Levels of Determinism in Workers Compensation Reinsurance Commutations

by Gary Blumsohn, FCAS

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Gary Blumsohn

Abstract

When commuting workers' compensation reinsurance claims, the standard method is to project the future value of the claims using stated assumptions for future medical usage, medical inflation, COLAs, and investment income. The actuary selects a best guess for each variable, and assumes this deterministic number will be realized in the future. To account for the date of death being stochastic, a mortality table is used to model the future lifetime.

By assuming deterministic values for future medical usage, medical inflation, COLAs, and investment income, the calculation ignores the possibilities of higher or lower values. It is shown that these do not generally balance out, and that the standard method produces biased results. In low reinsurance layers, the commutation amount is overstated, and in high layers it is understated. By removing deterministic assumptions from the calculation, bias is removed from the results. The paper gives a detailed, realistic, example to illustrate this.

The implications of the paper reach beyond the narrow realm of workers' compensation reinsurance commutations. The most obvious implications are for workers' compensation reserving, but the essential message applies to pricing and reserving of any excess insurance and reinsurance: deterministic assumptions often lead to biased results.

Biography

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[I am grateful to the following people for providing comments on earlier drafts of this paper: Eric Brosius, Sholom Feldblum, Joe Gilles, Mike Teng, Bryan Ware, and Wendy Witmer. They helped to improve the paper and avoid some embarrassing mistakes. Any further mistakes, embarrassing or otherwise, are my responsibility.]

Introduction

Excess reinsurance for workers' compensation generally pays out over many decades. While workers' compensation claims are usually reported to the insurer soon after the accident, and the insurer may soon report them to the reinsurer, the loss payments are slow, being made over the lifetime of the injured worker or even the lifetime of uninjured dependents. Consequently, even for reinsurance with a relatively modest retention, it can take many years to breach the retention, and many more years to exhaust a layer. For example, Gary Venter (1995) has estimated that it takes, on average, over 30 years to pay half the ultimate claim amount.

At some point after an excess reinsurance treaty ends, but before the losses have been fully paid, it is common to commute either the reinsurance treaty or the individual reinsured claims. The commutation is a transaction whereby the reinsurer pays the ceding company a flat amount, in exchange for canceling future liabilities. This saves costs for both parties, since the expense of submitting claims to the reinsurer and the cost of paying these claims are eliminated. It allows the parties to shut their reinsurance files and spend their time on more profitable activities.

The actuarial techniques for evaluating workers' compensation commutations differ from the techniques generally used in commutations of other lines of business. With workers' compensation (and in some other cases, like unlimited medical benefits for no-fault auto) the population of claims is generally known at the time of the commutation — there is very little lag in claims being reported to the primary company. Also, the amount of the payments is not dependent on some future court verdict. The payments are based on a fixed annual indemnity amount, subject, in some states, to an annual cost of living adjustment, and on the actual medical payments to be incurred by the claimant. In the case of permanent-total disability cases, these payments often continue for the rest of the claimant's life. Since the losses are so closely tied to the claimant's life span, it is natural to use the mortality techniques more generally associated with life actuaries than with their property/casualty brethren.

While the actuarial techniques in these calculations are by now well accepted, this paper will argue that the results are systematically biased and can be improved upon. The life-table techniques generally assume that mortality is stochastic, but that various other variables (amount of medical care, inflation rates, investment yields) are deterministic. These deterministic variables can be stripped away, much as earlier actuaries stripped away the assumption of deterministic mortality. By doing this, we improve the accuracy of our calculations and eliminate some biases.

Though this paper will express the issues in terms of commutations, the issues are similar when doing excess workers' compensation case reserving using life-table methods. In other words, even though there are layers that we do not expect to get hit, we should carry reserves for those layers. Over a pool of claimants, some will die before hitting the upper layers, and others will not. The goal should be to get the reserves right on average.

Life-Table Techniques

Method 1: Totally deterministic calculation

The simplest method for performing the calculation is to assume the claimant will live to his life expectancy and then calculate the present value of the future stream of payments for this time. This method, though simple and appealing, is wrong. As actuaries are well aware, and as will be discussed in detail later, assuming a deterministic life-span leads to systematically incorrect results.

Method 2: Stochastic date of death

The actuarial literature contains several papers that discuss the calculation of reserves for long-term workers' compensation cases, and the calculation of a commutation value only differs in minor respects from the calculation of a reserve.[1] It is generally accepted among actuaries, and, to a lesser extent, the wider insurance community, that the right way to reserve these claims is through the life-table techniques routinely used by life actuaries. The big advance of the life-table method over a method that assumes the insured will live to his exact life expectancy is that it takes into account the probabilities of the claimant dying either earlier or later than the life expectancy. This is particularly important when dealing with excess reinsurance, because if the claimant lives beyond his life expectancy, a higher layer may be breached.

The move from a deterministic number of payments to a stochastic number of payments, through the use of a life table, is a crucial advance in the accuracy of the calculation. A life-table approach allows for the possibility that a claimant may live to age 95, and hence pierce reinsurance layers that would not have been pierced if he had died at his life expectancy. Thus, in calculating the value of a commutation for a high reinsurance layer, there may be a positive amount in a layer, even though the layer will not be hit unless the claimant lives well beyond his life expectancy. In other words, if the claimant lives to his life expectancy of, say, 75, a retention of $5 million may not be breached. But if he lives another 10 years, to 85, the total payments in the additional 10 years of life may be enough to breach the $5 million retention.

Put another way, there will be a positive commutation amount in layers that we do not expect to get hit. The commutation is (effectively) a purchase of reinsurance by the reinsurer, covering the possibility of the claimant breaching the retention. There need not be a guarantee that the retention will be breached in order for the expected losses in the layer to be positive.

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1 The classic paper is Ronald Ferguson's *Actuarial Note on Workmen's Compensation Loss Reserves* (1971), which applied life-table methods to excess indemnity reserves. He did not address the issue of the medical portion of the reserve. Richard Snader (1987) applied similar methods to long-term medical claims. A recent valuable addition to the literature is by Lee Steeneck (1996), who uses an analysis very close to the "Method 2" that will be discussed later in this paper.

Assumptions

In doing the commutation calculation, the actuary needs to make a number of assumptions:[2]

- An appropriate *mortality table* must be selected.

- For workers' compensation, the indemnity amount is generally known, but it may be subject to *cost-of-living adjustments*, which depend usually on movements in the average weekly wage in the state.

- The amount of medical expenses must be estimated for each year in the future. This is usually done in two steps: first, estimate the future *annual medical expense* in today's dollars, and, second, estimate what future *medical price inflation* will be, to convert today's dollars into tomorrow's dollars.

- The *rate at which to discount* future dollar payments to present value.

Once assumptions have been chosen, the calculations can be performed, and the parties can agree on an amount for settlement.[3]

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2 In practice, some reinsurance contracts have commutation clauses in which the parties have negotiated some of the parameters at the time the contract is drawn up. For example, the clause may specify what mortality table to use and what rate to use in discounting the future payments.

3 This paper will not address the crucial impact of income tax. In looking at the commutation, one must account for taxes without the commutation, compared to taxes with the commutation.

i) If the claim is not commuted, the reinsurer carries a reserve on its books. For tax purposes, this reserve is discounted by the IRS discount factors, and the unwinding of the reserve is counted into the incurred losses of the company each year. On the other hand, the investment income earned on the reserve is taxable.

Levels of Determinism

The problem, though, as this paper will show, is that the life-table method ignores fluctuations in other key variables. Just as it is wrong to assume a claimant's life-span is fixed, so it is wrong to assume that medical usage and inflation are fixed. Assuming a deterministic life-span leads to inaccurate calculations. Likewise, assuming deterministic medical care and inflation will lead to inaccurate calculations. A deterministic life span implies that high layers of reinsurance will not be hit, when they do, in fact, have a chance of getting hit if the claimant lives long enough. Likewise, deterministic medical care and deterministic inflation understate the costs to the highest reinsurance layers.

Just as Ferguson's paper stripped away one level of determinism from these calculations, so we must strip away further levels of determinism, if we want to get greater accuracy.

A Comprehensive Example

The following section gives a realistic example of how one would strip determinism from the model. The calculations are significantly more

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ii) If the claim is commuted, the reinsurer takes down the reserves it holds for the claim and puts up a paid loss. If the reserve is greater than the paid loss (as it frequently is, because statutory accounting demands undiscounted, or perhaps tabularly-discounted, reserves) the reinsurer's profit rises by the difference between the reserve and the paid loss. This profit is taxable.

The ceding company has the reverse entries on its books.

When commuting, the tax benefits or tax hits are as important as any other cash flows. They are, however, beyond the scope of this paper. For a detailed discussion of the tax effects, see Connor and Olsen (1991).

complex than the standard life-table method. However, using computers, the problems are not insurmountable, and the results are significantly less biased.

The Data

Suppose we are commuting the following claim:

- Joe Soap has been permanently and totally disabled since 1992. On 1/1/97, the effective date of the commutation, he will turn 35 years old.

- Through 12/31/96, the primary company has paid out $300,000 in medical expenses and $70,000 in indemnity payments.[4] This is an unusually large claim, but by no means unheard of. A smaller claim would not affect any of the conclusions.

- In 1996, Mr. Soap received indemnity payments at the rate of $20,000 per year, but these are subject to a cost-of-living adjustment that is effective on January 1 of each year, based on the increase in the state-average-weekly-wage over the previous year.

- The best estimate of his future medical expenses is $70,000 per year, in 1996 dollars. These will increase with medical inflation.

- Joe's mortality follows that for the overall male population, as shown in the 1990 US census. (Exhibit 1) Based on this mortality, his life expectancy is 39.6 years.[5]

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4 For simplicity, we have ignored ALAE in this example. ALAE is usually covered by the reinsurance, and should be included if this is the case. However, ALAE is usually a small portion of workers' compensation claims, and including it would not change any of the principles discussed in this paper.

5 One may wonder whether it is reasonable to use mortality for the general population, when Joe is presumably rather badly injured. Depending on the claimant's condition, one may wish to use impaired mortality tables. It should be noted, however, that contrary to the usual

- Our best guess of future inflation is 4.2% per year.[6] We assume, for convenience, that changes in the state-average-weekly-wage follow the overall price inflation in the economy. (We generally expect wages to rise faster than prices over the long run. As productivity increases, real wages generally rise.)

- Our best guess of future medical inflation is 5.36% per year.[7] Exhibit 2 shows historical changes in the CPI and medical CPI.

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intuition on the matter, workers' compensation lifetime-pension cases do not, overall, appear to have higher mortality rates than those of the general population. Gillam (1993) shows that at some ages, the mortality of workers' compensation claimants is even below that of the general population. Gillam's technique weights each claimant equally. However, over a large book of business, that may not be the optimal approach, since some claims are bigger than others. In particular, many of the really big claims are for people who are extremely badly injured and require, say, 24-hour attendant care. One might speculate that a dollar-weighted average of mortality could be found to be significantly worse than the general population.

By using the 1990 census table, we are ignoring future mortality improvements, that may result from better medical care in the future. As medical care improves, mortality rates have historically dropped. By ignoring mortality improvements, we are implicitly assuming Joe Soap has impaired mortality.

6 The 4.2% used in the text is the average of actual Consumer Price Index changes from 1935 to 1995, using data supplied by the US Bureau of Labor Statistics. Using this average was a matter of convenience, rather than a matter of believing that it is a good predictor of future inflation. The data, though not a predictor of future inflation, give one a reasonable idea of how inflation could move over the long term.

Steeneck (1996, p. 252), when faced with projecting indemnity inflation into the indefinite future, selects 4.0% as his annual rate.

7 As with CPI changes, this average is based on changes in the Medical component of the CPI from 1935 to 1995. Also, as with the CPI, I am using this number for illustrative purposes,

- The appropriate risk-adjusted discount rate is assumed to be the same as the expected annual inflation rate, namely 4.2% per year. Again, this assumption is for convenience in this illustrative example. In general, discounting should be based on some investment yield, less a risk adjustment to take care of the riskiness in the flows being discounted. (Butsic, 1988) Real interest rates will usually be positive, and I am assuming the appropriate risk adjustment exactly offsets the real interest rate. (This is not the same as assuming that inflation is zero and discounting is done at a zero rate. Assuming zero inflation will ensure that higher reinsurance layers are not touched, when, in fact, there is a great likelihood that they will be hit.)

- The primary insurer has purchased reinsurance in a number of layers:

Layer 1	$130,000 excess of $370,000
Layer 2	$500,000 excess of $500,000
Layer 3	$1 million excess of $1 million
Layer 4	$3 million excess of $2 million
Layer 5	$5 million excess of $5 million
Layer 6	$5 million excess of $10 million
Layer 7	$5 million excess of $15 million
Layer 8	$10 million excess of $20 million
Layer 9	$10 million excess of $30 million
Layer 10	$10 million excess of $40 million
Layer 11	$10 million excess of $50 million

rather than as a prediction of future medical inflation. Steeneck (1996, p. 252), projects annual medical inflation of 5.5%.

Layer 12	$10 million excess of $60 million
Layer 13	$10 million excess of $70 million
Layer 14	$10 million excess of $80 million
Layer 15	$10 million excess of $90 million
Layer 16	Unlimited excess of $100 million

The first layer is somewhat artificial: since $370,000 has already been paid by the end of 1996, the layer will pay from the first dollar in 1997. This allows us to look at the value of all future payments. Also, the top layer is somewhat unusual. Reinsurers do not usually sell unlimited layers. However, it will be instructive to see the value of reinsurance on the unlimited top layer.

Method 1: Totally Deterministic Calculation

Though actuaries would not use a totally deterministic method (i.e., one that assumes Joe lives exactly to his life expectancy and then dies) it is instructive to see what result this produces. Exhibit 3 shows this calculation, and the table below summarizes the results.

Layer (in $,000s)	Nominal Payments (in $,000s)	Present Value of Payments (in $,000s)
130 xs 370	130	126
500 xs 500	500	430
1,000 xs 1,000	1,000	679
3,000 xs 2,000	3,000	1,358
5,000 xs 5,000	5,000	1,388
5,000 xs 10,000	1,911	399
Higher Layers	0	0
Total, All Layers	**11,541**	**4,380**

Total payments are $11.5 million, exhausting the five layers and part of the sixth. The lack of payments in higher layers implies these layers will not be breached, and no commutation payment is needed. This method ignores the chance of death either earlier or later than one's life expectancy. We correct this by using a life-table approach, following Ferguson.

Method 2: Stochastic date of death

In Method 2, a mortality table is used to model Joe's life span, as shown in Exhibit 4. The table below compares the commutation amounts from Methods 1 and 2.

Layer (in $,000s)	**Expected Nominal Payments (in $,000s)**		**Expected Present-Value Payments (in $,000s)**	
	Method 1	Method 2	Method 1	Method 2
130 xs 370	130.0	129.7	126.0	125.7
500 xs 500	500.0	494.9	430.2	425.9
1,000 xs 1,000	1,000.0	970.6	679.4	659.8
3,000 xs 2,000	3,000.0	2,729.7	1,357.8	1,241.3
5,000 xs 5,000	5,000.0	3,734.8	1,387.7	1,048.5
5,000 xs 10,000	1,910.9	2,647.3	398.7	510.2
5,000 xs 15,000	0.0	1,704.2	0.0	254.6
10,000 xs 20,000	0.0	1,523.1	0.0	177.9
10,000 xs 30,000	0.0	374.7	0.0	33.6
10,000 xs 40,000	0.0	61.0	0.0	4.5
10,000 xs 50,000	0.0	6.5	0.0	0.4
10,000 xs 60,000	0.0	0.4	0.0	0.0
Higher layers	0.0	0.0	0.0	0.0
Total, all Layers	**11,540.9**	**14,376.9**	**4,379.7**	**4,482.5**

Several points are worth noting:

- Using Method 2, twelve layers have non-zero commutation amounts, compared to only six layers using Method 1. This is because Method 2 recognizes that people can live beyond their life expectancies. If the person lives to the outer reaches of the mortality table, say to 110, many more layers will be breached. The highest layer reached is $10 million excess of $60 million, implying that the largest possible claim, for a person living to the maximum number of years in the life table is somewhere between $60 million and $70 million. [Exhibit 4 shows that the maximum possible loss is $78.4 million, but the tiny probability of this happening means that the expected losses in the layers above $70 million are below $1,000, and thus do not show up on the table above.]

- For all layers combined (which translates to the value of all future amounts payable to the claimant) the nominal total from Method 1 ($11.5 million) is considerably lower than the nominal total from Method 2 ($14.4 million). However, the present value from Method 1 ($4.4 million) is only slightly lower than the present value from Method 2 ($4.5 million). How can we explain this?

  i) Nominal Total from Method 2 considerably greater than Method 1
  The easiest way of explaining the relation between the nominal totals is by analogy to a more familiar idea involving annuities. As most actuaries are aware, the present value of a life annuity is less than the present value of an annuity certain for the person's life expectancy. (Bowers, 1986, pp. 149 - 150 (example 5.13) and p. 158 (exercise 5.45).) In other words, the cost of paying someone $1 per year for life is less than the cost of paying $1 per year for a guaranteed period equal to the person's life expectancy. The intuition is that if you pay for the person's actual lifetime, there's a chance of living beyond the life expectancy, and those payments will be discounted at a higher rate than the earlier payments. By contrast, the annuity certain ignores the possibility of these higher discounts.

How does this relate to the nominal payments from Method 1 being much lower than Method 2? In our situation, we have inflation affecting the payments in two ways: the indemnity amounts are increased by the annual cost-of-living increase, and the medical amounts are increased by the annual medical inflation. If the claimant lives to, say, 95 years old, there will be many years of inflation increasing the annual payments, beyond the inflation contemplated in Method 1, which halts at the life expectancy. Thus, without inflation, the nominal amounts from Methods 1 and 2 would be identical; with inflation, the nominal amount from Method 1 will be lower than that for Method 2.

ii) Present value of Method 2 almost the same as Method 1
Without inflation, the payments would be the same each year. Then, as noted above, the present value of Method 1 (an annuity certain for the life expectancy) would exceed the present value for Method 2 (a life annuity). When there is inflation, things are more complicated. The issue is whether the effect of the additional inflation beyond the life expectancy outweighs the effect of the additional discounting. Depending on the rates, the present value of Method 2 could be either higher or lower than the present value of Method 1.

- On the layers that are pierced by Method 1, the commutation value from Method 2 is lower than the value from Method 1. For example, on the $500,000 excess $500,000 layer, the value under Method 1 is $430,200, while under Method 2 it's $425,900. This is because Method 1 assumes the amounts are paid for certain, and discounts only for the time-value of money. By contrast, Method 2 recognizes that the claimant may die early, and that the amounts may not be paid. Of course, in the layers not pierced in Method 1, the commutation value for Method 2 is always higher.

- We can make no general statement about whether a commutation calculated using Method 1 will produce a total amount, for all layers combined, that is greater than or less than the total for Method 2. This will depend on a number of factors. For example, if the primary company buys reinsurance on only very low layers, Method 1 will tend to be higher. If it buys reinsurance only on high layers, Method 2 will tend to be higher.

Determinism and Risk

Once a claim has been commuted, the cedent takes the risk of future losses. If the claimant lives to a ripe old age, the primary company will suffer a loss — it would have been better off not to have commuted. That's not a problem: insurance is about taking risks. The commutation calculation measured the mortality risk, and included it in the commutation price. Though the primary company may not be happy to have to pay higher than expected losses, the mortality risk has been priced into the commutation amount. But, there are other risks faced by the ceding company that have not been priced into the commutation amount. Medical inflation is one such example.

The assumed rate of medical inflation is often a contentious issue in commutation negotiations. The parties may argue over whether we should use the average for the past decade (currently about 7%), a longer term average (about 6% if we average back to World War 2), or an econometrician's projection for medical inflation for the next decade. In many cases we are projecting inflation for 70 years or more, so we cannot expect our numbers to be perfect. But, often, the parties find a number on which they can agree — let us assume it is 5.36%, and let us assume this number is, indeed, the future long-term average medical inflation rate. The parties use Method 2, with 5.36% medical inflation, and agree on the amount. The ceding company, it would appear, has been compensated for future inflation.

The ceding company has not, in fact, been compensated for future inflation. It has been compensated for a fixed 5.36% future inflation. It faces the risk that 2 or 3 years hence there will be very high medical inflation, say 20% or 25% per year, for 3 or 4 years, after which medical inflation will drop back to its long-term average. This period of abnormally high medical inflation will quickly erode the retention, which is in nominal dollars, and breach the excess layers much more quickly than the commutation calculation assumes.

There is, similarly, a chance that medical inflation for the next few years will be lower than the long term average, and high medical inflation may not occur for another 60 years. Over the course of the 70 years, one would expect this all to even out. So, the skeptic may ask, why should we care? If, on average, it evens out, and if a company does a large number of commutations over a large number of years, the overall result will be about right.

The problem is that it will not be "about right." Things do not average out in the long run. Just as Method 1 gave biased results, so Method 2, by assuming certain inputs are deterministic, gives biased results. Method 1 may be labeled "completely deterministic." Method 2 strips away the deterministic life expectancy from Method 1. But there are further layers of determinism that need to be stripped away if we want to get more accurate answers.

The Effects of Variable Inflation

To see why things do not average out, let's examine the effects of variable inflation more closely. Consider an average inflation rate of 5% per year in each of 3 scenarios, and assume the pre-inflation amount payable per year is $100:

	Medical Amount Payable Each Year		
Year	**Scenario 1: 5% inflation each year**	**Scenario 2: 20% inflation in year 1; 0% in all other years**	**Scenario 3: 20% inflation in year 4; 0% in all other years**
0	100.00	100.00	100.00
1	105.00	120.00	100.00
2	110.25	120.00	100.00
3	115.76	120.00	100.00
4	121.55	120.00	120.00
Total	**552.56**	**580.00**	**520.00**

Inflation early on (scenario 2) raises the nominal dollar amounts in all future years, causing the total nominal amount to be higher. If there is reinsurance on these payments, the reinsurance retention would be breached earlier, and perhaps a layer will be breached that would not otherwise have been breached. The average inflation over the 3 scenarios is the same, but Scenario 2 results in more dollars of medical expenses, and Scenario 3 results in fewer dollars of medical expenses.

For a given average inflation rate, the path of inflation over the life of the claim will affect the future payments: high inflation early on will result in higher amounts; low inflation early on will result in lower amounts. While the total amount over all layers of reinsurance may roughly average out to be the same when present-valued, the amounts within the various layers will differ significantly.

If there is high inflation early on, the reinsurance retention will be breached earlier than expected. There is thus a greater chance that the claimant will still be alive to receive the payment. This greater possibility of payment directly affects the commutation calculation.

The standard commutation calculation fails to include certain risks, and thus neglects to price them. Method 2 assumes mortality is stochastic, but that medical inflation is deterministic. It also assumes wage inflation (and hence cost-of-living adjustments, in states that have them), investment income, and the annual medical usage of the claimant are deterministic. This will generally bias the commutation amount upwards for lower layers and downwards for higher layers. This is analogous to Method 1 overstating the lower layers and understating the higher layers, relative to Method 2. ("Higher" and "lower" is relative to the size of an individual claim.) Making each of these factors stochastic will remove some of the bias in the calculation.

Stripping Away Determinism

Method 3: Stochastic economic factors and medical costs

Method 3 incorporates several additional random variables into the calculation:

- Inflation is not constant over time. It will fluctuate from year to year, with the rates not independent from year to year. [A note on terminology: By "inflation," with no modifier, I mean inflation relating to the overall economy, most popularly measured by the CPI. When referring specifically to price rises for medical care, I will refer to "medical inflation."]

- Medical inflation, while roughly tracking the ups and downs of general inflation, will not be the same as inflation.

- Investment yields fluctuate from year to year, but, like inflation, years are not independent.

- The annual medical payment to the claimant will not be a constant real amount each year. As the claimant's health changes, this amount will change. The claimant may take a turn for the worse, and require $200,000 of hospitalization one year; or he may have a stable period where his medical expense is a lot lower than projected.

Each of these variables needs to be modeled. The specific way they have been modeled here is not the only way it could be done. The details of the example are less important than the general point being made, namely, that additional fluctuations need to be taken into account.

1) Inflation

Inflation was modeled using an autoregressive process of the following form:

$$\text{Inflation rate}_{\text{Year } t} = \text{Long-term average inflation rate} + \alpha[\text{Inflation rate}_{\text{Year } (t-1)} - \text{Long-term average inflation rate}] + \text{error}_{\text{Year } t}$$

Daykin, et al. (1994, pp. 218 - 225), discusses this model, and a number of other inflation models that may better fit the data. In the interests of simplicity, I chose to use this model. Using this model, we can start with a known inflation rate for 1995, and simulate a series of future paths of inflation.

Using least-squares fitting of inflation data from the Bureau of Labor Statistics from 1935 - 1995, I obtained the following parameters:

Long-term average inflation = 4.2% per year.
$\alpha = 0.51$

The error term was modeled using a lognormal distribution. Since the error should be positive or negative, but a lognormal is only defined for positive variables, I shifted the lognormal. The best fit was obtained by using a shifted lognormal with parameters $\mu = -2.76$ and $\sigma = 0.51$. To ensure a zero mean for the error term, the lognormal was shifted by the mean of this distribution, or about .072. Exhibit 5 shows the derivation of these parameters.

This inflation variable was used to model the Cost of Living Adjustment to the indemnity payments. COLAs are usually tied to changes in the state average weekly wage, and I assumed that wage inflation is the same as overall price inflation — a convenient simplification, not necessarily correct. Since most COLAs are capped, I assumed the COLA could not be more than 5% in any year. I also assumed that if inflation is negative, the indemnity amount would not go down. Since COLAs are lagged a year, I assumed the COLA in 1998 is based on 1997 inflation, etc.

2) Medical Inflation

Medical inflation may be higher or lower than inflation, but there is a link between the two: if there were a 20% inflation rate for a sustained period, one would not expect medical inflation to remain at 2%. I thus selected a model of medical inflation that is tied to the overall inflation rate, but with a degree of error allowed. The model was:

$$
\begin{aligned}
\text{Medical Inflation}_t
&= \text{Inflation}_{\text{Year } t} \\
&\quad + \beta[\text{Medical inflation}_{\text{Year }(t-1)} - \text{Inflation}_{\text{Year}(t-1)}] \\
&\quad + [\text{long-term average medical inflation} - \text{long-term average inflation}] \\
&\quad + \text{error term}_{\text{Year } t}
\end{aligned}
$$

The error term is assumed to be normally distributed, with a mean of zero.[8]

I used the longest available data series to get these parameters. The Bureau of Labor Statistics has medical CPI numbers back to 1935. For the period 1935 to 1995, average medical inflation was 1.16 percentage points higher than average inflation. This is what I used for the third term of the above expression. I am assuming these long-term trends will continue, although, there is of course no guarantee of this.

The fitted value for β was 0.38, and the error term was normally distributed with a mean of 0, and a standard deviation of 0.027. Exhibit 6 shows the development of this model.

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8 The inflation model had a lognormal error term, but the medical inflation model has a normal error term. The reason was that I had a strong feeling that the error for inflation was skewed, whereas it is less obvious that the difference between overall inflation and medical inflation (which is largely what drives the medical inflation model) is skewed.

3) Investment Yields

I used a very simple model of investment yields. The firm is assumed to invest in one-year bonds that are held to maturity. Consequently, one would never have investment losses. In general, the bond yield would equal the expected inflation rate plus some small premium. However, one should discount using a risk-adjusted rate, and I simply assumed that the risk adjustment equals the premium over the inflation rate, i.e., the rate used for discounting is the same as the inflation rate. Even if inflation is negative, one would not expect interest rates to drop below some threshold (e.g., 2%), so I assumed the risk-adjusted discount rate could not go below zero, i.e., I set the rate for discounting at the greater of zero or the inflation rate.[9]

4) Medical Services Used By Claimant

Medical usage will fluctuate from year to year. In some years, the claimant will use relatively little, while in other years he may require surgery, with large medical bills. The services from year to year may be correlated. For example, if he has surgery this year, the costs of post-operative treatment may keep the costs higher than average in the next year. One can model this process using a similar autoregressive model to the way we modeled inflation:

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9 This is a rather unrealistic model of investment income, but it will be adequate for our purposes. Insurers usually buy longer term investments, especially if they are investing reserves backing lifetime workers' compensation claims. They may also invest in stocks, or other assets, that do not have fixed yields. These complications are beyond the scope of the paper.

It is also beyond the scope of the paper to address the question of whether discounting should be based on the firm's (either the reinsurer or reinsured's) actual investments, or whether it should be based on market discount rates.

Medical $\text{amount}_{\text{Year } t}$

= Long-term average medical amount

+ γ[Medical $\text{amount}_{\text{Year } (t-1)}$ - long-term average medical amount]

+ $\text{error}_{\text{Year } t}$

The long-term average medical amount for this case is, by assumption, $70,000. Empirically, there does not appear to be a very strong link between last year's medical amount and this year's, so I used $\gamma = .05$. The error term was modeled by a lognormal with $\mu = 10.80089$ and $\sigma = 0.75$. The mean of this lognormal is 65,000, so I shifted the distribution by 65,000 to ensure the error term has a mean of zero.

Running the Model

Each of these parameters was then put into a simulation model. By simulating inflation, medical inflation, and the annual medical amount, one can get a set of input parameters for each simulation. These parameters are then run through the same model as is used for Method 2. The difference is that each time it is run through with different parameters, so that instead of getting a single present value of the future payments, we get a distribution. (Exhibit 7 shows a single simulation from this distribution.)

The means of these distributions, for each layer, are shown below, compared with the results for Methods 1 and 2:

Layer (in $,000s)	Expected Nominal Payments (in $,000s)			Expected Present-Value Payments (in $,000s)		
	Method 1	Method 2	Method 3	Method 1	Method 2	Method 3
130 xs 370	130	130	130	126	126	125
500 xs 500	500	495	495	430	426	426
1,000 xs 1,000	1,000	971	969	679	660	664
3,000 xs 2,000	3,000	2,730	2,715	1,358	1,241	1,247
5,000 xs 5,000	5,000	3,735	3,701	1,388	1,048	1,053
5,000 xs 10,000	1,911	2,647	2,694	399	510	526
5,000 xs 15,000	0	1,704	1909	0	255	288
10,000 xs 20,000	0	1,523	2,317	0	178	271
10,000 xs 30,000	0	375	1,214	0	34	108
10,000 xs 40,000	0	61	673	0	4	49
10,000 xs 50,000	0	7	394	0	0	24
10,000 xs 60,000	0	0	241	0	0	13
10,000 xs 70,000	0	0	154	0	0	7
10,000 xs 80,000	0	0	102	0	0	4
10,000 xs 90,000	0	0	69	0	0	3
Unlimited xs $100MM	0	0	193	0	0	6
Total, all Layers	**11,541**	**14,377**	**17,970**	**4,380**	**4,483**	**4,815**

It is worth noting a few things regarding these results:

- Unlike Methods 1 and 2, Method 3 hits all the reinsurance layers. A less deterministic approach ensures that higher layers will be hit. Thus, layers that might otherwise have been thought to have no possibility of a loss, are shown to have some commutation value.

- The total nominal value of Method 3 is higher than the nominal value of Method 2 (and Method 2 is higher than Method 1, as discussed earlier).

  This is largely explained by the treatment of inflation. The medical and indemnity amounts paid in some future period depend on the products of (1 + inflation) for all prior periods. For example, the amount paid in period 3 depends on what inflation was in periods 1 and 2. The inflation rates are not independent from period to period: they are positively correlated. Thus, the expected value of the product is greater than the product of the expected values, making the overall nominal payments for Method 3 higher than the payments in Method 2.[10]

- The overall present value factor for Method 2 is 31% (= 4,483 ÷ 14,377), but the present value factor for Method 3 is only 27% (= 4,466 ÷ 16,420). In other words, Method 3 has, on average, a steeper discount applied to it.

  The relationship between the present values of Methods 2 and 3 is complex, largely because the assumptions are not consistent between the two methods. Yes, we tried to make them consistent, but the differences in the assumptions become clear once we examine them more carefully.

  Consider the indemnity cost-of-living adjustments. We said that, based on the historical record, inflation averages 4.2% per annum, and this was the number we used for the COLA in Method 2. In Method 3, inflation varies stochastically, with a mean of 4.2%. But our rules for the COLA said that it couldn't be more than 5%, or less than 0%. In Method 3, the

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10 E(XY) = E(X)E(Y) + cov(X,Y). Thus, if X and Y are positively correlated, the expected value of the product exceeds the product of the expected values.

average inflation rate is 4.2%, but the average COLA is not 4.2% because it is sometimes capped. In fact, it averages about 2.98%.

Likewise, we said the discount rate was equal to the inflation rate, but that the discount rate could never go negative. On average, then, the discount rate is higher than 4.2% — about 4.39%. This higher effective discount rate is the main reason for the total present value factor of Method 3 being less than the total present value for Method 2.

The assumptions between Methods 2 and 3 are not the same: Method 2 assumes higher COLAs than Method 3, and lower discount. Running Method 2 at the same average COLA as Method 3 (2.98%), and the same average discount (4.39%), changes the Method 2 present value to $4.124 million, which is 8% lower than the $4.483 million we originally calculated. (See Exhibit 8.)

In general, the relationship between the present values of Methods 2 and 3 will depend on the particular assumptions, and how they interact with the various caps and correlations.

- In the lowest layers, the nominal value of Method 1 is higher than Method 2, and Method 2 is higher than Method 3.[11] This is because

11 On the earlier table, the nominal values for Methods 2 and 3 look the same at the low retentions. In fact, however, the numbers in the table are rounded. If the complete numbers had been shown, the nominal values in the low layers would be systematically less (though admittedly by a small amount) for Method 3 than for Method 2:

	Nominal Value (in $Thousands)	
Layer	Method 2	Method 3
1	129.74	129.70
2	494.89	494.55
3	970.56	969.34
4	2,729.68	2,715.21

Method 1 implies these layers will be hit for certain, whereas Methods 2 and 3 recognize that the claimant could die before the layer is penetrated. In addition, Method 3 recognizes that there could be years of unusually low claim amounts, so that it may take longer than expected to breach the retention. This reduces the commutation amount in two ways:

i) The longer it is until the retention is breached, the greater the chance of the claimant dying before breaching the retention.
ii) The longer it is until the retention is breached, the steeper the effect of present valuing.

In higher layers, which have a lower probability of being penetrated, this situation reverses itself: Method 3 gives higher results than Method 2. The upper layers are most vulnerable to a period of sustained high inflation or high claim levels. Methods 1 and 2 assume inflation and claim levels are fixed, so they do not contemplate periods of sustained high inflation or claim levels.

- For the lower layers, where the chances are good that the claimant will live long enough to breach them, Method 2 gives similar results to Method 3. But as the layers get higher, the Method 2 number gets lower and lower as a percentage of Method 3.

	Method 2 Result as Percentage of Method 3 Result	
Layer	**Nominal**	**Present Value**
1	100%	100%
2	100%	99%
3	100%	97%
4	100%	95%
5	99%	90%
6	94%	83%

7	82%	72%
8	56%	48%
9	22%	19%
10	5%	4%
11	1%	1%
Higher Layers	0%	0%

- Note how the present value factor for the losses declines sharply in the higher layers. For example, for the $5 million excess $5 million layer, the present value is $1.053 million, compared to the nominal value of $3.701 million. This translates to a present value factor of 28%. By contrast, in the $10 million excess $90 million layer, the present value factor is only 4%.

ARE THERE FURTHER LAYERS OF DETERMINISM?

This paper has demonstrated that the commutation calculation is significantly affected by making a variety of variables non-deterministic. Have we now stripped away all determinism? Put another way: does this paper describe "the perfect" commutation calculation, or are there further layers of determinism that can, at least in principle, be stripped away?

There are, indeed, further layers of determinism that can be stripped away from a calculation of this nature, although it will become increasingly more difficult to do so. This paper has shown how we can strip away determinism in the levels of inflation, medical utilization, etc. But to measure the paths for these variables, we have relied on statistical measures on past data. Clearly, these historical data may no longer be valid predictors of the future. For example, the paper assumes that the best predictor of medical inflation is the last 60 years of medical CPI information. One can plausibly argue that what drove medical inflation in the 1930s and 1940s was completely different from what drove it in the 1970s and 1980s, and different from what will drive it in future. And it is quite possible that the drivers of inflation will change periodically over the course of the claimant's lifetime.

This same issue applies to other variables. For example, advances in medical care could affect the medical utilization for the claimant's condition — and perhaps render the assumed mortality table redundant.

The next layer of determinism is the models themselves. We have assumed the model stays fixed over the claimant's lifetime, but we can easily imagine a situation where the parameters of the model shift, or the model itself changes.

The problem is that this next layer of determinism is not easily subject to measurement, and hence is not amenable to quantification by the usual actuarial methods. But not being able to quantify does not allow us to say that these items do not exist, and to simply ignore them.

The Economics Of Uncertainty

Economists distinguish between "risk" and "uncertainty."[12] Risk includes those things that can be measured statistically, and uncertainty includes those things that cannot be measured, but which might occur. For example, if I bet on a fair coin coming up heads, I am facing a risk. But if I bet on the chance of intelligent life being found on an as-yet-undiscovered planet, that is uncertainty — I have no way of measuring the associated probabilities.

Most insurance problems consist of a mixture of risk and uncertainty. Insurers are good at dealing with risk. By measuring the probabilities of loss and pooling the risk, we can largely eliminate the risk and get stable losses in the aggregate. It is far more difficult to deal with uncertainty.

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12 The classic reference on risk and uncertainty is Knight (1921). For a more recent discussion of the economics of uncertainty, see O'Driscoll and Rizzo (1985).

In this paper, we have been measuring risk: we have only dealt with those things that can be measured. (Insofar as they cannot be modeled well, there are elements of uncertainty.) The next layer of determinism consists of uncertainty. We have no way of estimating the chances of the inflation model changing, or what the new model might be.

Without making any attempt to measure the effect of uncertainty, we can make some qualitative statements about its effects on commutations. Just as removing earlier layers of determinism increased the commutation amount in the higher layers, so removing yet another layer of determinism will increase the commutation amount in higher layers, and higher layers that would not otherwise have been pierced, will have some commutation value. Why? Under the inflation model postulated in the example in this paper, it is conceivable, but extremely unlikely, that there will be years where inflation will run above, say, 100% a year. (Actuaries who have dealt with foreign insurance and reinsurance may themselves have been burnt by hyperinflation in places like Israel and Argentina.) We can certainly envision unlikely circumstances where the US economy falls apart and there is hyperinflation. This possibility was not included in the data used for fitting the models, and is thus not contemplated in the resulting commutation amount.

All the other variables in the commutation are subject to similar uncertainty: mortality rates might plummet as cures are found for cancer and heart disease; or mortality rates might soar, as a new virus kills half the population. The annual medical usage might drop, if a cure is found for the claimant's ailment, which was previously thought to be permanent. Or the cost of medical care might soar as a new drug is discovered that greatly improves the claimant's quality of life, at twice the cost. What if the government takes over the entire health-care system, and insurers are no longer responsible for medical care costs?

We can dream up many different situations that will change what insurers owe to claimants. We can put probabilities on none of these, and we also know that there are many possibilities that we may not even think of, until they actually happen.

In commutations, it is common to ignore this uncertainty, and to commute some of the very high layers without payment. This is unwarranted. Commuting reinsurance is really a matter of pricing future possibilities, and reinsurers do not give away free layers, even if they have only a remote chance of being hit. For example, suppose I want to buy workers' compensation reinsurance for a layer of $1 million excess of $800 million. (To avoid catastrophe issues, let us assume the reinsurance is per claim, not per occurrence.) There has never been a workers' compensation claim that large, or even remotely close to it. Yet, would a reinsurer be willing to give the layer away free (assuming they have no costs to service the contract)? Of course they won't. Reinsurers recognize the remote possibility of having to pay on this contract, and they need to charge for that risk. The risk is remote, but remote is not the same as non-existent. The chance of the layer being hit is not measurable, but not-measurable is not the same as zero.

The pricing issues also apply to commutations. There is no reason why a cedent should be willing to commute a layer for nothing, even when the actuarial calculations (at some level of determinism) say there is no chance of hitting the layer. Though there is far less uncertainty at the time of a commutation than there was when the contract was written, there is still enough uncertainty that payment for the cedent re-assuming this risk is warranted.

Other Lines of Business; Pricing and Reserving, Too

The issues discussed in this paper apply more broadly than just to workers' compensation commutations. A commutation for, say, a General Liability treaty would usually develop the expected losses to ultimate, and commute based on the discounted value of those losses. But this ignores certain risks that are transferred back to the ceding company in the commutation. For example, a GL treaty being commuted in 1978 would have relieved the reinsurer for liability for environmental claims that were generated by the Superfund law, which passed a couple of years later. It was unknown, at the time of the commutation, that the cedent was giving up coverage for this risk, but it was not unknown that the cedent was taking the risk of some such change in the future. Just as a company selling GL reinsurance will not give away remote layers free of charge, so the commutation should not be free for these layers either.

Other lines of business have the same levels of determinism as do workers' compensation. The difference is that for workers' compensation we can do the calculations on a claim-by-claim basis, which helps to lay bare many of the underlying assumptions.

And it is not just commutations that are affected by determinism. It applies to regular pricing and reserving work as well. The clearest example would be the reserving of workers' compensation reinsurance, where the methods used in this paper can be directly applied. But for pricing and reserving of any excess insurance or reinsurance, it is important to keep in mind the problems of determinism. If we simply assume the future will turn out to be what was expected, or that the future will follow the patterns of the past, we are bound to be led astray. The scary part of writing insurance is the uncertainty of what the future will bring. The uncertainty cannot be quantified, but all too often we stick our heads in the sand and assume that if something cannot be quantified, it doesn't exist.

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Exhibit 1

1990 US Life Table (Males)

Age	l(x)	Life Expectancy
0	100,000.0	71.8
1	98,969.0	71.6
2	98,894.0	70.6
3	98,840.0	69.7
4	98,799.0	68.7
5	98,765.0	67.7
6	98,735.0	66.8
7	98,707.0	65.8
8	98,680.0	64.8
9	98,657.0	63.8
10	98,638.0	62.8
11	98,623.0	61.8
12	98,608.0	60.8
13	98,586.0	59.9
14	98,547.0	58.9
15	98,485.0	57.9
16	98,397.0	57.0
17	98,285.0	56.0
18	98,154.0	55.1
19	98,011.0	54.2
20	97,863.0	53.3
21	97,710.0	52.3
22	97,551.0	51.4
23	97,388.0	50.5
24	97,221.0	49.6
25	97,052.0	48.7
26	96,881.0	47.8
27	96,707.0	46.9
28	96,530.0	45.9
29	96,348.0	45.0
30	96,159.0	44.1
31	95,962.0	43.2
32	95,758.0	42.3
33	95,545.0	41.4
34	95,322.0	40.5
35	95,089.0	**39.6**
36	94,843.0	38.7

Age	l(x)	Life Expectancy
37	94,585.0	37.8
38	94,316.0	36.9
39	94,038.0	36.0
40	93,753.0	35.1
41	93,460.0	34.2
42	93,157.0	33.3
43	92,840.0	32.4
44	92,505.0	31.6
45	92,147.0	30.7
46	91,764.0	29.8
47	91,352.0	28.9
48	90,908.0	28.1
49	90,429.0	27.2
50	89,912.0	26.4
51	89,352.0	25.5
52	88,745.0	24.7
53	88,084.0	23.9
54	87,363.0	23.1
55	86,576.0	22.3
56	85,719.0	21.5
57	84,788.0	20.7
58	83,777.0	20.0
59	82,678.0	19.2
60	81,485.0	18.5
61	80,194.0	17.8
62	78,803.0	17.1
63	77,314.0	16.4
64	75,729.0	15.8
65	74,051.0	15.1
66	72,280.0	14.5
67	70,414.0	13.8
68	68,445.0	13.2
69	66,364.0	12.6
70	64,164.0	12.0
71	61,847.0	11.5
72	59,419.0	10.9
73	56,885.0	10.4

Age	l(x)	Life Expectancy
74	54,249.0	9.9
75	51,519.0	9.4
76	48,704.0	8.9
77	45,816.0	8.4
78	42,867.0	7.9
79	39,872.0	7.5
80	36,848.0	7.1
81	33,811.0	6.7
82	30,782.0	6.3
83	27,782.0	5.9
84	24,834.0	5.5
85	21,962.0	5.2
86	19,216.8	4.9
87	16,607.4	4.5
88	14,157.7	4.2
89	11,889.0	3.9
90	9,819.5	3.7
91	7,962.6	3.4
92	6,326.9	3.2
93	4,915.0	2.9
94	3,723.5	2.7
95	2,743.0	2.5
96	1,958.3	2.3
97	1,349.7	2.1
98	894.0	1.9
99	566.2	1.8
100	340.6	1.6
101	193.2	1.5
102	102.4	1.3
103	50.1	1.2
104	22.3	1.1
105	8.9	1.0
106	3.1	0.9
107	0.9	0.8
108	0.2	0.7
109	0.0	0.5
110	0.0	

Source: Vital Statistics of the United States, 1990 [US Department of Health and Human Services, 1994]
Note that the published tables extend only to age 85; beyond 85, the numbers are extrapolations.

Exhibit 2

Inflation:
Consumer Price Index and Medical Consumer Price Index

	Index at December		Annual Inflation			Index at December		Annual Inflation	
		Medical		Medical			Medical		Medical
Year	**CPI**	**CPI**	**CPI**	**CPI**	**Year**	**CPI**	**CPI**	**CPI**	**CPI**
1935	13.8	10.2			1966	32.9	27.2	3.5%	6.7%
1936	14.0	10.2	1.4%	0.0%	1967	33.9	28.9	3.0%	6.3%
1937	14.4	10.3	2.9%	1.0%	1968	35.5	30.7	4.7%	6.2%
1938	14.0	10.3	-2.8%	0.0%	1969	37.7	32.6	6.2%	6.2%
1939	14.0	10.4	0.0%	1.0%	1970	39.8	35.0	5.6%	7.4%
1940	14.1	10.4	0.7%	0.0%	1971	41.1	36.6	3.3%	4.6%
1941	15.5	10.5	9.9%	1.0%	1972	42.5	37.8	3.4%	3.3%
1942	16.9	10.9	9.0%	3.8%	1973	46.2	39.8	8.7%	5.3%
1943	17.4	11.4	3.0%	4.6%	1974	51.9	44.8	12.3%	12.6%
1944	17.8	11.7	2.3%	2.6%	1975	55.5	49.2	6.9%	9.8%
1945	18.2	12.0	2.2%	2.6%	1976	58.2	54.1	4.9%	10.0%
1946	21.5	13.0	18.1%	8.3%	1977	62.1	58.9	6.7%	8.9%
1947	23.4	13.9	8.8%	6.9%	1978	67.7	64.1	9.0%	8.8%
1948	24.1	14.7	3.0%	5.8%	1979	76.7	70.6	13.3%	10.1%
1949	23.6	14.9	-2.1%	1.4%	1980	86.3	77.6	12.5%	9.9%
1950	25.0	15.4	5.9%	3.4%	1981	94.0	87.3	8.9%	12.5%
1951	26.5	16.3	6.0%	5.8%	1982	97.6	96.9	3.8%	11.0%
1952	26.7	17.0	0.8%	4.3%	1983	101.3	103.1	3.8%	6.4%
1953	26.9	17.6	0.7%	3.5%	1984	105.3	109.4	3.9%	6.1%
1954	26.7	18.0	-0.7%	2.3%	1985	109.3	116.8	3.8%	6.8%
1955	26.8	18.6	0.4%	3.3%	1986	110.5	125.8	1.1%	7.7%
1956	27.6	19.2	3.0%	3.2%	1987	115.4	133.1	4.4%	5.8%
1957	28.4	20.1	2.9%	4.7%	1988	120.5	142.3	4.4%	6.9%
1958	28.9	21.0	1.8%	4.5%	1989	126.1	154.4	4.6%	8.5%
1959	29.4	21.8	1.7%	3.8%	1990	133.8	169.2	6.1%	9.6%
1960	29.8	22.5	1.4%	3.2%	1991	137.9	182.6	3.1%	7.9%
1961	30.0	23.2	0.7%	3.1%	1992	141.9	194.7	2.9%	6.6%
1962	30.4	23.7	1.3%	2.2%	1993	145.8	205.2	2.7%	5.4%
1963	30.9	24.3	1.6%	2.5%	1994	149.7	215.3	2.7%	4.9%
1964	31.2	24.8	1.0%	2.1%	1995	153.5	223.8	2.5%	3.9%
1965	31.8	25.5	1.9%	2.8%					
							Average	**4.2%**	**5.3%**

Source: US Department of Labor, Bureau of Labor Statistics

Completely Deterministic commutation calculation

Parameters:

(A)	Evaluation Date:	1/1/97
(B)	Age at evaluation date:	35
(C)	Annual indemnity payment	20,000
(D)	Annual medical payment: (at mid-1996 price levels)	70,000
(E)	Indemnity paid to date	70,000
(F)	Medical paid to date	300,000
(G)	Life expectancy:	39.6
(H)	Cost-of-Living Adjustment:	4.2%
(I)	Medical Inflation Rate:	5.36%
(J)	Annual Discount Rate:	4.2%

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cumulative of (5)
1996 and prior		*70,000*		*300,000*	*370,000*	*370,000*
1997	4.2%	20,840	5.36%	73,752	94,592	464,592
1998	4.2%	21,715	5.36%	77,705	99,420	564,012
1999	4.2%	22,627	5.36%	81,870	104,497	668,510
2000	4.2%	23,578	5.36%	86,258	109,836	778,346
2001	4.2%	24,568	5.36%	90,882	115,450	893,796
2002	4.2%	25,600	5.36%	95,753	121,353	1,015,148
2003	4.2%	26,675	5.36%	100,885	127,560	1,142,709
2004	4.2%	27,795	5.36%	106,293	134,088	1,276,797
2005	4.2%	28,963	5.36%	111,990	140,953	1,417,750
2006	4.2%	30,179	5.36%	117,993	148,172	1,565,922
2007	4.2%	31,447	5.36%	124,317	155,764	1,721,686
2008	4.2%	32,767	5.36%	130,981	163,748	1,885,434
2009	4.2%	34,144	5.36%	138,001	172,145	2,057,579
2010	4.2%	35,578	5.36%	145,398	180,976	2,238,555
2011	4.2%	37,072	5.36%	153,191	190,263	2,428,818
2012	4.2%	38,629	5.36%	161,402	200,031	2,628,850
2013	4.2%	40,251	5.36%	170,054	210,305	2,839,155
2014	4.2%	41,942	5.36%	179,169	221,111	3,060,265
2015	4.2%	43,704	5.36%	188,772	232,476	3,292,741
2016	4.2%	45,539	5.36%	198,890	244,429	3,537,170
2017	4.2%	47,452	5.36%	209,551	257,002	3,794,172
2018	4.2%	49,445	5.36%	220,783	270,227	4,064,400
2019	4.2%	51,521	5.36%	232,617	284,138	4,348,537
2020	4.2%	53,685	5.36%	245,085	298,770	4,647,308
2021	4.2%	55,940	5.36%	258,221	314,161	4,961,469
2022	4.2%	58,290	5.36%	272,062	330,352	5,291,820
2023	4.2%	60,738	5.36%	286,644	347,382	5,639,203
2024	4.2%	63,289	5.36%	302,009	365,297	6,004,500
2025	4.2%	65,947	5.36%	318,196	384,143	6,388,643
2026	4.2%	68,717	5.36%	335,252	403,968	6,792,611
2027	4.2%	71,603	5.36%	353,221	424,824	7,217,435

Exhibit 3, Page 2

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cumulative of (5)
2028	4.2%	74,610	5.36%	372,154	446,764	7,664,199
2029	4.2%	77,744	5.36%	392,101	469,845	8,134,044
2030	4.2%	81,009	5.36%	413,118	494,127	8,628,170
2031	4.2%	84,411	5.36%	435,261	519,672	9,147,843
2032	4.2%	87,956	5.36%	458,591	546,547	9,694,390
2033	4.2%	91,651	5.36%	483,171	574,822	10,269,212
2034	4.2%	95,500	5.36%	509,069	604,569	10,873,781
2035	4.2%	99,511	5.36%	536,356	635,867	11,509,648
2036	4.2%	62,214	5.36%	339,063	401,277	**11,910,925**
Total		2,104,844		9,806,081		

Future payments = 11,910,925 - 370,000 = 11,540,925

Year	(6) Cumulative Total Payment Cumulative of (5)	(7) $500,000 xs $370,000	(8) $500,000 xs $500,000	(9) $1 million xs $1 million	(10) $3 million xs $2 million	(11) $5 million xs $5 million	(12) $5 million xs $10 million
		Incremental Payments By Layer					
1996 and prior	370,000	0	0	0	0	0	0
1997	464,592	94,592	0	0	0	0	0
1998	564,012	35,408	64,012	0	0	0	0
1999	668,510	0	104,497	0	0	0	0
2000	778,346	0	109,836	0	0	0	0
2001	893,796	0	115,450	0	0	0	0
2002	1,015,148	0	106,204	15,148	0	0	0
2003	1,142,709	0	0	127,560	0	0	0
2004	1,276,797	0	0	134,088	0	0	0
2005	1,417,750	0	0	140,953	0	0	0
2006	1,565,922	0	0	148,172	0	0	0
2007	1,721,686	0	0	155,764	0	0	0
2008	1,885,434	0	0	163,748	0	0	0
2009	2,057,579	0	0	114,566	57,579	0	0
2010	2,238,555	0	0	0	180,976	0	0
2011	2,428,818	0	0	0	190,263	0	0
2012	2,628,850	0	0	0	200,031	0	0
2013	2,839,155	0	0	0	210,305	0	0
2014	3,060,265	0	0	0	221,111	0	0
2015	3,292,741	0	0	0	232,476	0	0
2016	3,537,170	0	0	0	244,429	0	0
2017	3,794,172	0	0	0	257,002	0	0
2018	4,064,400	0	0	0	270,227	0	0
2019	4,348,537	0	0	0	284,138	0	0
2020	4,647,308	0	0	0	298,770	0	0
2021	4,961,469	0	0	0	314,161	0	0
2022	5,291,820	0	0	0	38,531	291,820	0
2023	5,639,203	0	0	0	0	347,382	0
2024	6,004,500	0	0	0	0	365,297	0
2025	6,388,643	0	0	0	0	384,143	0
2026	6,792,611	0	0	0	0	403,968	0
2027	7,217,435	0	0	0	0	424,824	0
2028	7,664,199	0	0	0	0	446,764	0
2029	8,134,044	0	0	0	0	469,845	0
2030	8,628,170	0	0	0	0	494,127	0
2031	9,147,843	0	0	0	0	519,672	0
2032	9,694,390	0	0	0	0	546,547	0
2033	10,269,212	0	0	0	0	305,610	269,212
2034	10,873,781	0	0	0	0	0	604,569
2035	11,509,648	0	0	0	0	0	635,867
2036	**11,910,925**	0	0	0	0	0	401,277

Year	(13) Present Value Factor	(14) Discounted Value by Layer: $500,000 xs $370,000	(15) $500,000 xs $500,000	(16) $1 million xs $1 million	(17) $3 million xs $2 million	(18) $5 million xs $5 million	(19) $5 million xs $10 million	(20) All Layers Combined
1996 and prior								
1997	0.9796	92,666	0	0	0	0	0	92,666
1998	0.9402	33,289	60,181	0	0	0	0	93,470
1999	0.9023	0	94,284	0	0	0	0	94,284
2000	0.8659	0	95,106	0	0	0	0	95,106
2001	0.8310	0	95,937	0	0	0	0	95,937
2002	0.7975	0	84,697	12,081	0	0	0	96,778
2003	0.7653	0	0	97,628	0	0	0	97,628
2004	0.7345	0	0	98,488	0	0	0	98,488
2005	0.7049	0	0	99,357	0	0	0	99,357
2006	0.6765	0	0	100,236	0	0	0	100,236
2007	0.6492	0	0	101,124	0	0	0	101,124
2008	0.6230	0	0	102,023	0	0	0	102,023
2009	0.5979	0	0	68,503	34,428	0	0	102,931
2010	0.5738	0	0	0	103,850	0	0	103,850
2011	0.5507	0	0	0	104,779	0	0	104,779
2012	0.5285	0	0	0	105,718	0	0	105,718
2013	0.5072	0	0	0	106,668	0	0	106,668
2014	0.4868	0	0	0	107,628	0	0	107,628
2015	0.4671	0	0	0	108,599	0	0	108,599
2016	0.4483	0	0	0	109,580	0	0	109,580
2017	0.4302	0	0	0	110,573	0	0	110,573
2018	0.4129	0	0	0	111,577	0	0	111,577
2019	0.3963	0	0	0	112,591	0	0	112,591
2020	0.3803	0	0	0	113,618	0	0	113,618
2021	0.3650	0	0	0	114,655	0	0	114,655
2022	0.3502	0	0	0	13,495	102,209	0	115,704
2023	0.3361	0	0	0	0	116,765	0	116,765
2024	0.3226	0	0	0	0	117,838	0	117,838
2025	0.3096	0	0	0	0	118,922	0	118,922
2026	0.2971	0	0	0	0	120,019	0	120,019
2027	0.2851	0	0	0	0	121,128	0	121,128
2028	0.2736	0	0	0	0	122,249	0	122,249
2029	0.2626	0	0	0	0	123,383	0	123,383
2030	0.2520	0	0	0	0	124,529	0	124,529
2031	0.2419	0	0	0	0	125,688	0	125,688
2032	0.2321	0	0	0	0	126,860	0	126,860
2033	0.2228	0	0	0	0	68,076	59,968	128,045
2034	0.2138	0	0	0	0	0	129,243	129,243
2035	0.2052	0	0	0	0	0	130,454	130,454
2036	0.1969	0	0	0	0	0	79,008	79,008
Total		125,955	430,206	679,440	1,357,759	1,387,664	398,673	4,379,697

Method 2: Stochastic Mortality (Other inputs deterministic)

	Parameters:	
(A)	Evaluation Date:	1/1/97
(B)	Current Age:	35
(C)	Annual Indemnity Payment	20,000
(D)	Annual Medical Payment (at mid-1996 price levels)	70,000
(E)	Indemnity Paid to Date	70,000
(F)	Medical Paid to Date:	300,000
(G)	Cost-of-Living Adjustment	4.2%
(H)	Medical Inflation Rate:	5.36%
(I)	Annual Discount Rate:	4.2%

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cum. of (5)	(7) Probability of claimant living to mid-year	(8) Present Value Factor	(9) Discount for mortality & investment income (7) x (8)
1996 and prior		70,000		300,000	370,000	370,000			
1997	4.2%	20,840	5.36%	73,752	94,592	464,592	0.999	0.9796	0.9784
1998	4.2%	21,715	5.36%	77,705	99,420	564,012	0.996	0.9402	0.9364
1999	4.2%	22,627	5.36%	81,870	104,497	668,510	0.993	0.9023	0.8962
2000	4.2%	23,578	5.36%	86,258	109,836	778,346	0.990	0.8659	0.8576
2001	4.2%	24,568	5.36%	90,882	115,450	893,796	0.987	0.8310	0.8206
2002	4.2%	25,600	5.36%	95,753	121,353	1,015,148	0.984	0.7975	0.7851
2003	4.2%	26,675	5.36%	100,885	127,560	1,142,709	0.981	0.7653	0.7510
2004	4.2%	27,795	5.36%	106,293	134,088	1,276,797	0.978	0.7345	0.7184
2005	4.2%	28,963	5.36%	111,990	140,953	1,417,750	0.975	0.7049	0.6870
2006	4.2%	30,179	5.36%	117,993	148,172	1,565,922	0.971	0.6765	0.6568
2007	4.2%	31,447	5.36%	124,317	155,764	1,721,686	0.967	0.6492	0.6278
2008	4.2%	32,767	5.36%	130,981	163,748	1,885,434	0.963	0.6230	0.5999
2009	4.2%	34,144	5.36%	138,001	172,145	2,057,579	0.958	0.5979	0.5730
2010	4.2%	35,578	5.36%	145,398	180,976	2,238,555	0.954	0.5738	0.5472
2011	4.2%	37,072	5.36%	153,191	190,263	2,428,818	0.948	0.5507	0.5222
2012	4.2%	38,629	5.36%	161,402	200,031	2,628,850	0.943	0.5285	0.4982
2013	4.2%	40,251	5.36%	170,054	210,305	2,839,155	0.936	0.5072	0.4750
2014	4.2%	41,942	5.36%	179,169	221,111	3,060,265	0.930	0.4868	0.4526
2015	4.2%	43,704	5.36%	188,772	232,476	3,292,741	0.923	0.4671	0.4310
2016	4.2%	45,539	5.36%	198,890	244,429	3,537,170	0.915	0.4483	0.4100
2017	4.2%	47,452	5.36%	209,551	257,002	3,794,172	0.906	0.4302	0.3898
2018	4.2%	49,445	5.36%	220,783	270,227	4,064,400	0.897	0.4129	0.3702
2019	4.2%	51,521	5.36%	232,617	284,138	4,348,537	0.886	0.3963	0.3512
2020	4.2%	53,685	5.36%	245,085	298,770	4,647,308	0.875	0.3803	0.3328
2021	4.2%	55,940	5.36%	258,221	314,161	4,961,469	0.863	0.3650	0.3150
2022	4.2%	58,290	5.36%	272,062	330,352	5,291,820	0.850	0.3502	0.2978
2023	4.2%	60,738	5.36%	286,644	347,382	5,639,203	0.836	0.3361	0.2810
2024	4.2%	63,289	5.36%	302,009	365,297	6,004,500	0.821	0.3226	0.2648
2025	4.2%	65,947	5.36%	318,196	384,143	6,388,643	0.805	0.3096	0.2491
2026	4.2%	68,717	5.36%	335,252	403,968	6,792,611	0.788	0.2971	0.2340
2027	4.2%	71,603	5.36%	353,221	424,824	7,217,435	0.769	0.2851	0.2194
2028	4.2%	74,610	5.36%	372,154	446,764	7,664,199	0.750	0.2736	0.2053
2029	4.2%	77,744	5.36%	392,101	469,845	8,134,044	0.730	0.2626	0.1917
2030	4.2%	81,009	5.36%	413,118	494,127	8,628,170	0.709	0.2520	0.1786
2031	4.2%	84,411	5.36%	435,261	519,672	9,147,843	0.686	0.2419	0.1660
2032	4.2%	87,956	5.36%	458,591	546,547	9,694,390	0.663	0.2321	0.1538
2033	4.2%	91,651	5.36%	483,171	574,822	10,269,212	0.638	0.2228	0.1420
2034	4.2%	95,500	5.36%	509,069	604,569	10,873,781	0.612	0.2138	0.1307
2035	4.2%	99,511	5.36%	536,356	635,867	11,509,648	0.584	0.2052	0.1199
2036	4.2%	103,690	5.36%	565,104	668,795	12,178,443	0.556	0.1969	0.1095
2037	4.2%	108,045	5.36%	595,394	703,439	12,881,882	0.527	0.1890	0.0996
2038	4.2%	112,583	5.36%	627,307	739,890	13,621,772	0.497	0.1813	0.0901
2039	4.2%	117,312	5.36%	660,931	778,242	14,400,014	0.466	0.1740	0.0812

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cum. of (5)	(7) Probability of claimant living to mid-year	(8) Present Value Factor	(9) Discount for mortality & investment income (7) x (8)
2040	4.2%	122,239	5.36%	696,356	818,595	15,218,610	0.435	0.1670	0.0727
2041	4.2%	127,373	5.36%	733,681	861,054	16,079,664	0.403	0.1603	0.0647
2042	4.2%	132,723	5.36%	773,006	905,729	16,985,393	0.372	0.1538	0.0572
2043	4.2%	138,297	5.36%	814,440	952,737	17,938,129	0.340	0.1476	0.0501
2044	4.2%	144,105	5.36%	858,094	1,002,199	18,940,328	0.308	0.1417	0.0436
2045	4.2%	150,158	5.36%	904,087	1,054,245	19,994,574	0.277	0.1360	0.0376
2046	4.2%	156,465	5.36%	952,546	1,109,011	21,103,585	0.246	0.1305	0.0321
2047	4.2%	163,036	5.36%	1,003,603	1,166,639	22,270,224	0.217	0.1252	0.0271
2048	4.2%	169,884	5.36%	1,057,396	1,227,280	23,497,503	0.188	0.1202	0.0226
2049	4.2%	177,019	5.36%	1,114,072	1,291,091	24,788,594	0.162	0.1153	0.0187
2050	4.2%	184,453	5.36%	1,173,787	1,358,240	26,146,834	0.137	0.1107	0.0152
2051	4.2%	192,201	5.36%	1,236,702	1,428,902	27,575,737	0.114	0.1062	0.0121
2052	4.2%	200,273	5.36%	1,302,989	1,503,262	29,078,998	0.094	0.1019	0.0095
2053	4.2%	208,684	5.36%	1,372,829	1,581,513	30,660,512	0.075	0.0978	0.0074
2054	4.2%	217,449	5.36%	1,446,413	1,663,862	32,324,374	0.059	0.0939	0.0055
2055	4.2%	226,582	5.36%	1,523,940	1,750,522	34,074,896	0.045	0.0901	0.0041
2056	4.2%	236,098	5.36%	1,605,624	1,841,722	35,916,618	0.034	0.0865	0.0029
2057	4.2%	246,015	5.36%	1,691,685	1,937,700	37,854,318	0.025	0.0830	0.0021
2058	4.2%	256,347	5.36%	1,782,359	2,038,707	39,893,025	0.017	0.0796	0.0014
2059	4.2%	267,114	5.36%	1,877,894	2,145,008	42,038,032	0.012	0.0764	0.0009
2060	4.2%	278,333	5.36%	1,978,549	2,256,882	44,294,914	0.008	0.0733	0.0006
2061	4.2%	290,023	5.36%	2,084,599	2,374,622	46,669,535	0.005	0.0704	0.0003
2062	4.2%	302,203	5.36%	2,196,334	2,498,537	49,168,073	0.003	0.0676	0.0002
2063	4.2%	314,896	5.36%	2,314,057	2,628,953	51,797,026	0.002	0.0648	0.0001
2064	4.2%	328,122	5.36%	2,438,091	2,766,212	54,563,238	0.001	0.0622	0.0000
2065	4.2%	341,903	5.36%	2,568,772	2,910,675	57,473,913	0.0004	0.0597	0.0000
2066	4.2%	356,263	5.36%	2,706,459	3,062,721	60,536,634	0.0002	0.0573	0.0000
2067	4.2%	371,226	5.36%	2,851,525	3,222,750	63,759,385	0.0001	0.0550	0.0000
2068	4.2%	386,817	5.36%	3,004,366	3,391,184	67,150,568	0.00002	0.0528	0.0000
2069	4.2%	403,064	5.36%	3,165,400	3,568,464	70,719,032	0.00001	0.0507	0.0000
2070	4.2%	419,992	5.36%	3,335,066	3,755,058	74,474,091	0.000001	0.0486	0.0000
2071	4.2%	437,632	5.36%	3,513,825	3,951,457	78,425,548	0.0000002	0.0467	0.0000

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	Incremental Payments by Layer												
Year	$130,000 xs $370,000	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
1996 and prior													
1997	94,592	0	0	0	0	0	0	0	0	0	0	0	0
1998	35,408	64,012	0	0	0	0	0	0	0	0	0	0	0
1999	0	104,497	0	0	0	0	0	0	0	0	0	0	0
2000	0	109,836	0	0	0	0	0	0	0	0	0	0	0
2001	0	115,450	0	0	0	0	0	0	0	0	0	0	0
2002	0	106,204	15,148	0	0	0	0	0	0	0	0	0	0
2003	0	0	127,560	0	0	0	0	0	0	0	0	0	0
2004	0	0	134,088	0	0	0	0	0	0	0	0	0	0
2005	0	0	140,953	0	0	0	0	0	0	0	0	0	0
2006	0	0	148,172	0	0	0	0	0	0	0	0	0	0
2007	0	0	155,764	0	0	0	0	0	0	0	0	0	0
2008	0	0	163,748	0	0	0	0	0	0	0	0	0	0
2009	0	0	114,566	57,579	0	0	0	0	0	0	0	0	0
2010	0	0	0	180,976	0	0	0	0	0	0	0	0	0
2011	0	0	0	190,263	0	0	0	0	0	0	0	0	0
2012	0	0	0	200,031	0	0	0	0	0	0	0	0	0
2013	0	0	0	210,305	0	0	0	0	0	0	0	0	0
2014	0	0	0	221,111	0	0	0	0	0	0	0	0	0
2015	0	0	0	232,476	0	0	0	0	0	0	0	0	0
2016	0	0	0	244,429	0	0	0	0	0	0	0	0	0
2017	0	0	0	257,002	0	0	0	0	0	0	0	0	0
2018	0	0	0	270,227	0	0	0	0	0	0	0	0	0
2019	0	0	0	284,138	0	0	0	0	0	0	0	0	0
2020	0	0	0	298,770	0	0	0	0	0	0	0	0	0
2021	0	0	0	314,161	0	0	0	0	0	0	0	0	0
2022	0	0	0	38,531	291,820	0	0	0	0	0	0	0	0
2023	0	0	0	0	347,382	0	0	0	0	0	0	0	0
2024	0	0	0	0	365,297	0	0	0	0	0	0	0	0
2025	0	0	0	0	384,143	0	0	0	0	0	0	0	0
2026	0	0	0	0	403,968	0	0	0	0	0	0	0	0
2027	0	0	0	0	424,824	0	0	0	0	0	0	0	0
2028	0	0	0	0	446,764	0	0	0	0	0	0	0	0
2029	0	0	0	0	469,845	0	0	0	0	0	0	0	0
2030	0	0	0	0	494,127	0	0	0	0	0	0	0	0
2031	0	0	0	0	519,672	0	0	0	0	0	0	0	0
2032	0	0	0	0	546,547	0	0	0	0	0	0	0	0
2033	0	0	0	0	305,610	269,212	0	0	0	0	0	0	0

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	Incremental Payments by Layer												
Year	$130,000 xs $370,000	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
2034	0	0	0	0	0	604,569	0	0	0	0	0	0	0
2035	0	0	0	0	0	635,867	0	0	0	0	0	0	0
2036	0	0	0	0	0	668,795	0	0	0	0	0	0	0
2037	0	0	0	0	0	703,439	0	0	0	0	0	0	0
2038	0	0	0	0	0	739,890	0	0	0	0	0	0	0
2039	0	0	0	0	0	778,242	0	0	0	0	0	0	0
2040	0	0	0	0	0	599,986	218,610	0	0	0	0	0	0
2041	0	0	0	0	0	0	861,054	0	0	0	0	0	0
2042	0	0	0	0	0	0	905,729	0	0	0	0	0	0
2043	0	0	0	0	0	0	952,737	0	0	0	0	0	0
2044	0	0	0	0	0	0	1,002,199	0	0	0	0	0	0
2045	0	0	0	0	0	0	1,054,245	0	0	0	0	0	0
2046	0	0	0	0	0	0	5,426	1,103,585	0	0	0	0	0
2047	0	0	0	0	0	0	0	1,166,639	0	0	0	0	0
2048	0	0	0	0	0	0	0	1,227,280	0	0	0	0	0
2049	0	0	0	0	0	0	0	1,291,091	0	0	0	0	0
2050	0	0	0	0	0	0	0	1,358,240	0	0	0	0	0
2051	0	0	0	0	0	0	0	1,428,902	0	0	0	0	0
2052	0	0	0	0	0	0	0	1,503,262	0	0	0	0	0
2053	0	0	0	0	0	0	0	921,002	660,512	0	0	0	0
2054	0	0	0	0	0	0	0	0	1,663,862	0	0	0	0
2055	0	0	0	0	0	0	0	0	1,750,522	0	0	0	0
2056	0	0	0	0	0	0	0	0	1,841,722	0	0	0	0
2057	0	0	0	0	0	0	0	0	1,937,700	0	0	0	0
2058	0	0	0	0	0	0	0	0	2,038,707	0	0	0	0
2059	0	0	0	0	0	0	0	0	106,975	2,038,032	0	0	0
2060	0	0	0	0	0	0	0	0	0	2,256,882	0	0	0
2061	0	0	0	0	0	0	0	0	0	2,374,622	0	0	0
2062	0	0	0	0	0	0	0	0	0	2,498,537	0	0	0
2063	0	0	0	0	0	0	0	0	0	831,927	1,797,026	0	0
2064	0	0	0	0	0	0	0	0	0	0	2,766,212	0	0
2065	0	0	0	0	0	0	0	0	0	0	2,910,675	0	0
2066	0	0	0	0	0	0	0	0	0	0	2,526,087	536,634	0
2067	0	0	0	0	0	0	0	0	0	0	0	3,222,750	0
2068	0	0	0	0	0	0	0	0	0	0	0	3,391,184	0
2069	0	0	0	0	0	0	0	0	0	0	0	2,849,432	719,032
2070	0	0	0	0	0	0	0	0	0	0	0	0	3,755,058
2071	0	0	0	0	0	0	0	0	0	0	0	0	3,951,457
	130,000	500,000	1,000,000	3,000,000	5,000,000	5,000,000	5,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	8,425,548

Commutation Value by Layer, Discounted for Both Mortality and Investment Income

Columns are derived by multiplying the corresponding column from Exhibit 4, pages 3 and 4, by Column 9, from pages 1 and 2. For example, Column 23 = Column 10 x Column 9

	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)
Year	$500,000 xs $0	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
1996 and prior													
1997	92,546	0	0	0	0	0	0	0	0	0	0	0	0
1998	33,158	59,944	0	0	0	0	0	0	0	0	0	0	0
1999	0	93,651	0	0	0	0	0	0	0	0	0	0	0
2000	0	94,194	0	0	0	0	0	0	0	0	0	0	0
2001	0	94,733	0	0	0	0	0	0	0	0	0	0	0
2002	0	83,377	11,892	0	0	0	0	0	0	0	0	0	0
2003	0	0	95,800	0	0	0	0	0	0	0	0	0	0
2004	0	0	96,323	0	0	0	0	0	0	0	0	0	0
2005	0	0	96,832	0	0	0	0	0	0	0	0	0	0
2006	0	0	97,323	0	0	0	0	0	0	0	0	0	0
2007	0	0	97,792	0	0	0	0	0	0	0	0	0	0
2008	0	0	98,234	0	0	0	0	0	0	0	0	0	0
2009	0	0	65,651	32,995	0	0	0	0	0	0	0	0	0
2010	0	0	0	99,022	0	0	0	0	0	0	0	0	0
2011	0	0	0	99,359	0	0	0	0	0	0	0	0	0
2012	0	0	0	99,651	0	0	0	0	0	0	0	0	0
2013	0	0	0	99,892	0	0	0	0	0	0	0	0	0
2014	0	0	0	100,073	0	0	0	0	0	0	0	0	0
2015	0	0	0	100,187	0	0	0	0	0	0	0	0	0
2016	0	0	0	100,223	0	0	0	0	0	0	0	0	0
2017	0	0	0	100,175	0	0	0	0	0	0	0	0	0
2018	0	0	0	100,036	0	0	0	0	0	0	0	0	0
2019	0	0	0	99,796	0	0	0	0	0	0	0	0	0
2020	0	0	0	99,445	0	0	0	0	0	0	0	0	0
2021	0	0	0	98,971	0	0	0	0	0	0	0	0	0
2022	0	0	0	11,473	86,892	0	0	0	0	0	0	0	0
2023	0	0	0	0	97,621	0	0	0	0	0	0	0	0
2024	0	0	0	0	96,733	0	0	0	0	0	0	0	0
2025	0	0	0	0	95,701	0	0	0	0	0	0	0	0
2026	0	0	0	0	94,524	0	0	0	0	0	0	0	0
2027	0	0	0	0	93,201	0	0	0	0	0	0	0	0
2028	0	0	0	0	91,726	0	0	0	0	0	0	0	0
2029	0	0	0	0	90,088	0	0	0	0	0	0	0	0
2030	0	0	0	0	88,273	0	0	0	0	0	0	0	0
2031	0	0	0	0	86,265	0	0	0	0	0	0	0	0
2032	0	0	0	0	84,057	0	0	0	0	0	0	0	0
2033	0	0	0	0	43,408	38,239	0	0	0	0	0	0	0

Commutation Value by Layer, Discounted for Both Mortality and Investment Income

Columns are derived by multiplying the corresponding column from Exhibit 4, pages 3 and 4, by Column 9, from pages 1 and 2. For example, Column 23 = Column 10 x Column 9

	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)
Year	$500,000 xs $0	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
2034	0	0	0	0	0	79,039	0	0	0	0	0	0	0
2035	0	0	0	0	0	76,233	0	0	0	0	0	0	0
2036	0	0	0	0	0	73,234	0	0	0	0	0	0	0
2037	0	0	0	0	0	70,047	0	0	0	0	0	0	0
2038	0	0	0	0	0	66,684	0	0	0	0	0	0	0
2039	0	0	0	0	0	63,156	0	0	0	0	0	0	0
2040	0	0	0	0	0	43,596	15,885	0	0	0	0	0	0
2041	0	0	0	0	0	0	55,676	0	0	0	0	0	0
2042	0	0	0	0	0	0	51,764	0	0	0	0	0	0
2043	0	0	0	0	0	0	47,769	0	0	0	0	0	0
2044	0	0	0	0	0	0	43,723	0	0	0	0	0	0
2045	0	0	0	0	0	0	39,657	0	0	0	0	0	0
2046	0	0	0	0	0	0	174	35,433	0	0	0	0	0
2047	0	0	0	0	0	0	0	31,632	0	0	0	0	0
2048	0	0	0	0	0	0	0	27,783	0	0	0	0	0
2049	0	0	0	0	0	0	0	24,088	0	0	0	0	0
2050	0	0	0	0	0	0	0	20,590	0	0	0	0	0
2051	0	0	0	0	0	0	0	17,325	0	0	0	0	0
2052	0	0	0	0	0	0	0	14,328	0	0	0	0	0
2053	0	0	0	0	0	0	0	6,770	4,855	0	0	0	0
2054	0	0	0	0	0	0	0	0	9,234	0	0	0	0
2055	0	0	0	0	0	0	0	0	7,165	0	0	0	0
2056	0	0	0	0	0	0	0	0	5,415	0	0	0	0
2057	0	0	0	0	0	0	0	0	3,975	0	0	0	0
2058	0	0	0	0	0	0	0	0	2,824	0	0	0	0
2059	0	0	0	0	0	0	0	0	96	1,838	0	0	0
2060	0	0	0	0	0	0	0	0	0	1,271	0	0	0
2061	0	0	0	0	0	0	0	0	0	797	0	0	0
2062	0	0	0	0	0	0	0	0	0	474	0	0	0
2063	0	0	0	0	0	0	0	0	0	84	181	0	0
2064	0	0	0	0	0	0	0	0	0	0	138	0	0
2065	0	0	0	0	0	0	0	0	0	0	66	0	0
2066	0	0	0	0	0	0	0	0	0	0	24	5	0
2067	0	0	0	0	0	0	0	0	0	0	0	11	0
2068	0	0	0	0	0	0	0	0	0	0	0	4	0.00
2069	0	0	0	0	0	0	0	0	0	0	0	1	0.21
2070	0	0	0	0	0	0	0	0	0	0	0	0	0.22
2071	0	0	0	0	0	0	0	0	0	0	0	0	0.03
	125,704	425,899	659,848	1,241,298	1,048,489	510,228	254,647	177,949	33,565	4,463	409	21	0.47
		Overall Total =	**4,482,519**										

Fitting of Auto-regressive model for CPI

Model: *Inflation rate = average inflation + α (last year's inflation - average inflation) + error term where error term is represented by a shifted lognormal*

α = 0.5087

α is chosen to minimize the sum of the squared errors in Col. 4

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year	**CPI at December**	**Annual % Increase in CPI**	**Least-Squares Fit of Inflation Model***	**Squared Error****	**Errors*****	**Error + .07**	**log(error + .07)**
1935	13.8						
1936	14.0	1.4%					
1937	14.4	2.9%	2.8%	0.00000	0.00074	0.07074	(2.64877)
1938	14.0	-2.8%	3.5%	0.00394	(0.06277)	0.00723	(4.93002)
1939	14.0	0.0%	0.6%	0.00004	(0.00633)	0.06367	(2.75402)
1940	14.1	0.7%	2.0%	0.00018	(0.01332)	0.05668	(2.87029)
1941	15.5	9.9%	2.4%	0.00565	0.07520	0.14520	(1.92967)
1942	16.9	9.0%	7.1%	0.00037	0.01935	0.08935	(2.41521)
1943	17.4	3.0%	6.6%	0.00136	(0.03683)	0.03317	(3.40598)
1944	17.8	2.3%	3.6%	0.00016	(0.01252)	0.05748	(2.85638)
1945	18.2	2.2%	3.2%	0.00009	(0.00968)	0.06032	(2.80815)
1946	21.5	18.1%	3.2%	0.02233	0.14943	0.21943	(1.51674)
1947	23.4	8.8%	11.3%	0.00059	(0.02433)	0.04567	(3.08639)
1948	24.1	3.0%	6.5%	0.00126	(0.03550)	0.03450	(3.36693)
1949	23.6	-2.1%	3.6%	0.00318	(0.05643)	0.01357	(4.29960)
1950	25.0	5.9%	1.0%	0.00244	0.04942	0.11942	(2.12514)
1951	26.5	6.0%	5.1%	0.00009	0.00936	0.07936	(2.53376)
1952	26.7	0.8%	5.1%	0.00189	(0.04344)	0.02656	(3.62827)
1953	26.9	0.7%	2.4%	0.00028	(0.01681)	0.05319	(2.93387)
1954	26.7	-0.7%	2.4%	0.00101	(0.03171)	0.03829	(3.26246)
1955	26.8	0.4%	1.7%	0.00017	(0.01293)	0.05707	(2.86352)
1956	27.6	3.0%	2.2%	0.00006	0.00749	0.07749	(2.55767)
1957	28.4	2.9%	3.6%	0.00004	(0.00666)	0.06334	(2.75926)
1958	28.9	1.8%	3.5%	0.00031	(0.01760)	0.05240	(2.94887)
1959	29.4	1.7%	2.9%	0.00015	(0.01212)	0.05788	(2.84931)
1960	29.8	1.4%	2.9%	0.00025	(0.01566)	0.05434	(2.91243)
1961	30.0	0.7%	2.7%	0.00043	(0.02067)	0.04933	(3.00923)
1962	30.4	1.3%	2.4%	0.00011	(0.01054)	0.05946	(2.82247)
1963	30.9	1.6%	2.7%	0.00012	(0.01080)	0.05920	(2.82677)
1964	31.2	1.0%	2.9%	0.00037	(0.01912)	0.05088	(2.97827)
1965	31.8	1.9%	2.5%	0.00004	(0.00617)	0.06383	(2.75151)
1966	32.9	3.5%	3.0%	0.00002	0.00435	0.07435	(2.59901)
1967	33.9	3.0%	3.8%	0.00006	(0.00766)	0.06234	(2.77520)
1968	35.5	4.7%	3.6%	0.00013	0.01127	0.08127	(2.50993)
1969	37.7	6.2%	4.4%	0.00031	0.01750	0.08750	(2.43612)

Year	(1) CPI at December	(2) Annual % Increase in CPI	(3) Least-Squares Fit of Inflation Model*	(4) Squared Error**	(5) Errors***	(6) Error + .07	(7) log(error + .07)
1970	39.8	5.6%	5.2%	0.00001	0.00371	0.07371	(2.60755)
1971	41.1	3.3%	4.9%	0.00026	(0.01614)	0.05386	(2.92129)
1972	42.5	3.4%	3.7%	0.00001	(0.00301)	0.06699	(2.70328)
1973	46.2	8.7%	3.8%	0.00243	0.04927	0.11927	(2.12637)
1974	51.9	12.3%	6.5%	0.00344	0.05863	0.12863	(2.05085)
1975	55.5	6.9%	8.3%	0.00019	(0.01386)	0.05614	(2.87997)
1976	58.2	4.9%	5.6%	0.00005	(0.00710)	0.06290	(2.76621)
1977	62.1	6.7%	4.5%	0.00048	0.02180	0.09180	(2.38814)
1978	67.7	9.0%	5.5%	0.00127	0.03563	0.10563	(2.24785)
1979	76.7	13.3%	6.6%	0.00444	0.06660	0.13660	(1.99068)
1980	86.3	12.5%	8.8%	0.00137	0.03707	0.10707	(2.23427)
1981	94.0	8.9%	8.4%	0.00003	0.00509	0.07509	(2.58910)
1982	97.6	3.8%	6.6%	0.00076	(0.02755)	0.04245	(3.15954)
1983	101.3	3.8%	4.0%	0.00000	(0.00203)	0.06797	(2.68875)
1984	105.3	3.9%	4.0%	0.00000	(0.00026)	0.06974	(2.66298)
1985	109.3	3.8%	4.1%	0.00001	(0.00256)	0.06744	(2.69655)
1986	110.5	1.1%	4.0%	0.00083	(0.02881)	0.04119	(3.18948)
1987	115.4	4.4%	2.6%	0.00033	0.01830	0.08830	(2.42704)
1988	120.5	4.4%	4.3%	0.00000	0.00117	0.07117	(2.64263)
1989	126.1	4.6%	4.3%	0.00001	0.00353	0.07353	(2.61007)
1990	133.8	6.1%	4.4%	0.00029	0.01696	0.08696	(2.44231)
1991	137.9	3.1%	5.2%	0.00044	(0.02088)	0.04912	(3.01355)
1992	141.9	2.9%	3.6%	0.00005	(0.00704)	0.06296	(2.76531)
1993	145.8	2.7%	3.5%	0.00006	(0.00773)	0.06227	(2.77633)
1994	149.7	2.7%	3.4%	0.00006	(0.00769)	0.06231	(2.77569)
1995	153.5	2.5%	3.4%	0.00008	(0.00868)	0.06132	(2.79172)
Average		4.2%		0.00109	0.00032	0.07032	(2.76472)
Std. Dev.					0.03329	0.03329	0.51239

* Column 3 is calculated as: [Avg. of Col. 2] + α[Value of Col. 3 for previous yr - Avg. of Col. 2]

** Column 4 is calculated as: $\{\text{Col. 2 - Col. 3}\}^2$

*** Column 5 is calculated as {Col. 2 - Col. 3}

Shifted lognormal to model the error term is calculated by fitting a lognormal to Col. 6, the error term, plus a shift of .07, which ensures that all the error terms are positive. The lognormal is fitted using the method of moments where:

$\mu =$ -2.7647

$\sigma =$ 0.5124

Fitting of Model for Medical Inflation

Model: *Medical inflation* $_t$ *= inflation* $_t$ *+ β(Medical inflation* $_{t-1}$ *- Inflation* $_{t-1}$ *) + (Average medical inflation - average inflation) + error* $_t$

β = 0.382

ß is chosen to minimize the sum of the squared errors in column 6

Year	(1) Medical CPI at December	(2) Annual % Increase in Medical CPI	(3) Annual % Increase in Overall CPI	(4) Least-Squares Fit of Medical Inflation Model*	(5) Error**	(6) Squared Error***
1935	10.2					
1936	10.2	0.0%	1.4%			
1937	10.3	1.0%	2.9%	3.5%	-2.48%	0.00062
1938	10.3	0.0%	-2.8%	-2.3%	2.33%	0.00054
1939	10.4	1.0%	0.0%	2.2%	-1.25%	0.00016
1940	10.4	0.0%	0.7%	2.2%	-2.25%	0.00051
1941	10.5	1.0%	9.9%	10.8%	-9.86%	0.00972
1942	10.9	3.8%	9.0%	6.8%	-2.96%	0.00087
1943	11.4	4.6%	3.0%	2.1%	2.46%	0.00061
1944	11.7	2.6%	2.3%	4.1%	-1.45%	0.00021
1945	12.0	2.6%	2.2%	3.5%	-0.97%	0.00009
1946	13.0	8.3%	18.1%	19.4%	-11.08%	0.01228
1947	13.9	6.9%	8.8%	6.3%	0.67%	0.00004
1948	14.7	5.8%	3.0%	3.4%	2.33%	0.00054
1949	14.9	1.4%	-2.1%	0.1%	1.22%	0.00015
1950	15.4	3.4%	5.9%	8.4%	-5.05%	0.00255
1951	16.3	5.8%	6.0%	6.2%	-0.33%	0.00001
1952	17.0	4.3%	0.8%	1.9%	2.44%	0.00059
1953	17.6	3.5%	0.7%	3.3%	0.26%	0.00001
1954	18.0	2.3%	-0.7%	1.5%	0.79%	0.00006
1955	18.6	3.3%	0.4%	2.7%	0.64%	0.00004
1956	19.2	3.2%	3.0%	5.3%	-2.05%	0.00042
1957	20.1	4.7%	2.9%	4.2%	0.53%	0.00003
1958	21.0	4.5%	1.8%	3.6%	0.87%	0.00008
1959	21.8	3.8%	1.7%	3.9%	-0.12%	0.00000
1960	22.5	3.2%	1.4%	3.3%	-0.11%	0.00000
1961	23.2	3.1%	0.7%	2.5%	0.57%	0.00003
1962	23.7	2.2%	1.3%	3.4%	-1.27%	0.00016
1963	24.3	2.5%	1.6%	3.1%	-0.59%	0.00003
1964	24.8	2.1%	1.0%	2.5%	-0.41%	0.00002
1965	25.5	2.8%	1.9%	3.5%	-0.68%	0.00005
1966	27.2	6.7%	3.5%	5.0%	1.70%	0.00029
1967	28.9	6.3%	3.0%	5.4%	0.82%	0.00007
1968	30.7	6.2%	4.7%	7.1%	-0.88%	0.00008
1969	32.6	6.2%	6.2%	7.9%	-1.75%	0.00031
1970	35.0	7.4%	5.6%	6.7%	0.63%	0.00004
1971	36.6	4.6%	3.3%	5.1%	-0.54%	0.00003
1972	37.8	3.3%	3.4%	5.1%	-1.79%	0.00032
1973	39.8	5.3%	8.7%	9.8%	-4.53%	0.00205
1974	44.8	12.6%	12.3%	12.2%	0.37%	0.00001
1975	49.2	9.8%	6.9%	8.2%	1.64%	0.00027
1976	54.1	10.0%	4.9%	7.1%	2.83%	0.00080
1977	58.9	8.9%	6.7%	9.8%	-0.94%	0.00009

Year	(1) Medical CPI at December	(2) Annual % Increase in Medical CPI	(3) Annual % Increase in Overall CPI	(4) Least-Squares Fit of Medical Inflation Model*	(5) Error**	(6) Squared Error***
1978	64.1	8.8%	9.0%	11.0%	-2.18%	0.00048
1979	70.6	10.1%	13.3%	14.4%	-4.24%	0.00180
1980	77.6	9.9%	12.5%	12.5%	-2.56%	0.00065
1981	87.3	12.5%	8.9%	9.1%	3.41%	0.00116
1982	96.9	11.0%	3.8%	6.4%	4.64%	0.00215
1983	103.1	6.4%	3.8%	7.7%	-1.29%	0.00017
1984	109.4	6.1%	3.9%	6.1%	0.00%	0.00000
1985	116.8	6.8%	3.8%	5.8%	0.98%	0.00010
1986	125.8	7.7%	1.1%	3.4%	4.31%	0.00186
1987	133.1	5.8%	4.4%	8.1%	-2.32%	0.00054
1988	142.3	6.9%	4.4%	6.1%	0.81%	0.00007
1989	154.4	8.5%	4.6%	6.8%	1.74%	0.00030
1990	169.2	9.6%	6.1%	8.7%	0.84%	0.00007
1991	182.6	7.9%	3.1%	5.6%	2.36%	0.00056
1992	194.7	6.6%	2.9%	5.9%	0.71%	0.00005
1993	205.2	5.4%	2.7%	5.3%	0.06%	0.00000
1994	215.3	4.9%	2.7%	4.8%	0.07%	0.00000
1995	223.8	3.9%	2.5%	4.6%	-0.61%	0.00004
Mean		5.3%	4.2%		-0.40%	0.00076
					2.75% = Std. Dev. of errors	*0.04477 = Sum of square errors*

Average difference between medical inflation and inflation (i.e., avg. of Col. 2 - avg. of Col. 3) = 1.16%

* Column 4 is calculated as Col. 3 for previous year + ß[Col. 2 for previous year - Col. 3 for previous year] + [Avg. of Col. 2 - Avg. of Col. 3]

** Column 5 = Column 2 - Column 4

*** Column 6 = $\{\text{Column } 5\}^2$

ß is fitted to minimize the sum of column 6.

One Simulation from Method 3
Stochastic Mortality, Inflation, Medical Inflation, and Investment Yields

Parameters:

(A)	Evaluation Date:	1/1/97
(B)	Current Age:	35
(C)	Annual Indemnity Payment	20,000
(D)	Annual Medical Payment (at mid-1996 price levels)	Varies
(E)	Indemnity Paid to Date	70,000
(F)	Medical Paid to Date:	300,000
(G)	Cost-of-Living Adjustment	Varies
(H)	Medical Inflation Rate:	Varies
(I)	Annual Discount Rate:	Varies

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cum. of (5)	(7) Probability of claimant living to mid-year	(8) Present Value Factor	(9) Discount for mortality & investment income (7) x (8)
1996 and prior		70,000		300,000	370,000	370,000			
1997	2.7%	20,541	2.69%	69,625	90,166	460,166	0.999	1.0000	0.9987
1998	0.9%	20,716	9.69%	116,357	137,073	597,239	0.996	0.9968	0.9929
1999	5.0%	21,752	7.73%	51,620	73,372	670,610	0.993	0.9813	0.9747
2000	2.4%	22,266	11.19%	43,111	65,377	735,988	0.990	0.9428	0.9337
2001	5.0%	23,380	10.32%	23,845	47,225	783,212	0.987	0.9010	0.8897
2002	5.0%	24,549	5.65%	43,978	68,527	851,739	0.984	0.8623	0.8489
2003	3.3%	25,369	5.17%	95,153	120,521	972,260	0.981	0.8264	0.8109
2004	3.1%	26,166	1.17%	250,254	276,419	1,248,680	0.978	0.8057	0.7880
2005	1.6%	26,587	6.55%	49,640	76,227	1,324,907	0.975	0.7822	0.7623
2006	5.0%	27,917	6.99%	81,635	109,552	1,434,459	0.971	0.7580	0.7360
2007	3.4%	28,875	10.27%	101,913	130,788	1,565,247	0.967	0.7420	0.7176
2008	5.0%	30,319	11.64%	99,335	129,655	1,694,902	0.963	0.7343	0.7070
2009	5.0%	31,835	5.11%	132,868	164,703	1,859,605	0.958	0.7267	0.6965
2010	4.8%	33,373	7.04%	110,591	143,964	2,003,569	0.954	0.7193	0.6858
2011	2.5%	34,193	7.38%	126,342	160,535	2,164,104	0.948	0.7029	0.6666
2012	4.3%	35,656	8.53%	75,493	111,149	2,275,253	0.943	0.6566	0.6189
2013	3.9%	37,063	12.24%	241,570	278,632	2,553,886	0.936	0.6054	0.5670
2014	5.0%	38,916	4.44%	391,743	430,658	2,984,544	0.930	0.5699	0.5299
2015	5.0%	40,861	-1.51%	239,565	280,426	3,264,970	0.923	0.5364	0.4949
2016	0.8%	41,182	-4.98%	117,385	158,568	3,423,538	0.915	0.5091	0.4657
2017	0.0%	41,182	-1.18%	151,238	192,421	3,615,959	0.906	0.4991	0.4522
2018	0.0%	41,182	4.60%	505,346	546,529	4,162,487	0.897	0.4969	0.4455
2019	0.0%	41,182	2.30%	321,015	362,198	4,524,685	0.886	0.4967	0.4402
2020	0.0%	41,182	7.33%	163,486	204,669	4,729,354	0.875	0.4949	0.4331
2021	5.0%	43,241	1.19%	193,421	236,663	4,966,016	0.863	0.4931	0.4256
2022	3.8%	44,882	4.18%	118,487	163,369	5,129,385	0.850	0.4931	0.4192
2023	5.0%	47,126	1.48%	156,834	203,960	5,333,345	0.836	0.4911	0.4106
2024	1.4%	47,775	2.19%	603,315	651,090	5,984,435	0.821	0.4454	0.3656
2025	0.1%	47,829	5.16%	150,581	198,410	6,182,845	0.805	0.3927	0.3160
2026	3.8%	49,643	3.11%	349,255	398,898	6,581,743	0.788	0.3458	0.2723
2027	1.7%	50,494	2.92%	149,743	200,237	6,781,980	0.769	0.2907	0.2237
2028	0.0%	50,505	4.66%	96,200	146,705	6,928,685	0.750	0.2520	0.1891
2029	1.4%	51,211	4.46%	337,926	389,137	7,317,822	0.730	0.2307	0.1684
2030	1.1%	51,779	2.90%	307,518	359,297	7,677,119	0.709	0.2232	0.1582
2031	0.0%	51,779	3.58%	156,003	207,782	7,884,901	0.686	0.2208	0.1515
2032	0.3%	51,960	7.39%	236,209	288,169	8,173,071	0.663	0.2192	0.1452
2033	5.0%	54,558	9.98%	236,796	291,354	8,464,425	0.638	0.2154	0.1373
2034	5.0%	57,286	12.47%	407,806	465,093	8,929,518	0.612	0.2116	0.1294
2035	5.0%	60,151	10.37%	533,333	593,483	9,523,001	0.584	0.2107	0.1231
2036	5.0%	63,158	10.32%	224,000	287,158	9,810,160	0.556	0.2086	0.1160
2037	5.0%	66,316	3.15%	567,911	634,227	10,444,386	0.527	0.1980	0.1043
2038	3.3%	68,476	7.85%	428,832	497,308	10,941,694	0.497	0.1868	0.0928

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cum. of (5)	(7) Probability of claimant living to mid-year	(8) Present Value Factor	(9) Discount for mortality & investment income (7) x (8)
2039	4.0%	71,212	-3.11%	586,585	657,797	11,599,491	0.466	0.1787	0.0833
2040	0.0%	71,212	4.36%	159,131	230,343	11,829,835	0.435	0.1720	0.0748
2041	0.0%	71,212	8.06%	498,516	569,728	12,399,562	0.403	0.1669	0.0673
2042	4.6%	74,508	2.36%	436,885	511,393	12,910,956	0.372	0.1599	0.0594
2043	0.3%	74,714	4.09%	1,029,491	1,104,205	14,015,160	0.340	0.1517	0.0515
2044	2.3%	76,449	2.38%	523,272	599,722	14,614,882	0.308	0.1353	0.0417
2045	2.2%	78,156	7.11%	555,505	633,662	15,248,544	0.277	0.1169	0.0324
2046	2.7%	80,276	7.32%	1,182,773	1,263,049	16,511,592	0.246	0.1061	0.0261
2047	2.4%	82,185	3.30%	392,255	474,440	16,986,033	0.217	0.1011	0.0219
2048	0.9%	82,966	1.78%	274,463	357,428	17,343,461	0.188	0.0980	0.0185
2049	1.1%	83,851	-0.06%	436,779	520,629	17,864,090	0.162	0.0945	0.0153
2050	0.0%	83,851	1.54%	779,726	863,577	18,727,667	0.137	0.0911	0.0125
2051	0.0%	83,851	2.85%	239,547	323,398	19,051,066	0.114	0.0897	0.0102
2052	0.0%	83,851	3.63%	438,803	522,654	19,573,720	0.094	0.0888	0.0083
2053	0.3%	84,069	2.03%	980,719	1,064,789	20,638,509	0.075	0.0874	0.0066
2054	0.0%	84,069	11.94%	451,630	535,699	21,174,208	0.059	0.0843	0.0050
2055	4.3%	87,715	6.71%	843,104	930,819	22,105,027	0.045	0.0796	0.0036
2056	5.0%	92,101	14.17%	842,189	934,290	23,039,317	0.034	0.0756	0.0026
2057	5.0%	96,706	6.06%	823,588	920,294	23,959,611	0.025	0.0702	0.0017
2058	3.3%	99,852	-3.28%	400,213	500,065	24,459,676	0.017	0.0646	0.0011
2059	0.0%	99,852	24.39%	5,305,393	5,405,244	29,864,920	0.012	0.0599	0.0007
2060	5.0%	104,844	15.98%	1,891,811	1,996,656	31,861,576	0.008	0.0560	0.0004
2061	5.0%	110,087	5.35%	5,825,837	5,935,924	37,797,500	0.005	0.0535	0.0003
2062	2.5%	112,805	5.22%	1,102,848	1,215,652	39,013,153	0.003	0.0501	0.0001
2063	4.5%	117,903	3.14%	591,854	709,757	39,722,910	0.002	0.0470	0.0001
2064	0.8%	118,864	7.99%	1,406,116	1,524,980	41,247,889	0.001	0.0451	0.0000
2065	5.0%	124,807	10.89%	7,307,112	7,431,919	48,679,808	0.0004	0.0440	0.0000
2066	5.0%	131,047	9.24%	4,535,733	4,666,780	53,346,589	0.0002	0.0429	0.0000
2067	5.0%	137,600	16.37%	5,857,809	5,995,408	59,341,997	0.0001	0.0418	0.0000
2068	5.0%	144,480	16.02%	1,370,853	1,515,332	60,857,329	0.00002	0.0404	0.0000
2069	5.0%	151,704	12.40%	4,972,397	5,124,100	65,981,429	0.00001	0.0383	0.0000
2070	5.0%	159,289	9.96%	7,659,607	7,818,896	73,800,325	0.000001	0.0352	0.0000
2071	5.0%	167,253	11.63%	10,212,211	10,379,464	84,179,788	0.0000002	0.0320	0.0000

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
	Incremental Payments by Layer													
Year	$130,000 xs $370,000	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million	$10 million xs $80 million
1996 and prior														
1997	90,166	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	39,834	97,239	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	73,372	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	65,377	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	47,225	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	68,527	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	120,521	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	27,740	248,680	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	76,227	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	109,552	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	130,788	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	129,655	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	164,703	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	140,395	3,569	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	160,535	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	111,149	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	278,632	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	430,658	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	280,426	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	158,568	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	192,421	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	546,529	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	362,198	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	204,669	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	236,663	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	33,984	129,385	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	203,960	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	651,090	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	198,410	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	398,898	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	200,237	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	146,705	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	389,137	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	359,297	0	0	0	0	0	0	0	0	0
2031	0	0	0	0	207,782	0	0	0	0	0	0	0	0	0
2032	0	0	0	0	288,169	0	0	0	0	0	0	0	0	0

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
	Incremental Payments by Layer													
Year	$130,000 xs $370,000	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million	$10 million xs $80 million
2033	0	0	0	0	291,354	0	0	0	0	0	0	0	0	0
2034	0	0	0	0	465,093	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	593,483	0	0	0	0	0	0	0	0	0
2036	0	0	0	0	287,158	0	0	0	0	0	0	0	0	0
2037	0	0	0	0	189,840	444,386	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	497,308	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	657,797	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	230,343	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	569,728	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	511,393	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	1,104,205	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	599,722	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	385,118	248,544	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	1,263,049	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	474,440	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	357,428	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	520,629	0	0	0	0	0	0	0
2050	0	0	0	0	0	0	863,577	0	0	0	0	0	0	0
2051	0	0	0	0	0	0	323,398	0	0	0	0	0	0	0
2052	0	0	0	0	0	0	522,654	0	0	0	0	0	0	0
2053	0	0	0	0	0	0	426,280	638,509	0	0	0	0	0	0
2054	0	0	0	0	0	0	0	535,699	0	0	0	0	0	0
2055	0	0	0	0	0	0	0	930,819	0	0	0	0	0	0
2056	0	0	0	0	0	0	0	934,290	0	0	0	0	0	0
2057	0	0	0	0	0	0	0	920,294	0	0	0	0	0	0
2058	0	0	0	0	0	0	0	500,065	0	0	0	0	0	0
2059	0	0	0	0	0	0	0	5,405,244	0	0	0	0	0	0
2060	0	0	0	0	0	0	0	135,080	1,861,576	0	0	0	0	0
2061	0	0	0	0	0	0	0	0	5,935,924	0	0	0	0	0
2062	0	0	0	0	0	0	0	0	1,215,652	0	0	0	0	0
2063	0	0	0	0	0	0	0	0	709,757	0	0	0	0	0
2064	0	0	0	0	0	0	0	0	277,090	1,247,889	0	0	0	0
2065	0	0	0	0	0	0	0	0	0	7,431,919	0	0	0	0
2066	0	0	0	0	0	0	0	0	0	1,320,192	3,346,589	0	0	0
2067	0	0	0	0	0	0	0	0	0	0	5,995,408	0	0	0
2068	0	0	0	0	0	0	0	0	0	0	658,003	857,329	0	0
2069	0	0	0	0	0	0	0	0	0	0	0	5,124,100	0	0
2070	0	0	0	0	0	0	0	0	0	0	0	4,018,571	3,800,325	0
2071	0	0	0	0	0	0	0	0	0	0	0	0	6,199,675	4,179,788
	130,000	500,000	1,000,000	3,000,000	5,000,000	5,000,000	5,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	4,179,788

Commutation Value by Layer, Discounted for Both Mortality and Investment Income

Columns are derived by multiplying the corresponding column from Exhibit 4, pages 3 and 4, by Column 9, from pages 1 and 2. For example, Column 24 = Column 10 x Column 9

	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
Year	$500,000 xs $0	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million	$10 million xs $80 million
1996 and prior														
1997	90,049	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	39,551	96,548	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	71,517	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	61,045	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	42,017	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	58,170	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	97,731	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	21,858	195,953	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	58,110	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	80,630	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	93,851	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	91,665	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	114,711	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	96,288	2,448	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	107,007	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	68,794	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	157,981	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	228,222	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	138,769	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	73,838	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	87,012	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	243,501	0	0	0	0	0	0	0	0	0	0
2019	0	0	0	159,453	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	88,650	0	0	0	0	0	0	0	0	0	0
2021	0	0	0	100,727	0	0	0	0	0	0	0	0	0	0
2022	0	0	0	14,245	54,235	0	0	0	0	0	0	0	0	0
2023	0	0	0	0	83,737	0	0	0	0	0	0	0	0	0
2024	0	0	0	0	238,064	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	62,701	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	108,634	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	44,788	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	27,744	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	65,543	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	56,851	0	0	0	0	0	0	0	0	0
2031	0	0	0	0	31,485	0	0	0	0	0	0	0	0	0
2032	0	0	0	0	41,853	0	0	0	0	0	0	0	0	0

Commutation Value by Layer, Discounted for Both Mortality and Investment Income

Columns are derived by multiplying the corresponding column from Exhibit 4, pages 3 and 4, by Column 9, from pages 1 and 2. For example, Column 24 = Column 10 x Column 9

	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
Year	$500,000 xs $0	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million	$10 million xs $80 million
2033	0	0	0	0	40,012	0	0	0	0	0	0	0	0	0
2034	0	0	0	0	60,197	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	73,083	0	0	0	0	0	0	0	0	0
2036	0	0	0	0	33,316	0	0	0	0	0	0	0	0	0
2037	0	0	0	0	19,808	46,367	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	46,163	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	54,806	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	17,233	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	38,354	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	30,387	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	56,878	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	24,993	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	12,459	8,041	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	32,988	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	10,388	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	6,598	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	7,956	0	0	0	0	0	0	0
2050	0	0	0	0	0	0	10,779	0	0	0	0	0	0	0
2051	0	0	0	0	0	0	3,310	0	0	0	0	0	0	0
2052	0	0	0	0	0	0	4,338	0	0	0	0	0	0	0
2053	0	0	0	0	0	0	2,798	4,192	0	0	0	0	0	0
2054	0	0	0	0	0	0	0	2,669	0	0	0	0	0	0
2055	0	0	0	0	0	0	0	3,366	0	0	0	0	0	0
2056	0	0	0	0	0	0	0	2,401	0	0	0	0	0	0
2057	0	0	0	0	0	0	0	1,597	0	0	0	0	0	0
2058	0	0	0	0	0	0	0	562	0	0	0	0	0	0
2059	0	0	0	0	0	0	0	3,817	0	0	0	0	0	0
2060	0	0	0	0	0	0	0	58	801	0	0	0	0	0
2061	0	0	0	0	0	0	0	0	1,514	0	0	0	0	0
2062	0	0	0	0	0	0	0	0	171	0	0	0	0	0
2063	0	0	0	0	0	0	0	0	52	0	0	0	0	0
2064	0	0	0	0	0	0	0	0	10	45	0	0	0	0
2065	0	0	0	0	0	0	0	0	0	124	0	0	0	0
2066	0	0	0	0	0	0	0	0	0	9	24	0	0	0
2067	0	0	0	0	0	0	0	0	0	0	16	0	0	0
2068	0	0	0	0	0	0	0	0	0	0	1	1	0.00	0
2069	0	0	0	0	0	0	0	0	0	0	0	1	0.00	0
2070	0	0	0	0	0	0	0	0	0	0	0	0	0.16	0
2071	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.02
	129,600	448,885	731,208	1,470,647	1,042,047	327,641	87,197	18,661	2,548	179	40	2	0.20	0.02
	Overall Total =	**4,258,655**												

Method 2, With Inflation and Investment Income "Capped"

	Parameters:	
(A)	Evaluation Date:	1/1/97
(B)	Current Age:	35
(C)	Annual Indemnity Payment	20,000
(D)	Annual Medical Payment (at mid-1996 price levels)	70,000
(E)	Indemnity Paid to Date	70,000
(F)	Medical Paid to Date:	300,000
(G)	***Cost-of-Living Adjustment***	***2.9785%***
(H)	Medical Inflation Rate:	5.36%
(I)	***Annual Discount Rate:***	***4.3887%***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year	**Cost of Living Adjustment**	**Indemnity Payment**	**Medical Inflation**	**Medical Payment**	**Total Payment**	**Cumulative Total Payment**	**Probability of claimant living to mid-year**	**Present Value Factor**	**Discount for mortality & investment income**
					(2) + (4)	Cum. of (5)			(7) x (8)
1996 and prior		70,000		300,000	370,000	370,000			
1997	3.0%	20,596	5.36%	73,752	94,348	464,348	0.999	0.9788	0.9775
1998	3.0%	21,209	5.36%	77,705	98,914	563,262	0.996	0.9376	0.9339
1999	3.0%	21,841	5.36%	81,870	103,711	666,973	0.993	0.8982	0.8922
2000	3.0%	22,491	5.36%	86,258	108,750	775,723	0.990	0.8604	0.8522
2001	3.0%	23,161	5.36%	90,882	114,043	889,766	0.987	0.8243	0.8139
2002	3.0%	23,851	5.36%	95,753	119,604	1,009,370	0.984	0.7896	0.7773
2003	3.0%	24,562	5.36%	100,885	125,447	1,134,817	0.981	0.7564	0.7422
2004	3.0%	25,293	5.36%	106,293	131,586	1,266,403	0.978	0.7246	0.7087
2005	3.0%	26,046	5.36%	111,990	138,037	1,404,440	0.975	0.6941	0.6765
2006	3.0%	26,822	5.36%	117,993	144,815	1,549,255	0.971	0.6650	0.6456
2007	3.0%	27,621	5.36%	124,317	151,938	1,701,193	0.967	0.6370	0.6160
2008	3.0%	28,444	5.36%	130,981	159,425	1,860,618	0.963	0.6102	0.5876
2009	3.0%	29,291	5.36%	138,001	167,292	2,027,910	0.958	0.5846	0.5602
2010	3.0%	30,164	5.36%	145,398	175,562	2,203,472	0.954	0.5600	0.5340
2011	3.0%	31,062	5.36%	153,191	184,253	2,387,725	0.948	0.5364	0.5087
2012	3.0%	31,987	5.36%	161,402	193,390	2,581,114	0.943	0.5139	0.4844
2013	3.0%	32,940	5.36%	170,054	202,994	2,784,108	0.936	0.4923	0.4610
2014	3.0%	33,921	5.36%	179,169	213,089	2,997,197	0.930	0.4716	0.4385
2015	3.0%	34,931	5.36%	188,772	223,703	3,220,901	0.923	0.4518	0.4168
2016	3.0%	35,972	5.36%	198,890	234,862	3,455,763	0.915	0.4328	0.3958
2017	3.0%	37,043	5.36%	209,551	246,594	3,702,356	0.906	0.4146	0.3756
2018	3.0%	38,146	5.36%	220,783	258,929	3,961,285	0.897	0.3971	0.3561
2019	3.0%	39,283	5.36%	232,617	271,899	4,233,185	0.886	0.3804	0.3372
2020	3.0%	40,453	5.36%	245,085	285,537	4,518,722	0.875	0.3645	0.3190
2021	3.0%	41,658	5.36%	258,221	299,879	4,818,601	0.863	0.3491	0.3014
2022	3.0%	42,898	5.36%	272,062	314,960	5,133,561	0.850	0.3345	0.2843
2023	3.0%	44,176	5.36%	286,644	330,821	5,464,382	0.836	0.3204	0.2679
2024	3.0%	45,492	5.36%	302,009	347,501	5,811,882	0.821	0.3069	0.2520
2025	3.0%	46,847	5.36%	318,196	365,043	6,176,926	0.805	0.2940	0.2366
2026	3.0%	48,242	5.36%	335,252	383,494	6,560,419	0.788	0.2817	0.2218
2027	3.0%	49,679	5.36%	353,221	402,900	6,963,320	0.769	0.2698	0.2076
2028	3.0%	51,159	5.36%	372,154	423,313	7,386,632	0.750	0.2585	0.1939
2029	3.0%	52,683	5.36%	392,101	444,784	7,831,416	0.730	0.2476	0.1808
2030	3.0%	54,252	5.36%	413,118	467,370	8,298,785	0.709	0.2372	0.1681
2031	3.0%	55,868	5.36%	435,261	491,129	8,789,914	0.686	0.2272	0.1560
2032	3.0%	57,532	5.36%	458,591	516,123	9,306,036	0.663	0.2177	0.1442
2033	3.0%	59,245	5.36%	483,171	542,417	9,848,453	0.638	0.2085	0.1330
2034	3.0%	61,010	5.36%	509,069	570,079	10,418,532	0.612	0.1998	0.1222
2035	3.0%	62,827	5.36%	536,356	599,182	11,017,715	0.584	0.1914	0.1118
2036	3.0%	64,698	5.36%	565,104	629,802	11,647,517	0.556	0.1833	0.1019
2037	3.0%	66,625	5.36%	595,394	662,019	12,309,536	0.527	0.1756	0.0925
2038	3.0%	68,610	5.36%	627,307	695,917	13,005,453	0.497	0.1682	0.0836
2039	3.0%	70,653	5.36%	660,931	731,584	13,737,036	0.466	0.1611	0.0751

Year	(1) Cost of Living Adjustment	(2) Indemnity Payment	(3) Medical Inflation	(4) Medical Payment	(5) Total Payment (2) + (4)	(6) Cumulative Total Payment Cum. of (5)	(7) Probability of claimant living to mid-year	(8) Present Value Factor	(9) Discount for mortality & investment income (7) x (8)
2040	3.0%	72,758	5.36%	696,356	769,114	14,506,150	0.435	0.1544	0.0672
2041	3.0%	74,925	5.36%	733,681	808,606	15,314,756	0.403	0.1479	0.0597
2042	3.0%	77,156	5.36%	773,006	850,163	16,164,919	0.372	0.1417	0.0526
2043	3.0%	79,454	5.36%	814,440	893,894	17,058,813	0.340	0.1357	0.0461
2044	3.0%	81,821	5.36%	858,094	939,915	17,998,728	0.308	0.1300	0.0400
2045	3.0%	84,258	5.36%	904,087	988,345	18,987,073	0.277	0.1245	0.0345
2046	3.0%	86,768	5.36%	952,546	1,039,314	20,026,387	0.246	0.1193	0.0294
2047	3.0%	89,352	5.36%	1,003,603	1,092,955	21,119,342	0.217	0.1143	0.0247
2048	3.0%	92,013	5.36%	1,057,396	1,149,409	22,268,751	0.188	0.1095	0.0206
2049	3.0%	94,754	5.36%	1,114,072	1,208,826	23,477,578	0.162	0.1049	0.0170
2050	3.0%	97,576	5.36%	1,173,787	1,271,363	24,748,941	0.137	0.1005	0.0138
2051	3.0%	100,483	5.36%	1,236,702	1,337,184	26,086,125	0.114	0.0962	0.0110
2052	3.0%	103,475	5.36%	1,302,989	1,406,464	27,492,589	0.094	0.0922	0.0086
2053	3.0%	106,557	5.36%	1,372,829	1,479,387	28,971,976	0.075	0.0883	0.0066
2054	3.0%	109,731	5.36%	1,446,413	1,556,144	30,528,120	0.059	0.0846	0.0050
2055	3.0%	113,000	5.36%	1,523,940	1,636,940	32,165,060	0.045	0.0811	0.0037
2056	3.0%	116,365	5.36%	1,605,624	1,721,989	33,887,049	0.034	0.0776	0.0026
2057	3.0%	119,831	5.36%	1,691,685	1,811,516	35,698,566	0.025	0.0744	0.0018
2058	3.0%	123,400	5.36%	1,782,359	1,905,760	37,604,325	0.017	0.0713	0.0012
2059	3.0%	127,076	5.36%	1,877,894	2,004,970	39,609,295	0.012	0.0683	0.0008
2060	3.0%	130,861	5.36%	1,978,549	2,109,410	41,718,705	0.008	0.0654	0.0005
2061	3.0%	134,759	5.36%	2,084,599	2,219,358	43,938,063	0.005	0.0626	0.0003
2062	3.0%	138,772	5.36%	2,196,334	2,335,106	46,273,169	0.003	0.0600	0.0002
2063	3.0%	142,906	5.36%	2,314,057	2,456,963	48,730,132	0.002	0.0575	0.0001
2064	3.0%	147,162	5.36%	2,438,091	2,585,253	51,315,385	0.001	0.0551	0.0000
2065	3.0%	151,545	5.36%	2,568,772	2,720,318	54,035,703	0.0004	0.0528	0.0000
2066	3.0%	156,059	5.36%	2,706,459	2,862,518	56,898,220	0.0002	0.0505	0.0000
2067	3.0%	160,707	5.36%	2,851,525	3,012,232	59,910,452	0.0001	0.0484	0.0000
2068	3.0%	165,494	5.36%	3,004,366	3,169,860	63,080,313	0.00002	0.0464	0.0000
2069	3.0%	170,423	5.36%	3,165,400	3,335,824	66,416,137	0.00001	0.0444	0.0000
2070	3.0%	175,499	5.36%	3,335,066	3,510,565	69,926,702	0.000001	0.0426	0.0000
2071	3.0%	180,727	5.36%	3,513,825	3,694,552	73,621,254	0.0000002	0.0408	0.0000

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	Incremental Payments by Layer												
Year	$130,000 xs $370,000	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
1996 and prior													
1997	94,348	0	0	0	0	0	0	0	0	0	0	0	0
1998	35,652	63,262	0	0	0	0	0	0	0	0	0	0	0
1999	0	103,711	0	0	0	0	0	0	0	0	0	0	0
2000	0	108,750	0	0	0	0	0	0	0	0	0	0	0
2001	0	114,043	0	0	0	0	0	0	0	0	0	0	0
2002	0	110,234	9,370	0	0	0	0	0	0	0	0	0	0
2003	0	0	125,447	0	0	0	0	0	0	0	0	0	0
2004	0	0	131,586	0	0	0	0	0	0	0	0	0	0
2005	0	0	138,037	0	0	0	0	0	0	0	0	0	0
2006	0	0	144,815	0	0	0	0	0	0	0	0	0	0
2007	0	0	151,938	0	0	0	0	0	0	0	0	0	0
2008	0	0	159,425	0	0	0	0	0	0	0	0	0	0
2009	0	0	139,382	27,910	0	0	0	0	0	0	0	0	0
2010	0	0	0	175,562	0	0	0	0	0	0	0	0	0
2011	0	0	0	184,253	0	0	0	0	0	0	0	0	0
2012	0	0	0	193,390	0	0	0	0	0	0	0	0	0
2013	0	0	0	202,994	0	0	0	0	0	0	0	0	0
2014	0	0	0	213,089	0	0	0	0	0	0	0	0	0
2015	0	0	0	223,703	0	0	0	0	0	0	0	0	0
2016	0	0	0	234,862	0	0	0	0	0	0	0	0	0
2017	0	0	0	246,594	0	0	0	0	0	0	0	0	0
2018	0	0	0	258,929	0	0	0	0	0	0	0	0	0
2019	0	0	0	271,899	0	0	0	0	0	0	0	0	0
2020	0	0	0	285,537	0	0	0	0	0	0	0	0	0
2021	0	0	0	299,879	0	0	0	0	0	0	0	0	0
2022	0	0	0	181,399	133,561	0	0	0	0	0	0	0	0
2023	0	0	0	0	330,821	0	0	0	0	0	0	0	0
2024	0	0	0	0	347,501	0	0	0	0	0	0	0	0
2025	0	0	0	0	365,043	0	0	0	0	0	0	0	0
2026	0	0	0	0	383,494	0	0	0	0	0	0	0	0
2027	0	0	0	0	402,900	0	0	0	0	0	0	0	0
2028	0	0	0	0	423,313	0	0	0	0	0	0	0	0
2029	0	0	0	0	444,784	0	0	0	0	0	0	0	0
2030	0	0	0	0	467,370	0	0	0	0	0	0	0	0
2031	0	0	0	0	491,129	0	0	0	0	0	0	0	0
2032	0	0	0	0	516,123	0	0	0	0	0	0	0	0
2033	0	0	0	0	542,417	0	0	0	0	0	0	0	0

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	Incremental Payments by Layer												
Year	$130,000 xs $370,000	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
2034	0	0	0	0	151,547	418,532	0	0	0	0	0	0	0
2035	0	0	0	0	0	599,182	0	0	0	0	0	0	0
2036	0	0	0	0	0	629,802	0	0	0	0	0	0	0
2037	0	0	0	0	0	662,019	0	0	0	0	0	0	0
2038	0	0	0	0	0	695,917	0	0	0	0	0	0	0
2039	0	0	0	0	0	731,584	0	0	0	0	0	0	0
2040	0	0	0	0	0	769,114	0	0	0	0	0	0	0
2041	0	0	0	0	0	493,850	314,756	0	0	0	0	0	0
2042	0	0	0	0	0	0	850,163	0	0	0	0	0	0
2043	0	0	0	0	0	0	893,894	0	0	0	0	0	0
2044	0	0	0	0	0	0	939,915	0	0	0	0	0	0
2045	0	0	0	0	0	0	988,345	0	0	0	0	0	0
2046	0	0	0	0	0	0	1,012,927	26,387	0	0	0	0	0
2047	0	0	0	0	0	0	0	1,092,955	0	0	0	0	0
2048	0	0	0	0	0	0	0	1,149,409	0	0	0	0	0
2049	0	0	0	0	0	0	0	1,208,826	0	0	0	0	0
2050	0	0	0	0	0	0	0	1,271,363	0	0	0	0	0
2051	0	0	0	0	0	0	0	1,337,184	0	0	0	0	0
2052	0	0	0	0	0	0	0	1,406,464	0	0	0	0	0
2053	0	0	0	0	0	0	0	1,479,387	0	0	0	0	0
2054	0	0	0	0	0	0	0	1,028,024	528,120	0	0	0	0
2055	0	0	0	0	0	0	0	0	1,636,940	0	0	0	0
2056	0	0	0	0	0	0	0	0	1,721,989	0	0	0	0
2057	0	0	0	0	0	0	0	0	1,811,516	0	0	0	0
2058	0	0	0	0	0	0	0	0	1,905,760	0	0	0	0
2059	0	0	0	0	0	0	0	0	2,004,970	0	0	0	0
2060	0	0	0	0	0	0	0	0	390,705	1,718,705	0	0	0
2061	0	0	0	0	0	0	0	0	0	2,219,358	0	0	0
2062	0	0	0	0	0	0	0	0	0	2,335,106	0	0	0
2063	0	0	0	0	0	0	0	0	0	2,456,963	0	0	0
2064	0	0	0	0	0	0	0	0	0	1,269,868	1,315,385	0	0
2065	0	0	0	0	0	0	0	0	0	0	2,720,318	0	0
2066	0	0	0	0	0	0	0	0	0	0	2,862,518	0	0
2067	0	0	0	0	0	0	0	0	0	0	3,012,232	0	0
2068	0	0	0	0	0	0	0	0	0	0	89,548	3,080,313	0
2069	0	0	0	0	0	0	0	0	0	0	0	3,335,824	0
2070	0	0	0	0	0	0	0	0	0	0	0	3,510,565	0
2071	0	0	0	0	0	0	0	0	0	0	0	73,298	3,621,254
	130,000	500,000	1,000,000	3,000,000	5,000,000	5,000,000	5,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	3,621,254

Commutation Value by Layer, Discounted for Both Mortality and Investment Income

Columns are derived by multiplying the corresponding column from Exhibit 4, pages 3 and 4, by Column 9, from pages 1 and 2. For example, Column 23 = Column 10 x Column 9

	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)
Year	$500,000 xs $0	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
1996 and prior													
1997	92,224	0	0	0	0	0	0	0	0	0	0	0	0
1998	33,296	59,081	0	0	0	0	0	0	0	0	0	0	0
1999	0	92,526	0	0	0	0	0	0	0	0	0	0	0
2000	0	92,673	0	0	0	0	0	0	0	0	0	0	0
2001	0	92,820	0	0	0	0	0	0	0	0	0	0	0
2002	0	85,684	7,283	0	0	0	0	0	0	0	0	0	0
2003	0	0	93,112	0	0	0	0	0	0	0	0	0	0
2004	0	0	93,251	0	0	0	0	0	0	0	0	0	0
2005	0	0	93,381	0	0	0	0	0	0	0	0	0	0
2006	0	0	93,497	0	0	0	0	0	0	0	0	0	0
2007	0	0	93,595	0	0	0	0	0	0	0	0	0	0
2008	0	0	93,671	0	0	0	0	0	0	0	0	0	0
2009	0	0	78,085	15,636	0	0	0	0	0	0	0	0	0
2010	0	0	0	93,742	0	0	0	0	0	0	0	0	0
2011	0	0	0	93,729	0	0	0	0	0	0	0	0	0
2012	0	0	0	93,678	0	0	0	0	0	0	0	0	0
2013	0	0	0	93,583	0	0	0	0	0	0	0	0	0
2014	0	0	0	93,437	0	0	0	0	0	0	0	0	0
2015	0	0	0	93,233	0	0	0	0	0	0	0	0	0
2016	0	0	0	92,962	0	0	0	0	0	0	0	0	0
2017	0	0	0	92,619	0	0	0	0	0	0	0	0	0
2018	0	0	0	92,196	0	0	0	0	0	0	0	0	0
2019	0	0	0	91,688	0	0	0	0	0	0	0	0	0
2020	0	0	0	91,084	0	0	0	0	0	0	0	0	0
2021	0	0	0	90,375	0	0	0	0	0	0	0	0	0
2022	0	0	0	51,578	37,976	0	0	0	0	0	0	0	0
2023	0	0	0	0	88,614	0	0	0	0	0	0	0	0
2024	0	0	0	0	87,554	0	0	0	0	0	0	0	0
2025	0	0	0	0	86,372	0	0	0	0	0	0	0	0
2026	0	0	0	0	85,070	0	0	0	0	0	0	0	0
2027	0	0	0	0	83,645	0	0	0	0	0	0	0	0
2028	0	0	0	0	82,096	0	0	0	0	0	0	0	0
2029	0	0	0	0	80,413	0	0	0	0	0	0	0	0
2030	0	0	0	0	78,583	0	0	0	0	0	0	0	0
2031	0	0	0	0	76,594	0	0	0	0	0	0	0	0
2032	0	0	0	0	74,439	0	0	0	0	0	0	0	0
2033	0	0	0	0	72,121	0	0	0	0	0	0	0	0

Commutation Value by Layer, Discounted for Both Mortality and Investment Income

Columns are derived by multiplying the corresponding column from Exhibit 4, pages 3 and 4, by Column 9, from pages 1 and 2. For example, Column 23 = Column 10 x Column 9

	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)
Year	$500,000 xs $0	$500,000 xs $500,000	$1 million xs $1 million	$3 million xs $2 million	$5 million xs $5 million	$5 million xs $10 million	$5 million xs $15 million	$10 million xs $20 million	$10 million xs $30 million	$10 million xs $40 million	$10 million xs $50 million	$10 million xs $60 million	$10 million xs $70 million
2034	0	0	0	0	18,513	51,128	0	0	0	0	0	0	0
2035	0	0	0	0	0	67,002	0	0	0	0	0	0	0
2036	0	0	0	0	0	64,207	0	0	0	0	0	0	0
2037	0	0	0	0	0	61,265	0	0	0	0	0	0	0
2038	0	0	0	0	0	58,184	0	0	0	0	0	0	0
2039	0	0	0	0	0	54,976	0	0	0	0	0	0	0
2040	0	0	0	0	0	51,655	0	0	0	0	0	0	0
2041	0	0	0	0	0	29,462	18,778	0	0	0	0	0	0
2042	0	0	0	0	0	0	44,748	0	0	0	0	0	0
2043	0	0	0	0	0	0	41,203	0	0	0	0	0	0
2044	0	0	0	0	0	0	37,629	0	0	0	0	0	0
2045	0	0	0	0	0	0	34,054	0	0	0	0	0	0
2046	0	0	0	0	0	0	29,736	775	0	0	0	0	0
2047	0	0	0	0	0	0	0	27,047	0	0	0	0	0
2048	0	0	0	0	0	0	0	23,705	0	0	0	0	0
2049	0	0	0	0	0	0	0	20,509	0	0	0	0	0
2050	0	0	0	0	0	0	0	17,494	0	0	0	0	0
2051	0	0	0	0	0	0	0	14,691	0	0	0	0	0
2052	0	0	0	0	0	0	0	12,125	0	0	0	0	0
2053	0	0	0	0	0	0	0	9,818	0	0	0	0	0
2054	0	0	0	0	0	0	0	5,142	2,641	0	0	0	0
2055	0	0	0	0	0	0	0	0	6,027	0	0	0	0
2056	0	0	0	0	0	0	0	0	4,546	0	0	0	0
2057	0	0	0	0	0	0	0	0	3,331	0	0	0	0
2058	0	0	0	0	0	0	0	0	2,362	0	0	0	0
2059	0	0	0	0	0	0	0	0	1,615	0	0	0	0
2060	0	0	0	0	0	0	0	0	196	863	0	0	0
2061	0	0	0	0	0	0	0	0	0	663	0	0	0
2062	0	0	0	0	0	0	0	0	0	393	0	0	0
2063	0	0	0	0	0	0	0	0	0	220	0	0	0
2064	0	0	0	0	0	0	0	0	0	56	58	0	0
2065	0	0	0	0	0	0	0	0	0	0	55	0	0
2066	0	0	0	0	0	0	0	0	0	0	24	0	0
2067	0	0	0	0	0	0	0	0	0	0	9	0	0
2068	0	0	0	0	0	0	0	0	0	0	0	3	0.00
2069	0	0	0	0	0	0	0	0	0	0	0	1	0.00
2070	0	0	0	0	0	0	0	0	0	0	0	0	0.00
2071	0	0	0	0	0	0	0	0	0	0	0	0	0.03
	125,520	422,784	645,876	1,179,539	951,989	437,878	206,147	131,305	20,718	2,195	146	4	0.03
	Overall Total =		4,124,102										