclude the third party lines. One of these was the expense distribution by line problem encountered with multi-line policies which include both automobile liability and general liability as well as automobile physical damage. If expenses are first allocated by policy and then by annual statement line, the significance of the expense data by line becomes vague. (This difficulty also becomes apparent in the insurance expense exhibit itself.) To compound the problem, the assignment of the premiums and expenses of an individual line to a particular premium group becomes difficult. It would be realistic to assign the data to the premium group corresponding to the total third party premium. This is compatible with the general technique of determining premium discount and retrospective rating expense provisions on the basis of total third party standard premium. But this does not fit into a scheme of studying general liability and automobile liability separately by size.

Another contributing factor in the decision to drop the third party liability lines from the study was the introduction of the commercial package policies. This added to the problems of determining the premium size category as well as siphoning premiums into another annual statement line.

The data used in developing the revised expense program was that submitted by the non-participating stock companies. The expense allocations submitted by other companies were not used since manual rate provisions are based on the indications from the stock companies exclusively. This does not mean that the work done by other companies was in vain. This information was available on a combined basis for review of non-stock premium discount and expense provision gradations. In addition, individual companies can use their results for analysis of their own experience by premium size, and analysis of retrospective rating plans, dividend schedules by size, variable dividend plans, and other net cost analyses.

As Mr. Morison outlined, many systems of expense constants were

considered. One of the original plans was the one suggested by the NAIC Subcommittee. This program consisted of a $12 expense constant up to $1,000 premium size with accompanying expense percentage loadings. Further review brought the conclusion that expense constants for policies above $500 were not strongly justified on the basis of the stock companies' data.

The propriety and necessity of expense constants at the present time for risks in excess of $500 is questionable in general. The possible $5 expense constant for the $500 to $1,000 risk is small in comparison to the $200 to $400 which these risks currently pay through the manual expense provisions.

Mr. Morison has good justification for anticipating that another study will not be requested in the foreseeable future. It is questionable, however, whether the industry will be justified in waiting fifteen years to complete another study as was done between 1950 and 1965. The effect of inflation upon incurred expenses and written premiums could well have a dramatic effect upon expense ratios by size within five to ten years. Hopefully, company efforts to pare expenses, particularly for the small risk, will have an effect upon the need for greater expense constants and further extension of the Three Year Fixed Rate Program.

DISTRIBUTION BY SIZE OF RISK

A MODEL

CHARLES C. HEWITT, JR.

Distribution of risks by size is important in many lines of commercial casualty insurance, and yet there seems to be no evidence in the *Proceedings* of any attempt to provide a workable mathematical model for this distribution. This paper will indicate that there is a basic model which provides excellent fit of the raw data in many instances. Also, the paper will illustrate an application of the model to a study of certain types of expense by size of risk.

THE MODEL—LOG-GAMMA DISTRIBUTION

The Gamma Distribution (also referred to as Pearson Type III) has been used in several recent articles in these *Proceedings* with excellent results. Dropkin[1] gives a readily understandable discussion of the gamma function, including the use of the Pearson Tables[2] in his Appendix D to his 1959 paper, "Some Considerations on Automobile Rating Systems Utilizing Individual Driving Records." In the Gamma Distribution the probability density function, p. d. f., is given by:

$$T(x,a,p)\,dx = \frac{a^{p+1}}{\Gamma(p+1)}\,x^{p}\,e^{-ax}\,dx$$

where

$$[0 \leq x] \text{ and } \begin{matrix} a \\ p+1 \end{matrix} \Big\} > 0$$

In Dropkin's work $r\ (= p+1)$ is used; however, p is one of the entry values into the Pearson Tables and is, therefore, a little handier in going back and forth between the theory and the tables.

$$E(x) = \frac{p+1}{a} \text{ and } \sigma^2(x) = \frac{p+1}{a^2}$$

$$\text{Mode}\,(x) = \frac{p}{a}$$

If $X =$ Risk premium,

and $x = log_e X$,

then $T(x,a,p)$, or a compound thereof, produces reasonably good fits to distributions by size of risk. In this instance it is appropriate to refer to

[1] L. B. Dropkin, "Some Considerations on Automobile Rating Systems Utilizing Individual Driving Records," *PCAS XLVI*, p. 165.

[2] Karl Pearson, *Tables of the Incomplete Gamma Function*, Cambridge University Press (1957).

$T(x,a,p)$ as the Log-Gamma Distribution. This particular model is extremely flexible in shifting back and forth between distributions of *number of risks* by size of risk and distributions of *amount of premiums* by size of risk. E.g., if $T(x,a,p)$ represents a distribution of amount of premium, then it is easily seen that:

$$T(x, a+1, p)\,dx = \frac{(a+1)^{p+1}}{\Gamma(p+1)} x^p e^{-(a+1)x}\,dx$$

is the distribution by number of risks,

from which it can be shown that $E(X) = \left(\frac{a+1}{a}\right)^{p+1}$

The modal value of X for the distribution of *number of risks* is:

$$e^{\frac{p}{a+1}}$$

while for the distribution of *amount of premium* the mode is:

$$e^{\frac{p}{a}}$$

THE FIT—WORKMEN'S COMPENSATION STUDY BY SIZE OF RISK

The method of fitting the data for non-participating stock companies from the 1965 Study of Expenses by Size of Risk by the National Council on Compensation Insurance is discussed in Appendix 1. A comparison of the theoretical and actual values for number of risks and amount of premium is set forth in Table 1.

To verify that this model fits other size-of-risk data, a number of similar tests were made on workmen's compensation insurance statistics for the National Council and for some of the independent state rating bureaus. In general it was found that the basic model described above works quite well for distributions of non-participating stock company business and distributions of "All Other" risks in workmen's compensation. A compound of $T(x,a,p)$ was used to fit data for mutual carriers (see Appendix 2).

THE APPLICATION—EXPENSES BY SIZE OF RISK

Certain overhead items of expense analyzed during the course of the National Council's 1965 Study are capable of being expressed analytically by the following formula:

$$\epsilon = \alpha + \beta e^{-\gamma x}$$

where ϵ is the expense ratio for a particular premium size, and X, and x have the same meaning as heretofore; when x has its minimum value of zero, the expense ratio becomes $\alpha + \beta$; as x increases, the second

TABLE 1

COMPARISON OF THEORETICAL AND ACTUAL* DISTRIBUTIONS BY SIZE OF RISK
(EXCLUDING 3-YEAR FIXED RATE POLICIES)

NON-PARTICIPATING STOCK CARRIERS

Annual Premium Size	Number of Policies (000's omitted)		Standard Premium (Excl. $10 Expense Constant) (000,000's omitted)	
	Theoretical	Actual	Theoretical	Actual
Under $100	381.3	397.2	$ 16.8	$ 16.1
$ 100-$ 499	359.0	348.6	78.2	81.4
500- 749	54.0	55.6	32.7	34.2
750- 999	28.5	28.0	24.3	24.3
Under $1,000	822.8	829.4	152.0	156.0
$ 1,000-$ 4,999	77.0	71.5	157.6	152.5
5,000- 24,999	15.2	13.9	148.4	139.0
25,000- 49,999	1.5	1.5	50.8	50.6
50,000- 99,999	0.6	0.7	41.4	43.9
$ 1,000-$ 99,999	94.3	87.6	398.2	386.0
$100,000-$249,999	0.3	0.4	41.3	56.6
$250,000 and over	0.1	0.1	73.9	66.8
$100,000 and over	0.4	0.5	115.2	123.4
TOTAL	917.5	917.5	$ 665.4	$ 665.4

*Source: National Council on Compensation Insurance – Report of the Special Committee to Study Expenses by Size of Risk (May 28, 1965) – Exhibit I – Non-Participating Stock Carriers

term in the above relationship approaches zero and the expense ratio tends toward α as a limiting value.

Since the minimum value for X is unity $(x = 0)$, $\alpha + \beta$ represents the "expense constant" for those items of expense being represented by the formula.

Using $T(x,a,p)$ and the above form for expense ratios, it follows that:

$$E(\epsilon) = \alpha + \beta \left(\frac{a}{a+\gamma}\right)^{p+1}$$

or, for any premium range up to some value X'

$$E_{x'}(\epsilon) = \alpha + \frac{\beta \left(\frac{a}{a+\gamma}\right)^{p+1} I(u^*, p)}{I(u,p)}$$

where

$$I(u,p) = \int_0^{x'} T(x,a,p)\,dx, \text{ and } u = \frac{a}{\sqrt{p+1}}\,x'$$

u is necessary since it is the other entry value (with p) in Pearson's Tables of the Incomplete Gamma Function.

$$I(u^*, p) = \int_0^{x'} T(x,a+\gamma,p)\,dx, \text{ and } u^* = \frac{a+\gamma}{\sqrt{p+1}}\,x'$$

The method of fitting the data for certain overhead expenses for non-participating stock companies from the National Council's 1965 Study is discussed in Appendix 1. The three parameters are found to be:

$$\alpha = .050; \qquad \beta = 11.69; \qquad \gamma = 0.94$$

so that

$$\epsilon = .050 + 11.69\, e^{-0.94x},$$

$$\text{or expense \$ \$ \$} = .050\ \text{X} + \$11.69\, e^{0.06x}$$

$$(\text{since X} = e^x)$$

As pointed out, when the premium is \$1, the "expense constant" for these particular items is $\alpha + \beta$ or \$11.74[3]. This is perhaps the first analytical derivation of an *expense constant.*

[3] Cf Report of April 28, 1965, Meeting of (NAIC) Subcommittee to Study Expenses by Size of Workmen's Compensation Risk, which suggests a figure of \$12 for an expense constant.

TABLE 2

COMPARISON OF THEORETICAL AND ACTUAL* EXPENSE RATIOS BY SIZE OF RISK

(EXCLUDING 3-YEAR FIXED RATE POLICIES AND $10 EXPENSE CONSTANT)

NON-PARTICIPATING STOCK CARRIERS

	Actual* Expense Ratios				Theoretical Expense Ratios
Annual Premium Size	Inspection Boards and Bureaus	Payroll Audit	Other General	Total	Total
Under $100	.032	.105	.243	.380	.380
$ 100-$ 499	.018	.039	.062	.119	.124
500- 749	.018	.027	.042	.087	.079
750- 999	.022	.021	.044	.087	.071
Under $1,000	(.020)	(.041)	(.073)	(.134)	(.134)
$ 1,000-$ 4,999	.017	.014	.026	.057	.059
5,000- 24,999	.018	..009	.023	.050	.052
25,000- 49,999	.021	.007	.026	.054	.051
50,000- 99,999	.020	.006	.026	.052	.051
$ 1,000-$ 99,999	(.019)	(.010)	(.025)	(.054)	(.055)
$100,000-$249,999	.020	.005	.023	.048	.050
250,000 and over	.024	.005	.024	.053	.050
$100,000 and over	(.022)	(.005)	(.024)	(.051)	(.050)
TOTAL	(.020)	(.016)	(.036)	(.072)	(.072)

*Source: Same as for Table 1 (Expense transfers ignored)

A comparison of the theoretical average expense ratios within each premium grouping with the actual expense ratios is set forth in Table 2. Although the fit is fairly good, it is far from perfect, but the raw data is itself rather erratic from one interval to the next. In any event this example serves to illustrate the applicability of the Log-Gamma model in determining mean expense ratios for premium size intervals and in total.

CONCLUSION

The Log-Gamma Distribution is a flexible, easily applied model which provides relatively good fits in either the basic or a compound form to commercial risk distributions by size. When the parameters of the model have been determined, the Log-Gamma is readily applicable to analysis of factors, such as expenses, which appear to vary with risk size in a polynomial or exponential form.

APPENDIX 1—FITTING THE DATA

While the results produced by an appropriate model and the ease with which the model may be applied are the important considerations, the technique of fitting a particular set of data is also of some interest. Size of risk distributions generally have two characteristics that produce problems in fitting, unless proper precautions are taken. The characteristics are (1) a great majority of the risks are at the lowest premium sizes, and (2) jumbo risks at the opposite end of the spectrum distort the moments of the premium distribution. The precautions are (1) make the initial fit on distributions of premium amounts rather than number of risks—the former distribution is always far less skewed than the latter, and (2) make the initial fit on the logarithm of premium size rather than the premium size itself—the distortion created by the jumbo risks is minimized. (These general comments are also appropriate for fitting distributions by size of loss.)

Log-Gamma Fitting. This is a two-parameter distribution and the ultimate determination of the parameters, a and p, was by solution of the two equations for mean value:

$$(1)\quad E(x) = \frac{p+1}{a} \qquad \text{(on distribution by amount of premium)}$$

$$(2)\quad E(X) = \left(\frac{a+1}{a}\right)^{p+1}$$

However, the latter equation is not easily solved without a good approxi-

mation for p. This approximation was obtained by using the sample mean and variance of $T(x,a,p)$; the former is given in (1) just above and the latter is, of course gixen by $\frac{p+1}{a^2}$. Any reasonable value for the "interval $E(x)$ and $E(x^2)$" in each of the premium intervals will do for this approximation, except that the values for $E(x)$ and $E(x^2)$ in the uppermost premium interval should be repaired at each successive approximation, since this is an open-end interval and even logarithm values need to be carefully selected. Once a stabilized value of p (it is easiest to round to the nearest entry value in the Pearson Tables) is obtained, then equation (2) is readily solved.

Expense distribution. The expression for expense ratio at a particular premium size is a three-parameter exponential formula. The determination of the parameters was achieved by combining analytically the expense ratio for a particular premium size with the frequency of premium amounts at that particular premium size (as fitted to the Log-Gamma function) and producing arithmetic mean values for:

(1) the entire premium range,

(2) the first $100 of the premium range, and

(3) the first $1,000 of the premium range.

The latter two conditions were chosen after an examination of the source data indicated that these premium intervals were critical in obtaining a good fit of expense ratios. The three conditions produced three equations which were then solved for the three parameters on a trial-and-error basis (with a minimum of difficulty).

APPENDIX 2—COMPOUND LOG-GAMMA

The basic Log-Gamma is not a good model for mutual carrier distributions or for "Manufacturing" risk distributions by size. However, a compound Log-Gamma of the form:

$$h\,T(x,a_1,p_1) + (1\text{-}h)\,T(x,a_2,p_2),\ (0 < h < 1)$$

does produce the results set forth in Table 3. (Subscript 1 parameters were "borrowed" from the non-participating stock carrier distribution.)

This compound distribution can then be applied to an analysis of expenses by size of risk, where the parameters in the expense ratio formula are different for the separate elements of the compound Log-Gamma function. The result of this fitting of expense data for mutual carriers (Table 4) is included for the sake of completeness.

TABLE 3

COMPARISON OF THEORETICAL AND ACTUAL* DISTRIBUTIONS BY SIZE OF RISK (EXCLUDING 3-YEAR FIXED RATE POLICIES)

MUTUAL CARRIERS

Annual Premium Size	Number of Policies (000's omitted)		Standard Premium (Excl. $10 Expense Constant) (000,000's omitted)	
	Theoretical	Actual	Theoretical	Actual
Under $100	89.8	95.7	$ 4.0	$ 3.6
$ 100-$ 499	103.2	100.3	23.8	23.3
500- 749	21.2	21.5	12.9	13.0
750- 999	12.7	12.5	10.9	10.8
Under $1,000	226.9	230.0	51.6	50.7
$ 1,000-$ 4,999	45.3	42.7	99.3	93.0
5,000- 24,999	13.9	13.3	141.1	140.5
25,000- 49,999	1.7	1.7	57.7	61.3
50,000- 99,999	0.7	0.7	49.6	50.1
$ 1,000-$ 99,999	61.6	58.4	347.7	344.9
$100,000-$249,999	0.3	0.4	50.0	58.9
250,000 and over	0.1	0.1	74.3	69.1
$100,000 and over	0.4	0.5	124.3	128.0
TOTAL	288.9	288.9	$ 523.6	$ 523.6

*Source: National Council on Compensation Insurance – Report of the Special Committee to Study Expenses by Size of Risk (May 28, 1965) – Exhibit II – Mutual Carriers

TABLE 4

COMPARISON OF THEORETICAL AND ACTUAL* EXPENSE RATIOS BY SIZE OF RISK

(EXCLUDING 3-YEAR FIXED RATE POLICIES AND $10 EXPENSE CONSTANT)

MUTUAL CARRIERS

Annual Premium Size	Actual* Expense Ratios				Theoretical Expense Ratios
	Inspection Boards and Bureaus	Payroll Audit	Other General	Total	Total
Under $100	.051	.088	.244	.383	.381
$ 100-$ 499	.024	.036	.062	.122	.141
500- 749	.027	.027	.045	.099	.103
750- 999	.034	.023	.041	.098	.095
Under $1,000	(.029)	(.034)	(.067)	(.130)	(.140)
$ 1,000-$ 4,999	.033	.016	.032	.081	.076
5,000- 24,999	.029	.008	.024	.061	.059
25,000- 49,999	.027	.005	.021	.053	.053
50,000- 99,999	.027	.004	.020	.051	.051
$ 1,000-$ 99,999	(.030)	(.009)	(.024)	(.063)	(.062)
$100,000-$249,999	.027	.004	.019	.050	.049
250,000 and over	.029	.003	.017	.049	.048
$100,000 and over	(.028)	(.003)	(.018)	(.049)	(.049)
TOTAL	(.029)	(.010)	(.027)	(.066)	(.066

*Source: Same as for Table 3

APPENDIX 3—PARAMETERS

Non-Participating Stock (Subscript 1)	Parameter	Mutual (Subscript 2)
1.220	a	2.223
10.0	p	21.8
.050	α	.046
11.69	β	5.25
0.94	γ	0.63

h	Compound Log-Gamma	1−h
.731	Number of risks	.269
.293	Amount of premium	.707

DISCUSSION BY JAMES R. BERQUIST

We are, indeed, indebted to Mr. Hewitt for his continual efforts to provide us with practical applications of the theoretical techniques developed by mathematical statisticians.

In this paper Mr. Hewitt suggests a model which gives a good fit for size of risk distributions. That this technique does, in fact, fit the industry data is shown in Tables I and III.

The value of the suggested model is not limited to industry statistics, however, as its most practical application for the company actuary will be in fitting the distribution of business by size of risk of his own company to the model.

For example, the table on the following page shows the differences between the actual distribution of Employers Mutuals workmen's compensation risks by size and the theoretical distribution obtained by using a compound Log-Gamma as Mr. Hewitt suggests in Appendix 2. In this case the a_2 and p_2 were determined by using the method outlined in Appendix 1. The "h's" turned out to be .861 for the distribution of business by amount of premium, and .466 for the distribution of the number of risks.

Typical of the authors of many good mathematical textbooks, Mr. Hewitt assumes a rather high degree of mathematical proficiency on the part of his readers, and leaves the reader on his own to supply some of the missing proofs.

On page 107, for example, he says the following: "if $T(x, a, p)$ repre-

COMPARISON OF THEORETICAL AND ACTUAL DISTRIBUTION BY SIZE OF RISK

Employers Mutuals of Wausau

Annual Premium Size	Number of Policies* Actual – Theoretical	Standard Premium Size* Actual – Theoretical
Under $100	-.0004	-.0047
$ 100-$ 499	+.0015	+.0056
500- 749	+.0005	+.0016
750- 999	-.0005	-.0020
Under $1,000	+.0011	+.0005
$ 1,000-$ 4,999	-.0034	-.0017
5,000- 24,999	+.0015	+.0011
25,000- 49,999	+.0011	+.0002
50,000- 99,999	-.0009	--
Under $100,000	-.0006	+.0001
$100,000-$249,000	-.0044	-.0002
$250,000 and Over	+.0049	--

*Actual and theoretical values were calculated as ratios to total number of policies or amount of premium, carried to four decimal places.

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sents a distribution of amount of premium, then it is *easily** seen that $T(x, a+1, p)$ . . . is the distribution by number of risks."

This reviewer feels the paper would have been much more readable had the author reviewed for his readers some basic mathematical statistics. He could have pointed out that the basic Gamma frequency function is $x^p e^{-ax}$. The value $\frac{a^{p+1}}{\Gamma(p+1)}$, then, was obtained by integrating the frequency function $x^p e^{-ax}$ over the range 0 to ∞ and requiring this integral to be

* Reviewer's italics.

equivalent to *1.0,* the requirement of any p.d.f. Then, since the amount of premium is e^x, the frequency function for the number of risks is $x^p e^{-(a+1)x}$ upon dividing by the amount of premium. By integrating this frequency function and fulfilling the requirement that the integral equals *1.0,* we do "easily" obtain $\Gamma(x, a+1, p)$.

Mr. Hewitt's fine narrative on "fitting the data" in Appendix 1 would have been enhanced, at least for the average reader, if he had seen fit to include some of his worksheets used in obtaining the tables in the paper.

This paper is a valuable addition to our *Proceedings* despite the minor points just raised. We hope that Mr. Hewitt, and others, will continue to share their research with us.

DISCUSSION BY ROBERT L. HURLEY

While this paper, so suggestive of an austere scholarship, may seem directed to those of the avant-garde who delight in frolicking among the outer reaches of actuarial theory, Mr. Hewitt presents both a challenge and a promise to those members whose interests, like this reviewer's, may gravitate more towards the application of actuarial principles to current underwriting and rating problems.

This paper shows that the distribution by size of both the workmen's compensation standard premium and the number of policies* may be fairly described by a Log Gamma equation. It also suggests that certain workmen's compensation expenses may vary by size of risk according to a similar pattern. There is the intimation (which particularly interests this reviewer) that loss distributions may follow the same law, using the latter term in its least restrictive sense.

A quick check on Mr. Hewitt's findings by premium size (c.f. Table I) reveals a close fit of the actual to theoretical values, according to the Pearson Chi-Square or even the possibly more critical Kolmogorov-Smirnov test. While references were afforded the reader on the Gamma function, the author was understandably more interested in the potential significance of his findings to actuarial theory than in detailing the mathematics, some of which is available in the standard literature. This "Hoc age" (up and at it) approach which is not infrequently so characteristic of the scholar can be oftentimes bewildering and even exasperating to the less specialized reader.

* As given in Exhibit I of the National Council on Compensation Insurance's Report of the Special Committee to Study Expenses by Size of Risk.

It might, therefore, be not inappropriate for the reviewer to fill in with certain details which he has been able to find in the literature and to add some comment on the problem of graduation methods versus risk theory, drawing chiefly on the work of others with which, in some instances, he has had only the most casual relationship, and in others, no personal contact at all.

As Mr. Hewitt noted, the Gamma Distribution is sometimes referred to as the Pearson Type III Curve. It may be recalled that at the turn of the century Karl Pearson suggested that most of the familiar uni-modal frequency distributions could be generated by varying the numerical coefficients of a differential equation whose numerator was a linear and whose denominator was a quadratic expression in x.

The basic equation is of the general form $\frac{dy}{dx} = \frac{y\,(m-x)}{a+bx+cx^2}$

When the coefficient c equals zero, $\frac{dy}{y} = \frac{(m-x)\,dx}{a+bx}$

or $\frac{dy}{y} = -k_1\,dx + \frac{k_2}{(x-r)}dx$; And integrating: $y = Ae^{-k_1 x}\,(x-r)^{k_2}$

Or letting $k_1\,(x-r) = w$

$y = Be^{-w}\,w^{k_2}$, which is the general form of the Gamma equation given in Mr. Hewitt's paper.

The Gamma function is commonly represented as a skew shaped curve where y has its peak value at the lower end of the x scale and drops off towards zero as the x value approaches infinity. It will be sensed intuitively that the contour of such a curve might well fit the type of data, policies and premiums by size groups, with which Mr. Hewitt was working.

Now lest it be thought that the Pearson system is solely a fabrication out of sheer fancy with no foundation in reality, it should be noted that the basic differential equation cited above can be developed out of those quite practical problems as figuring the chance of getting a full house in a poker game. And the familiar Normal Curve $y = k_1 e^{-k_1 x^2}$ results from assigning zero values to the b and c coefficients of the x values in the denominator of Pearson's differential equation.

In many actuarial problems, reasonably satisfactory predicative statistics can be developed by recasting the original data so that tables of the probability integral (i.e. the normal curve) may be used. On occasions it is found that while, for example, the number of losses y by dollar size

group x will not fit the normal curve, a reasonably good fit can be obtained by transforming to *log x* or the logarithm of the dollar loss size.

The substitution of the *log x* scale may tend to reduce both the variance and the skewness of the distribution. It is demonstrated in mathematical texts that while *log x* approaches infinity as x increases, it does so more slowly than any polynomial in $ax^{n1} + bx^{n2} + \ldots$ no matter how small a positive fraction n may become. Consequently, the substitution of log functions sometimes renders the data more tractible to mathematical analysis, and this seemingly was a consideration in Mr. Hewitt's decision to use the log of the gamma function.

Mr. Hewitt's paper, it is believed, represents another significant advance by the proponents of the mathematical theory of risk school in the search for a constantly more precise analytic expression for the actuarial principles underlying the casualty and property insurance business.

It may be recalled that in his review of the paper on Table M in Volume LII of the *Proceedings,* Mr. Hewett stressed the need (in support of Mr. Simon's conclusion) for determining the basic nature of underlying loss patterns rather than perpetuating the customary practice of collecting a series of observations and by some subtle ingenuity, but more commonly through the mere drudgery of actuarial sweat, devising an equation that would fit tolerably well. In this regard, it may be helpful to take just one business problem commonplace to many company actuaries, trace some intermediate solutions, and see it emerge as one of the basic situations demanding the attention of those who are interested in the possible applications of the mathematical theory of risk.

Many years ago, now, a company about to file an individual risk rating plan for fire insurance was induced to research the possibility of incorporating an optional deductible (i.e. up to $5000) feature as "natural" for large accounts with 25 or more locations. A number of the then actuarial students were set to scurrying about the statistics to see what $1000 to $5000 deductibles were worth by line size.

The Loss Elimination Ratios (LERs) were computed for each deductible line size and an attempt was made to fit the observations to a rectangular hyperbola with the axes rotated minus 45°, or a curve of the general form $xy = k$. The fit was so unsatisfactory at the upper reaches of the insurable values that it was decided to draw a curve that would best fit the observed points solely on an eye control.

Somewhat later, when another company came out with a considerably less modest deductible program, additional data were taken off to check

the comparative rate credits. Combining the latter data with the statistics from the earlier study, one of the investigators found that the observed LERs could be made to fit more closely a theoretical curve by changing the equation from $y = \frac{k}{x}$ to $y = \frac{k}{a + bx}$

Within the last few years many of the fire rating bureaus have filed deductable rating plans wherein the observed LERs by line size for various fire insurance deductibles from $500 to $75,000 will be found to fit reasonably well (at least within the range of values for which readings were available) a graduation equation of the general form $y = \frac{k}{(\log x)^n}$

And in Volume LII of the *CAS Proceedings* Mr. Simon's very readable exposition of the mathematical research underlying the 1965 revision of Table M relates that after testing some 25 different equations, it was found that the insurance charges were best described by an equation of the form $\phi(r) = 1 / (1 + r + b_2 r^2 \ldots b_5 r^5)$ where r equals the adjusted ratio of actual to expected losses.

Now, these previous references, covering different samples, different times, different coverages, all tend to describe insurance loss distribution by size as a pattern which might be generalized into an equation of:

$$y\, f(x) = k$$

Mr. Hewitt's use of the log gamma might conceivably be viewed as a further generalization on this equation with the substitution of a second variable in x for the constant k—so that the revised equation becomes $c\, y\, f_1(x) = f_2(x)$; *with* $f_2(x) < f_1(x)$ as $x \to \infty$. With the following equivalences to Mr. Hewitt $y = T$; $c = \frac{\Gamma(P+1)}{a^{P+1}}$,

$f_1(x) = e^{ax}$; $f_2(x) = x^P$ in Mr. Hewitt's first equation

$$T\,dx = \frac{a^{P+1}}{\Gamma(P+1)}\, x^P\, e^{-ax}\, dx$$

On occasions all of us are probably bothered by the mathematical creations sometimes erected to explain situations that on the surface, at least, appear quite simple. As a case in point, we might take the basic equation $y\, f(x) = k$, discussed above.

When $f(x)$ equals x this equation reduces to an expression which is equally applicable to Boyle's Law of Gases, or to the area of a rectangle, or to any situation explaining the variation of two factors whose product tends to be constant. On the face of it, such a situation can be thought

analogous to the distribution of expected losses or excess loss ratios by size since as the size increases, the expectancy decreases—but not in a straight line down to zero for some fixed x less than infinity.

And yet, on testing, we sometimes discover that the easy explanation just does not fit the facts. Consequently, additional elements must be sought to account for the underlying phenomena at play.

But on occasions this attempt to fit the mathematics to the observed facts, even with the additional data, does not work out too successfully. In such a situation the attack on the problem must be redirected, and our mathematical horizons widened.

This, as I understand it, is the goal of the Mathematical Theory of Risk school, and Mr. Hewitt's paper might be regarded as a particular approach, of some promise, to the insurance industry's possible needs area of the distribution of risk and maybe losses by size.

INSURANCE COST OF AUTOMOBILE BASIC PROTECTION PLAN IN RELATION TO AUTOMOBILE BODILY INJURY LIABILITY COSTS

FRANK HARWAYNE

ACKNOWLEDGMENT

The author is indebted to the Harvard Law School, to Professor Robert E. Keeton (Harvard Law School), and to Professor Jeffrey O'Connell (University of Illinois) for sparking the interest in undertaking this study and for their aid in reviewing the manuscript. In particular, evaluation of some of the finer points of the Basic Protection Plan would have presented a much more arduous task without assistance from these able men and Professor C. Arthur Williams (University of Minnesota). The analysis and conclusions drawn are, of course, the author's own.

A discussion by Professor Keeton of the main provisions of *Basic Protection for the Traffic Victim—A Blueprint for Reforming Automobile Insurance* by Keeton and O'Connell (Little, Brown & Co., 1965) is included in this issue of the *Proceedings* as part of a panel presentation on Automobile Compensation Plans at the May, 1966 meeting of the Society. The complete text is available from the publisher.

The problem considered herein is one of estimating costs for automobile basic protection insurance as it would be expected to affect New York State in comparison with present day bodily injury automobile liability insurance. Since the problem is unique, standard techniques and methods have not always been suitable to the task. Wherever practicable, however, techniques, methods and statistical data used have been grounded in developments recognized and accepted in insurance circles.

Two formal estimates[1] of cost have been computed, a high one based on automobile data inclusive of the cost effects of pain and suffering as currently recognized in the liability system and an intermediate one which reflects loss of income and economic costs computed from known workmen's compensation average claim costs in automobile accidents. The high estimate for $10,000/$100,000 limits of coverage is slightly less than

[1] For completeness, two additional estimates not included in the main text are contained in Appendix A. Appendix A incorporates eleven items which, less conservatively, may be of significance to Basic Protection costs.

costs for present $10,000/$20,000 automobile bodily injury liability insurance costs (89% of costs with both on a $10,000/$20,000 comparative basis). The intermediate estimate for $10,000/$100,000 limits of coverage is approximately 85% of present $10,000/$20,000 automobile bodily injury liability insurance costs; it would be approximately 76% of costs with both on a $10,000/$20,000 comparative basis.

The estimate derived from workmen's compensation figures excludes payments for pain and suffering. The cost estimate derived from automobile liability insurance data, on the other hand, is higher because it includes the cost effects of pain and suffering. It is as though some "added protection" coverage for pain and inconvenience under the basic protection system were included in this estimate. The estimate derived from workmen's compensation data, then, is the better estimate of the cost of basic protection alone.

Medical cost is approximately 25% of combined wages and medical of the basic protection plan. Moreover, the high indemnity cost of death and major permanent cases which number approximately 2% of the cases makes up approximately 21% of the total cost.[2]

At the $10,000 limit per claim level, the average value of economic loss appears to be 81% of the combined value of all economic loss and pain and suffering. This is changed somewhat (85%) at the $5,000 limit per claim level. On the other hand, above $10,000 no estimates can be made from available insurance data except to note that currently applicable increased limits factors include both economic loss and pain and suffering; the increments charged are relatively moderate, possibly because of the uncertainty of both the existence and the value to be attached to pain and suffering as respects particular claims. For example, the premium charged for doubling the coverage from $5,000/$10,000 liability limits to $10,000/$20,000 liability limits is 20%; from $10,000/$20,000 to $25,000/$50,000 (an increment of three times the $5,000/$10,000 coverage) it is an additional 16 percentage points of cost.

The cost of the basic protection plan was first considered from the standpoint of present day liability or tort costs in the aggregate; on this there could be superimposed necessary adjustments and modifications determined from sample surveys. In the light of the wealth of material which, by diligent digging, may be extracted from more complete and publicly available data reported by insurers, motor vehicle authorities and

[2] The dollar amount of interest aggregated by periodic payments is not significant in relation to the other factors entering into the computations and has therefore not been included in the derivations.

others, it became apparent that such material encompasses, if not all relevant automobile incidents, at least many more automobile incidents for a given period of time than does a sample of several hundred cases. For this reason, the initial approach was reconsidered and modified to encompass pertinent insurance and reported motor vehicle data together with such other elements as census data which bear on economic costs. Further, the information developed has been converted to a unit cost basis so that more ready comparisons may be made with current insurance costs. It is believed that this approach may afford a practical method of comparing premium determination under a fault system with that under the basic protection system.

Consideration was given to various elements of the insurance premium. It was concluded that for cost purposes there was no basis for assuming the marketing system of insurance would be different from the current marketing system. Accordingly, the calculations have been developed on this basis; if the basic protection system were to be accompanied by marketing changes, then these would have to be separately reflected.

The volume of New York State automobile bodily injury liability insurance premiums in 1964 amounted to $585.3 millions for all insurers, which, assuming the intermediate savings estimate of 15% under the Basic Protection Plan, yields an annual savings of $87.8 millions.

In carrying forward the estimates of unit costs under the present liability system and the basic protection plan, attention has been directed to losses and loss adjustment expenses to the exclusion of other costs such as production expenses (commissions and other acquisition), taxes, or insurers' general expenses (policy writing, record keeping, etc.) Nevertheless, for completeness, it is well to note these elements as part of the overall premium structure generally used by the leading stock and mutual insurance ratemaking groups. The expense and profit or contingency provisions which are periodically revised to reflect actual expenses are approximately as follows:

Premium		100.0%
Production expense	18.5%	
Tax	4.7	
General expense	6.4	
Profit or contingency	3.4	
Sub-total		33.0
Balance for loss and loss adjustment		67.0%

Of the 67.0% for loss and loss adjustment expense 6.1% of premium is expended for unallocated claims expense, i.e., maintenance of the claim department, claim files, etc. In addition, as developed in this study, it is estimated that allocated claims expense, i.e. claims expense specifically allocated to individual claims, absorbs 8.2% of the stock and mutual insurance company premium in New York State, so that total claims adjustment expense amounts to 14.3% of premium; on the 1964 premium volume, this amounts to $83.7 millions.

Measured against loss payments, allocated claims expense is equal to approximately 16% on the average. This amount has been assumed to correspond approximately to the cost of the current system expended on plaintiffs' attorneys.

Although arguments might be made for reducing allocated claim expense because litigation would be minimized or increasing allocated claim expense because there might be a reduction of controls in first party litigations, for cost analysis purposes it has been here assumed that the proposed system would neither increase nor decrease current claims expense. It has also been assumed that the maximum average allocated claims expense from various sources will prevail. On the average, it is assumed that insurers' allocated claim expense cost of 16% of recovery under the liability system will correspond approximately to the cost of the current system's expenditures on claimants' attorneys. While this may appear low at first, it is not unreasonable to the extent that (a) competition between insurers and claimants for legal services is a factor affecting fees and prices, and (b) the figure represents an average of success[3] and failure in plaintiff representation under contingency fee arrangements.

It is to be noted that the per case loss adjustment expense of both insurers and claimants is reflected at full value in the estimate of cost under the basic protection plan; moreover, the aggregate cost of loss adjustment has been increased 25% to reflect the larger number of claims which will be settled under the proposal.

Statistics Background

In New York State all insurers report their automobile bodily injury liability insurance statistics to either the Mutual Insurance Rating Bureau,

[3] The State of New York Judicial Conference, Seventh Annual Report, 1962, indicates retainers and contingent fees of one-third or more filed in closing statements, pp. 144 and ff. See also, Columbia University, Project For Effective Justice, Accidents, Money, and the Law: *A Study of the Economics of Personal Injury Litigation,* by Marc A. Franklin, Robert H. Chanin, and Irving Mark, pp. 20 and ff.

the National Association of Independent Insurers, the National Bureau of Casualty Underwriters, or the Statutory Automobile Rating Bureau. The best available automobile personal injury cost data are contained in the records kept by insurers. For purposes of this study it is fortunate that the statistical support needed to comply with insurance rate regulation has resulted in disclosure of much detailed insurance information regarding private passenger automobile experience separate from vehicles used for commercial and other purposes. In addition to this, frequency of claims in relation to number of vehicles insured, average claim costs, and pure premiums or loss costs per car can be computed from the data which are almost always publicly available in reasonable detail.

It must be understood that such insurance information, used with care, is far superior and by no means to be equated with a limited sample survey such as may be obtained by public opinion surveys. This is clearly brought out by a review of insurance claims reported as a result of accidents occurring in 1960. For that year insurers reported 257,245[4] claims (a small number of these claims refer to policy year 1960 rather than accident year 1960). Simultaneously, persons killed or injured in automobile accidents reported to the State of New York Motor Vehicle Department in 1960 numbered 275,795,[5] or 7% more than the number of claims. It is apparent from the closeness of the two figures that claims reported to insurers cover the vast majority of situations involving injuries or fatalities.

Much valuable information is available from workmen's compensation insurance data reported to the New York Compensation Insurance Rating Board, a statistical and ratemaking organization which acts on behalf of insurers. The records of the State of New York Workmen's Compensation Board also indicate the extent of workmen's compensation injuries where the accident causing agency is a motor vehicle.[6]

Although the primary emphasis is on data disclosed through insurance records rather than from other sources, much non-insurance information has also been included and given proper weight in measuring cost factors. The non-insurance information considered in this regard was taken from five main sources. These are the records of the State of New

[4] Summation of reports of all statistical agents for automobile liability insurance shown in Table D-1.

[5] Published Statistical Report of Motor Vehicle Accidents, State of New York, Department of Motor Vehicles, shown in Table D-1.

[6] Reported in Compensated Cases Closed published by the State of New York Workmen's Compensation Board in various Research & Statistics bulletins. For the years 1961-1963, 25,876 such cases were closed.

York Motor Vehicle Department, the State of New York Workmen's Compensation Board, the United States Department of Health, Education and Welfare Public Health Service, the National Safety Council, and the National Industrial Conference Board.

The State of New York Motor Vehicle Department provides extremely valuable detailed information regarding injuries and fatalities according to description of the accident situation, age, sex, and other characteristics. In measuring economic cost for this study, it has sometimes been necessary to translate summary information published by sex, age, and driver characteristics to census format so that the economic effects according to each of these pertinent characteristics can be combined with labor force characteristics in estimating economic loss.

U. S. Department of Health, Education and Welfare
National Health Survey

There is a general belief that motor vehicle accidents tend to be more severe than other accidents. This is borne out by the U. S. National Health Survey in its publication *Persons Injured in Motor Vehicle Accidents and Associated Disability,* U. S., July 1959-June 1961, Series B, No. 42. At page 3, the survey points out that "Moving motor vehicle accidents accounted for only 6.4 per cent of the persons injured in all accidents. However, the number of disability days resulting from moving motor vehicle accidents represented 18.8 per cent of all restricted-activity days, 22.7 per cent of all bed-disability days, and 20.1 per cent of all work-loss days due to accidental injuries. This would indicate that injuries in moving motor vehicle accidents, in comparison with other types of accidents, occur less frequently, but tend to be more severe." Workmen's compensation data also lead to similar conclusions; accordingly, data selected have been limited to motor vehicles, although other data may also be shown.

New York State
Cost Elements of Automobile Accidents

Sources and descriptions of information bearing on personal injuries resulting from automobile accidents are given later in this report.

The largest single body of insurance information available is that pertaining to private passenger type automobiles classified according to statistical plans and regularly reported to insurance supervisory authorities. The voluminous detail of this information, of which the latest covers accidents occurring in 1963, comprises more than five-sixths of all automobile lia-

bility insurance experience. The records reported by the Mutual Insurance Rating Bureau and the National Bureau of Casualty Underwriters, whose members and subscribers write approximately 70% to 75% of the automobile bodily injury liability insurance business in New York State, were used to determine the comparative cost estimates set forth in Table 1. The use of very conservative values throughout Table 1 affords high cost estimates of the basic protection system. Lines 1 and 2a, separately for indemnity and medical payments costs, are derived directly from data reported by the statistical agents and incorporated in the insurers' ratemaking programs. Line 2b excludes 13.5%[7] of claim cost on account of allocated claim expense. For comparative purposes it should be noted that legal fees under the workmen's compensation system in New York State are considerably less than this percentage. For cases[8] closed from 1961-1963, legal fees per case (where legal fees were charged) averaged 9% of indemnity cost; however legal fees were involved in less than one-sixth of the cases reported and the dollar amounts for legal fees were less than 1.5% of indemnity costs. Line 3 gives the annual pure premium or loss cost per insured car. Line 4 shows the loss cost charge for uninsured motorists coverage.[9] Line 5 sets forth the pure premium (including and excluding allocated claim expense) of the present automobile liability insurance system. Line 6 gives effect to the additional claims which will be payable if liability considerations are removed; a factor of 1.25[10] is applied. In connection with line 7, it is assumed that attorneys' fees on behalf of claimants under the new program will be equal to insurers' current allocated claim expense costs per case and that these will not be reduced under the new program. Line 7a sets forth the 50% of claimants' attorneys' fees payable by the claimant; line 7b sets forth as a single amount the insurers' allocated claim expense plus 50% of the claimants' attorneys' fees which is payable by insurers. Line 8 (excluding allocated claim expense) incorporates a deductible feature of $100 or 10%, whichever is greater, by application of a factor of .853.[11] Line 8a shows the indicated pure premium (including allocated claim expense of 100% on behalf of the insurer and 50% on behalf of the claimant) before offsets for other insurance, sick

[7] See Table D-2.

[8] Where the accident causing agency was a passenger automobile.

[9] 30% of the premium covers expenses.

[10] From Table D-1.

[11] From Table D-3. See Keeton, R. E. and O'Connell, J., *Basic Protection for the Traffic Victim—A Blueprint for Reforming Automobile Insurance*, Chapter 7, pp. 299-339, The Proposed Motor Vehicle Basic Protection Insurance Act, Article 2, Section 2.3 (a). It is to be noted this value could be slightly higher because only work loss is subject to the deductible for larger cases.

TABLE 1

NEW YORK STATE
ESTIMATED COST ELEMENTS OF AUTOMOBILE ACCIDENTS
BASED ON
AUTOMOBILE BODILY INJURY LIABILITY INSURANCE DATA

	Liability Basis		
	Indemnity	Medical Payments	Combined
1. Accident year 1963 claim frequency....	5.26%	3.57%	
2. Average claim cost:			
a) including allocated claim expense	$970	$182	
b) excluding allocated claim expense 2a × .865.....	$839		
3. Pure premium ($10,000/20,000 indemnity) 1 × 2:			
a) including allocated claim expense	$ 51.02	$ 6.50	$57.52
b) excluding allocated claim expense	$ 44.13		
4. Uninsured motorist coverage loss cost .70 × $3.00.....	$ 2.10		$ 2.10
5. Estimated present loss cost including uninsured motorist coverage 3 + 4:			
a) including allocated claim expense	$ 53.12	$ 6.50	$59.62
b) excluding allocated claim expense	$ 46.23		
6. Effect of eliminating liability 5 × 1.25 (for indemnity):			Non-Liability Basis
a) including allocated claim expense			$66.40
b) excluding allocated claim expense			$57.79
7. Attorneys' fees and allocated claim expense:			
a) claimants: 50% (6a – 6b).....			$ 4.31
b) insurers: 150% (6a – 6b).....			$12.92
8. *Indicated loss and allocated claim* cost of basic protection program (deductible basis):			
a) before off-sets 6b × .853 × 7b			$62.21
b) discounted 15% for payable economic *loss due to the income tax exclu*sion .883[1] × 6b × .853 × 7b.....			$56.45
c) 8b after off-sets for other insurance, sick leave, etc. 8b – 6% × 6b ...			$52.98

[1] 15% not applied to medical; $1.0 - .15 \cdot \frac{\$839 - \$182}{\$839} = .883$

leave, etc. Line 8b removes the 15% of economic loss which is excluded from the new program due to the income tax exclusion.[12] Line 8c includes the offsets[13] for other insurance, sick leave, etc., the principal one being that for the New York Disability Benefits Law under which the average claim cost has been $261[14] per case. It is most probable that other insurance of substantial proportions exists; however, as there appears to be no foolproof way of disclosing such other insurance, it has not been included. The last figure of the exhibit shows the indicated cost of the new program including uninsured motorist coverage at $10,000/$20,000 limits.[15] The figure of $52.98 is approximately 11% less than present day loss costs for statutory limits, including medical payments and uninsured motorist coverage. Such a difference can be used to finance coverage with limits of $10,000 per claim and $100,000 per accident.[16]

The figures of Table 1 have been carried forward in Table 2 which affords a comparative estimate of costs of the present automobile liability system with those of the basic protection system. The table shows that, on the basis of high cost estimates (including pain and suffering), the program on a $10,000/$20,000 basis would entail approximately 89% of present costs. A somewhat lower estimate results from the application of workmen's compensation average claim costs[17] (excluding pain and suffering) and this is equal to 76% of present costs. To each of these figures should be added the element of multiple claims in a single accident represented by the relative cost of $10,000/$20,000 limits and $10,000/$100,000 limits for which the current charge is approximately 9% on the bodily injury liability portion of premium only. This element produces an increase factor of 9 per cent on the deductible basis of the basic protection plan resulting in a high cost estimate (including pain and suffering) of 98% of current automobile bodily injury liability costs. The estimate based on workmen's compensation figures (excluding pain and suffering) reduces this amount to approximately 85%. Continuation of the present

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[12] *Ibid.* Article 1, Section 1.10 (d).

[13] Based on 34% of persons injured in motor vehicle accidents being employed and off the job in 55% of the cases and reimbursed at 31% of incurred cost (the average New York Disability Benefits Law claim cost as ratio to automobile liability average claim cost).

[14] For the year 1963 as published by the New York Insurance Department.

[15] This is the "high" estimate referred to on p. 1 supra. As indicated there, this is without an adjustment to take account of the fact that payments under the present system are somewhat higher because of damages for pain and suffering. When such an adjustment is made, the estimated cost of basic protection coverage is reduced by about 13 percentage points as indicated in Table 2.

[16] *Op. cit.* Article 2, Section 2.3 (e).

[17] See Table C-3.

TABLE 2

NEW YORK STATE
DISTRIBUTION OF AUTOMOBILE BODILY INJURY
PURE PREMIUMS AND RELATIVE COSTS OF
AUTO LIABILITY VS. BASIC PROTECTION

		Basic Protection	
	Present Liability	Auto Data	Auto and W.C. Data
Indemnity (including uninsured motorist)...	$46.23	$40.06	$32.32
Medical.....	6.50		
Allocated claim.....	6.89	12.92	12.92
TOTAL.....	$59.62	$52.98	$45.24
Ratio to total present	100%	89%	76%
Increment to purchase $10,000/$100,000 limits.....	9%	9%*	9%*
Relative cost of $10,000/$100,000 limits..	109%	98%	85%

*25% additional claims is offset by the 10% deductible and the 15% exclusion of economic loss due to the income tax exclusion.

Notes: 1. Figures for present liability and basic protection (auto data) were obtained from Table 1. Indemnity and medical figures for basic protection (auto and workmen's compensation data) were obtained by applying the ratio of workmen's compensation average cost per case limited to $10,000 (wages and medical at $677) to automobile bodily injury liability average claim cost excluding allocated claim expense ($839).

2. Basic protection costs from auto data include the cost of pain and suffering in the same degree as is contained in the present liability system for the specific limits of coverage.

3. The inclusion of extraterritorial coverage on a present liability basis requires averaging of costs of basic protection with the 100% level of liability costs in proportion to extraterritorial losses as a per cent of all losses; for extraterritorial losses amounting to 5% of the total, basic protection costs including extraterritorial coverage on a present liability basis affect the table results by less than 1%.

liability basis with respect to extra-territorial insurance coverage should cause virtually no change in the foregoing percentages. It should be noted that the workmen's compensation insurance classification data used produce approximately the same results as would the use of Workmen's Compensation Board data.[18]

That both estimates of cost in Table 2 are essentially conservative is made readily apparent in considering elements such as the 1.25 factor which was used to estimate claim frequencies under the new program.

A sample study conducted by the Motor Vehicle Department indicated that approximately 13% more persons suffer injury in automobile accident involvement than are reported to the Department; these may involve injured persons where the incident is reported only to the insurer or to local law enforcement authorities. A recent published study[19] in Canada used a 15% figure for non-reporting in Ontario. The more conservative (costly) figure of 15% has been utilized in Table D-1 and the result rounded upward; on this basis there are 25% more persons killed and injured than are reported in automobile bodily injury liability insurance statistics. Had the unrounded 1.13 figures of the Motor Vehicle Department sample been used, the resulting frequency figure would have been 3% less than that actually used throughout. Further, it would not have been unreasonable to assume that the *less costly* accidents would not be reported to the Motor Vehicle Department; nevertheless, these accidents have been included at the average amounts. The average indemnity amounts of the selected workmen's compensation insurance classification of Table C-3 tend to be slightly higher than the indemnity costs of workmen's compensation accidents caused by automobiles, shown in Table C-4. Additionally, in estimating allocated claim expense of the new program, the highest cost assumption, namely 13.5%, was used and no economies on the part of the claimant's or insurer's attorneys was reflected. Rather, it is believed that the use of relatively stringent requirements for purposes of this analysis will require the basic protection program to clearly demonstrate its economic feasibility. It is expected that the crucible of experience ultimately will determine the extent to which non-recognition of the foregoing factors proves to have been overly conservative.

More detailed descriptions of the data used throughout are given in the pages which follow.

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[18] See Table C-4.

[19] Wittick, Herbert E., "Estimating the Cost of Accident Insurance as a part of Automobile Liability Insurance," *PCAS; Vol. LI*, pp. 105-121.

State of New York
Motor Vehicle Department Statistics

Statistics[20] published by the State of New York Motor Vehicle Department cover all fatal motor vehicle accidents and personal injury motor vehicle accidents reported during the year 1964. Persons injured are separated into three categories, namely, (a) those suffering fractures, lacerations or other serious injury, (b) other visible injury and (c) no visible injury but complaint of pain. Other pertinent characteristics such as age, sex, driver, etc., are also shown. For the current study individual characteristics pertinent to economic loss were identified and combined with specific economic and other cost factors.

Table A-1 shows persons injured in automobile accidents in New York State in 1964 according to age groups for pedestrians, persons in other motor vehicles, etc.

Table A-2 shows similar information for persons killed.

Table A-3 exhibits drivers involved in personal injury accidents reported in 1964 by sex and age of driver. This information is later utilized to allocate the total number of drivers injured according to age and sex.

Table A-4 shows drivers involved in accidents reported in 1964 by sex. The percentage of male and female was applied to the total number of drivers injured in motor vehicle accidents reported in 1964 to form the basis for Table A-5. The total figures for all ages were then distributed to age group in accordance with the percentages of involved drivers shown in Table A-3.

The class intervals used in Table A-5 for age groups conform approximately to the class intervals published by the United States Census Bureau for persons in the labor force.

Table A-6 divides those persons injured in motor vehicle accidents reported in 1964 into drivers and all others by age group.

Table A-7 shows all persons injured by sex and subdivides them into the driver and all other category according to stated ages and as a per cent of the total for non-drivers injured by stated age.

United States Census
New York Population 1960

Census reports[21] show percentages of persons in the labor force in

[20] Statistical Report of Motor Vehicle Accidents, State of New York, Department of Motor Vehicles.

[21] United States Census of New York Population 1960—Table 54, Labor Force Status By Age and Sex.

New York State according to age and sex. These percentages have been applied to persons injured according to age, sex and driver characteristics.

Table B-1 shows the percentage of persons injured who are drivers according to age and sex and the average per cent of injured male drivers and injured female drivers in the labor force.

Table B-2 shows the percentage of non-drivers according to age and the average percentages of injured non-drivers in the labor force, for male or female.

Table B-3 is a recapitulation of the persons injured shown in Table A-7, with 39% of the non-drivers age 15 or over distributed to the male category. The average percentages in the labor force of Tables B-1 for drivers and B-2 for non-drivers are combined to give the percentage in the labor force for injured males and females age 15 and over.

Table B-4 is in two parts. Persons under age 15 are assumed not to be in the labor force; males and females 15 years old and over are distributed according to whether or not they are in the labor force. It is here assumed that 95% of females 15 years old and over who are not in the labor force are nevertheless engaged in housekeeping. The latter part of this table is a recapitulation which shows that, of the persons injured in automobile accidents, approximately 61% are in the labor force at the time, 17% are housekeeping dependents and the remaining 22% are other dependents.

Workmen's Compensation Experience
New York Policy Year 1961

The New York Compensation Insurance Rating Board publishes data[22] on all workmen's compensation insurance classifications of risk. Among these are taxicab companies—chauffeurs and employees away from garage, route salesmen and route supervisors, which classifications produce a concentration of compensable injuries resulting from motor vehicle accidents. Accordingly, the experience of these classifications has been used in arriving at cost estimates of a basic protection plan. If the experience of all workmen's compensation classifications were appropriate, then resulting average cost estimates would have been somewhat lower.

Table C-1, Part I, shows policy year 1961 workmen's compensation insurance experience for taxicab companies—chauffeurs and employees

[22] New York Workmen's Compensation Classification Experience compiled from reports under the Unit Statistical Plan by the New York Compensation Insurance Rating Board.

away from garage, route salesmen and route supervisors, and also all classifications combined. Numbers of claims, indemnity and medical costs are shown separately for cases involving death, permanent total, major permanent, minor permanent, temporary and non-compensable medical injuries. The figures are adjusted to reflect benefit changes effectuated by the New York State Legislature through June 30, 1965 and ultimate developments of experience in accordance with regular procedures utilized by the New York Compensation Insurance Rating Board. Medical costs were also adjusted to reflect 1965 levels of cost in accordance with medical and hospital agreements made between insurers and hospitals.

Table C-1, Part II, adjusts the figures of Table C-1, Part I, to eliminate the workmen's compensation law limitations on indemnity benefit amounts and also limitations on number of compensable cases. The computations for removing the waiting period and two-thirds of wages limitations follow the New York Compensation Insurance Rating Board's methods of evaluation which were taken from the procedures adopted by the National Association of Insurance Commissioners.[23]

Table C-2 shows the average work loss and average medical cost of Table C-1, Part II, according to category of death, permanent total, major permanent partial, minor permanent partial, temporary and non-compensable medical injury.

Table C-3 combines the number of persons killed or injured reported to the State of New York Motor Vehicle Department in 1964 (number injured increased 15% for non-reporting) with the average costs per workmen's compensation case taken from the selected automobile classifications of Table C-2. Individual costs were rounded to the nearest ten dollars. In addition to showing the unlimited total and medical-only cost per case, death and major permanent cases were limited to a $10,000 average cost (in actual operation the figure will be less than $10,000, on the average) and other cases were included at undiscounted amounts shown in Table C-2 under the heading, Limited to $10,000, Total. Also shown under the heading, Limited to $10,000, are Wages and Medical figures which include $10,000 for death and major permanent cases, full medical costs on all cases, full indemnity costs for 61% of injured persons in the labor force and 50% of full indemnity costs for 17% of injured persons engaged in housekeeping as set forth in Table B-4. It is interesting to note that these workmen's compensation figures adjusted to 1965 conditions produce

[23] Proceedings of the National Association of Insurance Commissioners, 84th Annual Convention, 1953, Vol. II, pp. 711-746.

medical costs of $182 per case and limited economic loss of $677 per case compared with automobile liability accident year 1963 average limited medical payments costs of $182 and indemnity of $839 per case[24] (reported as of 1964 and developed to an ultimate cost basis). The data reinforce each other and suggest the conclusion that pain and suffering is a meaningful, but not over-riding, cost element of the first $10,000 of loss per case.

State of New York
Workmen's Compensation Board
Compensated Cases Closed 1961-1963

The New York Workmen's Compensation Board has available records[25] of the accident agency, which is defined as the specific object, substance, or part of the working environment most intimately associated with the injury occurring in workmen's compensation cases. Tabulations of detailed data pertinent to this study cover 25,876 cases closed from 1961-1963 where the accident agency was a motor vehicle, 8,733 of which were passenger cars. Of these 6,916 cases involved passenger cars in motion.

Average indemnity cost information relating to the 25,876 cases closed is contained in Table C-4. That table shows the average indemnity costs of workmen's compensation cases closed in 1961-1963 for injuries caused by automobiles, according to category of injury, both on a present workmen's compensation indemnity basis and on a full indemnity basis. These data which tend to show somewhat lower average costs than the selected automobile classifications of Table C-2 are based on more than 25 times as many indemnity cases; however, no information regarding medical costs and the number of non-compensatory medical cases has been reported. In general, the amounts shown in Table C-4 tend to support the amounts in Table C-2 although the former are somewhat less.

Table C-5 indicates accidents resulting from autos not in motion tend to be less costly than those resulting from autos in motion. The difference in average cost per case can here be seen for the occupations producing the greatest number of automobile workmen's compensation cases.

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[24] See Table 1.

[25] Detailed information is recorded on punched cards showing agency cause, industry, occupation, extent of disability, compensation award, legal fee and other relevant data. Some of this detail is published in the various Research & Statistics Bulletins.

Automobile Bodily Injury Liability Insurance

Insurers report their experience in a variety of ways. Annual aggregate results are shown in the insurance expense exhibit[26] which is part of the annual statement filed by every insurer each year. Reports[27] to statistical agents are also made in great detail according to classification, amount of excess loss, etc. For the year 1960, comparisons of premiums from both sources are shown in Table D-1. In addition, the number of bodily injury liability claims reported to statistical agents is shown and compared with the records of the State of New York Motor Vehicle Department of the number of persons reported killed or injured in 1960.

It is pertinent here to reflect that the insurer counts only those claims where it has put up an amount in reserve on account of an accident or where it has made a payment on the claim. Initially, the count of claims will reflect the insurer's practices and evaluation of an incident described by its insured and not by the accident victim; thus there may be confusion between property damage and personal injury and uncertainty as to whether personal injury occurred even though an insurer records a claim. This confusion of facts, together with unsuccessful liability claims under the present system is reflected in the subsequent reports of statistics filed by insurers. For example, the two leading statistical organizations reported 175,188 private passenger automobile liability insurance claims for accident year 1960 in their first reports and this number dropped by 4% to 167,479 at the third report of the same incidents.

Summaries from the usual classification records reported to the statistical agents are contained in Table D-1. Classified experience in detail includes allocated claim expense, that is, the insurer's loss adjustment expense which is allocable to the specific claim. The information of Table D-2 is shown on the basis of inclusion and exclusion of such loss adjustment expense. It is therefore possible to determine allocated claim expense cost by comparing the year 1962 on both bases. For this purpose, the National and Mutual Bureaus' private passenger automobile liability insurance claims, which comprise about five-sixths of the total, were reviewed. The results shown in Table D-2 indicate that allocated claim expense in New York State amounts to approximately 13.5% of the claim

[26] Summaries are published by the State of New York Insurance Department in its annual booklet, Loss and Expense Ratios.

[27] Summaries are reported to insurance regulatory authorities. Consolidations are also reported to the statistical agent's member and subscriber insurers.

cost including such expense, a figure which is substantially higher (and more conservative) than the countrywide figures[28] would indicate.

The Mutual Insurance Rating Bureau and the National Bureau of Casualty Underwriters function as both statistical and rate-making organizations. In that capacity approximately 70% to 75% of liability insurance claims are reported to them. For purposes of computing the amount of losses eliminated by various sizes of deductible insurance cost, these organizations call for and collect data by size of claim.[29] Such information on New York State experience for the year 1962 is shown in summary form in Table D-3. Under a program to pay 90% of the amount of claims subject to a deductible of the first hundred dollars of loss, the cost would be 85.3% of the cost without a deductible feature. A minor variation due to the fact that only work loss is subject to the deductible for larger cases need not be included in the foregoing factor.

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[28] Member companies reported to the National Bureau of Casualty Underwriters countrywide figures of approximately 8.5% comparable to the 13.5% figure for stock and mutual insurers on New York business.

[29] Call for Automobile Liability Size of Claim Data.

TABLE A-1

NEW YORK STATE
PERSONS INJURED IN AUTOMOBILE ACCIDENTS – 1964

Age Group	Totals	Pedes-trian	Other Motor Vehicle	Motor Vehicle with Pedes-trian	Bicycle	Fixed Object	Other
0 - 4	9,388	2,280	6,365	26	64	341	312
5 - 14	26,520	9,325	11,767	108	3,806	842	672
15 - 24	67,175	2,645	48,405	234	882	10,212	4,797
25 - 44	96,387	3,247	81,895	406	116	7,319	3,404
45 - 64	56,228	3,240	47,992	215	51	3,111	1,619
65 & over	11,656	1,975	8,548	62	15	673	383
Not stated	27,613	2,458	22,558	265	516	894	922
TOTAL.....	294,967	25,170	227,530	1,316	5,450	23,392	12,109

AS PERCENTAGE TO TOTALS

Age Group	Totals	Pedes-trian	Other Motor Vehicle	Motor Vehicle with Pedes-trian	Bicycle	Fixed Object	Other
0 - 4	3.2%	9.1%	2.8%	2.0%	1.2%	1.4%	2.6%
5 - 14	9.0	37.0	5.2	8.2	69.8	3.6	5.5
15 - 24	22.8	10.5	21.3	17.8	16.2	43.7	39.6
25 - 44	32.7	12.9	36.0	30.9	2.1	31.3	28.1
45 - 64	19.0	12.9	21.1	16.3	.9	13.3	13.4
65 & over	3.9	7.8	3.7	4.7	.3	2.9	3.2
Not stated	9.4	9.8	9.9	20.1	9.5	3.8	7.6
TOTAL.....	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: New York State Motor Vehicle Department

TABLE A-2

NEW YORK STATE
PERSONS KILLED IN AUTOMOBILE ACCIDENTS – 1964

Age Group	Totals	Pedestrian	Other Motor Vehicle	Motor Vehicle with Pedestrian	Bicycle	Fixed Object	Other
0 - 4	101	71	19	2	–	3	6
5 - 14	238	135	27	6	48	12	10
15 - 24	701	64	225	4	7	305	96
25 - 44	627	93	223	13	2	225	71
45 - 64	586	197	213	10	3	120	43
65 & over	485	289	126	10	2	42	16
Not stated	65	29	16	4	3	10	3
TOTAL.....	2,803	878	849	49	65	717	245

AS PERCENTAGE TO TOTALS

Age Group	Totals	Pedestrian	Other Motor Vehicle	Motor Vehicle with Pedestrian	Bicycle	Fixed Object	Other
0 - 4	3.6%	8.1%	2.2%	4.1%	– %	.4%	2.4%
5 - 14	8.5	15.4	3.2	12.2	73.8	1.7	4.1
15 - 24	25.0	7.3	26.5	8.2	10.8	42.5	39.2
25 - 44	22.4	10.6	26.3	26.5	3.1	31.4	29.0
45 - 64	20.9	22.4	25.1	20.4	4.6	16.7	17.6
65 & over	17.3	32.9	14.8	20.4	3.1	5.9	6.5
Not stated	2.3	3.3	1.9	8.2	4.6	1.4	1.2
TOTAL.....	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: New York State Motor Vehicle Department

TABLE A-3

NEW YORK STATE
STATISTICAL REPORT OF MOTOR VEHICLE ACCIDENTS
DRIVERS INVOLVED IN
PERSONAL INJURY ACCIDENTS REPORTED IN 1964
BY SEX AND AGE OF DRIVER

	Personal Injury			
	Male		Female	
Age	Number	%	Number	%
Under 18	5,621	2.5%	1,585	3.1%
18 - 24	46,996	20.5	11,077	21.5
25 - 29	28,482	12.5	5,382	10.5
30 - 39	52,708	23.0	12,332	24.0
40 - 49	44,614	19.5	11,619	22.6
50 - 59	30,845	13.5	6,405	12.5
60 - 64	9,626	4.2	1,552	3.0
65 & Over	9,747	4.3	1,466	2.8
TOTAL	228,639	100.0%	51,418	100.0%
NOT STATED	49,468		7,074	
GRAND TOTAL	278,107		58,492	

Source: State of New York, Department of Motor Vehicles

TABLE A-4

NEW YORK STATE
STATISTICAL REPORT OF MOTOR VEHICLE ACCIDENTS
DRIVERS INVOLVED IN ACCIDENTS REPORTED IN 1964
BY SEX

		Number	Per Cent
Personal injury	Male	278,107	83%
	Female	58,492	17
	TOTAL	336,599	100%
Fatal	Male	2,857	88%
	Female	394	12
	TOTAL	3,251	100%

Source: State of New York, Department of Motor Vehicles

TABLE A-5

NEW YORK STATE
DRIVERS INJURED IN MOTOR VEHICLE ACCIDENTS
REPORTED IN 1964
BY SEX AND AGE OF DRIVER

	Male		Female	
Age	Per Cent	Number	Per Cent	Number
All Ages	100.0	107,691	100.0	22,109
Under 15	–	–	–	–
15 – 24	23.0	24,769	24.6	5,439
25 – 44	45.3	48,784	45.8	10,126
45 – 64	27.4	29,507	26.8	5,925
65 & over	4.3	4,631	2.8	619

Note: Percentages were obtained from exhibit of drivers involved in motor vehicle accidents reported in 1964. 142,637 reported drivers injured were reduced 9% in proportion to number of persons injured with ages not stated. Male drivers were taken at 75.5% of all drivers injured and female drivers at 15.5%.

TABLE A-6

NEW YORK STATE
ALL PERSONS INJURED IN MOTOR VEHICLE ACCIDENTS
REPORTED IN 1964
DRIVERS AND ALL OTHERS, BY AGE

Age	All	Drivers	All Others		
			Number	Per Cent	Per Cent of Age 15 & Over
Under 15	35,908	–	35,908	26.1	XX
15 – 24	67,175	30,208	36,967	26.9	36.4
25 – 44	96,387	58,910	37,477	27.2	36.9
45 – 64	56,228	35,432	20,796	15.1	20.4
65 & over	11,656	5,250	6,406	4.7	6.3
All stated ages	267,354	129,800	137,554	100.0	XX
15 & over			101,646		100.0

Note: All persons injured are based on 1964 reports to State of New York Motor Vehicle Department. Drivers injured by age are based on 1964 reports of drivers involved in motor vehicle accidents.

TABLE A-7

NEW YORK STATE
PERSONS INJURED IN MOTOR VEHICLE ACCIDENTS
REPORTED IN 1964
TOTAL, DRIVERS AND ALL OTHERS, BY SEX

Category	Male	Female	Total
All persons injured	178,297	116,670	294,967
Age not stated	16,691	10,922	27,613
All persons injured – stated ages	161,606	105,748	267,354
Drivers injured – stated ages	107,691	22,109	129,800
All other persons injured – stated ages	53,915	83,639	137,554
Percentage of total	39%	61%	100%

Note: 27,613 persons injured with age not stated have been allocated to sex in proportion to all males and females injured in motor vehicle accidents. Drivers injured are based on reports of drivers involved in motor vehicle personal injury accidents reported in 1964.

TABLE B-1

NEW YORK STATE

PER CENT OF DRIVERS INJURED IN MOTOR VEHICLE ACCIDENTS REPORTED IN 1964 AND AVERAGE PER CENT IN LABOR FORCE BY SEX AND AGE

Age	Male Drivers		Female Drivers	
	In Accidents	In Labor Force	In Accidents	In Labor Force
Under 18	2.5%	20.6%	3.1%	13.2%
18 – 24	20.5	77.7	21.5	53.5
25 – 44	45.3	95.1	45.8	40.0
45 – 64	27.4	90.3	26.8	44.5
65 & over	4.3	34.1	2.8	11.9
TOTAL	100.0%	85.7%	100.0%	42.5%

Note: 1. Per cents in accidents are based on 1964 reports to State of New York Motor Vehicle Department of drivers involved in motor vehicle accidents.

2. Per cents in labor force are based on United States Census of New York Population 1960 – Table 54, Labor Force Status By Age and Sex.

TABLE B-2

NEW YORK STATE

PER CENT OF NON-DRIVERS INJURED IN MOTOR VEHICLE ACCIDENTS REPORTED IN 1964 AND AVERAGE PER CENT IN LABOR FORCE – BY SEX AND AGE

Age	Non-Drivers In Accidents	In Labor Force	
		Male	Female
15 – 24	36.4%	77.7%	53.5%
25 – 44	36.9	95.1	40.0
45 – 64	20.4	90.3	44.5
65 & over	6.3	34.1	11.9
	100.0%	83.9%	44.1%

Note: 1. Per cents of non-drivers in accidents are based on 1964 reports to State of New York Motor Vehicle Department of personal injury accidents.

2. Per cents in labor force are based on United States Census of New York Population 1960 – Table 54, Labor Force Status By Age and Sex.

TABLE B-3

RECAPITULATION
NEW YORK STATE

NUMBER OF PERSONS INJURED IN MOTOR VEHICLE ACCIDENTS
REPORTED IN 1964
AND AVERAGE PER CENT IN LABOR FORCE
BY DRIVER STATUS AND SEX FOR PERSONS 15 AND OVER
AND ALL PERSONS UNDER 15

	Persons Injured				
Category	Total	Male	In Labor Force	Female	In Labor Force
15 and over:					
All drivers	129,800	107,691	85.7%	22,109	42.5%
All others	101,646	39,642	83.9	62,004	44.1
SUB-TOTAL	231,446	147,333	85.2%	84,113	43.7%
Under 15	35,908				
TOTAL – STATED AGES	267,354				

TABLE B-4

NEW YORK STATE
NUMBER OF PERSONS INJURED IN MOTOR VEHICLE ACCIDENTS
REPORTED IN 1964
IN LABOR FORCE, OUTSIDE LABOR FORCE AND
PERCENTAGE DISTRIBUTION

Category	In Labor Force	Not in Labor Force
Under 15 yrs. old		35,908
Males – Per cent	85.2%	14.8%
Number	125,528	21,805
Females – Per cent	43.7%	56.3%
Number	36,757	
Housekeeping*		44,988
Not housekeeping		2,368

*1960 census reports 2,646,304 married women, not in labor force, with husband present, out of 4,102,165 women 14 years old and over, not in labor force. Conservatively, 95% of females 15 years old and over and not in labor force are assumed to be housekeepers.

RECAPITULATION

		Number	Per Cent
Totals	In labor force	162,285	61
	Not in labor force:		
	Female housekeeping	44,988	17
	Other dependents	60,081	22
TOTAL STATED AGES		267,354	100

Source: State of New York Department of Motor Vehicle data combined with United States Census of New York Population 1960, Labor Force data.

TABLE C-1 *Part I*

NEW YORK STATE

POLICY YEAR 1961 WORKMEN'S COMPENSATION EXPERIENCE

AT TWO-THIRDS OF WAGES AND $55 WEEKLY LIMIT – ULTIMATE BASIS

SELECTED AUTOMOBILE CLASSIFICATIONS AND ALL CLASSIFICATIONS

	Taxicab Cos. – Chauffeurs and Employees away from garage; Route Salesmen & Route Supervisors			All Classifications		
Category	No. of Claims	Indemnity	Medical	No. of Claims	Indemnity	Medical
Death	10	235,340	6,109	554	13,859,387	341,266
Permanent total				59	1,619,293	1,152,946
Major permanent	7	142,832	26,869	1,860	19,741,823	5,646,721
Minor permanent	164	213,040	72,054	26,752	32,803,068	9,543,202
Temporary	798	409,928	224,435	62,312	34,254,084	18,276,240
Non-compensable medical	1,282		64,127	361,469		12,142,524
TOTAL	2,261	1,001,140	393,594	453,006	102,277,655	47,102,899

Note: Figures at second report were adjusted to reflect law changes to June 30, 1965 and ultimate development as per New York Compensation Insurance Rating Board regular procedure applicable to classification experience.

TABLE C-1 Part II

NEW YORK STATE

POLICY YEAR 1961 WORKMEN'S COMPENSATION EXPERIENCE

WORK LOSS AND MEDICAL COSTS

SELECTED AUTOMOBILE CLASSIFICATIONS AND ALL CLASSIFICATIONS

	Taxicab Cos. – Chauffeurs and Employees away from garage; Route Salesmen & Route Supervisors			All Classifications		
Category	No. of Claims	Indemnity	Medical	No. of Claims	Indemnity	Medical
Death	10	462,443	6,109	554	27,233,695	341,266
Permanent total				59	3,181,911	1,152,946
Major permanent	7	280,665	26,869	1,860	38,792,682	5,646,721
Minor permanent	164	418,624	72,054	26,752	64,458,029	9,543,202
Temporary	1,234	974,666	246,238	185,211	81,444,223	22,404,698
Non-compensable medical	846		42,324	238,570		8,014,066
TOTAL	2,261	2,136,398	393,594	453,006	215,110,540	47,102,899

Note: 1. The number of temporary cases for all classifications includes those lasting 7 days or less taken at 196% of reported temporary cases equal to 34% of reported non-compensable medical cases. 34% of non-compensable cases and medical amounts were transferred to the temporary category.

2. Ultimate basis indemnity loss figures at two thirds of wages and $55 weekly limit were adjusted by regular limit factor procedures used by the New York Compensation Insurance Rating Board at $\frac{1.0}{.7635 \times 2/3} = 1.965$.

In addition, temporary indemnity cost was increased 21.0% for elimination of 7 day waiting period.

3. Medical costs reflect 1965 levels.

TABLE C-2

NEW YORK STATE
POLICY YEAR 1961 WORKMEN'S COMPENSATION EXPERIENCE
AVERAGE WORK LOSS AND MEDICAL COSTS
SELECTED AUTOMOBILE CLASSIFICATIONS AND
ALL CLASSIFICATIONS

Category	Taxicab Cos. – Chauffeurs and Employees away from garage; Route Salesmen and Route Supervisors		All Classifications	
	Indemnity	Medical	Indemnity	Medical
Death	$46,244	$ 611	$49,158	$ 616
Permanent total			53,931	19,541
Major permanent	40,095	3,838	20,856	3,036
Minor permanent	2,553	439	2,409	357
Temporary	790	200	440	121
Non-compensable medical		50		34

Note: Based on figures from Table C-1 Parts I and II.

TABLE C-3

NEW YORK STATE
NUMBER OF PERSONS KILLED OR INJURED IN MOTOR VEHICLE ACCIDENTS REPORTED IN 1964
BY TYPE AND ESTIMATED AVERAGE INDEMNITY AND MEDICAL COST PER CASE

Type	No. of Cases	Average Cost Per Case Unlimited Total	Limited to $10,000 Total	Wages & Medical	Medical Only
Death	2,803	$46,860	$10,000	$10,000	$610
Serious	36,134	7,090	3,690	2,990	780
Non-serious	114,923	990	990	750	200
Medical	188,155	50	50	50	50
TOTAL	342,015	$ 1,493	$ 832	$ 677	$182

Note: 1. Figures by type are those reported to State of New York Department of Motor Vehicles, with injury cases increased 15% to include non-reporting.

2. Average costs per case are developed from workmen's compensation insurance coverage for taxicab companies' chauffeurs and employees away from the garage and route salesmen and route supervisors rounded to the nearest $10. Although definitions of type are not identical for Motor Vehicle and workmen's compensation accidents, they are considered to be similar enough to warrant their use in determining comparative average costs.

3. Serious average cost per case is the average of major and minor as follows:

	Per Cent	Unlimited	Limited to $10,000 Total	Wages & Medical	Medical
Major	10	$43,933	$10,000	$10,000	$3,838
Minor	90	2,992	2,992	2,213	439
Average		7,086	3,693	2,991	779
Rounded		7,090	3,690	2,990	780

4. In calculating wages and medical loss $10,000 was used for death and major permanent cases. For other cases full medical costs were used, full indemnity loss for 61% in the labor force, 50% of indemnity loss for 17% in housekeeping and no indemnity loss for 22% other dependents.

TABLE C-4

NEW YORK STATE
AVERAGE INDEMNITY COSTS OF WORKMEN'S COMPENSATION CASES CAUSED BY AUTOMOBILES
CASES CLOSED 1961-1963, BY CATEGORY OF INJURY

Category	All Cars	Passenger Cars			Not Passenger Cars
		All	In Motion	Not In Motion	
WORKMEN'S COMPENSATION BASIS – $60 MAXIMUM PER WEEK					
Death	$24,660	$24,079	$23,674	$31,997	$25,106
Permanent total	56,402	58,745	57,193	80,469	54,995
Major permanent	21,718	22,931	24,156	15,910	21,229
Minor permanent	1,528	1,526	1,965	1,042	1,529
Temporary	404	400	410	336	406
FULL INDEMNITY BASIS					
Death	$44,413	$43,366	$42,637	$57,627	$45,216
Permanent total	101,580	105,800	103,005	144,925	99,046
Major permanent	39,114	41,299	43,505	28,654	38,233
Minor permanent	2,752	2,748	3,539	1,877	2,754
Temporary	573	566	580	476	575

Note: For full indemnity basis, all figures on $60 maximum per week have been adjusted by a factor of 1.801. In addition, temporary costs have been adjusted by a cost factor of 1.210 to reflect the elimination of the waiting period and a frequency factor of .65 for inclusion of additional short duration cases.

TABLE C-5

NEW YORK STATE

AVERAGE INDEMNITY COSTS OF WORKMEN'S COMPENSATION CASES CAUSED BY PASSENGER AUTOMOBILES CASES CLOSED 1961-1963, BY SELECTED OCCUPATIONS

WORKMEN'S COMPENSATION BASIS, $60 MAXIMUM PER WEEK

Occupation	Death	Total	Permanent Major	Permanent Minor	Temporary
AUTOS IN MOTION					
Professional workers, not nurses	$23,836	$50,185	$25,494	$2,284	$690
Managers & officials	26,728	70,802	25,765	2,099	587
Messengers, distributors	2,760	57,422	19,647	1,844	275
Outside salespersons, agents	28,519	–	19,947	2,192	428
Protective service workers	17,051	51,790	36,310	2,191	512
Mechanics, repairmen	31,374	–	26,565	1,863	465
Chauffeurs, drivers	19,378	15,053	19,044	1,719	344
All industries	$23,674	$57,193	$24,156	$1,965	$410
AUTOS NOT IN MOTION					
Managers & officials	–	–	$10,116	$1,122	$302
Outside salespersons, agents	–	–	15,985	1,092	326
Protective service workers	–	–	36,239	905	807
Mechanics, repairmen	$34,030	–	20,714	1,050	313
Chauffeurs, drivers	–	–	14,153	1,244	362
Attendants, garage, etc.	–	–	7,183	791	234
Garage laborers, etc.	–	–	10,649	1,988	236
All industries	$31,997	$80,469	$15,910	$1,042	$336

TABLE D-1

NEW YORK STATE
1960 AUTOMOBILE BODILY INJURY LIABILITY INSURANCE DATA FOR ALL INSURERS COMBINED

Item	Premiums	No. of Claims
Private passenger non-fleets	393,429,734	217,831
All others	81,717,734	39,414
TOTAL	475,147,468	257,245

Comparative reports elsewhere:

A. Insurance expense exhibit	
Policy year 1960	479,103,945
B. State of New York Motor Vehicle Department:	
(1) Number reported killed and injured 1960	275,795
(2) (1) Increase for non-reporting at 15% of number injured	41,056
(3) Total injured and killed	316,851
C. Total injured and killed as ratio to insurance claims reported	1.23
D. Ratio in C rounded upward	1.25

TABLE D-2

NEW YORK STATE
ALLOCATED CLAIM EXPENSE
FROM COMPARISON OF PRIVATE PASSENGER AUTOMOBILE ACCIDENT YEAR 1962 BODILY INJURY LIABILITY CLAIM COSTS WITH AND WITHOUT ALLOCATED CLAIMS EXPENSE

	Cos. Reporting to Mutual Insurance Rating Bureau and National Bureau of Casualty Underwriters			
	Losses Incurred			Basic Limits
Item	Basic Limits	Excess Limits	No. of Claims	Avg. Claim Cost
1. Including allocated claim expense	$160,418,503	$10,908,661	158,953	$1,009.
2. Excluding allocated claim expense	112,259,226	6,201,152	128,519	873.
3. Allocated claim expense as per cent of losses including allocated claim expense				13.5%

Note: Figures including allocated claim expense were derived from accident year 1962 experience of the National and Mutual Insurance Rating Bureaus; figures excluding allocated claim expense were derived from automobile bodily injury liability size of claim experience for calendar or accident year 1962.

TABLE D-3

NEW YORK STATE
INDICATED COST OF THE LARGER DEDUCTIBLE
OF $100 OR 10% PER CLAIM

Item	Private Passenger No. of Claims	Private Passenger Amount	All Cars No. of Claims	All Cars Amount
A. Less than $100	25,231	$ 1,056,089	28,377	$ 1,186,630
B. $100 and less than $1,000	75,039	31,551,812	84,931	35,680,715
C. $1,000 – $10,000	28,249	79,651,325	32,173	90,873,040
D. Total	128,519	$112,259,226	145,481	$127,740,385
Losses Eliminated By $100 or 10% Deductible Per Claim:				
From A ($100)		$ 1,056,089		$ 1,186,630
From B ($100)		7,503,900		8,493,100
From C (10%)		7,965,133		9,087,304
E. Total losses eliminated		$ 16,525,122		$ 18,767,034
F. E as % of D		14.7%		14.7%
G. Charge with deductible 100.0% – F		85.3%		85.3%

TABLE D-4

NEW YORK STATE
1962 PRIVATE PASSENGER
AUTO BODILY INJURY LIABILITY LOSSES
BY SIZE OF CLAIM (LIMITED TO $10,000 PER CLAIM)

Size of Claim Group	Amount of Losses of Group Size	No. of Claims in Excess of Group Size
Less than $ 25	67,335	121,752
" " 50	300,469	114,602
" " 100	1,056,089	103,288
" " 250	4,663,115	80,700
" " 500	12,835,585	57,393
" " 1,000	32,607,901	28,249
" " 2,000	52,649,539	13,405
" " 3,000	64,891,758	8,286
" " 4,000	73,860,438	5,649
" " 5,000	80,251,953	4,204
" " 10,000	102,919,226	934
First 10,000	112,259,226	
All sizes	112,259,226	128,519

APPENDIX A

Modifications Resulting From Conditional Adjustments in Factors Applicable to Costs of Basic Protection

The main body of the text deals with estimates of costs essentially in the most conservative manner practicable. There are, however, a number of valid considerations which, if recognized, will result in a more realistic appraisal of probable costs. These are listed below and their effects are included in a series of conditional adjustments which result in an adjusted Table 2, Appendix B.

(1) Liability insurance claims are only 97% of liability claims paid, the balance of 3% being paid by political subdivisions and other self-insurers. For workmen's compensation insurance, self-insurers comprise approximately 5% of the total; automobile registrations indicate approximately 1% of the total involve exempt vehicles.

(2) 25% additional claims are estimated to cost, on the average, 80% of that of known liability claims, giving rise to a factor of $1.200 \div 1.250 = .96$ or a 4% reduction.

(3) Allocated claims expense per case is estimated to cost 10% less than present costs for both claimant and insurer.

(4) The applicable deductible factor is estimated to be 5% higher because the deductible feature does not apply to high cost medical expense and coverage is $10,000 above the deductible amount.

(5) Disability benefits payments recovered under the program represent only half of the amount of recoveries which will be obtained under the program.

(6) 10% of cases in the Motor Vehicle Department definition of serious would be classified as temporary according to the workmen's compensation definition (i.e. lacerations, etc.)

(7) The auto data basic protection pure premium index is approximately equal to the sum of (a), (b), and (c) as follows:

(a)	$(.865 \times 1.25 \times .853 \times .883)$	$= .814$
(b)	$(1.5 \times 1.25 \times .135)$	$= .253$
(c)	$-(.06 \times .865 \times 1.25)$	$= -.065$
(d)	Total	$= 1.002$

(8) Items 1 through 5 modify the three terms and the total of the pure premium index in 7 as follows:

(a)	$(.814 \times .97 \times .96 \times 1.05)$	$= .796$
(b)	$(.253 \times .97 \times .96 \times .90)$	$= .212$
(c)	$-(2 \times .97 \times .96 \times .065)$	$= -.121$
(d)	Total	$= .887$

(9) The effect on auto data basic protection pure premium of including items 1 through 5 is:

(a)	$(.796 - .121) \div (.814 - .065)$ or $.675 \div .749$	$= .901$
(b)	$.212 \div .253$	$= .838$
(c)	Total, $.887 \div 1.002$	$= .885$

(10) The effect of item 6 on average claim cost is a reduction of approximately $\$23 \div \$677 = .03$ (auto and workmen's compensation data); the factor applicable is .97.

(11) Adjusted Table 2 recognizes the effect of the foregoing adjustments on the more conservative Table 2 in the report. As a note of caution, some of the elements in items 1 through 6, while reasonable, may not be subject to actuarial proof at the present time.

APPENDIX B

ADJUSTED TABLE 2

NEW YORK STATE
DISTRIBUTION OF AUTOMOBILE BODILY INJURY PURE PREMIUMS AND RELATIVE COSTS OF AUTO LIABILITY VS. BASIC PROTECTION

	Present Liability	Basic Protection Auto Data	Basic Protection Auto and W.C. Data
BEFORE CONDITIONAL ADJUSTMENTS[1]			
1. Indemnity (including uninsured motorist)	$46.23	$40.06	$32.32
Medical	6.50		
2. Allocated claim	6.89	12.92	12.92
TOTAL	$59.62	$52.98	$45.24
CONDITIONAL ADJUSTMENTS[2]			
3. Line 1		.675 ÷ .749 or .901	
4. Line 2		.212 ÷ .253 or .838	
AFTER CONDITIONAL ADJUSTMENTS			
5. Indemnity 1 × 3		$36.09	$28.26[3]
6. Allocated claim 2 × 4		10.83	10.83
7. TOTAL	$59.62	$46.92	$39.09
8. Ratio to total present	100%	79%	66%
9. Increment to purchase $10,000/$100,000 limits[1]	9%	9%	9%
10. Relative cost of $10,000/$100,000 limits	100%	88%	75%

Notes: [1] See Table 2.

[2] See description of items in Appendix A, particularly items 7, 8, 10 and 11.

[3] $28.26 obtained by applying the ratio of workmen's compensation average cost per case limited to $10,000 ($677 reduced by .03 for Appendix A, item [10]) to automobile bodily injury average claim cost excluding allocated claim expense ($839) to auto data pure premium; $677 × .97 ÷ $839 = .783; .783 × $36.09 = $28.26.

DISCUSSION BY ERNEST T. BERKELEY

In reviewing Mr. Harwayne's paper I found it necessary to go over the Keeton-O'Connell Automobile Basic Protection Plan again, as I had read it originally some time ago. The Plan has so many details, however, that even after I had read it the second time and started reviewing the cost analysis, I had to refer to the Plan time after time to refresh my memory. I can assure you this is a worthwhile educational process, even though the knowledge acquired may be somewhat temporary in nature.

I must say that I would have found the reading of this paper much easier had it started with a summary of the Keeton-O'Connell Plan. I do not advance this as a criticism of the paper, as I am sure it was written on the assumption that the Plan had already been read, which is entirely logical. I understand that when printed in the Proceedings the paper will be preceded by the Plan itself or a summary thereof.

As I read Mr. Harwayne's paper, it became apparent very quickly that actuarial judgment must be exercised to a very unusual extent. Many times I found myself wondering whether a somewhat different value could have been assigned to a particular factor, but on reflecting how this might be justified in an objective manner, I realized that much more information would have to be developed, probably from sources not readily available, such as studies based on individual insurance company records.

It also soon became apparent that the best policy was to accept the author's valuations and then consider his final conclusions in the light of different valuations in various places. I could not help feeling that the conclusions he states in the body of his paper are based on assumptions that generally are overly conservative. The less conservative—and to me more realistic—assumptions and conclusions are set forth in Appendix A. Obviously in a situation of this kind where there are so many variables that are difficult to evaluate objectively, it is impossible to reach a conclusion that can be firmly supported. Nevertheless, I cannot find concrete evidence to contradict Mr. Harwayne's conclusion that the Keeton-O'Connell Plan would cost less than the present system, even though I do not feel so sure of the extent of the saving.

I still have some reservations about the cost of the Plan in actual operation, however, largely on account of a factor that is strictly subjective, the effect of which cannot be estimated in advance. I am referring to the effect on drivers of a system providing protection against loss regardless of fault. Is this going to encourage careless driving and thus result in an

increase in accidents and claims, and hence in costs? Only time can answer that question.

There are two subjects I feel could have been treated more fully in the paper, namely insurers' expenses and the offsets for benefits received from other insurance, etc.

Allocated claim expense is the only item of the expenses of insurers dealt with fairly completely and I am inclined to agree with the author's estimate in Appendix A that this particular expense would probably cost less under the Keeton-O'Connell Plan. On the other hand, other important items of expense, such as unallocated claim and general administration, have not been discussed.

It is easy to understand why the author does not go into these expenses, since any comments can only be a matter of opinion, due to the difficulty of developing any objective estimates until much more is known about the details of actual application and operation of the Plan, which would have to be evaluated by qualified insurance company personnel.

Despite this drawback, however, I think some observations in this area would have contributed an additional and worthwhile dimension to the paper.

The only offset for other insurance mentioned specifically is that for benefits received under the New York Disability Benefits Law. In addition to this, it seems as if some mention should have been made of other important and more familiar benefits such as those under the Workmen's Compensation Law, for example. I believe a reasonable approximation of the offset for workmen's compensation benefits could have been made from various statistics given in the paper. The lack of specific reference to benefits under private insurance plans is understandable, because of the probable difficulty of determining them easily in actual practice.

The author has assessed the value of the offset for all these other benefits by suggesting in Appendix A that the New York Disability benefits would represent only one-half the amount of recoveries obtained under the Plan.

I believe Mr. Harwayne has done a very commendable job with the statistics available to him and he has presented conclusions that are helpful, informative, and within the bounds of reasonableness.

DISCUSSION BY DONALD E. TRUDEAU

Mr. Harwayne, in his capacity as consulting actuary, is to be congratulated for his fine effort in making what probably is the first attempt at a costing of the Basic Protection Plan. This reviewer found the task of analyzing Mr. Harwayne's manipulations a bit tedious, not so much because of the content of the paper under discussion, but because he had to read and reread the Basic Protection Plan under its various guises. One wishes that Mr. Harwayne had included as part of his paper a brief synopsis of what the Plan was all about and what it purports to accomplish. This inclusion would have made the commentary, assumptions, and calculations easier to follow. A deficiency of the paper is its lack of continuity and logical structure. This deficiency is particularly evident in using the many Tables as reference points for factors that appear in Tables 1, 2, and Appendix A.

The basic assumption that Mr. Harwayne makes in his paper is that Basic Protection costs can be determined directly as a function of present costs. This I would argue with at great length. Since present average claim costs include not only economic loss but also considerable amounts for medical costs, pain, suffering, inconvenience, and to some extent awards for permanent, partial, or total disabilities, it seems unreasonable to apply the factors .883 for the income tax exclusion and .853 for the deductible and 10% work loss offset to the total present indemnity cost. The same reasoning may be made with respect to the functional relationship Mr. Harwayne assumes in the case of allocated claim expense. If, as the Basic Protection Plan contemplates, a great reduction in the number of cases going to suit will occur, then the allocated claims expense provision seems very much inflated. However, some of this inflation dissipates when one considers that property damage claims that arise in conjunction with bodily injury must still be handled on a third party basis.

The Basic Protection Plan contemplates no provision for pain and suffering except on an optional basis and when this category of loss exceeds $5,000. Mr. Harwayne in Note 2 of Table 2 says that "Basic protection costs from auto data include the cost of pain and suffering in the same degree as is contained in the present liability system for the specific limits of coverage." Again the functional relationship and the assumption that this pain and suffering cost is equivalent to what the insured would pay for the optional pain and suffering benefits and the excess over $5,000 if a tort case arose out of the claim. I would assume that this is the basis of Mr. Harwayne's quote; however, he makes no mention of this in his paper.

The Basic Protection Plan makes specific provision for a tort exemption for death cases, the first $100 of loss, pain and suffering over $5,000, and out of state accidents. The insured, in order to be as fully covered as under the present third party system, would have to provide himself with coverage for these types of claims. Mr. Harwayne's paper makes no mention of these additional coverages except with respect to the extra-territorial provision. Admittedly, a costing of these elements would be hazardous, but they seem important enough as a group to account for a substantial positive increment to the costs as presented in the paper.

There is little doubt in the reviewer's mind that the Basic Protection Plan will cost less than the present system. However, this fact appears to be only common sense when one considers the various offsets and exclusions which are contained in the plan. But, how much less and why seems to be the primary consideration. A number of "savings estimates" are derived in the paper, yet the true cause of these savings is not explained. In the paper the following statement appears: "The volume of New York State automobile bodily injury liability insurance premiums in 1964 amounted to $585.3 millions for all insurers, which, assuming the intermediate savings estimate of 15% under the Basic Protection Plan yields an annual savings of $87.8 millions." This statement makes fine quotable material and can be interpreted in many ways. This reviewer would interpret it to mean that the entire 15% reduction could be properly analyzed as being due to the $100 deductible or 10% of work loss offset and the 15% income tax exclusion. These same provisions could be made part of the present system. Then what are the benefits, if any, which accrue to the insured under a program such as the Basic Protection Plan?

Some obvious benefits, such as the consideration of collateral sources and the elimination in part of large legal fees to plaintiffs' attorneys are not covered in any depth in the paper. Others, such as the question of whether or not a more equitable distribution of insurance loss costs to various types of claimants is afforded under this plan is not covered at all. The answer to this question seems to be an implicit yes but the degree to which this distribution of loss costs under the Basic Protection Plan differs from that under the present system receives little attention. Perhaps the writer can make a case of this by pointing to his analysis of workmen's compensation costs. This analysis is thoughtful and very informative. However, no thorough comparison with present costs by type of injury is made. Such a comparison is solely needed if a true picture is to emerge concerning the merits of the Basic Protection Plan.

What are the benefits to the insured through the elimination of pain and

suffering costs except under an optional feature and for the excess over $5,000? As the reviewer mentioned earlier in this review, Mr. Harwayne assumes the cost of pain and suffering under the Basic Protection Plan in the same degree as under the present system. But what are the true costs of pain and suffering under the present system? The optional pain and suffering feature of the plan contemplates the payment of a fixed amount ($100—$500) per month if the claimant is disabled and unable to work at least one week. The cost for this coverage could be determined by obtaining statistics on the percentage of claims that are disabling, the average length of disability, the percentage of disabling cases that cause loss of income, etc. These statistics could be so related to calculate a pure premium. This pure premium could then be related to that portion of the present automobile bodily injury liability pure premium that provides for pain and suffering and a truer comparison made.

The reviewer feels that in the costing of the Basic Protection Plan a different approach could have been taken by Mr. Harwayne. He could have costed the plan in much the same manner as individual accident and health rates are determined. For disability cases, a sample of automobile accidents as paid under individual accident and health plans would reveal length of disability by various socio-economic criteria such as age, sex, marital status, and occupation. Medical costs by type of injury could be obtained from a number of sources including automobile med pay plans, Blue Cross and Blue Shield programs, and also employee health programs as well as individual and group health coverages. I believe this type of analysis would offer a truer comparison of costs and distribution of costs than the method employed.

Some additional observations on the data and assumptions that Mr. Harwayne did use in his study:

1) The 15% factor used to discount payable economic loss to reflect the income tax exclusion seems high. A lower factor such as 12% would seem more reasonable in view of the fact that recovery for this loss is limited to a maximum of $750 per month.

2) It is felt that unallocated claims expense will rise under the Basic Protection Plan due to the necessity of determining collateral source benefits, actual economic loss, and extent of injury.

3) The assumptions and calculations in Appendix A could have been elaborated on more thoroughly to allow for a more adequate understanding.

In conclusion, the reviewer would consider this paper as the first shot fired

in what promises to become without any doubt a controversy in which actuaries and insurance people in general will embroil themselves for a long time to come. One can only pity the company actuary who may have to determine a classification system that will fit this plan, the state insurance department official who may have to approve it, and the agent who may have to sell it.

DISCUSSION BY RICHARD J. WOLFRUM

The Paper Is a Timely One

The concept of some sort of an automobile compensation system, particularly for bodily injury caused by the operation of an autombile, has intrigued many people, principally academicians, for over forty years. However, all of the efforts to cope with problems of actually devising a system of this type has been for naught in this country.

Nevertheless, it is a rare time now when you can pick up a trade journal or other insurance publication without reading an article by someone advocating a serious review of the efficacy of the present negligence system of handling automobile liability claims. The authors are no longer only academic people, but are responsible executives in insurance companies, well known legal authorities, and members of legislative and judiciary bodies.

The proposal that seems currently to be receiving the most publicity and discussion is the well thought out system advanced by Professor Keeton and Professor O'Connell (which I will refer to in my discussion as the "Keeton System"). Therefore, Frank Harwayne's costing of the Basic Protection portion of the Keeton System is most timely. I hope it will inspire and encourage more members of the insurance profession, particularly casualty insurance actuaries who should be the ones involved in evaluating the financial aspects of plans of this type, to examine objectively the features of this Keeton System or any other system which can be viewed as representing a progressive improvement over the present system. Too often the discussion of these proposals have been based upon emotions, self-interest, conjecture, personal judgment, or, worst of all, a one-time personal experience by a claimant, claim examiner, or an attorney for either side in the settlement (or non-settlement) of a particular claim.

Proper Insurance Data Not Available

As you review Mr. Harwayne's paper, it immediately becomes clear that the proper data to evaluate a general compensation system for auto-

mobile bodily injuries and particularly the Keeton Plan, are not available today. The proposed Basic Protection coverage reimburses, in part, the persons injured in automobile accidents for their wage loss due to disability or the medical expenses incurred by them. In addition, for death cases, survivors benefits are allowed based upon the economic loss that the death meant to the survivors. It must be astonishing for a layman outside of the insurance business to learn that, with the enormous amount of data we collect and maintain on automobile accidents, we do not keep records of the types of disability or lengths of disabilities, the medical cost of such injuries, the economic status of the persons injured, or the number and types of dependents in death cases. Yet, these are the types of data that we need in order to evaluate in a reasonably accurate way the economic loss of such injuries.

As Professor Blanchard* did almost 35 years before him, Mr. Harwayne had to revert to data on workmen's compensation injuries, attempting to confine himself to those for which the proximate cause was assumed to be an automobile. While workmen's compensation costs are based upon a system of reimbursing an injured person for part of his economic loss, the distribution of workmen's compensation injuries by type of injury may be entirely different from those caused by automobile accidents —even if limited to workmen's compensation automobile injuries. More than 80% of the automobiles on the highway are personally owned private passenger cars, while workmen's compensation automobile injuries are mainly those involving trucks, salesmen's cars, or taxi cabs. In addition, the economic strata of the people who are reimbursed for their injuries under workemn's compensation coverage does not include:

1. Owners of businesses
2. Self-employed
3. Retired
4. Housewives
5. Military personnel
6. Students
7. Children

A small sample drawn on claims settled by my company indicates that these classes of people comprise almost 50% of the people injured in automobile accidents. The economic loss for these people obviously would be much different than the loss for people covered under workmen's com-

* In *Report by the Committee to Study Compensation for Automobile Accidents* (1932), Columbia University Council for Research in Social Sciences.

pensation. Moreover, the disability cost and medical cost may be evaluated in quite a different manner under a workmen's compensation system with an employer in the picture compared to an automobile compensation system (particularly when you consider a two-party system as proposed by Professor Keeton) where no such monitor appears to be present in many claims settlement procedures.

We Need Automobile Bodily Injury Accident Tables

In my opinion, it is high time that the insurance industry put together official automobile bodily injury accident tables similar to those now used to value law changes under the various workmen's compensation acts. These tables should show, among other distributions, at least the following distributions:

1. The economic status of people injured,
2. Injuries by type of injury,
3. Disability periods for people injured,
4. The medical and hospital cost of injuries,
5. Dependency status of survivors for death cases.

With these distributions we should be able to determine, with reasonable accuracy, the overall economic loss of automobile injuries that are currently covered under the tort system.

However, there is also an additional evaluation or costing procedure which has to be made and which is just as important. This is to distribute the overall costs among the various classes of people injured or among various segments of the public. In order to work up the rearranging of the distributions of the overall cost, we should have the following additional distributions:

1. The relationship of the injured party to the named insured under the automobile liability policies today, and
2. The status of the injured person—passenger in insureds car, guest in insureds car, driver of other car, etc.

With this information we could distribute the overall cost to proper classifications, depending upon whether benefits are paid on the present three-party bases or on a new two-party basis.

Uncompensated Victims under Negligence System

Most of the automobile compensation systems propose a so-called "no fault" basis of handling claims. Therefore, to cost such proposals, we also need to have some information on just how many claimants are *not*

now compensated for their injuries under the present tort system because it is based upon negligence or "fault."

Most of the estimates I have reviewed of the number of uncompensated victims have been made as a result of personal interviews with claimants, personal judgments of claimants attorneys, and company attorneys (which, not surprisingly, are contradictory) or a review of court judgments. These subjective estimates are made more confusing when they involve the question of comparative negligence laws vs. contributory negligence laws. The different concepts in these laws obviously have a bearing on the estimates, but it appears that, from a practical standpoint, the laws are rarely administered (either by juries or by judges or by the insurance carriers) exactly the way the law reads or specifies. In my opinion, we need more objective estimates of the number of such injured persons if we ever want to "cost" this feature of the proposals.

It is surprising to me that many companies do not know what percentage of the accidents reported to them have something actually paid on them. At least this would be a good starting point for obtaining a reasonable estimate of the number of so-called "uncompensated victims." Along with this information, it would be helpful to know how many claimants file claim reports with more than one insured, and some analyses of just how the medical payments coverage only cases fit in with this number, particularly if we want to eliminate duplicate claims by the same injured person.

Collateral Benefits

The Keeton Plan specifically and carefully offsets any loss under the Basic Protection coverage with practically any other collective benefits available to the injured person except life insurance. This is a very important provision and, to evaluate it, we have to know, or at least have some reasonable estimate of, the amount of coverage under the so-called collateral benefits that have been purchased privately by the public or are available to them through group or other employer financed systems. These include:

1. Personal accident and health benefits including Blue Cross and Blue Shield.
2. Medicare
3. Social Security benefits
4. Group accident and health insurance
5. Salary continuation plans
6. Workmen's compensation benefits

According to information from the Health Insurance Institute, the magnitude of some of these collateral benefits seems to indicate that, at the present time in the state of New York, there is a tremendous overlap of benefits available to an insured, particularly when he is successful in settling a case with or obtaining a judgment against an insurance carrier for an automobile accident. The Source Book of the Institute indicates 93% of the civilian population in New York has some form of health insurance protection. While these New York figures may be overstated somewhat because they are based upon place of employment and not state of residence, nevertheless they have a substantial effect on any costing procedure.

Of course, some of the policy contracts providing these collateral benefits might be immediately revised to exclude coverage for automobile accidents. However, it can be assumed, with some degree of confidence, that this will require some time and serious thinking on the part of those people who are the current purveyors of benefits to the public before they give up quickly their role in this area.

Claimants' Attorneys' Fees

Several of the proposed automobile compensation systems, in order to promote fast negotiated settlements with injured claimants, generally provide that part or sometimes all of claimants' attorneys' fees will be paid by the insurer. Consequently, we also need to know approximately what proportion of the settlements which are paid to a claimant today actually does not reach his pocket because his attorney takes a certain percentage of the settlement as a fee. We have numerous records within the insurance industry as to what proportion of the claim expense incurred by companies goes to attorneys, staff attorneys, or to outside attorneys, but practically none on claimants' attorneys.

Several studies have been made by outside people as to the percentage of a trial court judgment that goes to the claimants' attorneys, but this provides very little information as to the amount of money that is paid claimants' attorneys on those cases where the settlement is negotiated between the attorney and the insurance company. If we can believe the estimates of many people in the legal and judicial profession who advocate automobile compensation systems, claimants' attorneys take as much as 50% of the total amount of such settlements.

Before we can accept an estimate that this large a percentage of the loss payments do not reach the injured victim, I believe some attempt should be made to obtain reasonably accurate data in an objective way.

Surely the claimants' attorneys have a stake in the present tort system. Therefore, they should provide rather complete statistical data in this area, at least so that they themselves can recognize the scope of the problem and defend their role in the current method of handling automobile injuries. If they do not, their silence will give credence to the large percentages which are being tossed about by their critics.

Mr. Harwayne's Conclusions Show Effect of Lack of Data

Because of the insufficiency of the data that Mr. Harwayne had to work with, he had to come up with three different estimates of the probable cost of the Basic Protection Plan. These estimates range from a high of 89% of the present automobile bodily injury system, to an intermediate costing which indicated a price tag of 76%, down to an estimate that the Basic Protection would cost as low as 66%. I am not sure that actuaries present a proper image when they have to come out with estimates that have this wide a range. This is not to be critical of Mr. Harwayne because I was greatly impressed by his professional and able study, and have to compliment him on the way that he wrung out as much as he could possibly get from the inadequate data that he had to use.

Let me make it perfectly clear, at this point, that there is no doubt in my mind that the Basic Protection coverage portion of the Keeton Plan, as presently designed, would obviously cost less than the present automobile bodily injury system. In my opinion, you can come to no other conclusion when you read all the restrictions in coverage or restrictions in benefits payable to injured victims under the Basic Protection Plan when compared to the present tort system. In the numerous cases where Mr. Harwayne was forced to make assumptions, he made conservative ones, which means to me that the probability is great that his estimates of the overall cost of the Basic Protection coverage are higher than can be reasonably expected. Possibly, he could have indicated which estimate was the more correct one in his opinion. In any event, I believe it is the actuaries' job to come up with a much more precise estimate of just how much less the system would cost in terms of the present system, or point out in detail the inadequacy of data which prevents more precise estimates.

The Reductions in Benefits Payable under Basic Protection Coverage Could Apply to Present System

I have indicated above that most of the cost reductions of the Basic Protection coverage, as compared to the present automobile bodily injury system, are due to certain restrictions of coverage or restrictions in the

benefits that would be payable for automobile injuries as compared to the present tort system. It should also be pointed out, however, that these same restrictions in coverage or reductions in payable benefits could be applied to the present automobile bodily injury system, so that the lower overall cost is not a result of something revolutionary or something magical. For instance, we could apply the following reductions in coverage or benefits paid to the present system along with the same reductions in present costs as Mr. Harwayne came out with:

1. No coverage for 10% of wage loss or $100 of economic loss, whichever is greater—14.7%.
2. A 15% income tax reduction on benefits paid for wage loss—11.7%.
3. No benefits paid for pain and suffering—19.3%.
4. Offset in benefits payable due to other collateral benefits being available—6%.

If we use these percentages estimated by Mr. Harwayne (and he indicates correctly that these are conservative) these cutbacks in benefits alone amount to a cost reduction of over 40% or over 50% depending upon whether these reductions are additive or multiplicative.

His most conservative estimates appear to be the reduction for the exclusion of pain and suffering and, particularly, for the reduction due to the abrogation of the collateral source rule.

If the information I receive from my claim people is correct, a rule of thumb in claims handling is that, *on the average*, settled costs under the present tort system are 2½ times "specials." As I understand their terminology, "specials" are wage loss, medical, and hospital costs. Accepting these figures, we could replace his 19.3% reduction by a factor in the neighborhood of 60% for removing pain and suffering benefits.

If the Health Insurance Institute is correct that about 90% of the public in New York State is covered by some sort of health benefits, then the offset due to the elimination of duplicate benefits payable must indeed be much higher than the 6% Mr. Harwayne used. In addition, social security, medicare, and many other benefits are not included in the Health Insurance Institute's figures.

If I may be permitted to put forward a "guesstimate," as many others before me have done, and use these less conservative percentages for the exclusion of pain and suffering benefits and collateral source benefits, I

would say that if you would include all of these exclusions under a negligence system you could reduce the present cost of providing the much broader benefits under the existing tort system by 75%.

Basic Protection Coverage Is Only One Part of Total Keeton System

Mr. Harwayne evidently was asked to direct his attention *only* to the Basic Protection portion of the overall Keeton System. It should be mentioned that there are several other additional and voluntary coverages that should be carried by an individual insured in order to complete his insurance protection under the Keeton System. They are as follows:

1. Added protection coverage which is a schedule to provide for pain and suffering benefits excluded under the Basic Protection coverage.
2. Liability coverage for the first $100 in benefits excluded under the Basic Protection Plan and for liability for injuries caused by insured in out-of-state accidents.
3. Catastrophe protection for economic loss sustained over and above limited benefits paid under Basic Protection coverage.
4. Property damage liability coverage—the same coverage purchased today.
5. Liability coverage for protection against claims involving economic loss in excess of $10,000 of economic loss or pain and suffering in excess of $5,000.

The cost of these additional coverages are substantial, and will offset to some extent any overall savings inherent in the Basic Protection coverage if they are all purchased. Also, the very existence of Basic Protection coverage may well have an effect of increasing the cost of some of the residual liability coverages.

It is hoped that some members of the insurance fraternity will evaluate and cost some of these additional coverages so that the probable overall cost of the total Keeton System can be compared to the overall cost of the complete automobile liability system today.

A New Approach to Handling Claims Would Be Required

It would appear that, under a "no-fault" system of handling claims, the insurance industry would have to review its whole claim system and institute a novel, legal and claim handling philosophy which obviously has a direct bearing on the cost of the system. In addition, under a two-party system as compared to a three-party system which is followed under the

tort negligence system today, the insurance companies will be faced with an entirely new set of problems of administering or maintaining some control over the benefits paid. New loss control methods would have to be put into effect and some new administrative procedures would have to be followed in order to make sure that fraudulent claims are not easy to collect.

Aside from a comparison of the expenses involved in handling today's claim and legal procedures with the expenses of the imagined procedures that would be followed under a proposed compensation system, there are philosophical "imponderables" that do not lend themselves to objective analyses or actuarial costing methods. These imponderables include:

1. To what extent will Basic Protection coverage aid in settling liability claims, rather than financing law suits?
2. Are more small claims going to be presented, particularly for disability by non-wage earners?
3. Do the potential third-party claims encourage malingering and other first-party costs to build up a basis for such suit?
4. Will the "regardless of fault" concept discourage highway safety consciousness?
5. Would amounts paid under Basic Protection coverage contain a portion for pain and suffering merely to conclude settlement?

A Different Distribution of Overall Cost by Classification and Geographical Area Is Required

Once the overall cost of a system is produced, a problem that is just as important as computing the overall cost is to decide how the distribution of the overall cost will be made among the various insureds or members of the public. Such an allocation should be made so that the rates will not be unfairly discriminatory and so that each individual insured will be equally acceptable to an underwriter providing the coverage. It is obvious that under the Basic Protection coverage, where a two-party or "related to insured" system of reimbursing the injured parties is followed, the potential hazard represented by benefits payable under an individual policy becomes drastically different from the hazard in a system where a three-party "unrelated to insured" liability claim handling procedure is followed.

For example, a small sample of our third-party liability bodily injury claims paid indicates approximately 50% are paid to the driver of the other car involved with our insured's car, 30% are paid to passengers in this

other car, 10% to passengers in our insured's car, and 10% to other persons, mainly pedestrians.

However, under two-party medical payment coverage claims procedures, the distribution changes such that 50% of the number of claims are paid to the driver of our insured's car, 35% to passengers in his car, 5% to our insured, or relatives resident in household, injured as pedestrians by any automobile, and 10% to others.

Underwriting Considerations Will Change Drastically

In my opinion, the foregoing data indicates the underwriting bases underlying the classification systems that we follow today would be turned topsy-turvy. Under a three-party fault system, the principal factor that determines the probable benefits paid under a policy is the potential accident frequency of the driver or drivers of the insured automobile and variations in expected frequency by class vary usually about 200-250%. As far as the expected average claim cost is concerned, very little variation by classification is currently anticipated since there is a randomness about the age and economic status of the people your insured may injure and, consequently, about the value of the injuries he may be liable for. However, under a system where benefits are paid to your own insured and passengers in his car, this randomness in average claim cost is no longer a fact.

While the variation in the potential accident frequency by classification would, of course, continue to be important, the expected average amount of benefits paid to various classes of insureds could differ so drastically that the expected average claim cost, not frequency, would be the primary factor that would determine the price to be charged an individual insured. Since the system pays benefits to the injured owner or his guests in the automobile based upon their economic condition at the time of the accident, and reduces these benefits based upon what other benefits are available, it is obvious that the probability is great that some classes of risks would receive very little in the way of benefits or none at all, while for other classes of risks the average benefits paid would probably be quite high. The variation in expected average claim cost by class could easily vary ten times or more from the overall average. For instance, those persons to whom collateral benefits would automatically be available, such as insureds over 65, would represent low hazard risks, since social security and medicare benefits are paid in lieu of benefits under the basic protection coverage and the monthly benefits paid would probably be nil. Those who are in the lower economic strata such as military personnel or students

under 20 would also appear to be the less hazardous risks since their net average wage loss would be very low, probably under $50 a month. On the other hand, the self-employed man with a high income, with loving spouse and several children, who is a good family man and frequently takes them on long vacation trips in a Volkswagen Bus, and who carries no accident insurance other than loads and loads of life insurance to protect his family, could probably expect to get the maximum monthly payout of $750 per month.

Different Marketing Problems Will Develop

The change in potential hazard would immediately take care of some of our current assigned risk problems. However, there may well develop entirely new and unusual problems in the area of restricted markets. For example, the present "Class 2" assigned risk supplement might be replaced with a "Family Man" assigned risk supplement.

A safe driver under any Safe Driver Plan would be one who carefully goes around hitting only other people's automobiles, has only a two-seater sports car to cut down on potential passengers, is alert to avoid pedestrians and trees and takes pains to use his seat belt or do anything else to prevent injury to himself. An insured who is a civic minded individual engaged in such worthwhile activities as boy scout leader or some other function that kept filling his car with passengers would probably find himself penalized under a Safe Driver Plan.

Well-to-do residential areas would be put on undesirable neighborhood lists, particularly those with medical specialists charging high fees, and luxury hospitals with their high costs, since owners of automobiles in these areas would probably use these facilities.

Business use of the automobile or corporate owned automobiles would be preferred because of the availability of Workmen's Compensation benefits. Underwriters would welcome those lucky individuals who are poor enough to be eligible for government benefits and other Great Society Programs, particularly if they continue after an automobile injury.

Keeping these factors in mind, I have appended what I believe would be a typical insurance application for insurance protection under this Basic Protection coverage and, in addition, a comparison of the characteristics that would be considered under a three-party negligence system to those in any classification system that I believe might well be followed under a two-party "related insured" system such as the Basic Protection coverage. Desirable characteristics under the present system become undesirable

characteristics under the two-party system. Risks formerly shunned by underwriters will find themselves pursued by company production forces and advertising media. Many considered "cream" under selective underwriting procedures today will become "skim milk" under the proposed system.

In my opinion, competitive considerations could easily result in erection of classification and territory rates within a state that could vary by more than a 50 to 1 ratio. This would mean that a risk for whom the potential benefits are very high would probably pay much more than what he pays today, simply because his insurer pays his economic losses and not the insurer of the other car which is involved in the accident. There is a question in my mind whether the public is ready to be compelled to accept this type of rearrangement of the distribution of cost of automobile accidents, particularly when all of us normally feel that the "other fellow was at fault" when we are involved in a collision with another automobile.

Conclusion

Mr. Harwayne, by his able analyses of available data, has made a worthwhile contribution to the current discussions which are going on in the industry today concerning the "automobile problem." He has shown that the insurance companies can and should increase their statistical knowledge about the inherent workings of the present automobile tort system. Recent events of the past have indicated that the state and federal legislatures would not be shy about changing or taking over our role in the reimbursement of wage, medical, hospital, or other costs to injured members of the public, without waiting for an objective evaluation of the effect or cost of such a move. However, even though the possession of the facts may not actually prevent us from being replaced in our long held position in this area, or being relegated to purely service agencies, at least we will have the satisfaction of aggressively facing this "automobile problem" in a positive and objective manner, rather than approaching it in a negative way and losing the battle by default.

WE-PAY-U INSURANCE COMPANY

ANYWHERE, U.S.A.

APPLICATION FOR BASIC PROTECTION COVERAGE

Name of Insured _____

Address of Insured _____

Approximate Valuation of Home $_____

Average Price of Homes in your Neighborhood $_____

Occupation and Description of Job _____

A. PERSONAL INFORMATION ON DRIVERS AND POTENTIAL PASSENGERS

Give following information on yourself, every driver of the car, your wife, children or relatives resident in your household: (If you drive your car in a car pool, answer these questions for each member of the car pool.)

		Driver, Relative or Car Pool Member			
		No. 1	No. 2	No. 3	No. 4
1. Name.....		____	____	____	____
2. Relationship to named insured.....		____	____	____	____
3. Age.....		____	____	____	____
4. Income earned or not.....	Yes	____	____	____	____
	No	____	____	____	____
5. Self-Employed.....	Yes	____	____	____	____
	No	____	____	____	____
6. Retired.....	Yes	____	____	____	____
	No	____	____	____	____

Please answer the following questions accurately since benefits payable under this policy will be based upon the answers.

7. Average monthly income.....		____	____	____	____
(a) What part of this is earned income? (Do not include pensions.)		____	____	____	____
8. Are any Accident and Health Benefits available to named person?.....	Yes	____	____	____	____
	No	____	____	____	____
9. What type of benefits are avaliable?.....					
(a) W. C. Benefits.....		____	____	____	____
(b) Medicare.....		____	____	____	____
(c) Basic Medical.....		____	____	____	____
(d) Major Medical.....		____	____	____	____
(e) Hospital Costs.....		____	____	____	____
(f) Wage Continuation.....		____	____	____	____

APPLICATION FOR BASIC PROTECTION COVERAGE

- 2 -

		Driver, Relative or Car Pool Member			
		No. 1	No. 2	No. 3	No. 4
10.	Do these other benefits exclude automobile accidents?..... Yes				
	No				
11.	How many dependents do these named people have? (Need not answer for yourself, wife, or your children who are listed.).....				
12.	What doctor does each person normally visit?.....Name				
	Address				
13.	What is his usual visitation fee?.....				
14.	What hospital does each person normally use?.....Name				
	Address				
15.	What is its usual Semi-Private rate?.....				
16.	Does any person listed have any present physical disability?.....Yes				
	No				

17. If yes, describe_____

B. USE OF CAR

1. What percent of time is car used in your business?_____
2. What percent of time do you carry passengers?_____
3. Average number of passengers carried_____
4. Is car driven to and from work? Yes_____No_____
5. Miles driven to work one way_____
6. Used to pull camp or home trailer? Yes_____No_____

C. MAKE AND DESIGN OF CAR

1. Make, Year and Model of Car? Make_____Year_____Model_____
2. How many passengers can car carry?_____

APPLICATION FOR BASIC PROTECTION COVERAGE

- 3 -

		Driver, Relative or Car Pool Member			
		No. 1	No. 2	No. 3	No. 4
C.	MAKE AND DESIGN OF CAR (Continued)				
3.	Is it equipped with:				
(a)	seat belts?.....Yes	_____	_____	_____	_____
	No	_____	_____	_____	_____
(b)	padded dash and sun visor?.....Yes	_____	_____	_____	_____
	No	_____	_____	_____	_____
(c)	collapsible steering wheel?.....Yes	_____	_____	_____	_____
	No	_____	_____	_____	_____
(d)	other safety features....Yes	_____	_____	_____	_____
	No	_____	_____	_____	_____

Describe_____

_____

D. PAST ACCIDENT RECORD (ANSWER QUESTIONS FOR EACH DRIVER OF CAR)

1. How many accidents has driver been involved in in last five (5) years? _____ _____ _____ _____

2. Give date and describe the circumstances of each accident.

Accident #1_____

_____

Accident #2_____

_____

3. Was driver or passenger in insured car injured?..... Yes_____No_____

4. If yes, give estimate of wage loss and medical and hospital cost of injuries. _____

_____

5. Was driver or passenger a resident of household? Yes_____No_____

6. If not, what was relationship to named insured?_____

AUTHOR'S REVIEW OF DISCUSSION

Before replying to the reviews let me summarize my independent investigation of the pure premium cost elements of the Basic Protection Plan. The sequence is as follows:

		Pure Premium	25% More Claims	Total Pure Prem.
1.	Present: Indemnity and uninsured motorist	$46.23		
2.	Medical payments	6.50		
3.	Allocated claims	6.89		
4.	Total	$59.62		
5.	Basic Protection: Auto data	$46.23	$11.56	$57.79
6.	Allocated claims	6.89	1.72	8.61
7.	Half of claimants' attorneys fees	3.45	.86	4.31
8.	Less: $100 or 10% deductible			— 8.50
9.	Sub-total			62.21
10.	Less: 15% of payable economic loss due to income tax exclusion			— 5.76
11.	Sub-total			56.45
12.	Less: Off-sets for Disability Benefits Law			— 3.47
13.	Net cost auto data			52.98
14.	Adjustment for workmen's compensation data			— 7.74
15.	Sub-total workmen's compensation basis			45.24

		Basic Protection	
The values are	Liability	Auto	Auto & W.C.
	$59.62	$52.98	$45.24
	100%	89%	76%
Cost of 10/100 limits	9	9	9
Total cost	109%	98%	85%

A modified approximation of the foregoing states

1. Frequencies could be reduced 3% on account of self-insured vehicles

2. The 25% additional claims, largely unreported today would cost only 80% of the average claim cost
3. Allocated claim expense for both insurer and insured would drop 10%
4. Deductible will cost 5% more than computed
5. Recoveries from other sources will be equal to that from Disability Benefits Law
6. 10% of cases termed serious by the Motor Vehicle Department would be non-serious in workmen's compensation terms.

The modified figures would be

		Basic Protection	
	Liability	Auto	Auto & W.C.
	100%	79%	66%
Cost of 10/100 limits	9	9	9
Total cost	109%	88%	75%

I find the comments by Don Trudeau, Ernest Berkeley and Dick Wolfrum extremely enlightening. I would like to take them up in that order.

The reader will have to judge for himself as to the paper's continuity and logical structure. I will simply say that complicated plans untried and unproven ordinarily require comparable exposition and development.

Concerning the particular factors used in the deductible calculation, it should be obvious that the removal of pain and suffering will reduce the average claim cost; consequently a $100 deductible in relation to a reduced average claim cost is bound to eliminate a larger proportion of the total cost (area of the distribution curve) than $100 in relation to the average cost including pain and suffering. I see this as a criticism that the factors developed may *overstate* rather than *understate* the cost.

I wonder if Don really means to say that property damage allocated claim expense is currently being charged to bodily injury liability.

Some criticism is made for not dealing directly with optional coverages. Certainly the cost of optional coverages must be determined if options are to be provided. I do not, however, look on these elements as being part of the mandatory coverage contemplated under the Basic Protection Plan and have left this for future consideration when, as, and if people want this program. Recognition of extra-territorial coverage must be afforded

since the Basic Protection Plan conceivably could be adopted in one state and not in another.

It is true that the type of deductible in the Basic Protection Plan could, with legislative enactment, be applied to the present liability system. It is my purpose only to make an objective evaluation of the expected cost of the Basic Protection Plan. A thorough reading of the book could be made by others, not necessarily actuaries, and if they cared to, they could pass judgment as to its advantages or disadvantages.

With regard to the allocation of cost to individuals, it doesn't make much sense to measure the detailed microcosm of cost allocation to individuals until some hard conclusions are reached with respect to the macrocosm of the Plan's overall cost. Dick Wolfrum brings out some thoughtful conclusions and I for one would be most happy to undertake to develop the distribution of cost further in the future.

Concerning pain and suffering, my reaction to the question of "true" costs is that it appears to lead toward a futile philosophical question sometimes used in courtroom histrionics, namely, how much is a man's life worth, a moment of unendurable pain, etc. There is no useful answer except possibly in statistical terms. Don proposes an interesting derivation of pain and suffering pure premium. Don's difference in approach on costing the Basic Protection Plan, I would say, could be answered by saying that's what makes horse races. I personally do not have this type of accident and health data available to me. I would be very pleased to have Mr. Trudeau's company or any other company volunteer its data for this purpose.

I do not fully appreciate Don's criticism of the factor for income tax exclusion.

Regarding Appendix A, I do point out that the values to me appear reasonable, but an adequate actuarial basis to support all of the values contained in those calculations is lacking.

Turning to Ernest Berkeley's very kind review, I must say it's a new and pleasant feeling to note my colleagues brand me "overly conservative." Perhaps it is a demonstration of my objectivity in developing the cost; heretofore, as a professional actuary, I have sometimes heard myself labelled the reverse of "overly conservative."

With respect to workmen's compensation offsets, note that some workmen's compensation claims are today being paid as third party cases and, therefore, the situation may be somewhat muddied and confusing. As Ernest points out, I did not include this element as an offset, although it probably is significant.

Turning now to Dick Wolfrum's review, it is an extremely lengthy one in keeping with the weight of the subject matter. Dick takes some issue with the use of workmen's compensation injuries by type of injury; he says it is different from those caused by automobile accidents. I point out that the workmen's compensation cost by types of injuries arising from classifications primarily involving automobile operations have been compared with workmen's compensation cost of injuries arising from the use of automobiles; the types have been averaged according to degree of injury reported to the Motor Vehicle Department. This has a tendency to reallocate injury costs according to averages of drivers, passengers, pedestrians, etc. Mr. Wolfrum's company's sample of the types of persons injured is most welcome. I wish we could get more of such data. I think the idea of an automobile bodily injury accident table has great merit.

With respect to collateral benefits, the listing of possible recovery areas is an excellent one. Some data is needed, particularly from insurers. Perhaps the 93% figure affords a good clue as to the possible appeal of the Basic Protection Plan to the average person who might expect to pay lower premiums as a policyholder and who also might expect to receive speedy reimbursement without present day red tape if he were to become a victim.

I do not disagree that we need more information on claimants' attorneys' fees. Concerning the criticism that my figures show a low cost from 66% to a high one of 89% I am confident that if I have been successful in narrowing it down to this range on the basis of very limited data the range could be narrowed down even further on the basis of additional information. In any case, the results are neither unreasonable nor inadequate in terms of pricing. Similar problems had to be faced 50 to 60 years ago in converting an employer's liability premium to a workmen's compensation premium. That conversion proved to be only temporary until actual experience took hold. In these days of sophisticated recordkeeping, the period of trial and travail during the time a conservative entry Basic Protection Plan premium might be used probably would be very short; statistics could supplant judgment very quickly.

Regarding the application of deductibles under the present system, one should consider the possibility that the policyholder today might not want to buy deductible coverage if, as a claimant, he would continue to pay legal fees of 16% to 50% of the gross recovery. It is possible that he might find the Basic Protection Plan attractive if the net to him, as a claimant, could be reasonably close to his net today as a claimant exclusive of other insurance.

I really have no comment to Dick's "guesstimate" that present day rates could be reduced by 75%. I find it an amazing conclusion and simply leave it to the company actuaries to argue over the particular figures.

The statement that the very existence of basic protection coverage may well have an effect on increasing the cost of the sum of the residual liability coverages is rather cryptic, but unenlightening.

I agree that measures would need to be developed to make sure that fraudulent claims are not easy to collect.

Concerning the five points of imponderables, only time will tell whether or not these will be marginal elements. As an individual, it appears to me that the economic incentives are somewhat lacking because the possible recovery amounts are not particularly attractive compared with the effort required to recoup the deductible.

Concerning the overall cost by classification and geographical area, I can only repeat that I would be most anxious to develop this if the program is otherwise found acceptable. Most appropriately, it could be developed cooperatively if the necessary data were made available to me.

Undoubtedly underwriting considerations will change. Present relationships between most preferred and least preferred are more like 1000% rather than 250% when one considers geographical differences.

As a general comment, underwriting considerations ought to follow *after* it is determined whether or not the insurance represents a necessary or desirable coverage and service to the policyholders and claimants.

In a broad service sense, the fact that different marketing problems will develop need not be detrimental. Perhaps such differences in rate structure could achieve a leveling out which, although it would require reeducation of underwriters, would be of some advantage to persons generally. The newly "desirable" (and currently "undesirable") risks would have few insurance problems while the newly "undesirable" (and currently "desirable") risks could reverse the present situation; those newly "undesirables" could still obtain auto insurance by using the leverage of other insurance, a fact of life today which is almost entirely obscured, except in the market place.

I would think that the 50 to 1 ratio of variation by class and territory is an overstatement; if brought to more proper dimensions it is not greatly inconsistent with the present 10 to 1 ratio.

In conclusion, I appreciate the criticisms levied by all the reviewers because, in the long run, it must result in developing an improved product

which meets the needs of the policyholder public; at the least it could improve coverage and price under the present liability system. I would hope that improvements in the system of affording insurance for proper purposes will also result in improving underwriting results, which we all know encompass a very large amount of pain and suffering. In any event, it is of the utmost importance that we actuaries recognize our responsibility to provide an impartial evaluation of any serious new program. We should be in the forefront, analyzing and developing insurance programs. It is only by working at being leaders in the insurance industry that we can hope to become leaders and not simply to remain followers of the dictates of others.

DISCUSSIONS OF PAPERS PUBLISHED IN VOLUME LII

RESERVING FOR RETROSPECTIVE RETURNS

WALTER J. FITZGIBBON, JR.

VOLUME LII, PAGE 203

DISCUSSION BY F. J. HOPE

The Casualty Actuarial Society is fortunate that Mr. Fitzgibbon has initiated a study into this important but long neglected area of reserving. Retrospective rating is the accepted way of life in many large insurance accounts, and the premium volume now written on this basis exceeds the volume in several of the annual statement lines of business in some companies.

Taking his points in order, I agree with his definition as to component parts which should make up the total amount of reserves for annual statement purposes.

As to "negative" reserves, i.e., the anticipation of additional premiums due the company, it does seem appropriate that such be included in the annual statement, provided that one is fully confident that the money is truly forthcoming. Of course, if the staff, time, and data are available for individual risk calculation, then a negative reserve indication can be treated with confidence. We have generally been skeptical of formula indications of such reserves, based on past data, except in periods of known rate inadequacy in a major line of business. There is also the practical difficulty of acceptance of such reserves by the regulatory authorities.

Turning to the characteristics of a good reserving method, Mr. Fitzgibbon has compiled a most acceptable list. I would only suggest that the element of relative stability be added. By its very nature, retrospectively rated business lends itself poorly to the accepted calendar year accounting methods of determining profit and loss, and wide fluctuation of reserves should not be allowed to compound the problems. With reference to this point, I will merely note here the opening sentence in paragraph 2 of the section on reserve method characteristics, which reads:

> "The total reserve can be considered to be composed of the sum of a reserve for each line of insurance for each policy year."

There can be no quarrel with this consideration, since the annual statement pretty much requires that there be such component parts. At a later

point, I would like to question whether it necessarily follows that the components must first be developed individually without regard to the consequent total.

The formula for reserving starts on the logical premise that the reserve should vary inversely with the loss ratio. There will be many individual instances where the facts do not support the premise, but the logic is sound on a long term, aggregate basis.

A simple formula relating loss ratio and "deviation" ratio has been developed, in the form: $Y = .472 - .539\,X$, with X representing the loss ratio and Y the deviation ratio, i.e., the ratio of net return and additional premium to standard earned premium. Given X, Y is determined and applied to a policy year standard premium to estimate the total deviation anticipated by that body of experience. Returns and additionals paid to date are then subtracted to determine a net reserve for that policy year.

The formula rests largely upon the consistency of past deviation ratios in relation to the present and future. But in the light of workmen's compensation ratemaking methods and the expense gradations common to most states, it can be expected that the deviation ratios will not change radically on a substantial volume of interstate compensation business. Probably the greater threat is the slow erosion in factors such as Table M. It might be noted, in fact, that when a loss ratio of 60 percent is assumed, the formula now produces a deviation ratio of about 15 percent. This must certainly be more than the average expense gradation in this body of experience, indicating the strong possibility that the two constants were based on data rated with an inadequate insurance charge, and must ultimately be adjusted to reflect the revision of Table M.

We noted with interest that the deviation ratio in our company for the same five policy years averaged within one-half of one point of those upon which the formula is based.

Exhibit I shows a complete application of the formula to one policy year through 54 months of development beyond expiration of the latest policy, pointing up some of the difficulties of evaluating immature data, as commented on in the section citing the difficulties of a runoff test.

There is an interesting observation that under the formula, excessive loss reserves are offset in part in their impact on underwriting results because they tend to reduce the reserve for retrospective returns, and, of course, this applies in reverse to less than adequate reserves. The underwriter must take some comfort in this self-correcting device, while the claims man and the actuary must search their respective souls for the truth.

The brief sections on other reserving formulas seem to require no comment.

With respect to methods for other lines of business, reservations had been expressed earlier as to the necessity of building the total reserve from the sum of the parts. Application of retrospective rating to other lines of business is generally a combination of several lines at a time, and entry into Table M is based upon total expected losses. It would seem appropriate to examine techniques which would produce the best reserve in the aggregate as a first step, with appropriate adjustments by line to recognize past experience and such other significant factors as might exist, but with a moderation that would avoid undue fluctuations and still balance to the total.

A separate formula has been developed to convert net reserves to a "returns only" basis, using essentially the same techniques as in the earlier formula. The data needed to develop the constants is of such detail as to be available probably to only a few carriers at the present time.

It is difficult to understand the rationale underlying the concept of reserves based on return only. It is the essence of retrospective rating that, risk by risk, loss ratios will vary around some expected loss ratio. On that basis, we balance charges against savings, and it is not clear why we should depart from that concept in reserving. Admittedly, we are balancing premiums not yet collected against estimated return premiums, but the practical effect is probably no worse than developing earned premium from premiums written, but not yet collected.

Finally, we agree with the concluding observations made by Mr. Fitzgibbon and extend our compliments to him for a job well done.

DISCUSSION BY D. R. UHTHOFF

I doubt if any of us are thoroughly satisfied with our own company methods for reserving against retrospective returns. Even though we may have taken pains with and given much thought to this problem, it's the kind of thing we can't be very sure of and it's likely to come up for intensive review at least once a year, certainly in preparation for annual statement time. It's good to be able to compare notes with Mr. Fitzgibbon as he describes and discusses an attractive-looking method used by his company, and also as he points briefly to other reserving methods, perhaps simply to demonstrate his open-mindedness to these other methods, even

though enthusiastic about his own. I particularly like one sentence: "A reserve may always be created through use of 'judgment' alone." This shows he does have his feet on the ground.

The paper describes characteristics of a good reserving method, giving us helpful principles to have at hand, and then shows how a reserve established as a function of retrospective business loss ratio can substantially fit those principles. The author's presentation is interesting, quite understandable, and obviously consistent with an apparent purpose of helpful give and take on one of the several internal problems many of us would like to get together on, either in the *Proceedings* or through informal discussions.

I was disappointed in finding that my own company experiences did not have adequately useful correlation between restrospective returns and retrospective business loss ratios, policy year by policy year. I somewhat envied Mr. Fitzgibbon's own company experiences in that they did provide the correlation which made a good case for the method, although I would suggest the possibility that, one or two years later, circumstances might render a description written at that time more theoretically logical than factually justified. In other words, not only do I suspect possibility of chance variations, goodness knows why, but also we are in a changing era, increasing popularity of retrospective rating affecting the characteristics of the retrospective community, and offhand I wouldn't venture to say just what effect the new Table M may have upon returns and relations to loss ratios.

Of course, these changing things can affect the validity of any methods and must be coped with or left alone to be reflected eventually in actual experience. As the Chinaman says, "It's a wise man who knows what to leave to chance." Perhaps the only way we can be fairly sure of a proper over-all reserve is to proceed almost on a risk-by-risk basis according to the rating plan values applied to each risk's developed premiums. And here we get into a fundamental kind of question: Should we attempt to establish reserves precisely as of a statement date according to immature developed premiums, rating factors based upon premiums completed at statement date, and estimated losses, as though business were to cease as of statement date, or should we go the more practical route of estimating ultimate returns, a purpose more suitable for accuracy of operating statements. Probably the latter purpose will also give the more conservative reserve from a cessation of business standpoint.

As a matter of fact, Mr. Fitzgibbon's method, as he establishes loss ratio and reserve return relations from older and developed policy year

experience, seems to follow the operating result purpose. Otherwise, he would have had to establish a series of equations corresponding to various stages of policy year development and this he could of course not do without a risk-by-risk process of estimating returns as of various moments. Inasmuch as he has not established equations according to development stages, one might question the validity of his application of one common equation to policy year groups of premiums as they develop, such as 12 months and later.

We have found serious development disturbance with retrospective return indications as these returns are calculated with second and third reportings. Our company has traditionally followed an over-all return percentage, on the conservative side, and in one attempt to obtain a more recent return percentage indication, we thought of applying development factors from first to second and to third reportings, but these did not seem dependable enough to count upon. We have been seeing these development factors change considerably from year to year. By staying a bit on the conservative side we are enabled to hold our return percentage somewhat constant from year to year, and thus we see a practical result that our current calendar year operating statement reflects substantially only the actual returns made in that current year, without being affected seriously by reserve changes. This would seem to have some merit, although it does mean that our timing is about a year off, inasmuch as we should have reserved for the returns at the end of the preceding year. Perhaps, though, we are more afraid of error in such reserving, that we then might have more fluctuations in our year-to-year statements because of reserve variations, perhaps with over-corrections, thereby accentuating effects.

In thinking about the method of relating returns to loss ratio, one might consider that returns, particularly if a company uses the stock company scale of expense gradations, are substantially a function of standard premium size, with the residuals being functions of loss ratio and rating values. I wonder if the method might not be improved in this way, a large piece of the return being rather dependably taken care of by working with standard premium expense gradation, and the balance of the job depending upon a cleaner affinity to loss ratio. Perhaps, too, if a company had enough volume to boast about, risks might be segregated into two or three broad groups according to some rating value characteristics. I wish someone in these crowded days would take a crack at something like that, presuming he might tell us how it all worked, somewhat as with the generous spirit with which Mr. Fitzgibbon has contributed something of very practical worth to our *Proceedings.*

RATEMAKING PROCEDURES FOR AUTOMOBILE LIABILITY INSURANCE

PHILIPP K. STERN

VOLUME LII, PAGE 139

DISCUSSION BY STANLEY DORF

Mr. Stern's review of automobile liability insurance ratemaking procedures used by the major rating organizations updates his previous paper on the same subject by reflecting some of the more important ratemaking modifications of the past ten years. This admirable revision, intended as before to introduce the fundamentals of a complex subject, is no patchwork product but a thorough reformulation of the subject. It is clearer and more logically organized than the original essay, which was itself a highly valuable contribution to the *Proceedings* of the Society. The paper will, I feel sure, be read with profit both by actuarial students and those nonactuaries who would gain some insight into the automobile ratemaking mysteries.

In general, the revised paper is both more detailed and yet, paradoxically, easier for the reader to follow. Explanations of many terms previously undefined (such as "fleet" and "non-fleet," "basic limits," etc.) are now presented as they occur in the text. A separate section has been introduced to deal with the more difficult concepts of ratemaking. Mr. Stern considers the actual formal rate filing only after an extended presentation of the reporting and summarization of individual company statistics, on both the accident and policy year bases. Important recent ratemaking developments, including package automobile policies and the new private passenger classification and rating system are discussed in detail, although the Safe Driver Insurance Plan is barely mentioned.

Mr. Stern has limited his paper to a description of automobile ratemaking methods in use today. One wonders whether this approach is sufficient for the inquisitive student who needs to know why as well as what. The paper itself presents two convenient examples:

1. The main rationale for Mr. Stern's complete revision of his earlier paper is that the rating organizations have substituted the accident year for the policy year approach in private passenger and commercial automobile ratemaking. Surely certain questions will disturb the student: What were the advantages of adopting the accident year method? Was anything lost in the process?

2. In an appendix, the paper outlines some features of the new private passenger classification and rating system, now effective in many states. The student may well ask how a plan with some 4,900 distinct rating classes in each territory necessarily represents an improvement over the more simplified classification system described in the body of the paper.

Ratemaking procedures are continually changing. If Mr. Stern had shown, in even a cursory way, how some of these procedures developed, the student would more fully understand the mechanics of the ratemaking process itself.

Neither Mr. Stern's original paper nor his revision pays sufficient attention to the expense portion of the rate structure. Probably this is due largely to the fact that the rating organizations themselves review these items less closely than loss experience in their rate filings. Nevertheless, it has always seemed surprising that so much care has been taken in the precise determination of losses, while expenses and profit, which together account for one-third of the premium dollar, have been treated in so relatively casual a manner. The paper observes that "the expense ratios can be obtained from the Insurance Expense Exhibit, which shows separate amounts for the various categories of expense." Mr. Stern's study, however, of the 34.5% currently required for expenses and profit, reveals that the production cost allowance accounts for 20% of the total, and this item "is generally not based on the past experience from the Insurance Expense Exhibit." (Production cost is considered a "budgetary" provision, an unclarified term which may confuse the beginner.) The 5% provision used in most states for underwriting profit and contingencies is obviously unrelated to Insurance Expense Exhibit results, while the 3% for taxes will vary more as a result of individual state requirements than because of countrywide expense averages. This leaves General Administration and Inspection and Bureau expenses, or 6.5% of the total expense loading, which are actually subject to adjustment via the Insurance Expense Exhibit.

Among the new developments discussed at some length is the rating organizations' method for measuring loss cost trends. That trend factors represent the only area of the ratemaking process where an extrapolation from actual loss data is found necessary might perhaps have been made clearer to the reader. Here, again, some statement of the underlying reasons for the use of such a mechanism would have been helpful. Does the use of trend factors in excess of unity rest upon the more fundamental assumption that inflation will be with us for a long time? Would rating

organizations continue the use of such factors for any length of time if average paid claim costs fell sharply while the consumer price index continued to rise? If, as a result of the awakened public interest in automobile safety, there were a noticeable and continuing reduction in highway accidents, would it not be equally proper to introduce a claim frequency trend factor?

I observe that if Mr. Stern had treated the subjects that make up most of my comments on his essay the paper would have been longer than it already is. This is more a reflection of the vastness of the subject than a criticism of Mr. Stern's fine work. In what he set out to do, namely, to present a clear, comprehensive description of current automobile liability ratemaking procedures, Mr. Stern has been eminently successful.

DISCUSSION BY JAMES F. GILL

Mr. Stern's paper is a complete revision of his paper, "Current Ratemaking Procedures for Autobobile Liability Insurance," presented at the November meeting in 1956. The author is to be complimented; he has prepared an excellent paper which will be of tremendous value to the student as well as others not familiar with automobile ratemaking procedures.

Mr. Stern explains in the Preface that his paper has the same objective as his previous paper in that it is a description of the ratemaking process rather than an evaluation. The paper clearly indicates the author's comprehensive knowledge of the subject, and because of his thorough knowledge of this subject he has inadvertently not clarified some of the procedures, at least for the student. My remarks involve only some questions that might occur to the student.

The author states in the Introduction that many non-bureau companies use rates promulgated by the bureaus, frequently on the basis of a percentage departure. Mr. Stern then states that apparently such filings are supported, though by means different and presumably less exacting than is required of rating organizations. The student may wonder if this is so and why it is so.

It might be well to note that eight industry organizations, including the rating bureaus and the major trade associations, drafted a memorandum in August of 1947 setting forth recommendations on important points with respect to the administration of the Kentucky Casualty and Surety Rate Regulatory Law which became effective October 1, 1947. The memorandum in part states:

"When a rate manual or a revision thereof becomes effective for a rating organization on the basis of supporting information submitted, it is desirable to permit independent filing companies which file that manual to obtain acceptance of similar rate filings. To do otherwise might force the independent company either to reproduce the supporting data already on file with the Department in connection with the particular changes or to affiliate with the rating organization in order to be able to use the same manual. Special provisions and departures introduced in the manual by independent filing companies should be supported by them, of course, because for such features they would not be able to depend upon the supporting information submitted by the rating organization for its manual. A rating organization may likewise avail itself of supporting information submitted by an independent filing company for its filing."

To the best of my knowledge, this memorandum continues to reflect the views of the industry.

The description of trend factors indicates that if the statewide rate level is to be based on the latest accident year, a trend factor reflecting eighteen months of subsequent data would be used. However, a trend factor of longer duration would be used if the statewide level were to be based on two accident years. No mention is made at this point as to the period of time. However, the reader will learn in the section dealing with statewide rate levels, provided that he studies the table on page 77, that the trend factor can be 21 or 24 months.

The section, The Making of Rates, states the use of a formula does not mean that automobile liability insurance ratemaking should or has become a mechanical process. This is true. However, the author further states that the rate maker has to be willing and able to depart from the formula by superimposing on it such modifications as special circumstances require. It would have been very helpful if some examples of such modifications had been given.

In the section dealing with the Statewide Rate Level, Mr. Stern refers to an earlier example in reference to premium at present rates, indicating that the present rates not only reflect the rates that are printed in the manuals but also the rules that are superimposed upon the rates, reflecting, where applicable, rate reductions given to compact cars, multi-car risk, driver training credit and the application of the safe driver insurance plan. However, the example does not indicate how the safe driver insurance plan is applied.

In the same section, the author explains the development of statewide rate level changes and shows in Exhibit 7 factors to adjust losses for subsequent change of average paid claim costs. In the explanation, he states these factors were modified in the rate filing, recognizing other relevant information. The reader is left to his own devices as to what the author means by "other relevant information."

As mentioned before, the paper will be a very fine addition to the *Proceedings* of the Casualty Actuarial Society, and in preparing a paper requiring the detail incidental to ratemaking procedures, it is almost impossible not to leave some areas unexplained. In any case, Mr. Stern is to be commended for a fine paper.

SOME OBSERVATIONS CONCERNING FIRE AND CASUALTY INSURANCE COMPANY FINANCIAL STATEMENTS

PAUL M. OTTESON

VOLUME LII, PAGE 215

DISCUSSION BY JOHN W. CARLETON

Mr. Otteson has made a valuable and provocative contribution to a subject that is of considerable current interest.

His paper has been written in a commendably clear, firm and forceful style. If any criticism attaches to the manner of presentation, it might be to the effect that he uses essentially the same style to express statements of fact, possible inferences from given facts, and statements of individual preferences. An unwary reader may occasionally find himself accepting a sentence in the last category as a sentence in the first category.

The paper covers five facets of financial statements for fire and casualty companies, relating them to the *full* and *true* wording in the jurat of the required annual statement filing. The words "full" and "true" have virtuous connotations. It is believed Mr. Otteson properly reads into them something more fundamental than filling in all appropriate blanks after mechanical compliance with instructions.

Nevertheless, I find myself resisting some of Mr. Otteson's statements and more particularly some of the premises implicit in his discussion. When people agree generally on facts and agree generally that virtue is a good thing, but disagree as to where these agreements lead, there must be a reason. In this review I want to explore briefly what seems to be the reason.

It is suspected that Mr. Otteson may feel the financial statements of fire and casualty companies should address themselves to a slightly different collection of questions than I think they should. I can build this suspicion by extrapolating from a suggestion he makes for improving what he calls the accuracy of unpaid loss liability estimates. He suggests that if more time were allowed for the runoff (or for the receipt of more information) then more accurate estimates might be made; i.e., ones closer to the values ultimately revealed by time. Some actuaries might question the contribution an extra month would make as respects some important kinds of claims. However, if one considers the schedule customarily required for the preparation and filing of the annual statement, then Mr. Otteson's suggestions fall within the range of practical possibilities. Thus, I should

acknowledge in advance some discourtesy in extrapolating out of the practical range in order to develop a possible difference between my concept of what financial statements should do and Mr. Otteson's.

When liabilities are of such a nature that they can be quantified only as more information flows in with the passage of time, it is tautological to state that a deferred filing date will usually permit a more "accurate" estimating of them. Time, in sufficient quantity, will permit a precise test of the under or oversufficiency of unpaid loss liabilities, liabilities to policyholders for insurance bought but as yet undelivered, even the policy reserves of a life company.

The ultimate in the use of time to enhance accuracy would be to look back at an insurance carrier five or ten years after it had completed its life cycle; i.e., five or ten years after it had terminated its corporate existence through sale or liquidation. From this vantage point it should be possible to put each dollar of cumulative incurred loss into its proper accounting period according to an accident date criterion, an earned premium matching criterion, or any other criterion that might be thought productive. From this vantage point it should be possible to know what ninety-day balances were collectible and what unauthorized reinsurance was in fact recoverable. From this point it should be possible to take the cost of developing a good agency plant and the cost of recruiting and training a good staff and redistribute them, generally forward, to the accounting periods that enjoyed the premium and profitability that these investments made possible—achieving a match of revenue and outgo that would exceed the demands of the most zealous professionals. We could have a very accurate recasting of balance sheets and operating statements, the word "accurate" being defined in terms of hindsight and thoroughgoing matching criteria.

Such data would have some uses but they are not the uses for which financial statements are prepared, either in the insurance business or, as far as I know, in any other business. It is thought that such a hypothetical recasting is the yardstick with which to test whether a financial statement is a full and true disclosure.

With some technical exceptions, insurance financial statements are prepared while the organization is operating as a going concern, as promptly as mechanically possible after a cutoff date, and at a point of time when the ultimate consequences of commitments made prior to that cutoff date are not only unknown but unknowable. What should be measured and disclosed to policyholders, shareholders, licensing authorities and managers when the disclosure must be made at a point of time when these direct con-

sequences of prior transactions with last year's customers cannot be quantified until further events have taken place?

It is suggested that the preferred answer to this question in terms of general usefulness, ease of communication, and comparability with other businesses is one which applies a principle that can be loosely worded something like this: The statement should be prepared in such a way that there is released into cumulative operating earnings only those portions of cumulative operating revenues which, as of the statement date, are substantially certain to still belong there after the future events have taken place. Statutory accounting is not entirely consistent with this principle, but I think it tries to be close.

AUTHOR'S REVIEW OF DISCUSSION BY MR. CARLETON

John Carleton's review evaluates the paper on an overall rather than on a point by point basis. An example or two supporting his general criticisms would make them more meaningful.

The review then proceeds to develop argument for a position or point of view concerning what the ultimate philosophy and objective of insurance company financial statements should be. This argument is summarized and crystallized into a definite "principle" in the last paragraph which reads as follows:

> "The statement should be prepared in such a way that there is released into cumulative operating earnings only those portions of cumulative operating revenues which, as of the statement date, are substantially certain to still belong there after the future events have taken place."

Concerning attitude toward financial statements, the author would agree substantially with the principle expressed; the "observations" contained in his paper are consistent with it. The last paragraph however does raise interesting questions which should at least be subject to further exploration, development, and clarification.

The principle is limited to "operating" income and revenue. Should not the same principle apply to investment valuations and increments to surplus? Present practice is much more conservative as to operating results than as to investment valuations and increments to surplus.

The full meaning of the term "release" is not quite clear. The unearned premium reserve does "release" and "withhold" prescribed proportions of the gross premium income. For other deductions the withholding and re-

leasing is accomplished through establishing balance sheet liabilities generally *not related* to revenue, e.g., the provision for unpaid losses. Does the principle imply that safety margins should be built into liabilities and if so should these margins be optional or should they be mandatory and in accordance with prescribed rules.

The term "cumulative" should relate to the balance sheet rather than the earnings statement; the balance sheet reflects complete financial results on a cumulative, all-time basis. The significance of earnings statements lies in what they relate concerning a definite, specified period of time such as a calendar year.

The term "substantially certain" is interesting and may prove to be a useful addition to financial statement vocabulary. The term would be more meaningful if it were considered in relation to the present words of virtue, "full and true," under which the system now operates.

Some further elaboration on points in which statutory accounting *is* or *is not* consistent with the "substantial certainty" principle would make the reviewer's general evaluation more meaningful. Also, can several important concepts of virtue such as "substantial certainty," "full and true," and "objectiveness" all be accomplished at the same time?

DISCUSSION BY ROBERT G. ESPIE

Mr. Otteson's paper is very timely in that the financial statements of fire and casualty insurance companies have within recent years been questioned, at least implicitly, by investment analysts and professional accountants who have shown no reluctance about adjusting official results to produce figures more suitable for investors or more in accord with accounting principles generally acceptable for other types of enterprises. Our financial statements need to be re-examined as to their ability to do what they ought to do and their avoidance of what ought not be done.

Unfortunately, in addressing himself to the "full and true" phrase in the jurat the author has with one stroke claimed an objective that is intrinsically above reproach and posed an ethical problem for which he offers no solution. If the statement signer truly believes, for example, that "statutory over case-basis" reserves are not liabilities, he can hardly sign a statement which so includes them; if he omits them from liabilities and signs the statement he will be charged with perjury on the ground that "full and true" means "full and true in accordance with the requirements for filling in the blank." It seems to this reviewer that only in the area of loss evaluation does the author really concern himself with fullness and truth and that in

his other comments he really concerns himself with the usefulness and meaningfulness of the prescribed statement form and preparation rules. To the extent that he does so he concerns himself with whether the statement, as prescribed, does a good job of fulfilling its objective, and yet he does not define that objective. In this respect, he leaves undone a task which badly needs doing and he exposes himself to the consequences in logic of building an argument without properly examining his basic premises.

CONSOLIDATION

The author does not seem to have clarified the objectives of consolidated statements and might perhaps have reached different conclusions if he had done so. For the purposes of the shareholder of a parent company, it is appropriate to consolidate all significant subsidiaries so that the shareholder can determine a proper figure of the earnings attributable to his holdings and a proper figure of the capital funds represented by each share. The policyholder, on the other hand, may be completely misled by a consolidated statement if, for example, his claim is in fact a claim only against a subsidiary which is itself a limited liability company whose liabilities are not guaranteed by the parent. To policyholders and other creditors, information as to surplus protection is only relevant if it is available to them, and a consolidated statement could be quite misleading. Between the two extremes of ownership status only and creditor status only comes the policyholder of a mutual company who has something of the interests of the shareholder, particularly if he is a policyholder of the parent company, and something of the interests of the creditor, particularly if his own policy is backed only by the assets of a particular subsidiary.

If the author had set forth objectives of consolidation in the above terms, his dicta on the subject of consolidation might have been somewhat different.

VALUATION

The author also appears only to touch the surface of the valuation problem and has relied upon concepts applicable to other types of business in forming his judgments.

Two alternative philosophies of asset valuation, and for that matter liability valuation, may be considered. One is the liquidation concept—what happens if all assets and liabilities are immediately exchanged for the common denominator of cash? The other is the going-concern concept —what happens if all assets and liabilities are held in their present form until liquidated in an orderly fashion as a part of the business process?

The liquidation approach has been the classic approach in insurance company statements because of the preoccupation of regulatory authorities with their role of guardian of solvency for the protection of the policyholders and claimants. It has the advantage that it is simple and within the administrative capacity of the regulatory authorities. It may also approach the valuation which would be made on reinsurance of an entire company which is going out of business. It has the drawback of being unrealistic for the company which is in infinitesimal danger of going out of business and unrealistic for large blocks of assets whose rapid sale would of itself depress the market. It is also unrealistic for those assets which are intended to be "used up" during their lifetimes as part of the costs of operation, for which the depreciation approach is more reasonable.

The going-concern approach has the advantage of being more realistic for the vast majority of companies and of producing more accurate earnings statements. Accuracy of earnings statements has come to be generally considered by accountants to be the paramount objective for other types of businesses, particularly where the creditor interests are sophisticated enough to make their own determinations, and where the thrust of the regulatory authorities must be in the direction of protecting comparatively unsophisticated investors.

For the purposes of the insurance regulatory authorities it therefore appears that the real purpose of valuation—the determination of whether a company is in such circumstances as warrants its being continued to sell insurance—is not satisfied by either the liquidation concept or the going-concern concept. It must be a combination of the two.

This approach to valuation supports the author's dictum that market values should be used for common stocks but not his claim that these values should be discounted for potential capital gains tax unless the basic policy of the company is to speculate in common stocks and sell for profit rather than to invest in common stocks for virtually permanent ownership. On the going-concern concept the stocks are not expected to be sold and capital gains tax is not expected to be paid. If the company has to liquidate its holdings to finance an underwriting disaster the underwriting loss may be expected to offset the capital gains, no tax will be paid, and valuation at market without tax discount will in fact have been shown to be the best measure of the value of these stocks to pay off claims. If a company has an expectation of an underwriting loss every year (a sort of "continuous disaster" such as is produced in some current rate-setting situations) it may deliberately plan to invest in growth stocks whose value can be real-

ized without capital gains tax, just as it may deliberately choose taxable bonds over tax-exempts when faced with annual underwriting losses.

The valuation of bonds on an amortized basis without regard to current vagaries of the market must be the preferred basis unless it is conceded that the company is going out of business or that for some other reason there may be an expectation of bond investments not being held to maturity. Note that on the going-concern basis a company could normally finance an underwriting disaster by temporarily "warehousing" bonds rather than dumping them in a poor market.

INCURRED LOSSES

The author is on surer ground in the area of measurement of unsettled losses. It is apparent, as he has shown, that marked differences exist in the abilities of individual companies to measure at the end of the calendar year in which the accident occurs the ultimate amount for which that accident will be settled. One suspects that if his Exhibits A and B had been constructed for a series of years he would have found that this ability may also vary markedly from year to year within an individual company. He might also have found that valuation ability varies from line to line within a company and that one line may offset another.

He might have commented on the fact that a well-managed company does not take drastic managerial action on the basis of a single year's results and that by the time enough years' results are known to establish a credible trend the redundancy variations of a line for a year will most likely have been smoothed out to a point where the management, or the regulatory authority, will not actually have been seriously misled by the accuracy shortcoming of the statement for a particular year.

His exposition should also be helpful in discouraging analysts from placing excessive reliance on individual year's results as being indicative of a trend.

Incidentally, the author's difficulty in distinguishing between consolidated and unconsolidated statements is borne out by the (e) and (f) columns of the first lines of each of Exhibits A and B. The column (e) figure is for one company of the group only; the column (f) figure is for both.

SCHEDULE P

The author's comments with respect to this schedule seem to overlook the general consensus that its shortcomings are too many and too important to warrant its retention in the statement. Without considering the funda-

mental flaws in it he points out some of the disadvantages which arise from its use and suggests means of patching it. His patches do not correct the fundamental flaws and their suggestions will be a disservice to the cause of "full and true" statements if uncritical readers assume that such patching will correct the schedule into a good thing.

This reviewer questions his statements that voluntary reserves are not liabilities, that statutory excess reserves are not liabilities, and that separation of the two on the balance sheet, in the surplus block, would give the regulatory authorities information which is meaningful and which is not now readily available.

The distinction between a "liability" for the apparently precise costs of an event which has happened and a "reserve" for the apparently imprecise costs of an event which may happen is a distinction which is practically impossible to draw for an insurance company. If a "going-concern" insurance company sets aside a reserve for a rainy day (or a very windy day) or for possible future upward development of case-basis reserves, is it any different except in technique of measurement from the reserve for payment of an annuity-type benefit? Does some imaginary line exist which divides "liabilities" based on statistical tables from "reserves" based on managerial judgment?

UNEARNED PREMIUMS AND PREPAID EXPENSES

The author in this section makes some pertinent comments on the subject of "prepaid expenses" and "equity in the unearned premium reserve" but after setting forth some of the problems he rather weakly concludes that "a note of caution" should be sounded before introducing this concept into official balance sheets.

In this reviewer's opinion he has fallen into the common trap of assuming that prepaid expenses do exist because the statement speaks of "unearned" premiums and because it seems to imply that premiums are "taken into income" over a period of time.

A more consistent approach is to regard premiums as being taken into income when written and the corresponding acquisition costs charged off at that point. Thereafter, it may be necessary for an insurance company to have a reserve to provide for the fulfillment of the obligations which arose from that transaction. Generally, the reserve which would be adequate for this purpose would be 65% or 75% or 80% or some other percentage of the gross premium. If the policyholder has the right of cancellation at any time with return of part of his premium, it would be impru-

dent for management to hold as a reserve less than the amount returnable. (It would also be imprudent for the management to discount this policy obligation by its expectation of being able to secure a return of commission.) Under these circumstances the regulatory authorities cut through the various arguments as to what percentage of the gross premium should be held by stipulating the outside figure of a pro-rata of 100% of the gross premium. To the extent, if any, that this reserve is more than adequate to liquidate the anticipated outgo, there is an element of overvaluation which reduces surplus and may distort the emergence of earnings. If the situation is so looked at, the concept of prepaid expense disappears and the argument boils down to (1) should there be two different annual statements which would not agree, one for regulatory purposes and one for other purposes, or (2) should the objectives of policyholder protection be submerged in favor of other objectives, or (3) should the over-valuation of policy reserves be regarded as simply an example of that conservatism which underlies many accounting principles? To this reviewer the third alternative seems to be the only one acceptable to a management with stewardship responsibilities such as we have in the insurance business.

Mr. Otteson has touched upon a number of aspects of the annual statement which badly need exploring. It is to be hoped, however, that further explorations of this nature will be preceded by a deeper probe into the underlying philosophies of statements.

AUTHOR'S REVIEW OF DISCUSSION BY MR. ESPIE

Mr. Espie begins his review by pronouncing complete judgments as to the overall merits of the paper. The relationship of these judgments to either the intent or the substance of the paper at times appears quite distant. The review then continues on a point by point basis.

CONSOLIDATION

The first sentence of this section of the review reads as follows:

> "The author does not seem to have clarified the objectives of consolidated statements and might perhaps have reached different conclusions if he had done so."

In reply, the following statement contained in the paper appears to express the author's objective quite clearly:

> "The consolidated balance sheet is the only method available to reflect properly the financial situation of a group of insurance companies when

ownership or financial control by one company over another is involved. It is the only means by which total capital can be compared with and related to the magnitude of the total insurance operation."

The review fails to consider the significance, truth, and propriety of the above statement. The question of whether the surplus of the parent company only must be related to the premium volume of the entire group in establishing "surplus to policyholders – premium volume" relationships is not considered or evaluated.

The example quoted by the reviewer is relevant concerning a subsidiary company policyholder but would not be properly applicable to a parent company policyholder. Also, the example is somewhat irrelevant in that the paper does not specify or contemplate that individual company statements would be eliminated.

VALUATION

The differences in viewpoint and position between the author and reviewer concerning this section of the review are complete.

The reviewer compares liquidation and going concern concepts of valuation. He defines the going concern concept to mean:

"What happens if all assets and liabilities are held in their present form until liquidated in an orderly fashion as a part of the business process?"

The Accountant's Handbook (1960), R. Nixon and W. G. Hell, quotes Paton and Paton *(Asset Accounting)* in explaining the meaning of going concern valuation as follows:

"The value of the business as a going concern is primarily a question of earning power. The cost approach, dominant in the treatment of individual tangible assets, loses significance when the center of attention shifts to the business entity. The enterprise, a conglomeration of facilities, has value in proportion to its ability to produce income."

It is difficult to see how this principle which relates to the overall worth of a business, without reference to any specific category of assets or liabilities, can be applied appropriately to the valuation of investment securities.

The reviewer believes in the liquidation concept (market value) as applicable to the valuation of stock. On the other hand, he opposes the capital gains tax reserve.

"unless the basic policy of the company is to speculate in common stocks and sell for profit rather than to invest in common stocks for virtually permanent ownership."

He then uses his own going concern definition to justify not establishing the reserve through the assumption that the stocks will not be sold:

"On the going concern concept the stocks are not expected to be sold and capital gains tax is not expected to be paid."

There is no explanation as to how companies would be classified as to whether they were "speculators" or whether they bought stocks for "permanent commitment". If capital gains tax is to be avoided the permanence must be absolute and complete even though it meant restrictions as to changes in overall investment strategy and tactics, or restrictions as to shifting among individual stock issues in light of changing situations and conditions.

The reviewer implies that if capital gains tax is used as an offset to a future underwriting loss it means that no capital gains tax cost is involved. The author believes this reasoning to be completely in error; the cost of a capital gains tax applied to reduce a loss carry forward is just as real as though the tax were paid in cash.

Concerning bonds, the reviewer relates his argument to the question of whether or not the company is going out of business. The author believes this question to be irrelevant. The current market evaluates bonds on the basis of present value of future interest earnings and principal payment in terms of current interest rates. The amortized value relates to cost values and these are in reality the market values of former times when interest rates were at different levels.

The reviewer suggests that

"a company could normally finance an underwriting disaster by temporarily 'warehousing' bonds rather than dumping them in a poor market."

This suggestion poses a basic question. How is a "poor market" to be recognized? It is easy to look backwards at the ups and downs but how is it possible to look ahead to determine what the market will be at a future date? The company in trouble may be assuming additional market risks beyond its capacity if it "warehouses" rather than liquidates.

Failure to recognize the verdict of the market place in the valuation of investment securities can be a dangerous game, and failure to recognize potential Federal tax liability is unwise and improper.

SCHEDULE P

The reviewer expresses disagreement with the author's Schedule P suggestions in a general sort of way. Specific recommendations for revising Schedule P contained in the paper are referred to as "patches." The author's proposal to transfer Schedule P reserves from the liability section to the "below the line" section of the balance sheet is not evaluated; this transfer would eliminate completely the effect of these reserves upon surplus to policyholders and thereby reduce their financial significance to a meaningless status. This seems like more than a "patch."

The reviewer then reveals much concerning his attitude toward financial statements. He advances the position that it is practically impossible for an insurance company to draw a distinction.

> "between a 'liability' for the precise costs of an event which has happened and the apparently imprecise costs of an event which may happen."

The author disagrees completely and wholeheartedly with this position and believes that it could lead fire and casualty financial statement principles down dangerous paths. From the standpoint of a financial statement declaring assets and liabilities as of a given date, past events and future events are as different as night and day; the former *must* receive financial recognition, and the latter *must not* unless a contractual liability relating to future events exists as in life insurance.

The "windy day" reserve and the reserve for an annuity benefit reflect situations which are entirely different. The liability for the annuity *exists* at the statement date and if future premiums are involved, these would be considered as an offset to the present value of the benefit. The liability for a future windstorm does not exist as of the statement date and therefore it cannot receive financial statement recognition.

The reviewer's question as to the imaginary line dividing "liabilities" based on statistical tables from "reserves" based on managerial judgment is difficult to understand. Tables are useful in evaluating outstanding losses when the elements of mortality and interest are involved. This valuation process has certain characteristics pertinent to this question: (1) the tables can be applied objectively, uniformly, and consistently; (2) the basis of valuation is understandable to the user of the information; and (3) a reasonable degree of valuation accuracy is presumed to be present. A reserve based on managerial judgment would have none of these characteristics and it may not even be related to existing liabilities. A review of actual

cases of Schedule P voluntary reserves for companies establishing such reserves reveals this lack of uniformity, consistency, and objectiveness most emphatically.

UNEARNED PREMIUMS AND PREPAID EXPENSES

The following reviewer's statement is unusual and somewhat puzzling:

> "A more consistent approach is to regard premiums as being taken into income when written and the corresponding acquisition costs charged off at that point."

This seems like a great departure from the customary earned premium definition of income which provides the basis of the annual statement accounting method. Further, it is difficult to relate this statement and the ensuing argument developed by the reviewer to the argument he actually selected in supporting the 100% unearned premium reserve concept.

DISCUSSION BY JOSEPH LINDER

I must confess to a feeling of disappointment upon reading Paul Otteson's paper and studying the exhibits, the preparation of which must have taken considerable time and effort. My appetite was whetted in the opening paragraph of his paper when he underlined the words "full and true" in the quotation from the sworn statement contained on page 1 of the annual statement. I am sure that all of us would like the annual statement to be "fuller and truer." Personally I believe that substantial improvement is not only highly desirable but entirely feasible with a substantial bonus in the form of economy in record-keeping. I must seriously question, however, whether Mr. Otteson's "observations" do much to help a most praiseworthy cause.

In considering the section on Consolidated Statements, I must first assume that, regardless of purchase price or other investment, a wholly owned or controlled subsidiary would have a per share *carrying value* based on an amount which is not in excess of combined capital and surplus. (This is the law in New York and some other states, and I am sure that Mr. Otteson will readily agree with me that it should be so by regulation, at least, in all states.)

Had Mr. Otteson limited his advocacy to multiple line companies, I would probably be in agreement with him if the group were all stock companies or even if the parent company were a mutual company with one or more stock subsidiaries. I might even be willing to agree, somewhat

grudgingly, if the group consisted entirely of mutual companies with some form of relationship to each other such as pooling.

Taking now the case of where a multiple line company (stock or mutual) enters the life field through the purchase or organization of a stock subsidiary and that the per share carrying value of the subsidiary will be based on an amount not exceeding that of combined capital and surplus. If we consider the annual statement balance sheet of the parent company at the end of any year, there is exhibited an increase (decrease) in surplus which is made up of the sum of two elements—multiple line operations and life operations. If we adjust for the change in the carrying value of the life subsidiary, analysis of multiple line operations are evident from the annual statement of the parent company to exactly the same extent as they would be if no life subsidiary were involved. Analysis of life operations are evident from the annual statement of the life subsidiary.

I am simply unable to understand the pertinence of Mr. Otteson's remarks where a multiple line company is the parent of a life company or, for that matter, where a life company is the parent of a multiple line company. Except for the accident and health coverages, there can be no inter-relationship of premiums between multiple line companies and life companies (acceptances, cessions, pooling, etc.) To this reviewer, such possible inter-relationship, rather than ownership or common management, is one of the chief reasons for consolidation.

In the section on Valuation of Investment Securities, Mr. Otteson suggests that not only should stock holdings be valued at market, but that consideration should be given to the establishment of an appropriate capital gains tax reserve against unrealized appreciation. While I am in agreement with Mr. Otteson on both counts, I am afraid that there would be considerable opposition, with some validity, against the establishment of the reserve against unrealized appreciation.

On bonds, however, I think that amortization of the higher grades is appropriate. While it is true, of course, that "convertibility to cash" should theoretically be the basis, we must not be unmindful of the fact that at times even Federal government issues have sold at most substantial discounts from purchase price. Also, under ordinary circumstances, only a small part of the bond portfolio would require "forced" liquidation. It seems to me that the gradual accumulation of a mandatory securities valuation similar to that for life companies, is a satisfactory solution.

A considerable portion of the paper is devoted to the two related topics of Incurred Losses and Schedule P. With much of his discussion as to the

posing of the problem, I am in agreement. As I see it, the extremely difficult problem of loss reserves is one which must be subject to constant and intensive study. There is no panacea. For carriers of at least reasonable integrity and competence, which probably includes all of the companies selected by Mr. Otteson, the results achieved are, on a percentage of adequacy basis, about what would be expected. The problem, however, is acute with some of the companies *not* included in the tabulation.

It has long been my feeling that the annual statement is badly in need of revision on the important matter of the exhibiting of loss data. Such revision would permit not only retrospective evaluation of loss reserves but prospective evaluation, even though the latter would of necessity be limited. So far as Schedule P is concerned, I am somewhat disappointed that Mr. Otteson's talents were not devoted to a more fundamental consideration as to the value of the parts preceding Part 5. Isn't somewhat more radical surgery indicated?

The remaining item which requires comment is that of Unearned Premiums and Prepaid Expenses. These items are not only not the same thing but either one is extremely difficult to define, let alone measure, in an annual statement which is the same for all types of carriers. More importantly, recognition in the annual statement of either item is, in the opinion of this reviewer, fundamentally unsound. Mr. Otteson's discussion, and his presentation of estimated liquidating values and market prices, points up the fact that investors constitute a set of legitimate claimants to information which is based on, but is *supplementary* to, the data contained in the annual statement. Public accountants constitute another set of legitimate claimants. There are others. Here, consideration should be given to the part that the annual statement plays in the supervision and regulation of insurance carriers, particularly the question of actual or imminent insolvency. It would appear that the introduction into the annual statement of judgment or controversial items not relating to statutory solvency would enormously complicate the supervisory and regulatory problem, without any compensatory gain.

AUTHOR'S REVIEW OF DISCUSSION BY MR. LINDER

The first paragraph of Mr. Linder's review evaluates the paper on a "complete, total" basis in a very positive manner and tone.

Various parts of the paper are then considered individually and in these considerations the differences in viewpoint between the reviewer and the author appear less "complete" than the general evaluation in the first paragraph would suggest.

CONSOLIDATED STATEMENTS

There is no difference of opinion between the author and reviewer as to the proper carrying value of a subsidiary company stock in the parent company balance sheet. Also, the reviewer agrees to the advocacy of consolidated financial statements when all the companies are multiple line.

The difference in viewpoint between the author and the reviewer concerning the basic underlying philosophy of consolidated financial statements is revealed in paragraph 5 of the review.

> "I am simply unable to understand the pertinence of Mr. Otteson's remarks where a multiple line company is the parent of a life company or, for that matter where a life company is the parent of a multiple line company. Except for the accident and health coverages, there can be no inter-relationship of premiums between multiple line companies and life companies (acceptances, cessions, pooling, etc.). To this reviewer, such possible inter-relationship, rather than ownership or common management, is one of the chief reasons for consolidation."

The author's viewpoint is that the need for consolidated statements arises through the ownership of one company by another company and that the importance of premium inter-relationships is secondary.

Consolidated statements are of unusual importance and significance for insurance companies because of the risk element inherent in the business. A great deal of significance and importance is attached to the "surplus as regards policyholders—premium volume" relationship. This relationship affects company policy decisions and the attitude of state regulatory authorities toward individual insurance companies. When one company owns another company a consolidated financial statement is the only way in which it is possible to gauge the true relationship between surplus as regards policy-holders and the true volume of risk assumed by the companies making up the economic entity. A casualty company owning a life company represents an economic entity in the same manner as a casualty company owning another casualty company. Life insurance operations need a surplus margin of protection and the parent company surplus *only* must be considered as the surplus protection for all companies (casualty and life) in the economic entity.

Premium inter-relationship is of significance in that it provides a mechanism by which companies can manipulate this "surplus-volume" relationship by corporate entity through reinsurance. By increasing the capital investment and ceding reinsurance to a subsidiary a parent company can

improve this ratio on a non-consolidated basis without really improving its financial capacity.

The reviewer's viewpoint is pertinent and appropriate in analysis of operating results by line of business; in this respect the consolidated statement combines all experience for each line written by the individual companies in the group into a single composite.

VALUATION OF INVESTMENT SECURITIES

The reviewer agrees that "consideration should be given to the establishment of an appropriate capital gains tax reserve against unrealized appreciation." He fears "considerable opposition, with some validity."

More specific information as to the source of and reason for the opposition would make this observation more meaningful. Also, it would be interesting to know how to read proper meaning to the term "some validity."

The reviewer favors the present practice of valuing higher grade bonds on an amortized basis as "only a small part of the bond portfolio would require 'forced' liquidation."

In contrast, the author believes that when insurance companies purchase long term obligations they are assuming the risk of changes in interest rates in the general market as well as the risk of receiving the principal amount at maturity date. Their financial statements should rightfully reflect this element of risk which they have chosen to take. The current market price bases the value of the bond on interest rates prevalent at the statement date considering both the present value of *prospective earnings* and the present value of a *principal amount* receivable at some future date. Therefore, current market should represent the appropriate valuation basis regardless of whether the company sells the bonds or holds them to maturity.

Accumulation of a mandatory securities valuation reserve would solve the problem only if the amount of reserve was based upon the difference between market value and book value. The life company reserve is determined on an entirely different basis.

SCHEDULE P

The reviewer suggests more drastic surgery than the proposals contained in the paper. The paper suggests that Schedule P reserves be removed from the liability section of the balance sheet and transferred to

the "below the line" section and that voluntary amounts be stated separately from the amounts required by the statutory formula; this is believed to be *very* drastic surgery.

GENERAL COMMENT

The last paragraph expresses the reviewer's viewpoint concerning the annual statement in relation to the total financial information problem. It is exceptionally pertinent and meaningful and very well presented.

PANEL DISCUSSION

AUTOMOBILE COMPENSATION PLANS

HISTORICAL REVIEW—PAUL W. SIMONEAU

In developing this historical review of alternatives to our present system of determining compensation for the accident victim, I have wanted to avoid too much involvement with the details of proposed plans. While I will point out the highlights of some of the proposals, this will be done to show the evolution which has taken place from the original ideas to the current approaches. Since this review is concerned only with alternatives to the present system based on negligence at common law, it does not include a review of the various proposals, some of which have been adopted, intended more fully to provide the accident victim with security against loss under the liability system; here I am referring to compulsory liability insurance, financial responsibility laws, uninsured motorist coverage, etc. —these will not be taken up.

Now taking a look back we see that after the adoption of workmen's compensation laws in many states between 1910 and 1915 it was inevitable that there would follow some agitation for similar legislation to provide compensation for victims of automobile accidents just as the workmen's compensation laws provided compensation for victims of industrial accidents. It appears that the first serious proposal to adopt the compensation approach outside the industrial area was in 1916. Ballantine* proposed using the compensation approach to settle claims arising out of railroad accidents—not automobile accidents in this instance, but the proposal was significant even so because here was the beginning of the early thinking and ideas of using workmen's compensation techniques on non-industrial accidents; and before the end of the decade several ideas and proposals were set forth for handling automobile accidents by the compensation method. Nothing came of these attempts and it seems that interest subsided until 1929 when Columbia University appointed a committee to study the problem of compensating the victims of automobile accidents. What prompted this study? The answer to this question is much the same as we have continued to hear over the years in criticism of the negligence system. It was asserted that the negligence system was unworkable in the face of the mounting toll of automobile accidents; that there were delays in the courts and consequently delays in the victims' receiving a much

* Ballantine, Arthur A., "A Compensation Plan for Accident Victims," *Harvard Law Review*, 1916.

needed settlement; that there were inequities in the settlements, often resulting from the pressures brought about by delay; that attorneys' fees constituted a large percentage of the judgment amount; and that the system was expensive. In one sense the problems of recovery were more acute then than they are today because at that time a much lower percentage of automobiles were insured, and no insurance often meant no recovery, even when negligence could be determined and a judgment was rendered against the defendant. In its report of findings, the Columbia University Committee argued against the use of fault in determining liability since it was very often impossible to determine negligence in an incident which occurs as swiftly as an automobile accident.

As an alternative, to meet the defects of the existing system and to make it reasonably certain that all persons with appreciable injuries would receive some compensation, the Committee proposed a plan which was analogous to workmen's compensation plans. The analogy with workmen's compensation ran to the elimination of the principle of fault, the requiring of insurance, and the providing for a statutory scale of benefits payable on a periodic basis. The Committee believed the analogy could be drawn because accidents were inevitable whether in industry or in the operation of automobiles, and just as the cost of industrial accidents is borne by industry, the cost of automobile accidents should be borne by the persons for whose benefit the automobiles are operated. It believed that because of the failure of the common law system to measure up to a fair estimate of social necessity a compensation plan was called for. The drafters of the Columbia Plan expected that under their plan the amount of compensation would bear a fair and constant relation to the amount of loss sustained; that the compensation would be obtained at small expense; and that the courts would be relieved of a mass of litigation. The proposed benefits, which were patterned after the benefits of the Massachusetts and New York workmen's compensation plans, included full payment for medical care regardless of the duration of illness, no compensation for the first week of disability, and benefits which were keyed to weekly wages in a manner comparable to workmen's compensation. For business and professional persons profits would take the place of wages in the calculations.

The Columbia Plan was opposed by insurance companies and bar associations because of its shortcomings, but perhaps also because the time had just not arrived to actually replace the common law system with an automobile compensation plan approach. The plan's shortcomings have been cited as follows: It would not compensate for injury or death

of the operator of the automobile unless the injury was caused by another automobile; compensation for property damage was not provided; no compensation was provided for injuries that would not incapacitate for more than one week; and though the scale of benefits might have been regarded as adequate for workmen's compensation, they were regarded as inadequate to meet the economic needs of automobile accident victims, who made up a different cross section of economic levels from that of persons engaged in industrial employment and falling under workmen's compensation laws. There was widespread interest in the Columbia Plan—it was even discussed in the legislatures of some states—but it did not receive the support it needed for adoption .

Following this period of interest there was very little activity until about the mid-1950s. A noted exception to this is the Saskatchewan Plan which was adopted in 1946; because that plan is a separate topic on our agenda, I will pass over it but in passing will say that the Columbia Plan was its forerunner and consequently it resembled the workmen's compensation approach.

Some of the thoughts and proposals which began to emerge in the mid-1950s and have continued to emerge to the present time represent in my view a new breed. There has been a departure from the early ideas of adopting the workmen's compensation approach for automobile accidents as was suggested by the Columbia Plan. True, some similarities exist —liability without fault, periodic payments as losses are incurred—but essentially the new proposals are not strictly a la workmen's compensation.

Representative of the sort of plan which has emerged recently is Green's* loss insurance plan of 1958. This plan would include compulsory insurance to cover damage to persons and property caused by collision, fire, theft or any other hazard arising out of the use of an automobile; losses would be compensated without regard to fault, such compensation to be based on common law damages in lieu of scheduled benefits periodically paid; the plan would completely replace the tort action for automobile injuries; it would not provide for any special administrative board, and claims would be referred to a judge after an informal hearing; since there would be no question of fault, and damages for pain and suffering would not be a factor, the function of the jury would be essentially eliminated.

There have been other proposals, similar in some respects and different in others, but we need not go into them. Suffice it to say that we

* Green, Leon, *Traffic Victims—Tort Law and Insurance,* Northwestern University Press, 1958.

are today in the midst of a revival of interest to develop and adopt an alternative method of compensating for loss due to automobile accidents; and what initially 50 years ago began as an idea to adopt workmen's compensation approaches for automobile accidents, has evolved over the years until it might be regarded today as an extension of the concept present in medical payments or physical damage insurance coverages which provide recovery of loss without regard to fault.

THE SASKATCHEWAN PLAN—ALAN C. CURRY

An understanding of the Saskatchewan Plan is greatly facilitated by a brief review of the history of the origin and development of the Plan itself.

Quite a few years ago in Saskatchewan an agrarian movement resulted in the formation of a group called the Cooperative Commonwealth Federation (called the CCF). In 1932 the CCF united with certain labor groups, which supported socialistic principles, to form a new political party and adopted the CCF designation. This revised CCF political party gained the balance of power politically in 1944. One of the principles to which this party subscribed was that the government belonged in the insurance business. In fact, the party felt government should control the essential elements of transportation, power, communications, and finance, including insurance. In 1944, therefore, it set about instituting these principles by acquiring control of many enterprises.

One of the first acts of this new government was to establish a committee to study the problem of compensation for victims of automobile accidents. At the time this committee was appointed Saskatchewan had a limited form of financial responsibility law which was similar to the commonly called "one bite" laws. This statute did little to encourage motorists to be insured, because only 10% to 12% were covered by any form of auto liability insurance.

After nearly two years of study the committee issued a report in which was set forth a number of conclusions and recommendations for action. Among them were the following:

1. Financial responsibility laws and liability insurance have not proved adequate because they have not tended to remove unqualified drivers from the highways, nor reduce the social waste that accompanies automobile accidents.
2. The theory that the right to compensation or indemnity must be dependent upon the present concept of liability, i.e., the rule of

negligence, must be abandoned. In the event of a motor vehicle accident a driver's liability must be absolute.

3. Persons who are "judgment proof" will not voluntarily purchase liability insurance.
4. Public liability insurance, because it contains exclusions, does not cover all situations.
5. Assigned risk plans impede the functioning of financial responsibility laws.
6. Unsatisfied judgment funds present the same weaknesses as liability insurance.
7. It is a sound socialist principle that where the state creates a compulsory market, the state itself should undertake to supply the market.
8. Compulsory insurance, as a state undertaking, will permit an underwriter to impose premium surcharges, where deemed advisable, and thru cooperation with licensing authorities, will keep unqualified drivers off the highways.
9. The economic loss resulting from the disability caused by motor vehicle accidents should properly be recognized as a factor in the cost of operating vehicles on a highway.
10. Financial responsibility laws are adequate for property damage liability losses but not for bodily injuries.

The initial recommendation of the committee was that a plan for compensating the victims of motor vehicle accidents be enacted. This recommendation was enacted into law in the spring of 1946 and became known as the Automobile Accident Insurance Act, 1946.

The initial Act was compulsory and established that it was to be administered through a newly formed government agency, the Saskatchewan Government Insurance Office. It provided that the benefits outlined in the Act were to be financed by requiring each motor vehicle owner to pay, at the time he purchased his motor vehicle license, an owner's fee of $5.00 plus a premium of $1.00 per driver. The Act provided for a death benefit of $2,000 for each primary dependent, lesser amounts for secondary dependents, dismemberment benefits as provided in a fixed schedule, medical services according to a fixed scale, and weekly indemnities on a fixed scale designed to maintain the injured person's income at a subsistence level. These benefits were provided regardless of fault, but were payable only to Saskatchewan residents and applicable only to accidents that occurred in the Province of Saskatchewan.

At the end of the first year the plan accumulated a surplus and the committee explored both reduced rates and increased benefits. The latter course was chosen and, in April, 1947, $100 deductible collision was added. With the addition, however, premium rates were adjusted so that, instead of charging a flat premium, vehicles were grouped in classes by model and age.

In 1948, bodily injury and property damage were added with limits of 5/10/1. In 1949, $100 deductible fire and theft were included, and PD was changed to provide a $100 deductible coverage.

This monopolistic form of compulsory insurance precluded private carriers from participating in the primary insurance market. However, the liability based on fault concept still prevailed and, due to numerous exclusions in the government plan, the modest limitations of coverage, and the fact that many accident situations were not covered, the private carriers conceived the idea of offering an "excess package" providing higher limits of liability, eliminination of the deductibles, etc. The Government Office soon adopted a similar program and a type of competitive market developed between private carriers and the Government Office.

In the ensuing years the compulsory program has been revised many times frequently to change benefit provisions, or the application thereof. Also, the rating system has been altered extensively. Both the opponents and the proponents of this program have been quite vocal. The Saskatchewan residents themselves have not been too sharply divided in their views regarding the insurance plan, as indicated by several somewhat casual surveys that have been made. They leave the impression that the program is a form of political activity to be accepted and endured. At best there is not a unanimity of conviction among them.

A comparison of the cost of this program to what might be called "regular" insurance produces more debate than conclusion. A precise comparison of the costs is difficult to attain because debatable assumptions are involved as to the degree of risk. For example, the 1950 report of the legislative research committee of North Dakota quotes an estimate that 60% of the motor vehicles in the Province are inoperable due to impassable roads from Christmas until sometime in Spring. In that same report it was pointed out that the losses under the compulsory coverage would be greater if it were not excess over the voluntary coverage. The effect of the "excess" provision could be anywhere from $25,000 to $400,000 on a volume well under $2,000,000 of losses. Another deterrent to an accurate comparison of costs is the inability to secure necessary

statistical data from the Government Office (being a Crown corporation its records are not readily available for public inspection).

A development of fairly recent vintage is the change in control of the provincial government. The CCF has been deposed and currently the government is controlled by a political party that favors removing the government from business enterprises of all kinds—including insurance—and returning the insurance business to private carriers. Studies are now in progress to accomplish this transition but substantial problems are involved, not the least of which is *how* to make the transition since all the compulsory coverage expires on March 31 of each year and facilities are needed to absorb over a quarter of a million risks all at one time—April 1.

To bring this matter to a current status, perhaps it would be of interest to sketch briefly the scope of the program as it now exists (the 1963 Act as amended thru 1964). It is as follows:

The Automobile Insurance Act applies to all self-propelled vehicles except for certain specified types, such as trolleys, railroad vehicles, fire engines, road rollers, snow plows, road machinery, conservation department vehicles, excavating vehicles, farm machinery (not trucks and cars), and certain tractors.

When an application for a certificate of registration (or license or permit) is presented, the applicant must also file an application for a Certificate of Insurance accompanied by the necessary premium payment.

A premium charge is made for each owner and each driver. In return, an owner's or an operator's certificate will be issued as the individual case requires. This certificate is the only evidence of insurance the insured has, because the statute serves as the policy form.

Although the licensing and insurance are two separate functions handled by separate facilities, they are closely correlated—such that, for example, if the premiums are unpaid, a license will not be issued. Similarly, if the registration—or the driver's license—is cancelled, the owner's or operator's certificate is suspended.

The insurer (Saskatchewan Government Insurance Office) has the right to assess additional charges at any time it feels that a disproportionate hazard is present. The insured, however, has the right to appeal the assessment of such additional charges by placing $10 in deposit and filing the necessary documents with the Rates Appeal Board. If, however, the additional premium is not paid, subject to refund, the certificate will not be issued and no license will be issued.

The coverage provided by the Act can be described in three general groups:

(a) The coverage provided to every person,

(b) The additional coverage provided by an owner's certificate, and

(c) The additional coverage provided by an operator's certificate.

(a) With respect to the first category, every person (ordinary resident of Saskatchewan) is insured against loss resulting from bodily injuries sustained as a result of:

(1) driving, riding or operating a moving motor vehicle in Saskatchewan, or

(2) collision with or being struck by a moving motor vehicle in Saskatchewan.

This is called the accident insurance coverage, which provides for payments under three primary instances: first, death benefits of $5,000 to a primary dependent and $1,000 for each secondary dependent subject to a maximum of $5,000 for all secondary dependents; second, dismemberment benefits according to a fixed schedule; the maximum payment is $4,000, but certain supplementary benefits can be paid subject to a maximum of $2,000 for medical services and funerals, etc.; third, weekly indemnity payments up to $25 per week for two years for total disability and up to $12.50 per week (two years) for partial disability.

(b) In addition to this coverage for everyone, the owner's certificate extends the accident insurance to cover:

(1) the individual named in the owner's certificate, as well as

(2) any other "ordinary" resident of Saskatchewan,

while either of them is riding in the described vehicle on a public highway outside of Saskatchewan, but still in Canada or the U.S.A.

The owner's certificate also provides comprehensive insurance, which is an all peril type of coverage. It covers the named person against direct and accidental damage to the described vehicle from any peril while in Canada or the U.S.A. Tires, wear and tear, and theft by a lessee or mortgagor, etc., are typical exclusions. Provision is made for general average and salvage charges for which the insured is legally liable. Although the statute does not specify a deductible, it does provide for a deductible to be used. Currently a $200 physical damage deductible applies to most private passenger cars. The deductible can be lowered to $100, $50, or $25 through the purchase of optional coverages.

The owner's certificate also provides bodily injury and property damage liability insurance. This includes coverage to the named individual or a permissive user for his liability subject to a single limit of $35,000, plus the customary additional expenses. The more or less common exclusions are applied and the $35,000 single limit is split initially to assure that $30,000 is available for bodily injury and $5,000 for property damage. Optional additional limits up to $300,000 are available. There is no property damage deductible.

(c) Since all Saskatchewan residents have accident coverage while in a car or being hit by a car in Saskatchewan, the operator's certificate extends the accident insurance to cover the named person while driving outside of Saskatchewan but still in Canada or the U.S.A. as long as the vehicle is described on a Saskatchewan owner's certificate.

The operator's certificate also extends the liability coverage to the named individual for liability while driving in Canada or the U.S.A. This covers driving in Saskatchewan and elsewhere.

The extension of the liability coverage includes a sort of uninsured motorist coverage in the event of a hit-and-run accident, or damage caused by an operator of a stolen vehicle. The limit in this case, also, is $35,000 but is reduced by any payments under the accident insurance coverage.

This outline of the plan is admittedly quite brief and does not include any of the myriad of details or peculiarities. To mention just one of the peculiarities, the operator coverages apply only when the named individual is driving a non-owned auto and that auto is also covered under an owner's certificate, or else he has reason to believe it is covered under one. A lot of uncommon exclusions and exceptions are necessary under a plan of this sort, but basically this is the plan as we have been able to decipher it.

We understand that a typical compulsory package premium for a 1964 Ford would approximate $56.00 annually throughout the province. The voluntary package cost varies by territory, and in Regina a typical $50 deductible physical damage and $200,000 liability package would cost approximately $30 unless the risk uses the automobile in business, or has had an accident in the past 3 years, in which case the charge would be $40. These charges are approximately $5 higher than those which apply to rural areas. Accidents and traffic violations are tabulated on a point system. More than five points generate a surcharge of $20 and more than eight points generate a $50 surcharge. In the event that more than twelve points accrue, the license is suspended for six months. The operator's certificate currently costs $3 annually.

We understand also that Temple University, through the Ford Foundation, studied this system and plans to issue a report in August, 1966.

FAMILY COMPENSATION COVERAGE - ROBERT W. GRIFFITH*

Introduction

Proposals for the substitution of automobile compensation plans for automobile tort liability principles have been suggested periodically dating back to the Columbia University study in the early 1930s. The various studies and proposals have arisen primarily from the academic fraternity although there has been a sprinkling of generalized suggestions arising from judicial circles. Within the insurance industry, it can be reasoned that the development of the medical payments coverage, as well as death and disability written in connection with the automobile policy, represents a direct recognition of the need to provide a means for compensation for auto injuries regardless of fault. The uninsured motorist coverage, although designed for other reasons, also acts to provide a means of recovery for auto accident injuries not previously covered.

The Family Compensation coverage was developed by the Nationwide Insurance Companies and activated in Maryland and Delaware in 1956. Although the coverage was primarily designed to provide benefits to the policyholder, members of his family, and guests in his car, it did contain the unusual provision that the same schedule of benefits was available to third party pedestrians and occupants of third party cars without regard to fault. This third party aspect of the coverage was developed in recognition of the trend in automobile liability insurance toward third party claim settlements in which the negligence concept seemed to play less and less an important role in the final settlement. In the courts, in the state legislatures, and in company practices, it appeared that auto liability insurance was regarded increasingly as protection to the public rather than to the policyholder. Auto liability seemed to be evolving more and more into a social type of coverage.

At the same time, defects in the negligence system were causing auto insurers more and more concern. Faulty administration cropped up in three areas:

1. Excessive verdicts in otherwise meritorious cases.

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* Robert W. Griffith, a guest panelist, is Second Vice President and Actuary of the Nationwide Mutual Insurance Company.

2. The build up of non-existent or minor injuries into claims which resulted in settlements or verdicts ranging from $250 to $1,500.
3. Congested court dockets and the time lag in getting cases to trial

Under the social interpretation of the present system and in recognition of its defects, the Family Compensation coverage was written so that third party claimants could be offered a reasonable settlement under a schedule of benefits without regard to the fault of the parties involved. It seemed a reasonable expectation that the coverage would speed up the settlement of the smaller bodily injury claims and further that such settlements would be equitable and would avoid undue investigation expenses. Lest there be a misunderstanding, let us make crystal clear that the third party aspect of the coverage was not automobile compensation per se, but rather was an offer to the injured claimant for certain recovery under a schedule of benefits without regard for fault in lieu of any claim under tort liability that he might otherwise have. The coverage was intended to *supplement* the negligence system in order to improve its administration. It was *not* designed to supplant the negligence system.

Family Compensation Coverage Provisions

Irrespective of liability, any person injured or killed in any accident arising out of the ownership, maintenance, or use of the described automobile is entitled to benefits payable under the coverage. This includes all occupants of the insured car, pedestrians, cyclists and all occupants of the claimant car. A third party claimant is offered the alternative of receiving immediate payment in accordance with the coverage benefits or of pursuing his claim on the basis of negligence. The coverage is a broad one in that it provides death benefits and disability income payments in addition to medical payments.

Third parties are excluded from coverage if the accident was caused by the gross negligence of such persons or was caused by such persons while under the influence of alcohol or narcotics. As to persons other than the insured and occupants of the described automobile, payments under the compensation schedule are reduced by the amount of other insurance payments for which such persons are eligible. In other words, if such persons are adequately compensated by other insurance in any form, it is not our intent by means of this coverage to allow duplicate compensation.

Here is the schedule of coverages:

1. Payment up to $2,000 for all reasonable expenses for medical, dental, surgical treatment, ambulance, hospital, professional nurses,

and prosthetic devices, incurred within one year following the accident.

2. Indemnity in the event of an injury requiring continuous house confinement within 180 days of the accident at the rate of $2.50 per day for persons under 18 years of age and $5 per day for persons over 18.
3. The death benefit is $2,000 for persons under 18 and $5,000 above that age.

How Does the Coverage Work in Actual Practice?

When an accident is reported, a third party claim is always assigned to a field claimsman. The coverage is explained to the claimant, and he is given a form which explains his right to make an election either to take compensation according to the schedule of benefits or to pursue his claim at law. He has up to three months in which to make his decision. In the majority of cases, a decision is made promptly either to accept compensation or to reject it.

If compensation is accepted, a release is obtained in consideration of payments according to the schedule. Payments are made for medical expenses as the bills are presented. The daily benefit for injury requiring continuous house confinement is paid every thirty days by the field claimsman.

On claims involving insureds who do not have a third party action against anyone entitled to protection under the named insured's bodily injury liability coverage, a release is taken which runs only to the company. Payments are then made to the insured in accordance with the schedule of benefits. Such insureds are also free to pursue their rights at law against a third party.

In those states where a "covenant not to sue" is recognized, this type of release will be taken from passengers in our insured's car to preserve their rights against a third party. Generally, these states do not have contribution among joint tort feasors. If the state does not recognize a covenant not to sue and does have contribution among joint tort feasors, a joint tort feasor agreement and release will be taken.

Evaluation of Family Compensation

The policyholder response to this coverage has been excellent, as evidenced by the fact that almost half of the policyholders carry this coverage where it is offered—some 770,000 as of year end 1965. The greater

benefits which are provided for the policyholder, members of his family, and occupants of his car are the reasons why he has found the coverage desirable. The coverage cost to the policyholder is about $7.00 each six months. Since the medical payments benefits are included in the coverage, and since our medical payments premium for $2,000 limits is generally $4.00, the net additional cost to the policyholder is about $3.00 each six months in most states. This premium provides him with the death and confinement benefits in addition to medical payments. It also finances the third party coverage for injured parties who are not occupants of the insured car. The pure premium for this third party coverage is only about 50 cents for six months. On the basis of increased protection to the policyholder alone, there appears to be a definite market for the coverage at the price charged.

From a study of 43,800 claims paid in 1963 and 1964, we have a record of the number and amount of claims by type of payee. In our opinion, these points are significant:

1. As expected, the policyholder, members of his household, and passengers in his car received the major portion of the Family Compensation benefits (80 percent of the dollar payments).

2. There were 18,500 third party claims (paid to persons other than occupants of the insured car) distributed as follows:

   Number of payments — 15 percent of claimants accepted the Family Compensation settlement while 85 percent settled under bodily injury.

   Dollars of payments — 5 percent of the dollar payments went to the Family Compensation claimants and 95 percent was paid under bodily injury claims.

This data indicates that Family Compensation coverage could make a solid contribution toward reducing the problem of the uncompensated accident victim. For example, Nationwide paid $1.2 million under the coverage during 1963 and 1964 to 2,900 third party claimants not in the insured vehicle and who had no other insurance protection for injury and death. Most of these payments were made to third persons who were at fault and who would therefore not have a remedy based on legal liability.

At the same time that this coverage was being developed, the industry chose to move forward with the uninsured motorist coverage as the

answer to the uncompensated accident victim. While several other companies have expressed interest in the third party feature of the Family Compensation coverage, the fact is that they have not placed the coverage into actual operation. Our company recognized that, if the coverage was to be successful, there would have to be industry support and participation. For this reason, the decision was made in 1965 to discontinue the experimental third party aspect of the coverage pending further developments. The coverage in its present form provides even broader protection to the policyholder and members of his family and is still called Family Compensation.

Our experimentation with the coverage indicates rather clearly that this form of third party protection does not serve effectively as an alternative to bodily injury Liability. We found that third party claimants have generally chosen to pursue their claim based on liability against the policyholder whenever there is a reasonable chance of recovery. Therefore, the coverage has not worked to clear up cases of questionable liability nor to reduce the number of court cases. Neither has it served to counteract the buildup of such third party claims, nor has it helped with the problem of administrative costs inherent in the adversary system of legal liability.

Summary

After ten years experience with this coverage, we have concluded that it has been highly successful from the standpoint of first party coverage. It is marketable at relatively low cost and it fills a definite insurance need of the motoring public. Although the third party aspect of the coverage did not accomplish some of the objectives we had hoped for, it is still a fact that it did operate to provide economic assistance to a segment of the public who were injured in auto accidents and who had no other means of recovery for their economic loss. We have little doubt that the problem of the uncompensated accident victim is still a problem that the insurance industry must face. The third party feature of the Family Compensation coverage is, we believe, a realistic and acceptable method of help to close a gap if the industry as a whole would participate. It remains a fact that continuance of a voluntary, private enterprise system of automobile insurance is more likely should we demonstrate the courage, the ingenuity, and the initiative to reduce the magnitude of the uncompensated accident victim problem.

THE BASIC PROTECTION PLAN—ROBERT E. KEETON AND JEFFREY O'CONNELL*

I.

The present automobile insurance system is ripe for reform. It is wastefully expensive and indefensibly unfair in the way it distributes both the benefits and costs of insurance against personal injuries suffered in traffic accidents. Also, merely adopting better rating and marketing methods and providing for victims of uninsured and unidentified motorists, though improving the system, would leave us still saddled with the basic problems of gross injustice and intolerable expense. More basic reform is needed.

Early in 1963, we began a broad study of this whole problem, with a staff assembled at Harvard Law School and supported by a grant from the Walter E. Meyer Research Institute of Law. We have had the continuing help of a panel of advisers, and the encouragement and cooperation of public officials, especially those to whom we have turned in Massachusetts. Also, insurance executives and practicing lawyers in Massachusetts and elsewhere, have been generous in responding to our requests for information and advice. Throughout this study it has been understood that, after hearing and considering different viewpoints, we were to arrive at an independent judgment about the best way to meet this problem, and report our findings and conclusions for consideration by whatever persons and groups may be interested.

II.

The major shortcomings of the present system can be stated in five points.

First, measured as a way of compensating for personal injuries suffered on the roadways, the system we have falls grievously short. Some injured persons receive no compensation. Others receive far less than their economic losses. Partly this gap is due to the role of fault in the system—to the need for the injured person to assert both that another was at fault in causing the accident and that he himself was legally blameless. In advancing these contentions a traffic victim faces severe problems

* This paper, prepared jointly by Professor Keeton of the Harvard University Law School and Professor O'Connell of the University of Illinois, was delivered orally by Professor Keeton, a guest of the Society. Professors Keeton and O'Connell are the co-authors of *Basic Protection for the Traffic Victim—A Blueprint for Reforming Automobile Insurance,* published by Little, Brown and Company, 1965. An analysis of the insurance cost of the Basic Protection Plan by Frank Harwayne, a Fellow of the Society, is one of the papers in this issue of the *Proceedings.*

of proof. Nearly always he finds it difficult to show what actually happened, and occasionally he cannot even identify the person responsible, because the accident was hit and run. Another major factor contributing to the gap between amounts of loss and amounts of compensation is that a person legally responsible for an injury may be financially irresponsible—uninsured and with inadequate assets of his own available to satisfy a claim. The size of the accumulated gap from these two and other causes varies significantly from state to state. Probably it is somewhat smaller in the states with compulsory motor vehicle liability insurance (Massachusetts, New York, and North Carolina) than in others. But even in these states it is still substantial.

Second, the present system is cumbersome and slow. Prompt payments of compensation for personal injuries are extraordinary indeed. And delays of several years before final payment—or determination that no payment is due—are common, especially in metropolitan areas. The backlog of automobile personal injury cases presents a serious community problem of delay in the courts, affecting other kinds of cases as well. And often justice delayed is justice denied. An injured person needing money to pay his bills cannot wait, as can an insurance company, through the long period necessary to press and recover his claim, and he may be forced to settle for an inadequate amount in order to obtain immediate recovery.

Third, the present system is loaded with unfairness. Some get too much —even many times their losses—especially for minor injuries. To avoid the expenses and risks of litigation insurance companies tend to make generous settlements of small claims. This largesse comes out of the pocket of all who are paying premiums as insured motorists. Others among the injured, as we have just suggested, get nothing or too little, and most often it is the neediest (those most seriously injured) who get the lowest percentage of compensation for their losses. Their larger claims are more vigorously resisted, and their more pressing needs induce them to give up more in return for prompt settlement. This disparity between losses and compensation is not explained by differences in fault in different cases. It is true that under the theory of the present system, in general, only an injured person innocent of fault is entitled to recover, and then only against a motorist who was at fault. But the practical results are more often inconsistent with this theory than consistent. In short, the results are branded unfair by the theory of the system itself, and one searches in vain for any substitute standard of fairness that gives these results a clean bill of health.

Fourth, operation of the present system is excessively expensive. It is burden enough to meet the toll of losses that are inescapable when in-

juries occur. It is intolerable to have to meet the additional burden of administrative waste built into our methods of shouldering inescapable costs. To some extent, it is true, costs of administration are part of the inescapable burden. But because of the role of fault in the present system, contests over the intricate details of accidents are routine. Often these contests are also exercises in futility, since all drivers must continually make split-second judgments and many accidents are caused by slight but understandable lapses occurring at unfortunate moments. Such contests, and all the elaborate preparations that must precede them, wastefully increase the costs of administration. In cases of relatively modest injury, the expense of the contest often exceeds the amount claimed as compensation. All this expense, of course, is added to automobile insurance costs and, together with a mark-up for the insurers through whose treasuries the premium dollars must pass, is reflected in the premium of every insured.

Fifth, the present system is marred by temptations to dishonesty that lure into their snares a stunning percentage of drivers and victims. To the toll of physical injury is added a toll of psychological and moral injury resulting from pressures for exaggeration to improve one's case or defense and indeed for outright invention to fill its gaps or cure its weaknesses. These inducements to exaggeration and invention strike at the integrity of driver and injured alike, all too often corrupting both and leaving the latter twice a victim—injured and debased. If one is inclined to doubt the influence of these debasing factors, let him compare his own rough-and-ready estimates of the percentage of drivers who are at fault in accidents and the percentage who admit it when the question is put under oath. Of course the disparity is partly accounted for by self-deception, but only partly. And even this self-deception is an insidious undermining of integrity, not to be encouraged.

This, in capsule, is the way the present automobile claims system looks when we stand back and view its performance in gross. It provides too little, too late, unfairly allocated, at wasteful cost, and through means that promote dishonesty and disrepect for law.

III.

In our study, we have proceeded on the premise that a first major step toward reform is to develop a full-scale plan that open-minded persons, whether specialists in automobile claims or simply interested citizens, can examine, either generally or in whatever detail they wish, and can see as a distinct improvement over present ways of compensating traffic victims.

The basic protection system is designed to effect such an improvement as to each of the key shortcomings of the present system. The Basic Protection proposal is a blueprint for prompt reimbursement of losses month by month as they occur, for reimbursement at reduced overhead and administrative cost because of the avoidance of a multitude of contests over fault and the value of pain and suffering in cases of less severe injury, and for reimbursement through standards and procedures that minimize inducements to dishonesty and causes of disrespect for law in its day-to-day practical application.

IV

There are two principal features of our proposal: (1) Development of a new form of compulsory automobile insurance (called basic protection insurance), which in its nature is an extension of the principle of medical payments coverage. It compensates all persons injured in automobile accidents without regard to fault for all types of out-of-pocket personal injury losses up to limits of $10,000 per person. Whenever an insured's automobile is in an accident and he, or a guest, is injured, his own insurance company will compensate him or his guest. (2) Enactment of legislation granting to basic protection insureds an exemption from tort liability to some extent – an exemption eliminating tort liability entirely in those cases in which damages for pain and suffering would not exceed $5,000 and other tort damages would not exceed the $10,000 limit of basic protection coverage. In all other cases, the effect of the exemption is to reduce the tort liability of basic protection insureds by approximately these same amounts.

Although this new coverage is like workmen's compensation in calling for payments on a basis of liability without fault and for periodic payments as losses occur, it is nonetheless very different in other important respects. Unlike workmen's compensation acts generally, the proposed basic protection plan does not require a separate marketing system or a separate system of administrative machinery like a workmen's compensation board. Rather, we propose that the new coverage be marketed through the same channels of private enterprise now used for automobile liability insurance and that claims be processed through present institutions and procedures – including jury trial of not only the tort claims that are preserved but also the more substantial basic protection claims (involving at least $5,000 of economic loss). Further, the proposed act does not provide a schedule of fixed benefits for each specific type of injury, as does workmen's compensation. Rather, reimbursement is based only on actual losses as they

accrue. Thus, basic protection insurance bears more similarity to current tort liability insurance than to workmen's compensation insurance. The closest analogy in present insurance, however, is medical payments coverage.

V.

A number of pervasive problems must be faced in translating the general principles underlying the basic protection concept into a workable plan. One of these concerns *pain and suffering*. Basic protection benefits are limited to reimbursement of economic losses and provide no compensation for pain and suffering; a policyholder may purchase an optional added protection coverage for pain and inconvenience benefits. Although basic protection does not provide compensation for pain and suffering, it does provide compensation for any resulting economic loss, such as loss of wages because pain is so severe that it prevents work. The special provisions concerning optional benefits for pain and inconvenience go beyond this coverage of economic losses. Insurers are authorized, but with one exception are not required, to offer pain and inconvenience coverage in any reasonable form they wish to develop. They are required to offer coverage providing such benefits at a selected monthly rate to an injured insured, or an injured relative residing in the same household, during any period in which the injured person is completely unable to work in his occupation. The benefits may range from $100 to $500 per month. This statutory form of coverage also provides for payment proportional to partial inability in cases in which the injured person is able to do some but not full work in his occupation. Under this statutory form of coverage the limit of liability for combined benefits during both complete and partial inability is 25 times the amount stated as the monthly benefit for pain and inconvenience during complete inability.

Whether it is desirable to extend basic protection to *property damage* is a debatable question. On balance, we have chosen not to do so. Most property damage in automobile accidents is to the automobiles themselves. This damage is already covered by a system reimbursing the owner without regard to fault, since the majority of the automobiles in use today are covered by collision insurance. Thus, though subject to improvement in its details, that system already applies a principle of compensation comparable to that which we propose for personal injuries. It should also be noted that extending basic protection to vehicle damage would greatly increase the level of compulsory automobile insurance premiums and might significantly affect the distribution of insurance business. The total package

of basic protection will probably be written by one insurer, whereas tort liability coverage and collision coverage on the same car are now frequently written by separate and unrelated companies, especially when the collision coverage is written at the request of a secured party from whom the car owner has borrowed the purchase money. It may be that such a change in customary marketing arrangements would simplify the distribution and administration of insurance coverage, but at least during the introduction of the basic protection system it seems wise to limit reform to the major social problem now produced by automobile accidents – the problem of ways and means of compensating the victims of personal injuries.

Another problem of implementation concerns the definition of loss for which benefits will be provided.

Basic protection benefits are designed to reimburse net economic loss only; overlapping with benefits from other sources is avoided by subtracting these other benefits from gross loss in calculating net loss.

Gratuities are disregarded, but with few exceptions benefits one is entitled to receive from other sources, such as payments from a sick leave program, Blue Cross, or an accident insurance policy, are subtracted from loss in calculating the net loss upon which basic protection benefits are based.

It is expected that basic protection benefits will not be treated as taxable income. In some cases, however, the victim will claim as economic loss a sum that would be taxable if the victim received it in the ordinary course. In such a case it is fair to limit the victim's award to the amount he would have received after the tax due had been paid. As an administrative convenience, it is presumed, subject to proof of a lower value by the claimant, that the value of this tax advantage equals 15 per cent of the loss of income. Thus, a person losing $100 gross wages is presumed to suffer an $85 loss of take-home pay.

Another important problem faced in implementing the basic protection concept concerns the choice between lump-sum and periodic benefits as the usual method of compensation. Basic protection payments are designed to reimburse losses as they occur, rather than by the lump-sum payment customary in settling or paying a damages judgment. Provision is made, however, for lump-sum awards by court order if the present value of all benefits expected to come due in the future does not exceed $1,000 or if a court makes a finding supported by medical evidence that a final disposition will contribute substantially to the health and rehabilitation of the injured person. This may be done if there is persuasive medical testi-

mony that, because of a "compensation neurosis," the injured person will not get well before final disposition of his claim. Furthermore, a claim is subject at any time to final settlement (as opposed to an award by court decision) for benefits claimed to be due for future loss, by an agreement for a lump-sum payment not exceeding $1,000 or by an agreement for future payment not exceeding $1,000 per month. With judicial approval, upon a finding that the form of settlement is in the best interests of the claimant, a claim may be settled for a larger lump sum or larger installments. Since the disposition is here being made by agreement, the standard is more permissive than when it is being ordered by a court over opposition by another party.

The question whether any kind of deductible should be used is another problem of implementation. The basic protection plan includes a standard deductible that excludes from reimbursable losses the first $100 of net loss of all types or 10 per cent of work loss, whichever is greater. The term "deductible" has customarily been used to signify the provision in present-day collision coverage under which the insured owner of the vehicle is himself expected to bear the loss from damage to his vehicle up to a specified amount (commonly $50) and the insurer reimburses him for loss in excess of that amount. In small cases the standard deductible of basic protection coverage operates in the same way; the insured himself bears the first $100 of his net loss of all types. The purpose of this provision is to hold down the cost of basic protection by excluding the very small claims as to which the modest benefits of reimbursement are outweighed by the relatively high costs of processing.

A second feature of the standard deductible comes into operation only in the larger cases when 10 per cent of the work loss proved exceeds $100. In that event, the only applicable deductible is 10 per cent of the work loss proved; the remainder of all net loss is covered up to the limits of basic protection coverage. This 10 per cent deductible does not apply to medical and hospital expenses, which are the principal out-of-pocket expenses arising from injuries sustained in automobile accidents. It does apply not only to work loss of a wage earner or a self-employed person but also to the expenses incurred in replacing the services of an injured housewife. Since the principal work loss caused by automobile accidents is wage loss, this deductible in practice will ordinarily amount to roughly 10 per cent of wages lost due to accident. In addition to directly reducing the cost of basic protection coverage to this extent, this deductible will reduce costs indirectly by diminishing the likelihood that the reimbursement allowed will induce malingering. A wage earner injured in a traffic accident

might be tempted to stay out of work beyond any period of genuine disability if by doing so he could receive exactly the same income as work would bring. To the extent that staying out of work results in a decrease in income, the inducement to return to work is greater. We have chosen 10 per cent of gross work loss as a deductible that will reduce the temptation to malinger while providing nearly full reimbursement of wages lost by a genuinely disabled victim. The combined effect of deducting this 10 per cent and further reducing the claim by an amount equal to the tax advantage of a non-taxable award produces benefits totaling about 75 per cent of gross wages, or a little less than 90 per cent of take-home pay. For example, suppose during the third month of disability gross wage loss was $500 and no proof was offered contrary to the presumption that the tax advantage equals 15 per cent of income lost. In this case the standard deduction is $50 – 10 per cent of $500; the tax advantage is $75 – 15 per cent of $500; and the benefits received total $375.*

There is little need to apply a deductible provision to out-of-pocket losses, since even full reimbursement of such losses produces no profit for the victim. He pays the doctor or other person serving his needs – for example, a taxi driver or a temporary domestic employee – and then receives as a benefit precisely the same amount. The problem of excessive charges for out-of-pocket loss is better dealt with by other devices, such as a provision allowing the expenses only if reasonable in amount and comparable to charges in cases not involving insurance. Such statutory controls will be supplemented in practice by the considerable power of the insurance industry to resist being overcharged.

The problems of implementation discussed above are a few among many such problems. Many others are treated in the full presentation of the basic protection proposal in the book referred to earlier.

VI.

We have attempted in this study to consder the underlying principles and general characteristics appropriate for a modern system of compen-

* The deductible for the first and second month's loss of wages, also, would have been $50 in each instance, unless a different result was required by the provision for a minimum deductible of $100 of net loss to a claimant arising from one accident. If, for example, no other basic protection benefits had yet been paid by the insurer when the claim for the first month's loss of wages was being paid, the applicable deductible would be $100, not $50. In that event, no further deduction would be made in paying benefits for the second month's loss of wages (since 10% of the cumulative wage loss would equal but not yet exceed $100), and the third month's payment for loss of wages would be the first occasion when the deductible was computed at exactly 10% of the wage loss for that period.

sating traffic victims. We have sought at the same time to formulate in detail a draft statute, not only as a way of testing the validity of general principles and improving their formulation, but also as an aid to those whose political action is necessary if legislation incorporating these principles is enacted. We offer, then, both a set of principles and a plan of detailed execution that we are prepared to recommend. We urge enactment of this legislation.

MINUTES OF THE 1966 SPRING MEETING

May 22-25, 1966

CAVALIER HOTEL, VIRGINIA BEACH, VIRGINIA

Prior to the formal convening of the business session on the morning of May 23, there was a social hour at 6:00 p.m. on May 22, followed by a buffet supper for early arrivals. These activities were in turn followed by a meeting of the Council convening at 8:00 p.m.

MONDAY, MAY 23, 1966

President Harold E. Curry called the meeting to order at 9:40 a.m.

The President introduced Mr. Thomas B. Redd, Rate Analyst, of the Virginia Insurance Department. Mr. Redd brought greetings from Insurance Commissioner T. Nelson Parker and stated that the Commissioner would be with us later to personally extend a welcome to the Commonwealth of Virginia.

Vice President Harold W. Schloss then took charge of the meeting.

He announced that any member could comment on the papers to be presented and was privileged to submit a written review thereof to be printed in the Proceedings, contingent upon the approval of such review by the Committee on Review of Papers.

The following new papers and reviews, and reviews of previous papers were presented during the meeting although some were presented at a session other than the May 23rd morning session:

New Papers and Reviews

(1) Rafal J. Balcarek: "Effect of Loss Reserve Margins in Calendar Year Results."

(2) Robert B. Foster: "Budgeting – A System for Planning and Controlling Expenses." Reviewed by Paul M. Otteson.

Mr. Foster indicated he might want to comment on Mr. Otteson's review at the November 1966 meeting.

(3) Frank Harwayne: "Insurance Cost of Automobile Basic Protection Plan in Relation to Automobile Bodily Injury Liability Costs."

Reviewed separately by Ernest T. Berkeley, Donald E. Trudeau and Richard J. Wolfrum.

(4) Charles C. Hewitt, Jr.: "Distribution by Size of Risk – A Model." Reviewed by James R. Berquist.

(5) Jeffrey T. Lange: "General Liability Insurance Ratemaking."

(6) George D. Morison: "1965 Study of Expenses by Size of Risk."

Mr. Harwayne indicated he might want to comment on this paper at the November 1966 meeting.

Reviews of Previous Papers

(1) Walter J. Fitzgibbon, Jr.: "Reserving for Retrospective Returns." November 1965 meeting.

Reviewed separately by Francis J. Hope and Dunbar R. Uhthoff, the latter review being read by James R. Berquist in Mr. Uhthoff's absence.

(2) Philipp K. Stern: "Ratemaking Procedures for Automobile Liability Insurance ." November 1965 meeting.

Reviewed separately by Stanley A. Dorf and James F. Gill.

(3) Paul M. Otteson: "Some Observations Concerning Fire and Casualty Insurance Company Financial Statements." November 1965 meeting.

Reviewed separately by John W. Carleton (read by James P. Jensen), Robert G. Espie (read by James H. Crowley), and Joseph Linder.

Mr. Otteson commented briefly on these reviews and indicated he would have further comments at the November 1966 meeting.

There then followed a panel discussion of "Management And The Actuary" with panelists:

Stanley M. Hughey, Executive Vice President, Lumbermens Mutual Casualty Company.

Seymour E. Smith, Senior Vice President, The Travelers Insurance Companies.

David A. Tapley, Senior Vice President, Wolverine Insurance Company.

Herbert E. Wittick, President-General Manager, Pilot Insurance Company.

Upon conclusion of the panel discussion the meeting recessed for lunch. In the evening there was held a social hour.

TUESDAY, MAY 24, 1966

This session convened at 9:15 a.m. with Vice President Harold W. Schloss conducting the meeting.

The entire session was devoted to the topic "Automobile Compensation Plans" with the following participants:

(1) "Historical Review"—Paul W. Simoneau, Assistant Actuary, Aetna Casualty and Surety Company.

(2) "The Saskatchewan System"—Alan C. Curry, Actuary, State Farm Mutual Automobile Insurance Company.

(3) "The Family Compensation Plan"—Robert W. Griffith, Actuary, Nationwide Mutual Insurance Company.

(4) "The Basic Plan"—Professor Robert E. Keeton, Professor of Law, Harvard Law School.

Following the presentations by the panelists there was a brief opportunity for comments and questions from the floor.

The session recessed for lunch at the conclusion of the discussion and in the evening there was a social hour and banquet.

At the banquet Commissioner T. Nelson Parker of Virginia was introduced to the gathering. In turn, Commissioner Parker introduced the Honorable Jess Dillon, Chairman of the Virginia State Corporation Commission, who gave an enlightening talk on the duties and unique powers of the Corporation Commission.

WEDNESDAY, MAY 25, 1966

The session convened at 9:15 a.m. with President Curry presiding.

After presentation by Mr. Hewitt of his paper "Distribution by Size of Risk" and review thereof by Mr. Berquist, both referred to earlier in these minutes, there was a continuation of the topic "Automobile Compensation Plans." This part of the session consisted of the presentation by Mr. Harwayne of his paper "Insurance Cost of Automobile Basic Protection Plan in Relation to Automobile Bodily Injury Liability Costs."

Following this there were two concurrent topics on the program:

(a) A panel and audience discussion on "Automobile Compensation Plans and Costs" led by:

Ernest T. Berkeley, Actuary, Employers' Group of Insurance Companies

Donald E. Trudeau, Assistant Actuary, Travelers Insurance Company

Richard J. Wolfrum, Actuary, Liberty Mutual Insurance Company.

(b) A panel "Handling the Substandard Property Risk":

Frederic J. Hunt, Jr. (Moderator), Assistant Secretary, Insurance Company of North America

Bernard H. Battaglin, Superintendent of Engineering, Western Actuarial Bureau

Darrell W. Ehlert, Actuary, Allstate Insurance Company

Herbert J. Phillips, Jr., Associate Actuary Employers' Group of Insurance Companies.

At the conclusion of these topics the 1966 Spring Meeting was adjourned at 12:15 p.m.

For the purpose of the record it is noted that, at the meeting, the following 84 Fellows, 41 Associates, and 22 Guests had signed registration cards to indicate their attendance:

FELLOWS

Aldrich, W. C.
Alexander, L. M.
Allen, E. S.
Bailey, R. A.
Balcarek, R. J.
Barker, G. M.
Bennett, N. J.
Berkeley, E. T.
Berquist, J. R.
Bornhuetter, R. L.
Cahill, J. M.
Crowley, J. H.
Curry, A. C.
Curry, H. E.
DeMelio, J. J.
Dickerson, O. D.
Dorf, S. A.
Dropkin, L. B.
Ehlert, D. W.
Elliott, G. B.
Finnegan, J. H.
Foster, R. B.
Gillam, W. S.
Graham, C. M.
Graves, C. H.
Harwayne, F.
Hazam, W. J.
Hewitt, C. C., Jr.
Hobbs, E. J.
Hope, F. J.
Hughey, M. S.
Hunt, F. J., Jr.
Hurley, R. L.
Johe, R. L.
Johnson, R. A.
Kallop, R. H.
Kates, P. B.
Klaassen, E. J.
Lange, J. T.
Leslie, W., Jr.
Linder, J.
Lino, R.
Liscord, P. S.
Longley-Cook, L. H.
MacGinnitie, W. J.
MacKeen, H. E.
Masterson, N. E.
McClure, R. D.
McGuinness, J. S.
McNamara, D. J.
Menzel, H. W.
Miller, N. F.
Morison, G. D.
Moseley, J.
Murrin, T. E.
Niles, C. L., Jr.
Oien, R. G.
Otteson, P. M.
Petz, E. F.
Phillips, H. J., Jr.
Richards, H. R.
Roberts, L. H.
Rodermund, M.
Rosenberg, N.
Rowell, J. H.
Salzmann, R. E.
Schloss, H. W.
Simon, L. J.
Simoneau, P. W.
Skelding, A. Z.
Smith, E. M.
Smith, S. E.

FELLOWS

Tapley, D. A.
Trist, J. A. W.
Trudeau, D. E.
Valerius, N. M.
Verhage, P. A.
Walsh, A. J.
Webb, B. L.
Wieder, J. W., Jr.
Wilcken, C. L.
Williams, P. A.
Wittick, H. E.
Wolfrum, R. J.

ASSOCIATES

Bell, A. A.
Brown, W. W.
Coates, W. D.
Cook, C. F.
Crandall, W. H.
Durkin, J. H.
Franklin, N. M.
Gibson, J. A. III
Gill, J. F.
Gould, D. E.
Greene, T. A.
Hammer, S. M.
Hanson, H. D.
Harack, J.
Hillhouse, J. A.
Jensen, J. P.
Margolis, D. R.
Markell, A. S.
McDonald, M. G.
McIntosh, K. L.
Muniz, R. M.
Peel, J. P.
Perreault, S. L.
Raid, G. A.
Ratnaswamy, R.
Ripandelli, J. S.
Roth, R. J.
Royer, A. F.
Ryan, K. M.
Scammon, L. W.
Scheel, P. J.
Scheibl, J. A.
Scheid, J. E.
Schuler, R. J.
Scott, B. E.
Singer, P. E.
Smith, E. R.
Steinhaus, H. W.
Stevens, W. A.
Strug, E. J.
Zory, P. B.

GUESTS

Battaglin, B. H.
Bechtolt, P. R.
Bickerstaff, D. R.
Black, K., Jr.
Bondurant, T. L.
Dillon, J.
Fox, A. E.
Griffith, R. W.
Hazelwood, D.
Keeton, R. E.
McSherry, H.
Murphy, S. W.
Nagel, J. R.
O'Shea, H. J.
Parker, T. N.
Redd, T. B.
Reid, J. N.
Reiner, J. G.
Rothbart, H.
Sturgeon, P. K.
Trees, J.
Zubay, E. A.

Respectfully submitted,

ALBERT Z. SKELDING,
Secretary-Treasurer

VOLUME LIII, Part II No. 100

PROCEEDINGS

NOVEMBER 16, 17, 18, 1966

PRESIDENTIAL ADDRESS BY HAROLD E. CURRY

In preparing for this traditional task, I made it a point to review the comments of my predecessors. It was stimulating to note that these speakers spent very little time reciting the accomplishments of their regime. The majority of their comments dealt with current problems of our profession and a challenge to explore new ideas and concepts.

Having had a year to recover from the surprise of being chosen to serve you as President, I want to express my deep appreciation for the honor you have accorded to me. The tasks of this office have been lightened immeasurably by the full cooperation of my fellow officers, the sound advice provided by the Council, and the diligent work of committee members sparked by competent chairmen. To this group of workers I say "thank you" in a loud voice.

I believe it is an open secret that I am quite proud of our profession and that, as time flows by, I feel certain an increasing proportion of the senior management group in our industry will be comprised of persons with an actuarial background. This recognition will not come gratuitously. It must be earned by a display of competence acquired through education, training and experience.

There is a tendency in some quarters to consider an actuary as somewhat of an oddity who lives in a mathematical dream world from which he emerges at periodic intervals, or when prodded, spews a multitude of data covering the past, crayons a complex formula on the blackboard, mutters a profound conclusion, and promptly retires to his ivory tower for further contemplation.

There may be a wee bit of exaggeration in describing an actuary in this manner, but I do believe that, as a profession, we have not adequately communicated our grasp of the problems of the industry to senior management nor have we created a public image of the place we fill in the conduct of the insurance business. Perhaps many of you have had the experience

of being at a social gathering of non-insurance people, being asked your occupation, and, when you reply that you are an actuary there is a barely "oh" heard and the subject is quickly changed. Occasionally you will encounter a brave or inquisitive soul who will say, "What does an actuary do?" This lack of understanding would not occur if we were of another profession and the answer would have been, "I am a doctor." Or a lawyer, an engineer, or a mechanic.

I would like to visit with you a little while today about some of the things to which I think we would be well advised to give our attention in the days immediately ahead, mold a definite view on them based on the sound insurance principles with which we are acquainted, and set about to vociferously and aggressively communicate our views to our associates in the business and to the public generally. I don't expect you to accept my views without question—in fact, you may violently disagree with me. I will be satisfied if they stimulate your thinking. (At this point I should insert the trite phrase—"these are the views of the author only, not of any organization with which he is affiliated.")

We are in an era of transition. Technological advances are making feasible the search for new facts that, as recently as a decade ago, would have been prohibitive in cost to secure. The degree and type of regulation to which our industry should be subjected is being critically examined. The insurance buyer is becoming more knowledgeable on insurance matters and more specific with respect to the scope of coverage he feels is adequate to fulfill his needs, the price he pays, how the price is determined, and the conditions to be met, by insurer and insured, to acquire or retain coverage.

All of these things involve matters with which each of us is concerned about every day in our work. Such being the case, we cannot escape involvement in a consideration of them, regardless of our niche in the general corporate structure. It is our professional obligation to think clearly, counsel wisely, and not embrace conclusions that are illogical or fundamentally unsound on matters such as these.

In order to adjust ourselves to an era of change, we must first candidly assess where we now are, then determine our goals, obligations and objectives. Having done this we can plot a course of action.

Opinions may differ as to where we are as a professional group. Some may feel that we are, and should continue to be, a professional group that devotes its entire energy to the mastery of mathematical techniques. Others may feel that a business lifetime devoted thusly sets a horizon for achievement that is too restricted. This latter group is inclined toward the con-

cept that acquiring an understanding of actuarial techniques and achieving professional status as an actuary is basic training for entering other areas of industry endeavor.

About two weeks ago, I had the pleasure of attending the fall meeting of the Society of Actuaries. One entire afternoon of their three day program was devoted to a panel discussion of the topic, "The Future of the Actuarial Profession as it Appears to the Younger Actuaries." Even though I was unable to be present for the entire session, I was there long enough to get the message loud and clear, from the panel of younger actuaries, that they are not going to be satisfied with a business career limited to a mastery of actuarial techniques. *They* intend to use their actuarial training to project themselves into other areas of insurance management.

If we are to be successful in attracting capable young men and women into our profession, I don't believe we can ignore these expressions of view. One of the things this suggests is that we need to study in depth the content and scope of the examinations we prescribe for acquiring membership in our Society. If we are to qualify the actuary to capably handle the varied tasks of general company management, is it not our obligation to prescribe courses of study and examinations that will reflect a substantial degree of competence in these other areas? As an alternative to a possible lengthening of our exams, should we consider that certain subjects constitute basic knowledge requirements for every actuary, but beyond that the actuary should be accorded the opportunity to select a field of specialization and be examined for competence in such selected areas?

Perhaps to a limited degree we have already committed ourselves to a program that will ultimately lead to a recognition of specialization within our profession. As you are all aware, certain of our exams are identical to those given by the Society of Actuaries. The question that must be answered before too long is whether, or to what extent, this concept should be extended and at what point should departure occur. I will go one step further and raise the question as to whether we are completely realistic to expect an individual to acquire competence in all the lines of insurance included in the casualty/property category.

A common actuarial technique is to study the past and from such study forecast the probable future. This is an interesting and illuminating exercise. Since this speculation as to the future of our profession is not subject to the provisions of existing rating laws, we can select any period of time we choose. I would suggest most any nice round number—such

as 25 or 30 years. Select most any line of insurance that has developed rapidly during this span of time and is apt to continue to grow. Analyze the rating methods, coverages, and market demands that existed at the beginning of your period of review. Trace the changes that have occured up to the present time and then project these trends for a like period into the future. The results may startle you or, at least, emphasize the point with which I'm concerned. Without pursuing this matter further, I will state my personal conviction that we—the present members of our Society—have an obligation to study our profession in depth and plot a course for development that will adequately cope with our prospective future needs and will encourage superior talent to seek our profession as a business career. I am not certain as to the best approach to a study of this problem. I am certain that your officers and the Council would welcome your suggestions and comments.

While we are in the process of adequately preparing the members of our profession to cope with the technical phases of our business, we should not overlook the need to learn how to communicate our thoughts and conclusions to our business associates who are less familiar with technical concepts and yet are influential in molding the course of our industry.

One of the problems confronting the members of any profession is how to express complex technical concepts in language the general public can understand should the occasion arise to do so. Until a relatively few years ago, this was not a problem of consequence to the actuary. We evolved a jargon for communicating with one another and could make ourselves reasonably well understood to our business associates in other facets of the industry. However, this situation has been changing in recent years, with the tempo of change accelerating in the last year or so. I refer particularly to the increasing frequency with which we are required to submit our rating decisions to public scrutiny and comment via the vehicle of public hearings. Until fairly recent times, public hearings on rate filings were relatively few and far between with the participants being persons familiar with traditional insurance procedures and the terms customarily used to identify them. That situation has changed in two important respects: (1) public hearings are being held with greater frequency, and (2) the participants lack familiarity with insurance terminology and are unable, or unwilling, to recognize the problems that are peculiar to our business and how these are handled. This results in a problem of communication for us. Even though we may categorize the probing into some of the technical phases of our business as the efforts of busybodies who are determined to discredit our business, we must, at the same time, recog-

nize that today's buyers are generally better informed, less inclined to accept past standards of performance or service as adequate under current conditions, and are more vociferous in their demands for what they consider to be their legal and moral rights. I don't need to tell you that we are in the midst of the development of a whole new set of values for measuring individual and collective responsibility and the rights of each of us therein. The unfortunate circumstance is that, as an industry, we have not identified this occurrence and taken the necessary steps to develop or maintain a proper perspective toward our industry in the minds of the insurance buyer. As a result, the actuary finds himself confronted with the necessity of defending concepts that seem quite elementary to him.

Let me offer, as examples, a few items that are currently being actively discussed that tend to encourage seizures of actuarial apoplexy that are the result of our oversight, as an industry, to acquaint the buying public with the unique situations with which we have to deal:

1. Rates should be based on the percentage relationship between premiums written and losses paid. We have never taken the time to tell the public that there is a difference between a premium written and a premium earned and what the difference means. Neither have we communicated that losses, insofar as the impact on the company's financial statement is concerned, may be in one of three categories—paid, outstanding, or incurred but not reported.
2. Investment income should be used in making rates. The first hurdle we encounter is that investment returns are directly considered in making life insurance rates. Why not in casualty and property insurance? Assuming we clear this hurdle, where do we go? Up to the present time, we have tended to become defensive and emotional on the subject at this point and a little fuzzy in our thinking, in my opinion, on how to cope with this problem. We endeavor to develop differences in view based on corporate structure or our love for the status quo and ignore the hard core issue of how to acquire or maintain the funds necessary to successfully and adequately satisfy the insurance needs of the buying public. A part of our problem in coping with this situation is a lack of descriptive language to apply to our sources of income and the manner in which it should be used.
3. The "liability based on fault" concept is outmoded. At our May 1966 meeting, we featured a discussion on this matter. We felt

that it is a matter on which the actuary should be informed because, if any of the proposals are to become law or are voluntarily adopted, the actuary will need to be fortified with the knowledge of how to properly price this type of coverage. Interest in coverage of this type comes about, in part at least, from a lack of understanding of tort liability and industry resistance to intermediate positions that would make our present liability system more palatable to the public.

While these serve as examples of problems confronting us because of our lack of an adequate chain of communication between our industry and the buying public, they also suggest an activity in which our professional group, I feel, should participate to a greater degree.

For many years one of the standing committees of this Society has been a Research Committee. Although we are a Society dedicated to furthering actuarial science which, to me, includes the developing of new facts on old subjects and exploring new subjects, we have not utilized the talents of this Committee to any substantial degree but have relied on individual members to bring to us new concepts and ideas through the medium of papers. While I would not want to suggest that such individual research be diminished one iota, I do feel we are missing an opportunity and sidestepping an obligation when we do not use the pool of talent available to us through our committees to analyze and study matters of acturial interest and have factual reports of their findings become a part of our library of reference material.

I would like to urge that we take a fresh look at this phase of our overall activity and would hope that an acceptable and feasible plan could be developed that would permit our Society to make impartial studies of current and prospective problems of actuarial interest. I concede it will not be an easy task to develop guidelines for this kind of activity, but I honestly feel that if we do not find a way to bring the professional stature of our Society to focus on matters of substantial interest to our members we are rendering a disservice to the industry of which we are a part. Organizations representing other professions have found ways to fulfull this desire. Our companion organization, the Society of Actuaries, has for many years sponsored pooled research in several areas. As a matter of fact, they are presently giving serious consideration to a constitutional amendment which would permit their Society to publicly take a position on matters that are vital to the business, even though they may to some extent be controversial. I am not recommending, at this time, that we take

a step of this magnitude, but I would suggest that we include in our deliberations a review of our own applicable constitutional provision.

Perhaps by this time some of you are beginning to wonder why I am rattling these traditions of our Society. That is a proper query and deserves a frank reply. During this past year while serving as your President, I have received several phone calls and letters from the press and individuals inquiring as to the Society's position on some of the current issues of actuarial interest. Generally, it is not a particularly difficult task to sell the rationale that we are a professional group representing diverse interests and hence we do not take a stand on controversial issues. The next question is less easy to field. It usually revolves around the concept that no doubt your Society has studied the matter and assembled facts and can these studies be acquired? When I respond that many individual members of our Society have, or are, studying these matters, but that the Society per se is not doing so, expressions of utter disbelief frequently occur. It isn't so much the personal affront of being called a liar that bothers me as it is the message that comes through loud and clear that people outside our profession can't comprehend why we don't pool our talents to research and analyze these matters. I have yet to find a solid reply to this "why." On the lighter side, our dearth of research activity does save time occasionally, like the brevity of the reply to a college student recently who asked for a bibliography of reference material he could use in preparing a term paper on the use of investment income in rate making.

I know that you will be pleased to hear that I am nearing the end of my "sermon." I sincerely hope that I have not left the impression that our Society is a group of "do nothings." My conviction is quite the contrary. I feel that our membership includes many of the best minds in our business. I am proud to be a member and flattered to have served as your President during the past year. I have tried to suggest that we take a forward look at our profession by analyzing our attitudes, improving our ability to communicate our convictions to our business associates and the general public, and through a more active research program, acquire the factual tools to do a better job in the future and enhance our professional status.

Our industry has a long tradition of service to the public and has been a strong advocate of the liberties and freedoms we all cherish. I hope we continue this tradition. So, in closing, I would like to leave with you a short quotation I came across the other day—"Liberty is not the right to do what we choose, it is the responsibility to do what is right."

CURRENT RATEMAKING PROCEDURES IN BOILER AND MACHINERY INSURANCE

JAMES F. BRANNIGAN

INTRODUCTION

The object of this paper is to provide a description of the basic mechanics and rationale involved in the development of Boiler and Machinery manual rates. In this vein, no attempt has been made to evaluate the described procedures. It is hoped that this paper presents an orderly approach to an understanding of the logic and considerations underlying the Boiler and Machinery ratemaking procedures.

A description of the coverage and calculation of the manual premium is provided initially to acquaint the reader with the utilization of the end products of a rate revision as well as the pecularities involved in the development of premium for this line of business. In the next section, a broad description of the type and form of statistics that are available to the ratemaker, as collected under the Boiler and Machinery Insurance Statistical Plan of the National Bureau of Casualty Underwriters, is provided. The remainder of the paper provides an explanation of an actual rate revision, with pertinent comments on recent innovations, where such are evident.

Since indirect damage coverages comprise approximately one third of the premium income for the Boiler and Machinery line, these are described in the same detail as that for the direct damage coverages.

COVERAGE AND DEVELOPMENT OF PREMIUM

The Boiler and Machinery policy provides a two-fold benefit to the insured: (1) indemnification in case of accident to the insured object and (2) inspection and limited engineering service. The ratemaking scheme for this line of business is geared to the measurement of the potential costs of these benefits.

Essentially, the policy provides the following in the event of a defined accident to the insured object:

Section I – Indemnification for damage to the property of the insured up to the limit of the policy.

Section II – Payment of the reasonable extra cost of temporary repair and of expediting the repair of the damaged object, provided that the coverage under Section I has not exhausted the limit of the policy, up to $1,000.

Section III – Indemnification for damages to the property of a third party for which the insured is held liable, up to an amount equal to the remaining portion of the limit of the policy after coverage under the two preceding sections has been satisfied.

Section IV – If the policy limit has not been exhausted by the coverage under the preceding sections, indemnification for bodily injury to a third party for which the insured is held liable up to an amount equal to the unexhausted portion of the limit of the policy. This coverage is on an optional basis.

Section V – Defense against suits alleging that the insured is responsible for property damage or bodily injury to a third party under Sections III and IV. The amount available for this section is in addition to the limit per accident of the policy.

A number of indirect damage coverages are also available in the Boiler and Machinery line. The forms whose rates are provided currently on a manual basis are:

(1) *Use and Occupancy*

Two basic forms of Use and Occupancy insurance are used to cover Boiler and Machinery exposures:

(a) Valued Form: Wherein a daily indemnity is provided for the described premises which is the maximum amount payable for each day during which business is entirely prevented. If there is a partial prevention of business, only that proportion of the daily benefit is covered for which business was prevented. These benefits are payable until a stated net limit of loss is reached. There are several valued forms available which provide variations from the foregoing basic description to meet the peculiarities of the businesses to be insured or types of objects to be covered.

(b) Actual Loss Sustained Form – With or Without Specified Daily Indemnity: This form, when written with specified daily indemnity, provides similar coverage to that afforded by the valued form but differs in that the amount payable per day is not contingent upon the proportion of business prevented in the case of a partial prevention of business. This is always written on a coinsurance basis with a net limit of loss per accident. This form, because of its similarity to the valued forms which do not require coinsurance, has gradually fallen into disuse within the industry. The form which has no specified daily indemnity provides a limit of loss for

a particular premises, which is the maximum amount payable for the prevention of business resulting from one accident. A major factor in determining the limit of loss to be covered is the number of days for which the insured feels that indemnification is required; however, there is no limit on the number of days for which indemnification is available so long as the limit of loss has not been exhausted.

(2) *Outage*

In general, Use and Occupancy provides reimbursement to the insured for the profit prevented and the necessary continuing expenses when an accident has occurred to the insured object. Outage, on the other hand, indemnifies the insured for the additional cost incurred when other means, or less efficient objects, must be utilized in order to continue business when such accident has occurred. Outage coverage provides a specified hourly indemnity for each hour during which the function of the insured object is prevented due to accident. The acceptance of this indirect damage form has lessened appreciably in recent years.

(3) *Consequential Damage*

This coverage provides the insured with indemnification for actual loss to specified owned property, and also to that of others if legally liable, when such loss is due to spoilage from lack of power, light, heat, steam or refrigeration at specifically designated premises, caused by accident to a specified object whether the object is located on those premises or elsewhere.

It should be noted that Guide (a) rates are available for U and O forms which are written on a weekly or monthly indemnity basis.

THE MAKEUP OF THE BOILER AND MACHINERY PREMIUM

In the development of the premium to be charged for the direct damage coverage of an object under a Boiler and Machinery policy, two basic elements must be determined: the object charge and location charge.

The object charge is a flat amount which varies for each type and size of object. This charge encompasses the cost of indemnification for loss including expediting expenses, and that part of the cost of an engineer's inspection which is peculiar to each type and size of object. In a general sense, the inspection costs that are contemplated in the object charge are those which an engineer incurs from the time he enters the premises where the object is located until he leaves and the writing of the necessary reports

in connection with such inspection. Most states and some municipalities require that certain types of boilers be certified as to their operating condition through an inspection by a licensed inspector. In general, all insurance boiler inspectors are licensed to perform this function. The expense of the issuance of a certification is also contemplated in the inspection expense attributable to the object charge.

The basic object charge is that for a $25,000 policy limit. For higher than a $25,000 limit, an excess limits factor is applied as a multiplier to the object charge. There are certain types of objects which are not considered to have a loss potential in excess of $25,000 regardless of size. The excess limits charge is not applicable to these object types. The excess limits factor varies only by the limit desired. It is possible to select limits lower than the $25,000 basic, but there is no credit given in the object charge due to the constant dollar cost element of an inspection which constitutes a major portion of this charge.

The location charge is also a flat amount and applies for each premises where the insured objects are located. A 40% discount is allowed for all locations over two which are situated within the boundaries of a single city or village. The predominant element of cost contemplated in this charge is the various expenses incurred by an engineer in traveling to and from the location where the insured object is situated. In addition, there is an excess loss allowance included in the location charge. Because of this, the charge varies directly with the limits selected. When the insured selects limits less than the $25,000 basic limit per object a reduced location charge is obtained and the allowance for excess limits losses is considered to be a credit.

If the insured elects to include bodily injury liability in the policy, a flat charge is levied which varies directly with the accident limit selected.

If the insured object is portable, a portable object charge is applied rather than a location charge. This charge, also a flat amount, is considerably less than the location charge, but no portable object or group of portable objects can be written without at least one location charge. As an example, if there were three portable objects to be insured, the one with the highest limits must take a location charge and the remaining two a portable object charge.

Exhibit I illustrates the table of these charges as they appear in the National Bureau of Casualty Underwriters rate manual. These charges are for a three year term as are all charges which appear in the manual.

In the development of the premium to be charged for the coverage of U. and O. and Outage under a Boiler and Machinery policy it is necessary to determine the applicable object group number, amount of daily indemnity, and the number of rating days. The manual rates are stated in terms of dollars charged per $1,000 of daily indemnity for a specified number of rating days.

Each insured size and type of object is categorized under a group number and suffix letter which encompasses all sizes and types of objects which have a common U. and O. hazard potential. If more than one object takes the same group number including the suffix letter, a single U. and O. charge is made for all of the objects. When more than one object is to be insured which have the same group number but differing suffix letters, the group number and suffix letter which produces the highest rate, assuming the exposure is the same for all objects in this group, is used in determining the charge to be made for that group of objects. Where more than one type of object is to be covered, a charge is made for each group number involved. In the rating of all U. and O. forms which have maximum daily indemnity, the maximum daily indemnity and net limit of loss are preselected and it is only necessary to divide the net limit of loss by the maximum daily benefit in order to calculate the number of rating days. This procedure applies generally to the valued forms and the Actual Loss Sustained – Maximum Daily Indemnity form. For the Actual Loss Sustained – No Specified Daily Indemnity form, the net limit of loss and number of rating days are pre-selected and it is only necessary to divide the net limit of loss by the number of rating days in order to calculate the daily indemnity for rating purposes. In the practical application of this technique, however, a different procedure is used. The limit of loss is selected and the rating daily indemnity calculated by dividing the annual value of the profit and continuing expenses by the average number of working days in a year and multiplying this result by the coinsurance percentage. The rating days are then calculated by dividing the limit of loss selected by the rating daily indemnity as determined. This form is usually written on a coinsurance basis. It is possible to conditionally suspend the coinsurance requirement through the use of a surcharge, but this suspension must be renewed annually.

A type of deductible device is also introduced in the U. and O. rating scheme which makes use of the concept of a "Specified Midnight" which is merely a determination by the insured of when the indemnity is to begin after an accident to the insured object has occurred. A dollar reduction per object group, which increases as the "Midnight" selected gets farther re-

moved from the day of the accident, is allowed from the rate charged had no specified midnight been selected. In all cases, the number of specified midnights must be added to the number of rating days which has been calculated in the determination of the number of rating days for rating purposes. The dollar allowance for a specified midnight is then deducted from the corresponding premium for that number of rating days. The charge thus determined is that for $1,000 of daily indemnity and must be multiplied by the ratio of the actual daily indemnity to $1,000 in order to reflect the proper premium for the daily indemnity anticipated in the policy.

When coinsurance is applicable, as in the case of both aforementioned actual loss sustained forms, a multiplier is applied to the premium thus developed. This multiplier varies inversely with the coinsurance percent selected by the insured.

Illustrations are provided in Exhibit II which show for the major form groups:

(a) the applicable group numbers for unfired vessels, (b) the applicable portions of the rate page for unfired vessels and (c) the pertinent co-insurance multipliers for all sizes and types of objects.

The premium to be charged for Outage insurance is obtained by applying a multiplier to the applicable object size and type valued form U. and O. rate for $1,000 of daily indemnity which takes into account the number of hours per day for rating purposes. The number of hours per day, for rating purposes, is calculated by dividing the limit per day by the hourly indemnity. This result is then divided by 1,000 and multiplied by the desired amount of hourly indemnity to develop the proper premium. A major difference between Outage and U. and O. in the development of premium is in the treatment of groups of objects. Several objects having the same group number have a single premium charge under the U. and O. form, but under the Outage form, each object incurs a premium charge regardless of the common group number. Exhibit III shows the current NBCU Outage multipliers.

In developing the premium charge for Consequential Damage, there are two major types of coverages to be considered; whether the property is: (a) insured solely while in storage dependent on cold or heat or (b) insured whether or not in storage. In addition to these determinants, the premium is dependent upon the desired limit of liability, the classification of the objects which are applicable, and the coinsurance basis. A charge is made for each classification type, regardless of the number of objects

involved in that classification. The premium is developed for each premises to be covered. A reproduction of the NBCU Consequential Damage Insurance Rate Table is shown in Exhibit IV.

THE COLLECTING OF BOILER AND MACHINERY STATISTICS

The National Bureau of Casualty Underwriters is the sole statistical collection, as well as ratemaking, agent for Boiler and Machinery. All of the major writers of Boiler and Machinery insurance report their statistics to the National Bureau and utilize, in varying degrees, the rating output of this organization.

Under this extremely detailed statistical plan, the type of statistics reported to the Bureau can be segragated into three broad categories: premiums and exposures, losses, and inspection expense. These statistics are reported annually on a transaction basis by calendar year so as to comply with a calendar-accident year method of recording and compiling experience which will provide for the development of accident year incurred losses, calendar year earned premiums, and earned exposures.

Premiums and Exposures

The unit of exposure utilized in Boiler & Machinery is the "object month" which is a specified object exposed for one month. Premiums and exposures are reported for each premium transaction by type and size of object. The object months are assigned to a calendar year in each transaction reported. In most instances, all of the premiums and exposures are written and reported on a three year basis; therefore, the exposures are reported as the number of months for which the policy is in force for each calendar year of the term of the policy. Where there is more than one object of the same type and size in a transaction, a summary is allowed with the exposures reported being the number of object months exposed during a calendar year times the number of objects along with the total written premium for these objects.

The type code is developed in such a way so as to segregate the amount of dollars that make up the components of the direct damage premiums (e.g. object charge, location charge and excess limits charge) and indirect damage premiums, as well as to designate through "special" type codes the actual debits or credits allowed under a filed individual risk rating rule, Special Multi-Peril policy, or any other rating vehicle which would produce premiums on other than a manual basis. The end result of this treatment of risk premium modifications in the type of object code is to have the

premiums for all real objects reported on a manual basis and still be able to balance, in total, to the actual written premiums.

The object size codes also serve several purposes aside from indicating the capacity of a specified object. For the location charge, portable object charge, and bodily injury liability charge, the limit per accident is identified. On U. and O., the group number applicable to the insured object is designated. All deductible business must be identified by specified codes in a Kind of Card designation. The reporting of the amount of the deductible (to the nearest $100) is provided for in a deductible amount code.

Losses

The losses are reported separately for those paid during the calendar year and those outstanding at the end of the calendar year. All losses are reported exclusive of loss adjustment expenses. As is applicable in the loss coding for any other line of business, the losses will be coded with the essential detail that was reported for the premium of the policy on which the loss was incurred, and associated with the object type and size code of the object the earliest failure of which caused the loss. The number of incurred losses is also reported, with an indirect coverage loss treated as another claim, separate and distinct from the direct damage loss.

Inspection Cost

Since engineering and inspection service is such an important part of Boiler and Machinery insurance and makes up such a large segment of the premium dollar, the plan provides for an extensive analysis of the total amount reported for each company in the Insurance Expense Exhibit, Part II, under Boiler and Machinery on lines 8, "Inspection Expenses Paid" and 9, "Boards, Bureaus and Associations Expenses Paid." This analysis gives due consideration to incurred inspection expense for direct and indirect coverages. On the direct damage coverages, it is necessary to record the actual number of inspection hours devoted to the various type and size of objects. These inspection hours shall "include only the time spent by the inspector in the plant inspecting objects of the type in question and discussing plant problems with respect to such objects."[1] On the basis of this record of hours spent, the dollars of inspection and boards and bureaus expenses are allocated to type of object.

[1] NBCU Boiler and Machinery Insurance Statistical Plan.

All of this data is reported to the NBCU separately for Continental U.S.A. (excluding Alaska), Alaska, Hawaii, and Puerto Rico. The only data furnished in the annual call for experience on a state by state basis is the total Boiler and Machinery experience for the calendar year of call. This report provides direct written premiums, losses paid during the year of call, and losses oustanding on December 31 of the year of call. These loss figures are further distributed to year of accident with each of the five previous years shown separately and all previous to that period shown in total. These statistics have not been used in the ratemaking procedure.

CURRENT RATE REVIEW PROCEDURES

The Boiler and Machinery rating procedure is unusual in two respects: (a) the rates are developed from countrywide data and applied on a countrywide basis; and (b) inspection expenses receive the same rating treatment as incurred losses. The latest rate revision for Boiler and Machinery was accomplished in 1961. The relatively stable results of this line from year to year and the need for a sizeable volume of current experience so as to obtain fairly credible indications by type of object precludes the use of frequent rate revisions although an overall rate level review is usually made on an annual basis. Prior to the 1961 revision, various changes were made in 1955, 1952, and 1948. The revision effective May 1, 1961, aside from being the most current, was also in extensive revision and will serve as an illustration of the procedures followed in Boiler and Machinery ratemaking.

REVISION OF THE OBJECT CHARGE

The general steps followed in the revision of the object charges are as follows:

(a) Establishment of an overall object rate level change: This is accomplished by comparing the overall indicated loss, loss adjustment, and inspection ratio to the expected loss, loss adjustment, and inspection ratio.

(b) Development of the object rate indicated percentage change: A modified pure premium approach is utilized in achieving the percentage change required in the present object charge for each object. The loss and loss adjustment and inspection pure premiums are compared to the present average object premium and, through the application of credibility, a formula loss, loss adjustment and inspection ratio indication is developed. This indication

is then balanced, for each object, to the overall rate level indications so as to approximate as closely as possible the overall rate level change for all of the objects combined.

(c) A major revision in the definition of accident, which produced a more liberal interpretation of the coverage, was taken into consideration in the 1961 rate revision, which necessitated an additional step in developing the percentage change in the object rate. Due to a lack of sufficient data to measure the value of this broadening of coverage statistically, flat percentage increases were developed on a judgment basis and applied to the loss portion of the indicated rate level change for each object type and size.

Calculation of Indicated Object Rate Level Change

In the development of the overall indicated object rate level change, the full coverage experience of all carriers writing Boiler and Machinery insurance in the continental United States for the three most current accident years 1956 through 1958 was utilized. The outline of the calculation utilizing this experience is shown in Exhibit V. In the calculation of the object rate earned premium on present rate level, there was no need to adjust the 1956-1958 premiums for a rate level change as there was none written at other than the present rate level. The 1955 rate revision affected only U. and O. rates; therefore, the object charge premiums were written at the rates developed in the 1952 revision. The earned premiums are calculated on the basis of the object months reported as exposures for the corresponding written premiums, which are assigned to specific calendar years under the Boiler & Machinery statistical plan. This, essentially, produces an earned premium calculated on a monthly basis. In this calculation, the number of object months, by object type, which were assigned to the review period of 1956-1958 were divided by the total number of object months in force to obtain the percentages which were earned. These percentages were applied to the corresponding written premium in force in order to calculate the earned premiums.

All premiums and exposures reported under this statistical plan are assigned a policy identification code, which is merely an indicator of the rate level at which they were written. All premiums which are written at the same rate level carry a common identification code. When it is necessary to calculate an earned premium on present rate level (i.e. the premiums of the experience period being written on various rate levels), to the earned object premiums which are indicated as being written on other

than the current rate level are applied the object rate adjustments, by object type, which have been effected from the time that these objects were written up to the time the revision is to be made. This adjusts these earned premiums to the current rate level and, by combining these with the earned premiums which are indicated as being written at the current rate level, the earned premium on present rate level is obtained. Since there are infrequent rate revisions in Boiler and Machinery, it is uncommon to find more than two policy identification codes involved in this calculation.

The incurred losses reported for that period were limited to $25,000 to produce basic limits loss experience. All loss adjustment expense, both allocated and unallocated, is included with the incurred losses. The inclusion of all loss adjustment expense was accomplished through the application of a 1.10 factor to the incurred losses. This factor was determined on the basis of a review of the expense experience, as reported in the Insurance Expense Exhibits of NBCU members, for Boiler and Machinery for calendar years 1957 through 1959. From this premium and loss data the indicated loss and loss adjustment ratio is calculated.

Once the indicated loss and loss adjustment ratio has been determined, it is necessary to measure the portion of the inspection cost which is included in the object charge. Appendix I outlines the calculation of the estimated dollars of inspection expense which is included in the object charge. This amount is compared to the present level earned object charge premiums in the calculation of the indicated inspection ratio. This indicated ratio is combined with that for loss and loss adjustment and an indicated loss and inspection ratio is obtained.

On the basis of the aforementioned review of the experience reported in the Insurance Expense Exhibit of NBCU member companies for calendar years 1957-1959, it was proposed that the following loss and expense provisions be considered as those included in the current Bureau manual rate prior to the application of any premium discount:

Total production cost	30.0
General administration	10.5
Taxes, licenses and fees	4.0
Underwriting profit & contingencies	5.0
Total service and overhead excluding inspection and bureau expenses	49.5
Loss, loss adjustment, inspection, and bureau expense	50.5

These expense allowances establish the expected loss, loss adjustment, and inspection ratio at .505. By comparing the loss and inspection ratio which was developed for the 1956-1958 accident year period to that expected, and subtracting unity, the indicated rate level percentage change is determined.

Development of Object Rate Indicated Percentage Change

This next step is, essentially, a calculation of the portion that each type of object contributes to the overall indicated rate level change. Due to the distribution of experience into these smaller parcels, the experience of the same carriers for the most current five accident year period, 1954 through 1958, was used in order to develop more meaningful indications for each type of object. The calculation is shown in Exhibit VI.

From the object month exposures reported for the 1954-1958 accident year period, the Number of Earned Objects, as shown in Column (2), is obtained by dividing, for each object, the total number of object months by 12, since the rates contemplated in this filing are based on an object year calculation.

The figures show in Column (3), Earned Premium at Present Average Rates, were developed in the manner described in determining the overall indicated rate level change. The earned premiums were calculated on the basis of the assignment of the earned exposures to calendar year. The premiums written at other than present rates for each object were earmarked by the applicable policy identification code and adjusted to the present rate level. The earned premium at present average rates is the combination of the adjusted earned premiums and those earned premiums written at the present rate level. It should be noted here that the term "present average rate" is applicable because the indications are obtained by object type, with rates being published by both type and size of object. In general, the object indicated rate level change is applied uniformly to the existing rate for all sizes within an object type. Column (4) of Exhibit VI is merely the incurred losses limited to $25,000, adjusted by 1.10 to include all loss adjustment expense and divided by the number of earned objects. Column (5), Loss and Loss Adjustment Pure Premium on Proposed Level, is calculated by applying to the actual pure premium for each object, Column (4), the ratio of the indicated loss and loss adjustment ratio (.269), as determined in the overall rate level change calculation (Exhibit V), which was based upon the experience of three accident years (1956-1958), to the loss ratio for all objects combined for the five accident year period (1954-1958). The inspection data utilized

in this filing is based upon the four latest calendar years (1955-1958) inspection costs per object as reported by all carriers under the Boiler and Machinery Insurance statistical plan.[2] The actual inspection pure premium was calculated by dividing the inspection cost per type of object class for calendar years 1955-1958, which is discounted by 12.83% to exclude the inspection costs included in the Location and Portable Object charges (see Appendix I), by the earned number of objects for the same period. The actual inspection pure premium was developed to a proposed level in Column (7) by applying to the inspection pure premium of each object a factor developed from the following ratio:

$$\frac{\text{Indicated inspection ratio (Line 5, Exhibit V)}}{\Sigma[\text{Col. (2)} \times \text{Col. (6)}] \div \text{Total Col. (3)}}$$

The application of this ratio places the inspection costs developed from the 1955-1958 calendar year data on a comparable basis to the loss and loss adjustment data.

The Present Average Rate, Column (8), to which the proposed loss and loss adjustment and inspection pure premium is to be compared is merely the premium at present average rates divided by the number of earned objects for each type of object class. The comparison of these figures is shown in Column (9).

The portion of this comparison which is to be utilized in determining the indicated rate level change for an object is dependent upon the credibility assigned to the experience of the object. This measure of reliance, in the Boiler and Machinery rating procedure, is based upon the five year earned premium on present rate level of the object class. The percent of reliance is shown in the Credibility Table of Exhibit VII.

The rationale behind the credibility table used for Boiler and Machinery is essentially the same as that for the credibility table which has been used in assigning reliance to class indications in fire insurance.[3] The requirement of $7,000,000 of five calendar years of earned premium at present rate level for full credibility was established much the same as the $5,000,000 was for fire, on a judgment basis. The premium requirements for less than full credibility are calculated using the common partial credibility formula $Z^2 = \frac{P}{N}$ where P is the premium for the object type and

[2] Due to a revision in the requirements for the filing of expenses in the Boiler and Machinery Insurance statistical plan which was effective in 1955, only the four latest calendar years of data were on a comparable basis so as to be usable in the revision.

[3] "Ratemaking for Fire Insurance"—Joseph J. McGrath, *PCAS* Vol. XLV.

N is $7,000,000, or the premium required for 100% credibility. As can be seen, this formula is based upon the square root rule of weighting utilizing the concept that the probable error of an experience average varies inversely with the square root of the volume.

The Formula Loss and Inspection Ratio, Column (11), is calculated for each object by weighting the developed loss and inspection ratio on proposed level with the credibility percentage warranted by the object class earned premiums, and weighting the overall indicated loss and inspection ratio (Line 6, Exhibit V) with the complement of that credibility percentage and unity. Column (12) shows the relationship of each of the object formula loss and inspection ratios to that for all objects combined (.593) for this body of experience. This shows the relative difference in magnitude of the individual object rate from that for all objects combined.[4] Once the relationship of each object to the average of all objects has been established, the overall rate level change can be apportioned to each object according to this relationship, thereby producing the Formula Rate Level Change as shown in Column (13).

In all cases, the Formula Rate Level Change by object class was limited (in this instance to a 25% increase for an object class), which is a generally accepted rating concept in all lines of insurance so as to maintain a degree of stability in the rating structure. This limitation on the increase to 25%, when these indicated changes were applied to the earned premium of each object type, produced an overall increase of 12.4% which was short of the overall 17.4% proposed increase. In the calculation of the Indicated Rate Level Change per object class, the balancing factor of 1.1041 was applied to the rate level factor of 1.174, for classes unaffected by the limitation, to produce an indicated rate level factor of 1.296 to be applied to the corresponding ratios of Column (12). This enabled the indications of a class to be limited to +25%, by increasing the Indicated Rate Level Change on the classes which were unaffected by the limitation by 10.41%, and achieve the 17.4% proposed increase overall.

Incorporation of Adjustment of Object Loss and Loss Adjustment Charge for Broadening of the Definition of Accident

Prior to the 1961 revision, there were two definitions of accident for Boilers, one being referred to as Limited coverage and the other Broad

[4] It should be noted that this procedure is similar to that employed in the ratemaking procedure for automobile liability in the distribution of the statewide rate level change to territory as shown by Mr. Philipp K. Stern in "Ratemaking Procedures for Automobile Liability Insurance," *PCAS* Vol. LII.

coverage. Under the Limited definition, coverage was provided for loss from tearing caused by pressure of steam or water therein. In essence, just rupturing or bursting was covered. The Broad definition covered the same hazards as that provided by the Limited definition but, in addition, covered sudden and accidental crushing inward, cracking of a cast metal part, and bulging or burning caused by pressure of steam or water, or resulting from a deficiency of steam or water. The definition of accident for Machinery covered the principal hazards of sudden and accidental breaking into two or more separate parts, both mechanical and electrical burning out and deforming of any rod or shaft.

In the revised definition of accident, the Limited Boiler coverage was left intact, hence no additional charge was utilized. For the Broad coverage, however, the definition was revised to insure against "the hazard of loss from breakdown, with the requirement of manifestation by physical damage necessitating repair or replacement."[5] This connotation extended the definition to include many externally caused hazards. For Machinery objects a similar extension of the definition of accident was made, dependent upon the type of object and the hazards peculiar to it. Essentially, the new definition provides coverage for the wide general area of mechanical or electrical breakdown of objects, the degree of broadening of interpretation being dependent upon the object.

It should be noted that there was also a revision of the definition of objects, but this did not create any change in the hazards to be measured, hence no adjustment in the rates were required.

Exhibit VIII illustrates the development of a composite of the percentage change in the object rate due to experience indications and to the revised definition of accident by type of object. Column (2) shows the object rate indicated percentage change from Column (14) of Exhibit VI. Column (3) shows the additional percent of loss hazard which, in the judgment of the underwriters of several companies, is required by this broadening of the definition. These percents were applied to the loss portion of the Present Average Rate in Exhibit VI, Column (8), which was adjusted by the indicated rate level change of Column (14), to produce the percentage changes in Column (4). In all cases, the composite rate level change has been limited to +33.3% in order to forestall excessive fluctuation in the rates for some objects.

[5] NBCU Manual of Boiler and Machinery Insurance, p. 301.

REVISION OF THE EXCESS LIMITS, LOCATION, PORTABLE OBJECT AND BODILY INJURY CHARGES

On the basis of a review of the experience of all carriers writing Boiler and Machinery insurance in the continental United States for accident years 1956 through 1958 separately, and in combination, as shown in Exhibit IX, it was proposed that a 10% reduction be reflected in the excess limits, location, portable object, and bodily injury liability premium level. The Earned Premium on Present Rate Level, Column (2), for these components of the direct damage premium was developed from the written premium reported to the National Bureau, in the same manner as that described in the calculation of the overall object rate level change. The incurred losses in Column (3) include the excess portion over $25,000 that was excluded from the object charge calculation plus all bodily injury losses. The bodily injury losses and excess losses include loss adjustment expense through the application of a 1.10 loss adjustment factor as proposed in the filing.

The determination of the dollars of Inspection Expense Not Included in the Object Rates, Column (4), was accomplished in the procedure outlined in Appendix I. The portion of expenses attributable to the individual accident years was calculated by taking 12.83%, the overall developed percent of inspection pure premium in the location and portable object charges for the three accident years combined, of the inspection expenses reported to the National Bureau for each of those accident years. The total for the combined accident years is also shown on line 10, Exhibit I of Appendix I. By combining the incurred loss, loss adjustment, and inspection dollars, and relating them to the earned premium at present rates, the loss and inspection ratio for these components of the direct damage rate is determined as shown in Column (5). These ratios were compared to those anticipated for these charges (.505), and, on the basis of this comparison, the 10% reduction was proposed. This reduction was accomplished through an adjustment of the rates published in the existing tables so as to produce the tables shown in Exhibit I, Sheet 2.

REVISION OF USE AND OCCUPANCY RATES

A procedure similar to that utilized in developing the object rate indicated percentage change is followed in developing the proposed rate level change by rating group, the major difference being the initial calculation of loss and loss adjustment ratios, instead of pure premiums, for each group. The experience of all forms for accident years 1954 through 1958, as shown in Exhibit X, indicated an overall loss ratio of 32.5%. On the basis of this favorable loss ratio, a 10% reduction was proposed in the

U. and O. premium level. An illustration of the distribution of this overall reduction to rating group is provided in Exhibit XI.

The premiums and losses of the five calendar-accident years 1953 through 1957, being the most current U. and O. experience available by rating group, were used to determine these indications. The earned premiums of Column (2) were adjusted to present level in the same manner as previously described. The incurred losses were loaded by the 1.10 factor for the inclusion of loss adjustment expense and the loss and loss adjustment ratios on present level calculated as shown in Column (5). The credibility table utilized in the direct damage portion of this revision was applied here, with the amount of reliance accorded to the rating group indications being dependent upon the five calendar year earned premiums at present rates.

The weighting process used in the development of the formula loss and loss adjustment ratio on present level is similar to that used in the direct damage calculations in that the indicated loss ratio was weighted with the accorded credibility percentage and the overall loss ratio weighted with the complement of that percentage and unity. This produced the results shown in Column (7). The formula loss and loss adjustment ratio on present level for each group was then divided by the total U. and O. formula loss and loss adjustment ratio (.282), which is the sum of the individual ratios of Column (7) applied to the corresponding premium of Column (2) and divided by the sum of Column (2), to determine the distribution of the overall −10% rate level change to rating group, much the same as was done in the direct damage rate revision. These results are shown in Column (8).

The Formula Rate Level Change is shown in Column (9) and is merely the application of the 10% reduction to the proportion each formula loss and loss adjustment ratio bears to the total. In the determination of the Proposed Rate Level Change in Column (10) a maximum and minimum limit of +25% and −20%, respectively, was imposed.

These limitations do not allow the achievement of the required −10% overall, and if there were no attempt made to achieve this reduction, the resulting effect would be but a 8.0% reduction when the rate level factor is applied to the earned premium of each class. A balancing factor of .8452 was introduced to be applied to the ratios derived in Column (7) for the classes unaffected by the limitations. This was calculated by multiplying the rate level factor of .900 by .8452 to produce a rate level factor of .7607 which, when applied to the corresponding ratios in Column (8), pro-

duced the Proposed Rate Level Changes of Column (10) within the limitations described. These proposed rate level changes were, for the most part, applied to the rates in the existing rate schedules to produce the revised changes.

OUTAGE AND CONSEQUENTIAL DAMAGE RATES

There have been no revisions made in the Outage multipliers or Consequential Damage rates during the past twenty years. Any revision in the U. and O. valued form rates, of course, would affect the Outage rate level directly since the Outage premiums are developed through the application of a multiplier to the U. and O. valued form rates.

The loss ratio results for both Outage and Consequential Damage have been consistently stable over the years, thereby dispensing with the need for a revision. It is extremely likely that, if a revision were to be made, it would be accomplished by a broad comparison of the indicated loss ratios with those expected, much the same as was done in the 1961 revision of U. and O. rates, with a flat percentage change effected.

CONCLUSION

Because the Boiler and Machinery Insurance Statistical Plan provides for premiums to be reported on a manual basis, there is no need to include in the ratemaking procedure a calculation to compensate for the off-balance condition that is created by the application of the various rating plans available for risks of size. Only manual, full coverage, premiums are utilized in the Boiler and Machinery ratemaking procedure.

As can be seen from the foregoing calculation of the object rate indicated percentage change, despite the use of pure premiums, this can hardly be considered a rating method utilizing a pure premium approach. These pure premiums are used to produce a loss and inspection ratio on proposed level, which, in the end result, does not produce a rate but merely an indicated change to be applied to existing rates.

A review of the type and form of the current statistics being produced for the Boiler and Machinery ratemaker indicates that there should be few changes in the future from the procedure used in the 1961 revision. Underwriting and engineering judgment should still play an important role in dealing with the changes that cannot be measured statistically as well as tempering the degree to which statistical indications should be followed. This will be necessary so long as the distribution of experience to the many object types is maintained and the volume of exposures expand at but a modest pace.

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Exhibit I
Sheet 1

EXCESS LIMITS APPLY

UNFIRED VESSELS - TYPES 1, 2, 3 and 4

Type 1. All Unfired Vessels except Types 2, 3, 4 and 5

Type 2. Rendering Tanks
Soap Kettles
Rotating Vessels not in Types 3 and 4

Type 3. Acid Accumulators
Bleachers and Kiers
Brick Hardening Cylinders
Creosoting Cylinders
Diffusers
Digesters

Type 4. Vessels in which any of the following processes is actively carried on:

Acetylation	Extraction (other than by Water)
Alkylation	Friedel-Crafts Reaction
Amidation	Halogenation
Amination	Hydrogenation
Cracking	Nitration
Depolymerization	Oxidation
Diazotization	Polymerization
Distillation (other than of Water)	Reduction
Esterification (except Soap-Making)	Sulphonation

Object Rates

Size (Sq. Ft.)	Type 1	Type 2	Type 3	Type 4
5	$ 9	$ 15	$ 15	$ 30
10	15	20	20	41
20	20	28	28	56
30	25	35	35	71
50	35	50	50	102
75	42	61	61	122
100	49	71	71	144
150	63	91	91	183
200	75	108	108	217
250	87	124	124	251
300	97	139	139	280
350	107	152	152	307
400	115	165	165	334
450	123	177	177	358
500	131	188	188	380
600	145	209	209	422
700	159	229	229	461
800	173	248	248	500
900	186	267	267	539
1,000	196	284	284	573
Each add'l. 100 Sq. Ft. or Fraction thereof	$10	$14	$14	$29

U. & O. Group No. (4a) — U. & O. Group - See Footnote* — U. & O. Group No. (5) — U. & O. Group No. (5)

*Use and Occupancy Group (4c) is applicable to Rotating Vessels forming a part of machines for manufacturing, processing or finishing paper or pulp except Rotating Vessels in types 3 and 4. Group (4b) is applicable to all other Type 2 objects.

Note: For Electric Steam Generators and Electric Dowtherm (or Diphenyl) Boilers or Vaporizers add $6 to the rates shown for Type 1 Objects.

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Exhibit I
Sheet 2

BOILER AND MACHINERY INSURANCE
1961 REVISION OF DIRECT DAMAGE RATES
PROPOSED EXCESS LIMIT FACTORS, LOCATION CHARGES, BODILY INJURY
LIABILITY CHARGES AND PORTABLE OBJECT CHARGES

Limit per Accident	Excess Limit Factor	Each Location		Each Portable Object		Limit per Accident
		Location Charge	Bodily Injury Liab. Charge	Portable Object Charge	Bodily Injury Liab. Charge	
$ 25,000	1.00	$ 28	$ 1	$12	$1	$ 25,000
30,000	1.02	31	2	13	1	30,000
40,000	1.03	35	3	14	1	40,000
50,000	1.04	39	4	15	1	50,000
60,000	1.04	43	5	16	1	60,000
75,000	1.05	49	6	17	1	75,000
100,000	1.06	56	7	18	1	100,000
150,000	1.07	68	9	19	1	150,000
200,000	1.08	80	11	20	1	200,000
250,000	1.08	92	12	21	1	250,000
300,000	1.09	104	13	22	1	300,000
400,000	1.09	126	15	23	1	400,000
500,000	1.10	148	17	24	1	500,000
750,000	1.11	200	20	25	1	750,000
1,000,000	1.12	250	20	26	1	1,000,000
1,250,000	1.13	300	20	27	1	1,250,000
1,500,000	1.14	350	20	28	1	1,500,000
1,750,000	1.15	400	20	29	1	1,750,000
2,000,000	1.16	450	20	30	1	2,000,000
Each Add'l. $500,000 or Fraction thereof	.01	$100	..	$2	..	Each Add'l. $500,000 or Fraction thereof

For an intermediate Limit per Accident not shown above, use the next higher amount.

Sub-Basic Limits

Direct Damage Coverage may be written for limits lower than the basic limit of $25,000 per accident. The limits and applicable charges are as follows:

Limit per Accident	Excess Limit Factor	Each Location		Each Portable Object		Limit per Accident
		Location Charge	Bodily Injury Liab. Charge	Portable Object Charge	Bodily Injury Liab. Charge	
$ 5,000	1.00	$15	$1	$ 7	$1	$ 5,000
10,000	1.00	18	1	9	1	10,000
15,000	1.00	22	1	10	1	15,000
20,000	1.00	25	1	11	1	20,000

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USE AND OCCUPANCY INSURANCE
VALUED - VALUED RATIO
ACTUAL LOSS SUSTAINED WITH DAILY INDEMNITY
INDEX TO RATING GROUPS

Exhibit II
Sheet 1

Boilers and Pressure Vessels

Description	Group Numbers: Limited Coverage	Broad Coverage	Add for Furnace Explosion Coverage
Fire Tube Boilers			
Oil or Gas Drilling Boilers	1b	1h	3a
Track Locomotive Boilers	1b	1h	3a
All Other Boilers			
Steam-15 lbs. and less incl. Hot Water Heating and Hot Water Supply Boilers	1a	1g	3a
Steam-over 15 lbs.	1b	1h	3a
Water Tube Boilers			
4,000 sq. ft. and less			
Steam-15 lbs. and less incl. Hot Water Heating and Hot Water Supply Boilers	1a	1g	3a
Steam-over 15 lbs.	1b	1h	3a
4,001-10,000 Sq. Ft.	1c	1i	3b
10,001-20,000 Sq. Ft.	1d	1j	3c
20,001-30,000 Sq. Ft.	1e	1k	3d
Over 30,000 Sq. Ft.	1f	1m	3e
Cast Iron Boilers	1a	1g	3a
Fired Vessels - Not Otherwise Classified			
Gas-Fired Radiators	1a	1g	3a
Economizers (except any steel economizer used solely with a Boiler)	1c	1i	3b
Coil or Storage Water Heaters	1a	1g	3a
All Others			
Steam or Water	2a	2c	3a
Except Steam or Water	2b	2d	3a

Description	Group Numbers
Unfired Vessels	
Type 1	4a
Type 2	
Rotating Vessels forming a part of machines for manufacturing, processing or finishing paper or pulp except Rotating Vessels in Types 3 and 4	4c
All Other Type 2 vessels	4b
Types 3 and 4	5
Type 5	4a

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Exhibit II
Sheet 2

USE AND OCCUPANCY INSURANCE RATE TABLE

VALUED - VALUED RATIO - ACTUAL LOSS SUSTAINED WITH DAILY INDEMNITY

Proposed Rates per $1,000 of Daily Indemnity

Number of Rating Days	Group Numbers									
	3a	3b	3c	3d	3e	4a	4b	4c	5	6
10	$ 61	$ 92	$122	$153	$183	$ 29	$ 64	$100	$118	$ 54
15	67	100	134	167	200	31	71	113	133	61
20	70	105	141	175	210	34	76	120	142	65
25	73	110	147	183	220	36	81	128	151	69
35	77	117	155	194	232	39	88	138	162	75
50	82	124	165	206	247	43	94	148	175	80
75	88	132	176	220	264	46	103	160	189	87
100	92	139	184	231	276	48	108	169	200	91
125	95	143	189	237	284	50	112	175	208	95
150	97	146	194	243	291	52	115	181	214	98
175	99	149	199	249	298	53	118	185	220	101
200	101	152	202	253	303	54	121	189	225	103
225	103	154	205	257	308	55	123	193	229	105
250	104	156	208	260	313	56	125	196	233	107
275	105	158	210	263	317	57	127	199	237	109
300	106	160	212	266	320	58	129	202	241	110
325	107	162	214	269	323	59	131	205	244	111
350	108	163	216	271	326	60	132	207	247	112
375	109	164	218	273	328	61	133	209	250	113
400	110	165	220	275	330	62	134	211	253	114
Each Add'l. 25 Days or Fraction thereof . . .	$ 1	$ 1	$ 2	$ 2	$ 2	$ 1	$ 1	$ 2	$ 2	$ 1

For any Intermediate Number of Rating Days, not shown in the above Table, use the Rate for the next higher Number of Rating Days shown.

Reduction for Specified Midnight Coverage

Midnight										
1st	$16	$23	$31	$38	$46	$ 5	$10	$16	$ 19	$ 9
2nd	30	45	59	74	89	11	25	39	46	21
3rd	37	57	75	94	112	15	34	53	62	29
4th	43	64	86	107	129	18	40	63	75	34
5th	47	70	94	117	140	21	45	71	84	39
6th	50	74	100	125	149	23	50	78	92	42
7th	52	78	105	131	157	25	53	83	98	45
8th	54	82	109	136	163	26	56	88	103	48
9th	56	85	113	141	169	27	58	92	108	50
10th	58	87	116	145	174	28	60	95	112	51
Any Other Midnight	Select the amount shown for the Number of Rating Days corresponding to the desired Specified Midnight, using the next lower Number of Rating Days for any Intermediate Number of Days.									

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Exhibit II
Sheet 3

ACTUAL LOSS SUSTAINED
USE AND OCCUPANCY INSURANCE
WITHOUT A SPECIFIED DAILY INDEMNITY
INDEX TO RATING GROUPS

Boilers and Pressure Vessels

Description	Group Numbers: Limited Coverage	Broad Coverage	Add for Furnace Explosion Coverage
Fire Tube Boilers			
Oil or Gas Drilling Boilers	101b	101h	103a
Track Locomotive Boilers	101b	101h	103a
All Other Boilers			
Steam-15 lbs. and less incl. Hot Water Heating and Hot Water Supply Boilers	101a	101g	103a
Steam-over 15 lbs.	101b	101h	103a
Water Tube Boilers			
4,000 Sq. Ft. and less			
Steam-15 lbs. and less incl. Hot Water Heating and Hot Water Supply Boilers	101a	101g	103a
Steam-over 15 lbs.	101b	101h	103a
4,001-10,000 Sq. Ft.	101c	101i	103b
10,001-20,000 Sq. Ft.	101d	101j	103c
20,001-30,000 Sq. Ft.	101e	101k	103d
Over 30,000 Sq. Ft.	101f	101m	103e
Cast Iron Boilers	101a	101g	103a
Fired Vessels - Not Otherwise Classified			
Gas-Fired Radiators	101a	101g	103a
Economizers (except any steel economizer used solely with a Boiler)	101c	101i	103b
Coil or Storage Water Heaters	101a	101g	103a
All Others			
Steam or Water	102a	102c	103a
Except Steam or Water	102b	102d	103a

Description	Group Numbers
Unfired Vessels	
Type 1	104a
Type 2	
Rotating Vessels forming a part of machines for manufacturing, processing or finishing paper or pulp except Rotating Vessels in Types 3 and 4	104c
All other Type 2 vessels	104b
Types 3 and 4	105
Type 5	104a

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Exhibit II
Sheet 4

ACTUAL LOSS SUSTAINED
USE AND OCCUPANCY INSURANCE
WITHOUT A SPECIFIED DAILY INDEMNITY

PROPOSED RATE TABLE

Rates per $1,000 of Daily Indemnity

Number of Rating Days	Group Numbers									
	103a	103b	103c	103d	103e	104a	104b	104c	105	106
1	$ 41	$ 61	$ 81	$101	$122	$ 10	$ 26	$ 41	$ 49	$ 22
2	53	79	105	132	158	17	44	69	81	37
3	60	90	120	150	179	21	54	85	101	40
4	65	97	130	162	195	24	62	97	114	52
5	69	103	138	172	206	26	68	105	125	57
6	72	108	144	180	216	28	72	113	133	61
7	75	112	149	187	224	30	76	119	141	65
8	77	116	154	193	231	31	80	124	147	68
9	79	119	158	198	237	32	83	129	153	70
10	81	122	162	203	243	33	85	133	158	72
15	88	132	176	220	264	37	96	149	177	81
20	93	140	186	233	280	40	103	161	190	87
25	97	146	194	243	291	42	109	170	201	92
35	103	155	206	258	309	46	117	183	217	99
50	109	164	219	273	328	49	126	197	234	107
75	116	175	233	291	349	53	137	214	253	116
100	122	182	243	304	365	56	144	225	266	122
125	125	188	251	314	376	58	150	234	277	127
150	128	193	257	322	386	60	155	241	285	131
175	131	197	262	328	394	62	158	247	293	134
200	134	201	267	334	401	63	162	253	299	137
225	136	204	272	339	407	64	165	258	305	140
250	138	207	276	344	413	65	168	262	310	142
275	140	209	279	348	418	66	170	266	314	144
300	142	211	282	352	423	67	172	269	318	146
325	143	213	285	356	427	68	174	272	322	148
350	144	215	288	359	431	69	176	275	326	150
375	145	217	290	362	435	70	178	278	329	151
400	146	219	292	365	438	71	180	280	332	152
Each Add'l. 25 Days or Fraction thereof	$ 1	$ 2	$ 2	$ 3	$ 3	$ 1	$ 2	$ 2	$ 3	$ 1

For any intermediate Number of Rating Days, not shown in the above Table, use the Rate for the next higher Number of Rating Days shown.

Reduction for Specified Midnight Coverage

1st Midnight	$21	$31	$41	$51	$61	$ 5	$13	$21	$25	$11
2nd Midnight	40	59	79	99	119	13	33	52	61	28
3rd Midnight	54	81	108	135	161	19	49	77	91	36
Any Other Midnight	Select the amount shown for the Number of Rating Days corresponding to the desired Specified Midnight, using the next lower Number of Rating Days for any intermediate Number of Days.									

Exhibit II
Sheet 5

Use and Occupancy Insurance
Coinsurance Multipliers

Coinsurance Percentage	Valued Ratio and Actual Loss Sustained - Maximum Daily Indemnity	Actual Loss Sustained - No Specified Daily Indemnity
100%	1.00	1.05
90	1.05	1.09
80	1.10	1.13
70	1.15	1.17
50	1.25	1.25
35	1.40	1.40
25	1.50	1.50

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Exhibit III

TABLE OF OUTAGE MULTIPLIERS

No. of Hours per Day	Multi-plier	No. of Hours per Day	Multi-plier	No. of Hours per Day	Multi-plier
1	10	9	14	17	28
2	10	10	16	18	29
3	11	11	18	19	31
4	11	12	19	20	33
5	12	13	21	21	34
6	12	14	23	22	36
7	13	15	24	23	38
8	13	16	26	24	39

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Exhibit IV

CONSEQUENTIAL DAMAGE INSURANCE RATE TABLE

Rates per $1,000 of Insurance

Class	Classification(**)	Coinsurance Basis			No Coinsurance
		80%	50%	25%	
	Property Insured Solely While in Storage Dependent Upon Cold or Heat				
1	Boilers and Fired Vessels (Limited Coverage) listed on pages 102-109 Objects listed on pages 112-121... (See Note Below)	$4	$5	$8	$12
2	Boilers and Fired Vessels (Broad Coverage) listed on pages 102-109, with or without Objects listed on pages 112-121.....	8	10	16	24
3	*Objects listed on pages 130-165, 176-177.....	12	15	24	36
4	+Objects listed on pages 166-175, 178-181.....	12	15	24	36
	Property Insured Whether or Not in Storage				
1	Boilers and Fired Vessels (Limited Coverage) listed on pages 102-109 Objects listed on pages 112-121... (See Note Below)	6	9	15	24
2	Boilers and Fired Vessels (Broad Coverage) listed on pages 102-109, with or without Objects listed on pages 112-121.....	12	18	30	48
3	*Objects listed on pages 130-165, 176-177.....	18	27	45	72
4	+Objects listed on pages 166-175, 178-181.....	18	27	45	72

*If the Objects for which insurance is provided under this classification Include Turbine with Driven Electric Generators insured for Breakdown Coverage of Combined Coverage or Deep-Well Pump Units, two rates are required, one from Class 3 and one from Class 4.

+If the Objects for which insurance is provided under this classification include Small Refrigerating Units, Small Compressing Units or Air Conditioner Units, three rates are required: one from Class 1 or 2, one from Class 3 and one from Class 4.

Note: If insurance applies with respect to Objects in Class 1 and also to Objects in Class 2, no rate is required for Class 1.

(**)The page references listed by Object Class pertain to those of the NBCU Boiler and Machinery manual.

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Exhibit V

BOILER AND MACHINERY

1961 Revision of Direct Damage Rates

Indicated Object Rate Level Change

1.	1956-1958 Object Rate Earned Premium on Present Level	$104,603,117
2.	1956-1958 Losses up to $25,000 including all Loss Adjustment	28,171,535
3.	Indicated Loss and Loss Adjustment Ratio (2) ÷ (1)	.269
4.	1956-1958 Inspection Expenses in Object Rates including Trend (Appendix I)	33,909,557
5.	Indicated Inspection Ratio (4) ÷ (1)	.324
6.	Indicated Loss and Inspection Ratio (3) + (5)	.593
7.	Expected Loss, Loss Adjustment and Inspection Ratio	.505
8.	Indicated Rate Level Percentage Change [(6) ÷ (7)] - 1.0	+17.4%

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Exhibit VI

BOILER AND MACHINERY

1961 REVISION OF DIRECT DAMAGE RATES
DEVELOPMENT OF OBJECT RATE INDICATED PERCENTAGE CHANGES

(1)	(2)	(3)	1954-1958 Loss & Loss Adjustment Pure Premium		1955-1958 Inspection Pure Premium		(8)	(9)	(10)	(11)	(12)	(13)	(14)
Type of Object	1954-1958 Number of Earned Objects	1954-1958 Premium at Present Average Rates	(4) Actual	(5) On Proposed Level	(6) Actual	(7) On Proposed Level	Present Average Rate	1954-1958 Loss and Inspection Ratio on Proposed Level [(5)+(7)] ÷ (8)	Credibility	Formula Loss and Inspection Ratio [(9)x(10)] +.593x [1.0-(10)]	Col.(11) as Ratio to Boiler and Machinery Total	Formula Rate Level Change [(12) x 1.174] -1.0	Indicated Rate Level Change
Steel Boilers-Steam-15 lbs. or less incl. Hot Water Heating and Supply Boilers	103,343	$ 1,456,598	$ .46	$ .47	$ 9.57	$10.37	$14.09	.769	.40	.663	1.103	+29.5%	+25.0%
Fire Tube Boilers-Steam-over 15 lbs.	53,924	1,561,307	1.93	1.97	21.27	23.05	28.95	.864	.40	.701	1.166	+36.9	+25.0
Oil or Gas Drilling Boilers	1,242	66,236	9.17	9.38	19.24	20.85	53.33	.567	0	.593	.987	+15.9	+25.0
Small Compressing Machines	27,297	320,742	.29	.30	5.45	5.91	11.75	.529	.20	.580	.965	+13.3	+25.0
Deep Well Pump Units	14,198	683,629	27.62	28.25	8.58	9.30	48.15	.780	.30	.649	1.080	+26.8	+25.0
Air Conditioners	19,619	1,006,324	7.30	7.47	5.46	5.92	51.29	.261	.30	.493	.820	-3.7	+6.3
Miscellaneous Electrical Apparatus	53,534	6,118,059	28.38	29.03	13.86	15.02	114.28	.385	.90	.406	.676	-20.6	-12.3
Total Electrical Machinery	908,147	32,629,011	10.71	10.95	6.11	6.63	35.93	.489		.508	.845	-0.8	+9.2
Total-Direct Damage Machinery	1,534,073	60,947,925	12.87	13.16	6.56	7.11	39.74	.510		.529	.880	+3.3	+11.9
Total-Direct Damage-Boiler and Machinery	10,482,702	171,455,770	4.30	4.40	4.90	5.30	16.36	.593		.601	1.000	+17.4	+17.4

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Exhibit VII

BOILER AND MACHINERY

1961 Revision of Direct Damage Rates

Credibility Table

Premium	Credibility
0 - 69,999	.0
70,000 - 279,999	.10
280,000 - 629,999	.20
630,000 - 1,119,999	.30
1,120,000 - 1,749,999	.40
1,750,000 - 2,519,999	.50
2,520,000 - 3,429,999	.60
3,430,000 - 4,479,999	.70
4,480,000 - 5,669,999	.80
5,670,000 - 6,999,999	.90
7,000,000 - and over	1.00

BOILER AND MACHINERY

1961 REVISION OF DIRECT DAMAGE RATES

COMPOSITE PERCENTAGE CHANGES REFLECTING OBJECT RATE EXPERIENCE AND REVISED DEFINITIONS OF ACCIDENT

	(1) Type of Object	(2) Percent Change from Col. (14) Exhibit IV	(3) Additional Loss Hazard (a) Based on Company Estimates†	(3) Additional Loss Hazard (b) Limited to Reproduce Maximum Change of +33.3%	(4) Proposed Percent Change Including Add'l. Loss Hazard
Limited Coverage	All Types of Objects Combined	+23.6%	-	-	+23.6% (a)
Broad Coverage	Steel Boilers-Steam-15 lbs. or less incl. Hot Water Heating and Supply Boilers	+25.0	+5.0%	-	+26.4
	Fire Tube Boilers-Steam-over 15 lbs.	+25.0	+5.0	-	+27.1
	Oil or Gas Drilling Boilers	+23.8	+5.0	-	+27.9
Electrical Machinery	Small Compressing Machines	+25.0	+5.0	-	+26.0
	Deep Well Pump Units	+25.0	+5.0	-	+29.4
	Air Conditioners	+6.3	+5.0	-	+8.5
	Miscellaneous Electrical Apparatus	-12.3	+5.0	-	-9.5
	Total Electrical Machinery	+9.2	+5.0	-	+12.5
Total-Machinery	Total-Direct Damage - Machinery	+11.9	+11.4	+10.4	+19.3
Total-Boiler and Machinery		+17.4	+6.9	+6.4	+20.9

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Exhibit IX

BOILER AND MACHINERY

1961 REVISION OF DIRECT DAMAGE RATES

Excess Limits, Location, Portable Object
and Bodily Injury Experience

(1) Accident Year	(2) Earned Premium on Present Rate Level	(3) Incurred Losses in Excess of $25,000, and Bodily Injury Losses*	(4) Inspection Expenses Not Included in Object Rates	(5) Loss & Inspection Ratio [(3)+(4)] ÷(2)
1956	$7,540,789	$ 465,184	$1,521,974	.264
1957	7,830,708	1,283,501	1,518,273	.358
1958	8,152,932	1,464,190	1,555,831	.370
Total	23,524,429	3,212,875	4,596,078	.332

*Including all loss adjustment expenses.

1961 REVISION OF USE AND OCCUPANCY INSURANCE RATES

Use and Occupancy Experience for Accident Years 1954-1958

All Forms

Coverage	Year	Earned Premium on Present Level	Incurred Losses*	Number Of Claims	Loss Ratio
Boiler	1954	$ 5,888,961	$ 1,023,271	506	17.4
	1955	5,652,384	1,604,027	481	28.4
	1956	6,499,399	2,015,546	581	31.0
	1957	7,168,986	5,779,815	504	80.6
	1958	7,333,478	1,924,670	509	26.2
	Total	32,543,208	12,347,329	2,581	37.9
Machinery	1954	10,427,631	2,127,083	655	20.4
	1955	10,508,211	3,760,456	773	35.8
	1956	12,763,195	3,527,218	757	27.6
	1957	13,074,128	5,108,474	809	39.1
	1958	12,101,983	2,845,575	750	23.5
	Total	58,875,148	17,368,806	3,744	29.5
Total+	1954	16,431,206	3,170,966	1,164	19.3
	1955	16,192,710	5,364,483	1,254	33.1
	1956	19,263,626	5,542,764	1,338	28.8
	1957	20,244,367	10,888,289	1,313	53.8
	1958	19,435,650	4,770,245	1,259	24.5
	Total	91,567,559	29,736,747	6,328	32.5

*Including all Loss Adjustment Expenses.
+Including Actual Loss Sustained Unsegregated Codes.

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Exhibit XI

BOILER AND MACHINERY

1961 REVISION OF USE AND OCCUPANCY RATES

DEVELOPMENT OF PROPOSED RATE LEVEL CHANGES BY RATING GROUP

(1) Rating Group	(2) 1953-1957 Earned Premium on Present Rate Level	(3) 1953-1957 Incurred Loss and Loss Adj.	(4) 1953-1957 Number of Claims	(5) 1953-1957 Loss & Loss Adj. Ratio on Present Level	(6) Credibility	(7) Formula Loss & Loss Adj. Ratio on Present Level [(5)x(6)] + .321x[1.0-(6)]	(8) Col. (7) As Ratio to Boiler and Machinery Total	(9) Formula Rate Level Change [(8)x.900] -1.0	(10) Proposed Rate Level Change
Steel Boilers-Steam-15 lbs. or less incl. Hot Water Heating and Supply Boilers; Cast Iron Boilers; Gas Fired Radiators; Coil or Storage Water Heaters	$ 1,712,995	$ 275,872	214	.161	.40	.257	.911	-18.0%	-20.0%
All Other Boilers and Fired Vessels	22,768,770	3,833,294	1,820	.168	1.00	.168	.596	-46.4	-20.0
Furnace Explosion	600,584	134,439	173	.224	.20	.302	1.071	-3.6	-18.5
Unfired Vessels									
Types 1, 2 and 5	2,677,429	5,859,806	204	2.189	.60	1.442	5.113	+360.2	+25.0
Types 3 and 4	1,345,840	807,333	40	.600	.40	.433	1.535	+38.2	+16.8
Furnace Transformers and Mercury Arc Rectifier Transformers	712,126	755,247	36	1.061	.30	.543	1.926	+73.3	+25.0
Power & Distribution Transformers and Induction Feeder Regulators	6,391,145	618,763	123	.097	.90	.119	.422	-62.0	-20.0
Miscellaneous Electrical Apparatus	5,240,171	1,767,193	657	.337	.80	.334	1.184	+6.6	-9.9
Total	86,434,125	27,776,077	6,143	.321		.282	1.000	-9.9	-10.0

APPENDIX

CALCULATION OF INSPECTION EXPENSES IN OBJECT RATES

In the reporting of Inspection and Boards and Bureaus expenses to the National Bureau under the Boiler and Machinery statistical plan, the dollars of expenses for these two categories are apportioned over the types of objects for direct damage coverages by giving "due consideration to a record of the number of inspection hours in the necessary details."[1] This procedure allocates all of the inspection expense to an object type; both the inspection expenses that will be measured in the object charge and those that will be measured in the location and portable objects charge.

In the calculation of the proposed inspection expenses contained in the object charge, the inspection expenses of the location and portable objects charges were first ascertained and by deducting these from the total inspection expenses, the remainder was considered to be those present in the object charge. In addition, a trend factor was introduced into the calculation so as to reflect steadily increasing engineering and inspection costs in the industry. Exhibit I of this Appendix illustrates the development of the two segments of inspection expenses.

In the judgment of the underwriters and the engineers, the current average cost of traveling to and from a location and the accompanying expenses of lodging, meals and so forth was proposed to be $28, with $12 being proposed for these expenses in connection with portable objects. The premium and expense data of calendar years 1956 through 1958 were used in the calculation of inspection expenses for the 1961 revision.

The number of written locations, as shown in Column (1), was derived from the number of location charges reported to the National Bureau by all carriers writing Boiler and Machinery insurance in the continental United States under the then existing satistical plan. Under the current plan, where the number of months coverage in each calendar year is reported for each location for the location, portable object, and bodily injury liability charges, the number of written locations for the location and portable object charges are calculated by dividing the total number of location months for the experience period by 36, since these charges are contemplated to be on a three year basis.

The proposed written inspection premium in the location charge is calculated by multiplying the proposed inspection amount in the location charge by the number of written locations, the results of which are shown in Column (3). These written inspection premiums do not take into con-

[1] NBCU Boiler & Machinery Insurance Statistical Plan.

sideration the 40% discount allowed in the location charge on the more than two locations which are situated within the boundaries of a single city or village. From data developed by a large carrier in comparing the collected to the collectible location charges, it was determined that this discount reduces the overall location charges by 5%, hence the use of only 95% of the written inspection premium in the location charge for further calculations as shown in Line (4). The proposed written inspection premium for the portable object charge is calculated in a similar manner and is also shown in Column (3). All of the portable object written inspection premiums are combined with the discounted location charge inspection premiums to obtain the proposed written inspection premiums in the location and portable object charges of Line (5). These written inspection premiums were adjusted to an earned basis on Line (9) by the application of an earned to written ratio based upon the total written and earned premiums developed from the reportings to the NBCU on the location and portable object charges for calendar years 1956 through 1958. The pure inspection dollars were obtained through the application of the proposed loss, loss adjustment and inspection ratio of .505 which eliminates all categories of expenses, except inspection and loss adjustment, from the earned premium which has been determined.

The total incurred inspection expense, Line 11, as reported to the NBCU for the three calendar years, were adjusted to reflect the subsequent trend in inspection costs in 1959 as determined from the data shown in Exhibit II of this Appendix. A comparison of the ratios of actual Inspection and Boards and Bureaus expenses paid to earned premiums on present level was made of 1959 to those of the experience period being used which indicated an increase of 7.7%. Further comparisons were made of pertinent data furnished by the U.S. Department of Labor for the first nine months of 1960 to that of the experience period. Additional non-industry data was utilized comparing hotel prices, as published by two noted research consulting firms, of 1959 to those for the experience period. All sources indicated that an increase in the cost of inspection services was evident. A trend factor of 1.075 was proposed to be incorporated into this rate revision, the resulting incurred inspection expenses reflecting current costs being shown on Line (13). The proposed inspection dollars in the object rate are then the remainder of the subtraction of the pure inspection dollars in the location and portable object charges from the incurred inspection expense of Line (13). The ratio of the inspection pure premium in the location and portable objects charges is developed, as shown on Line (15), to be used in later calculations.

National Bureau of
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Appendix
Exhibit I

BOILER AND MACHINERY

1961 REVIEW OF DIRECT DAMAGE RATES

CALCULATION OF INSPECTION EXPENSES IN OBJECT RATES

	(1) 1956-1958 Number of Written Locations	(2) Proposed Inspection Amount in Location Charge	(3) Proposed Written Inspection Premium in Location Charge (1)x(2)
Locations (a)	331,168	$28	$9,272,704
Portable Objects (b)	12,249	12	146,988
(4) Proposed written inspection premiums in location charges discounted for multiple locations (3a) x .95*			$8,809,069
(5) Proposed written inspection premium in (4) plus proposed written inspection premium in portable object charges (4)+(3b)			8,956,057
(6) 1956-1958 Earned location and portable object charges			15,624,435
(7) 1956-1958 Written location and portable object charges			15,375,315
(8) Ratio of earned charges to written charges			1.0162
(9) Proposed earned inspection in (5) (5)x(8)			9,101,145
(10) Dollars for pure inspection in (9) (9)x.505			4,596,078
(11) 1956-1958 Incurred inspection expenses			35,819,195
(12) Factor to reflect subsequent trend in inspection costs (See Exhibit II)			1.075
(13) 1956-1958 Incurred inspection expenses reflecting subsequent trend (11)x(12)			38,505,635
(14) Proposed inspection dollars in object rates (13)-(10)			33,909,557
(15) Percent of inspection pure premium in the location and portable object charges [(10 ÷ (11)]			12.83%

*Determined from data used in 1948 rate revision

BOILER AND MACHINERY

1961 REVISION OF DIRECT DAMAGE RATES

Inspection Trend Data

A. COMPARISON OF EXPENSE RATIOS FOR CALENDAR YEARS 1956-1959
INSURANCE EXPENSE EXHIBIT - COUNTRYWIDE DATA OF THE MEMBERS
OF THE NATIONAL BUREAU OF CASUALTY UNDERWRITERS

	1956	1957	1958	1956-1958	1959	Increase Over 1956-1958
Inspection Expense Paid (Including Boards, Bureaus and Associations) on Present Rate Level	25.9	26.1	26.0	26.0	28.0	+ 7.7%

B. ITEMS AFFECTING INSPECTION EXPENSES

	1956	1957	1958	1956-1958	Jan.-Sept. 1960	Increase Over 1956-1958
1. Average Weekly Earnings in Insurance Industry*	$77.49	$80.73	$82.97	$80.40	$87.73 (Jan.-) (July)	+ 9.1%
2. Retail Prices - All Foods*	111.7	115.4	120.3	115.8	119.2	+ 2.9
3. Retail Prices - Food away from home ∮	105.4	109.3	112.6	109.1	118.5	+ 8.6
4. Prices - Transportation*	128.7	136.0	140.5	135.1	146.2	+ 8.2
5. Hotel Prices						
a) Horwath & Horwath, Hotel Accountants and Consultants	192.0	204.0	210.0	202.0	218.0(1959)	+ 7.9
b) Harris, Kerr, Forster & Company - Accountants and Consultants	243.0	259.0	268.0	256.7	280.0(1959)	+ 9.1

*Source: Monthly Labor Review - U.S. Department of Labor.
∮Source: Consumer Price Index - U.S. Department of Labor.

C. PROPOSED TREND FACTOR = 1.075

IMPLICATIONS OF SAMPLING THEORY FOR PACKAGE POLICY RATEMAKING

JEFFREY T. LANGE

Following the introduction of the Homeowners' policy, interest began to develop in the problem of making rates for package policies. This interest was heightened by the introduction of the commercial package policies, which departed from the indivisible premium concept of the Homeowners' policy. These policies raised a question for ratemakers: should the experience data be collected so that a single rate might replace the separate rates for each coverage? Before answering this question, it was necessary to face the more basic question of how the experience developed for several different coverages might be combined for ratemaking. While actuaries were pondering these questions, still another problem arose. The experience data for the residual fire dwelling business—those risks not insured under the package policy—were found to be extremely adverse. Thus the ratemakers were forced to expand the package policy ratemaking problem to include ratemaking for residual business.

It is the purpose of this paper to discuss package policy ratemaking from the point of view of mathematical statistics, and in particular sampling theory. Two fundamental techniques which are widely used in sampling—stratification and ratio estimation—are discussed with emphasis on why these techniques produce more precise estimates than less sophisticated methods. These techniques are then applied to package policy ratemaking. The statistics are stratified by layer of coverage and the ratio of package and non-package pure premiums within each stratum is estimated. These ratios are applied to the underlying pure premiums, developed using combined package and non-package data, to obtain underlying pure premiums for each policy form and each coverage. For package policies, the underlying pure premiums (reflecting the appropriate ratios) may be combined and loaded for expenses to obtain an indivisible premium.

The essence of the method is that package policy experience will be subdivided by coverage for ratemaking, and will be used in combination with non-package experience in determining rate levels and rate relationships. Differentials will be computed for each coverage between package and non-package data to reflect the differences between these two classes of risks.

While the method is supported by certain principles drawn from sampling theory, which are explained in some detail, it also has practical advantages. Package rates would be adjusted even when the experience was

still of small volume; later when non-package volume declines, the combined experience will still be sufficient to produce adequate rate adjustment for residual classes of business. The method also provides for an accurate computation of trend, credibility and loss development factors for package policies.

The method implies that essentially the same statistical plan be used for both package and non-package data and that uniform definitions be used for all coverages. It also implies that both sets of data become available at about the same time (and for the same group of companies). Furthermore, it represents a departure from the current procedures for rating package policies. Finally, it would appear to suggest that package and non-package rates for all coverages be developed simultaneously. The net result of these implications is a radical departure from current procedure.

While the method presented in this paper is illustrated by a detailed example and is described at some length, it should be clear that it is not presented as a solution to package policy ratemaking problems. The purpose of the paper is to discuss the implication of certain principles from sampling theory for ratemaking. The ratemaking method presented is only an example of what might be developed from these principles. As is pointed out in the paper, there are certain limitations to these principles, and their applicability in general to all package policy ratemaking is not completely clear.

Sampling Theory and Ratemaking

One might well question whether sampling theory has any applicability to the general ratemaking problem. The typical sampling problem is to estimate a certain population parameter based upon a random sample of n items drawn from the total population. The theory deals with the best ways to select the sample units, the methods of computing the estimate and the relative precision of the estimate. Few companies or rating bureaus rely upon samples in establishing overall rate level changes, and hence one might argue that sampling theory has little application to ratemaking.

Whether sampling theory has any relevance for ratemaking depends upon our view of ratemaking and the insurance mechanism. If ratemaking decisions are made after an analysis of the costs of doing business—the premiums, losses and expenses—and if these statistics are considered to be historical accountings of what actually happened, then sampling theory has no application to ratemaking. On the other hand, the insurance business may be regarded "as a continuous game of chance between the company on one side, and the totality of policyholders on the other. In the

course of this game, certain random events known as *claims* occur from time to time, and have to be settled by the company, while on the other hand the company receives a continuous flow of risk premiums from the policyholders."[1] Thus, the relationship of claims or losses to premiums or exposures over a period of time may be described in terms of random sequences, which is to say, "the risk business of an insurance company forms a particular case of a stochastic process."[2]

In examining this latter view, it must be borne in mind that in an insurance contract the "insured is relieved of any concern, not only as to what is going to happen, but also as to what could happen but probably will not".[3] Thus, the losses which the insurer incurs during a given time period "never actually reflect the hazard covered, but are always an isolated sample of all the possible amounts of losses which might have been incurred".[4] Thus, insurance statistics may be viewed as samples of what might have occurred. In ratemaking, these samples are used to make projections of what will occur in the future, and it is important to note that these samples will be subject to sampling variation due to pure chance fluctuation.

If ratemaking statistics are samples, then sampling theory has a great deal of significance for ratemaking. One goal of ratemaking should be to produce estimates which minimize sampling variation. In this paper, certain sampling techniques, which are utilized to reduce the variance of estimates, are examined and their implications for ratemaking are explored. In general, such techniques might be divided into two broad classifications. One class would include those techniques which present more sophisticated ways of drawing the sample—i.e. that deal with sample design. In this class fall stratification, sub-sampling, cluster sampling, etc. The other class of techniques would encompass those that present improved methods of making an estimate from the data once it has been collected. In this latter category are ratio estimates, regression estimates, etc.

Stratification

In 1926, A. L. Bowley in his paper "Measurement of the Precision Attained in Sampling"[5] pointed out that the precision of estimates can be

[1] Cramer, H., "Collective Risk Theory: A Survey from the Point of View of the Theory of Stochastic Processing" (Esselte Reklam, Stockholm 1955), p. 5.

[2] Ibid., p. 7.

[3] Bailey, A., "Sampling Theory in Casualty Insurance," *PCAS Vol. XXXIX*, p. 50.

[4] Ibid., p. 50.

[5] Bowley, A., "Measurement of the Precision Attained in Sampling," *Bulletin of the International Statistical Institute (BISI) Vol. XXII.*

improved by taking a sample which is representative of the population. In particular, a more precise estimate can often be obtained economically by stratified random sampling. When stratified random sampling is used, the population is divided into several strata (mutually exclusive subgroups of the population), the sample is apportioned in some prearranged way among the strata, and the sampling performed at random from each stratum. In apportioning the sample among the strata, Bowley suggested that the number of sample units selected in a strata should be proportional to the number of units of the population in the strata: "proportional allocation."

Most authors agree that stratification nearly always results in a smaller variance for the estimated mean than is given by a comparable simple random sample. In fact, there will be a reduction in variance if the population can be subdivided into strata which are somewhat more homogeneous than the total population. The variance is reduced by the weighted average of the squared differences of the strata means and the grand mean.[6]

Variance for stratified sampling = variance $- \sum N_h (\bar{Y}_h - \bar{Y})^2/nN$
where $\bar{Y}_h$ is the mean for a strata

$\bar{Y}$ is the grand mean
N_h is the number of units in a strata
N is the total number of units in population
n is the number of sample units
"variance" is the variance of a simple random sample

As a result, the greater the difference between the individual strata (i.e. the more homogeneous each strata), the greater the improvement due to stratification. This arises from the nature of the variance itself. In simple random sampling, the variance is computed by squaring the difference between each sample item and the grand mean, not the mean of the strata as in stratified sampling. Thus, the reduction in variance arises from the fact that the individual item within each stratum is closer to the average value for the stratum than to the average of all strata.

Neyman[7] presented an alternate method of allocation in which the sample size within the strata is proportional to both the number of units and the standard deviation within the strata: "Neyman allocation" or

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[6] Derivation of the formula is given by Cochran, W. *Sampling Techniques* (Second Edition) (John Wiley & Sons, Inc., New York, 1963) p. 98.

[7] Neyman, J., "On the Two Different Aspects of the Representative Method: the Method of Stratified Sampling and the Method of Purposive Selection," *Journal of the Royal Statistical Society. Vol. XCVII*, p. 558.

"optimum allocation." If the variances for individual strata differ significantly from the variance of the whole sample, then by making the sample size within each strata proportional to its variance, a reduction in the overall variance proportional to the average differences in variance is possible. In other words, more information should be used in making estimates when the data exhibits greater variability. Both Hurley and Mayerson[8] arrived at a similar conclusion (for a different reason), when they examine the need for different credibility criteria for different classifications of risks.

Neyman proved that for infinite populations the variance of the sample mean for proportional allocation was always less than or equal to that for simple random sampling, and that the variance of the mean for Neymen allocation is less than or equal to that for proportional allocation. Armitage[9] extended Neyman's results to finite populations, and found that in general the results do not hold. In fact, if the means within each strata are equal, then the variance of the mean under proportional allocation is greater than that under simple random sampling. If in addition the standard deviations within each strata are equal, then variance of the mean under Neyman allocation is greater than that under simple random sampling. Thus, in the case of small samples stratification will improve precision only if the resulting strata are more homogeneous than the total population.[10]

Stratification by Coverage and Layer of Insurance

It would appear that by dividing loss statistics based upon coverage, and into layers within those coverages, the resulting strata would each be more homogeneous than the total sample. The distributions of claims and of losses by size of claim show considerable variation by line of insurance. It seems unnecessary to discuss at length differences in loss distributions between fire insurance and liability insurance, or between windstorm insurance and theft insurance. Similarly, it is generally accepted that in rate-making estimates may be improved by giving separate consideration to various layers of insurance.[11] This is another use of stratification, and

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[8] Hurley, R. "A Credibility Framework for Gauging Fire Classification Experience," *PCAS Vol. XLI* p. 161 and Mayerson, A. "A Bayesian View of Credibility," *PCAS Vol. LI*, p. 85.

[9] Armitage, P., "A Comparison of Stratified with Unrestricted Random Sampling from a Finite Population," *Biometrika Vol. XXXIV*, p. 273.

[10] A discussion of whether stratification will yield an improvement in precision when sampling from finite populations is given by Evans, W., "On Stratification and Optimum Allocation," *Journal of the American Statistical Association (JASA) Vol. XLVI*, p. 95.

[11] Salzmann, R., "Rating by Layer of Insurance," *PCAS Vol. L*, p. 15.

should result in improved estimates since the loss distributions for excess insurance differ substantially from those for basic coverages. Since strata by coverage and layer would exhibit different means (and variances), a considerable improvement in precision would result from making separate estimates within each strata, and then combining the estimates, as opposed to simply combining the data.

In addition to minimizing chance variation, stratification by coverage and layer of insurance would permit the application of different credibility procedures to different coverages and layers of coverage. From an actuarial standpoint, this would be more accurate than applying a single credibility factor to the overall result.[12]

Stratification by coverage would also permit the application of trend factors especially suited to each coverage, rather than an average trend factor. Bodily injury liability trends are certainly influenced by many factors (hospital costs, jury verdicts) which have little significance for fire insurance. Similarly, rising crime rates, while significant for theft insurance, have little relevance for windstorm insurance. Loss development factors, which measure the changes in the aggregate dollar losses for an accident year as reserves mature, are also probably best measured by coverage, rather than for all coverages combined.

It would seem that from an actuarial standpoint, the number of years of data to be used in ratemaking, the calculation of credibilities, the measurement of trends, and the computation of loss development factors might all best be considered independently by coverage. Furthermore, from a statistical viewpoint, the analysis of package policy statistics by coverage and layer of coverage, i.e. by strata, would serve to reduce the effect of chance variation and to increase the precision of the estimates.

Ratio Estimates

Ratio estimates, although biased, have been frequently used in applied statistical work for more than a quarter century. The Bureau of the Census, for example, has for many years produced annual estimates of items included in the decennial census by the use of sample surveys incorporating ratio estimate. In fact, the use of ratio estimation in large scale

[12] Hurley and Mayerson. It might also be noted that stratification by coverage parallels the subdivision of Workmen's Compensation data into three categories (serious, non-serious and medical) and the use of different credibility factors for each category. A discussion of the decrease in relative credibility which results from the combination of non-homogeneous data is given by L. H. Longley-Cook, "Underwriting Profit in Fire Bureau Rates," *PCAS Vol. LIII*, this issue.

sample surveys predates the theoretical examination of ratio estimates. In the application of these techniques, it was customary to note that ratio estimates are biased and to add the opinion that the bias "is usually negligible"; however, no support, mathematical or empirical, was offered for the latter statement.[13]

In order to apply any of the ratio estimation techniques each sample observation must consist of two points: an observation of the variable under study and of an auxiliary variable. The auxiliary variate is simply some item which is closely correlated with the variable to be studied. In producing the annual updating of the decennial census, the Bureau of the Census usually uses the values obtained at the time of the last complete census as the auxiliary variable. In its survey, the Bureau samples not only the current value, but also the value at the time of the last census. The ratio of the current value to the value at the time of the last census is estimated for the sample, and this ratio is applied to the total obtained in the last census to produce the estimate of this year's value.[14]

During the early 1950's, several statisticians became interested in examining the bias of the ratio estimate and its relative efficiency when compared with simple expansion. J. C. Koop[15] obtained an expression for the bias of a simple ratio estimate, and explored the possibilities of reducing the bias. When analytic expressions for the bias were developed, it became possible to evaluate the various ways of computing ratio estimates and to develop ratio estimates which were unbiased.[16]

Since the ratio estimate may be biased, one may question whether or not it is worth trying. There are two reasons for exploring its use. First, it is possible to compute unbiased ratio estimates or to compute biased ratio estimates and then estimate their bias. Thus, in practice, it is unnecessary to use a ratio estimate which is significantly biased, since if it is biased one has the option of using an unbiased ratio estimate. Second, whether or not there will be an improvement as a result of using ratio estimates can usually be estimated fairly easily.

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[13] Hansen, M., Hurwitz, W. and Gurney, M., "Problems and Methods of a Sample Survey of Business," *JASA Vol. XLI*, p. 173 and Hurwitz, W. and Hansen, M., "On the Theory of Sampling from Finite Populations," *Annals of Mathematical Statistics Vol. XIV*, p. 333.

[14] In actual practice, the sample design is more complicated and varies according to the item sampled. For an example see Hansen, Hurwitz and Gurney.

[15] Koop, J., "A Note on the Bias of the Ratio Estimate," *BISI Vol. XXXIII Part II*, p. 141.

[16] Hartley, H. and Ross, A., "Unbiased Ratio Estimates," *Nature Vol. CLXXIV*, p. 270.

Ratio estimates produce their most significant improvement over the other forms of estimation if the regression of the variable under study and the auxiliary variable is a straight line through the origin. In this case, ratio estimates are unbiased. If the relationship of the two variables is approximately linear, then ratio estimates are probably more precise. Stated more analytically,[17] ratio estimates are better (in the sense of having lower variance) than estimates based upon simple expansion (non-regression estimates) if the correlation of the variable under study and the auxiliary random variable is greater than one-half the ratio of the coefficients of variation of the auxiliary random variable to the variable under study:

$$\text{correlation} > \tfrac{1}{2} \frac{\text{coefficient of variation of auxiliary variable}}{\text{coefficient of variation of variable to be studied}}$$

If for example the relative amount of variation of both variables is equal, then the ratio estimate will result in a lower variance (and an improvement in precision) if the correlation exceeds .5. If the auxiliary random variable has less variation than the variable under study (i.e. if it is the result of a larger sample), then an even lower correlation is sufficient for a reduction in variance.

The use of stratification coupled with ratio estimation has been quite widespread in sampling problems. Published comparisons[18] of the application of these techniques versus less sophisticated methods have shown that the variance may be reduced by as much as 50% to 95%. This dramatic improvement in precision is equivalent to radically increasing the sample size at no additional cost.

Ratio of Package to Non-Package Experience

When a package policy is first introduced its rates are generally constructed from the non-package rates for component coverages with appropriate discounts. These non-package rates are the result of many rate revisions and can be thought of as relatively accurate, time-tested, known values in comparison with the package rates constructed from them using judgment discounts. During the first few years of the package policy's operation, the volume of statistics developed will probably be much smaller than the non-package experience, and certainly smaller than the sum total of the experience which over the years went into the development of the non-package rates. The preliminary package policy data may be thought

[17] Derivation is given in Cochran, p. 165.
[18] Ibid., p. 179.

of as a sample which will be used to estimate package policy rates. The non-package rates, as modified by the latest available statistics, may be considered auxiliary variables which can be utilized in the estimation of package rates. For a given coverage, the correlation between package and non-package statistics should be fairly high, especially in the early stages, since much of the package business will represent simply a transfer from the non-package policies.

One might also expect that the package and non-package statistics would exhibit approximately the same amout of relative variation. Perhaps due to smaller volumes, the package policy data might exhibit greater variation, but this may be offset to some extent by the greater homogeneity of the population of risks written under the package policy. If the package policy data exhibits as much, or more, variation than the non-package data, and if correlation between the two sets of data is relatively high (greater than .5), then by analogy to sampling theory a gain in precision should be achieved by the use of some form of ratio estimation.

The use of ratio estimates implies that the ratio of the variable under study to an auxiliary variable for the sample is measured, and that this ratio is applied to the auxiliary variable population value to obtain our estimate of the population value for the variable under study. Applying this to package policy ratemaking, the average ratio (by class and territory) of package to non-package pure premiums (or the ratio of the averages) might be applied to the non-package underlying pure premiums to obtain package underlying pure premiums for the coverage. These package underlying pure premiums for each coverage might be added together to obtain the pure premium underlying the indivisible premium for the package policy. Presumably, the non-package rates would reflect the rate level indications of the latest experience and trend data, and also the class and territory rate relationships established from several years of data. By using the ratio estimate technique, this body of statistical information would be incorporated into the package policy rates, while simultaneously reflecting the relationship of package and non-package experience indicated by the available statistical data. The ratio technique would thus make use of all of the available statistical information.

Eventually, the volume of data developed under the package policy may exceed that developed under the non-package policies—the residual problem. Here a ratio estimate technique might be employed, using the package policy underlying pure premiums as the auxiliary variable in setting non-package rates. However, the use of ratio estimates would cease

to yield much advantage when correlation between package and non-package business declines.

Example

The use of stratification and ratio estimation in ratemaking would be best illustrated by an example using actual package policy data. Unfortunately, statistics are not collected in a manner which permits an application of the method to a broad package policy. As an illustration of how the method might be applied, the Special Automobile Package Policy (SAP) was selected because statistics for that package policy and for its component coverages when purchased separately are collected under the same statistical plan and are almost comparable.

The SAP consists of a liability package with an indivisible premium and of a physical damage package. For this illustration the liability package was selected.

The basic ingredients of the liability package are bodily injury (B.I.) and property damage (P.D.) liability insurance at a $25,000 single limit[19], medical expense coverage limited to $1000 per person, uninsured motorist coverage with limits equal to the financial responsibility limits in the state, and accidental death coverage with a $1000 limit. An increased single limit of liability and increased medical expense coverage are available for an additional premium charge.

Currently, automobile liability ratemaking for non-package policies (Family Auto Policy—FAP) would treat each of these coverages independently. In order to illustrate how ratio estimates and stratification might be applied to a more sophisticated package incorporating both property and casualty coverages, the coverages will be grouped in three subdivisions representing three different approaches to ratemaking. The first will include the basic limits ($10,000/$20,000 B.I. and $5,000 P.D.) liability coverages, for which a rather sophisticated, formula ratemaking technique has been developed for FAP rates.[20] Since this approach utilizes exposures in computing premiums at present rates it is sometimes referred to as a "modified pure premium approach" and will serve as an example of casualty ratemaking procedures. The second group of coverages includes medical expense coverage and uninsured motorists coverage. The ratemaking techniques currently used for these lines may be taken as an illus-

[19] Limits of $15,000 for liability and $500 for medical expense are available in a few states.

[20] Stern, P., "Ratemaking Procedures for Automobile Liability Insurance," *PCAS LII*, p. 139.

tration of property insurance ratemaking in that they resemble the loss ratio approach as outlined by C. A. Kulp.[21] Finally, there are a collection of excess coverages, some mandatory (liability above 10/20/5 and accidental death coverage), some optional (liability in excess of the $25,000 single limit). Such low premium volume coverages, some with high possible single losses, will probably be found in most packages.

Since premiums at present rates are used in ratemaking for the FAP, it was necessary to subdivide the SAP indivisible premium into its components by coverage. This was accomplished by taking the original formula for computing SAP rates from the non-package rates, substituting the present FAP base rates for the original FAP rates, the present SAP base rate for the original SAP rate, and solving for the package discount.

$$\text{SAP Semi-annual Rate} = .5d[1.0750(\text{BI Rate}) + 1.0368(\text{PD Rate}) + .50(\text{Med. Pay. Rate}) + .50(\text{UM Rate})]$$

where d = complement of package discount expressed as a decimal and where (____ Rate) designates the corresponding annual FAP rate

This package discount times the present FAP 10/20 B.I. base rate related to the present SAP base rate is the percentage of the SAP premium at present rates in a given territory which should be allocated to 10/20 B.I. For example, in territory 01 where the FAP B.I. rate is $62, the SAP rate is $44 and the complement of the package discount was found to be .84, the percentage of SAP premium which should be allocated to bodily injury coverage is 59.2%:

$$\frac{.5d\ (\text{B.I. Rate})}{\text{SAP Rate}} = \frac{.5(.84)(\$62)}{\$44} = 59.2\%$$

This same procedure was applied to the other coverages.

The SAP premium at present rates for each territory could be added to the corresponding FAP premium and the sum could be incorporated in the standard ratemaking procedures for each subline. From the idenitfication of SAP losses by cause of loss, it is possible to obtain SAP losses for a given layer of coverage. The losses may be added to the corresponding FAP losses, and statewide rate changes and territory rates may then be computed using combined package and non-package data and following standard formulas. This has been illustrated with bodily injury liability data on Tables 2 and 3. For the basic limits coverages, the ratio of package to non-package data has been computed by dividing the SAP

[21] Kulp, C., "The Ratemaking Process in Property and Casualty Insurance—Goals, Techniques, and Limits," *Law and Contemporary Problems Vol. 15*, p. 493.

pure premium by the average FAP pure premium, which was computed by taking the weighted average of FAP pure premiums by class and territory utilizing the SAP exposures as weights.[22] (See Table 1.)

The Automobile Statistical Plan[23] does not require the reporting of exposures for medical payments coverage (the FAP equivalent of medical expense) or uninsured motorist coverage. SAP premiums and losses could be obtained for these two coverages as described in the preceding paragraph, and thus SAP statistics could be incorporated in the loss ratio analyses usually followed in setting rates for these sublines. In addition, the SAP premiums could be adjusted to the FAP level by dividing by the discount assumed in the allocation of SAP premiums by coverage. This would permit a comparison of SAP and FAP loss ratios so that indicated package discounts might be computed. (See Table 1.)

Several layers of coverage remain for consideration: excess B.I. and P.D. liability and accidental death coverage. Excess coverages are not normally rated on a state by state basis, so the experience for these coverages might be combined on a countrywide basis. Presumably, the SAP excess data could be reviewed simultaneously with non-package data and modifications of the existing charges made at that time. For our example, it has been assumed no modification of the existing charges for limits of coverage in excess of 10/20/5 is to be made.

The calculation of an SAP indivisible premium is shown for Territory 01. The proposed FAP rates (developed utilizing combined SAP and FAP data) are converted to underlying pure premiums and these underlyings are increased to the SAP limits of liability using the standard FAP factors for a $25,000 single limit, since no change in excess charges has been assumed. The ratio of SAP to FAP experience for each coverage is applied to the underlying for that coverage. The resulting underlying pure premiums by coverage were added together, multiplied by .5 to con-

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[22] For this example, it was necessary to estimate the ratio by taking the ratio of the averages; however, a more accurate result might have been obtained by averaging the ratios of the SAP pure premium to the FAP pure premiums for each class and territory and then correcting this average ratio for the bias. See Hartley and Ross. In order to simplify the example, credibility factors have not been applied to the ratios.

[23] *Automobile Statistical Plan*, National Bureau of Casualty Underwriters, 1966.

Table 1

ESTIMATION OF RATIOS

Coverage	Average Pure Premium S.A.P.	F.A.P. *(a)*	Ratio of S.A.P. to F.A.P.
B. I. 10/20	$36.39	$39.13	.93
P.D. $5,000	14.48	15.40	.94

Coverage	Complement of Discount Assumed in Splitting Premium *(b)*	S.A.P. Loss Ratio On S.A.P. Level	On F.A.P. Level	F.A.P. Loss Ratio	Ratio of Adjusted F.A.P. to F.A.P.
(1)	(2)	(3)	(4) = (3) × (2)	(5)	(4) ÷ (5)
Medical	.41	.820	.336	.703	.48
Uninsured Motorist	.41	.939	.385	.544	.71

Coverage	S.A.P. Premium	S.A.P. Losses	Loss Ratio
Excess liability and accidental death coverage			
In standard limits package	$119,599 *(c)*	$142,140	1.188
Excess over standard limits	290,170 *(d)*	228,104	.786
Subtotal	$409,769	$370,244	.904

NOTES:

(a) F.A.P. pure premiums by class and territory were averaged using the S.A.P. *exposures as weights.*

(b) The statewide average complement of the package discount was found to be .82. The complement of package discount times .50 yields .41. (A 50% additional discount for medical and uninsured motorist coverages was included in the original formula.)

(c) Computed by applying the increased limits factor (minus unity) to the basic *limits premium at present rates.*

(d) Computed by applying the average S.A.P. additional charge to the S.A.P. premium at present rates for standard limits.

Table 2

AUTOMOBILE LIABILITY INSURANCE – PRIVATE PASSENGER NON-FLEET

Development of Statewide Rate Level Changes

Coverage	(2) Accident Year	(3) 10/20/5 Limits Earned Premium at Present Collectible Level	(4) 10/20/5 Limits Incurred Losses	(5) Number of Claims	(6) Loss & Loss Adjustment Ratio at Present Rates (4) ÷ (3)	(7) Accident Year Weights	(8) Weighted Loss & Loss Adjustment Ratio at Present Rates
B. I.	1963	$9,434,132	$6,689,194	5,872	.709	15%	.786
	1964	9,723,912	7,767,803	6,318	.799	85%	
P.D.	1963	$4,421,474	$2,892,330	17,033	.654	15%	.678
	1964	4,560,564	3,109,779	17,582	.682	85%	

Coverage	(9)	(10) Factor to Adjust Losses	(11) Rate Level Loss Ratio (8) × (10)	(12) Expected Loss & Loss Adjustment Ratio	(13) Credibility	(14) Indicated Rate Level Change $\left[\frac{(11)}{(12)} - 1.0\right] \times (13)$
B. I.		1.000	.786	.662	1.000	+ 18.7%
P.D.		1.173	.795	.662	1.000	+ 20.1%

NOTES:

This table corresponds to Exhibit 7, page 178, of Stern's "Ratemaking Procedures for Automobile Liability Insurance" *(PCAS Vol. LII)*. An explanation of the terms used in the exhibit and of the derivation of the values shown in each column is set forth on pages 176-183 of Stern's paper. Modifications of Stern's example (in addition to the substitution of a different set of data) are discussed below.

Column (3) FAP and SAP earned premiums at present collectible rates were computed as described by Stern. SAP premiums were subdivided by coverage as explained previously, and then added to the FAP premiums. For 1964, the subdivision of premiums by policy form is shown below:

B.I.	1964	FAP	$8,430,213
		SAP	$1,293,699
		Total	$9,723,912

Columns (4) and (5) SAP losses for each coverage were identified by cause of loss coding. Both FAP and SAP losses were then limited and adjusted as outlined by Stern. For 1964, the subdivision of bodily injury losses by policy form is shown below:

			Column (4)	Column (5)
B.I.	1964	FAP	$6,542,253	5,325
		SAP	$1,225,550	993
		Total	$7,767,803	6,318

Column (12) was obtained by taking the weighted average of the FAP and SAP expected loss ratios. For this example, expected loss ratios of .655 and .705 respectively have been assumed.

Column (14) sets forth the combined rate change. Since the proposed differential between the two policy forms will differ from the present differential, there will be different rate changes for each policy form. For bodily injury coverage, the present package discount is .82; the comparable package discount resulting from the indications on Table 1 and the assumed difference in expense ratios is (.93) (.655 ÷ .705) or .86. By applying a rate change of + 17.9% for the FAP and utilizing the .93 ratio and the .705 expected loss ratio in computing SAP rates, a 23.7% rate change (1.179) (.86 ÷ .82) is achieved for the SAP. The average of the SAP and FAP rate changes would be 18.7%.

Table 3

AUTOMOBILE LIABILITY INSURANCE – PRIVATE PASSENGER CARS

Development of Proposed Rate Level Changes by Territory

Bodily Injury – 10/20 Limits

Territory	(2) Accident Year 1964 Earned Number of Cars	(3) Present Average Rate	(4) Accident Years 1962 – 1964 10/20 Limits Pure Premium (Incl. All Loss Adj.)	(5) Loss and Loss Adjustment Ratio at Present Rates (4) ÷ (3)	(6) Credibility	(7) Formula Loss & Loss Adjustment Ratio at Present Rates [(5) × (6)] + [1.0 – (6)] × .773	(8) Col. (7) as Ratio to Statewide Average	(9) Territorial Rate Level Change [(8) × 1.179] – 1.0	(10) Average of Present Differentials to Rate Class 1A	(11) Proposed Class 1A Rate (3) × [1.0 ÷ (9)] ÷ (10)
					BODILY INJURY					
01	56,383	60.15	45.42	.755	1.00	.755	.974	+14.8%	.970	71
02	39,920	55.22	44.91	.813	1.00	.813	1.049	+23.7	.969	70
03	10,082	44.68	30.23	.677	.80	.696	.898	+ 5.9	.951	50
•										
•										
•										
Total	202,944	47.92	37.02	.773		.775				

NOTES: This table corresponds to Exhibit 8, page 185, of Stern's "Ratemaking Procedures for Automobile Liability Insurance" *(PCAS Vol. LII)*, and an explanation of the exhibit appears on pages 183 through 187 of that paper. In addition to the use of combined SAP and FAP data, the following should be noted.

Column (3) was obtained by adding to the FAP premium at present rates, the SAP premium at present rates (apportioned by coverage as on Tables 1 and 2) and dividing by the combined FAP and SAP exposures.

Column (4) was obtained by limiting the SAP bodily injury losses (obtained from cause of loss coding) to 10/20 and adding them to the FAP losses. The result was divided by the combined exposures to obtain the pure premium.

Column (5) was obtained using the standard credibility table (Stern, page 166) and combined number of claims. Had FAP experience been used alone, credibilities would have been up to .10 lower. If SAP B.I. data were used alone, credibilities would have been .20 to .40 lower.

Column (8) did not differ significantly from the comparable values for the FAP policy alone: the maximum difference was 5%. However, when SAP B.I. data were used alone, there were substantial differences between the resulting ratios to the average and those shown in column (8) for low volume territories.

vert them to a semi-annual basis, and divided by the SAP expected loss ratio[24] to obtain the SAP indivisible premium.

(1) Coverage and Limits	(2) Proposed FAP Rate	(3) Underlying Pure Premium .655 x Rate	(4) Increased Limits Factor	(5) Ratio from Table 1	(6) SAP Underlying (3)(4)(5)
10/20 B.I.	$71.00	$46.51	1.0750	.93	$46.51
5,000 P.D.	34.00	22.27	1.0368	.94	21.71
$1,000 Med Pay	13.00	8.52	1.000	.48	4.09
UM	5.00	3.28	1.000	.71	2.33
					$74.64

SAP Semi-Annual Rate = .5(74.64 ÷ .705) = $53

Discussion

There are a number of similarities between the preceding example and the "component method" of ratemaking outlined by Bailey, Hobbs, Hunt and Salzmann in "Commercial Package Policies—Rating and Statistics."[25] They rejected the component method in favor of the "indivisible premium method." The main feature of the latter was that statistics would be analyzed "by type of insured, according to the combination of coverages selected."[26] Since their "Model Statistical Plan" provided for the recording of exposures and for cause of loss coding,[27] it would be possible to superimpose stratification and ratio estimation on the authors' indivisible premium ratemaking procedures. The added refinement of stratification-ratio estimation will produce more meaningful and useful results in each of the four areas where the indivisible premium approach was shown by the authors to be most efficient.

The first area had to do with the philosophy of package policies, and in particular with the concept that perils insured against is a valid basis for classification. A corollary is that package loss costs for a particular insured (type of insured) might not equal the sum of the loss costs for the coverages rated individually for all insureds. Since the use of stratification and ratio estimation does not call for the combination of the ex-

[24] To illustrate how package and non-package data might be combined even if the expense provisions were different for each type of policy, a .655 expected loss ratio has been assumed for the FAP and a .705 expected loss ratio for the SAP.

[25] Bailey, R., Hobbs, E., Hunt, F. and Salzmann, R., "Commercial Package Policies —Rating and Statistics," *PCAS Vol. L*, p. 87.

[26] Ibid., p. 92.

[27] Ibid., p. 97.

perience of all insureds (as does the authors' component approach), the truth of the packaging principle could be tested. While under the indivisible premium approach it would be tested only for all perils combined, by using stratification-ratio estimation one could determine which perils produced the saving. In the SAP example in the previous section, it was found that for certain coverages, e.g. medical expense, the savings were much more significant than for other coverages (52% versus 6%). The stratification-ratio estimation approach would yield more information in testing the packaging principle, and the results of such analysis would be of greater significance in planning future packages and redesigning existing packages because they would pinpoint areas where the greatest savings were achieved. Considering the Homeowners' policy as an example of indivisible premium rate-making, it is interesting to note that although it is clear that the packaging principle was true—i.e. package loss costs were less than the sum of the individual coverages—it is not possible to determine how much burglary loss costs were reduced by making this coverage mandatory, or whether there was any reduction in windstorm loss costs, etc. Such information might have been of value in modifying the Homeowners' package or in designing new package policies. It would not emerge from an indivisible premium method although it would be routinely produced by a method employing stratification-ratio estimation.

The second area was the screening and reducing of the number of different plans available, which would be accomplished by collecting data by combination coverage. By employing stratification-ratio estimation one might determine which combinations produce no packaging savings. Coverage combination purchased by the insured could be considered another form of risk classification which is superimposed over the existing classification plan. One could more precisely pinpoint the ineffective package combinations by isolating exactly where (for what coverages) the combination produced savings and the magnitude of these savings. For example, one might find that the addition of a certain coverage to a package did not produce any reduction in pure premium for that coverage, nor did it change the results for any other coverage. From this, one might conclude that the combination including that coverage on a mandatory basis should be eliminated.

The third area was the elimination of complications caused by duplication of coverage between endorsements and the basic policy. Once again the same arguments in favor of stratification and ratio estimation may be advanced. Providing the statistical plan is set up so that coding is carried out by risk, then an analysis by coverage has all the advantages of the in-

divisible premium analysis. In each of these areas the advantages claimed for the indivisible premium method arise from the way the statistics are maintained—"the Indivisible Premium Statistical Plan"—not from method of analysis. Given the excellent statistical plan described in "Commercial Package Policies—Rating and Statistics," the use of stratification-ratio estimation will generally produce more meaningful results than the indivisible premium method.

The fourth area was the primary one—the coding of the data. "With the indivisible premium approach, experience would be coded *by policy;* whereas experience would be collected *by coverage* under the component rating method."[28] A method involving coding by policy will produce the advantages discussed under areas one, two and three. Without such coding, a method is deficient in all areas. The use of stratification and ratio estimation offers no obstacle to coding by policy, as long as coverages purchased are identified and cause of loss is identified. The example of stratification and ratio estimation presented in the previous section was based on statistics for an indivisible premium package collected by policy, not by coverage.

Two points seem evident from this discussion of "Commercial Package Policies—Rating and Statistics." The first involves stratification-ratio estimation while the second deals with statistics. First, stratification and ratio estimation would yield more valuable information for the design and analysis of package policies than would either the indivisible premium approach, or a feedback of statistics into the basic coverages. This advantage is in addition to the greater precision gained by the use of actuarial procedures suited to each strata (coverage-layer) and the possible advantages from utilizing the ratios of package and non-package data. Second, the key to package policy ratemaking is the statistical plan. Stratification and ratio estimation yielded more information than the indivisible premium method when the "Indivisible Premium Statistical Plan" was used. Both methods owe most of their advantages to the statistical plan assumed by their authors. Each method assumes a statistical plan which is significantly different from the current methods of coding commercial package policy data. While a statistical plan as advanced as the "Indivisible Premium Statistical Plan" is not necessary for the use of stratification and ratio estimation, it is necessary that certain features be incorporated in the statistical plan if these methods are to be used. Among the desirable features are uniform definitions and methods of compiling data by package and

[28] Ibid., p. 94.

coverage, uniform classification and territory definitions, some uniformity in exposure bases, identification of coverages purchased, and cause-of-loss coding. It should be obvious that the existing statistical plans by line of insurance cannot be stapled together and put in a package policy binder. As a corollary to this, all of the detailed coding by line of insurance cannot be preserved in the commercial lines plan.

In the discussion of ratio estimates, it has been assumed that the ratio of package and non-package data will be used if ratio estimates are appropriate at all. In sampling, the denominator of the ratio is usually some auxiliary variable which exhibits less variation than the variable under study and which is based on a broader sample. In our example in which SAP volume was much smaller than FAP volume and FAP rates were the result of many years of experience, the FAP data provided such a base. Turning to Homeowners', it is obvious that the residual fire, burglary, and comprehensive personal liability lines would not provide such a base. The problem of a proper denominator for a ratio estimate will have to be decided individually for each problem to which ratio estimates are to be applied.

In the commercial lines field, one possibility is that a statistical organization might combine the data for the various packages with the non-package data and develop pure premiums by coverage (and layer of insurance), by class, and by territory. These industry-wide pure premiums could be used by companies and rating bureaus as a standard of comparison, or as the denominator in their ratio estimates. In that way an individual package policy could be compared coverage by coverage to the total business, and the company or bureau could establish the savings achieved due to packaging together a particular combination of coverages. Presumably, manual rates for non-package business could be computed by utilizing ratios of non-package pure premiums to the average, resulting in ratios in excess of unity (a non-package surcharge). Thus, a broad statistical basis would be obtained for class and territory relativities, and for analysis of varying package savings which resulted from the coverage combinations in different packages.

Conclusion

Stratification and ratio estimation could be used in package policy ratemaking to produce more accurate results and more meaningful statistics for the evaluation of package policies. The degree of increased accuracy and the utility of the additional information produced by these tech-

niques could probably be evaluated only by empirical studies. It would appear that these techniques have sufficient theoretical support to merit such empirical investigations. To accomplish this would require changes in the method of compiling statistics for package policies. Since similar changes[29] are being considered for other reasons, it is possible that these techniques might be experimented with in the commercial risk area.

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[29] Simon, L., "Statistical Support for Adequate Rates," *Best's Insurance News* (Fire & Casualty Edition) Vol. 67 (No. 3), p. 10.

UNDERWRITING PROFIT IN FIRE BUREAU RATES

LAURENCE H. LONGLEY-COOK

AN ADEQUATE PROFIT

In reviewing bureau rates for every line of business, it has been customary to interpret the requirement of adequacy to mean that rates should be adequate for the *average* company. There have been suggested departures from this rule. Albert Mowbray, the actuary mainly responsible for workmen's compensation rating procedures, held that rates must be adequate for the marginal or least fortunate companies and the author of this note suggested in 1951 that rates should be adequate for any individual prudent member company. On the other hand, insurance officials have sometimes claimed that the expense assumptions used in the rating formula should be somewhat less than the average actually experienced by all companies. However, these various interpretations of adequacy have never departed to any major extent from the principle that the rates should be adequate for the average company and there can be no doubt that the Commissioners' 1921 profit formula for fire insurance intended to provide an underwriting profit of 5% for the average company.

Until quite recently ratemaking in fire insurance was not particularly scientific. For example, Deputy Superintendent Walter F. Martineau of New York, writing in 1947, said:

> "In the past it was the practice to regard as inevitable that some classes would be extremely profitable, others would provide a smaller margin of profit or no profit, and that some classes would be written at a loss. So long as an overall profit was earned, many companies were willing to let this state of affairs continue. In some respects this condition was brought about by competition. The underwriters were willing to reduce profits or even lose money on some classes in order to keep the business, to secure other lines and to satisfy their producers, if the reduced profits or losses could be offset by gains in other classes where competition was not as keen."

With this state of affairs, it was not surprising that no very great thought was given to the effect on underwriting profit which would result from complying with the demand of the regulatory officials of certain states that mutual as well as stock company loss experience should be used for determining fire rates. This demand usually arose from a mistaken interpretation of the principle of the broadest possible base which is discussed later in this paper. If, at the time this procedure was proposed, the volume of

mutual business were small, the inclusion of these data would have had little effect on rate levels and the advantage of prompt approval to a rate filing often outweighs the advantage of complete technical accuracy. Further, there were even some company and bureau officials who held that the use of stock company experience alone might price these companies out of the market. In one state two rate cases were fought hard to eliminate this requirement without success. Although the use of combined experience is not too prevalent, it is used in a sufficient number of states to cause concern.

To appreciate the effect of this requirement on underwriting profit, we can best use a simple example. If mutual loss experience is the same as stock loss experience (except for chance variation) the use of the combined data creates no problem. But, as I have pointed out on more than one occasion, the mutual companies, as a result of their mode of operation, are able to obtain business which develops statistically credible experience more favorable than the stock insurers and, hence, if the loss experience of stock and mutual companies are combined, the true provision for underwriting profit in the rate for stock companies is not 5% but some appreciably lower figure. A simple numerical example illustrates this. We assume that the mutual companies write one-quarter of the business and that their loss ratio (bureau rates) is 10 percentage points lower than that of stock companies.

	Rating Formula	Mutual Companies	Stock Companies
Proportion of business	100%	25%	75%
Provision for losses	47.5%	40.0%	50.0%
Provision for expenses	46.5%	60.0%	46.5%
Provision for profit	5.0%		2.5%
Provision for catastrophes	1.0%		1.0%
Dividends to policyholders	—		—
	100.0%	100.0%	100.0%

Hence, in this illustration, the underwriting profit margin actually provided for stock companies is only one-half that apparently loaded into the rating formula.

Stock agency companies are limited to the business presented to them through the American Agency system and have no means of writing an average cross section of the fire insurance placed with all writers. A rating procedure which forces them to use experience from policies which they

are quite unable to write does not provide the stock companies with an adequate margin for underwriting profit and forces them to provide a tight market for the more difficult to place business. Thus, a commissioner who calls for this procedure is not complying with the legal requirement that rates shall be adequate and is the cause of public dissatisfaction in areas where insurance is difficult to obtain.

It is desirable to consider what would happen if stock experience were used for overall rate level but stock and mutual experience were used for individual classes. Dwellings are a difficult class at the present time because a large proportion of the better dwellings are covered by Homeowners policies, and, hence, while much of the remaining dwelling business is perfectly satisfactory, there is a high percentage of substandard business, owing to poor maintenance, overcrowding or lack of care by the occupant, who is often a tenant and not the owner. It is not surprising, therefore, that, because of the mutual method of operation, the mutual experience is based largely on the better risks and to force this experience to play a part in determining the rates for the substandard dwellings only makes the problem of providing insurance for these properties increasingly difficult.

To justify the use of combined stock and mutual fire insurance loss experience, or as is sometimes suggested experience including independents and direct writers as well, three fallacious arguments are frequently put forward, and these must be reviewed briefly. The first is usually referred to as the "broadest possible base" and the second, less frequently used, I will call "a house is a house." The third argument is that combined stock and mutual experience is used for workmen's compensation insurance which, it is generally admitted, is rated on actuarially sound methods.

BROADEST POSSIBLE BASE

The problem of the Broadest Possible Base is particularly fascinating because there are so many cross threads of truth and falsehood, with the occasional blending of business expediency to produce a weave of rare complexity. What is more obvious than to say that we should use the broadest possible statistical base for ratemaking? The germ of the idea can be seen in the Merritt Report of 1911, "It therefore recommends to the Superintendent of Insurance that he take up this question with the Commissioners of other states and with the companies, in an endeavor to work out a practical plan which will eventually result in producing a classification of loss experience of such an extent and volume as will

furnish a basis upon which the true burning-ratio in the various classes of risks throughout the country can be determined." The need for a broad base becomes clearer with the introduction of Workmen's Compensation insurance, as we can show from a quotation from the first paper in the first volume of the *Proceedings* of the Casualty Actuarial Society: ". . . the possible exposure in one classification will be insufficient in one state to produce an average, except in so many years, that meanwhile conditions may entirely change, and make the accumulated experience entirely useless." The need for the broadest possible base becomes more definitely stated when Clarence Hobbs writes in his text on *Workmen's Compensation Insurance,* "Compensation-insurance statistics, however, increase in value with their volume . . . in obtaining a sound statistical basis for rates. For such a basis, the experience of all carriers is none too great."

The idea of the broadest possible base comes from a statistical principle, usually referred to as the law of large numbers, which states that the larger the volume of a sample of homogeneous data, the closer the experience is likely to be to the expected value for the universe from which the sample is taken. It must be noted that the existence of homogeneous data is an essential requirement for the law of large numbers to apply and when statistics show that year after year the loss ratio of the mutuals is more favorable than that of the stock companies, no statistician would say that the combined data were homogeneous. The addition of mutual loss experience to the stock loss experience does not produce more credible loss data but rather less credible data, since the two classes of data are not homogeneous one with the other.

In order to resolve the paradox of the need for a greater volume of statistics and the statistical truth that the combining of non-homogeneous data produces less rather than more credibility, we must consider more carefully the ratemaking procedure. The well-known actuary and teacher, Clarence Arthur Kulp, has explained this procedure most clearly: "The rate has essentially only two functions. It should produce total funds sufficient to cover the insurer's obligation; it should distribute the cost of insurance fairly among insured persons." These two functions are really quite distinct and much of the fallacy of the broadest possible base arises from a misunderstanding of this separation. Kulp goes on to say, "Some of the limits on the effectiveness of the rate-making process . . . lie in the nature of the rate itself. As long, for example, as rates for most risks are made of historical data and for exposures so slight they require combination with other exposures, so long will it be necessary to accept the actuary's results for precisely what they are—broad averages. One corollary of this

is that rate adequacy must come before rate equity." The process of establishing overall rate adequacy is normally separate from the process of determining the rate for an individual risk, which provides rate equity, although the two are often procedurally intertwined. For rate adequacy we must limit the data to the experience of stock companies, as otherwise they will not, on the average experience the underwriting profit assumed in the rating formula. These data can be increased only by the addition of data which it is reasonable to believe are homogeneous with the stock company data. (This procedure is necessary in the case of an individual company's rate filing.) For rate equity we need to use the largest possible volume of data to establish *rate relativities* between various subclasses, as for example between the various grades of protection when these data are available under the new personal lines statistical plan of the National Insurance Actuarial and Statistical Association. In fact, for such rate equity considerations, data should not be limited to any one state but area data can be used to provide a broader base.

"A HOUSE IS A HOUSE"

A well-known actuary said a few years ago:

"A certain house has a certain risk of burning. This risk of burning will be different from that of other kinds of houses burning due to many factors. But the difference in risk will not be due to where the insurance is placed. The house's risk of burning was generated when the house itself was built and it is entirely related to the existence of the house. The risk of burning would be there whether there was or whether there was not the insurance. Using the proper sort of yardstick, a measurement of that risk can be made and two different people making that measurement properly will come up with the same quantity of risk as being one of the inherent characteristics of that house. While the methods may be more difficult to apply, this is no more difficult a concept than that a pound of butter is a pound of butter no matter who weighs it."

This simplified example, as it was called, was used in connection with private passenger automobile insurance where the classification incorporated not only details of the automobile and its location but also details concerning the driver including his accident record. The risk of a house burning depends on many features which do not enter into the rate classification, particularly those related to the occupants of the house. Some are careless by nature, smoke in bed and contribute in numerous other ways

to causes of loss; others are most careful. All houses with the same classification are not the same risk. If we could design a classification system which would reflect not only the size, construction and protection features associated with the house but also the hazard features associated with the occupants, it would then be possible to say that all houses in a particular classification had the same risk of burning and, ignoring differences in expense loadings, there was one correct rate for each house regardless of the insurer. Since such a classification system is not practical, we must realize that the risks in a classification are not homogeneous and that there are a number of correct rates for the various risks in any class. If the better risks in the class are insured by organizations which return any profit on the business to their insureds, the rate should be fixed at a level that provides an adequate profit on the business that remains and not at the arithmetic mean of the experience of all houses in the class.

COMBINED EXPERIENCE IS USED FOR WORKMEN'S COMPENSATION INSURANCE

There seems little reason to suppose that the loss experience of stock and mutual companies should be different for workmen's compensation insurance, because a great volume of this business is largely self rating owing to the high loss frequency. The following table shows the loss ratios of stock and mutual companies for fire and for workmen's compensation (nationwide) as reported in the New York Department's booklet of Loss and Expense Ratios.

	Fire		Workmen's Compensation	
	Stock	Mutual	Stock	Mutual
1961	52.1	41.7	65.7	62.5
1962	54.6	43.0	63.1	61.4
1963	61.6	51.6	63.8	65.8
1964	55.8	47.9	63.5	63.7
1965	56.0	48.2	64.2	62.0

This suggests that while the fire experience of stock and mutuals is not homogeneous one with the other, the compensation experience is probably homogeneous and the combined experience is appropriate for rate-making for this class of business.

NON-TARIFF RATE FILINGS

In the foregoing we have ignored the problem of rate deviations by stock companies and how the data in respect thereof should be handled

for ratemaking. The simplest procedure is to exclude the experience of deviated companies from both the loss data and the expense data, so that they are treated in the same way as we have pointed out is correct for mutual companies. The procedure, sometimes advocated, of restoring the premiums to manual rates in the development of loss ratios is not normally correct and can seriously reduce the true underwriting profit provided by the rating formula.

RATEMAKING AND COMPETITION

The ratemaking procedures used for fire insurance were designed for an era when competition was virtually non-existent, and much development is still necessary before we have a system designed to suit the competitive age. It must not be thought that the exclusion of mutual business from the ratemaking technique will in itself enable the stock companies to show an actual average underwriting profit of 5%. A couple of examples will illustrate this.

First, there is a continuing drain of the better fire business to the commercial package field. This drain will cause the residual business to deteriorate much faster than any trend factors based on cost of repair indices and, hence, even when the recommended trend factors are used unsatisfactory underwriting results are most likely. Second, some companies have been transmitting as fire insurance data to the National Board and its successor, NIASA, bureau premiums on preferred business which have been actually written at substantial discounts. Hence, the premiums reported to the ratemaker are greater than those actually collected.

It is hoped that as NIASA develops better statistical techniques these and other difficulties will be overcome, but state regulation of insurance will become increasingly difficult to justify if the Insurance Commissioners and their staffs do not accept changes in rating techniques advocated by the rating bureaus to meet the problem of competitive rates but instead continue to strive to preserve old and quite inappropriate procedures.

BURGLARY INSURANCE RATEMAKING

STEVEN H. NEWMAN

INTRODUCTION

Burglary insurance is designed to reimburse an insured party for any losses which he may sustain arising from the burglary, robbery, or theft of his property and possessions and any damage thereto. The need for this type of insurance has been recognized for many centuries. The earliest recorded example may be found in France in the year 1161, when a fund was set up which received a special license by edict of Pope Alexander III.[1]

In more recent times, burglary insurance has become a highly specialized branch of the insurance industry, with its own sublines of coverage, rating systems, and ratemaking procedures. *Burglary,* as the general name for this area of insurance, is slightly misleading, since it seems to refer to only one of its several subdivisions. *Crime insurance* would be a preferable heading, relating to any wrongful taking of that which belongs to another, but the term encompasses employee (fidelity) dishonesty insurance as well as non-employee (burglary-theft) dishonesty insurance.[2] As may be witnessed by the title of this paper, the name of burglary insurance has come to be understood as the broad descriptive term for the entire line of non-employee dishonesty insurance.

There are three major subdivisions within the field of crime insurance: robbery, burglary, and theft. The distinctions among them provide the basis for differing areas of coverage within the insurance policy.

Robbery is the removal of the personal property of another, either from his person or in his presence, by an act of violence or the creation of fear of violence within him.

Burglary is the act of breaking into and entering another's premises with the intent to commit a felony.

Theft is the actual abstraction or seizure of another's goods, and in insurance contracts it is used interchangeably with *larceny,* which is defined as the removal of another's personal goods with a felonious attempt to steal.

All of these subdivisions are themselves divided into the major sub-

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[1] Long, J. D. and D. W. Gregg, *The Property and Liability Insurance Handbook* (Richard D. Irwin, Inc. 1965), p. 649.

[2] Magee, J. H. and D. L. Bickelhaupt, *General Insurance,* 7th rev. ed. (Richard D. Irwin, Inc. 1964), p. 493.

lines which are the primary concern of the ratemaker. The major sublines under these divisions are as follows:[3]

Robbery:	Mercantile Robbery, Inside and Outside Premises; Paymaster Robbery.
Burglary:	Mercantile Open Stock; Mercantile Safe.
Theft:	Broad Form Personal Theft, On Premises and Away From Premises.
Package Policies:	Money and Securities Broad Form, Inside and Outside;
	Storekeepers' Burglary and Robbery;
	Broad Form Storekeepers'.

Historically, burglary insurance has been grouped with the casualty lines despite its greater resemblance to the field of property insurance. Notwithstanding this traditional association, the ratemaking procedures for burglary insurance are more closely allied to those of the original fire ratemaking formula, although some modifications have been made in accord with ratemaking procedures in the casualty lines. In this sense, burglary ratemaking may be considered a hybrid form which spans these two disparate fields of insurance.

The similarities between burglary insurance and the property lines lie primarily in the fact that burglary is a two-party coverage in which the insurer and the insured are the only two parties involved in a claim. The basic concept common to all property insurance coverages is present here; i.e. the principle of indemnification for actual loss sustained. Payment made to the insured is bounded by the conditions and limits set forth in the policy or imposed by coinsurance requirements, and the cash value of the property at the time of the loss, to the extent of the insurable interest of the policyholder. This restricts the range of a possible loss to a clearly defined area, in which any settlement is concerned only with the loss of material objects whose value is readily determinable by appraisal. For the most part, burglary losses, like losses under other property insurance, are immediately evident, the amount is generally known, and so claims can be settled quickly.

[3] A more detailed explanation of these sublines may be found in the Burglary Insurance Manual issued by the National Bureau of Casualty Underwriters, or the *Property and Liability Insurance Handbook* by Long and Gregg (especially Chapter 43).

This characteristic speed in the accurate assessment of burglary losses results in rapid settlement of claims. Amounts to be set aside as reserves for unpaid claims can be determined with accuracy and promptly paid. There is no reason to establish large reserves that may possibly be needed for the payment of claims, because there is seldom uncertainty as to a final determination of coverage. Therefore, burglary insurance ratemaking does not utilize a loss development factor. Burglary loss reserves are generally set up only for the short lapse of time necessary for the insurer to accomplish the routine procedures of appraisal and claim administration.

In liability insurance, the final cost of claims resulting from a particular accident is purely a matter of chance and is primarily dependent upon the nature of the injuries or damages sustained by the claimant. The results of any particular accident may range from minor bruises to multiple deaths. Therefore, no theoretical limitation may be placed upon the amount which the negligent party might have to pay.

If rate level changes for liability insurance were based upon total limits experience, the resulting rate level indications would be subject to the random influence of a small number of large claims, which might result in severe fluctuations of the manual rates from revision to revision. To remove this distortion, actuarial analyses are performed separately for basic limits experience and increased limits experience. The increased limits experience, which is particularly subject to the influence of random large losses, is analyzed on a much broader basis to stabilize the effect of these claims. Therefore, all losses are restricted to basic limits for purposes of liability ratemaking. However, the limitation of individual claims to basic limits for ratemaking purposes does not affect claim frequency, thus assuring the responsiveness of the rating structure to changes in the underlying loss-producing conditions.

Problems in burglary insurance ratemaking may not be split into loss frequency and severity components because of the unique nature of the exposures involved. The total loss resulting from a particular crime is not solely dependent upon chance factors. The amount of the loss is dependent upon the total value of the insured property, as well as the concentration of value in items that may be easily stolen and converted to cash. Thus a greater loss would result from the burglary of an appliance store than the burglary of a butcher shop. Similarly, it is probable that crimes against persons and property located in more exclusive neighborhoods produce greater monetary losses than the same crimes when committed in low-rent districts. For this reason rates are based upon the total value of the property, measured in units of $1,000.

Within a subline, different rates are used for the different classes of risk. Thus, on a countrywide basis, the appliance store might be rated at a $100 premium for the first $1,000 of coverage, while the butcher shop's premium for the same coverage would be only $50. In determining the final premium for a specific risk, the coinsurance requirements as well as the territorial multipliers for that particular area must be taken into account.

PRELIMINARIES TO RATEMAKING

The general standard of insurance ratemaking as set forth in the NAIC model rate regulatory bill adopted in most states is that rates should be neither excessive, inadequate, nor unfairly discriminatory. To achieve these results it is evident that rates must be responsive to changes in the loss costs underlying the various coverages afforded. In an attempt to accomplish this purpose insurance companies periodically revise rates to offset inflationary economic trends and changes in the underlying loss-producing characteristics of the risks covered.

The initial step in any ratemaking procedure is the compilation and tabulation of statistics. Written premiums, paid and outstanding losses excluding loss adjustment expenses, and number of claims are reported separately for each state by territory and subline for each calendar accident year. The National Bureau of Casualty Underwriters serves as a statistical agent for the collection of this data, as well as a ratemaking organization. The ratemaking techniques to be discussed in this paper are those developed and currently used by the National Bureau.

The gathered statistics constitute the raw data from which the new rates will be determined. The following adjustments of the reported experience must be made to reflect the current underwriting climate and to convert the data to forms required by the ratemaking formula.

Premiums

Burglary insurance experience is reported on a unit transaction basis. The reports are submitted monthly and contain the full detail required by the burglary insurance statistical plan. The punch cards show the codes for policy form, term, territory, etc., as well as the written premium and paid losses.

In the determination of the overall statewide rate level change, incurred losses and all loss adjustment expenses will be related to earned premiums on present rate level. Earned premiums on present rate level

reflect the premiums that would have been earned by the exposures of the experience period had they been written at current manual rates. The reported written premiums are adjusted to obtain the earned premium at present rates as follows:

1. The portions of the written premiums of each policy year that are earned in that year, as well as the contribution to the earned premiums of subsequent years, are computed. This pro-rata distribution of earned premiums to calendar year is dependent upon the effective date and the term of each policy.

2. An on-level factor is introduced to adjust the actual earned premiums for each calendar year to reflect present rate levels. This factor closely parallels the "rate revision adjustment factor" defined by LeRoy J. Simon in his paper in the *Proceedings* of the Casualty Actuarial Society as "a number which, when multiplied by a set of collected premiums, will revise or correct these premiums to reflect a new or current set of rates."[4] Thus, for policies written prior to the effective date of a rate revision, that revision and all subsequent revisions should be reflected in the applicable on-level factor. Set forth below is a simple illustration of the calculation of an on-level factor:

Effective Date of Revised Rates	Percent Change	Rate Level Factor
7/1/60	+10%	1.10
6/1/65	+12%	1.12
Composite	+23%	1.23

Effective date of Policy	On-Level Factor
7/1/59	1.23
1/1/61	1.12
8/1/66	1.00

The importance of an on-level factor is underscored when it is acknoweledged that "any line of insurance which uses the loss ratio method in ratemaking relies very heavily on an accurate premium base. If exposure data were available, a pure premium method would most likely be used but in the absence of proper exposure data, the rate revision adjustment factor is vital to the determination of the premium base."[5]

It is interesting to note that the application of the on-level factor in burglary insurance ratemaking differs from techniques applied in both

[4] Simon, L. J., "Rate Revision Adjustment Factors," *PCAS* Vol. XLV, p. 196.
[5] Ibid.

fire insurance and workmen's compensation insurance ratemaking. At one point[6] in the ratemaking procedures of both these lines of insurance it is necessary to adjust calendar year earned premiums to present rate level. Because there is no information available as to the months of inception of the policies which contributed earned premiums to the particular calendar year, it must be assumed that premiums have been written evenly throughout the year. The rate revision adjustment factor thus determined will be applied to the entire calendar year's earned premiums.

In the basic ratemaking data for burglary insurance, however, the month of issuance of all policies is retained. Thus it is only necessary to assume that policies are written evenly throughout the month, whereas when only the annual premium writings are known, the ratemaker must assume level writings throughout the entire year. This identification of the months of inception of all policies issued permits a more precise valuation of the earned premiums at present rates than is possible when only the years of issuance are identifiable. Of course, any possible distortions which might result from an unusual distribution of premiums written in a particular calendar year are counteracted through the inclusion of comparable data from another year computed using the same assumptions.

Losses

The following two adjustments of the reported total limits losses are made to obtain the incurred losses including all loss adjustment expense to be used in the ratemaking procedure:

1. The losses in burglary are reported excluding all loss adjustment expense, and adjustment must be made to supplement the data given under the statistical plan. A countrywide factor is calculated from the insurance expense exhibit data of National Bureau member companies. This factor is based upon the latest three years of experience and is determined by taking the ratio between the incurred losses including all loss adjustment expense and the incurred losses excluding all loss adjustment expense for all sublines combined. This enables the rate-maker to present the amount of the premium dollar expended by the companies directly on behalf of the insured.

2. The losses must also be adjusted to reflect present loss levels. If

[6] For the procedure in workmen's compensation insurance ratemaking, see Marshall, R. M., *Workmen's Compensation Insurance Ratemaking* (1961), especially Exhibit VII.

For fire insurance ratemaking, see the Fire Insurance Research and Actuarial Association's *Recommended Procedure for Rating Bureau Review of the Overall Fire Rate Level by State*, revised March 1965.

loss costs remain relatively stable over a period of time, then use of the loss data available from the latest experience period under review would provide a reasonable indication of the loss levels anticipated during the period for which the rates will be effective. This, however, is not the case. For the past several years, loss costs have risen substantially throughout the country. This element must be recognized in the ratemaking procedure if the proposed rates are to meet the statutory requirements of adequacy.

Burglary trend factors are currently based upon countrywide average paid claim cost data for all major burglary sublines combined excluding residence coverages. The impact of the introduction of multiple line package policies on the sale of pure residence crime coverages has been a sharp reduction of business. Since these residence coverages normally produce a large volume of small claims, the inclusion of this diminishing quantity of small claims with the data for all other sublines combined would result in exaggerated trend indications. The experience of the residence coverage is excluded in order to remove the distortion which might result from the inclusion of that data.

The determination and application of the trend factors now used in burglary insurance parallels the procedure employed in most other casualty lines of business. For burglary insurance ratemaking, these trend factors must be based upon countrywide data to combat the lower credibility presented by any smaller bodies of data. The relatively small premium volume developed by burglary insurance operations often leads to the application of a greater degree of judgment on the part of the actuaries involved in the ratemaking process than is exercised in other casualty lines. For a complete discussion of this phase of the ratemaking process the student is referred to a paper by Philipp K. Stern, "Ratemaking Procedures in Automobile Liability Insurance".[7]

RATEMAKING

Statewide Rate Level Change—All Major Sublines Combined

The technique employed in the ratemaking procedure is the loss ratio method which draws a comparison between the total earned premiums at present level and the total incurred losses including all loss adjustment expenses for all major sublines combined. At this point it should be noted that the use of data from all sublines combined to determine the indicated overall statewide rate level change parallels the ratemaking procedures

[7] Stern, P. K., "Ratemaking Procedures for Automobile Liability Insurance," *PCAS* Vol. LII, p. 139.

now generally used for property insurance, but conflicts with the standard ratemaking procedures developed for the liability lines of business. The ratemaking techniques employed for the liability lines are applied separately to each subline of coverage. In other words, the final rates for classes within each territory in a state are developed separately and independently for each subline. Thus the statewide rate level change for automobile commercial car bodily injury liability is based solely upon the data of that subline. The data from all burglary sublines is combined for purposes of determination of the statewide rate level change because their segregation would result in low credibility due to the small volume of burglary insurance business transacted.

Loss ratios (losses ÷ premiums) at present level are computed from the data of the latest available five calendar-accident years. Both a three-year and a two-year mean loss ratio are computed from the latest three years' and two years' loss ratios respectively, in order to reveal trends in loss levels and to permit responsiveness in the ratemaking formula. At the present time, if the five-year average, the three-year mean and the two-year mean loss ratios reflect a consistent uptrend, then the loss ratio upon which the revision of the rates will be based is the two-year mean loss ratio. However, if a consistent upward trend does not exist among these three loss ratios, then the loss ratio upon which revision of rates shall be based is the middle value of the five-year average, the two-year mean, and the expected loss ratio.

The expected loss ratio is that part of the premium dollar allotted for the payment of losses and loss adjustment expenses. The remaining portion of the premium dollar is set aside to provide for the expenses of conducting an insurance business and a provision for underwriting profit and contingencies. Set forth below is a comparison between the standard loss and expense provisions of burglary insurance and the standard provisions of automobile private passenger liability insurance.

	Automobile	Burglary
Total production cost allowance	20.0%	30.0%
Administration	5.5	11.0
Inspection and Bureau	1.0	2.5
Taxes, licenses, and fees	3.0	3.0
Underwriting profit and contingencies	5.0	5.0
	34.5	51.5
Expected loss and loss adjustment ratio	65.5	48.5
	100.0%	100.0%

The relatively higher burglary expense provisions are the consequence of the higher costs of conducting a burglary insurance business as compared with conducting an automobile liability insurance business. Since burglary premium volume is much smaller, and premiums per policy are lower, expenses in burglary insurance are a greater percent of the total cost of doing business.

Production costs are relatively greater in crime insurance because of the higher rate of agents' commissions. The justification underlying this high rate of commissions is that crime insurance is a product which must be sold to the public. Crime insurance is still regarded as a luxury by the general insurance-buying public, whereas in automobile liability insurance the public actively desires to purchase insurance due to compulsory insurance and financial responsibility laws. However, it is conceivable that increasing crime rates and greater news emphasis on the worsening situation would result in a greater awareness of crime insurance coverages by the general public.

The higher general administration and inspection provisions in the rates for crime insurance are necessary to provide the insurers with sufficient funds to exercise the high degree of underwriting selectivity required by the lack of homogeneity presented by crime insurance risks.

The indicated statewide rate level change is determined by a comparison between the loss ratio upon which the revision is to be based and the expected loss ratio (Selected Loss Ratio ÷ Expected Loss Ratio). This calculation determines the statewide percentage increase or decrease in the overall rate level which is then distributed by territory within each major subline.

Opposite is a numerical example which illustrates the determination of a statewide rate level change. The actual data were taken from a recent burglary rate filing. Notice that the effect of the statewide rate level change (Line 10), after distribution of the selected change by territory within each major subline, is lower than the selected statewide rate level change (Line 9). This is due to the limitation of the rate level change in any individual territory within a subline to +33.3%.

Territory Rate Level Development

The procedure currently employed here is a straightforward formula approach which is applicable to each major subline and within each territory for that subline. The use of a numerical illustration (on the following page) will facilitate the explanation and understanding of the method

BURGLARY INSURANCE

Calculation of Statewide Rate Level Change
Experience of All Major Burglary Sublines Combined
All Companies Reporting to N.B.C.U.

(1) Calendar Accident Year	(2) Earned Premium on Present Rate Level	(3) T/L Losses Including All Loss Adjustment*	(4) Number of Claims	(5) Loss and Loss Adjustment Ratio (3) ÷ (2)
1960	$1,736,712	$ 797,523	1,854	.459
1961	1,702,084	743,976	1,886	.437
1962	1,615,150	905,673	2,036	.561
1963	1,575,368	816,384	1,729	.518
1964	1,484,061	1,041,073	1,912	.702
Total	$8,113,375	$4,304,629	9,417	.531
1962-1964 Mean				.594
1963-1964 Mean				.610
(6) Loss and loss adjustment ratio upon which revised rate level is based				.610
(7) Expected loss and loss adjustment ratio				.483
(8) Indicated statewide rate level change for all major burglary sublines |(6) ÷ (7)| − 1.00				+ 26.3%
(9) Selected statewide rate level change for all major burglary sublines				+ 20.0%
(10) Effect of statewide rate level change for all major sublines				+ 19.1%

*Adjusted to reflect current loss levels

BURGLARY INSURANCE - MAJOR SUBLINES

Development of Rate Level Changes by Territory

(1) Coverage	(2) Rate Territory	(3) 1964 Earned Premium on Present Level	(4) 1960-1964 Number of Claims	(5) 1960-1964 Loss & Loss Adj. Ratio	(6) Credibility	(7) Formula 1960-64 Loss & Loss Adj. Ratio	(8) Col.(7) as Ratio to Avg. of Statewide All Major Sublines	(9) Formula Loss Ratio by Territory	(10) Col.(9) as Ratio to Statewide Average by Subline	(11) Rate Level Change (10) x 1.200 -1.00	(12) Present Multiplier	(13) Revised Multiplier
Broad Form Personal Theft-Inside	Terrs. 01, 02, 03	$ 9,777	168	.573	.40			.611	1.127	+33.3%*	.222	.296
	Remainder of State	49,116	802	.653	1.00			.653	1.204	+33.3%*	.238	.317
	Entire State	58,893	970	.637	1.00	.637	1.191	.646		+33.3%		
Broad Form Personal Theft - Outside	Terrs. 01, 02, 03	2,573	71	.592	.30			.524	1.027	+23.2%	.207	.255
	Remainder of State	9,102	257	.460	.60			.474	.929	+11.5%	.102	.114
	Entire State	11,675	328	.495	.60	.509	.951	.485		+14.1%		
.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
Statewide	All Major Sublines Combined	$1,484,061	9,417	.531		.535	1.000		1.000			

* All changes are limited to +33.3%.

employed. A simple explanation is sufficient for Columns 1 through 5, since the headings on these columns are almost self-explanatory.

Column 1 lists the major sublines and all major sublines combined.

Column 2 shows a breakdown of rating territories for each subline. The rating territories are not always the same for each subline since there are instances when two or more territories are combined because of the similarities between their experience.

Column 3 shows the total earned premium on present level of the latest year of the experience period for each rating territory. Column 4 exhibits the total number of claims for the five-year period for each territory. Column 5 exhibits the five-year average loss ratio for each territory.

Column 6 shows the credibility assigned to the experience in each territory. These credibility factors are based upon the number of claims, with full credibility (1.00) assigned to a volume of experience producing 683 claims or more.

The table of burglary credibility factors is similar to the table utilized in automobile liability ratemaking, except that the limits in each interval are relatively lower. It is the same table that is used in general liability ratemaking and is generated by the same formula.[8]

Column 7 is a weighted average of the statewide loss and loss adjustment ratio for each subline (in column 5) and the statewide loss and loss adjustment ratio for all major sublines combined (also in Column 5). The statewide loss and loss adjustment ratio for each subline is weighted to the extent of the credibility assigned to it, and the complement of the credibility is applied to the loss ratio for all major sublines combined. This calculation can be expressed by the following formula:

$$\text{Column 7} = [\text{Col. 5} \times \text{Col. 6}] + [\text{Total Col. 5} \times (1.00 - \text{Col. 6})]$$

Column 8 is the ratio of the statewide loss and loss adjustment ratio by subline appearing in Column 7 to the statewide loss and loss adjustment ratio for all major sublines combined also appearing in Column 7. The indices obtained by this calculation represent the indicated statewide changes by subline if no change in the statewide rate level were proposed.

The calculation of Column 9 is similar to that of Column 7. Within each subline, the territory loss and loss adjustment ratios are weighted with the comparable statewide loss and loss adjustment ratios appearing in Column 5. The formula for this calculation is as follows:

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[8] See Longley-Cook, L. H., "An Introduction to Credibility Theory," *PCAS* Vol. XLIX, p. 200. Also Lange, J. T., "General Liability Ratemaking," *PCAS* Vol. LIII (this volume).

Column 9 = [Col. 5 × Col. 6] + [Statewide Col. 5 × (1.00 − Col. 6)]

The experience of territories without full credibility is recognized only to the extent of the credibility assigned to them, and is weighted with the statewide average experience to curtail the large fluctuations which would result because of the limited volume of experience.

It should be noted that the application of credibility factors at two points in the development of rate level changes by territory is unique to burglary insurance. This "double credibility" approach is essential in the burglary ratemaking procedure because the overall statewide rate level change is determined for all burglary sublines combined. Although this overall rate level change is distributed simultaneously to the sublines and the territorial divisions for each subline, credibility weightings still apply to both components, resulting in the double credibility approach. This approach is not found in automobile liability or general liability ratemaking procedures because statewide rate level changes are determined separately for each subline.

Column 10 is the ratio of the formula loss and loss adjustment ratio appearing in Column 9 by territory to the statewide loss and loss adjustment ratio within each subline (also appearing in Column 9), multiplied by the indices by subline appearing in Column 8. These new indices represent the indicated rate level change by territory within each subline assuming no change in the statewide rate level is proposed.

Column 11 shows the actual rate level change for each territory, limited to a maximum of +33.3%. It is calculated by applying the selected statewide rate level change (see page 321, calculation of statewide rate level change, Line 8) to each of the territorial indices set forth in Column 10 as follows:

Column 11 = [Col. 10 × (1.00 + Statewide rate level change) − 1.00] × 100%

At present, the final schedule of burglary rates requires application of multipliers to a master table of rates for each subline which is applicable in all states.[9] Rate revisions only affect the territorial multipliers within

[9] The application of territorial multipliers to burglary master rate tables was instituted by the National Bureau in August of 1964. Prior to that date, a number of rate schedules were published for each subline, and territories were assigned to the schedules closest in line with their experience indications.

Territorial multipliers have been used in glass insurance for some time. The advantages of their use prompted their introduction into burglary insurance. The use of multipliers provided greater flexibility in the rating structure and allowed greater responsiveness to the experience indications.

each subline which are applied to the master rate table to establish actual rates. The relativities of the base rates for the various sublines embodied in the master rate table may be thought of as a set of countrywide differentials which reflect the underlying loss costs of the various sublines on a countrywide basis.

The master rate table sets forth rates per $1,000 of insurance except for the Broad Form Personal Theft and Mercantile Open Stock sublines which have graded rates. For these sublines the rate for each additional $1,000 of coverage is less than the rate for the first $1,000 of insurance.

Column 12 sets forth the present territorial multipliers which must be revised to reflect the rate level changes in each territory. The revised territorial multipliers appearing in Column 13 are obtained by a multiplication of the present territorial multipliers and the indicated territorial rate change in factor form.

THE CURRENT SITUATION

The continuing rise in the countrywide crime rate has resulted in a particularly adverse underwriting climate for burglary insurers. Underwriting results have been increasingly unfavorable in the past few years, as shown by the following exhibit of underwriting losses of National Bureau companies for 1961 through 1965. The underwriting losses for this five-year period amount to almost $15 million, representing 5.6% of the premiums earned for that period.

Burglary Insurance

Comparison of Premiums Earned and Underwriting Results†

Calendar Year	Premiums Earned	Amount of Net Gain From Underwriting*	Percent of Gain From Underwriting
1961	$ 53,586,546	$— 2,068,329	—3.9%
1962	53,784,027	— 1,259,727	—2.3%
1963	54,086,072	— 3,062,857	—5.7%
1964	52,622,559	— 4,022,722	—7.6%
1965	51,991,573	— 4,376,002	—8.4%
Total	$266,070,777	$—14,789,637	—5.6%

† Countrywide data of comparable companies based on 1966 members of the National Bureau.

* Minus (—) sign denotes loss.

The impact of inflation upon burglary loss settlement costs, as well as the increase in the number of burglaries and robberies during this period, have contributed substantially to this situation. The annual Uniform Crime Reports of the Federal Bureau of Investigation contain data on all types of crime in the United States. The following chart, taken from these reports, shows large increases in the number of all crimes, and specifically crimes against property, from 1961 to 1964.

Crime in the United States
Percentage Change (Increases by Year)

Calendar Years Compared	Total Offenses	Robbery	Burglary	Larceny $50 and Over
1961/1960	3.5%	3.0%	3.8%	4.9%
1962/1961	6.3	3.9	4.7	8.4
1963/1962	10.3	5.1	9.3	13.2
1964/1963	15.3	11.6	13.8	15.2
1964/1961	39.9%	25.6%	35.2%	48.4%

Note: The data included in this exhibit was obtained from the annual Uniform Crime Reports published by the Federal Bureau of Investigation. A direct correlation between the burglary insurance sublines and the F.B.I. breakdown does not exist. However, it is evident that crimes against property, which contribute to the majority of burglary insurance losses, are still increasing.

Another contributing factor has been the increasing popularity of multiple line package policies. The inclusion of crime coverages in these packages has resulted in the departure of the more desirable risks from the books of crime insurance underwriters to those of package policy underwriters. Since crime insurance rates are based upon broad averages for each class of business, the removal of the better-than-average risks from the insured population leaves the remaining book of business worse than the average risk contemplated by the rating structure. Thus the prevailing average rates become inadequate for the remaining risks, resulting in the undesirable underwriting picture described above.

One method available to the underwriter to help alleviate this situation would be greater use of mandatory deductibles on the insureds' policies. It has been pointed out that "from an underwriting standpoint, the risks which it is preferable to write on a deductible basis rather than on a full coverage basis are those with high [claim] frequency. Through writing such risks on a deductible basis, the assured is directly impressed with

the necessity for introducing [loss] prevention measures in order to reduce his own share of the incurred losses. Many risks of this nature which would produce very unfavorable experience for the insurance company if written on a full coverage basis prove to be satisfactory when written on a deductible coverage basis."[10]

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[10] Cahill, J. M., "Deductible and Excess Coverages," *PCAS*, Vol. XXIII, p. 34. This point has also been made with direct reference to burglary insurance coverages by Rodda, W. H., *Property and Liability Insurance* (Prentice-Hall, Inc. 1966) pp. 302-303.

MINUTES OF THE 1966 ANNUAL MEETING

November 16-18, 1966

SHERATON-CADILLAC HOTEL, DETROIT, MICHIGAN

The following 86 Fellows, 53 Associates, and 25 Invited Guests are recorded as having attended the 1966 Annual Meeting:

FELLOWS

Alexander, L. M.
Allen, E. S.
Bailey, R. A.
Balcarek, R. J.
Bennett, N. J.
Berquist, J. R.
Bevan, J. R.
Bornhuetter, R. L.
Boyle, J. I.
Brannigan, J. F.
Cook, C. F.
Crandall, W. H.
Crane, H. G.
Curry, A. C.
Curry, H. E.
Dahme, O. E.
DeMelio, J. J.
Drobisch, M. R.
Dropkin, L. B.
Ehlert, D. W.
Elliott, G. B.
Even, C. A., Jr.
Finnegan, J. H.
Flaherty, D. J.
Forker, D. C.
Foster, R. B.
Fowler, T. W.
Gillam, W. S.
Gillespie, J. E.
Graham, C. M.
Hazam, W. J.
Hewitt, C. C., Jr.
Hillhouse, J. A.
Hobbs, E. J.
Hunt, F. J., Jr.
Hurley, R. L.
Johe, R. L.
Johnson, R. A.
Kormes, M.
Lange, J. T.
Leslie, W., Jr.
Liscord, P. S.
MacGinnitie, W. J.
MacKeen, H. E.
Makgill, S. S.
Masterson, N. E.
Mayerson, A. L.
McClure, R. D.
McGuinness, J. S.
McNamara, D. J.
Meenaghan, J. J.
Menzel, H. W.
Mills, R. J.
Morison, G. D.
Moseley, J.
Muetterties, J. H.
Murrin, T. E.
Nelson, D. A.
Niles, C. L., Jr.
Oien, R. G.
Otteson, P. M.
Pennycook, R. B.
Perkins, W. J.
Resony, A. V.
Riccardo, J. F., Jr.
Richards, H. R.
Roberts, L. H.
Rodermund, M.
Roth, R. J.
Salzmann, R. E.
Scheibl, J. A.
Schloss, H. W.
Scott, B. E.
Simon, L. J.
Skelding, A. Z.
Smith, E. M.
Smith, E. R.
Tarbell, L. L.
Thomas, J. W.
Uhthoff, D. R.
Verhage, P. A.
Walsh, A. J.
Webb, B. L.
Wieder, J. W., Jr.
Wilcken, C. L.
Williams, D. G.
Wolfrum, R. J.

ASSOCIATES

Adler, M.
Amlie, W. P.
Ben-Zvi, P. N.
Bickerstaff, D. R.
Bland, W. H.
Carlson, E. A.
Conner, J. B.
Crawford, W. H.
Crofts, G.
Durkin, J. H.
DuRose, S. C., Jr.
Eliason, E. B.
Faber, J. A.
Farnam, W. E., Jr.
Franklin, N. M.
Fulton, C. B., Jr.
Gerundo, L. P., Jr.
Gibson, J. A., III

ASSOCIATES

Greene, T. A.
Hachemeister, C. A.
Hammer, S. M.
Hanson, H. D.
Hickman, J. C.
Holt, W. T.
Jensen, J. P.
Jones, N. F.
Kilbourne, F. W.
Lowe, R. F.
Margolis, D. R.
McIntosh, K. L.
Mokros, B. F.
Munro, R. E.
Murray, E. R.
Murray, J. B. M.
Newman, S. H.
Presley, P. O.
Quinlan, J. A.
Ratnaswamy, R.
Richardson, J. F.
Royer, A. F.
Ryan, K. M.
Scheel, P. J.
Schuler, R. J.
Singer, P. E.
Snader, R. H.
Staley, H. B.
Stern, P. K.
Stoke, K.
Sturgis, R. W.
Walters, M. A.
Welch, J. P.
Wooddy, J. C.
Young, R. G.

GUESTS

*Battaglin, B. H.
Benson, C. R.
Black, K., Jr.
*Blanc, R.
*Brown, P. S.
*Carter, E. J.
*Connolly, C. T.
*Crane, J.
Dykhouse, D. J.
*Galban, L. S., Jr.
Garrett, W. E.
*Griffith, R. W.
*Hart, J.
Hatfield, B. D.
*Hewey, H. V.
Hickok, D. W.
Huxley, F.
Larsen, W. H.
*Mingo, G. E.
*Nagel, J. R.
*O'Shea, H. J.
Song, Y. B.
*Strong, H. L.
*Watkins, E., Jr.
Wingstedt, B.

* Invitational Program.

Beginning at 1:30 p.m. on November 16, preceeding the plenary session, which convened the following day, there was held a well attended seminar on Mathematical Theory of Risk and allied topics conducted under the auspices of the CAS Committee on Mathematical Theory of Risk, Charles C. Hewitt, Jr., Chairman, who acted as moderator of the seminar session.

In addition to members of the CAS there were in attendance members of the Research Committee of the Society of Actuaries and others who had participated, shortly before, at a similar seminar held at the University of Michigan in Ann Arbor.

The following papers were presented by members of the CAS:

(1) James R. Berquist – "Practical Problems and Mathematical Theory of Risk."

(2) Lester B. Dropkin – "The Distribution of the Amount of a Single Claim."

(3) Lewis H. Roberts – "A Discipline for the Avoidance of Unwarranted Assumptions."

(4) Charles C. Hewitt, Jr. – "Loss Ratio Distributions."

(5) Kenneth L. McIntosh – "An Introduction to Finite Markov Chains."

After the presentation of each paper, there followed audience participation in the topics and questions from the floor.

The session was adjourned at 5:00 p.m. to permit the holding of a regularly scheduled meeting of the Council.

The first plenary session of the Annual Meeting was called to order by President Harold E. Curry at 9:40 a.m. on November 17. After some brief introductory remarks the President called upon Allen L. Mayerson who introduced the Honorable David J. Dykhouse, Insurance Commissioner of the State of Michigan, who gave a brief address of welcome.

Vice President Harold W. Schloss then presided for the remainder of the session.

The following reviewers then discussed the papers which had been presented at the May 1966 meeting. These discussions will appear in the next volume of the Proceedings.

Papers	*Reviewers*
(1) "Effect of Loss Reserve Margins in Calendar Year Results" by Rafel J. Balcarek	Laurence H. Longley-Cook (a)
(2) "Distribution by Size of Risk—A Model" by Charles C. Hewitt, Jr.	Robert L. Hurley
(3) "General Liability Insurance Ratemaking" by Jeffrey T. Lange	Philip O. Presley Stanley C. DuRose, Jr.
(4) "1965 Study of Expenses by Size of Risk" by George D. Morison	Frank Harwayne (a) Paul A. Verhage

(a) Mr. Longley-Cook's and Mr. Harwayne's discussions were read in their absence by Frederic J. Hunt, Jr. and Dunbar R. Uhthoff, respectively.

The next order of business was a panel discussion—"Reinsurance Today":

Ronald L. Bornhuetter, *Moderator*
Howard G. Crane, *Panel Member*
Thomas W. Fowler, *Panel Member*
Thomas A. Greene, *Panel Member*
Ruth E. Salzmann, *Panel Member*

Following conclusion of the panel and discussion from the floor, recess for luncheon was taken at 12:30 p.m.

The session reconvened at 2:00 p.m. on November 17 with Vice President Schloss in the Chair.

Past President of the CAS, Thomas E. Murrin, recently elected President of the American Academy of Actuaries, informed the gathering of recent developments in connection with the Academy, including the election of CAS Past President Norton E. Masterson as Secretary of the Academy.

There then followed a panel discussion "Package Ratemaking":

Henry W. Menzel, *Moderator*
Norman J. Bennett, *Panel Member*
Edward J. Hobbs, *Panel Member*
Jeffrey T. Lange, *Panel Member*
John H. Muetterties, *Panel Member*

The remainder of the November 17 afternoon session was devoted to the following Committee meetings.

(1) Educational Committee (a)
(2) Examination Committee (b)
(3) Publicity Committee (a)
    (a) Open meeting
    (b) Executive session

The Council of the CAS also met again.

Beginning at 6:30 p.m. there was a brief reception and social hour. No formally scheduled banquet was held.

The session reconvened at 9:00 a.m. on November 18.

The gathering was addressed by William P. Henderson, Chairman of the Board of the Henderson Tire Company on the subject "The Challenge To Automobile Actuaries in the Next Decade."

Following Mr. Henderson's talk, President Harold E. Curry presented his Presidential Address which will be printed in the next volume of the Proceedings.

The gathering then received the report of the Nominating Committee (Messrs. Norton E. Masterson, Chairman; William Leslie, Jr.; Laurence H. Longley-Cook) which, after a canvas of the informal ballots previously distributed to the Fellows of the Society, placed the following names in nomination:

President – Harold E. Curry
Vice President – Charles C. Hewitt, Jr.
Vice President – Harold W. Schloss
Secretary Treasurer – Albert Z. Skelding
Member of Council – Harry T. Byrne
Member of Council – Charles L. Niles, Jr.
Member of Council – Robert Pollack

These nominations were regularly seconded.

The Chair then called for any further nominations from the floor. There being no response the gathering then proceeded to elect the above nominees to the offices indicated.

The session was then informed that, acting under the provisions of Article V of the Constitution, such action being subject to ratification by majority ballot at the 1966 Annual Meeting, the Council had re-elected the following:

Editor – Matthew Rodermund
Librarian – Richard Lino
General Chairman, Examination Committee – Norman J. Bennett.

Upon motion duly made and seconded the Fellows present voted to confirm the action of the Council.

Diplomas were then presented to the following 14 new Fellows and the following 20 new Associates were introduced to the gathering:

FELLOWS

Augustin J. Cima (a)
Charles F. Cook
William H. Crandall
Orval E. Dahme
Charles A. Even, Jr.
Daniel J. Flaherty
David C. Forker
Jerry A. Hillhouse
Joseph F. Riccardo, Jr.
Richard J. Roth
Jerome A. Scheibl
Brian E. Scott
Edward R. Smith
Vernon J. Switzer (a)

(a) In absentia

ASSOCIATES

Phillip N. Ben-Zvi	Richard E. Munro
David R. Bickerstaff	Edward R. Murray
James B. Conner	James B. M. Murray
Edward B. Elaison	John A. Quinlan
James A. Faber	Richard H. Snader
Walter E. Farnam, Jr.	Robert W. Sturgis
Clyde B. Fulton, Jr.	Chester J. Toren
William T. Holt	John S. Trees
Frederick W. Kilbourne	Mavis A. Walters
Robert F. Lowe	John P. Welch

The Report of the Secretary-Treasurer, which is made a part of these minutes, was then presented.

The authors then presented a brief summary of the following new papers, which will be printed in the Proceedings:

(1) "Current Ratemaking Procedures in Boiler and Machinery Insurance" – James F. Brannigan.

(2) "Implications of Sampling Theory for Package Policy Ratemaking" – Jeffrey T. Lange.

(3) "Underwriting Profit in Fire Bureau Rates" – Laurence H. Longley-Cook. In Mr. Longley-Cook's absence the summary of his paper was read by Edward J. Hobbs.

(4) "Burglary Insurance Ratemaking" – Steven H. Newman.

This concluded the 1966 Annual Meeting of the Casualty Actuarial Society and adjournment was taken at 12:30 p.m. on Friday, November 18, 1966.

Respectfully submitted,

A. Z. SKELDING,
Secretary-Treasurer.

REPORT OF THE SECRETARY-TREASURER

The following report summarizes those activities of the Council, subsequent to the 1965 Annual Meeting, which it is believed will be of particular interest to the membership:

Meeting of February 18, 1966

Voted to give authors of papers 25 printed copies gratis with the privilege of purchasing additional copies.

Voted to contribute $40 to the Committee of Presidents of Statistical Societies toward the printing of a pamphlet "Careers In Statistics."

Meeting of May 22 and May 23, 1966

Voted to appoint a committee to consider the desirability of amendments to the Constitution and By-laws.

Meeting of September 22, 1966

Voted to establish the following guide lines for future meetings of the CAS

Fall meetings – Two days away from the job.
Spring meetings – Three days away from the job with preference for a Monday starting date.

Also, in view of the fact that it was evident disbursements would appreciably exceed receipts during the fiscal period October 1, 1965 through September 30, 1966, due in large part to ever mounting printing costs, it was voted that the President appoint a subcommittee to study the whole matter as CAS finances and report back to the Council its findings and recommendations.

Meeting of November 16, 1966

The Council, acting under the provisions of Article V of the Constituition, re-elected, subject to confirmation by the Fellows present at the 1966 Annual Meeting:

Editor – Matthew Rodermund
Librarian – Richard Lino
General Chairman Examination Committee – Norman J. Bennett

Voted to continue on the agenda for action at the next meeting of the Council the Report of the Financial Review Committee, Henry W. Menzel, Chairman.

Accepted the report of Norman J. Bennett, Chairman of the Examination Committee, that the Committee was giving consideration to the possibility of expanding the multiple choice procedure to other than Parts 1 and 2.

Voted that for future meetings the $10.00 registration fee shall not be waived for university or insurance department personnel as is now the case.

The Council considered many other matters during the year but, as previously indicated, it is believed the foregoing covers actions of particular interest to the members.

FINANCIAL REPORT

The detailed report follows the Secretary-Treasurer's Report in this Volume of the *Proceedings*.

The results were not good. Receipts were $28,429.18 with disbursements of $32,254.28, leaving a deficit of $3,825.10 due entirely to a substantial increase in printing costs, the bulk of which is due to the printing of the Proceedings which are furnished to members gratis. As total printing costs were $21,976.51 and receipts from dues were $11,815.00, there was a gap of about $10,000 between these two items.

As of September 30, 1966 the assets of the Society consisted of

Cash in checking and savings accounts	$19,349.27
U. S. Treasury Bonds at face value	5,000.00
Total	$24,349.27

This represents a decrease of $3,825.10 from the corresponding figure as of September 30, 1965.

OTHER ITEMS

(1) *Examinations*

Revised "Recommendations For Study" were adopted to become effective with the May 1967 examinations. Through the generosity of the Aetna Casualty and Surety Company this pamphlet was printed with practically no expense to the Casualty Actuarial Society.

(2) *Sites and Dates of Future Meetings*

May 21-24, 1967 – Pheasant Run Lodge
St. Charles, Illinois

November 12-14, 1967 – Hotel America
Hartford, Connecticut

May 19-22, 1968 – Kutsher's Country Club
Monticello, New York

November 17-19, 1968 – Marriott Motor Hotel
Twin Bridges
Washington, D. C.

Beyond November 1968 – Under Consideration

May 1969 – Some site in Lancaster County, Pennsylvania

Possible Future Spring Meetings

(a) The Greenbrier in West Virginia
(b) Williamsburg in Virginia
(c) The Broadmoor in Colorado.

FINANCIAL REPORT
Cash Receipts and Disbursements
from October 1, 1965 through September 30, 1966

Receipts

On deposit 10-1-65 (Checking)		$ 6,902.98
On deposit 10-1-65 (Savings)		10,983.91
On deposit 10-1-65 (Savings)		5,287.48
Members' dues	$11,815.00	
Examination fees	3,783.50	
Sale of **Proceedings**	2,678.08	
Sale of Readings	373.00	
Spring and annual meetings	3,264.00	
Registration fees	2,910.00	
Invitational program	1,380.00	
Exchange	−18.93	
Bond interest	193.76	
Savings account interest	702.19	
Michelbacher fund	483.08	
For Actuaries' Club N. Y.	782.50	
Miscellaneous	83.00	28,429.18
Total		$51,603.55

Disbursements

Printing and stationery		$21,976.51
Secretary's office		2,100.00
Examination expense		2,323.59
Meeting expense		4,116.49
Library fund		81.27
Insurance		119.82
Refunds:		
Lunch and dinners	220.00	
Examination fees	92.25	
Registration fees	130.00	
Fees to Actuaries' Club N.Y.	782.50	
Miscellaneous	311.85	
		32,254.28
On deposit 9-30-66		
Checking	2,375.69	
Savings	8,403.24	
Savings	8,570.34	
		$19,349.27
Total		$51,603.55

Assets

Cash in bank 9-30-66		
Checking		$ 2,375.69
Savings		8,403.24
Savings		8,570.34
U. S. Treasury Bonds		5,000.00
Total		$24,349.27

Liabilities

Surplus (Michelbacher Fund)	$17,683.29
Other surplus	6,665.98
Total	$24,349.27

One U. S. Treasury Bond 3⅞% No. 24277 due for $1,000 on May 15, 1968.

Two U. S. Treasury Bonds 3⅞% Nos. 3462-3 due for $1,000 each on May 15, 1968.

Two U. S. Treasury Bonds 3⅞% Nos. 1673-4 due for $1,000 each on November 15, 1974.

Employers' Fire Insurance Company Policy No. 31F238562 for $5,000 on books and book cases stored at 200 East 42 Street and $2,000 on material stored in library of Insurance Society of New York. Expires 9-14-67.

Fidelity Bond No. 044571 for $25,000 in Royal Indemnity Company.

Workmen's Compensation Policy No. 03-223577 in Maryland Casualty Company. Expires 5-10-69.

Owners' Landlords' and Tenants' Liability Policy No. 52-597299 in Maryland Casualty Company. Expires 4-23-67 for 100,000/300,000/5,000.

This is to certify that we have audited the accounts, examined all vouchers and investments shown above, and find same to be correct.

Auditing Committee
HOWARD G. CRANE, *Chairman*
J. H. BOYAJIAN
THOMAS W. FOWLER

BOOK NOTES

John F. Burton, Jr., *Interstate Variations in Employers' Costs of Workmen's Compensation,* 75 pages, the W. E. Upjohn Institute for Employment Research, Kalamazoo, Michigan.

This book develops index numbers for 29 states based on (1) manual rates, (2) wage levels, and (3) other factors, such as experience rating, premium discounts, and dividends. The other factors are assumed to have a uniform effect throughout all the states except the three (only two for 1965) with monopolistic state funds. The purpose of the book is to provide an answer to the question "Can a state that desires to improve its workmen's compensation program do so without increasing costs vis-a-vis other states to such an extent that present and prospective employers will be driven elsewhere?"

In the foreword to the book, it is stated that Mr. Burton has given the "first precise anwser" to this question. However, his method of calculating index numbers from a limited number of workmen's compensation manual rates, weighted by a common payroll, is essentially the same as that developed by Roger Johnson* and, as might be expected, the results are about the same. As for their being "precise," it is not in the nature of index numbers to be precise, and precision is not expected of them. The most commonly used index numbers are the so-called stock averages, which are compiled by at least three different agencies, and the fact that these averages do not agree with one another does not detract from their usefulness.

As long as workmen's compensation remains a compulsory line of insurance, with substantial variations in cost and benefit levels from state to state, there will be a demand for some method of comparison, presumably involving index numbers. Granting that any set of index numbers can be misinterpreted, it would probably still be simpler for the industry to try to meet this demand than to explain why it cannot be met.

RUSSELL P. GODDARD

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* *PCAS XL* (1953), page 10.

OBITUARIES

MALVIN EDWARD DAVIS
1901 — 1966

The death of Malvin Edward Davis on August 26, 1966 at the age of 65 is a loss deeply felt throughout the insurance industry and the actuarial profession. His leading contributions and executive vision had significant effect upon the business and will continue to influence it for some time to come. It was characteristic of his vigor and devotion that his activity during his last years remained undiminished in spite of poor health.

His brilliance and energy were apparent from the first. He completed his undergraduate studies at Wesleyan University in three years, graduating as a Phi Beta Kappa member. He joined the Metropolitan Life Insurance Company in 1923 and completed his actuarial examinations three years later to become a Fellow of the Actuarial Society of America. In 1930, he was appointed an officer of the Metropolitan and rose to become senior vice-president and chief actuary on January 1, 1960. He was made executive vice-president January 1, 1963 and held this post until his retirement in mid-1965.

Distinguished in professional circles, Mr. Davis was president of the Society of Actuaries in 1956-57, having previously served on the Board of Governors and several of the Society's commitees. He was president of the XVth International Congress of Actuaries when it convened in New York City in 1957. He was an Associate of the Casualty Actuarial Society since 1925, and was also a member of the American Mathematical Association and numerous business organizations.

He brought scholarship and a remarkable thoroughness to his work. A specialist in industrial life insurance, he authored numerous papers on the subject. He presented testimony on the conduct of the industrial insurance business before the Congressional Temporary National Economic

Committee at its 1939 hearings. In 1944, he published *Industrial Life Insurance in the United States*, which won the Elizur Wright Insurance Literature Prize as the best insurance book published that year.

He also brought foresight. After World War II, he was among the first to recognize the potential to the industry of electronic data processing machinery and he forcefully pursued a program to test, apply, and guide the development of these new devices. His work in this gained him such prominence that his views on the subject were continually sought both at home and abroad. In 1948 he was appointed chairman of a new committee of the Society whose task was to examine electronic data processing. The committee's pioneering reports gave guidance to the entire insurance industry during the formative years of this revolutionary development and made a lasting impact upon the conduct of the insurance business.

He was a man of many intellectual attainments, not the least of which was an abiding love and knowledge of music, which brought him comfort and pleasure throughout his life. He traveled widely and at one time had a second home in Bermuda.

He was married in 1932 to Mildred Lamb who died in 1959. There are no immediate relatives.

Mal Davis's alert competence, sound judgment and unshakable integrity earned him the respect, admiration, and affection of all who worked with him. He left his mark on his profession, on his company, and in the hearts of those who knew him.

EDWARD S. GOODWIN
1883 — 1966

Edward S. Goodwin, a Charter Member of the Casualty Actuarial Society, died on January 27, 1966, at the age of 83. He was born in East Hartford, Connecticut and spent his life in the Greater Hartford area.

He served as statistician for The Travelers Insurance Company from 1899 to 1916 when he left to join the banking house of Cooley and Company in Hartford. In 1919 he became a partner of Goodwin—Beach Investment Brokers and later served as president and member of the board of the East Hartford Trust Company.

He was regarded as an authority on the values of insurance and bank stocks and served on the board of directors of a number of Hartford area banks.

Mr. Goodwin is survived by his sister, Mrs. Susan Burnham of East Hartford, Connecticut.

EDWARD S. JENSEN
1900 — 1966

Edward S. Jensen, who retired a year ago as assistant vice president of Occidental Life Insurance Company of California, died September 2, 1966, following a brief illness. He had been an Associate of the Casualty Actuarial Society since 1921.

A native of Bloomfield, Connecticut, Mr. Jensen began his insurance career as a clerk in the casualty actuarial department of the Travelers Insurance Company in Hartford. One of his former associates in the Travelers recalls that Edward Jensen, "although not a college graduate, passed the Associateship examinations of the CAS by dint of long hours of self-study in such college grade subjects as higher algebra, probability and life contingencies with the encouragement and tutelage of some of his associates."

In July, 1924, he joined the Great Republic Life in Los Angeles, handling actuarial assignments. He began his Occidental career as a group underwriter in 1934.

Mr. Jensen was made assistant secretary in 1938, group superintendent in 1943 and assistant vice president in 1951. He was associated with the company's group division almost since its inception, and was actively engaged in group sales work until 1953, at which time he took charge of the group underwriting activities of the company.

He is survived by his wife, Martha, and two daughters, Miss Elaine V. Jensen and Mrs. Forest (Dorothy) Rusler.

C. OTIS SHAVER
1908 — 1966

C. Otis Shaver, an Associate of the Casualty Actuarial Society since 1957, died June 15, 1966, at the age of 57.

Born at Roanoke, Virgina, on December 20, 1908, he earned a bachelor of arts degree from Ohio State University and a law degree from La-Salle Extension University.

In 1945 Mr. Shaver joined the Nationwide Mutual Fire Insurance Company at its home office in Columbus, Ohio, as a fire underwriter. He was appointed manager of the company's fire premium department in 1946 and actuary four years later. He was elected second vice president and actuary in 1962.

Mr. Shaver was a member of Alum Creek Friends Church near his farm home outside Marengo, Ohio, and had served for years as a member of the executive board for annual meetings of the Ohio Society of Friends. He was an associate of the American Institute of Management and the Conference of Actuaries in Public Practice.

Other memberships were the governing board of the North Carolina Fire Insurance Rating Bureau, the executive committees of the National Association of Mutual Insurance Companies and the Transportation Insurance Rating Bureau, the board of directors of the Ohio Association of Mutual Insurance Companies, and the American Academy of Actuaries. He represented Nationwide Mutual Fire on a number of committees of the National Association of Independent Insurers and served on the National All-Industry Flood Insurance Committee of the National Association of Insurance Commissioners.

He was a member of the Citizens Executive Committee for a Better City of Columbus (Ohio) and the board of trustees of the Ohio Farmers Cooperative Association. He was an incorporator of the Nationwide Credit Union in 1951 and that same year helped to institute the company's employee blood bank program.

Mr. Shaver is survived by his wife, Maude Stephenson Shaver; two daughters, Mrs. Edwin Jeffries of Mansfield, Ohio, and Mrs. Robert Barrett of Marengo, Ohio; and three grandchildren.

HENRY W. STEINHAUS
1908 — 1966

Henry W. Steinhaus, an Associate of the Casualty Actuarial Society since 1959, died August 8, 1966. He had been president of Henry Steinhaus Associates, Inc., a firm of consulting actuaries and economists.

Mr. Steinhaus was born in Breslau, Germany. From 1929 to 1933, when he came to the United States, he was a lecturer at the University of Goettingen. He became a naturalized citizen in 1938.

From 1933 to 1957 Mr. Steinhaus was employed at the Equitable Life Assurance Society of the U. S. where he became research assistant to the president. In 1958 he helped form the partnership of Smick and Steinhaus, consulting actuaries, with J. J. Smick, a Fellow of the Casualty Actuarial Society. In 1964 he founded his own firm.

Mr. Steinhaus was also a lecturer in the Graduate School of Business, Columbia University, from 1958 to 1960, and, from 1959 until he died, chief executive of Welfare Pension and Equity Plans Services, Inc. He was a member of the American Academy of Actuaries, the Conference of Actuaries in Public Practice, the International Congress of Actuaries, the American Statistical Association, and a director of the Market Research Corporation of America.

Mr. Steinhaus is survived by his wife, Beatrice, and three daughters, Mrs. Peter (Margaret) Sheppe, Nancy, and Phyllis.

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