1991 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS

SESSION 1

The Valuation Actuary -- 1991 Developments

Donna R. Claire

Sheldon D. Summers

Douglas C. Doll

William T. Bryan

Steven A. Smith

THE VALUATION ACTUARY -- 1991 DEVELOPMENTS

Introduction

MS. DONNA R. CLAIRE: The year 1991 has been a busy one for most valuation actuaries, and the remainder of this year will probably be even busier. This session is to update you on the 1991 developments in the valuation actuary arena. These will be presented from three points of view: the regulator, the industry, and a specific company point of view. In addition, Steve Smith and I will fill you in on some miscellaneous 1991 developments that should be of interest to valuation actuaries.

One of the miscellaneous topics I would like to address is that Mr. Larry Gorski of the Illinois Insurance Department has taken to putting out a letter to company actuaries at the end of October each year. This has been fondly labeled Larry's Halloween trick or treat. This year's letter is dated October 25, 1991. It states that the Actuarial Standard of Practice (ASP) No. 14 says that cash-flow testing should be done where appropriate. He therefore reminds the actuaries signing the opinion for the 1991 annual statement that a statement should be included as to whether cash-flow testing was done, and if not, why not. Lack of time is probably not going to be an appropriate response, considering this standard has been in effect for over a year.

Let me introduce the panel to you. I am Donna Claire, President of Claire Thinking, Inc. I will be moderating this panel and giving you an update on some miscellaneous topics.

One of our speakers will be Sheldon Summers. He is a supervising actuary with the California Insurance Department. I first met him a couple of years ago in connection with the NAIC's Life and Health Actuarial Task Force. He has written opinions on everything from reinsurance to annuity and universal life reserves. He has become a regulating actuary to watch. I may not always agree with him, but he does present well-thought-out arguments. Sheldon will be giving an update of what has been going on in his home state of California. I think you will find that he is an interesting regulator from a state that has become very interesting lately.

Another speaker will be Doug Doll from Tillinghast. He is going to present the industry viewpoint, based on a survey he did of what companies are doing in 1991. Doug has spoken to this group before, and I think you'll enjoy hearing about his findings.

Bill Bryan is from SAFECO. I met Bill a couple of years ago when he started looking into cash-flow testing. SAFECO is not a New York company, so he did not have to file under New York Regulation 126. I thought that it would be interesting to hear from someone who had basically started the cash-flow testing from scratch recently. In addition, in the past couple of years, Bill asked me some really good questions about certain aspects of cash-flow testing -- questions that I did not necessarily have the answers to. I figured that, by now, he may have found some good answers that he can share with you. Also, for those of you who have read ASP No. 14, Bill Bryan's name appears in the upper right-hand corner of the names of those who helped write the standard; so if you have any questions on this, please address them to Bill.

Steve Smith of First Colony Life is your host for the Valuation Actuary Symposium. He will also be updating you on some of the so-called miscellaneous topics. These are the topics that committees of the Society of Actuaries has been working on: structured settlement mortality and a single premium deferred annuity (SPDA) lapse study.

Nonguaranteed Elements

The NAIC's Life and Health Actuarial Task Force requested that the American Academy of Actuaries' Committee on Life Insurance look into the problem of misleading and/or insupportable sales illustrations. There are two parts of the project: One part is to study the annual statement interrogatories in order to achieve better disclosure on company practices regarding nonguaranteed elements. The second part is to determine if a smoothness test could be designed which would identify potentially misleading values. This work is proceeding, and a final report has not yet been presented. I would like to give you a brief update on the work done.

There are new nonguaranteed elements interrogatories being designed by this committee. These will be presented to the NAIC Life and Health Actuarial Task Force in December 1991, so I expect you will hear more about these in 1992.

The Academy committee surveyed a number of companies that write traditional life insurance, universal life insurance, and excess interest whole life insurance. The answers to these surveys are being studied to determine if there is a particular smoothness test that could point out abusive practices. Preliminary analysis has been done, and it is expected that this will also be presented to the Life and Health Actuarial Task Force in December of 1991.

Update on New York Regulation 126

Mr. Robert Callahan, Chief Actuary of the New York Insurance Department, recently did a survey of companies that file actuarial memoranda under New York Regulation 126. The results of this survey will be published in a future addition of the publication of the Investment Section of the Society of Actuaries called *Risk and Reward.*

I would like to share some of his findings with you: 22% of the companies responding stated that they increased reserves as a result of cash-flow testing done under New York Regulation 126, while 10% released some reserves. Over 80% of the companies said there was closer coordination between the valuation and investment people. About 60% of the companies have realigned their investment portfolios as a result of the testing, and about two-thirds of the companies responding have changed new investments as a result of the cash-flow testing. A little more than one-third of the companies stated that new products were revised due to cash-flow testing.

I think these are powerful numbers. It shows that cash-flow testing can have a major impact on companies.

Valuation Actuary Reports

The following appendix is a sample actuarial opinion and memorandum. This sample opinion is for the SPDA and individual life insurance products that I cover in Session 2. This is strictly a sample opinion and memorandum; there are a number of other assumptions that can be made, e.g., for the dynamic lapse factor, which would be equally accurate. These documents have not been reviewed by any state regulator for acceptability.

Note: If this was a "real" actuarial report, I would include all relevant input and output, e.g., the model office used on the liability side, actual scenarios used, year-by-year development of surplus, copies of various sensitivity tests done. These are excluded here because of volume constraints.

The idea behind the actuarial report is that another qualified actuary would be able to take the information and reproduce the results. It is therefore recommended that a copy of the version of the projection program used, and applicable input and output files, be made a part of this report.

APPENDIX

SAMPLE ACTUARIAL OPINION

I, Valerie Actuary, am Senior Vice President and Chief Actuary of Little Life Insurance Company and a Member of the American Academy of Actuaries. I was appointed by the Board of Directors of said insurer to render this opinion as stated in the letter to the Commissioner dated December 15, 1991. I meet the qualification standards for rendering the opinion and am familiar with the valuation requirements applicable to life and health companies.

I have examined the actuarial assumptions and actuarial methods used in determining reserves and related actuarial items listed in the attached chart, as shown in the annual statement of the company, as prepared for filing with state regulatory officials as of December 31, 1991. Tabulated reserves are those reserves and related actuarial items which have been subjected to asset adequacy analysis.

I have relied on Li Ability, Vice President and Actuary, for the accuracy of the in-force liability records. I have relied on Ay Set, Chief Investment Officer, for the accuracy of the in-force asset records, as certified in the attached statements. In other respects my examination included such review of the actuarial assumptions and actuarial methods and such tests of the actuarial calculations as I considered necessary.

In my opinion the reserves and related actuarial values concerning the statement items identified above:

a. Are computed in accordance with presently accepted actuarial standards consistently applied and are fairly stated, in accordance with sound actuarial principals;

b. Are based on actuarial assumptions which produce reserves at least as great as those called for in any contract provision as to reserve basis and method, and are in accordance with all other contract provisions;

c. Meet the requirements of the Insurance Law and regulation of the state of Anywhere and are at least as great as the minimum aggregate amounts required by the state in which this statement is filed;

d. Are computed on the basis of assumptions consistent with those used in computing the corresponding items in the annual statement of the preceding year-end;

e. Include provision for all actuarial reserves and related statement items which ought to be established.

The reserves and related items, when considered in light of the assets held by the company with respect to such reserves and related actuarial items including, but not limited to, the investment earnings on such assets, and the considerations anticipated to be received and

retained under such policies and contracts, make adequate provision, according to presently accepted actuarial standards of practice, for the anticipated cash flows required by the contractual obligations and related expenses of the company.

The actuarial methods, considerations and analyses used in forming my opinion conform to the appropriate Standards of Practice as promulgated by the Actuarial Standards Board, which standards form the basis of this statement of opinion.

This opinion is updated annually as required by statute. To the best of my knowledge, there have been no material changes from the applicable date of the annual statement to the date of the rendering of this opinion which should be considered in reviewing this opinion.

The impact of unanticipated events subsequent to the date of this opinion is beyond the scope of this opinion. The analysis of asset adequacy portion of this opinion should be viewed recognizing that the company's future experience may not follow all the assumptions used in the analysis.

Valerie Actuary, FSA, M.A.A.A.

Senior Vice President and Chief Actuary
Little Life Insurance Company
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Littletown, Anywhere 11746
Address of Apointed Actuary

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Telephone Number of Appointed Actuary

DECEMBER 31, 1991 RESERVES AND LIABILITIES

	Asset Adequacy Analyzed Amount	Method	Other Amount	Total Amount
Exhibit 8				
A. Life Insurance	$100 mill	Cash Flow Testing	____	$100 Million
B. Annuities	$100 mill	Cash Flow Testing	____	$100 Million
C. Supplementary Contracts Involving Life Contingencies	____	____	____	n/a
D. Accidental Death Benefit	____	____	____	n/a
E. Disability - Active	____	____	____	n/a
F. Disability - Disabled	____	____	____	n/a
G. Miscellaneous	____	____	____	n/a
TOTAL (Exhibit 8, Item 1, Page 3)	____		____	$200 Million
Exhibit 9				
A. Active Life Reserve	____	____	____	n/a
B. Claim Reserve	____	____	____	n/a
TOTAL (Exhibit 9, Item 2, Page 3)	____		____	n/a
Exhibit 10:				
1 Premiums and Other Deposit Funds				
1.1 Policyholder Premiums (Page 3, Line 10.1)	____	____	____	n/a
1.2 Guaranteed Investment Contracts (Page 3, Line 10.2)	____	____	____	n/a
1.3 Other Contract Deposit Funds (Page 3, Line 10.3)	____	____	____	n/a
2. Supplementary Contracts Not Involving Life Contingencies (Page 3, Line 3)	____	____	____	n/a
3. Dividend and Coupon Accums (Page 3, Line 5)	____	____	____	n/a
TOTAL Exhibit 10	____		____	n/a
Exhibit 11 Part 1				
1. Life (Page 3, Line 4.1)	____	____	____	n/a
2. Health (Page 3, Line 4.2)	____	____	____	n/a
TOTAL Exhibit 11, Part 1	____		____	n/a
Separate Accounts (page 3, Line 27)	____	____	____	n/a
GRAND TOTAL	$200 Mill		____	$200 Million

RELIANCE STATEMENT FROM LIABILITY OFFICER

I, Li Ability, FSA, M.A.A.A., Vice President and Actuary of Little Life Insurance Company, hereby affirm that the listings and summaries of policies and contracts in force as of December 31, 1991, and other liabilities prepared for and submitted to Valerie Actuary, were prepared under my direction and, to the best of my knowledge and belief, are substantially accurate and complete.

Li Ability, FSA, M.A.A.A.

Vice President and Actuary
Little Life Insurance Company
Room 506
51 Accuracy Avenue
Littletown, Anywhere 11746
Address of Officer

(516) 555-1317
Telephone Number

RELIANCE STATEMENT FROM ASSET OFFICER

I, Ay Set, Chief Investment Officer of Little Life Insurance Company, hereby affirm that the listings, summaries and analyses related to data prepared for and submitted to Valerie Actuary in support of the asset-oriented aspects of the opinion were prepared under my direction and, to the best of my knowledge and belief, are substantially accurate and complete.

_____
Ay Set

Chief Investment Officer
Little Life Insurance Company
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ACTUARIAL REPORT

Overview

This report has been prepared regarding the reserves as reported in the 1991 Annual Statement for Little Life Insurance Company. Little Life Insurance Company commenced writing insurance business in 1991. The products are sold through career agents. It only sells SPDA and whole life insurance products.

In-force data were reviewed for reasonableness but were not tested for accuracy. Liability assumptions were developed based on discussions with the Company personnel in charge of the products. Asset assumptions were developed based on discussions with Company investment personnel.

Cash-flow testing was performed on all products sold by Little Life Insurance Company. All cash-flow testing was done under my supervision.

Actuarial methods, considerations and analyses used in the preparation of this memorandum conform to the appropriate standards of practice as promulgated by the Actuarial Standards Board, which is the basis for this memorandum.

The results reached in this analysis are dependent on the assumptions used. Actual results may vary as experience differs from the assumptions.

Reserves

A. Product Descriptions:

1. SPDAs -- SPDAs are Single Premium Deferred Annuities sold under Policy Form SPDA-1. This product is a non-tax-qualified annuity generally marketed to older farmers in the Midwest as a retirement vehicle. The average issue age is 60. The product is with age 72 as a maturity date. If the annuitant dies before the annuity date, the account value will be paid. The account value is defined as the premium paid in plus accumulated interest plus partial withdrawals.

   There is a 10% free partial withdrawal allowed yearly. No loans are allowed under the contract.

   The minimum interest-rate guarantee is 4% a year. In addition, the company guarantees a rate of interest (at least equal to the minimum guaranteed rate), annually at the contract anniversary.

   Annuity benefits are based on the 1983 IAM at 3% interest.

If the policyholder surrenders the policy before the maturity date, the following surrender charges apply:

Contract Year	Surrender Charges
1	7% of amount withdrawn
2	6% of amount withdrawn
3	5% of amount withdrawn
4	4% of amount withdrawn
5	3% of amount withdrawn
6	2% of amount withdrawn
7	1% of amount withdrawn
8+	0

2. Whole Life Insurance -- Little Life Insurance Company sells a participating whole life insurance policy. The marketing is concentrated on farmers in the Midwest. The only product currently sold is a $100,000 whole life insurance policy. Potential customers are required to have a paramedical exam. No substandard business is accepted. Premiums are due annually.

   Cash values are based on the 1980 CSO table at 4% interest. Extended term insurance and reduced paid-up insurance is also available, using the 1980 CSO table at 4%.

   Dividends are determined using a three-factor formula, reflecting actual expenses, mortality and investment earnings. There is a variable policy loan interest rate, with the interest rate set at the maximum value allowed by the state.

B. Source of Information

The in-force data was obtained from Li Ability, Vice President and Actuary in charge in in-force records. The in-force records used for the information in the asset liability analysis were obtained from the valuation extract file. This file is developed using a software program developed in house.

C. Reserve Method and Basis

For SPDAs, commissioners annuity reserve valuation method (CARVM) reserves were calculated, at 6.5%. For whole life insurance, the reserves were calculated using the 1980 CSO at 5.5%.

D. Investment Reserves

Little Life Insurance Company has $5 million in the mandatory securities valuation reserve (MSVR). This was not included in the asset liability analysis done for 1991, except to the extent that these reserves would provide an extra cushion in case of default experience more adverse than that tested develops.

E. Reinsurance

Little Life Insurance Company has no reinsurance treaties outstanding at the end of 1991.

Assets

A. Portfolio Description
Little Life Insurance Company has a separate portfolio of assets for SPDAs versus life insurance. A summary of the assets are given below:

Portfolio	Asset Type	Asset Maturity (years)	Asset Quality	Amount (in $1,000s)
SPDAs	Non-Call Bond	3	AA	$ 17,000
	"	5	AA	17,000
	"	7	AA	17,000
	"	3	BB	3,000
	"	5	BB	3,000
	"	7	BB	3,000
	Commercial Mortgages	3	BBB (internal rating)	13,000
	"	5	"	14,000
	"	7	"	13,000
TOTAL				100,000
Whole Life Insurance	Non-Call Bond	10	AA	20,000
	Call Bond	10	AA	20,000
	Call Bond	20	AA	20,000
	GNMAs	30	AAA	40,000
TOTAL				100,000

B. Investment and Disinvestment Assumptions
It was assumed that positive cash flow would be reinvested in the same manner as the current portfolio is invested, with each asset type being bought in the same proportionate share as above.

The disinvestment strategy assumed that the Company would borrow up to $1 million per portfolio at an interest rate equal to 1.2 times the short-term, new-money rate plus 1%. If additional cash was needed, it was assumed that assets would be sold, selling those assets shortest to maturity first.

C. Source of Asset Data
The information on assets in force was obtained from Ay Set, Chief Investment Officer. These data are on the IMIS system, a commercial software package for assets.

D. Asset Valuation Bases

The book value for all assets is that found in Schedule D of the Annual Statement of Little Life Insurance Company. The ratings used for bonds is the lower of Standard and Poor's or Moody's rating. For commercial mortgages, an internal rating system was used, which rates the mortgages on an equivalent basis to public bonds.

Analysis Base

A. Methodology

PTS, a commercial software system from Chalke Incorporated, was used for the cash-flow modeling. Version 6.2 was used for this analysis.

The following are the major assumptions used:

1. Interest Rates -- Treasury rates as of September 30, 1991, were used as a starting point for interest rates. For other categories of assets, the following assumptions were made:
   AA-rated Non-callable bonds: 1.05 x Treasury rates + 40 basis points
   AA-rated Callable bonds: 1.05 x Treasury rates + 65 basis points
   BB-rated bonds: 1.05 x Treasury rates + 150 basis points
   Commercial mortgages: 1.05 x Treasury rates + 150 basis points
   Government National Mortgage Association (GNMA) bonds: Treasuries + 120 basis points

2. Scenarios Tested -- For both SPDAs and whole life insurance, the seven scenarios as described in the valuation actuary model regulation were tested. The starting interest rates are given below:

90-Day Rate	3-Yr. Rate	5-Yr. Rate	7-Yr. Rate	10 Yr. Rate
5.82%	7.08%	7.38%	7.58%	7.97%

   In addition, for the SPDAs, 99 random scenarios were tested. These scenarios were developed using September Treasury rates as a starting point. It was assumed that interest rates would average 16% volatility. An assumption that the interest-rate deviations were lognormal was used in the development of these scenarios.

3. Inflation -- Per policy expenses were assumed to increase with inflation. Inflation was assumed to be 3% less than the short-term, new-money rate.

4. Defaults -- The default assumption used for assets was equal to the MSVR deduction (or an equivalent charge).

5. Prepayments -- It was assumed that the base level of prepayment on GNMAs was equal to the PSA (Public Security Association Standard Prepayment Model) rate. There is a factor, applied to the PSA rate, that is dependent on the excess of the current coupon rate over the initial GNMA coupon. This formula produces GNMA

prepayments of up to 60% if the current coupon rate is 5% less than the initial coupon rate.

6. Calls -- The callable bonds in the portfolio are not callable for the first five years after issue. After this point, it is assumed that the bonds are callable with a call premium equal to one coupon in year six, grading down to callable at par in year 10. It was assumed that the bonds would be called depending on the ratio of the theoretical market price to the call price. It was assumed no bonds would be called until this ratio was 1.05% (to reflect the cost of refunding), and 100% would be called when this ratio was 1.25%.

7. Loans/Partial Withdrawals -- It was assumed that 25% of the money eligible for loans on whole life insurance would be taken out. Since the loan rate is variable, this assumption does not have a major impact on the bottom line.

   On SPDAs, it was assumed that, as a baseline assumption, 10% of those eligible would take out 100% of their free partial withdrawals. If the interest rate credited were below market rate, it was assumed that this would increase, up to 50% when the credited rate was more than 5% less than the market rate.

8. Interest Credited/Dividend Payment Methodology -- It was assumed that the interest credited on SPDAs would be on a portfolio basis, using earned rates less a spread. For the whole life insurance, the three-factor formula was used to determine dividends. It was assumed that the interest-rate component would be determined using a portfolio rate less a spread.

9. Market Rate -- To determine excess lapses, an assumption as to what was a market rate (competitor's rate) had to be determined. For SPDAs, this assumption was that the market rate was equal to the 5-year Treasury spot rate less 50 basis points. for whole life insurance, this was determined to be the 5-year Treasury spot rate less 100 basis points.

10. Lapses -- For SPDAs, the base lapse formula assumed 1% lapses in the first policy year, grading up 0.5% thereafter. A dynamic lapse formula was determined as follows: Base lapse + 2 x (market rate-credited rate)^2.

    For whole life insurance, the assumed base lapse rate was 10%. The dynamic lapse formula was as follows: Base lapse + (market rate-credited rate)$^{1.5}$.

11. Mortality -- The mortality basis used for SPDAs was the 1983 IAM. For whole life insurance, the 1980 CSO table was used. Since this has built-in conservatism, additional mortality sensitivity was not done. As the clientele of Little Life Insurance is not in the high risk groups, and paramedical exams were done on all policyholders, additional reserves for AIDS were not considered necessary.

B. Rationale for Testing
All blocks of business of Little Life Insurance Company were examined, since all were thought to be significant.

In general, conservative assumptions were used, which minimized the need for additional sensitivity tests. For SPDAs, the effect of different dynamic lapse formulas were explored, but it did not have a significant impact on the bottom-line profitability. In addition, different assumptions for defaults were explored for the SPDAs. Doubling the expected defaults on junk bonds had a major impact on the testing. The baseline assumption used for the testing does seem reasonable, but it is an assumption that will be monitored.

C. Rationale for Degree of Analysis
All products were analyzed using cash-flow testing. Additional analysis was done on the SPDAs, since the results appear to be more market sensitive.

D. Criteria for Determining Asset Adequacy
The deductions for asset defaults were based on the MSVR category. Reserves appear adequate using this definition. In addition, higher default assumptions for low quality assets were tested. This shows that reserve adequacy for SPDAs is affected by this assumption. Therefore, a task force has been established to monitor the actual defaults in Little Life Insurance Company.

E. Effect of Federal Income Taxes, Reinsurance
Federal income tax was modeled in the cash flows, assuming the rate paid was 34% of the net gain from operations (and reflecting the tax reserves). In addition, the deferred acquisition cost (DAC) tax was reflected in the modeling.

Summary of Results
The following table summarizes the results of the cash-flow testing done. These results are expressed as the present value of after-tax surplus, with surplus expressed on a market value (economic) basis. The surplus used for SPDAs was the 10th-year surplus, since most of the SPDA business is expected to run off the books by then. For whole life insurance, 20th-year surplus numbers were used.

After-Tax Present Value of Market Value of Surplus
(in $Thousands)

Scenario	SPDAs 10th-Yr. Surplus	WL 20th-Yr. Surplus
Level	$2,247	$3,000
Pop Up	158	2,500
Pop Down	2,776	2,500
Grad Down	4,286	50
Grad Up	92	2,750
Cup	(488)	2,500
Cap	1,456	2,500

Conclusion
I have concluded that the statutory reserves for 1991 are adequate.

Valerie Actuary
Senior Vice President and Chief Actuary

Standard Valuation Law

MR. SHELDON D. SUMMERS: The revised model standard valuation law was adopted by the NAIC in December 1990. California has passed Senate Bill 889 to incorporate its version of the model law into its insurance code. The bill's requirement for an actuarial opinion is effective for each year ending on or after December 31, 1992.

The California version of the law offers less protection from liability to the actuary and augments the situations where the memorandum ceases to be confidential.

Of interest to California domiciled life insurers, Senate Bill 889 changes the due date from February 1 to March 1 for the valuation data supporting a company's life reserves.

The NAIC Actuarial Opinion and Memorandum Regulation was adopted by the NAIC in June 1991. The California Department is currently in the process of working to adopt this regulation.

Valuation of Variable Annuities

In the latter part of 1990 California Department of Insurance actuaries reviewed the variable annuity reserving methodology of a particular life insurer. The actuaries, after deliberating the issue among themselves, concluded that a reserve less than the corresponding contract account value was inappropriate. The Department considered issuing a bulletin addressing this issue but decided to discuss the matter with the NAIC Life and Health Actuarial Task Force before taking a formal position.

During their review and upon further study, Department actuaries found that insurers use different methods to calculate reserves for variable annuity products. One is to calculate a CARVM-type reserve. The assumption is made that the assets earn the valuation interest rate in future years. A deduction for the various risk charges is made annually to determine future cash-surrender values. These values are discounted at the valuation

interest rate and the greatest of these discounted values is compared to the cash value at the valuation date, the reserve being set equal to the larger amount.

Actuarial Guideline XIII, which addresses the recognition of surrender charges when using CARVM to calculate annuity reserves, includes a paragraph on variable annuities. This paragraph states conditions under which surrender charges should be treated as contingent and therefore not be recognized in the reserve calculation. The language of this paragraph implies that surrender charges could be recognized in the case of variable annuities if the conditions making them contingent did not exist.

The California Department of Insurance introduced this issue at the "Emerging Issues" portion of the Life and Health Actuarial Task Force meeting during the NAIC Spring Zone meeting in Charleston. At the Summer National meeting in Indianapolis, California proposed a change to Actuarial Guideline XIII, which would require variable annuity reserves to be no less than the corresponding contracts' account values. Early in October 1991 at the Actuarial Task Force's meeting in Scottsdale, California amended the language of the proposed change to the guideline. The current proposal includes the following language as a replacement to the next to last paragraph of Actuarial Guideline XIII:

> In the case of variable annuities, contract account values equal the values of the supporting assets in the separate account. Earnings from this business are not available to general account policyholders until released either as fees incurred by persisting policyholders for mortality and expense fluctuation risks or as surrender charges incurred by lapsing policyholders. Therefore, it is inappropriate to recognize these earnings prior to release by establishing reserves in the separate account which are smaller than the associated contract account values or by establishing reserves in the separate account equal to the corresponding account values and taking credit in the general account for the risk fees or surrender charges as either a negative liability or a receivable.

This issue, which has not yet been resolved, will be included in the Actuarial Life and Health Task Force's agenda for its Houston meeting in December 1991.

Continuous CARVM

A committee appointed by the American Academy of Actuaries is currently preparing a report on annuity reserves. This report is to be submitted to the NAIC Life and Health Actuarial Task Force sometime in November 1991. The report will include recommendations dealing with CARVM reserving and will also address the variable annuity reserving issue.

Section 5a of the Standard Valuation Law states:

> Reserves according to the commissioner's annuity reserve method for benefits under annuity . . . contracts . . . shall be the greatest of the respective excesses of the present values, at the date of valuation, of the future guaranteed benefits, including guaranteed nonforfeiture benefits, provided for by such contracts **at the end of each respective contract year,** . . . .

There has been debate over whether only future benefits referred at the end of each policy year are to be considered or if future benefits at some other point in time should also be investigated. For example, the guaranteed account value at the end of contract year one is $1,120. The cash value, after imposing an 8% surrender charge, is $1,030.40. The cash value on the first day of the second contract year is $1,041.60 since the surrender charge has declined to 7%.

The letter of the law appears to indicate that the $1,030.40 is the correct figure to discount back to the valuation date. However, arguments have been made that correct actuarial procedure supports discounting the $1,041.60.

The Illinois Department of Insurance issued a notice on October 30, 1989, stating that Actuarial Guideline VIII, which contains the language, "individual single premium deferred annuity reserves shall at least equal the greatest of any of the discounted values of all guaranteed future benefits . . . ," was interpreted as requiring benefits at any future point in time to be discounted rather than only those available at the end of each contract year. Larry Gorski has told me that this interpretation is only applied in cases where it is determined that policy design has been manipulated to avoid setting up higher reserves;

where no such manipulation exists and the surrender charges decrease 1% or less per year, the ending year cash values are used.

New York's Regulation 126 specifically states, "The minimum reserve for contracts . . . shall be the greater of (1) the contract cash-surrender value and (2) the greatest of the respective excesses of the present values, at the date of valuation, of the future cash-surrender values provided for by the contract on any day of each respective contract year, ..." The Colorado Department also follows this approach. On August 8, 1991, John Montgomery, Chief Actuary of the California Department of Insurance, addressed the issue and concluded that California should require the same level of reserves as New York's regulation would dictate.

Valuation of Universal Life Policies

California has a new regulation addressing reserving requirements for universal life insurance policies. This regulation will become official and will be published by the end of November 1991. The regulation will be effective for all policies issued on or after January 1, 1992. The regulation is similar to the existing NAIC model regulation in many respects.

Some of the highlights of the regulation are:

1. Present value calculations for reserving purposes are calculated using the lesser of the interest rate (or rates) specified by Section 10489.4 of the California Insurance Code or the guaranteed accumulation rate (or rates) of interest specified by the policy form.
2. As an alternative valuation method, companies may carry basic reserves equal to the mean of the cash-surrender value and the policy value at the date of valuation. This alternative method is to be known as the "California Method." A company may also use this method for all its universal life business issued before January 1, 1992, upon request to and approval from the commissioner.

Negative cash values on the valuation date may be used to calculate seriatim reserves when applying the California method; however, in no event may a policy reserve be less than zero.

3. Excess interest reserves are required when a rate of interest greater than the maximum valuation rate permitted by Insurance Code Section 10489.4 is guaranteed for more than one year beyond the policy anniversary date previous to the date of valuation. This applies regardless of whether the California method described above is used.
4. The regulation applies to individual and group universal life policies except for variable life insurance.

Reinsurance

The NAIC Financial Reinsurance Study Group, a subgroup of the Sale of Future Revenues/Securitization of Nonadmitted or Unrecorded Assets Working Group, recently exposed for comment a revised model regulation on life and health reinsurance agreements. The study group plans to meet in late November 1991 to discuss the comments it receives and to expose for adoption the proposed model regulation at the Winter National Meeting in Houston. The target date for NAIC adoption is June 1992. If adopted, it would replace the current model regulation.

Some of the highlights of the proposed model are:

1. Expense allowances paid by the reinsurer must cover anticipated allocable expenses of the ceding company in all accounting periods if surplus relief is to be recognized;
2. The model includes a representative sample of products and types of business that identifies the risks considered to be significant. These risks, except for certain types of treaties such as YRT, must be transferred under proportional reinsurance treaties for surplus relief to be recognized.
3. In the case of business with significant asset risks, for surplus relief to be recognized the underlying assets must either be transferred to the reinsurer or legally segregated in a trust account. As an exception to this requirement, assets for certain types of

business may be kept in the ceding company's general account if the reserve interest-rate-adjustment formula incorporates the ceding company's investment earnings and realized and unrealized capital gains and losses.

4. In the case of treaties involving existing business, the ceding company must file copies of such agreements to the Commissioner of its state of domicile. Each filing must also include detail information on the financial impact of the transaction. Although surplus relief from such treaties may be immediately reflected as surplus by the ceding company, the relief shall not be recognized as earnings until such time as the earnings emerge from the business reinsured.

The California Department of Insurance expects to release, in early November 1991, a bulletin that is very similar to the proposed model. However, the California bulletin requires the write-off by December 31, 1992 (December 31, 1991 for agreements which combine coinsurance and modified coinsurance) of any reserve credits or assets established with respect to noncomplying treaties.

MR. DOUGLAS C. DOLL: I am supposed to describe an industry survey on cash-flow testing that will be done in 1991. I am going to broaden the scope slightly and discuss what should be done in 1991.

The genesis of this presentation is a survey performed in spring of 1991 of members of the Southeastern Actuaries Club (SEAC). The survey responses were tabulated and presented by Darryl Harris, so I thank Darryl for his assistance with these results. In addition, Tillinghast sponsored discussion forums on cash-flow testing requirements a couple months ago. These were held at several locations around the country and allowed us to get a pretty good feel for the kinds of questions being asked by valuation actuaries all around the country.

In the SEAC survey, we asked questions about what the members' companies were doing about cash-flow testing for valuation actuary purposes and what methodology they were

using for the tests. Three significant areas of concern were highlighted, and these concerns have been confirmed by discussions with other companies:

1. What are the requirements for 1991 annual statements? Does ASP No. 14 require cash-flow testing for this year-end? The answer to that question will appear in the next issue of *The Actuarial Update*, and I will share it with you.
2. What does it mean to opine that the company has "adequate provision, according to presently accepted actuarial standards of practice, for the anticipated cash flows"?
   a. What scenarios need to be tested?
   b. What constitutes pass or failure of a scenario?
   c. Where is the point at which extra reserves should be established?

   Session 2 of this symposium deals with these questions, so I will simply discuss the questions and leave it to later speakers to answer them.
3. The third area of concern is that cash-flow testing is a lot of work: "How can we get this all done?" and "What assumptions shall we use for the assets and liabilities?"

Now, let's discuss the issue of what is required for 1991.

Table 1 is a categorization of statutory opinions that were returned as part of the SEAC survey.

TABLE 1

1990 Statutory Opinions --
References to Cash-Flow Testing

Testing definitely performed	1
Considered, but no time	5
Determined unnecessary	3
No mention	1
"As considered necessary"	4

For 1990 statutory opinions, there was a variety of responses to ASP No. 14, which did apply to 1990 year-end statements. In the fairly small sample of opinions that were returned with the survey, the least common responses were the two extremes. Only one

opinion said testing was performed, and only one opinion ignored the issue. There may have been some self-selection on which respondents sent in their opinions. The rest of the opinions were one of three kinds:

1. "Considered, but no time." Wording for this might be as follows: "My examination considered the need for cash-flow testing, but none was performed because of time limitations associated with the issuance of this opinion . . . . The following opinion is based on the assumption that the reserves of the company are supported by valid assets . . . ."
2. "Determined unnecessary." Wording for this might be as follows: "My examination considered the need for cash-flow testing, but none was performed because such tests were considered to be unnecessary; the cash flows associated with the company's products and investments are believed to be relatively insensitive to influences such as changes in economic conditions."
3. "As considered necessary." The wording for this varied widely. For example:
   a. "My examination considered the need for cash-flow testing, and such tests of cash flows were performed as I considered necessary."
   b. "My examination considered the need for cash-flow testing, and such tests of cash flows were performed on those products and investments most sensitive to influences such as changes in economic conditions. Cash-flow testing was considered necessary on other products and investments but none was performed because of time limitations associated with the issuance of this opinion. No cash-flow testing was performed on certain products and investments as such tests were determined to be unnecessary because the cash flows associated with these products and investments are believed to be relatively insensitive to influences such as changes in economic conditions, or were considered to be immaterial. These three classifications are summarized as follows:

Classification	Cash-Flow Testing Status
1) Most Sensitive	Tested
2) Sensitive	Not tested - time limitations
3) Relatively Insensitive or Immaterial	Testing unnecessary

Chart 1 indicates that most survey respondents had wonderful intentions in spring 1991 of performing cash-flow testing for this year-end: two-thirds of smaller companies and all larger companies. I believe that some of those companies are having second thoughts about those intentions now that year-end is almost here.

The increase in the percentage of companies performing cash-flow testing is paralleled in the increase in months being devoted to cash-flow analysis, as indicated in Table 2. Note that the Southeast does not include many huge multiline companies, so the average effort in the Southeast should be lower than in, say, the Northeast.

TABLE 2

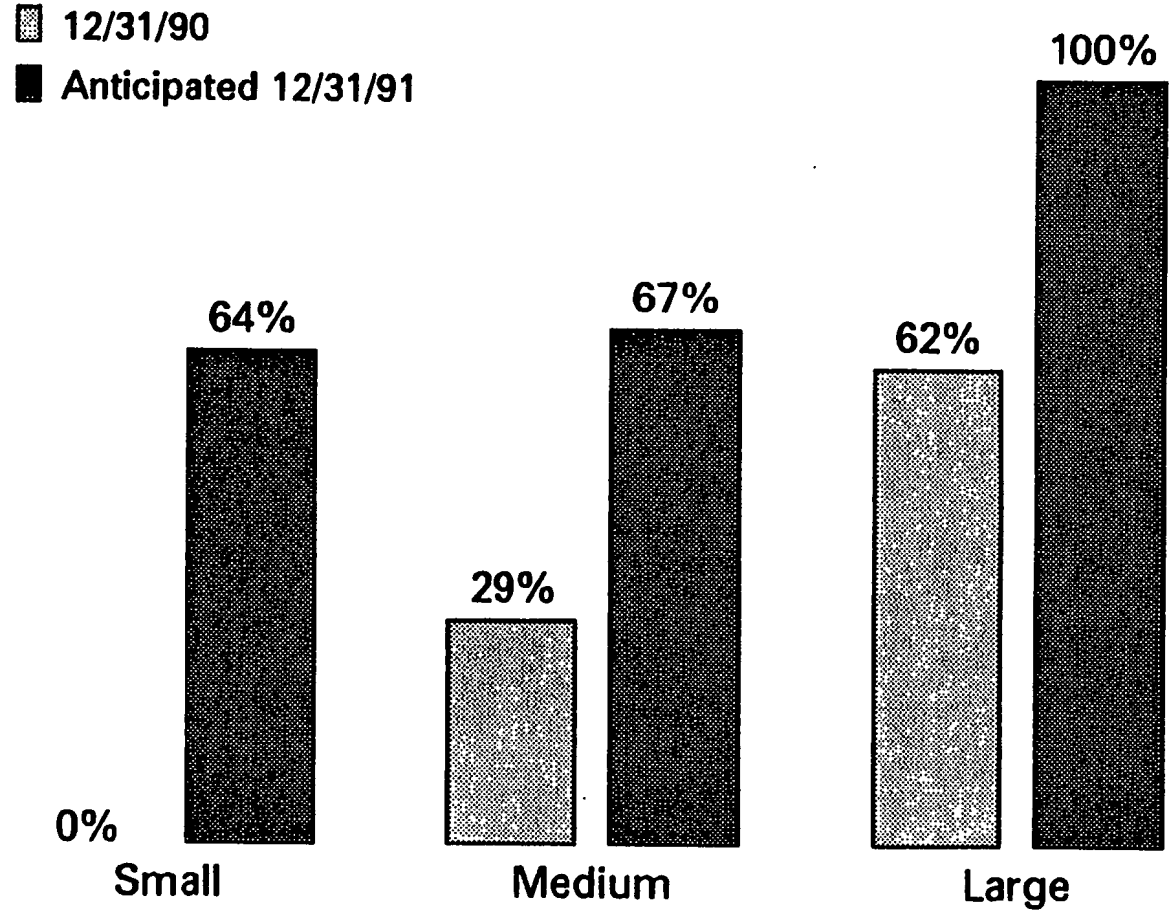
Months Devoted to Cash-Flow Analysis

	1990	1991
0	12	3
1	7	4
2	5	2
3-4	3	4
5-6	2	7
7-18	1	5
19-36	2	2
37+	1	2
Small	1	3
Medium	1	7
Large	12	15
All	5	9

We asked what alternatives companies were using to cash-flow analysis and got a variety of responses. In the October 1991 issue of *The Actuarial Update*, Tony Spano states that

CHART 1

Cash-Flow Testing for Statutory Opinions



alternatives to cash-flow testing would include risk-theory techniques, statistical techniques applied to historical data, and *a priori* arguments.

The 1992 valuation actuary opinion asks for the analyzed method for all reserves, not just those on which cash-flow testing is performed.

What is required for 1991? In the next issue of *The Actuarial Update*, there will be an article by Walt Miller and Jack Turnquist. Walt is the outgoing chairperson of the Actuarial Standards Board (ASB), and Jack is the incoming chairperson. The article addresses two questions:

1. Should disclosure regarding cash-flow testing appear in the actuarial opinion? The ASB recommends that the actuarial opinion for the 1991 statutory statement make full disclosure as to whether cash flow testing was utilized, and, if not, state the reason why not.
2. What are the consequences of not performing cash-flow testing because of a lack of time or resources? A qualified opinion must be rendered, that is, an opinion which states that cash-flow testing was not performed and that the assumption that reserves are supported by valid assets is not confirmed. Sample wording is given in the article.

An important cautionary statement in the article is the following:

> The ASB believes that a qualified opinion relating *only* to time or resource limitations could be insufficient. For example, it would *not* excuse the valuation actuary from the requirement to perform cash-flow testing if he or she reasonably should have known that a significant portion of the company's assets were impaired or that a material disintermediation of assets and liabilities existed.

The next area addressed by the SEAC survey is what constitutes failure of a scenario, and what scenarios must be passed? These results are shown in Table 3.

TABLE 3

Decision on Need for Additional Reserves

Judgment/likelihood	5
Not encountered	3
95% coverage	1
Negative cash flow or surplus, several paths	1
Worst of New York 7	1
Consult with CEO, auditors	1
Not determined	15

Most actuaries have not determined the point at which extra reserves should be set up. This is not surprising, since if no tested scenarios fail, there is no need to determine the point. Of those actuaries who have made a determination, the most common method appears to be using judgment about whether the failed scenario is reasonably likely to occur. My understanding is that this reasoning has been used on a least one occasion by a company to avoid increasing reserves after failing one of the New York Seven scenarios under New York's Regulation 126.

What does it mean to fail a scenario? Is it acceptable to have a projection that shows negative statutory surplus at some intermediate duration, so long as surplus is positive at the end of the projection period? I think it is acceptable, because the statement opinion is an asset adequacy opinion as of the date of the statement, not as of all future dates. But the valuation actuary needs to consider whether the assumptions in the later part of the projection are reasonable. Perhaps future "runs on the bank" need to be considered if intermediate difficulties are projected. One valuation actuary told me he plans to consider the current level of surplus, and whether the intermediate deficits consume a substantial portion of surplus. This might indicate that intermediate deficits are useful for setting target surplus levels, not reserve levels.

How many scenarios are companies testing? Table 4 indicates that many companies are limiting their tests to the seven scenarios specified in the Actuarial Opinion and Memorandum Regulation, also known as the "New York Seven," perhaps with a couple

extra handmade scenarios. Some companies are supplementing these handmade scenarios with stochastic scenarios. Even if you do not believe in a statistical approach to reserve setting (e.g., reserves should cover 95% of future scenarios), stochastic scenarios can be useful for finding scenario patterns that put a company at risk. That way, you do not have to figure out whether an increase in year one, three, or five is the greater danger -- a large enough sample size should cover all reasonable paths.

TABLE 4

Scenarios Tested

	Kind
New York Regulation 126	11
Random-generated	3
Other variations	4
	Number
5	1
7-8	4
7+	6
16	1
40-200	4

NOTE: Very few answers from small companies

A special task force has been created by the Life Committee of the ASB to develop a new standard that will address the actuary's responsibilities under the new Standard Valuation Law. Obviously, the standard will not be available this year-end, but should be available in 1992. I hope this standard will address these issues. A hint of what we might expect was in the September 1991 issue of *The Actuarial Update*, which had an article about a new actuarial standard for setting economic assumptions. Let me read three statements from that article:

1. "The standard discusses economic assumptions such as inflation, investment return, salary increases, and government indexes. The assumptions should be selected in a consistent manner. For example, the same underlying inflation rate should be used for both the interest and salary assumptions."

2. "The standard stresses that while past experience is important, greater emphasis should be placed on the long-term expectations."
3. "One thing the standard does not attempt to do is set a defined range for what is to be considered reasonable. The committee discussed the issue. It decided that any attempt to define a range of reasonableness could divert the practitioner from going through an analytical process in setting the assumptions, something the committee considers very important. Setting a defined range could also lead to abuses if the range were simply used as a safe harbor."

As a final note, I detect very little enthusiasm among valuation actuaries to test economic scenarios other than interest rates, probably because there is so little guidance on how to create such scenarios. Since recent company problems were caused by scenarios other than interest-rate swings, it will be interesting to see what guidance the ASB provides in this area.

Regarding asset projections (Table 5), there is a substantial amount of responsibility being delegated to the investment actuary or department on setting assumptions, although the poor valuation actuary has to do all the projection work. On liability projections, the two big issues continue to be what assumptions to use for competitor rate and for excess lapses.

TABLE 5

Asset Projections

	Set Assumptions	Performance Projections
Investment actuary or department	8	3
Valuation actuary	3	18
Both	10	2
Other*	3	1

* Accounting, pricing actuary, management, consultant

Finally, it was interesting to note (Table 6) the large increase of the companies planning to use cash-flow testing in pricing next year. Since ASP No. 14 covers pricing as well as reserve setting, this is not surprising.

TABLE 6

Uses Other Than Reserve Testing

	Now	Next Year
None	22	9
Pricing	8	15
Investment strategy	3	4
Target surplus	2	3
Financial projections	2	2
Fund estimates	1	1

MR. WILLIAM T. BRYAN: SAFECO Life Insurance Company is licensed in all states but New York. Therefore, we have not been subject to Regulation 126. While the new Standard Valuation Law and regulation regarding cash-flow testing are not mandatory until year-end 1992, we plan on following them in our reserve certification work for year-end 1991.

I will first talk about our assets, then our liabilities, then our cash-flow-testing work. While few of our companies have a truly unique product or asset, the combination of product mix, assets and management strategies are one-of-a-kind. It's like, if you give two kids identical sets of blocks, the structures they build will surely be unique.

SAFECO currently has $6 billion in assets. At year-end, we ranked as follows among all U.S. life insurers (Table 7).

TABLE 7

Category		Rank
Assets		56
Net Investment Income		47
Premium:	Total	49
	Individual Life	166
	Annuity	35
	Group	42
In force:	Individual Life	160
	Group Life	37

We hold the following ratings from reputable rating agencies:

A.M. Best	A+
Moody's	Aa2
Standard & Poor's	AA

Our assets consist mainly of bonds. At midyear, they accounted for 87% of our total assets. Some 93% are investment grade (Table 8).

TABLE 8

Summary of SAFECO Life Asset Portfolio
Statutory Values as of 6-30-91

	Book Value ($ Millions)
Bonds	$5,086
Stocks	
Preferred Stock	19
Common Stock	49
Mortgages	455
Real Estate	4
Other Invested Assets	83
Other Assets	148
TOTAL	$5,843

The common stock is mainly seed money for life insurance and investment subsidiaries.

Our mortgages are essentially all commercial mortgages. We use recourse lending on virtually all of them. Rather than being backed just by the property, the entrepreneur/developer is personally guaranteeing the loan. This plays a big role in our 99.5% nondelinquency rate. A predominance of west coast properties also helps.

Of our bond portfolio, mortgage-related bonds make up 36% of the total, with the majority being collateralized mortgage obligations (CMOs). Government Bonds make up 8% of the total. Corporate bonds comprise 53% of the total, with utilities being heavily represented (Table 9).

TABLE 9
Bond Distribution by Industry

Based on Statutory Values
As of 6/30/91

	% of Statement Value
Revenue/Municipal Bonds	3.0
Mortgage-Related Bonds:	
Pass-Through's	6.6
CMOs	26.3
Other	2.9
Total Mortgage-Related Bonds:	35.8
U.S. Government	5.2
Other Governments	2.6
Corporate Bonds:	
Transportation	4.0
Utilities	23.6
Banks, Insurance, Financial	7.7
Oil and Coal-Related	2.2
Other Corporations	15.9
Total Corporate Bonds:	53.4
Total	100.0

We maintain our own asset database in the corporate actuarial department. It's used to provide most of the investment information for the company. For the past year, we have had one FSA, three students and a clerk who devote 100% of their time to asset and investment analysis. We have our own Bloomberg terminal that we use to update call and prepayment information.

Invested assets are growing at $1 billion a year. It's a lot of work keeping up with the changes.

The company is broken into three main product-line areas: group (life and health), pension (all tax qualified), and individual life and annuities

The group area sells group life, medical and long-term-disability (LTD) coverage. While we have $20 million in LTD claim reserves, our main concern is near-term liquidity. The main risk is the C-2 pricing risk. In the pension area, we market GICs, IRAs, tax-sheltered annuities (TSAs) and corporate deposit administration plans. Here are the fund values in millions as of 6/30/91:

GICs	$ 450
IRAs	620
TSAs {403(b), 501(c)3}	1,000
Corporate Deposit Administration {401(a)}	300

We sell only bullet GICs; none of them have windows where funds can be withdrawn penalty free. On 90% of the GICs, withdrawals are allowed only for bankruptcy, plan termination or death benefits. They also have a one-way market value adjustment which protects us when interest rates rise.

The other three products have surrender charges, but allow 10% free withdrawals each year.

The TSAs are subject to a five-year payout (to counter a run on the bank) while the corporate deposit administration plans also have a one-way market value adjustment feature. These provisions certainly impact lapse rates, but they are difficult to incorporate into the interest-sensitive lapse formulas.

The individual life and annuity department also has four main products:

Name	6/30/91 Statutory Reserve ($Millions)
Structured Settlement Annuities (SSAs)	$2,400
SPDA (Nonqualified)	300
Universal Life	115
Traditional Life	100

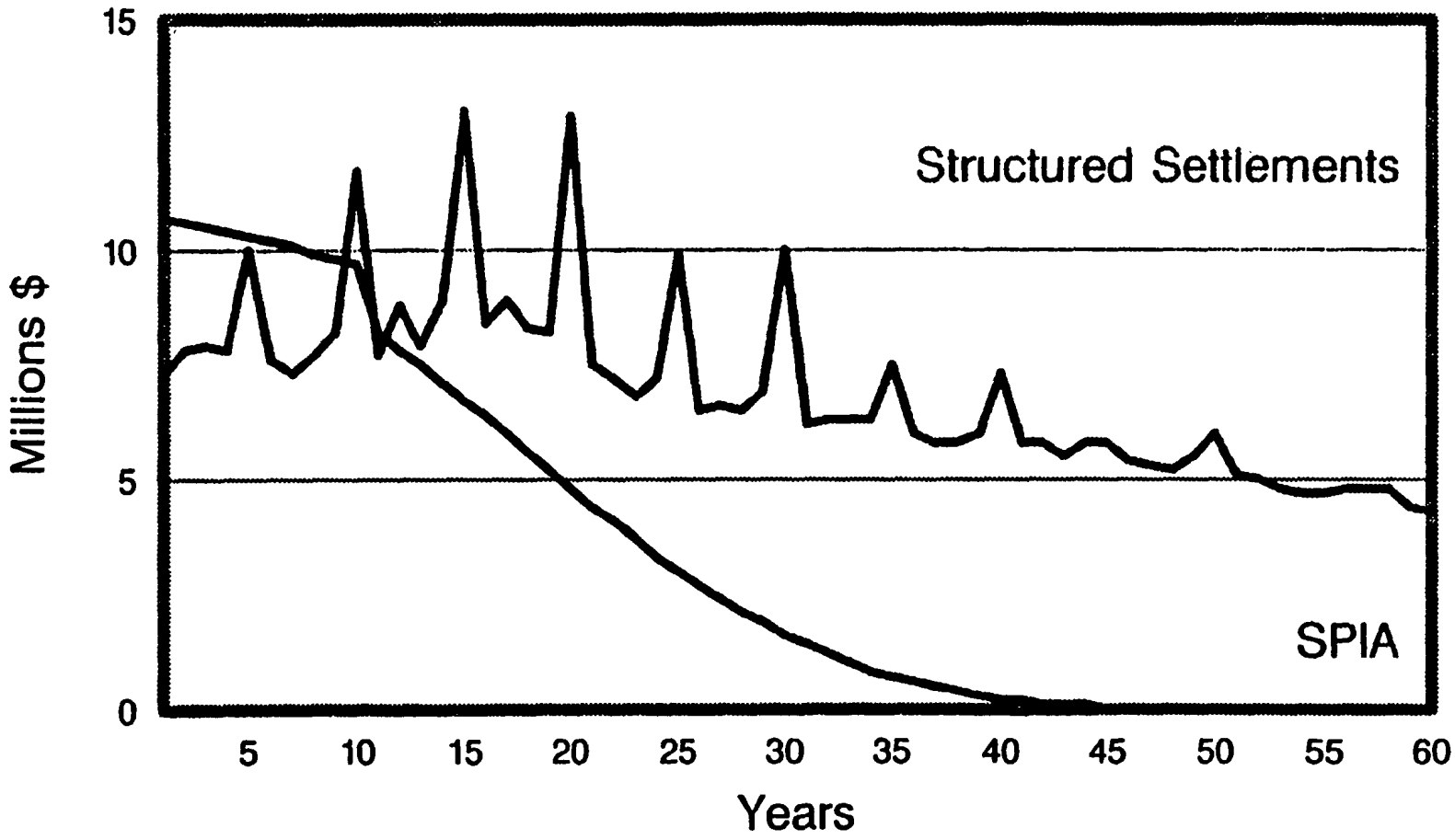
Part of our uniqueness is the relative amount of structured settlements and life insurance. In a typical company, life insurance reserves dwarf immediate annuity reserves. SSAs persist much longer than retirement annuities. Chart 2 compares their annual benefit payments for the same initial premium. As you can see, the SSA keeps going, and going, and going. One feature we like is that the SSA cannot be surrendered. The challenge SSAs present is a reinvestment risk. If only we could purchase 80-year mortgages that wouldn't be refinanced!

We've only recently ventured into the nonqualified SPDA marketplace because of concerns about the disintermediation risk. We market SPDAs exclusively through a small number of banking institutions. With a five-year surrender charge, they provide an alternative to a five-year certificate of deposit. Since the first ones were sold in 1987, it will be interesting to see how well they persist beyond the fifth year.

We have close to $100 million each of universal life and traditional individual life reserves. They are a fairly vanilla lot.

CHART 2

Projected Benefit Payments
One Year's Sales for 60 Years



In 1982, to better manage the various products, we segmented our assets. We now have six main portfolios. They are shown in Table 10 along with the products that they support.

TABLE 10

	Portfolio Size ($Millions)
Pension: GICs, IRAs, TSAs, Corporate Plans	$2,400
Annuity: SSAs	2,300
SPDA: Nonqualified SPDA	300
Universal Life:	115
Regular: Group, Traditional Life, Miscellaneous	210
Surplus	510

The pension product line has its own portfolio. The group line is part of the regular portfolio, which it shares with traditional life. The individual products are spread among four portfolios. The asset portfolios and the products they support operate like separate companies. Premiums and deposits go into the appropriate portfolio to be invested; benefits and expenses are deducted. Each year's GAAP profit is transferred to surplus. The investment department invests the positive cash flows according to the yield, duration, quality and liquidity guidelines for each portfolio.

Our ongoing, daily management of assets and liabilities focuses on cash flows, not duration and convexity. Near-term asset and liability cash flows are projected. Imbalances are communicated to the people running the product lines and investment department, who take appropriate action.

With this background on our products and our asset portfolios, I'll now talk about interest-sensitive cash-flow testing.

Under our current method, we develop the liability cash flows on one system and transfer the results (as cash outflows) to an asset projection system, using consistent interest scenarios in both systems.

The product-line actuaries are responsible for providing the liability model. In some cases, we use the same software for FAS 97 work, which cuts down on duplication of effort.

We do our testing at the portfolio level and then aggregate the results. To determine the starting point, assets are added or removed from the portfolio to ensure that the starting asset book value equals the current statutory reserve for the products in the portfolio. Starting assets will be overstated if accrued investment income is not taken into account. We allocate it proportionally among the portfolios.

CMOs comprise close to 25% of our assets. Since they are backed by various home mortgages, CMO cash flows move inversely to interest-rate levels. As rates fall, folks refinance and the investors receive a surge of CMO payments sooner than expected that must be reinvested in a low-interest environment. When interest rates rise, the prepayments slow down. You'd like extra cash to reinvest, but no one refinances. Suffice it to say, with CMOS, since most are triple-A in quality, the question has not been, if you'll get the money, but when.

Modeling how the various CMO payments will shift under various interest scenarios is quite complex. To properly model these, knowledge of the underlying mortgages is essential. Extensive CMO databases and analysis software are becoming available at affordable prices. We hope to eventually tie it in directly to our asset analysis system. We have also considered having an outside source model them for us. Besides being used for current analysis, it would serve as test data for CMO modeling software we might purchase or develop in the future.

As stated earlier, we do our analysis at the portfolio level. Because of their large relative size (they comprise almost 90% of our statutory reserves), we've focused most of our efforts on the SSA and pension products.

Structured Settlements -- If all this cash-flow modeling has got you down, try specializing in SSA liability projections. Once a mortality assumption is made, all future benefit payments can be determined. Since surrenders are not allowed, the liabilities are not affected by the interest-rate environment. In short, the liability cash flows are a breeze.

Assuming that they are properly priced and that asset quality is maintained, the primary risk is the reinvestment risk. Liability cash flows persist well past 40 years. If future interest rates drop far enough, reinvested cash flows will not provide an adequate yield, and surplus would have to come to the rescue.

Pension -- The products in our pension portfolio are modeled two different ways. We treat the GICs as essentially fixed. On over 90% of them, withdrawals are severely limited. With a market value adjustment to boot, the risk is primarily on the asset side; will the cash be there when needed? The balance of the pension liabilities are modeled on the same system we use for FAS 97 work.

The primary concern in the pension line is the rising interest-rate scenarios. As mentioned earlier, we have used product design to minimize our disintermediation exposure. This is the opposite of the structured settlement situation. As long as cash flow is positive, rising interest rates are welcomed there. We believe these two lines provide a healthy balance to each other in terms of combination of risks.

What we compare are benefit payments, expenses and taxes versus investment cash flow. On the asset side, our focus is on cash, not on investment income. Renewal premiums for pension and annuity products are assumed to be zero. We do not want to depend on future premium to cover a run on the bank. If this causes us to fail a particular scenario, we can rerun it with renewal premium to see its impact.

The only comment I have for the universal life plans is that we include the renewal premiums.

We will also test the traditional life and group products. The benefit cash flows aren't sensitive to interest rates, but we want to ensure that the assets backing them will spin off cash as needed.

Once all the lines have been modeled, we will aggregate the results. Positive cash flows resulting from the short-term products will be available to help on the long-term products.

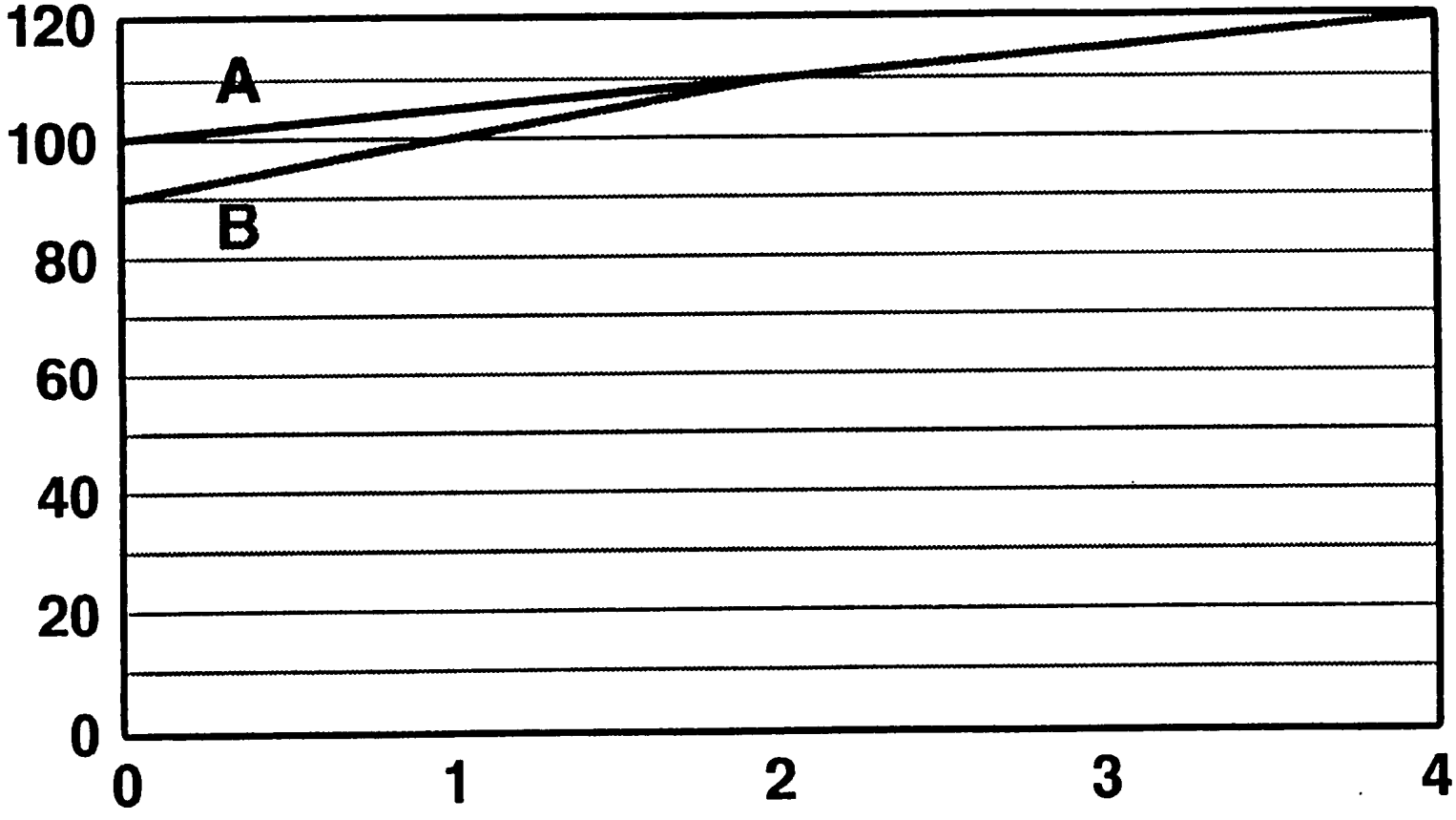
Now, I have some general comments on cash-flow testing. To date, we've only looked at flat yield curves and parallel yield shifts. Nonlevel yield curves will have some effect on the results, but we believe it is minor for these longer-term products. We will eventually incorporate nonlevel yield curves into our studies, but it's not high on our priority list. Critics say we could be blindsided by an inverted yield curve, as people take their money to buy certificates of deposit. Our belief is that qualified money is more stable than nonqualified, and we have a relatively small amount of the latter.

The level of statutory reserves affects the results. Since initial assets equal the starting reserve, a more conservative reserve lets you start with a higher asset level. Aggressive reserves make the tests more difficult to pass. For instance, on the qualified pension business, we hold a reserve equal to the accumulation fund plus excess interest, not the cash-surrender value. Let's compare two companies (Chart 3), A and B, both of which have a closed block of SPDAs with a current fund value of $100 million. The surrender charges are $10 million and run off in two years. Both will post the same reserve in two years (fund value). In the meantime, company A, which holds the fund value for reserves, has an easier time certifying the reserves because it has $10 million more of starting assets than company B, whose starting assets equal the surrender value.

Because of the time pressures involved, the year-end statutory opinion will be largely based on work done in the fourth quarter based on September 30 data. I've heard it said that this work will be very useful for management. For this to be true at SAFECO, at least two adjustments are needed. For reserve testing, after-tax profits are retained in the portfolio.

CHART 3

SPDA Reserves for Two Companies



In actual practice, they are transferred to surplus. For reserve testing, assets are added or removed so the starting value equals the reserve. In actual practice, the portfolio assets are expected to cover the liabilities:

	Reserve Testing	Management Reality
Annual Profits	Stay in Portfolio	Transferred to Surplus
Starting Assets	Equal Reserve	Equal Portfolio Assets

We currently model the assets on a seriatim basis. Run time is forcing us to look at combining assets in order to get the work done in timely fashion. We plan to include MSVR assets only on scenarios that produce poor results. For each interest scenario, we run 10 to 40 Monte Carlo simulations to project calls and defaults. These give us a range of results. Charts 4-6 show the sample output. We consider the test a failure if the average curve doesn't ultimately come up for air and keep breathing. With a failure, the cash flows go negative and never recover. Chart 6 shows an example of that.

Our disinvestment strategy is to borrow money using a one-year loan at current interest rates. We considered modifying the asset program to accommodate sales, but decided against it. Since we plan to discontinue using this asset projection system after this year, we don't want to invest too much time and effort on a dead-end system.

The bulk of the cash-flow-testing work is done in the corporate actuarial department. The product-line actuaries provide most of the liability modeling. The investment traders have helped with specific modeling questions like estimating the residual value on bond defaults, how interest-rate changes affect the various kinds of CMO collateral, ways to predict which bonds will be called, and the probability of receiving cash through sink funds.

In some respects, the valuation actuary requirements are like DEFRA and FAS 97. In 1984, actuaries were forced to revalue tax reserves to comply with DEFRA. It took a lot of time and generated lots of discussion. When FAS 97 was adopted, stock company

CHART 4

Sample Output

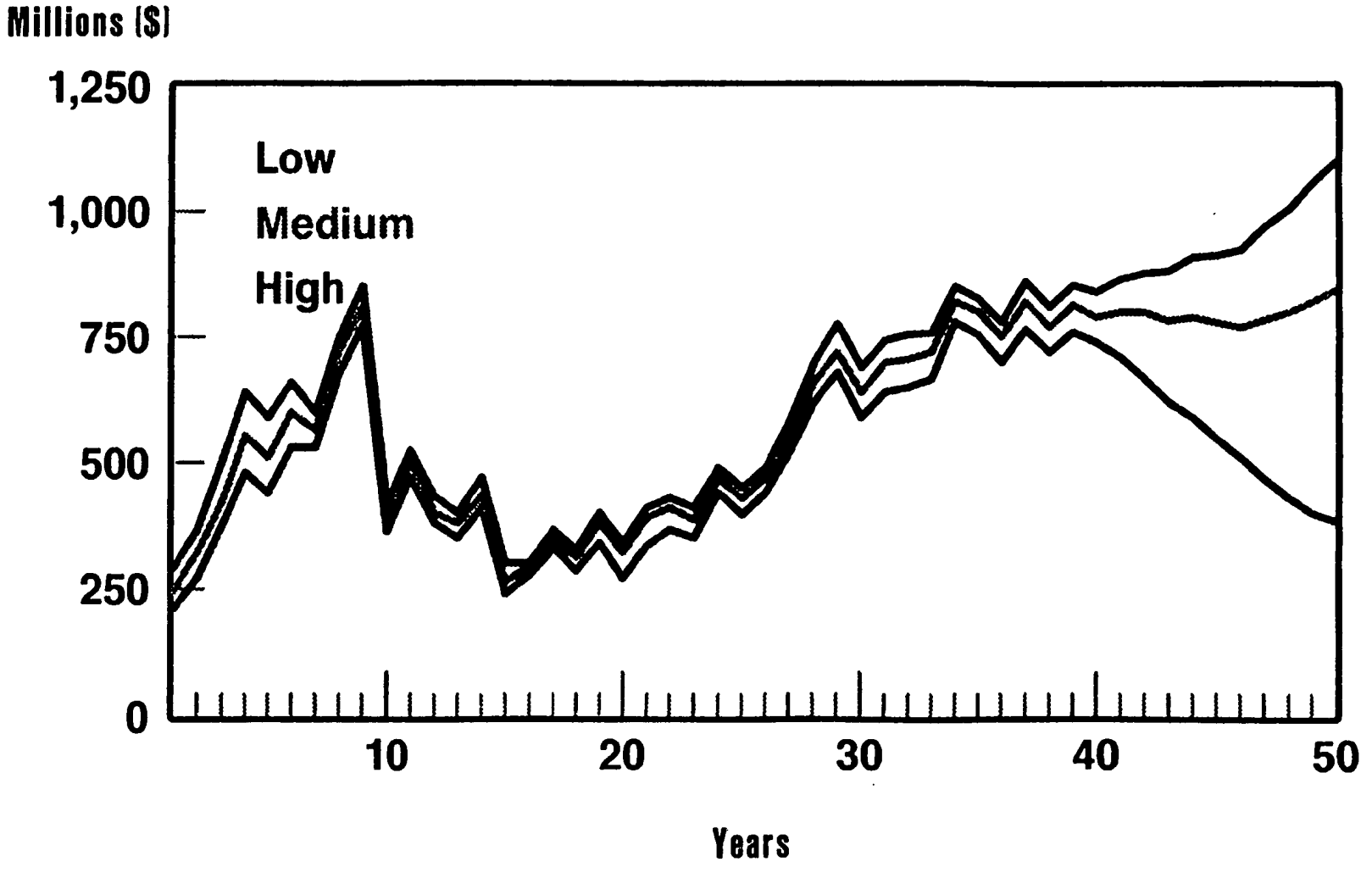


CHART 5

Success

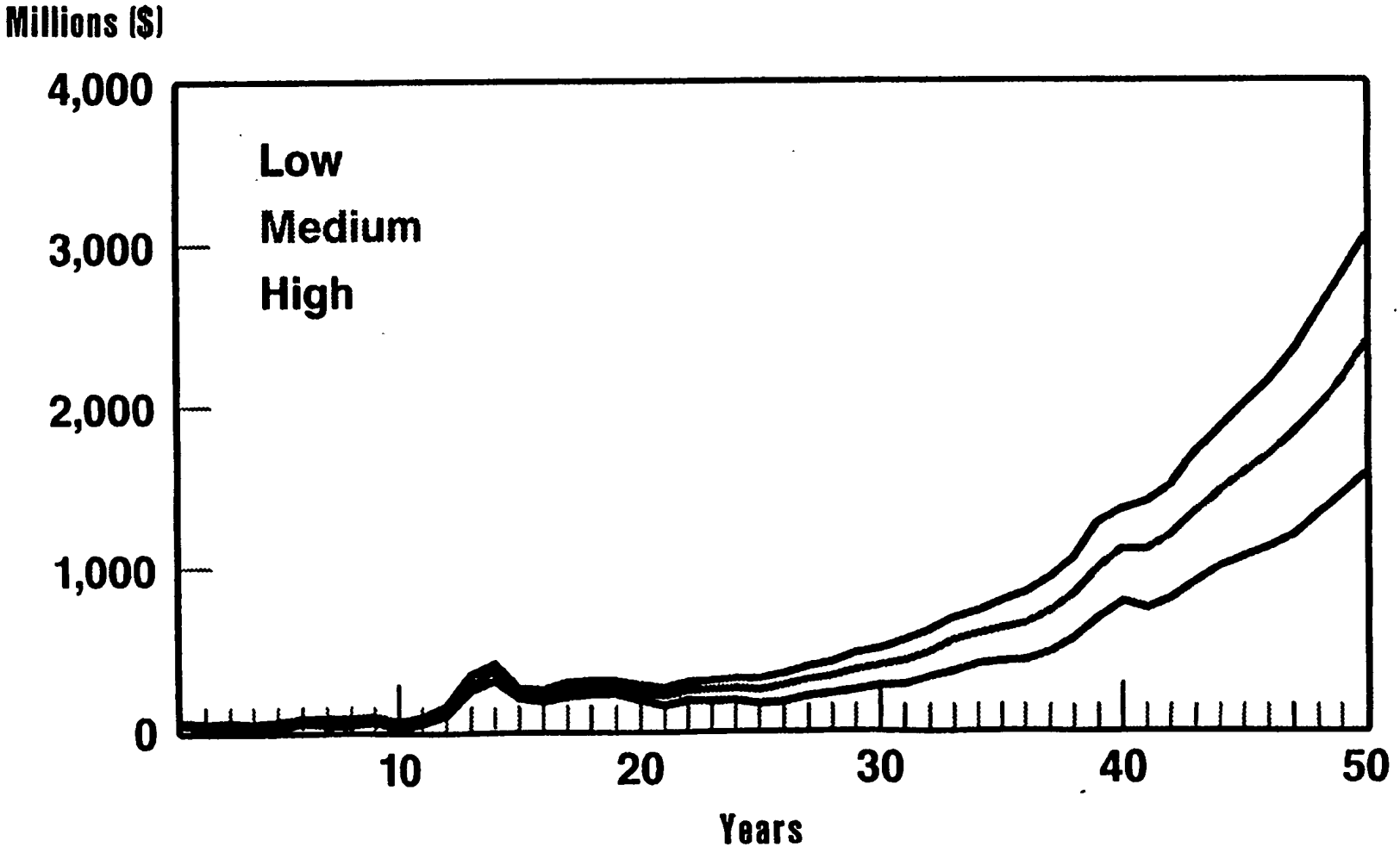
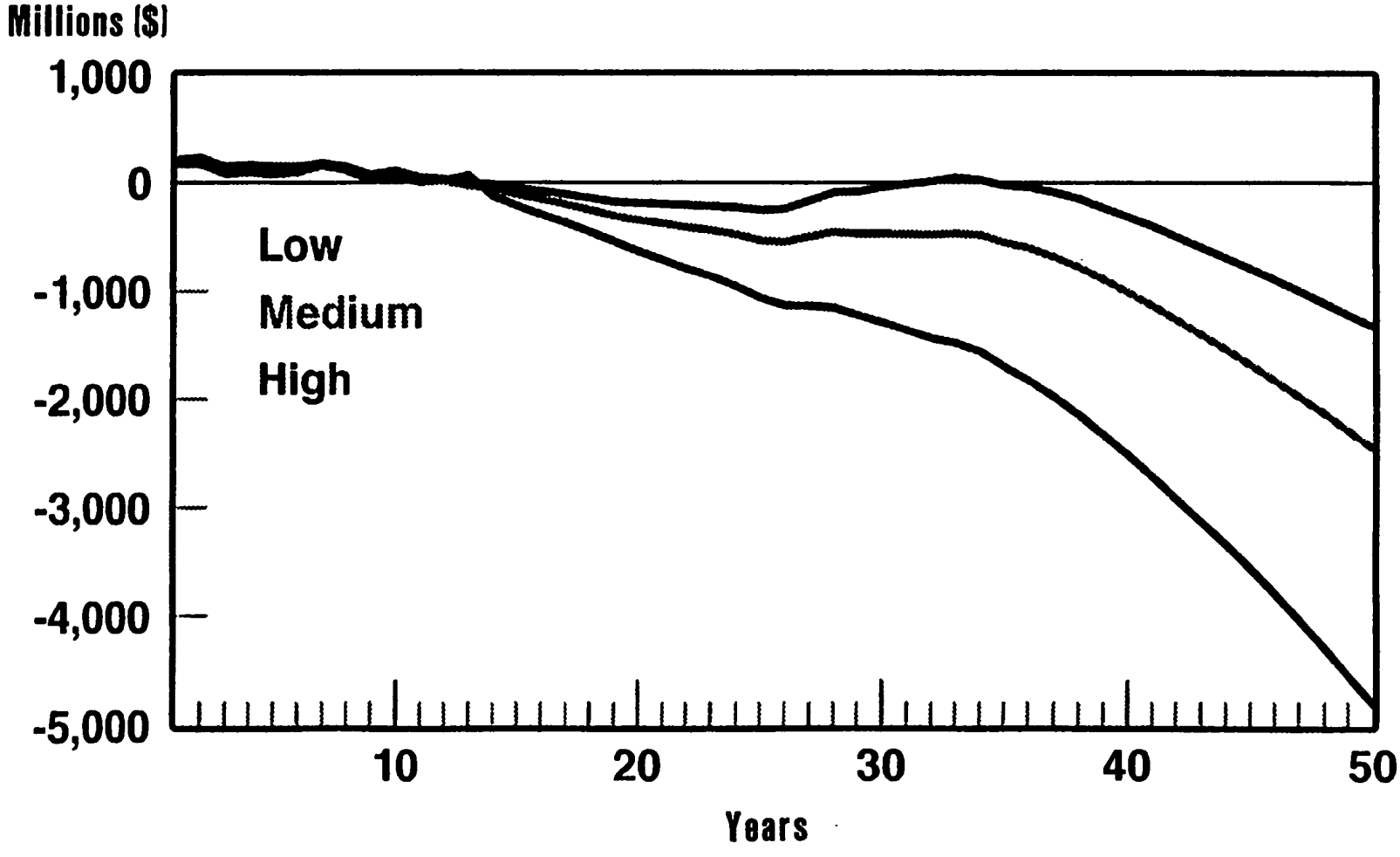


CHART 6

Failure



actuaries were required to modify deferred acquisition cost amortization schedules for many of their products. It was a major effort. While the cash-flow testing is also forced on us, once we've emerged through the dusty details and mechanics, we will have acquired a vital tool in our ongoing efforts to measure and manage risk. And those who look to us for this will be able to do so with added confidence.

MR. STEVEN A. SMITH: I am going to make a few comments on two separate subjects, the SPDA Persistency Study, also known as the Interest-Sensitive Cash-Flow Study, and the Structured Settlement Annuity Mortality Study, which I helped design.

SPDA Persistency Study

The SPDA Persistency Study is a joint research project of both the Life Insurance Marketing and Research Association (LIMRA) and the Society of Actuaries, and is being funded by both organizations. Initially, the Interest-Sensitive Cash-Flow Study has been reduced to a pilot research study of persistency on SPDAs. A fairly large number of companies have contributed data to the study. I am on the Project Oversight Group (POG) for this project, which is the reason that I have the information that I am going to give you at this time.

The very first preliminary results were discussed by the POG and the researchers recently. The results are very preliminary and are in need of significant additional analysis before any numerical results will be released.

However, there was one finding, that there seems to be very high lapses at the end of interest-guarantee periods, that the POG felt was potentially significant enough that some indication should immediately be given to the industry.

That result is that lapses at the end of the interest-rate guarantee, for guarantee periods of other than one year, for example at the end of a three- or a five-year guarantee, may be three to five times what many actuaries may have been using for pricing and/or valuation

assumptions. If you have been assuming 5%, 10% or even 15% for such lapses, you are very likely to find that your experience lapses will be significantly greater than that.

The cause is as yet undetermined. Additional research and analysis is needed before any bonafide conclusions can be reached. The cause may be the end of the interest guarantee or the coterminous end of the interest-rate guarantee and a significant reduction in or elimination of surrender charges. Remember also that this potential finding comes from a study of the results observed in the 1989 contract year that would probably involve a period of declining as opposed to rising interest rates. Age may also be a factor. Further analysis is needed.

Structured Settlement Annuity Mortality Study

About a year ago, the Annuity Mortality Study Committee of the Society of Actuaries was authorized to study the mortality on structured settlement annuities. Roger Harbin of SAFECO and I were added to the committee to help it design the study and review the results.

The dual purposes of study were to determine the adequacy of the 1983*a* mortality table for statutory valuation purposes and to give pricing and valuation actuaries a better idea about what mortality levels are appropriate.

Some 33 companies have contributed data to the study, which covers the period from issue of every policy included in the study to the end of 1989. Each company has already received a mortality study with something like 30 or 40 tables, both for its own data and for industry total data.

No one company and no single calendar year included enough deaths to produce statistically significant results. However, since settlement annuities have no cash-surrender values, we decided that it was feasible to combine study years from a file of all deaths (inception to

date) and a recent in-force file to get a sufficient number of deaths: 815 deaths for standard business and 572 deaths for substandard business.

The study was conducted by the Medical Information Bureau (MIB). Neither Roger Harbin nor I had any access to individual company results. I am informed by Society research staff, however, that while individual companies had wide variations, all individual company ratios below 50% and above 200% were the result of small exposures and deaths.

Now I have a few words about the basic characteristics of settlement annuity business. For standard business, the average issue age is 34.9 on a count basis and 33.2 on an amount basis -- very different from that of regular retirement annuities.

Substandard business has an average actual issue age of 30.0 on a count basis and 25.7 on an amount basis. The average rated age is 50.0 on account basis and 50.8 on an amount basis. The average rate-up is therefore 20.0 on a count basis and 25.1 years on an amount basis.

Before I enumerate a few tentative conclusions of the study, I would first like to caution you that this is a first ever study. The data submission forms were created from scratch and are not the result of many years of refinement. We have discovered and corrected a number of errors, and the data are still being reviewed. Some errors may still be present. Amount data are still suspect as to quality.

Now for tentative conclusions. In the aggregate, the 1983*a* actual/expected mortality ratio is 136%. For standard business therefore, it seems conclusive that the 1983*a* mortality table is conservative. However, self-selection is clearly involved over age 40. The older ages exhibit mortality characteristics that are much more like annuitant than population mortality. No significant difference was observed by year of study or by sex.

For substandard business, the 1983*a* table is probably conservative for statutory purposes. The aggregate 1983*a* actual/expected ratio is 126%. However, contracts rated up more than 20 years have substantially lower actual/expected (A/E) ratios. Similar to the result for standard business, the older ages exhibit mortality characteristics more like annuitant than population mortality.

One other thing that we did in the substandard portion of the study was to calculate actual/expected ratios both on a rated-age basis and on the mortality basis prescribed by NAIC Actuarial Guideline IX-A.

Rated-age actual/expected mortality ratios (1983*a* table) were 126% on a count basis and 127% on an amount basis. By comparison, NAIC Guideline IX-A CED (constant extra deaths) actual/expected ratios were 42% on a count basis and 37% on an amount basis.

My first reaction when I saw these comparative ratios was, there might be a problem with Guideline IX-A reserves. If both rated-age and CED actual/expected ratios were below 100%, then I would feel that industry substandard settlement annuity reserves are too low. They are not. Rated-age mortality ratios are 126%, which implies, as a whole, that the industry has not been too aggressive in establishing rated ages.

These relative actual/expected ratios are probably about as expected, given the nature of the CED reserve method, which is to add a constant to the mortality rate in order to equate life expectancies with those developed during the underwriting process. A 42% ratio does not necessarily imply a CED reserve insufficiency. Reserve adequacy depends on present value of future benefits using future mortality rates.

As was indicated by the papers when Guideline IX-A was developed, CED reserves start lower than but quickly exceed rated-age reserves. It is possible to have a Guideline IX-A CED actual/expected ratio of significantly less than 100% and a reserve that is greater than a rated-age reserve. For example, if a male aged 20 is rated up to age 50, 125% of rated

age mortality is observed and a contract is issued on a 20-year certain and life thereafter basis, which would be a fairly typical case, the 11th-year CED reserve is 101% of the 11th-year, rated-age reserve, while the CED actual/expected ratio will be only 43%.

More analysis is probably needed on this point, however. My personal belief is that, if the industry reserves were all on the Guideline IX-A CED basis, as they must be by 1993, then there would not be much difference from rated-age reserves. Rated-age reserves likely will gradually become insufficient while CED reserves will rapidly become even more conservative.

In summary, I do not believe that there is any significant problem with industry settlement annuity reserves. The 1983*a* table is conservative for both standard and substandard risks. Settlement annuity mortality approaches annuitant mortality at the older ages. Finally, as a whole, the industry has been a bit aggressive on highly rated cases, and hence individual companies have been much too aggressive on highly rated cases.