

RECORD OF SOCIETY OF ACTUARIES 1985 VOL. 11 NO. 4B

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

Moderator: EDWARD S. SILINS
Panelists: R. STEPHEN RADCLIFFE
 STANLEY B. TULIN
Recorder: STEVEN E. LIPPAI

- o Status of the revision of Recommendation 7
- o Status of the Special Advisory Committee to the NAIC
- o Principles for the valuation of life insurance companies
- o Practical aspects of asset-liability matching

MR. EDWARD S. SILINS: In July 1985, the American Academy of Actuaries released a discussion draft on the Standards for Valuation Actuaries. This included both qualifications standards and standards of practice. I'm currently the chairman of the task force dealing with the possible revisions of Recommendation 7. This is a task force of the Academy Committee on Life Insurance Reporting Principles. Both the qualification standards and standards of practice stem from the valuation actuary concept which was introduced by the Joint Committee on the Role of the Valuation Actuary in the United States, involving both the Academy and the Society. The recommendations of this committee were adopted and endorsed by both boards. Since the valuation actuary concept is still in its infant stages, the draft distributed by the Committee on Life Insurance and Financial Reporting Principles was intended to put the subject on the discussion table so that the Academy would be ready to respond when and if regulations were adopted which would call for actuarial opinions dealing with asset-liability matching. Therefore, our committee anxiously sought input from the membership. The Academy's position is to be promptly reactive when such laws are adopted, rather than proactive with regard to the possible adoption of laws and regulations.

We anticipate that no changes will be made to the current Recommendation 7 unless the valuation actuary concept is in place and action is taken by either the NAIC or the individual states. It is hoped that valuation principles will become available for the practicing actuary, along with other research and documentation with respect to cash-flow matching in an insurance company environment. We anticipate that the earliest possible convention statement for life insurance companies that would require such as opinion would be the statement of 1987. The

OPEN FORUM

wheels of change in insurance regulations generally move slowly, and this appears to be no exception.

I would like to briefly review the responses which we have received to date on the standards portion of the release. Based on past experience with discussion drafts submitted to the Academy's membership, the 34 responses dealt with qualification standards only, and those will be addressed by a separate committee. Of the remaining 29 responses, 3 suggested retaining the current standards and not adopting the proposed revision of Recommendation 7. Eight other responses indicated that, if adopted, the recommendation would become an onerous burden for both small companies and for those companies not selling a significant amount of interest-sensitive products.

Of those responding to the list of the 12 discussion items included in the front of the discussion draft, there was a wide diversity of opinion. The responses represented considerable thought, and the committee appreciates the comments received. The issues generating the most discussion included:

1. Who should select the interest rate scenario? The committee recommended that the NAIC would choose a minimum number of scenarios with the valuation actuary choosing a number of alternate scenarios where appropriate. Most of those disagreeing felt that the actuary should select them exclusively. Someone appropriately pointed out that just as important as the scenarios themselves is the reaction of the other assumptions to the change in the interest rate.
2. Should we retain the current good and sufficient language? The committee recommended alternate language saying "reasonable according to standards." The "good and sufficient" language has been around since the opinion was adopted in 1975. Since there is no body of case law available or other legal guidance, this issue remains difficult.
3. Who should require the investment officer disclosure? The committee believed that the NAIC should do so, but that generated significant discussion as well. A few actuaries recommended eliminating the disclosure of investment related data called for in Interpretation 7-D. Others felt that the actuary could rely on the investment officer as necessary but that should not be mandated.
4. Does the failure of one path of interest rates cause the need to increase the aggregate reserves? It was the committee's position that this should be answered affirmatively. If one reasonable scenario failed, several people felt that an increase in reserves would not be appropriate, since it would unlock the old reserve basis currently called for in the blue book. Others felt that unlocking was acceptable but that the failure of one reasonable path shouldn't cause an increase in the reserves.
5. How should assets be allocated between surplus in the various lines of business? The committee felt that a reasonable approach consistent with the other in-place procedures of the company was

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

appropriate. It would appear to the committee that the minimum acceptable segmentation was between surplus and operating lines of business. That generated significant discussion as well. Several of the responses stated that the assets didn't need to be allocated at all in order to perform the valuation. Others felt that companies should be segmenting assets in order to conduct their regular business whether or not the valuation was going to be performed.

Our committee is in the process of analyzing all of the various responses, and we will continue to monitor the developments within the entire arena of the valuation actuary including all of the various committees and the regulatory bodies that are dealing with it. The responses provide much food for thought for the task force and the parent committee. Our timetable for implementation, if we ultimately do implement the revised Recommendation 7, is unclear at this time.

Pending the full development of the valuation actuary concept, the Special Advisory Committee to the NAIC Life and Health Actuarial Task Force was formed to provide interim guidance to the actuaries and regulators in the life and health industry. The advisory committee was asked to address an interim procedure which would alert regulators about the need to review an individual company regarding its ability to make good on its obligations. After concluding that the current actuarial opinion is not used as a regulatory tool and identifying the concern that the current valuation was not completely satisfactory, the advisory committee made the following recommendations.

1. Establish credentials for the valuation actuary.
2. Provide that a qualified opinion must expressly set forth any qualifications of that opinion.
3. Define the scope of the analysis which the NAIC anticipates to be performed by the actuary.
4. Require that supporting documentation of the actuary's opinion be available in the form of an actuarial report to management.
5. Recommend that the NAIC outline a set of surveillance procedures for regulators to use in reviewing the actuarial opinion.

While not absolutely requiring asset-liability cash-flow opinions, it was intended that guidelines would be put in place which regulators could mandate for specific insurance companies if regulators became uncomfortable with the financial position of a particular company. No change to the current laws, the convention blank, the instructions, or the standards of practice are anticipated if the recommendations of the special advisory committee become adopted. In essence, it would be an administrative rather than a regulatory matter for pursuit in particular situations.

MR. R. STEPHEN RADCLIFFE: For the past year I've been on the Society of Actuaries' Committee to develop Principles for the Valuation

OPEN FORUM

of Life Insurance Companies. Our committee does not have well-formed and well-documented principles to present to you. We have some principles to present, but they are by no means final; they're still being developed. However, I have a lot of information that will show you the current thinking about how the valuation actuary should form an opinion on the solvency of life insurance companies.

Currently it is unclear whether the Society will take on the responsibility of promulgating principles. So even the status of general principles is rather delicate. The principles I will discuss are a test case, to help determine whether the Society is going to go into the business of promulgating principles.

Principles are hard to formulate. You start with a good idea, but after it is fully distilled to everyone's satisfaction, you're left with a fairly trivial statement of the obvious. It's questionable how useful a statement like that is. Despite this problem it is an important intellectual pursuit to try to write down a principle. It may end up a generalized statement that is not entirely meaningful. However, as a by-product of the discussion to arrive at the principle, many important issues are developed. The statements that we will see here are going to show you a few of the principles that our committee derived. They are not the most important part of our work. The most important part is the set of issues that we developed while we were trying to come up with the principles.

The following list indicates that our committee struggled with what type of valuation we should address. Our first thought was that we should develop principles for statutory valuations. But, later we felt that a principle should be more basic than that and cover valuations of all types. I have listed several types of valuations.

Different Types of Surplus Produced by Valuations

<u>Types of Surplus</u>	<u>Reasons for Valuation</u>
1. Statutory	Right to Exist
2. GAAP	Stockholder's Earnings
3. Tax Equity	Mutual Co. Federal Income Tax
4. Value of Company	Purchase Price
5. Liquidation Value	Bankruptcy
6. Gross Premium "Value"	Check on Statutory

In each valuation, the residual of the valuation is the surplus. In each valuation, you make an estimate of the assets and of the liabilities. Both of the estimates can be different. As a result, there is an infinite variety of remainders or residuals that you can obtain from the valuation.

These possible surplus values range over quite a large boundary of numbers. The statutory value is one of the middle values. One of the higher values is a result of the tax equity for the mutual companies. The liquidation surplus might be a low value because the assets may shrink at liquidation.

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

Consider a graph of the surplus of a company over its lifetime. One line is drawn on the graph which represents only one set of valuations through that insurance company's lifetime. There is actually a band of surpluses through the company's lifetime, representing the fact that you could draw several lines that represent surplus. Some of them may dip below the zero line during the company's lifespan and still end up with a final value that's positive. The key issue is that the statutory line cannot dip below the zero line of the graph. Our committee was trying to develop principles that would apply to every one of those insurance valuations with specific emphasis on appropriate statutory valuation. A few of the principles our committee derived including a premise for each principle follow.

1. The Purpose Principle: A valuation is performed to determine whether the assets of a life insurance company are adequate to provide for its benefit obligation.

Premise: A valuation is part of the determination of the financial condition of a life insurance company.

On the surface that is an obvious statement, but, it has an important meaning. In the past, valuation took on the role of an inventory process. The actuary would develop in-force blocks of business, look up the valuation factor that applied to each of the blocks, and multiply the two. That was the reserve we had to hold. This principle emphasizes that we must determine whether the assets are appropriate and adequate. In this case, we get into the valuation of the insurance company and not just an inventory process. We are not only trying to determine the solvency. We are trying also to determine the solidity, where solidity is a measure of the probability of future solvency of the company. We must develop an analysis to determine whether not only the reserves but also the assets are adequate to cover the future benefits.

An important unresolved issue is what assets we are talking about when we make our valuation. Are we talking about the assets equal to the reserves, or the entire assets of the company which include surplus? I contend that we should concentrate on the assets equal to the reserves. We don't know enough about surplus to make a valid opinion on surplus. Some helpful formulas are emerging for analyzing how much surplus a company should keep. However, we are not sophisticated enough to make public opinions regarding the adequacy of those amounts. There is still a lot of judgment and guesswork in determining how much surplus a company needs. At some future time, we may be able to make those opinions and back them up scientifically, but for the moment we should stick to analyzing assets equal to the reserves.

Another issue involves how much power you give the valuation actuary, especially with regard to surplus. Is he the ultimate oracle of how much surplus a company should have? Or should he just be the person who gives information to management so it can make the decisions on the amount of surplus that should be kept? Is the valuation actuary the only one who has a valid opinion about how much surplus a company should keep? I think not.

OPEN FORUM

The old valuation process is inadequate, because it is just an inventory process. Now we need to add more to that valuation process so that the regulators have the information needed to make better decisions. Valuation actuaries, however, can enhance the information in the annual statement so that those regulators can make good decisions without making opinions with regard to surplus.

2. The Comprehensiveness Principle: A valuation must include provisions for all risks inherent in the company's business which have a potential, material impact on the financial condition of the company.

Premise: A valuation should be comprehensive enough to address all material factors affecting the financial condition of a life insurance company.

This is not only a valuation principle but a general actuarial principle. It affects many actuarial disciplines--pricing, valuation, estimation of pension benefits, and so on.

In the past, the valuation process has ignored the C-3 risks which are obviously important. Since the risk became apparent in the 1980s, there is now an emphasis to evaluate this risk. That means an analysis of the match of the asset and the liability cash flows will be an important part of the valuation process.

Possibly, the pendulum has swung too far. Now we have so much emphasis on the C-3 risk, we're forgetting about some of the other risks, especially C-2. There is a C-2 risk in universal life that may not be completely evaluated the way it should be. We are not covering our margins. There are several ways to compete in the marketplace. One way is to take a C-3 risk, invest longer, and hope to get a higher interest rate. Another way is to sacrifice the interest margin which a lot of people are doing. Sacrificing the margin increases the C-2 risk. Another way is to take a C-1 risk and buy junk bonds to cover the margin in universal life. This example illustrates that we should have a balanced approach to evaluating these risks when we are making valuations.

Mr. James A. Geyer and Mr. Michael B. Mateja prepared an excellent presentation on the combination of risks. Their presentation showed that we still have not determined exactly how to combine risks. While we have some preliminary studies, I think Mr. Mateja and Mr. Geyer would both say that we have not completely solved the problem of risk combination. Sometimes, I wonder whether we should have split-up the risks the way we did. We put them into nice, neat compartments so that we could define them. But, that left us with the problem of combining all of these risks, once we analyzed each one. Maybe it would have been better to just analyze a combined general risk factor in the first place. The problem is that we don't have any tools to analyze generalized risk.

3. The Appropriateness of Assumptions Principle: Valuation computations should be based on reasonable sets of basic assumptions

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

appropriate for the nature of the business being valued and the type of valuation being performed.

Premise: Valuation results are highly dependent on the range of assumptions used.

A key issue is whether a certain valuation should be just for the in-force business or whether the valuation should include the future business or some recognition of future business. This issue breaks down as to whether you should evaluate surplus or just the assets behind the reserves. If you're going to concentrate on the in-force business, you can focus just on the reserves. That's the best way to start.

Who chooses the scenarios? If you let the valuation actuary choose, then there's no consistency between companies. In this case, the regulator has a hard time determining whether the valuations are standardized. On the other hand, if you let the regulators choose, the valuation actuary has no freedom and is probably going to be forced into using some inappropriate assumptions. There is a compromise where the regulators prescribe a minimum set of scenarios that must be used. The valuation actuary can add more scenarios if he wishes.

Is segmentation mandatory to perform a proper valuation? We know that segmentation is helpful, but is it mandatory? What level of conservatism do you use in assumptions? Should the conservatism change from one scenario to the next?

Should there be a time limit on the opinion? The theoretical time limit is that the opinion is good only as long as the assumptions hold true. I don't know if that's ten years or one year. I would guess it's more like a week with the economy that we have today. I'm uncomfortable with the valuation actuary's opinion holding the test of time because the benefit of hindsight is rather unkind to anyone who makes a reasonable opinion that doesn't come true.

4. The Standards of Practice Principle: A valuation should be prepared with care by qualified professionals and follow current professional standards of practice.

Premise: A valuation should convey the appropriate messages to its audiences who lack the authority and background to prescribe the information they want and must rely on information that the actuary communicates to them.

The principles that we struggled to define are thoughts, ideas, or concepts that will stand the test of time. Principles shouldn't change from one valuation to the next or from one year to the next. Standards and practices will be developed that go along with the principles. Also, you need to have a legal framework. Those two items change, but the principle should not change. This is part of the reason that the principle usually is distilled into a rather fundamental statement, one that can remain unchanged with time.

OPEN FORUM

One problem discussed under this principle is the definition of reasonable and plausible. I have not seen any definitions of reasonable and plausible that work. They don't give me a good feeling of what is a reasonable assumption and what is a plausible assumption. We're going to need those definitions if our opinions have those words in them. That's a problem that Mr. Silin's committee has tried to deal with as well.

Interestingly enough, we're in limbo as far as the legal framework goes too. We don't have any laws that say there is a valuation actuary. It sounds like Mr. Silin's committee is going to wait to develop standards until that law is passed. That's a rather key element to this whole process, and I don't see any movement for states to pass laws to give the valuation actuary any legal status.

5. The Sensitivity Testing Principle: A valuation should produce results under a number of reasonable sets of alternative assumptions to provide measures determining its sensitivity to changes in the assumptions used.

Premise: A valuation results in estimates rather than exact measures due to expected variations between actual experience and the experience assumptions used in the valuation.

This is another principle that you might label as basic. It should be applied to all of our work, not just valuation. We are in the business of making estimates, and estimates depend on how the actual results follow the assumptions made. You should not run just one test but several to see what kind of boundaries your opinion or your studies have.

We've had a difficult time determining how to handle catastrophic occurrences in our assumptions and in the sensitivity testing. If you can concentrate on just evaluating the assets underlying the reserves, the valuation of catastrophic occurrences is easier. However, there are many who believe that this is an important part of the valuation process which is not complete unless you test the worst possible case.

There is a major issue regarding the appropriateness of the various techniques for sensitivity testing. Many techniques are developed now. You're going to see quite a few of them at the valuation actuary symposium being held in November 1985. Since there is a wide variety of methods which give different answers, there is a major question as to which one we should use.

What are the acceptable results in the sensitivity testing? Can you flunk one out of five and be okay? Can you flunk one out of ten? Can you flunk one out of two? We don't know where the level is. That leads to another question. How many scenarios? Five? Twelve? Twenty? Forty? I read a paper that said forty isn't enough. But doing forty tests of our valuation would be impossible for my company.

I have given you a sample here of the principles that we've developed. The committee would appreciate your comments. If you have any,

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

please direct them to Mr. Robert D. Hogue, the incoming Chairman of the Principles Committee.

MR. STANLEY B. TULIN: I intend to take you through some examples to give you an idea of the concerns that any valuation actuary has today. I'll end with what I think we have to do as a profession to stay a profession. It's going to start simple and get too complicated.

When dealing with C-3 problems or for that matter C-1 problems, you have to involve parts of your management that are not familiar with some of the terms involved in the discussion. There are a couple of key points here. One is the definition of reinvestment risks and consumer disintermediation risks. Reinvestment risk exists where assets have shorter duration than liabilities. Disintermediation risk exists where assets have durations longer than liabilities. This often comes as a surprise to different parts of the insurance company management.

Another point is probably what most of us, at least with respect to C-3, are talking about when we say that we're starting to understand the C-3 risk. All things being equal, interest-sensitive contracts have liability durations which shorten as interest rates rise, thus compounding the disintermediation risk. Also, liabilities tend to lengthen (i.e., lower lapse) when interest rates are falling, thus increasing the reinvestment risk.

This leads to an important conclusion for an industry that has been experiencing different things for a number of years in an unstable economic environment. For most of our contracts, classical immunization using duration-matching techniques are not possible because most of us don't have the luxury of dealing with fixed-liability streams.

It's hard to think about the valuation actuary's job without thinking about the job of the pricing actuary, the investment department, or the people who are setting the strategy for the company to realize the assumptions implicit in all of the products. Exhibit 1 is what I loosely call a universe definition which a company could use in developing interest rate scenarios. Exhibit 2 looks at potential movements in interest rates. It's a highly simplistic model in that most of the work that we've been doing has involved as many as thirty different yield curves. Down the left side of Exhibit 1 is a yield curve number. The first yield curve has short-term rates at 685 and long-term rates at 909. The worst yield curve or the highest, which is what many of us think of as the worst, is the so-called inverted yield curve that has short-term rates at 1633 and long-term rates 1595.

Exhibit 2 is something that you may not need as a valuation actuary. However, you may want to think of the job of the pricing actuary as being the same as the job of the valuation actuary except that it's at time zero. The pricing actuary needs to develop an expectation as well as a worst-case definition. In order to have an expectation, you have to have a view. Even if your view about future interest rate movements is that you don't have a view, that's a view in the sense that you can then develop random distributions around some expectation. This exhibit shows a highly simplistic view of interest rate movements

OPEN FORUM

EXHIBIT 1

STRUCTURE OF YIELD CURVE INPUT

<u>YIELD CURVE</u>	<u>SHORT TERM</u>	<u>5 YEAR RATE</u>	<u>10 YEAR RATE</u>	<u>20 YEAR RATE</u>
1	6.85%	8.75%	8.83%	9.09%
2	8.63	10.20	10.40	10.60
3	10.75	12.15	12.25	12.35
4	12.40	13.42	13.46	13.50
5	16.33	16.13	16.01	15.95

EXHIBIT 2

STRUCTURE OF PROBABILITY INPUT

ENDING
YIELD
CURVE

BEGINNING YIELD CURVE

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1	60%	30%	10%	--	--
2	25	40	20	10%	--
3	15	20	40	20	15%
4	--	10	20	40	25
5	--	--	10	30	60
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	100%	100%	100%	100%	100%

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

that can be used in developing the expectations on a scenario-generated basis. The top part of this grid represents the beginning yield curve. It suggests that if you start the year at the middle yield curve, curve number 3, than you have a 20 percent chance of ending the year at either 2 or 4; a 10 percent chance of going as far as 1 or 5; and a 40 percent chance of staying where you are. Again, it is highly simplistic compared to what really happens.

However, it is the beginning of the thought process that you need to use to get expectations of investment results for interest-sensitive or, for that matter, any other kind of product today. The valuation actuary job is simpler in one sense. I don't think you need an expectation for the valuation actuary as much as you need a worst case scenario.

Mateja and Geyer mentioned that they were using assumptions that related the lapse assumption or surrender assumption on their universal life (UL) products and single premium deferred annuities (SPDAs) to the external environment. The relationship of the lapse rate to the credited rate and the surrender charges is the way we've done it. This is just an example of what I call a dynamic withdrawal assumption. One of the big variables that the valuation actuary and the pricing actuary have to deal with is the fact that little data exist that can be used to validate a formula like this. We've had our hands on some of it for a number of years and have been trying to correlate and regress our ideas and experience into a formula. This is a sample formula that one might use.

$$\begin{aligned} \text{Withdrawal rate} &= 15\% + 2 \times (\text{Market Rate}-\text{Credited Rate})^2 \\ &\quad - 3 \times (\text{Surrender Charge}); \\ &\text{But not less than } 3\% \end{aligned}$$

The withdrawal rate is a function of the market rate and the credited rate. In the second element of the equation, we square two times the difference between the market rate and the credited rate, and then subtract three times the surrender charge. We add that to 15 percent to obtain the lapse rate. This is a much simpler example than the typical formula that we've used, but at least it illustrates the kinds of relationships you can get. We define market rate as the lesser of (1) the 1-15-year bond rate less 1.65 percent or (2) the short-term rate less 1.15 percent. Most of the experience we've seen, at least in the annuity business, suggest that this is true until you have a large difference between the market and the credited rate. With a 500 basis point change and a 7 percent surrender charge in place, you'd have a 44 percent lapse rate. This gives you an example of the dynamic lapse rate. This is an area of tremendous judgment--one that effects the results significantly.

OPEN FORUM

Exhibits 3 and 4 illustrate a live case. We have a large immunized portfolio. By immunized I mean classic immunization where the duration of the assets is equal to the duration of the liabilities. Further, we've assumed that those durations would be rebalanced quarterly so that we would keep the duration match in place. In fact, we would never go out of a duration match. We found the results to be fascinating because we assessed the risk of a duration match.

Many companies tell me they're immunized. I used to think that being immunized meant you were in great shape. There are significant risks to interest rate changes even with an immunized portfolio. Most of that risk is the yield curve twist and yield curve steepness risks. The twelve scenarios in exhibit 3 deal with that, although they look at rising interest rates with static spreads between top and bottom. Exhibit 3 shows three scenarios--1, 2, and 12--characterized as level. I'd like you to focus on those because they are yield curves where there isn't anything dramatic happening. We just had the difference between top and bottom either steeping or contracting a little.

We have a \$1.4 billion immunized portfolio. If interest rates stay exactly the way they are, we end the period with a small amount of surplus which is what we expected since it's a tight market. Next, assume things stay more or less exactly as they are except that the yield curve steepens. For example, figure that interest rates would stay just about the same and that the only thing that would happen during the period is that the short-term rate would go down and the long-term rate would go up maybe a point.

Instead of having a 250 basis point difference between the short rates and the long rates, you ended the period with maybe a 400 basis point spread. The result shows that instead of having a million dollar profit or so, we'd have something on the order of an \$8 million loss. Look at case 12 where the only thing we did was change that pivot. Think of the ten-year securities remaining constant throughout. Here we contracted the spread between the short-term rate and the long-term rate. Instead of an \$8 million negative surplus, we end the period with something on the order of a \$14 million positive surplus. The difference is \$22 million. Since this is on a \$1.4 billion portfolio, it's a little bit more than $1\frac{1}{2}$ percent.

Parts of our industry classically have surplus of no more than five times that percentage. This is not looking at violent changes in interest rates. This is not looking, at least in scenarios 1, 2, and 12 at classic C-3 routes. This is what I have come to be intensely interested in because I've found that it significantly affects whether or not the companies that are pricing closely, as this company is obviously doing, are going to survive.

Look at some of the other scenarios. Scenario 5 results in merely a \$40 million shortfall at the end with an immunized portfolio, which is maintained in an immunized fashion. The point here is that you have an immunized portfolio. You are duration matched. You feel like you're responsible, and you are still somewhat short at the end if scenario 5

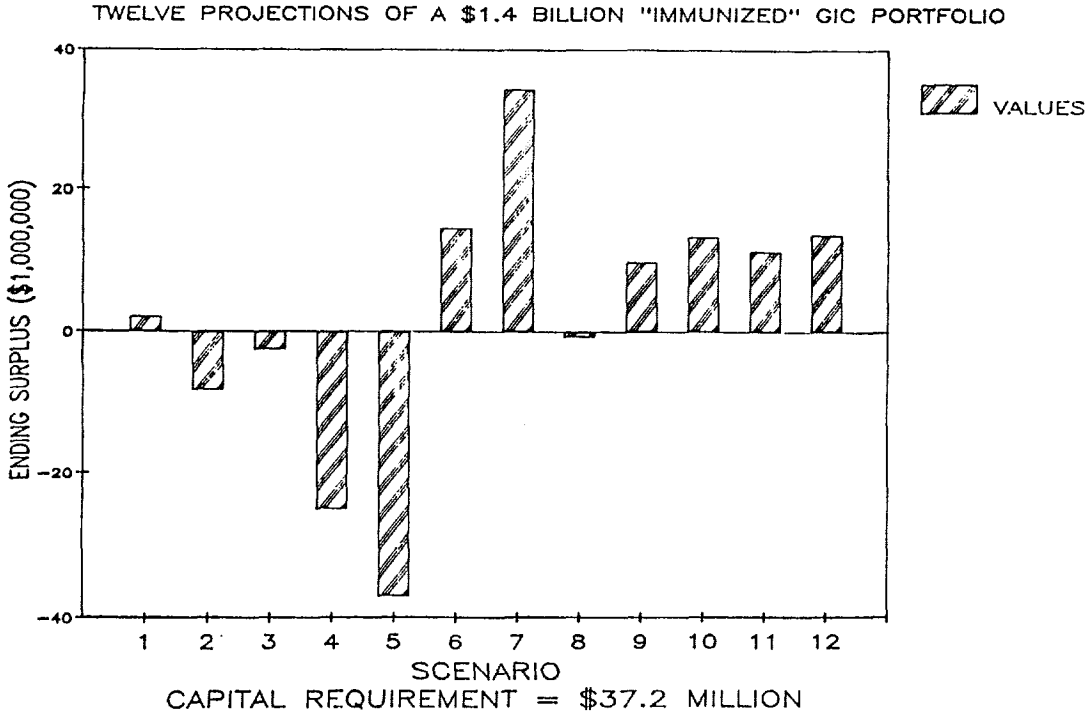
ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

EXHIBIT 3

SCENARIO DESCRIPTIONS FOR PROJECTIONS OF

"IMMUNIZED" GIC PORTFOLIO

1. Level.
2. Level. Yield curve steepens.
3. Valley -- rates fall then return to original level. Yield curve steepens.
4. Mountain -- rates rise then fall back to original level. Yield curve steepens.
5. Rising. Yield curve steepens.
6. Falling. Yield curve steepens.
7. Falling. Yield curve becomes less steep.
8. Rising. Yield curve inverts.
9. Mountain -- rates rise then fall back to original level. Yield curve becomes less steep.
10. Valley -- rates fall then return to original level. Yield curve becomes less steep.
11. Deep valley -- rates fall further than in scenario 10. Yield curve becomes less steep.
12. Level. Yield curve becomes less steep.



ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

materializes. Scenario 5 is about as extreme a case as I'd ever want to look at. In terms of the absolute magnitude of the range, it's no worse than anything that we've had in the last five years. What's different is that the historic yield curve spread stays in place. In other words, at the top point long-term rates get to about 20 and short-term rates to around 16.

Exhibit 5 is a pricing example that you also can think of as a required capital example or a valuation actuary example for an annuity block. We've obtained input from investment people with whom we've worked. This is a semilive case. Once you've established a dialogue with your investment people, try to get them to realize that this problem is as much theirs as it is yours and that the analysis of the quantification of the risk is important. Have them come up with a bunch of scenarios or yield curves that they consider possible. These yield curves are just the beginning of the process because you get a different answer if you go from 6 to 13 in one period than you do if you go from 6, 7, 8, 9, 10 all the way up to 13. One of the concerns with using one or two scenarios is that you may be missing things that are worse or, of more concern, you just may not find by doing a handful of scenarios.

Exhibit 6 is a set of 20 random walks based on those scenarios and the underlying probability distribution. This is a random walk through some of those scenarios. You can see that you go up or down based on these probability distributions. They don't do what we have traditionally tried to simulate when we pick a scenario by going straight up or straight down. Instead they do a little bit of everything all the time. And, in fact, with the yield curve twist, you have different rates doing different things. So, it's a highly complex set of scenario variations --really multidimensional. It's one of the concerns about how you deal with the problems of valuation actuary.

This project was to deal with an annuity portfolio. We established an investment strategy where investments were made in two-, four-, and seven-year bonds. The mean result obtained an ending positive surplus of \$50 million. The worst result that we had, random trial 9, was a loss of \$34,000,000. This is based on the interest environment we looked at earlier. We didn't have an assumption that was a doomsday approach. The worse result that we had was a \$34,000,000 loss, and that's what we're calling the required capital.

The standard deviation for those 20 simulations is \$60,100,000. (See Exhibit 7.) You can see that this is more than the mean results, which suggests a lot of potential variation and a lot of risk. The median is \$45,300,000.

The point here is two-fold. First, this is the kind of analysis that a pricing actuary must do today. Pricing actuaries and valuation actuaries are going to have to get close to each other and start thinking about the same issues. Second, you have a tremendous amount of variation.

The kind of analysis that we have just gone through is valuable. It is and ought to be an end in itself. It can help management understand

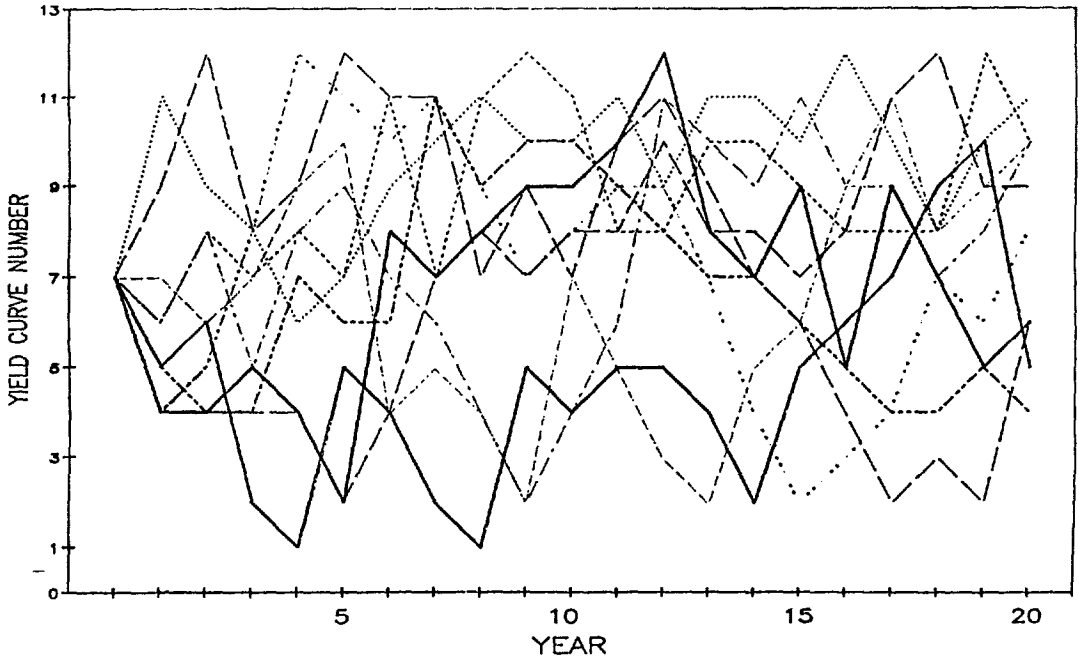
OPEN FORUM

EXHIBIT 5

POSSIBLE YIELD CURVES FOR
PROJECTION OF ANNUITY BLOCK

<u>CURVE NUMBER</u>	<u>SHORT TERM NMR</u>	<u>2 YEAR BOND NMR</u>	<u>5 YEAR BOND NMR</u>	<u>10 YEAR BOND NMR</u>	<u>20 YEAR BOND NMR</u>
1	4.05	5.32	6.94	7.68	8.32
2	6.05	7.32	8.94	9.68	10.32
3	6.82	7.97	9.51	10.21	10.64
4	7.41	8.47	9.95	10.54	10.95
5	7.89	8.89	10.28	10.90	11.28
6	8.59	9.47	10.81	11.31	11.65
7	9.41	10.32	12.00	12.50	13.79
8	10.43	11.33	13.04	13.54	13.99
9	11.49	12.14	13.53	13.99	14.36
10	12.64	13.36	14.59	14.71	14.68
11	13.82	14.59	15.97	15.65	15.20
12	14.85	15.36	16.66	16.30	15.53
13	16.85	17.36	18.66	18.30	17.53

SAMPLE INTEREST SCENARIOS



ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

EXHIBIT 6

TWENTY YEAR PROJECTION OF \$500 MILLION ANNUITY PORTFOLIO

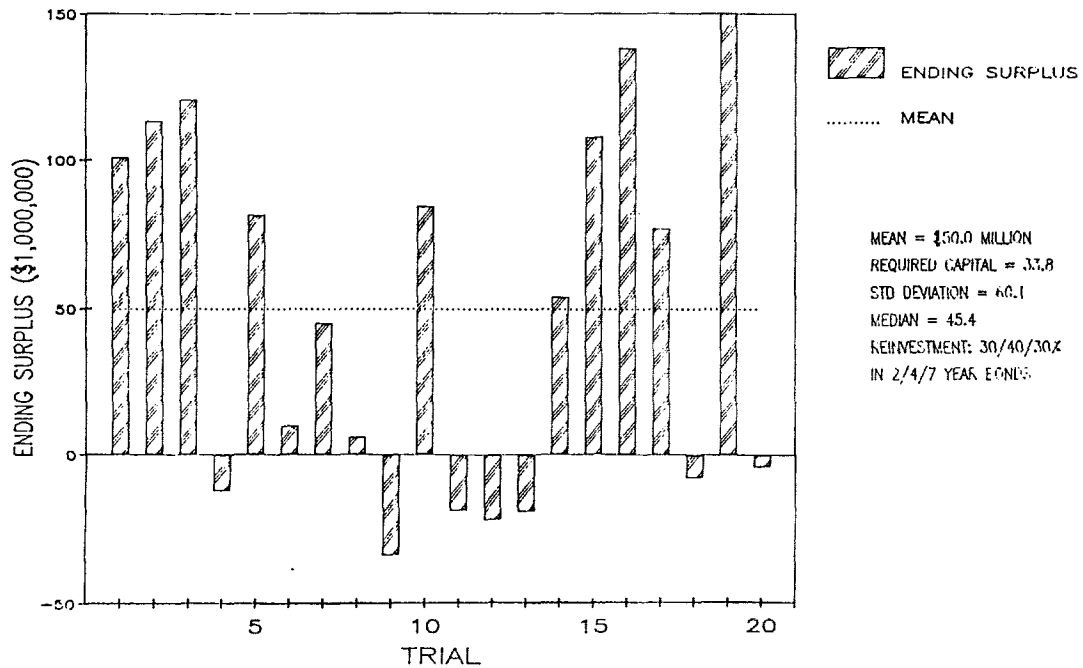


EXHIBIT 7

OPEN FORUM

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

its business. Every person who has worked on this type of cash-flow analysis has come away feeling that he has a much better understanding of his business, insurance in general, and risks in general. This is required to deal with the insurance environment of the mid-1980s and probably the insurance environment of the next 20 years. It enables you to estimate required capital and mean return. It allows you, if you start doing multiple analysis of this type, to plot the risk-reward equation which is so critical and basic to the industry but has never been looked at before. Our industry had it buried in substantial profit margins which have deteriorated. Now, we all have to be aware of the risks. You can plot what happens at a \$34,000,000 required surplus level. You can construct a scenario in terms of investment management and other things that would have a \$17,000,000 required surplus to see what the profit is on that. Ultimately, you'll end up with a classic diminishing return graph that would show you what your return was for incremental dollars of invested capital or risk capital. This would allow management to make some fairly important decisions about the direction of their business. So it's important in itself.

The issues for the valuation actuary, in terms of what he's going to sign his name to, are complex. They have nontrivial solutions. I'm not going to suggest that I have any idea what the right answer is. But, the big concern that everybody has is whether the valuation actuary can do it right. The question that they're not asking is who else can do it. I believe that actuaries are the only ones who can do it. We are the only ones who have the background to assess these risks. At this time, I'm less concerned about figuring out an opinion than I am in doing the analysis. We should plow forward. At least we would be learning about this, talking to our managements about it, getting them to understand the risks, and getting the regulators to understand our problems. That dialogue will force us to end up with opinions that we can sign.

We also need to accept more responsibility. This gets to something critical. The notion of an opinion by a valuation actuary is an attempt by either society, the regulatory environment, or the profession itself to pass risks to the members. What naturally happens in any risk transaction is that the person is going to take the risk saying, "Well, I'd rather not." A lot of people say they'd rather not, and I don't blame them. But, you have to think about the consideration. The consideration in this example, or at least in where we're heading as an industry, is professional respect, a definition of what our profession is and what it means, and a lot of things that we all want. That is where we have to head. I hope that, even though it's hard and going to require a lot of work from various committees, we keep moving in that direction.

The types of securities that the companies are investing in have proliferated, making the whole C-3 problem more difficult to analyze. There are a lot of one-step solutions, where companies are hoping that they can solve the C-3 problem permanently with one or two things. Unfortunately, almost all of our analysis indicates that this doesn't work.

OPEN FORUM

The allocation of assets question is critical. The question of whether or not we look at just the reserves without the surplus is critical. Ultimately, we have to look at everything and reach opinions about whether or not companies work. We're the ones who can tell the public whether or not a company is in good or bad shape. We can't say whether it is solvent or insolvent, but we can make relative comparisons in much the same way that Mr. Mateja and Mr. Geyer were allowed to make by their analysis about different lines of business. This kind of structure and analysis can allow us, as actuaries, to make comparisons of the relative comfort that one should have at one company versus another company.

I'd like everybody to think about my paraphrasing of some words of an ancient philosopher appropriate to all of this:

If we are not for ourselves, then who are we for? If we're only for ourselves, what are we? And, if not now then when?

The Society and the Academy should be thinking that now has to be the time. Not necessarily to do everything, but to work on it. Now is the time that our various publics are starting to look at us. We have to be there for those publics in order to have something for ourselves. And, there is no one else who can do it other than ourselves.

MR. SILINS: The actuary has not traditionally focused on the investment area. The focus of the valuation actuary is on the assets almost as much as on the liabilities. This has caused a lot of discomfort among actuaries and for good reason. Many of them feel that they are not schooled in a way that would enable them to do these types of analysis. It's time that we began learning about those things, feel comfortable, and work towards moving in that arena.

Actuaries traditionally have done gross premium valuations, which are projections. The kinds of projections that we're talking about in the valuation actuary concept go beyond that, almost to the point where we're looking into our crystal ball more than we've ever done. It's important for the valuation actuary to put assumptions in the opinion if we are going to be required to do so. I'm not sure what form those opinions will take, perhaps something along the lines that there are many assumptions inherent in this projection and some of them will not occur exactly. It's important to get a sensitivity to the analysis in order to get a general feel for what's happening to the company under various scenarios.

MR. DONALD D. CODY: I regard the valuation actuary as being a part of a large discipline--call it surplus management or public financial management. The scenario I would like to put forward involves how you respond to a management that asked the question of you. You're an actuary. Management thinks of you as an actuary and as the only person in the company who can answer the question of how much surplus the company makes. We do have the choice to do that, and this is the point I was making. You may need the motion of your chief

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

executive officer asking you to do it. This is likely to occur where you have a top management which on a scale of one to ten is between nine and ten. We should not be frightened away by the fact that we will never know the complete answer to this. All you can use are the tools available and use them as well and intelligently as you can. Always answer in a range. Of course you can't be positive. We are lucky that Mr. Tulin is the new Chairman of the C-3 Risk Task Force. You can see why he has that position. We can expect great things in the way of additional clarification and tools in the next year or two.

MR. ROBERT J. CALLAHAN: We, in New York, have had the requirement for an actuarial opinion as to the assets supporting the reserves with annuities and with guaranteed interest contracts if a company wanted to use the higher set of valuation interest rates. That's been in effect for three years. Prior to that, by circular letter, we had the requirement for an actuarial opinion and memorandum as to assets supporting liabilities for the use of the higher set of valuation interest rates. This past year, we have had new legislation enacted which will extend those requirements. Regardless of whether you use the higher set or the lower set of valuation interest rates, the insurer must submit an actuarial opinion and memorandum in form and substance acceptable to the superintendent. We currently have advisory groups assisting us so that we don't write these regulations in an ivory tower. We have called upon the expertise of the industry for its assistance in this area. Ms. Donna Claire is chairing the advisory subgroup, regarding the actuarial opinion and memorandum. For the past three years, we have given a great deal of latitude to the actuary in choosing the appropriate assumptions. Yet to be determined is whether these new regulations will set forth a minimum number of interest paths, a minimum number of the scenarios, the starting point, and the deviations up and down. I am urging that they do. However, we are awaiting the results of the advisory committee which may prefer not to do so. A good deal of work is going on in this area, and we hope to have the gist of it in place by the end of the year. These regulations will apply to all licensed companies, both foreign and domestic. On these four advisory subgroups are representatives of both foreign and domestic insurers. This past year, we also have written letters to all the credited reinsurers who were not licensed to do a direct business in New York but who are required to meet the solvency standards. Our reserve requirements will apply to them likewise.

MR. SILINS: Had we had the valuation actuary concept in place a few years ago, could or would any of the recent life company insolvency been avoided? In other words, would the things people are proposing to put in force work?

MR. TULIN: Using a minimum number of scenarios that are hand chosen and getting the sensitivity of the results by scenario can at least allow you to get the understanding of the relationship of the interest risks. As far as the insolvency question goes, the one that I know something about is Baldwin-United and its life companies. My feeling is that this develops into the concepts of what the valuation actuary is versus what he is not. In the case of Baldwin-United, the

OPEN FORUM

valuation actuary, had this been in place and working perfectly, could have done nothing other than ring the bell maybe a month before the bell rang. At best, it assumes that the actuary understands all the things we've got in place right now. Maybe the problem of Baldwin-United was a C-4 problem that ultimately manifested itself in both a C-3 and a C-1 problem. When I first got involved in it, I thought it was just a C-3 problem. C-3 problems are, at times, manageable. C-1 problems are difficult to deal with especially when they comprise 25 percent of a portfolio. The trouble with a C-1 problem involving 25 percent of a portfolio is that once the valuation actuary takes a snap shot, the problem is already there. I don't see where the valuation actuary, at least in our principles' current stage of development, could stop the things from happening that happened to Baldwin-United.

MR. J. ALAN LAUER: I'm dubious that having the valuation actuary concept in effect four years ago would have been very beneficial. I see too many statements of actuarial opinion currently stating that the reserves meet all legal standards where the opinion isn't worth the paper its written on. I'm afraid that there are too many actuaries who have rather loose ideas of current standards of practice in this regard. My perception of the valuation actuary concept is a long-term one. As a regulator, I feel that it is essential that we have strong valuation actuaries in place. It is essential from the viewpoint of the regulators since we just can't keep up with all the new developments in the industry. It is essential from the standpoint of the insurance industry because, if regulators have difficulty keeping up with new developments, then the industry gets strangled in a straight jacket of old-fashioned regulations. The principle is that valuations should be prepared with appropriate care by qualified professionals and follow current professional standards of practice. It is essential for the profession to identify, as clearly as possible, current professional standards of practice. The Society and the Academy have taken steps in this direction. It's important that nobody feels that the steps taken so far are adequate. This effort must continue, because we have to get to the point where regulators can feel confidence in the statement to which an FSA's name is attached.

We talk about all these concepts of C-3 risks and various scenarios. There are a lot of actuaries today who are not prepared to cope with these concepts but not because they're incompetent. Rather, perhaps they just haven't had a chance to absorb all of the material that's coming out. The Society in particular has a tremendous obligation, which it is beginning to undertake. I want to encourage it to expand the effort to educate these actuaries and particularly the actuaries working for small companies or the one-man consulting shop servicing all companies.

The small companies need these new concepts just as much as the large companies. But, how does the actuary in a one-man shop or in the small company apply all these new principles in practice? The profession has an obligation to its members to do as much as it can.

MR. SILINS: Most people would agree that we have a long way to go with regard to the theory and standards of practice. I am an optimist

ACTUARIAL OPINIONS ON ASSET-LIABILITY MATCHING

and think that the theory and educational requirements will be put in place over the next few years. We will have a body of knowledge and standards of practice that will stand up in a court of law. Most people by now have either read or heard about the article in Forbes magazine about malpractice and other types of lawsuits for actuaries. It seems to foretell an increase in the volume of lawsuits on actuaries.

MR. TULIN: I agree with your thrust about the need to get after the profession. One of the things that we're going to try to do in the Society's C-3 Task Force, besides continuing some of the research, is to compile case studies of C-3 analysis in a way that we hope the membership can use to understand how to go about doing C-3 analysis. That is something that many of us are aware of.

MR. CALLAHAN: There has been a good deal of literature on the subject of the C-3 risks, plus seminars in the past five years. The New York Department's circular letter 33-1982 was put together by an advisory group which was familiar with the C-3 risks. The principles laid down in that circular letter may need to be expanded and updated today. Basically, that indicates testing at least two paths--one increasing and one decreasing. It suggested doing a third one as a point of reference, namely, a level path. It was silent as far as the magnitude of the change in the interest rate to be projected under either the ascending path or the descending path. In reviewing the actuarial opinions and memorandum for the past three years, I found that most companies pick their starting point as the new-money rate at year end. Thus, when you look at the actuarial opinion from one year end to the next year end, you see a new starting point with a new projection. There was at least one company that used a starting point at a far lower rate. Some companies only tested a difference of three percentage points up and down. Others tested a difference of 10 percent. Some tested, or at least they showed us, five paths, some seven paths, some nine paths, and some eighteen paths. I would like to see the new rules specify a minimum number of paths and the type of paths--continually up, continually down, up then down paths, down and up and so on. But a good deal of work remains to be done to this. In three or four years as we gather more experience, we will perhaps modify anything we come out with now.

MR. JOHN O. MONTGOMERY: I worked with Mr. Tulin on the Baldwin-United Rehabilitation Plan and have the utmost respect for his work. We learned about projections during that operation. We since have carried that forward into a number of examinations. Other annuity producers have gotten into difficulty and have used the work of this group and another consulting firm. We found these tools to be extremely useful. While the companies were initially complaining about the expense of doing such things, after they got through, they realized they had a valuable management tool. It is important to stress that a valuable management tool is being developed. I also want to point out that, with Baldwin-United, the actuaries had nothing to do with what happened. What is needed is a better surveillance system of holding-company operations by the NAIC. I've been chairing a working group on this within the NAIC.

