1994 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS

SESSION 1

Introduction and Overview

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MR. STEVEN A. SMITH: Dwight Bartlett, FSA, MAAA, is insurance commissioner for the Maryland Insurance Administration. He is responsible for regulation of the entire insurance industry in Maryland with premium income at $10 billion annually and, in particular, the solvency regulation of 113 domestic insurers. He is also a former President of the Society of Actuaries, currently is cochairperson of the Life and Health Actuarial Task Force of the NAIC, and is former president of Mutual of America Life Insurance Companies.

Donna Claire is president of Claire Thinking, Inc. She engages in general insurance consulting, with a focus on asset and liability management, corporate modeling, and valuation issues. She has chaired several industry groups related to the valuation actuary concept, including the Practice Notes Task Force. She's a member of the Academy Committee on Life Insurance, and the Committee on Life Insurance Financial Reporting. Donna has offered several papers on cash-flow testing and valuation issues, and has been a frequent speaker at professional meetings, including six previous Valuation Actuary Symposiums.

Our last speaker is Glen Gammill, who is a partner with Coopers & Lybrand in the New York office. His professional experience includes a broad array of advisory services, including designing and implementing accounting conversions from statutory to GAAP, for both mutual and stock companies. He's also provided actuarial accounting services in connection with planning and implementing mutual life insurance company demutualizations, and organizing and conducting merger and acquisition advisory services, such as providing actuarial appraisals and designing and conducting due diligence reviews.

INTRODUCTION AND OVERVIEW
Current Activities of NAIC's Life and Health Actuarial Task Force

MR. DWIGHT K. BARTLETT III: Before reviewing the current activities of the task force, I would like to touch on several other NAIC-related activities of particular concern to me. The first has to do with state insurance department accreditation by the NAIC. This is a process which began three or four years ago to encourage insurance departments to upgrade the quality of their financial audit and examination work of their domestic insurance companies. The threat to states that do not become accredited is that ultimately their financial examinations of their domestic companies might not be accepted by other states, forcing multistate companies into the position of being potentially subject to multiple financial examinations to maintain their licenses to do business in other states.

I am happy to report that Maryland expects to join the 36 other states already accredited as a result of action by the NAIC at its meeting in Minneapolis on September 18, 1994.

The accreditation process has shown its worth as demonstrated by the recent history of the Maryland Insurance Administration. The threat referred to previously was sufficient to persuade the state legislature to substantially increase our budget and make other changes necessary for us to achieve accreditation. That is the upside of the process. The downside is that the legislatures in many states are becoming increasingly restive at what they see as attempts to blackmail them to adopt insurance-related legislation that in some cases is only vaguely related to the ability of state insurance departments to competently supervise the financial condition of its domestic insurance industry. This is a matter that will receive considerable discussion in the NAIC in coming months, I am sure.

The second matter has to do with the concerns I have expressed since I became Maryland's insurance commissioner with respect to the sufficiency of the state-based guaranty association system for life insurance companies to protect the policyholders of financially impaired companies. I have been very vocal in expressing concern that the

rehabilitation plans for Executive Life and Mutual Benefit Life demonstrate vividly the inadequacy of the present system. I have been trying to generate discussion of this subject in the actuarial profession in a variety of ways, for example, the article I wrote, which was published in the January/February 1994 issue of *Contingencies*. I have been disappointed at the lack of response to my attempts. I encourage anyone who is interested in the subject to review my article and join the debate.

But what you want to hear about I am sure is the status of a variety of projects that are on the agenda for the NAIC's Life and Health Actuarial Task Force. I first joined the task force and became its cochairperson at the beginning of 1994. I was given this responsibility because of concerns by the NAIC's leadership about the slowness of progress in its view on some of these projects, particularly the revisions of the standard nonforfeiture laws for life insurance and annuity policies. Substantial progress has been made on both of these this year, and I believe its reasonable to assume that our work will be completed no later than the December 1994 NAIC meeting in New Orleans.

There are a lot of technical issues involved in both of these revisions that time does not permit me to review in detail. Let me merely touch on several broad public policy issues that have surfaced as a result of the proposed revisions.

The proposal for fund-based life insurance polices such as universal life links gross premiums with cash values in a way that does not exist for traditional forms of life insurance. For fund-based policies the minimum cash value is the gross premium accumulated at a minimum interest rate specified in the law less mortality and expense charges subject to maximums specified in the law and less the unamortized portion of maximum surrender charges. The implication of this is that, when a company decides to increase its gross premiums for these types of policies, it will cause necessarily an increase in the minimum cash surrender benefits for the policy. That is not true for traditional types of policies.

Some representatives of the insurance industry have argued that this creates an unlevel playing field between the two types of policies and in effect creates an inappropriate form of rate regulation. It does appear, however, that the task force will not accept this argument as valid and will proceed along the current lines in its final recommendations.

Another area that has generated some controversy is the question whether policies should be permitted that allow for the adjustment of the policy's cash surrender value at the time of cash surrender or the change in the interest rate environment since the policy was issued. In earlier drafts of the proposal, it was contemplated that companies would be able to issue policies with a market value adjustment feature, but at the task force's most recent meeting in summer 1994, it did vote to eliminate the authority. I do expect, however, this question will be revisited before our recommendations are finalized later this year.

With respect to the revision of the standard nonforfeiture law for annuity policies, there has been one overriding issue the consideration of which has consumed a great deal of the time of the task force. This concerns whether companies should be permitted to issue so-called two-tiered annuity policies without restriction. Two-tiered annuity policies are policies where the policy's cash surrender value at any point in time is considerably less than the policy's current fund value available for annuitization. One insurance company in particular has argued that there should be no limitations or at worst very broad limitations on the differential between the two values. This company argues that permitting substantial differentials will permit it to be more aggressive in its investment policy without incurring unacceptable disintermediation risk, thus benefiting those policyholders who ultimately will annuitize their policies. Some members of the task force believe, however, that the differentials should be constrained, perhaps even to the point of requiring that the two values be identical at the contemplated maturity date of the policy. As a compromise, the task force has been contemplating limiting the differential to a maximum of 10% of the account value.

Again this matter will receive, I am sure, considerable discussion both in Minneapolis and later meetings of the task force before the task force work is complete.

The task force has several other current projects it hopes to complete by the end of the year. This includes regulation XXX, which would revise the select period factors for the life valuation mortality table in order to reduce the deficiency reserves that typically are generated by the present factors. It would also clarify how the standard valuation law applies to policies that have durational gross premium rate increases. In effect such policies would be required to hold the larger of reserves generated by treating the policy as a single policy over its contemplated lifetime or those created by treating each premium level segment as a separate policy.

Another project nearing completion is the proposed GGG regulation, which would clarify the application of the commissioner's annuity reserve valuation method (CARVM) to annuity contracts with multiple streams of benefits. This proposal would require such policies to be valued in a fashion such that each type of benefit stream would be considered separately, and the largest reserve produced by the separate valuations would be the minimum reserve.

Last are proposed revisions to the regulation on the valuation actuary's opinion and memorandum. The proposal would require the valuation actuary to provide a considerably greater level of detail in the memorandum than is currently required. The proposal was exposed as a result of task force work early in the summer of 1994 and has generated a substantial amount of commentary, mainly objecting to the proposed level of detail required. Again we expect to complete our work on this model regulation by the end of 1994.

MS. DONNA R. CLAIRE: I get to speak a few minutes on practice notes and other topics. I think the main reason I get invited to speak at the symposium is to give all of you an early look at this year's practice notes.

The August draft of the 1994 life practice notes will certainly be updated. I have already received some changes from Larry Gorski and others. For 1994, there are no changes to the health practice notes. Both sets of notes can be obtained by calling the American Academy of Actuaries.

One change in the practice notes for 1994 is that the Society of Actuaries is becoming involved. Eventually it may take over the entire process. For 1994, the life practice area people of the SOA are acting as official reviewers.

There are two new practice notes: one on expenses and the other on general modeling issues. Warning: these are the notes that will probably change the most. To make your lives a lot easier, the 1994 changes to the existing practice notes are underlined.

One of the notes I would like to bring your attention to is note number 3 on reliance. This has not changed much from 1993. However, it does detail some changes to the annual statement blank, which is effective for 1994. These changes have to do with what part of the statements the auditors must sign off on, and the valuation actuary must reconcile to. This may involve additional work for valuation actuaries, so please read.

Some of the new additions to the practice notes have to do with actual and proposed changes to various state regulations regarding the valuation actuary. For example, the list of items that certain regulators would like to see in the executive summary has been expanded (see Life Practice Note Number 1). To the extent possible, I have also incorporated the proposed new New York state requirements. Other comments have been

added due to questions I or other members of the Practice Notes Task Force have been asked, so keep those cards and letters coming. I have also done a number of peer reviews in the past year, and have come across certain questions or problem areas several times, so I have added some of this information to the practice notes.

The practice notes will also be available on Actuaries Online, the CompuServe service. Any comments or additional areas of research one makes on the network will eventually get back to me.

Miscellaneous Topics

One of the miscellaneous topics I get to cover is the proposed revisions to the annuity reserve law. There is a technical resource group, which is an industry advisory group of which I am a member, which is currently working on this. One of the interesting ideas that have developed is to base the valuation rates off the entire Treasury yield curve, with shorter-duration products such as single premium deferred annuities (SPDAs) being based on shorter-duration assets, and longer-duration products such as structured settlements being based on longer-duration Treasuries. In addition, the group is developing what is called the "greatest present value of maturity value" concept -- for an SPDA, for example, it would mean that one would reserve for the assumption that 100% of the people mature the product; in addition one would look at other policy benefits, such as a disability or nursing home care benefit, and apply probabilities to their occurrence in determining the minimum level of reserves. The work of this group is on a slow track, waiting for the revisions to the annuity nonforfeiture law to be completed, so I do not expect any changes in the near future on annuity reserving.

I have a few updates regarding New York. New York has passed the revised valuation law, and will have revised regulations out by the end of 1994. New York is requesting both the executive summary and the actuarial memorandum from all companies doing business in the state. The New York regulation contains many more details than the model regulation, so it is certainly recommended that one obtain a copy of the regulation

and read it as soon as possible. New York also has Regulation 147 on nonlevel premium plans. This is comparable to, although not exactly the same as, the regulation that will replace Actuarial Guideline 4 (fondly known as Guideline XXX). This is also necessary reading for those companies doing business in New York.

There's one last miscellaneous topic. Regulators have seen some plans that have showed some creative uses and methods of reinsurance and were not necessarily happy with some of these. They are working on revisions to the model reinsurance regulation. The Actuarial Standards Board has also agreed to revise Actuarial Standard of Opinion Number 11 (on reinsurance). These will probably be 1995 developments.

In light of these, maybe I will be invited back next year to give you the further updates.

INTRODUCTION AND OVERVIEW

MR. GLEN M. GAMMILL: First, I'd like to review with you what GAAP is. One way to do that is through a review of the hierarchy of GAAP, the body of information that embodies GAAP. Of course, number one on our list are Statements of Financial Accounting Standards (SFASs).

Also, there are Interpretations of the FASB, called FINs. One of the FINs that some of you would be aware of, particularly mutual company representatives, is FIN 40, which generally states that you have to comply with all GAAP literature in order to get a clean audit report on a GAAP basis.

Then there are the old Accounting Practices Bulletin (APB) opinions. For example, APB No. 16 deals with purchase GAAP. And APB No. 11 for years was the deferred tax bible. Now APB No. 16 is being replaced by this Emerging Issues Task Force (EITF) 92-9 in connection with life insurance transactions. Also, we have the AICPA's Research Bulletins or ARBs.

Another level of GAAP authority would be FASB technical bulletins and AICPA industry audit guides. One particular audit guide was entitled "Audits of Stock Life Insurance Companies." That guide was issued December 1972 and is applied to stock life insurers only. Eventually, the guide was replaced by *SFAS 60.*

We also have statements of position (SOPs) issued by the AICPA. A recent SOP relates to participating individual life insurance issued by mutual life insurers.

The FASB also has an EITF, and we'll later see that this task force has become very important in terms of influencing accounting principles. EITF 92-9, referred to earlier, is the task force document that addresses purchase GAAP for the life insurance industry. EITF 92-9 interprets APB No. 16 as it relates to the industry. The AICPA practice bulletins parallel the timeliness of society practice notes. I recall the Practice Bulletin

No. 8 dealing with implementation issues on *SFAS 97* came out roughly a year after all the *SFAS 97* conversions had taken place.

The AICPA also has accounting interpretations and FASB has 11 documents called Q&As. Also, industry practices are very important.

Finally, there's other accounting literature. And when I think of other accounting literature, I'm reminded of an AICPA Accounting Research Study (No. 7) that I read when I was studying for the CPA exam years ago, called *An Inventory of Generally Accepted Accounting Principles* by Paul Grady. That book presented an inventory of all the accounting principles that had really been accumulated from inception to around 1970. It was one of my favorite sources of accounting knowledge.

The volume of principles that support GAAP is incredibly large. GAAP is also influenced by the pronouncements of other professional associations and regulatory agencies, AICPA technical practice aids, accounting text books, hard books, articles, and the like. And, of course, the Society, through the American Academy, would also influence GAAP. GAAP is basically transaction based, for example, product lines of business drive transactions. Practice is using methodologies and assumptions to relate the principles to the transaction. So practice is very important in GAAP.

Now, let's focus on authoritative GAAP versus GAAP in practice. First, consider the number of professionals that influence GAAP. There's the AICPA. Consider that there are more CPAs in Texas than there are actuaries in the world, then compare the FASB and the AICPA headquarters with the Actuarial Standards Board and the American Academy headquarters. I didn't know where the SEC, in terms of number of professionals, stood relative to FASB. But my guess is, if they have a big building in Washington DC, there must be a lot of accountants there as well. Another way to look at GAAP influence is the "clout scale." Of course, the SEC is way up there on the clout

scale regarding GAAP. While FASB can make pronouncements in the U.S. on GAAP principles, it's really the SEC that can set and redirect FASB's agenda rather quickly.

Whenever the SEC doesn't choose to, and FASB doesn't care to, the AICPA can issue SOPs, such as the new SOP for participating individual life.

Finally, there are the actuaries. In terms of the bottom line, many times their clout goes unnoticed.

Today, many believe that GAAP credibility is on the line. SFAS 115 concerns the fair value of fixed-income securities, of which many of your companies have a whole bunch, and the deferred acquisition cost (DAC) "what if" calculation related to recalculating amortization "if" all unrealized investment gains/losses were currently realized.

Carried to an extreme, one could envision an accounting model in which every asset and every liability had two values. The second value would be the value reported on the balance sheet and would result in credits or charges directly to equity. The first value would affect audits or charges to the income statement.

The fact that the SEC, through vehicles like the EITF, can influence and redirect the evolution of accounting principles means we're treading in dangerous waters.

MR. WILLIS B. HOWARD, JR.: I'm with the National Organization of Life and Health Insurance Guarantee Associations (NOLHGA). I'd like to respond briefly to my honorable friend, Commissioner Bartlett. Dwight, the guarantee association system works, and it works well. In the example of Kentucky Central Life, with over 350,000 policyholders, over 90% of those are fully covered by the guarantee association limits. The difficulty is not with the guarantee association system, but with the political pressure on the domiciliary commissioner to exhaust every possibility of rehabilitation prior to triggering the guarantee associations. Once triggered, the guarantee associations move expeditiously to satisfy their statutory obligations of providing continuation coverage.

MR. BARTLETT: Are you going to tell me, Bill, in all honesty that you really believe that the policyholders of Executive Life and Mutual Benefit Life have been well-served? For example, with Mutual Benefit, if you opted out of that rehabilitation plan you get, as I recall, 55 cents on the dollar of your account value. If you opt into the plan, you agreed to subject yourself to a moratorium period, which means you do not get full access to the cash values of your policy until the next century. Are you going to say that's meaningful coverage for those policyholders? I think that's ridiculous.

MR. HOWARD: The guarantee association limits for policyholders covered does provide adequate coverage. You cited a situation where there were a number of policyholders who did not have the benefit of guarantee association coverage. The policies were not covered, or a number of states did not provide coverage for that particular insolvency.

MR. BARTLETT: Yes, but if you opted out of the plan, you don't have coverage under the guarantee association. If you opt into the plan, even if you have coverage, you still subject yourself to a moratorium period, which if you have opted in, if you would cash surrender the policy in the first year, for example. Again you get only something like 55 or 60% of the cash surrender value.

MR. HOWARD: Yes, there are limitations in any system. But I think the system we have works and works well despite the very real strain that a huge insolvency such as Mutual Benefit does put on the system. I would certainly grant you that point.

LIFE PRACTICE NOTES
December 1994

TO: Members of the American Academy of Actuaries and Other Interested Parties
FROM: Life Practice Notes Work Group
SUBJ: 1994 Practice Notes for Life and Health Insurance Appointed Actuaries in the United States

Enclosed are the following Life Practice Notes for 1994:

Practice Note	Title
1994-1	General Considerations
1994-2	Procedures to Follow in Accepting or Resigning the Position of Appointed Actuary for Life or Health Insurers in the United States
1994-3	Reliance upon Third Parties
1994-4	Interest Rate Models
1994-5	Use of the AVR/IMR in Cash Flow Testing
1994-6	Modeling Bond Default Risk
1994-7	Modeling Mortgage and Real Estate C-1 Risk
1994-8	Collateralized Mortgage Obligations
1994-9	Alternative Methods of Testing for Obligation Risk
1994-10	Special Issues for Valuing Single Premium Group Annuity Contracts
1994-11	Special Issues Involving Structured Settlements
1994-12	Notification of Reserve Misstatement
1994-13	Expenses
1994-14	Report Preparation

LIFE PRACTICE NOTES
December 1994

The members of the work group responsible for this set of life practice notes are as follows:

Donna R. Claire, chairperson

Arnold A. Dicke
Douglas C. Doll
Craig F. Likkel
Linn K. Richardson
Henry W. Siegel
Steven A. Smith
Stephen J. Strommen
Charles N. Vest
Michael L. Zurcher

Comments are welcome as to the appropriateness of the practice notes, desirability of annual updating, validity of substantive disagreements, etc. Comments should be sent to Donna Claire at her Directory address.

LIFE PRACTICE NOTE 1994-1
December 1994

General Considerations

Introduction

This practice note was prepared by a work group organized by the Committee on Life Insurance Financial Reporting of the American Academy of Actuaries. The work group was charged with developing a description of some of the current practices used by valuation actuaries in the United States. This work group was originally formed in 1992 and issued the first set of Life Practice Notes that year; changes have been made to this set of practice notes on an annual basis to reflect additional information on current practices.

The practice notes represent a description of practices believed by the work group to be commonly employed by actuaries in the United States in 1994. The purpose of the practice notes is to assist actuaries who are faced with the requirement of adequacy testing by supplying examples of some of the common approaches to this work. However, no representation of completeness is made; other approaches may also be in common use. It should be recognized that the information contained in the practice notes provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. Moreover, these practice notes are based upon the model Standard Valuation Law of the National Association of Insurance Commissioners (NAIC). To the extent that the laws of a particular state differ from the NAIC model, practices described in these practice notes may not be appropriate for actuarial practice in that state. This practice note has not been promulgated by the Actuarial Standards Board or any other authoritative body of the American Academy of Actuaries, nor is it binding on any actuary.

The members of the work group responsible for this practice note are as follows:

Donna R. Claire, chairperson

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LIFE PRACTICE NOTE 1994–1
December 1994

Note: This practice note covers some possible answers to a number of different questions that were asked by and posed to members of the work group and that have not otherwise been covered in other practice notes.

Q. What *current practices* are the practice notes based on?

A. Since 1986, some actuaries have been performing cash flow tests for certain annuity and other interest-sensitive lines of business under the requirements of New York Regulation 126. Many practices that have been developed were in response to this regulation. Reviews of these practices have been published from time to time (e.g., *Proceedings of the Valuation Actuary Symposium*, 1985–1993).

Also, in 1990, the Actuarial Standards Board published Actuarial Standard of Practice (ASOP) No. 14, which required the actuary to do cash flow testing under certain circumstances. Since the release of ASOP No. 14, some regulators have required cash flow testing in order to show reserve adequacy. Practices developed because of this testing are also included as *current practices.*

A survey was taken in early 1993 on the practices followed by appointed actuaries for year end 1992. This survey was jointly sponsored by the Society of Actuaries and the American Academy of Actuaries. There were 141 responses to this survey. Certain results from this survey have been incorporated into the 1994 Life Practice Notes.

A Postmortem 1992 Valuation Actuary Symposium was held in June 1993. Approximately 70 actuaries attended. Additional surveys were taken at this seminar. Results of some of these surveys have also been used to update the Life Practice Notes.

Comments from insurance regulators were also incorporated into the 1994 Practice Notes.

Q. Are these practice notes expected to become a *standard* that actuaries must follow?

A. Absolutely not. These practice notes document what is believed to be *current practice.* There are a number of reasons an actuary would use methods other than those described in these practice notes. First, the appointed actuary is the one opining on the reserves, and he or she could be aware of special circumstances pertaining to a particular company or block of business. Also, an actuary may have developed better testing methods, and *current practice* may not have caught up with the improved method of testing.

Finally, the practice notes may not necessarily represent the total range of current practice in all areas. Each practice note was reviewed by actuaries familiar with the topic of the practice note, and these actuaries have concluded that the practice note represents approaches acceptable under current practice. Moreover, comments were solicited from the actuarial community. It is quite possible, however, that other approaches that are properly termed *current practices* were not documented.

Q. How do actuaries approach modeling?

A. One possible game plan for modeling a life insurance company is as follows:

1. Determine the purpose of the testing.
2. Review the prior year's modeling.
3. Develop assumptions.
4. Determine the sensitivity tests to be done.
5. Model.
6. Validate the model/results.
7. Determine what, if any, corrective actions are needed.
8. Write the report.

Q. What is the goal of asset adequacy testing?

A. A number of actuaries feel that the primary purpose of the asset adequacy testing is to inform management of actual or possible problems that arise due to the current management of the business, e.g., due to the current crediting or investment strategies. At least one report, such as an executive summary, may be directed at management. Another goal of this testing may be, of course, to satisfy the regulatory requirements.

Q. How does one establish what should be tested?

A. According to ASOP No. 22, virtually all reserves should be covered: "For reserves to be reported as *not analyzed*, the appointed actuary should judge them to be immaterial." One standard of materiality used by some actuaries is less than 5% of total reserves. (This is the number mentioned in a letter to appointed actuaries dated November 3, 1994, from Larry Gorski, Life Actuary of the Illinois Department of Insurance.) Some other actuaries set a dollar limit to materiality.

Q. How is an asset (reserve) adequacy analysis different from a solvency test?

A. An *asset adequacy analysis* is a determination as to whether projected asset cash flows, together with projected premiums or considerations, are reasonably likely to cover projected liability cash flows. The assets included in this type of analysis include only assets backing the liabilities and do not include assets backing the surplus of the company. Also, no projection of new business is made. The main objective of the asset adequacy test is to determine whether the liabilities and reserves are deficient and whether an additional reserve needs to be established.

A *solvency test* is more inclusive than an asset adequacy analysis. All of the assets and liabilities of the company are included in a solvency test. Also, a projection of new business is usually included. The main objective of the solvency test is to determine whether the surplus of the company is sufficient to support the current operations of the company.

The NAIC model *Actuarial Opinion and Memorandum Regulation* (hereafter the *Model Regulation*), in support of the Standard Valuation Law, requires an actuary to opine, in certain circumstances, that "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 . . . 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." Thus, the required opinion is an asset adequacy opinion on reserve adequacy, as opposed to a solvency opinion.

The actuary is not currently required by either the ASB's standards of practice or the model Standard Valuation Law (as of August 1, 1994) to test for solvency with regard to the actuarial opinion that is filed with the statutory annual statement. However, reserves are typically the largest liability of a life insurance company, so reserve adequacy testing is an important tool in assessing the health of life insurance companies.

Q. How long should the projection period be?

A. ASOP No. 22, *Statutory Statements of Opinion Based on Asset Adequacy Analysis by Appointed Actuaries for Life or Health Insurers,* states that, "[a]sset adequacy should be tested over a period which extends to a point at which reserves on a closed block are immaterial in relation to the analysis." Many actuaries use shorter projection periods for single-premium deferred annuities (SPDAs) than for structured settlements, immediate annuities, and life insurance policies. New York requires that all remaining policies in the short lines (deferred annuities) be forced to cash-surrender at the end of the 10-year projection, and that assets be sold as needed at market values consistent with the then-prevailing interest rates. Projections may also be done for longer periods, such as 20

years, to test whether investment earnings eventually fall to where they don't support guaranteed minimum interest rates in "down and die" scenarios.

Q. What lines may be combined for purposes of cash flow testing?

A. Generally, the appointed actuary opines on the adequacy of reserves in the aggregate. Thus, in theory, life insurance may be combined with annuities. More commonly, actuaries test the products by major business units. These business units may not necessarily represent statement lines of business. The NAIC *Model Regulation* allows aggregation to be done before the reserves of the individual business units are judged deficient or redundant. That is, the results of individual scenarios may be aggregated. For example, long-duration annuities (immediate annuities) and short-duration annuities (SPDAs) may be aggregated on a scenario-by-scenario basis.

The NAIC *Model Regulation* also allows redundancies in one line to affect deficiencies in another, provided that either (1) the results have been developed using consistent economic scenarios, or (2) the lines involve mutually independent risks.

Some states, such as New York, may have different requirements. These state requirements may not allow aggregation across major lines of business.

Q. If lines of business are being aggregated, must the same projection period be used for all lines of business?

A. Some actuaries use the same number of years to test all lines of business being aggregated. The typical test period appears to be 20 years. However, it is not a requirement that the same projection be used. Since some products (e.g., SPDAs) are generally of shorter duration than immediate annuities and structured settlements, it may be difficult to find a common projection period that produces meaningful results for each duration for all lines combined; therefore, some actuaries use different projection periods, depending on the line of business being tested.

Q. Can the lines themselves be combined, or only the results?

A. Both methods currently are being utilized. Combining the lines in effect means combining results on a scenario-by-scenario basis. Combining results means using redundancies in one line to offset a deficiency in another line.

When different projection periods are used, combining the cash flows of distinct lines may not make sense. Instead, some actuaries project each business unit separately and discount the excess of the ending market value of assets less the ending present value of liabilities back to the projection date, in order to get results that may be combined on a scenario-by-scenario basis.

Q. How may assets be allocated among the lines if cash flow testing is done separately for each line?

A. Regulations will normally require that any assets that are contractually allocated to a specific line for a special purpose (such as by reinsurance treaty or separate account) be allocated to that line for the cash flow testing. Beyond that, if the company has segmented the assets by line (officially or unofficially), then this allocation may represent a good place to start. However, to the extent that the actuarial opinion covers all lines of business, investments can be assigned differently, providing that the same asset is not used twice and the resulting liability rates (e.g., annual crediting rates) are not distorted.

Some companies maintain records of the years in which assets were purchased and the years in which the money was received under various contracts, so the actuary may make use of these allocations to assign assets to liabilities.

Many actuaries feel it is important to maintain reasonable consistency from year to year in the method of allocating the assets to product lines. If a change in allocation is made, it may be useful to document the impact of the change on the adequacy test.

Q. What are acceptable criteria for adequacy?

A. One criterion used by many actuaries is the estimated ending net market value, calculated by estimating the market value of assets at the interest rates in effect at the end of the scenario, and deducting the present value (at the same interest rates) of the remaining projected benefits and expenses. This gives an estimate of the market value of ending surplus. Scenario tests with positive market values of ending surplus are considered acceptable.

Q. How may the discount rate be determined?

A. There are currently several methods of determining a discount rate. The method suggested by members of the New York Insurance Department is to run a scenario, and then

rerun the scenario adding $1,000 of existing assets. The ratio of the ending differences can be used to determine the discount rate for that scenario.

There are other methods of determining a discount rate currently being used by actuaries. One is to use the after-tax portfolio rate (i.e., the average investment earnings rate) used in each scenario. Another method is to use the 1-year Treasury forward rates that are generated in each scenario. An alternative is to use the Treasury spot rate for the length of the projection period, e.g., 20 years, that is generated under each scenario.

Q. Are extra reserves set up if any of the scenarios fails to meet the adequacy criterion?

A. Not necessarily, although it is a possibility. Approximately 10% of those responding to the 1992 Valuation Actuary Survey reported that they increased reserves as a result of cash flow testing.

One method of establishing such rules was proposed in an article by Dr. David N. Becker, Michael S. Smith, and Michael L. Zurcher, entitled "Zen and the Art of Reserve and Asset Adequacy." This article was first published in Lincoln National's *Reinsurance Reporter* (3d quarter, 1993). The article established eight rules (the *eightfold way*) the authors developed in order for the asset adequacy decision to be made. These rules covered whether there were positive retained earnings for the block at the end of a projection; whether there were scenarios that ultimately "passed" but that encountered serious stress during the period of testing; the effect of sensitivity testing results; and the effect of aggregating.

For sets of random scenarios, it would depend on what percentage of scenarios are failed and by how much. As noted above, an actuarial test of reserve adequacy is not a solvency test. While a test of solvency would presumably require the passing of a very large percentage of scenarios (and a reasonable limit to the severity of failure), a reserve typically may be considered *adequate* as long as a reasonable percentage, including moderately adverse scenarios, is passed.

At this time, there is no specific rule as to what percentage of random scenarios must be passed to determine reserve adequacy. In judging the results of a multi-scenario test, it is prudent for the actuary to bear in mind that the surplus that is generated by any scenario is subject to a number of assumptions used in the testing (e.g., investment strategy, interest crediting strategy, dynamic lapse formula, etc.). The liberalism or conservatism of these various assumptions influences the interpretation of the results.

There are several insurance regulators who would like to have the failure of any of the Basic 7 scenarios disclosed in either the actuarial opinion or an executive summary to the actuarial memorandum. The proposed changes to the NAIC *Model Regulation* would require disclosure of the ending surplus on each scenario. At this time, there are no requirements from regulators as to the number of scenarios one has to "pass." The revised New York Regulation 126 does require additional testing if the present value of ending surplus is negative in any of the Basic 7 scenarios.

Q. Is it enough to verify that there are still sufficient assets at the end of the projection period only, or should intermediate points in time be checked also?

A. The final wording of ASOP No. 22 removed all references to the checking of intermediate points. Such references had occurred in earlier drafts. Thus, according to ASOP No. 22, a reserve adequacy test does not require that intermediate points be checked.

Some actuaries believe the standard requires them to look at intermediate cash flows to assure that any negative cash flows could potentially be funded from company resources or by borrowing. However, the projection of statutory reserves (and thus surplus levels) at intermediate points is not required by the standard.

Poor performance at intermediate points in time may have an impact on the choice of assumptions beyond that point in time. For example, a string of years with substantial statutory losses may influence future excess lapse assumptions. Some actuaries use the results of intermediate years to see if the situation is so bad that a lapse-mortality spiral could occur, resulting in the need to increase reserves.

Other actuaries point out that surplus is normally available to cover statutory shortfalls in intermediate years. Such surplus is not reflected in reserve adequacy tests; therefore, some level of imbalance at intermediate points may be tolerated, particularly on a line-of-business basis.

Of the 132 actuaries who responded to the survey on 1992 practices, 84% looked at intermediate results. This could have been partly in response to some regulators' requests that book and market surplus at intermediate points be checked. For example, for year end 1992, the California Insurance Department requested that the surplus levels for intermediate years be shown. Some actuaries felt this was a request for solvency testing, not reserve adequacy testing. If a regulator asks for tests that go beyond asset adequacy testing of the reserve, some actuaries separate such additional tests from the tests that are made to support the appointed actuary's required opinion on reserve adequacy.

In the proposed revisions to the NAIC *Model Actuarial Opinion and Memorandum Regulation* and in the proposed revision to New York Regulation 126, in the list of items that would be required in the memorandum executive summary, the following is stated: "Comments should be provided on any interim results that may be of significant concern to the appointed actuary."

Q. If, based on the asset adequacy tests, the reserves are judged to be inadequate, how does the actuary decide the amount of additional reserves required?

A. One method is to experiment with projections based on progressively greater amounts of starting assets. When a level that produces satisfactory results is found, reserves are strengthened to this level.

Note: The *Model Regulation* allows for a 3-year grade-in from the time the law is enacted in a particular state of any additional reserves required. However, some states may require the additional reserves to be put up immediately.

Q. If additional reserves are to be set up, does the reserve increase go through the gain from operations, or is it booked directly to the surplus of the company?

A. Starting in 1993, there is a separate liability item for additional reserves established due to cash flow testing. The 1993 revision of the NAIC *Accounting Procedures Manual* states that these extra reserves would flow through surplus.

Q. Since it is nearly impossible to wait for year-end data and then get the opinion completed by the end of February, may the actuary use data from prior valuation periods for the purpose of the year-end opinion?

A. ASOP No. 22 allows data prior to year end to be used in the testing, provided that significant changes have not occurred.

Approximately one half of the actuaries who responded to the 1993 survey of valuation actuaries based their testing on results earlier than December 31, 1992. These actuaries reconciled with annual statement year-end numbers, but used the earlier (generally September 30, 1992) results if there was not a material change between that date and the end of the year. Some actuaries update results for the actual end-of-year yield curve, since this can have a major impact.

There were several regulators who were not in favor of using numbers other than year-end numbers in the testing. This is because the annual statement numbers are the numbers that they have readily available, and it is on these numbers that an actuary is opining. These regulators did mention that they were particularly concerned with companies that actively traded their asset portfolios. They would prefer to grant extensions past the March deadline for those who could not complete the testing in that time frame. They did suggest that sensitivity testing could be performed earlier in the year, as long as these results could be reconciled to year-end numbers.

Q. How are shareholder dividends treated in asset adequacy testing?

A. This question was asked in a survey on the 1992 asset adequacy testing. About 20% mentioned that shareholder dividends were used in the testing. Some mentioned that this was not applicable to their company, because they were employed by a mutual company.

Some actuaries said that it was not necessary to reflect shareholder dividends, since this is a function of surplus, which is not part of reserve adequacy testing. Other actuaries pointed out that there are times when the payment of shareholder dividends is a necessity for business, e.g., when required by the terms of an acquisition. Still others viewed shareholder dividends as any other expense that must be paid.

Some actuaries stated that shareholder dividends would be paid where surplus was above the target surplus. Other actuaries based the assumed payout on company experience or plan projections. Other formulas included a constant percentage of statutory gains, or a level X basis-points-a-year charge.

Q. How are policyholder dividends treated in asset adequacy testing?

A. Most actuaries treat policyholder dividends similar to interest credited on SPDAs or universal life. They start with the current dividend scale, and may update this scale periodically for changes that would be made to dividends due to changes in the interest rates, expenses, etc. Because companies declare dividends for a year at a time, a number of actuaries build in a lag factor to any dividend changes.

Q. With regard to the actuarial opinion, what determines whether a reserve is in the *formula reserve, additional reserve,* or *other amount* columns of the reserve table that appears in the scope paragraph of the opinion?

A. The NAIC *Model Regulation* contains a reserve table that gives the format for listing reserves that are to be included in the opinion. However, other than the headings on the columns, it does not explicitly describe what should go into each column. One way to prepare this table is as follows:

Column (i) Formula reserves—This is only for formula reserves that were subject to asset adequacy analysis. Obviously, formula reserves consist of reserves determined through a statutory formula. However, it also includes any reserves that do not have a specified statutory reserve formula but are calculated by a standard methodology or procedure each year.

Column (ii) Additional reserves—This would be the amount of any additional reserve above the formula reserve that is being held due to the results of the asset adequacy analysis. Section 5E of the *Model Regulation* addresses this issue.

Column (iii) Analysis method—This is the method used for asset adequacy analysis. The appointed actuary may need to list more than one method for each line in the table, e.g., *cash flow testing*, *gross premium valuation*, with the corresponding reserve amounts for each method. The appointed actuary may refer to ASOP Nos. 14 and 22 in doing this.

Column (iv) Other amount—This is for the reserves that were not subject to asset adequacy analysis. (The most common reason for not analyzing certain business is because it is de minimis.)

Column (v) Total amounts—The total of columns (i), (ii), and (iv).

Q. In what ways did the regulators feel that opinions and memoranda could be improved?

A. A group of actuarial insurance regulators reviewed some of the 1992 and 1993 opinions and memoranda during the past 2 years. Some of the areas they identified as requiring improvement are as follows:

1. Reliances—Some opinions and memoranda were not clear as to who developed, and took responsibility for, certain assumptions. (See Practice Note 1994-3 regarding new NAIC rules on data reliance.)

2. Assumption details—Insufficient details and technical analysis were provided.

3. Reinsurance—There were several cases where reinsurance assumed or ceded did not appear to be adequately modeled.

4. Off-balance-sheet items—Some actuaries did not model off-balance-sheet items, such as derivatives.

5. Sensitivity testing—Some actuaries either did not perform sensitivity testing, or did not include the results in the memorandum.

6. Investment assumptions—Some regulators expressed a concern that certain of the investment assumptions were not realistic.

7. A representative of the Illinois Insurance Department expressed the opinion that the executive summaries he received from some companies were too long; he would prefer to see the executive summary cover only the items requested, and highlight any problems. A representative of the California Insurance Department mentioned that he would like to see more discussion of actual or potential problems in the executive summary.

Q. Should items that are known to occur during the cash flow testing period, such as Phase III taxes for a company no longer writing new business, be included in the testing?

A. ASOP No. 22 states that, "[t]he asset adequacy analysis should take into account all anticipated cash flows, such as renewal premiums, guaranteed and nonguaranteed benefits, expenses, and taxes."

If there are significant anticipated cash flows (either positive or negative) that are not covered in the actuarial opinion and that do not have associated statement liabilities and/or assets, the actuary may want to disclose these in the actuarial memorandum and consider their effect in developing the overall opinion in a similar manner to which intermediate points in time are considered. (See question on intermediate points in time earlier in this practice note.)

Q. Should derivatives be included in the asset adequacy testing?

A. ASOP No. 7 states that, "[t]he actuary should consider the assets' characteristics as well as the insurer's investment strategy." If the insurer is including derivatives as part of the current assets or investment strategy, this requirement in the ASOP does appear to state that derivatives should be considered. If the cash flows associated with the derivative are interest-sensitive or depend in other ways on the economic scenario, the ASOP would appear

to suggest that such dependencies should be modeled.

LIFE PRACTICE NOTE 1994-2
December 1994

Procedures to Follow in Accepting or Resigning the Position of Appointed Actuary for Life or Health Insurers in the United States

Introduction

This practice note was prepared by a work group organized by the Committee on Life Insurance Financial Reporting of the American Academy of Actuaries. The work group was charged with developing a description of some of the current practices used by valuation actuaries in the United States. This work group was originally formed in 1992 and issued the first set of Life Practice Notes that year; changes have been made to this set of practice notes on an annual basis to reflect additional information on current practices.

The practice notes represent a description of practices believed by the work group to be commonly employed by actuaries in the United States in 1994. The purpose of the practice notes is to assist actuaries who are faced with the requirement of adequacy testing by supplying examples of some of the common approaches to this work. However, no representation of completeness is made; other approaches may also be in common use. It should be recognized that the information contained in the practice notes provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. Moreover, these practice notes are based upon the model Standard Valuation Law of the National Association of Insurance Commissioners (NAIC). To the extent that the laws of a particular state differ from the NAIC model, practices described in these practice notes may not be appropriate for actuarial practice in that state. This practice note has not been promulgated by the Actuarial Standards Board or any other authoritative body of the American Academy of Actuaries, nor is it binding on any actuary.

The members of the work group responsible for this practice note are as follows:

Donna R. Claire, chairperson

Arnold A. Dicke	Steven A. Smith
Douglas C. Doll	Stephen J. Strommen
Craig F. Likkel	Charles N. Vest
Linn K. Richardson	Michael L. Zurcher
Henry W. Siegel	

Comments are welcome as to the appropriateness of the practice notes, desirability of annual updating, validity of substantive disagreements, etc. Comments should be sent to Donna Claire at her Directory address.

Accepting an Appointment

Q. What is the source of information regarding procedures that an actuary may follow in accepting or resigning a position as appointed actuary?

A. Since the concept of *appointed actuary* is relatively new in the United States, there are not many current practices that have been developed on this subject in the U.S. Some of the suggestions contained in this practice note are based on procedures established by the Canadian Institute of Actuaries, based on concepts codified in Canadian law, which differs in significant respects from U.S. law. In addition, some of the information in this practice note is based on the Codes of Professional Conduct of the various U.S. organizations representing actuaries.

Q. What information may the appointed actuary wish to obtain from the previous appointed actuary?

A. Prior to accepting the position as appointed actuary, the actuary may feel it prudent to meet with the most recent appointed actuary of the company to review (1) reasons for the termination as appointed actuary, and (2) the most recent opinion and supporting memorandum and the supporting documentation. This will permit the actuary to become informed of any items of concern to the previous appointed actuary (e.g., inadequate access to management or the board of directors, the qualifications of the persons or firms providing major reliance, adverse scenarios in the cash flow testing performed, etc.).

Note: The 1994 revisions to New York Regulation 126 (the valuation regulation in New York) require the new appointed actuary to talk with the previous appointed actuary regarding any problems with the prior asset adequacy testing. The proposed revision of the valuation regulation in Pennsylvania would require that the notice of termination shall disclose whether

> in the 12 months preceding, there were disagreements with the terminated appointed actuary on any matter of actuarial principles or practices, valuation requirements, or asset adequacy analysis assumptions or methodology, which disagreements, if not resolved to the satisfaction of the terminated appointed actuary, would have caused the appointed actuary to make reference to the subject matter of the disagreement in connection with the appointed actuary's actuarial opinion.

LIFE PRACTICE NOTE 1994-2
December 1994

Q. What is the relationship between the appointed actuary and the board of directors?

A. The NAIC's model *Actuarial Opinion and Memorandum Regulation* (hereafter the *Model Regulation*) states that the appointed actuary shall be chosen by either the board of directors or by its authority through an executive officer of the company.

Prior to accepting the position as appointed actuary, the actuary may wish to determine whether the following conditions will exist:

1. The actuary will be permitted to appear before the board of directors to present the statement of actuarial opinion and supporting memorandum, if the actuary wishes to do so;

2. If the statement of actuarial opinion and supporting memoranda is presented to the board by a person other than the appointed actuary, there is assurance that the opinion and supporting memoranda will be presented in their entirety, not amended or edited by a third party;

3. The actuary will be permitted to meet with the board of directors at such other times as the actuary believes necessary in order to communicate problems that may emerge between the annual statements of actuarial opinion;

4. The actuary will have access to information, records, and members of company management as necessary to perform the duties of the appointed actuary;

5. The board of directors will agree to keep the actuary informed of certain transactions or conditions specified by the actuary via some agreed-upon process (e.g., attendance at board meetings, copies of board minutes and agendas);

6. The resources required to fulfill the actuary's duties (e.g., electronic data processing, support staff) will be made available; and

7. The board (or its delegate) will agree to make available such persons or officers as may be identified by the actuary to be used in reliance (e.g., the investment officer or the administrative officer). If the contemplated persons or firms refuse to be relied upon or are found to be unqualified, then the actuary will be permitted to consult with the board of directors regarding alternative resources.

Q. What is the relationship between the appointed actuary and those the actuary is relying on?

A. Prior to accepting the position of appointed actuary, or as soon as possible thereafter, the actuary may wish to meet with the persons or firms intended to be used as reliance. In placing reliance, the actuary should be mindful of Actuarial Standard of Practice (ASOP) No. 22, *Statutory Statements of Opinion Based on Asset Adequacy Analysis by Appointed Actuaries for Life or Health Insurers*, section 6.3; Sections 7(B)5 and 8(B)5 of the *Model Regulation*; and ASOP No. 23, *Data Quality*. See also Practice Note 1994-3, *Reliance upon Third Parties*.

Q. What documentation may be provided with regard to the appointed actuary's personal qualifications?

A. Prior to accepting the position of appointed actuary, the actuary may wish to document his or her qualifications. Qualification issues are addressed in the *Qualification Standards for Public Statements of Actuarial Opinion*, promulgated by the American Academy of Actuaries Committee on Qualifications and incorporated by reference in the Code of Professional Conduct.

In addition to those requirements, the actuary may wish to document his or her personal breadth and depth of knowledge regarding the products, markets, and strategies of the particular company, and in doing so identify areas where support or reliance may be needed to allow the performance of his or her duties as appointed actuary. For further discussion of reliance on third parties, see Practice Note 1994-3.

The actuary should comply with the continuing education documentation requirements of the Qualification Standards.

Q. What are the considerations regarding late appointments?

A. Special concerns are appropriate if the appointment is made late in the year, and the ability of the actuary to carry out the duties in a timely manner in order to form an unqualified opinion is thereby endangered.

Prior to accepting the position of appointed actuary, the actuary may wish to inform the board of directors (or its delegate) of any such concerns.

Q. How should an actuary acknowledge appointment as appointed actuary?

A. ASOP No. 22 requires the actuary to acknowledge acceptance of appointment as appointed actuary in writing. The acceptance letter may record the issues (and agreements reached) that are addressed in the previous sections of this practice note.

Resigning an Appointment

Q. What are some possible causes for resigning an appointment?

A. There are normal causes for resignation, such as job transfer or retirement. If the conditions agreed upon with the board of directors (or its delegate) before appointment may not be fulfilled, or if subsequent needs arise to which the board of directors does not agree, or which may not be fulfilled, the appointed actuary may wish to inform the board and try to rectify the situation. If the appointed actuary determines that rectification will not take place to the appointed actuary's satisfaction, the appointed actuary may wish to resign the position.

Q. How should the resignation by the appointed actuary be documented?

A. ASOP No. 22 requires the resignation to be in writing. The actuary may wish to record the reason for resignation in a memorandum to the board of directors.

If and when an appointed actuary is replaced by another appointed actuary, the *Model Regulation* requires that the company notify the insurance commissioner and "give reasons for replacement."

Q. What will the appointed actuary's relationship be with successor appointed actuaries?

A. The resigning actuary may wish to meet with the proposed successor and provide copies of the most recent actuarial opinions and supporting memoranda and related work papers, to enable the proposed successor to fulfill his or her duties. The resigning actuary may wish to discuss any concerns with the proposed successor at that time. Such communications may be required by law, regulation, actuarial standards of practice, or the Code of Professional Conduct.

LIFE PRACTICE NOTE 1994-3
December 1994

Reliance upon Third Parties

Introduction

This practice note was prepared by a work group organized by the Committee on Life Insurance Financial Reporting of the American Academy of Actuaries. The work group was charged with developing a description of some of the current practices used by valuation actuaries in the United States. This work group was originally formed in 1992 and issued the first set of Life Practice Notes that year; changes have been made to this set of practice notes on an annual basis to reflect additional information on current practices.

The practice notes represent a description of practices believed by the work group to be commonly employed by actuaries in the United States in 1994. The purpose of the practice notes is to assist actuaries who are faced with the requirement of adequacy testing by supplying examples of some of the common approaches to this work. However, no representation of completeness is made; other approaches may also be in common use. It should be recognized that the information contained in the practice notes provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. Moreover, these practice notes are based upon the model Standard Valuation Law of the National Association of Insurance Commissioners (NAIC). To the extent that the laws of a particular state differ from the NAIC model, practices described in these practice notes may not be appropriate for actuarial practice in that state. This practice note has not been promulgated by the Actuarial Standards Board or any other authoritative body of the American Academy of Actuaries, nor is it binding on any actuary.

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Comments are welcome as to the appropriateness of the practice notes, desirability of annual updating, validity of substantive disagreements, etc. Comments should be sent to Donna Claire at her Directory address.

LIFE PRACTICE NOTE 1994-3
December 1994

Q. May the appointed actuary rely upon the company's auditor for the substantial accuracy of records and information?

A. Subsections 7(B)5 and 8(B)5 of the NAIC *Model Actuarial Opinion and Memorandum Regulation* (hereafter the *Model Regulation*) offer, as an alternative, the following sentence as recommended language for the actuarial opinion:

> I have relied upon [name of accounting firm] for the substantial accuracy of the inforce inventory and information concerning the liabilities. . . .

However, a Notice to Practitioners dated February 1991 from the American Institute of Certified Public Accountants (AICPA) states in part the following:

> The auditor should not consent to be referred to in an actuarial opinion in which the actuary expresses reliance on the auditor for the accuracy of the underlying data. If the auditor becomes aware that an actuary has expressed such reliance on the auditor, the auditor should advise the actuary that he or she does not consent to such reference, and the auditor should consider other actions that may be appropriate and may also wish to consult with legal counsel.

Q. On whom may the appointed actuary rely for substantial accuracy of records and information?

A. The *Model Regulation* allows the actuary to rely on company officers and investment managers. A statement from those relied upon, stating what information and assumptions were provided by that person, must be attached to the actuarial opinion and actuarial memorandum. A suggested form for this statement is given in Instruction No. 7 to the annual statement for 1994 (see below).

The actuary should be aware, however, that both Actuarial Standard of Practice (ASOP) No. 22, *Statutory Statements of Opinion Based on Asset Adequacy Analysis by Appointed Actuaries for Life and Health Insurers*, and ASOP No. 23, *Data Quality*, contain specific requirements governing appointed actuaries' obligations to satisfy themselves that data and analyses provided by third parties are reasonable and consistent. The actuary should become familiar with these obligations, and should comply with the standards when relying upon third parties for data or analysis. The proposed revisions to the NAIC *Model Regulation on Actuarial Opinion and Memoranda* and the proposed revisions to New York's Regulation 126 would add the following sentence to the reliance statement: "I have reviewed the information relied upon for reasonableness and consistency."

Of course, the actuary has the option of personally reviewing the underlying basic records him- or herself. In that case, recommended language is presented in Sections 7(B)4 and 8(B)4 of the *Model Regulation*. Some actuaries are reluctant to take this responsibility unless they are also qualified auditors.

Q. What other tests of data reliability must the actuary perform?

A. Beginning with the 1994 annual statement, the actuary will be required to state that certain in-force claim and asset information from the valuation model reconciles to certain annual statement totals. The Annual Statement Instruction No. 6 (see below) gives suggested language for the actuarial opinion reflecting this reconciliation.

The external auditors will also be required to extend their audit procedures to the same annual statement figures. In the event that an auditor should find a material error in those annual statement figures, the auditor must inform the actuary of the problem and the actuary must decide whether there is a material effect on reserves. In this way, the regulators can be assured that the actuary has relied on data that an outside auditor has reviewed. The AICPA is considering requiring as part of the audited statement a Supplemental Schedule of Assets and Liabilities that would contain all the totals to which the appointed actuary must reconcile.

This Supplemental Schedule (see below) contains a complete list of annual statement items that must be reconciled. Only the information actually used by the actuary in the valuation needs to be reconciled to the statement. If, for instance, an actuary does not perform cash flow testing in the valuation, reconciliation of asset figures would not be necessary.

Q. Under what circumstances must claim figures used in asset adequacy testing be reconciled to Schedule O?

A. Schedule O is only completed for those lines of business for which claim runout data are used to establish claim reserves. This is always the case for group and individual health insurance. Certain large companies may use this process for other lines of business as well (e.g., individual life and group life). In that case, a separate table for those lines of business needs to be included for Schedule O.

The intent of the statement instruction is that Schedule O should be completed even if the data are used only for a part of the reserve (e.g., the reserve for claims submitted more than 15 days after the closing date of the statement).

Q. Is this reconciliation all that an actuary must do to satisfy the requirements of ASOP No. 22?

A. The reconciliation required by the annual statement instructions is at a very broad level. While this reconciliation provides general satisfaction that the data are reasonable, the division of data among important subsets can have a material effect on reserves. Accordingly, many actuaries make more detailed tests than are required by the annual statement instructions.

Appendix 1

Annual Statement Instructions—Actuarial Opinion

Note: The following text is from proposed amendments to the NAIC Life and Accident and Health Annual Statement Instructions (approved by NAIC Blanks Task Force, October 1993).

6. The scope paragraph should include a paragraph such as the following regarding data used by the actuary in forming the opinion:

> In forming my opinion on [specify types of reserves] I relied upon data prepared by [name and title of company officer(s) certifying in-force records and/or other data] as certified in the attached statements. I evaluated that data for reasonableness and consistency. I also reconciled that data to [Exhibits and Schedules to be listed as applicable*] of the company's current annual statement. In other respects, my examination included such review of the actuarial assumptions and actuarial methods used and such tests of the calculations as I considered necessary.

*A complete list of all schedules and exhibits should be included in the Annual Statement Instructions (see Appendix 3).

7. There shall be attached to the actuarial opinion a statement(s) by the company officer(s) who prepared the underlying data similar to the following:

> I, [name of officer], [title], of [name of company] hereby affirm that the listings and summaries of policies and contracts in force as of December 31, 19XX, and other liabilities prepared for and submitted to [name of appointed actuary] were prepared under my direction and, to the best of my knowledge and belief, are substantially accurate and complete and are the same as, or derived from, the in-force records and other data which form the basis for the annual statement(s).
>
> I, [name of officer], [title], of [name of company], hereby affirm the listings, summaries, and analysis relating to data prepared for and submitted to [name of appointed 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 and the same as, or derived from, the records and other data which form the basis for the annual statement(s).

Appendix 2

Annual Statement Instructions—Annual Audited Financial Reports

Note: The following material is adapted from a proposed amendment to paragraph 9 (see Appendix 1).

The following should be included in the modification to paragraph 9, Scope of Examination and Report of Independent Certified Public Accountant.

> The insurer shall require the independent certified public accountant to subject the information included in the Supplemental Schedule of Assets and Liabilities (illustrated below) to the auditing procedures applied in the audit of the current statutory financial statements to determine whether such information is fairly stated in all material respects in relation to the basic statutory financial statements taken as a whole and agrees to the insurer's annual statement filed with the state insurance departments and the NAIC.
>
> The supplemental schedule should be included with the audited annual statutory financial statements. The auditor should issue a report on the supplemental information as to whether the information is fairly stated in relation to the financial statement taken as a whole.

In the above paragraph, the supplemental information represents a schedule listing the items to which the auditor has extended his or her procedures to.

Appendix 3

Example Insurance Company
Supplemental Schedule of Assets and Liabilities—December 31, 199X
Schedule 1—Selected Financial Data

Note: The following material (adapted from a proposed amendment to paragraph 9 (see Appendixes 1 and 2)) is a summary of certain financial data included in other exhibits and schedules subjected to audit procedures by independent auditors and utilized by actuaries in the determination of reserves.

Investment Income Earned (Exhibit 2)	
Government bonds	XXXXXX
Other bonds (unaffiliated)	XXXXXX
Bonds of affiliates	XXXXXX
Preferred stocks (unaffiliated)	XXXXXX
Preferred stocks of affiliates	XXXXXX
Common stocks (unaffiliated)	XXXXXX
Common stocks of affiliates	XXXXXX
Mortgage loans	XXXXXX
Real estate	XXXXXX
Premium notes, policy loans, and liens	XXXXXX
Collateral loans	XXXXXX
Cash on hand and on deposit	XXXXXX
Short-term investments	XXXXXX
Other invested assets	XXXXXX
Derivative instruments (financial options and futures)	XXXXXX
Aggregate write-ins for investment income	XXXXXX
Gross investment income	XXXXXX

Assets

Real Estate Owned—Book Value less Encumbrances (Schedule A—Part 1)	XXXXXX
Mortgage Loans by Type—Book Value (Schedule B—Part 1)	
Farm mortgages	XXXXXX
Residential mortgages	XXXXXX
Commercial mortgages	XXXXXX
Total mortgage loans by type	XXXXXX
Mortgage Loans by Standing—Book Value (Schedule B—Part 2)	
Good standing	XXXXXX
Good standing with restructured loans	XXXXXX
Interest overdue more than three months	XXXXXX
Foreclosure in process	XXXXXX
Total mortgage loans by standing	XXXXXX
Other Long-Term Assets—Statement Value (Schedule BA)	XXXXXX
Collateral Loans (Schedule C—Part 1)	XXXXXX
Bonds & Stocks of Parents, Subsidiaries and Affiliates—Book Value (Schedule D)	
Bonds	XXXXXX
Preferred Stocks	XXXXXX
Common Stocks	XXXXXX
Total	XXXXXX

Assets (cont.)

Bonds and Short-Term Investments by Class and Maturity:	
Bonds by Maturity—Statement Value (Schedule D—Part 1A)	
Due within 1 year or less	XXXXXX
Over 1 year through 5 years	XXXXXX
Over 5 years through 10 years	XXXXXX
Over 10 years through 20 years	XXXXXX
Over 20 years	XXXXXX
Total by maturity	XXXXXX
Bonds by Class—Statement Value (Schedule D—Part 1A)	
Class 1	XXXXXX
Class 2	XXXXXX
Class 3	XXXXXX
Class 4	XXXXXX
Class 5	XXXXXX
Class 6	XXXXXX
Total by class	XXXXXX
Total Bonds Publicly Traded (Schedule D—Part 1A)	XXXXXX
Total Bonds Privately Placed (Schedule D—Part 1A)	XXXXXX
Preferred Stocks—Statement Value (Schedule D—Part 2)	XXXXXX
Common Stocks—Market Value (Schedule D—Part 2)	XXXXXX
Short-Term Investments—Book Value (Schedule DA—Part 1)	XXXXXX
Financial Options Owned—Statement Value (Schedule DB—Part A)	XXXXXX
Financial Options Written & In Force—Stmt Value (Sch. DB—Pt B)	XXXXXX
Financial Futures Contracts Open—Current Price (Sch. DB—Pt C)	XXXXXX
Cash on Deposit (Schedule E)	XXXXXX

Inforce

Life Insurance In Force	
Industrial	XXXXXX
Ordinary	XXXXXX
Credit Life	XXXXXX
Group Life	XXXXXX
Accidental Death Insurance In Force	XXXXXX
Life Insurance Policies with Disability Provisions In Force	
Industrial	XXXXXX
Ordinary	XXXXXX
Credit Life	XXXXXX
Group Life	XXXXXX
Supplementary Contracts In Force	
Ordinary—Not Involving Life Contingencies	
Amount on Deposit	XXXXXX
Amount of Annual Income Payable	XXXXXX
Ordinary—Involving Life Contingencies	
Amount of Annual Income Payable	XXXXXX
Group—Not Involving Life Contingencies	
Amount on Deposit	XXXXXX
Amount of Annual Income Payable	XXXXXX
Group—Involving Life Contingencies	
Amount of Annual Income Payable	XXXXXX
Annuities—Ordinary	
Immediate—Amount of Annual Income Payable	XXXXXX
Deferred—Fully Paid Account Balance	XXXXXX
Deferred—Not Fully Paid—Account Balance	XXXXXX
Annuities—Group	
Immediate—Amount of Annual Income Payable	XXXXXX
Deferred—Fully Paid Account Balance	XXXXXX
Deferred—Not Fully Paid—Account Balance	XXXXXX
Accident and Health Insurance—Premiums In Force	
Ordinary	XXXXXX
Group	XXXXXX

Credit	XXXXXX
Deposit Funds and Dividend Accumulations	
Deposit Funds—Account Balance	XXXXXX
Dividend Accumulations—Account Balance	XXXXXX

Claims Payments—Net Amount Paid Policyholders 199X (Schedule O—Part 1)

Group Accident and Health

	Year Loss Reported				
Year Loss Incurred	199X—4	199X—3	199X—2	199X—1	199X
199X—4					----
199X—3	----				----
199X—2	----	----			
199X—1	----	----	----		
199X	----	----	----	----	

Other Accident and Health

	Year Loss Reported				
Year Loss Incurred	199X—4	199X—3	199X—2	199X—1	199X
199X—4					----
199X—3	----				----
199X—2	----	----			
199X—1	----	----	----		
199X	----	----	----	----	

Other Coverages That Use Developmental Methods to Calculate Claims Reserves

	Year Loss Reported				
Year Loss Incurred	199X—4	199X—3	199X—2	199X—1	199X
199X—4					----
199X—3	----				----
199X—2	----	----			
199X—1	----	----	----		
199X	----	----	----	----	

Appendix 4

In addition, Schedule O has a new Part 3:

Reserve and Liability Methodology—Exhibits 9B and 11

Line of Business	Methodology *	Amount **
Industrial Life		
Ordinary Life		
Individual Annuity		
Supplementary Contracts		
Credit Life		
Group Life		
Group Accident & Health		
Credit Accident & Health		
Other Accident & Health		
Total		XXX

*Indicate for which coverages actual claim runout date is used in setting reserves. For those coverages, Parts 1 and 2 of Schedule O must be completed. For other coverages, Parts 1 and 2 are not needed.

**Sum of Exhibit 9B and Exhibit 11 net of reinsurance.

LIFE PRACTICE NOTE 1994-4
December 1994

Interest Rate Models

Introduction

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LIFE PRACTICE NOTE 1994–4
December 1994

Q. What approaches to modeling interest rates are included in current actuarial practice for appointed actuaries when doing asset adequacy testing?

A. Approaches currently used to represent interest rates in actuarial models may be broadly categorized as deterministic and stochastic. The most familiar deterministic approach is a single interest rate model, in which projections are made and present values are calculated using a single interest rate. A slight generalization of this approach is the single scenario method, in which a series of interest rates are used for future years, such as one rate for 15 years and another rate thereafter. A second deterministic approach is the multiple fixed scenario method. In this approach, several scenarios (series of future interest rates) are used. Examples of these are also the Basic 7 scenarios stated in the NAIC *Model Actuarial Opinion and Memorandum Regulation* (hereafter the *Model Regulation*). (*Note:* These basic scenarios were first specified in New York Regulation 126, so some actuaries refer to them as the *New York 7* scenarios.)

The multiple fixed scenario method can be further generalized by constructing yield curve scenarios (series of future yield curves).

Stochastic methods generally fall into two categories: random scenario models and option-pricing models. Random scenario models generate scenarios of future interest rates or yield curves by applying a random number generator to one or more probability distributions. The interest rate or yield curve for each period is generated from the probability distribution and based on the interest rates that apply to the previous period. In this way, a full set of interest rates for all future periods is developed. This interest rate scenario is used to determine the magnitude of cash flows (if interest sensitive) and to discount them to a valuation date. A number of such scenarios and the corresponding present values of the cash flows are developed. Option-pricing models use a somewhat different approach. They too are based on an interest rate model, but the model is typically applied to asset and/or liability cash flows to produce an option-adjusted present value. The behavior of this value with respect to incremental changes in the initial yield curve is then studied. Option-pricing models do not necessarily produce values for individual underlying scenarios.

Q. Which of these approaches are appropriate if cash flow testing is required?

A. A *cash flow* test is an adequacy test that involves sensitivity testing of the interest rate model. Since stochastic models are based on a range of values for interest rates, this requirement is met if a sufficient number of scenarios are used. Sensitivity testing involves the examination of variations in the results of a test as one or more of the assumptions are varied. In order to test sensitivity to the interest rate model, the results of individual scenarios may be examined. Thus, option-pricing models are not typically used for cash

flow testing unless the models produce values for each distinct underlying scenario. The multiple fixed scenario method is in effect a sensitivity test for the single scenario method, and so is appropriate. Application of a single scenario deterministic model would generally *not* be considered to constitute adequate cash flow testing.

Q. Is there any time when a single interest rate scenario path may be appropriate?

A. If interest rate involvement is not a critical variable, such as short-term health insurance backed by short-term assets, then a single interest rate scenario with multiple *other assumption* scenarios is the approach used by some actuaries.

Q. What considerations guide the use of the multiple fixed scenario method?

A. The usefulness of the multiple fixed scenario method depends on the range of scenarios used. Normally, practitioners utilize scenarios representing a number of significantly different future interest rate environments. These environments typically differ by level of interest rate and by rate and direction of change of interest rates. Also, yield curve inversions are frequently represented. The range of scenarios includes moderately adverse interest rate environments.

Q. Are any scenario sets in common use?

A. The most commonly used set of deterministic scenarios is the so-called *New York 7* scenarios, required for submissions under that state's Regulation 126, which are the *Basic 7* scenarios in the revised Standard Valuation Law. These scenarios are actually redetermined each year so that the initial values can be set to equal current interest rates. A common practice is to extend the New York 7 (the Basic 7) approach to yield curves, and to add scenarios in which inversions are assumed to occur.

The minimum interest rate in the Basic 7 scenarios is floored at one half of the starting 5-year Treasury rate. For determining the interest rates for other than 5 years, some actuaries use parallel yield curves, reducing all interest rates used by the same amount the 5-year Treasury curve would be reduced. Others reduce other points along the yield curve proportionately to the reduction in the 5-year Treasury rate.

Regulation 126 also sets a maximum interest rate of 25%. This maximum is commonly used by actuaries, although some actuaries also feel that some scenarios which reach interest rates higher than the Regulation 126 maximum should be considered, especially when the current

interest rates are high. The *Model Regulation* does not specify any maximum interest rates.

In the survey of what actuaries did for year end 1992 asset adequacy testing, 29% tested just the Basic 7 scenarios. Another 29% tested the Basic 7 scenarios plus 1-3 inverted yield curve scenarios. Approximately 40% of the actuaries tested under more than 10 scenarios; some of those used stochastically generated scenarios in addition to the Basic 7 scenarios.

Some actuaries develop their own scenarios for use in forming their opinions regarding adequacy, and look to the New York 7 scenarios as part of their sensitivity testing.

Q. Is testing under the Basic 7 scenarios adequate?

A. Actuarial Standard of Practice (ASOP) No. 22 states: ". . . the actuary should be satisfied that the number and types of scenarios tested are adequate. Limiting such scenarios to those contained in the *Model Regulation* is not necessarily adequate."

Q. Are there any scenarios commonly used by appointed actuaries in testing?

A. In the 1993 survey of appointed actuaries, the most commonly cited additional scenarios were those with inverted yield curves. Testing changes in yield curves can provide useful information for assets such as structured notes, where the investment income and market values will change with changes in the shape of the yield curve.

Q. What meaning can be attached to the mean of the results under multiple deterministic scenarios?

A. Some regulators believe that no meaning can be attached to an average over scenarios chosen in such a manner, because the fact that a certain portion of the scenarios has produced satisfactory results gives no information about the statistical likelihood that a satisfactory result will occur.

Q. What types of random scenario models are included in current actuarial practice?

A. There are several types of random scenario models commonly used. One type of model uses binomial lattice to predict future rates. Another method is to use a Monte Carlo approach to calculate period-to-period changes in interest rates. Sometimes, changes in long- and short-term rates are calculated separately (i.e., using distinct distribution functions), and an interpolation procedure is used to approximate a yield curve. The standard deviation of the distribution is called the *volatility*.

Q. What distribution functions are commonly used by actuaries in determining a specific model of the term structure?

A. The lognormal distribution currently is commonly used for models that assume that long- and short-term interest rates are the random variables. (Other interest rate models, such as the Cox-Ingersoll-Ross and the Brennan-Schwartz models, use distribution functions for the error terms or residuals of the model equations.) Such a distribution, with quarterly volatility of around 16% for short-term rates and 8% for longer-term rates, is believed by many actuaries to validate reasonably to recent Treasury yield curves.

However, some recent research indicates other distributions may be preferable. A source of information on this subject is found in a report by David Becker, entitled "Statistical Tests of the Lognormal Distribution as a Basis for Interest Rate Changes," in the *Transactions of the Society of Actuaries*, v. XLIII (1991), p. 7. A description of the lognormal distribution is found in the *Proceedings of the Valuation Actuary Symposium* (1987), p. 22, and (1991), p. 540. A discussion of various stochastic models is given in the article "An Actuarial Layman's Guide to Building Stochastic Interest Rate Generators," by Dr. James Tilley. This article is printed in the *Transactions of the SOA*, v. XLIV (1992), p. 509. Another reference is Gordon E. Klein's "The Sensitivity of Cash Flow Analysis to the Choice of Statistical Model for Interest Rate Change," which can be found in *Transactions of the SOA*, v. XLV (1993).

Q. What is *reversion to the mean*?

A. *Reversion to the mean* is a tendency, built into a model, for random values to move toward a target value (mean) as the number of trials increases. For random scenario models, this is accomplished by modifying the output of the sampling procedure, perhaps by multiplying by a reversion factor that, in turn, is a function of a parameter called the *strength* of mean reversion. If the strength is zero, no mean reversion occurs; if it is unity, the interest rate is set to the target value. The reversion factor may be a function of the difference between the random value and the target value. At this time, there does not appear to be a substantial amount of research into choosing the proper value for a target value.

Q. When is reversion to the mean used by actuaries?

A. Actuaries sometimes use reversion to the mean to control the variations in interest rates produced by the Monte Carlo approach. For example, a reasonable proportion of the scenarios may be expected to include *pop-up* events at a frequency of, say, 5% or more, but such events should not occur in every scenario. Reversion can control this effect.

Q. How can an interest rate model be validated?

A. Normally, an interest rate model will revolve around the current yield curve. Moreover, for random scenario models, the volatility typically will fall within the range observed in recent history. The frequency of inversions is also considered in validating the interest rate model in most instances (cf. D. Becker, *Profits and Rewards* (Oct. 1991), p. 6).

Q. Are models ever used that violate the validation requirements?

A. Yes. Such models may be used for sensitivity tests and other purposes. For example, some practitioners set the mean of the *change* random variable to a level that will cause a large number of scenarios to fall in the regions that are expected to produce less acceptable results.

Q. What does *yield curve normalization* mean?

A. A number of actuaries surveyed said that the yield curve was abnormally steep at the end of 1992 and 1993, i.e., the short-term rates were abnormally lower than long-term rates. Therefore, a number of actuaries changed the yield curves tested so that the yield curve would be *normal* (i.e., less steep) after a period of years, typically 2 years. The actuarial regulators represented on the Life and Health Actuarial (Technical) Task Force appear to favor testing scenarios that show normalization whenever the starting yield curve has an abnormal shape—either flat, inverted, or unnaturally steep.

Q. How many random scenarios are sufficient?

A. Given the complexity of interest rates, a definitive answer cannot be given. Currently, some practitioners use from forty to several thousand scenarios. The accuracy of the estimate of the possible range of surplus for the business being tested can be expected to

increase with the square root of the number of scenarios. Testing the improvement gained from additional scenarios in a given situation may be useful. Some practitioners examine the scenario set to assure the presence of a significant number of scenarios of the kind thought most likely to produce less acceptable results.

Q. If some elements of a set of random scenarios are clearly unreasonable, can these be ignored or replaced?

A. Practitioners generally resist this practice. First, throwing out selected scenarios in a random sample destroys the randomness of the sample. In addition, recent history is not a safe guide to what is *reasonable*; most actuaries in the 1970s never expected the high interest rates of the early 1980s, and most actuaries in the 1980s did not expect the low interest rates we see today. However, if the set as a whole seems to be *too wild*, *too tame*, or *too sparse* in inversions, then many actuaries would consider modifying the parameters and generating another set.

Q. Does current actuarial practice include the use of option-pricing models for reserve adequacy testing?

A. Option-pricing models have been used for pricing and profitability testing of insurance and annuity products. Research is currently being conducted by the Society of Actuaries in the hope of extending their applicability to reserve adequacy testing. Normally, option-pricing models are constructed to estimate market values of options. In order to use option-pricing models for reserve testing, it is necessary to take account of the book-value orientation of statutory accounting.

Q. What considerations govern the use of option-pricing models for reserve adequacy testing?

A. It is usually prudent to check option-pricing models for internal consistency—for example, to avoid the possibility of risk-free arbitrage. Dr. Tilley's article, "An Actuarial Layman's Guide to Building Stochastic Interest Rate Generators," referenced above, discusses the possibility that interest rate models do not necessarily have to be totally arbitrage free. If several different option-pricing models are used (say, for certain assets and liabilities), many actuaries feel the consistency of the calculations must be checked. Also, the inability to study the variation of results as a function of the underlying interest rate scenarios leads some actuaries to adopt a higher degree of conservatism in using option-pricing models than other methods.

One limitation of option-pricing models is that they generally focus on C-3 risk and usually ignore the C-1 and C-2 risks.

At this time, there are regulators who will not accept asset adequacy testing done solely on the basis of option-pricing as described above, since the method has not yet been proved to their satisfaction to be adequate to test reserve adequacy.

LIFE PRACTICE NOTE 1994-5
December 1994

Use of the AVR/IMR in Cash Flow Testing

Introduction

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Q. How may the portion of the asset valuation reserve (AVR) that can be used to support a certain business unit be determined?

A. One method is to take the pro rata share of the default component of the AVR, based on the assets chosen to back the line, based on page 46 of the annual statement, with the following variables:

ratio	=	[actual current bond and preferred stock component (Line 6)] / [maximum current bond and preferred stock component (Line 7)]; or [actual mortgage component (Line 6)] / [maximum mortgage component (Line 7)] respectively, for bonds and preferred stocks versus mortgages;
factor	=	reserve factor by investment grade group (page 47); and
statement value	=	amount in Schedule D, Part 1, Column 4 of the assets equal to reserves backing the particular line of business by investment grade.

The pro rata share of AVR for the assets backing the line is equal to the sum over all investment grade groups of (ratio * factor * statement value). (If one wanted to add an extra element of precision, this result may be increased for the AVR on the assets that are assumed to back AVR (i.e., the AVR on the AVR).)

Q. How can the AVR for a segment be used?

A. There are several ways in which this can be used.

1. For each scenario, make the projection twice: without defaults and with defaults. Discount the difference in ending surplus back to the projection date at an appropriate sequence of interest rates for the scenario. If the maximum present value of this difference, for all specified scenarios, is less than the pro rata portion of the AVR described above, then the actuary can run the projections without the AVR assets and without defaults (under the assumption that the AVR covers the cost of defaults).

2. If this pro rata share of AVR is not sufficient to cover the present value of cost of defaults for all scenarios, then for each scenario the actuary could add assets equal to the pro rata AVR, and run the projections with defaults modeled.

3. Alternatively, if the actuary can model the development of the AVR itself, then the actuary could start with assets equal to the liability reserves plus the full pro rata AVR, and model the contributions to AVR as well as the projected defaults. (*Note*: New York limits the use of assets supporting the AVR to more than the present value of defaults.)

Q. The *Model Actuarial Opinion and Memorandum Regulation* states that the interest maintenance reserve (IMR) must be used in asset adequacy testing. Why?

A. The IMR is part of the statutory reserve. The IMR consists of the capital gain (or loss) on formerly owned assets that were sold or called, which is amortized over the remaining life that the asset would have had. The purpose of the IMR is to maintain the original matching between assets and liabilities that might be destroyed by the sale of an asset. Originally, it was anticipated that the IMR would be allowed to go negative, as long as the asset adequacy testing showed that the total statutory reserves, including the negative IMR, were sufficient to cover the liabilities. However, many regulators currently do not allow the IMR to be a negative number in the annual statement, so the starting IMR will not be negative. There is no prohibition regarding the use of negative IMR within the asset adequacy testing; a number of actuaries are allowing the IMR to go negative within the testing period.

Q. How does one determine which portion of the IMR can be used to support certain products, and how can it be used?

A. If the actuary allocates those former assets by line, then one possibility is to increase the starting assets by the amount of the unamortized portion of the capital gains for the former assets that are allocated to a certain product or business unit. Another possibility is to allocate the IMR proportionately to starting assets. The advantage to this second method is that it is simpler. A disadvantage to this method is that longer liabilities probably have longer assets, which produce higher capital gains when sold after a given drop in interest rates than shorter assets do.

Alternatively, if the actuary has software that is able to model the development of the IMR itself, then he or she could start with assets equal to the liability reserves plus the portion of the IMR, and model the changes to IMR as assets are called and sold during the projection.

Q. If products with relatively short lives are cashed out at the end, and the IMR and AVR are being modeled, what happens to the IMR and AVR at the end of the testing period?

A. The AVR only covers default risk. If at the end of the period, there are still assets left, the AVR could be considered when determining the amount of those assets. The IMR may be positive (or negative) even when there are no policies left that need to have interest maintained. Since the IMR must be included in testing, the value of the IMR should be included in calculating the ending surplus.

LIFE PRACTICE NOTE 1994-6
December 1994

Modeling Bond Default Risk

Introduction

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Q. What is *asset risk*?

A. *Asset risk*, as defined in Actuarial Standard of Practice (ASOP) No. 22, *Statutory Statements of Opinions Based on Asset Adequacy Analysis by Appointed Actuaries for Life or Health Insurers*, is "the risk that the amount or timing of items of cash flow connected with assets will differ from expectations or assumptions for reasons other than a change in investment rates of return." This risk, which includes default risk, is commonly referred to as *C-1 risk*.

Q. What are the current practices used in modeling default risk?

A. C-1 bond default risk has been most thoroughly evaluated in relation to risk-based capital needs. The analysis often takes the form of cash flow testing where the capital required to protect a company from threats to financial security under severely adverse conditions is developed. C-1 bond default risk has traditionally been evaluated independently of other forms of insurance risk.

In contrast, cash flow testing for reserve adequacy assessment usually makes provision for all forms of risk with the primary emphasis on investment-rate-of-return risk (C-3 risk). The testing measures asset and liability cash flow variations resulting from changes in interest rate environments. However, other insurance risk assumptions, including default risks, are sometimes held static over the modeling period.

One current practice of incorporating bond defaults into asset adequacy analysis results in a constant percentage reduction in the level of investment income. This is accomplished by reducing the asset value of all assets within a given asset quality class by the expected default rate for that period, with adjustment for residual values. The default assumptions are based on published historical default studies or company experience, and usually average the experience over a number of years. More sophisticated modeling varies the default assumptions by the rating quality of the bonds.

Q. What are the limitations with the current practice mentioned above?

A. As stated above, cash flow testing for asset adequacy analysis emphasizes exposure to interest rate risk. Asset and liability assumptions determine how policyholders, insurers, and borrowers vary their actions in response to changing interest rates. While there are other influences that affect these actions, cash flow testing under multiple interest rate scenarios can provide a sufficient test for reserve adequacy with respect to the C-3 form of risk.

Default risk exposure, however, is more correlated to general economic conditions than to interest rate levels. Default risk will be correlated to interest rate fluctuations only to the extent that more general economic conditions have correlation to interest rates. This correlation is not robust, and actuaries have, therefore, not generally attempted to vary default experience within interest rate scenarios, even though some cash flow software provides such a mechanism. Cash flow models also have not integrated economic conditions with interest rate scenarios. Actuaries have built default risk into cash flow asset adequacy testing through static default experience assumptions.

Factors other than economic-related default fluctuations also affect an asset portfolio's exposure to default risk. These factors are related to the specific make-up of the assets supporting the liabilities. These factors include the number of assets, the size of the individual issues, and the concentrations of assets with specific characteristics. For example, if a significant percentage of the portfolio's value is maintained in several very large issues, the default risk is greater than a portfolio of equal-sized assets. Similarly, a portfolio of 100 bonds of equal size is more risky than an equal-sized 600-bond portfolio. These types of variations in risk are not captured by applying a default loss factor ratably across all the assets in the portfolio, even if the loss assumptions vary with economic conditions.

Q. What types of considerations generally are reviewed in developing default experience assumptions?

A. In performing asset adequacy analysis, the appointed actuary generally considers reviewing historical bond default experience to develop average experience assumptions. The review could consider default experience over a 10- to 20-year period along with more recent experience. Company default experience may be valuable to study if the portfolio is large enough, especially for private placement bond experience.

A Society of Actuaries study on the credit risk for commercial mortgages and private placements is available. Information from this study could be useful in developing default risk charges.

Consideration may also be given to potential changes in future experience relative to past. Variations in annual rates of default and loss severity may be noted, keeping in mind that the magnitude of these variations may likely differ by quality ratings. From these reviews, the actuary may develop *average* default experience assumptions for use in cash flow testing. A number of actuaries do use different default assumptions, depending on the actual quality rating of the asset classes.

Q. Are there other specific considerations in modeling defaults?

A. Current practice and state-of-the-art cash flow software generally do not allow for the full integration of interest rate risk and default risk. The software also typically does not provide the analytical tools required to evaluate how default risk will vary by economic conditions or how default risk varies by specific makeup of the portfolio (number of issuers, size concentrations, publics versus privates, etc.).

The appointed actuary will have an understanding of how default experience of the modeled asset portfolio can deviate due to its specific characteristics. One approach to develop this understanding is to use a default model that permits several variations in asset make-up (e.g., quality, size, and concentration).

Q. Is sensitivity testing done on the C-1 risk?

A. A survey of what actuaries did for 1992 year-end testing showed that 30% did sensitivity testing on the C-1 risk. The results of this testing would probably be more significant for companies with lower-quality assets.

Q. Why are the default risks tested, since the risk-based capital provision and the AVR cover default risk?

A. The risk-based capital formula determines an appropriate minimum level of surplus. Since the asset adequacy testing is for reserve adequacy, not company solvency, the surplus does not impact the testing. However, the actuary can consider the asset valuation reserve (AVR) in determining the reserves needed to cover defaults, since the AVR is a reserve.

Q. What are possible methods of testing for bond default risk in an asset adequacy analysis?

A. Using the knowledge gained from an historical review of default rates under changing economic conditions and from a review of potential default variations due to portfolio characteristics, the appointed actuary will have gained insight into the potential annual fluctuation in default experience as well as fluctuations over a successive period of years. Current software technology does not readily permit default risk assessment much beyond a static reduction in yield, certainly not a full integration of default risk with interest rate risk.

However, the appointed actuary may want to take a more rigorous approach to default risk assessment than merely reducing the yield by the *average* default loss.

Some actuaries test for asset adequacy using the static approach within interest rate scenario cash flow testing. The static default assumptions (where default losses are level over the modeling period for a specific asset quality and grade) can consider assumptions developed from at least three experience period reviews: a 10- to 20-year historical analysis, a more recent historical review (3 to 5 years), and a short-term *best estimate* set of assumptions looking forward. The assumptions provided from this initial analysis for the static approach will provide a *base level* if further default testing is necessary.

The actuary may wish to examine the effect on reserve adequacy of possible fluctuations (due to economic changes or portfolio specific characteristics) around the expected default rate. This type of assessment is more important if the base level testing indicates reserve levels at or nearing inadequacy. The approach to this second level of testing is not straightforward using currently available software. One kind of test that could be performed under the static approach would be to use a default assumption that deviates from the expected value by, for example, one standard deviation. Such a test will allow the actuary to observe the sensitivity of results to the default assumption.

Q. Are there any other considerations in evaluating bond risk?

A. A number of actuaries evaluate the default risk of other bonds issued by the same issuer if such bonds constitute a significant percentage of the portfolio.

In addition to asset default risk, actuaries can consider obligation and investment-rate-of-return risk exposures.

LIFE PRACTICE NOTE 1994-7
December 1994

Modeling Mortgage and Real Estate C-1 Risk

Introduction

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Q. Are there any *standard* assumptions that can be used?

A. The latest draft of the revisions to New York Regulation 126 allows using an annual expense charge (or reduction in annual investment income) of 10% of the appropriate asset valuation reserve (AVR) maximum for assets considered in the default component of the AVR. However, if company experience calls for higher charges, the actuary is required by the regulation to use such higher charges. Currently, the AVR maximum for mortgages is 3.5%, multiplied by a company experience factor that can range from 0.5 to 3. Regulation 126 also allows an appropriate allocation, applicable to the reserves being tested, of assets supporting the default component of the AVR to be used in cash flow testing. However, this allocation may not be greater than the amount of such assets needed to cover the risk of asset default.

The revisions to Regulation 126 are silent on the issue of assets considered in the equity component of the AVR, namely common stocks and real estate.

It is likely that the AVR maximums and risk-based capital (RBC) factors will line up at some point in the future. The practicing actuary may want to consider basing default charges on the RBC factors rather than the AVR maximums. For example, the RBC factor for loans in the process of foreclosure is 20%. Using 10% of the RBC factor results in a charge of 200 basis points. Using 10% of the normal 3.5% AVR maximum results in a charge of only 35 basis points, which may be inadequate in today's environment, for loans in the process of foreclosure.

Using the RBC factors for delinquent loans and loans in the process of foreclosure may help to address one of the shortcomings of the AVR. This shortcoming is that the overall average factor will be 3.5% whether industry experience is unusually good or unusually bad. The use of higher factors for problem loan categories will produce a higher average factor in bad times, and a lower one in good times.

One additional point to consider about the use of either the AVR maximums or RBC factors is that the company experience factor used in both considers only the incidence of mortgage problems, not the severity of loss when problems occur. Thus, a company with a high incidence of problems but low levels of losses may be able to justify the use of somewhat lower factors. Also, the experience factor does not yet incorporate loans in good standing with restructured terms.

The *Quarterly Survey of Loan Delinquencies and Foreclosures* of the American Council of Life Insurance includes data on restructured *commercial* loans, in sufficient quantity to be used as an industry average. Restructures were 2.92% of total loans as of December 1990, 5.09% as of December 1991, 7.44% as of December 1992, and 9.35% as of December

1993. Any significant variation in a company's experience from this average could justify an adjustment to the experience factor. One version of the experience factor could be the sum of delinquent loans, loans in the process of foreclosure, restructured loans, and foreclosures; divided by the sum of total mortgage loans and foreclosures. This can be compared to the industry average for the prior 2 years.

Q. What approach may be taken to developing company experience?

A. Participation in the Society of Actuaries' Credit Risk Study for Commercial Mortgages and Private Placements can provide a structure for determining the ultimate loss on mortgages, following the loan, if necessary, through the process of foreclosure and ultimate sale. This study also gathers data items that may be used in developing a quality rating system for mortgages. The emergence of a rating system will offer the advantage of basing charges on loans a company holds, rather than on past experience, which may be on different loans. As loans of various qualities mature over the course of the projections, the use of a rating system would also enable default charges to be based on the quality of loans still held at the particular time the charges apply.

The SOA study released data for 1986 through 1989. This study is being updated for more recent years.

If an internal quality system exists in the company, this can be used in determining expected defaults. It would be helpful if this rating system were to be compared against that being developed by the SOA to ensure that items to be considered in the broad-based rating system will be available with the internal records.

Q. To what can a company's results be compared?

A. The ACLI study on commercial mortgages provides information on the incidence of problems, as far back as 1965. The industry averages used in the mortgage experience factor for the AVR and the RBC also provide some recent information, although restructured loans are not yet included.

A study entitled "Commercial Mortgages: Default Occurrence and Estimated Yield Impact," written by Mark Snyderman of Aldrich, Eastman, and Waltch, and published in the Fall 1991 issue of the *Journal of Portfolio Management*, tracks the experience of over 7,000 loans held by life insurance companies from 1972 through 1989. This study analyzes the severity of loss as well as the incidence of default, and shows an average loss of 32% on 155 foreclosed loans. Defaults are found to reduce the portfolio average yield by 31 to 52 basis

points a year, depending upon the default loss severity assumption for unforeclosed loans. Annual default rates are studied by years since loan origination, and peak in the early years at 1.6% before settling down to about 1%. The study shows that 41% of defaulted loans were actually foreclosed, with 59% either becoming current or being paid off. The average time from initial default to final disposition was 3 years for foreclosed loans.

In the current environment, most experts expect higher default rates, higher loss rates, and longer disposition times for commercial mortgages than found in the Snyderman study, with the situation continuing for at least a few more years. However, the Snyderman study may be considered by the actuary when developing long-term loss assumptions, perhaps after factoring in several years of more severe assumptions.

A report entitled, "Commercial Mortgage Stress Test," published June 8, 1992, by Fitch Investors Service, Inc., provides significant additional data on default probabilities and loss severity, including comments on assumptions that might be appropriate for the immediate future. The report also includes a summarization of the qualitative factors that should be considered in rating a pool of mortgages. Many of these factors typically would apply in evaluating individual mortgages.

Q. How might the company's internal rating system be used by the appointed actuary?

A. If a company has had an internal rating system long enough to do an experience study by rating, these results can be used. (*Note*: These results must be used in New York if the results are worse than the charges suggested in New York Regulation 126.) If, however, the internal rating system is fairly new or has recently undergone recent refinements, the actuary may want to estimate how the mortgage ratings would correspond to the bond ratings. The actuary can then use the resulting charges suggested in New York Regulation 126 for bonds. If the resulting weighted average charge is less than the overall charge required for mortgages, the actuary could ratio up the charge used for each specific rating.

Q. What about liquidity concerns?

A. While the yield degradation assumptions outlined above can provide an adequate measure of the amount of losses, companies with significant mortgage holdings or with any significant need for liquidity may wish to consider incorporating additional timing elements into their cash flow testing. For example, the Snyderman study showed an average of 3 years from the time of initial default to ultimate disposition. In the current environment, it may be

reasonable to assume either a longer time period or a lower price at disposition.

Interest-only loans in particular may have difficulty finding another lender to refinance with at maturity, especially over the next several years. One may assume that a company will have to refinance 50–75% of loans, with significant balloon payments coming due in the next few years. Reasonable credit charges typically will cover the fact that some of these loans may have to be refinanced at below-market rates. However, the size of the maturity payments may necessitate modeling this refinancing explicitly if these payments are important to meeting the cash needs of the business being tested.

Q. How can existing foreclosed real estate be modeled?

A. The best analysis generally would be on a property-by-property basis. While the results of such analysis may be summarized to an overall level that can be used for asset adequacy analysis, possible variations by property may be too great to make the use of broad-based assumptions feasible. This is more important if the amount would have a material effect on results.

The Fitch report includes a summary of some of the additional factors that may be considered in evaluating nonperforming loans and foreclosed real estate.

Q. Where can market data on real estate be obtained?

A. There are a number of publications that discuss real estate. Examples of these include *National Real Estate Investor*, a monthly magazine that contains an overview of submarkets, published by Communications Channels, Inc.; *Viewpoint 1992*, a national summary of capitalization rates, discount rates, and market absorption, published by Valuation Network, Inc.; and an annual empirical survey of space available and new construction, published by TCW Realty Advisors.

Q. How might limited partnerships be evaluated?

A. One method to evaluate limited partnerships is to be consistent with the evaluation of such assets under RBC, i.e., to look through the limited partnership package to the underlying assets. Each asset can then be evaluated on its own merits.

Q. What may be examined with regard to concentration of a portfolio?

A. If the company has a large percentage of assets in mortgages and real estate, there are various tests of concentration that an actuary may want to consider in determining the adequacy of assets in relation to the liabilities. These include a large percentage of the company's assets in a single property or development, a single city or geographic location, and/or a single type of asset (e.g., hotels).

LIFE PRACTICE NOTE 1994-8
December 1994

Collateralized Mortgage Obligations

Introduction

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LIFE PRACTICE NOTE 1994-8
December 1994

Q. What are *collateralized mortgage obligations* (CMOs), and where can general information on them be found?

A. Collateralized mortgage obligations (CMOs) are a broad class of investments that, at the core, are supported by residential mortgage loans. There are many types of CMOs, with various levels of risk. One good source of general information on CMOs is in the *1991 Valuation Actuary Symposium Proceedings*, in two presentations by Randall Lee Boushek and David A. Hall ("CMO Boot Camp: In the Tranches," pp. 107-166; and "Practical Asset/Liability Modeling for CMOs," pp. 331-406).

Q. What are the challenges of projecting CMO cash flows?

A. In the 1990 Valuation Actuary Symposium, Mr. Boushek described CMOs as nothing more than "contrived but uncertain" cash flows. The uncertainty is due to the underlying driver of the cash flows—mortgage payments and the prepayment function. The contrivance is due to (1) the extreme complexity of many CMO structures, (2) the fact that CMO structures differ among various CMOs, and (3) the lack of readily available data on CMO structures at points in time after issue. (At the time of issue, the structure is readily available in the prospectus.)

Q. What typically constitutes an adequate CMO model?

A. The desired sophistication and accuracy of a CMO model used for cash flow projections depend on the relative importance of CMO holdings in the portfolio and the volatility of the CMOs held. An accurate model generally will have, as a minimum, the following model features: (1) cash flows of the modeled tranche, dependent (if appropriate) on cash flows of other tranches; and (2) prepayment rates dynamic over time as interest rates change.

One method of testing the accuracy of the model is to compare results over different scenarios with the results projected by CMO databases and systems operated by broker/dealers or independent vendors. Two of the vendors are Global Advanced Technologies (GAT) and INTEX. A second method that provides some information is to compare the setup that would have been used 1 year ago with the actual cash flows received in the past year from the CMOs.

For companies with large exposures to CMOs, access to a *live* database of CMO issues can help with the two major problems with building CMO models. The first problem is that the great variety of tranches that exists usually makes it difficult for simple models to accommodate them all. The second problem is the difficulty of maintaining up-to-date data, not only on the tranche owned, but on the other CMO tranches that accompany the tranche owned.

Q. What prepayment assumptions may be used?

A. The appointed actuary generally is not trying to *predict* a specific prepayment rate as much as trying to *correlate* prepayment rates with changes in interest rates and other economic variables. The actuary's primary objective typically is to ensure that the correlations are reasonable. The following is a list of some of the items that the actuary can check for reasonableness:

1. the prepayment rate rises as interest rates decrease, and such changes typically follow an S curve (i.e., some additional prepayments with small changes in interest rates form the bottom of the curve; then prepayments accelerate as the difference between the original coupon rates and current market rates widens; and followed by prepayments eventually leveling off at some rate); likewise, the prepayment rate slows as interest rates increase;

2. prepayments are generally slower for lower coupon collateral and faster for higher coupon collateral;

3. prepayment rates vary by type of collateral (GNMA versus FNMA/FHLMC, 15-year versus 30-year, new versus seasoned mortgages);

4. prepayment rates are consistent across CMOs with comparable collateral;

5. prepayment rates for the level-interest-rate scenario bear a reasonable relationship to *street median* PSAs or historical PSAs. (PSAs are the Public Security Association Standard Prepayment Model); and

6. prepayments may slow due to the *burn-out* factor—the mortgage holders who watch interest rates prepay when interest rates are first lowered, while those remaining may not react as much to subsequent interest rate changes.

The appointed actuary generally will evaluate the sensitivity of results to the prepayment function. If it is a key assumption, the actuary may wish to perform sensitivity tests.

Q. Are there any additional prepayment considerations when the underlying collateral is based on floating-rate, rather than fixed-rate, mortgages?

A. Base prepayment rates on floating-rate mortgages appear to be higher than those on fixed-rate mortgages. This may be because some floating-rate mortgage holders may just be waiting for the "right" time to convert to a fixed-rate mortgage. Therefore, some actuaries

model dynamic prepayments on floating-rate mortgages based on changes in the coupon rates of 15- or 30-year fixed-rate mortgages.

Q. What other assumptions–besides prepayment rates–are necessary to consider for CMOs?

A. Another assumption the valuation actuary may want to evaluate is the sensitivity of indexed tranches (e.g., the floating-rate tranches indexed to LIBOR), with regard to the link of the index to the scenario interest rate. In addition, for a CMO that is non-agency backed, a default assumption is needed.

Q. What does the NAIC model *Actuarial Opinion and Memorandum Regulation* require be shown in the actuarial memorandum regarding CMOs?

A. The NAIC's model *Actuarial Opinion and Memorandum Regulation* states that the memorandum should include portfolio descriptions and investment assumptions. Details as to assumptions used in modeling CMOs include the prepayment assumption, and any simplifying assumptions used in modeling the company's CMOs.

For 1993, some actuaries included charts as to the cash flows of the inforce CMO portfolio under each of the scenarios tested.

For 1992, the Illinois Insurance Department requested additional details on CMOs to be included in actuarial memoranda. This includes an accounting of the amount of CMOs of various types, e.g., interest only mortgage strips (IOs), principal only mortgage strips (POs), planned amortization classes (PACs), targeted amortization classes (TACs), zero coupon tranches (Z tranches), and residual strips. One of the purposes of this information is to determine the volatility of the prepayments for the CMOs owned.

Q. Can grouping methods be used for modeling CMOs?

A. Some actuaries have used grouping methods for modeling CMOs. However, some regulators may request scenario cash flows on an individual CMO basis.

Q. What are some suitable methods of determining the market value of CMOs at a future point in time?

A. The market values of CMOs are important if the CMOs are modeled as being sold at a certain point in the future. In order to model the CMO, the underlying mortgage and the tranches preceding the CMO tranche owned usually are considered.

There are currently several methods of modeling the market value of CMOs being used by appointed actuaries. One of these methods is to use option pricing to evaluate the expected market value at each future period used in the testing. Another method is to assume the interest rates from the point being tested remain level from that point on, evaluate the worth of the underlying mortgage pool, and from there, determine the market value of the CMO owned.

Q. What are *FLUX scores*, and should they be related to asset adequacy testing?

A. FLUX (FLow Uncertainty indeX) scores are designed to measure the volatility of cash flows from CMOs. The formula used for deriving these numbers was designed by testing expected cash flows of various CMOs under several interest rate paths. The FLUX numbers are available on most major CMO data bases. They are also available to regulators via the State Data Network. It is not a requirement that these numbers be used in asset adequacy testing. However, it is possible that a company with CMOs with a number of high FLUX scores may have additional questions asked by the regulators regarding any cash flow testing done. The appointed actuaries may, therefore, wish to know the FLUX scores of CMOs tested.

LIFE PRACTICE NOTE 1994-9
December 1994

Alternative Methods of Testing for Obligation Risk

Introduction

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Q. What is *obligation risk*?

A. *Obligation risk*, as defined in Actuarial Standard of Practice (ASOP) No. 22, *Statutory Statements of Opinion Based on Asset Adequacy by Appointed Actuaries for Life or Health Insurers*, is "the risk that the amount or timing of items of cash flow connected with the obligations considered will differ from expectations or assumptions for reasons other than a change in investment rates of return or a change in asset cash flows." This risk is commonly referred to as *C-2 risk*, or *pricing risk*.

Q. What type of sensitivity testing is commonly done?

A. A survey of appointed actuaries in the context of asset adequacy testing for year end 1992 showed that 66% did sensitivity testing on lapse assumptions, and 53% did sensitivity testing on morbidity/mortality assumptions. Other types of sensitivity testing done on obligation risks included expenses, interest crediting strategies, dividends, reinsurance, amount of renewal premiums, and federal income tax assumptions.

Q. How does the appointed actuary typically decide on the scope of obligation risk testing?

A. The first step is to identify the material, or major, risks under the category of obligation risk. A review of sensitivity analyses from prior pricing and/or projection work, combined with the appointed actuary's general knowledge of the product line(s), might provide the basis for identification of the material risks. In then deciding on the scope of testing, the actuary generally will consider the potential volatility of future experience, the significance of any variance in terms of its effect on results (i.e., ending surplus), the existence of any repricing capability for nonguaranteed elements, and any interrelationships with asset, investment-rate-of-return, or other obligation risks. The obligation risks to be considered in this manner generally include mortality (including potential AIDS claim impact), morbidity, lapse, and expense risks. While both favorable and unfavorable deviations in future experience are possible, many actuaries believe the appointed actuary's primary concern should be the potential for adverse deviation with any obligation risk.

Q. What are some alternative methods of testing for obligation risk in an asset adequacy analysis?

A. At least three general methods are available, each with significant potential variations in application to any particular company or line of business. The three methods described in this practice note are as follows:

Scenario-Specific Testing
Sensitivity Testing
Health Claim Liability Methods

Q. What is meant by *scenario-specific testing for obligation risk*?

A. As the name implies, *scenario-specific testing* involves the development of specific alternative obligation risk scenarios within the context of cash flow testing for investment-rate-of-return risk and/or asset risk. While actuaries generally think of variations in economic and/or interest rate assumptions when considering alternative scenarios for cash flow testing, it is also possible to incorporate variations in key components of obligation risk. A *scenario* is, in fact, defined as "[a] set of economic and operating assumptions on the basis of which cash flow testing is performed," in ASOP No. 7, *Performing Cash Flow Testing for Insurers*. Variations in key assumptions with respect to obligation risk can be considered as part of the scenario's *operating assumptions*. Such variations in scenarios can be generated using either stochastic or deterministic methods, similar to the different methods used to develop variations in interest rates. The actuary is prudent to take care in the development of scenarios to keep the number to a manageable size that is still sufficient to reflect a range of conditions for all of the important categories of risk.

Q. What is meant by *sensitivity testing for obligation risk*?

A. In the context of an asset adequacy analysis, sensitivity testing of non-asset-related variables can be utilized to demonstrate the adequacy of reserves with respect to obligation risk. The sensitivity tests are designed to be applied after the completion of a basic set of scenarios involving different economic assumptions that are primarily focused on testing for asset and/or investment-rate-of-return risk. This approach would involve, for each significant type of obligation risk, determining the range of variations of the base assumption that has a reasonable possibility of occurring. The scenarios would then be rerun to determine the impact of such variation.

Certain combination sensitivities can also be tested in order to evaluate the impact of potential combinations of adverse experience.

Q. What is meant by using health claim liability methods for obligation risk testing?

A. Health claim liability methods are described in ASOP No. 5, *Incurred Health Claim Liabilities*, and include tabular methods, development methods, and loss-ratio methods. These methods are usually applicable to health insurance and similar lines that involve liabilities which are largely insensitive to the level of interest rates.

The key concerns of the appointed actuary are as follows:

1. the method is applied consistent with the standard to provide a reasonable estimate of the liability;

2. the liability or reserve can be demonstrated to be insensitive to interest rates and/or the choice of assets backing the liability (a going concern assumption may be involved here); and

3. the method is validated and/or updated regularly based on follow-up studies and updated experience analysis.

More detailed descriptions of health practices are in separate Health Practice Notes.

Q. Are the results of sensitivity testing shown in the actuarial memorandum?

A. In a survey of 1992 practices, slightly over one half of the appointed actuaries stated that the results of the sensitivity tests were shown in their memoranda.

A group of actuarial regulators has met several times in 1993 and 1994 at the NAIC meeting to review 1992 and 1993 memoranda. One outstanding criticism was that either sensitivity testing was not done, or that the results of the testing were not discussed in the memoranda.

LIFE PRACTICE NOTE 1994-10
December 1994

Special Issues for Valuing Single Premium Group Annuity Contracts

Introduction

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Q. What mortality assumptions can be used for single-premium group annuities?

A. When doing cash flow testing, actuaries may incorporate projections of future mortality improvement (ideally, generational mortality). (*Note*: An updated Group Annuity Mortality Table will be exposed by the Society of Actuaries in early 1995. This table incorporates generational mortality.)

If credible, a company's own mortality experience may be considered when determining the assumptions for liability projections.

Q. What ancillary benefits might be appropriate to consider in testing?

A. There are a number of ancillary benefits that may be considered when developing cash flow testing. These include early retirement benefits (usually subsidized), pre-retirement joint-and-survivor benefits, special death benefits, and other types of ancillary benefits that are often provided under terminal funding (or *closeout*) contracts.

Liability cash flow projections can make provision for these types of benefits, both in timing and amounts. One method of developing these assumptions is to use the pricing assumptions for these ancillary benefits. If these ancillary benefits have a substantial impact on results, sensitivity testing of the assumptions may be appropriate.

Q. What are special considerations for annuities under participating contracts?

A. Because of the wide variety of types of contractual arrangements, different methods of cash flow testing and modeling may be appropriate for different companies and contracts. The actuary may wish to examine the nature of the guarantees when determining methods and assumptions for cash flow testing on these types of liabilities.

If the annuities are fully guaranteed by the insurance company, and the plan sponsor or contract holder is not obligated to deposit additional funds in the future to support the annuities (typical of IPG contracts), it may be appropriate to treat these annuities as though they were non-participating annuities in cash flow testing.

LIFE PRACTICE NOTE 1994-11
December 1994

Special Issues Involving Structured Settlements

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LIFE PRACTICE NOTE 1994-11
December 1994

This practice note has been divided into three sections:

Section A. Guideline IX-A, which describes the minimum reserves allowed for substandard annuities and structured settlements.

Section B. Guideline IX-B, which defines a new commissioner's reserve valuation method for individual single-premium immediate annuities (and any deferred payments associated therewith), some deferred annuities, and structured settlement annuity contracts.

Section C. Cash flow testing for immediate annuities and structured settlements.

Section A: Guideline IX-A Questions

Q. What does Guideline IX-A require?

A. Guideline IX-A describes the minimum reserves allowed for substandard annuities. It also discusses when and to what extent a substandard valuation table may be used for annuities. When less than standard reserves are allowed, Guideline IX-A requires them, by use of the *constant extra deaths method*, to grade into standard reserves by the end of the (standard) mortality table.

Q. How are minimum reserves calculated for substandard annuities, according to Guideline IX-A?

A. According to Guideline IX-A, one must make a constant addition to the mortality rates, beginning with the annuitant's actual age, such that the life expectancy under the adjusted table is greater than or equal to

1. the life expectancy developed during the underwriting process, or

2. if more than one life expectancy is developed during the underwriting process, the average of all such life expectancies.

Q. When can a substandard mortality table be used under Guideline IX-A?

A. A substandard mortality table may be used when valuing one of the following:

1. benefits arising from court settlements; or

2. settlements involving workers' compensation; or

3. settlements arising from long-term disability claims, and when the annuitant is the injured party and there are relevant hospital records or physicians's reports that are kept on file by the company.

Q. How does the magnitude of the Guideline IX-A minimum reserves compare to that of the *rated up in age* reserves that have historically been the more common choice as a reserve methodology?

A. Typically, all things being equal, the minimum reserve under Guideline IX-A (or the constant application of extra deaths method) will produce an initial reserve, ${}^{cd}V_0$, that is less than its rated age counterpart, ${}^{r}V_0$, assuming that the selected rated age and the application of constant extra deaths to the mortality table at the true age produce life expectancies that are equivalent. With survival however, ${}^{cd}V_t$ fairly quickly exceeds ${}^{r}V_t$. Eventually, when the attained rated age reaches the limit of the mortality table, ${}^{r}V_t$ would be 0 while ${}^{cd}V_t$ would be approaching the standard reserve, V_t, that is, the reserve based on the true age of the annuitant without modification to the mortality table.

It should be noted that the presence of a certain period in the contract can alter the general relationship of the two reserves. It is possible that the initial reserve under an extra deaths methodology could exceed that under a rated age methodology under some conditions. It is also generally true that the absolute difference in initial reserve between the two methodologies decreases with increases in the certain period of the annuity contract.

For further information on this subject, actuaries may wish to consult the article entitled "NAIC Actuarial Guideline IX-A," in the July 1989 issue of *The Financial Reporter*, the newsletter of the Financial Reporting Section of the Society of Actuaries. The article was also reprinted as a Society of Actuaries Study Note, number 443-92-90.

Section B: Guideline IX-B Questions

Q. What does Guideline IX-B require?

A. Guideline IX-B defines a new commissioner's reserve valuation method for individual single- premium immediate annuities (and any deferred payments associated therewith), some deferred annuities, and structured settlement annuity contracts. The new reserve method

typically requires the use of nonlevel interest rates, under either option 1, the *carve out method*, or option 2, the *graded interest rate method*. Insurers are no longer permitted to use level interest rate reserves.

If a block of annuities issued in a given calendar year can pass either the *110% year of issue aggregate test* or the *115% individual contract test*, then the block can be reserved using the (level) valuation interest rate appropriate for Plan Type A contracts without cash settlement options for that calendar year.

If the block fails the tests, then one of two methods must be used:

1. The carve out method, which requires lump-sum benefits to be reserved at a lower interest rate.

2. The graded interest rate method, which requires all benefits to be reserved using graded interest rates.

Q. Guideline IX-B provides two methods for the reserving of single-premium immediate annuities (SPIAs), the carve out method and the graded interest rate method. Of the two methods, which one generally provides the lower total reserve?

A. Except for the case where there are no lump-sum benefit payments, the graded interest rate reserve methodology will produce the lowest initial reserve, ${}^{Gr}V_0$, because a level (x%) interest rate for the first 20 years is calculated such that ${}^{Gr}V_0$ is equal to an initial level interest rate reserve, ${}^{L}V_0$, which uses the appropriate (level) Plan Type A valuation rate for all benefits. Because the carve out method requires that any failing lump benefits (or groups of benefits) be segregated and reserved at level Plan Type A rates appropriate for their duration, the initial carve out reserve, ${}^{C}V_0$, is greater than or equal to ${}^{Gr}V_0$. Where a contract has no lump benefits, ${}^{Gr}V_0 = {}^{C}V_0$.

The graded reserves ultimately exceed carve out reserves as a result of the low ultimate interest rates that the graded methodology uses after the first 20 years. Under the carve out methodology, the lump-sum benefits are reserved at appropriately lower-level interest rates, whereas the benefit components that do not fail the 110% or 115% test can be reserved at the applicable level immediate annuity interest rate.

Under the graded methodology, all benefits payable beyond the first 20 years are subjected to a lower ultimate interest rate, whereas under the carve out method, only the lump-sum benefits are subjected to a lower valuation interest rate. The optimal reserve may be to start out using the graded methodology and as appropriate, perhaps by year of issue, move to the carve out method at or near where the two reserves are equal and cross over.

In any event, no SPIA reserve can be considered sufficient under Guideline IX-B in the absence of adequate cash flow testing, especially in the generally downward interest rate scenarios.

Q. Of the two carve out techniques (that is, the 110% aggregate test and the 115% seriatim test), which gives the lower reserve?

A. Generally speaking, the 110% aggregate test will probably give the lower reserve because it permits the aggregation of contracts within a year of issue. Contracts without lump-sum benefits can be combined with contracts with lump-sum benefits. The potential exists for two contracts with differing benefit patterns, each of which has lump-sum benefits that would fail the 115% seriatim test, to *cancel* each other out to some extent in the aggregate. However, a situation can exist where the 115% test would produce the lower reserve because of its larger tolerance, but, in general, this is not the case.

As yet, the law does not permit benefit aggregation across years of issue, which could potentially provide an even lower reserve.

Q. What is the rationale behind Guideline IX-B?

A. Single-premium immediate annuity (SPIA) benefits in general, and structured settlement annuity (SSA) benefits in particular are frequently quite long in duration. Prudent investment strategy usually dictates that portfolio managers invest as long and with as much call protection as possible. However, as it is rarely possible to cash flow match the assets and liabilities (since many of the annuity contracts will have benefit payments extending 50 or more years into the future), and, given the C-3 risk from asset calls and prepayments, the utilization of a level valuation interest rate forever would not be conservative actuarial practice, irrespective of whether or not the underlying contracts contain deferred lump-sum payments or have increasing benefit patterns. Level interest rate reserves would then likely be insufficient.

Thus, reserves based upon level valuation interest rates are no longer permitted for these liabilities under the Guideline. Instead, one must choose one of the two approaches given in the Guideline: the carve out method or the graded interest rate method.

SPIA reserves need adequate cash flow testing, especially in the generally downward interest rate scenarios.

Q. Are there any additional considerations to using Option A versus Option B reserves for structured settlements?

A. If the actuary uses Option B (graded) reserves, then the reserves are getting stronger over time. For example, if they are strengthened by 20 basis points per year, one builds up more of a sufficiency in later years. Then if interest rates go down, one would still have sufficient earnings to support the reserves. If one looks at only the market value of ending surplus, the effect of the graded reserve is not seen. In fact, if two companies are otherwise equal but one has reserves based on more strongly graded interest rates, then that company might be in a position to weaken reserves later on while the other company would need to strengthen its reserves.

Q. What are the effective dates for the guidelines?

A. Beginning in 1990, insurers were required to comply with Guidelines IX-A and IX-B for 1990 and later issues. However, an insurer must be in compliance for all of its inforce that is subject to the 1980 Amendments to the Standard Valuation Law by its 1993 year-end valuation.

Section C: Questions on Cash Flow Testing for Immediate Annuities and Structured Settlements

Q. May cash flow testing be based on an open block of business with future issues, or must the current inforce be treated as a closed block?

A. Testing the inforce as a closed block is a way to confirm that existing reserves and assets are sufficient to back the existing liabilities.

Q. What length of time period should be used for cash flow testing?

A. Since structured settlements are sometimes issued at very young actual ages, a case can be made for doing at least some of the projections over a period of many decades; perhaps as long as 50 years or more. This would mean that virtually all of the initial assets would have matured, and replacement assets would have been in place for many years.

A number of actuaries feel that the period chosen should be long enough that half to two-thirds of the benefits (and 80–90% of the present value of the benefits) will have been paid by the end of the projection period. In general, 30 years may be an acceptable time frame for an average block; it is the period mentioned in New York's Regulation 126.

Q. Are there any special considerations on the scenarios to be tested for structured settlements and other payout annuities?

A. For structured settlements and other products where the testing period is more than 10 years, many actuaries test random scenarios in order to test the effect of varying the interest rates beyond 10 years, since the scenarios mentioned in Regulation 126 and in the model *Actuarial Opinion and Memorandum Regulation* only vary interest rates for a 10-year period.

For structured settlements and other products where long testing periods are used, consideration may be given to testing variations in interest rates greater than the maximum variation of 5%, which is mentioned in Regulation 126 and in the model *Actuarial Opinion and Memorandum Regulation*, since interest rates have varied by more than 5% in the past 15 years.

Q. What are some other sources available to the actuary wishing to become more familiar with this topic?

A. The SOA *Record*, v. 17, pp. 1787-1808, is one such source of information.

LIFE PRACTICE NOTE 1994-12
December 1994

Notification of Reserve Misstatement

Introduction

This practice note was prepared by a work group organized by the Committee on Life Insurance Financial Reporting of the American Academy of Actuaries. The work group was charged with developing a description of some of the current practices used by valuation actuaries in the United States. This work group was originally formed in 1992 and issued the first set of Life Practice Notes that year; changes have been made to this set of practice notes on an annual basis to reflect additional information on current practices.

The practice notes represent a description of practices believed by the work group to be commonly employed by actuaries in the United States in 1994. The purpose of the practice notes is to assist actuaries who are faced with the requirement of adequacy testing by supplying examples of some of the common approaches to this work. However, no representation of completeness is made; other approaches may also be in common use. It should be recognized that the information contained in the practice notes provides guidance, but is not a definitive statement as to what constitutes generally accepted practice in this area. Moreover, these practice notes are based upon the model Standard Valuation Law of the National Association of Insurance Commissioners (NAIC). To the extent that the laws of a particular state differ from the NAIC model, practices described in these practice notes may not be appropriate for actuarial practice in that state. This practice note has not been promulgated by the Actuarial Standards Board or any other authoritative body of the American Academy of Actuaries, nor is it binding on any actuary.

The members of the work group responsible for this practice note are as follows:

Donna R. Claire, chairperson

Arnold A. Dicke	Steven A. Smith
Douglas C. Doll	Stephen J. Strommen
Craig F. Likkel	Charles N. Vest
Linn K. Richardson	Michael L. Zurcher
Henry W. Siegel	

Comments are welcome as to the appropriateness of the practice notes, desirability of annual updating, validity of substantive disagreements, etc. Comments should be sent to Donna Claire at her Directory address.

Q. What must the appointed actuary do if notified of a reserve misstatement?

A. The NAIC has adopted a new annual statement instruction, effective for actuarial opinions submitted in connection with annual statements for the year 1993 and thereafter. The instruction, which is reprinted in full below, sets forth the procedure that must be followed if the appointed actuary discovers that his or her opinion would not have been issued or would have been materially altered had the actuary known that certain data or other information was factually incorrect as of the balance sheet date.

The instructions explicitly indicate that the opinion shall not be considered in error solely because the data or information in question concerned events subsequent to the balance sheet dates or if the actual results differed from projected results.

Q. What may the actuary do if the actuary thinks a conflict exists between the responsibilities to notify the commissioner and the responsibilities to his or her employer?

A. In carrying out his or her responsibilities, the actuary may perceive a conflict of interest between the responsibility to notify established in the NAIC instruction and the actuary's responsibility to his or her client or employer. In recognition of this, the instruction allows the actuary to provide, in place of the required notification, "such other notification [as] recommended by the actuary's attorney." In order to minimize the effects of any such conflict of interest, the actuary may wish to have the client or employer specify in the letter of appointment that the procedure described in this annual statement instruction is to be carried out by the appointed actuary.

Q. What is the annual statement instruction regarding reserve misstatement?

A. The Annual Statement Instructions for Life and Accident and Health Insurers—Actuarial Opinion, instruction #12, states the following:

> The insurer required to furnish an actuarial opinion shall require its appointed actuary to notify its board of directors or its audit committee in writing within five (5) business days after any determination by the appointed actuary that the opinion submitted to the domiciliary Commissioner was in error as a result of reliance on data or other information (other than assumptions) that, as of the balance sheet date, was factually incorrect. The opinion shall be considered to be in error if the opinion would not have been issued or would have been materially altered had the correct data or other information been used. The opinion shall not be considered in error if it

would have been materially altered or not issued solely because of data or information concerning events subsequent to the balance sheet date or because actual results differ from those projected.

Notification shall be required for any such determination made between the issuance of the opinion and the balance sheet date for which the next opinion will be issued. The notification should include a summary of such findings and an amended opinion.

An insurer who is notified pursuant to the proceeding paragraphs shall forward a copy of the summary and the amended opinion to the domiciliary Commissioner within five (5) business days of receipt of such and shall provide the appointed actuary making such notification with a copy of the summary and the amended opinion being furnished to the domiciliary Commissioner. If the appointed actuary fails to receive such copy within the five (5) business day period referred to in the previous sentence, the appointed actuary shall notify the domiciliary Commissioner within the next five (5) business days that the submitted opinion should no longer be relied upon or such other notification recommended by the actuary's attorney.

If the actuary learns that the data or other information relied upon was factually incorrect, but cannot immediately determine what, if any, changes are needed in the statement of opinion, the actuary and the company should undertake as quickly as reasonably practical those procedures necessary for the actuary to make the determination discussed above. If the insurer does not provide the necessary data corrections and other support (including financial support) within ten (10) business days, the actuary should proceed with the notification discussed above.

No qualified actuary shall be liable in any manner to any person for any statement made in connection with the above paragraphs if such statement is made in a good faith effort to comply with the above paragraphs.

LIFE PRACTICE NOTE 1994-13
December 1994

Expenses

Introduction

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Q. For which expenses is provision commonly made in cash flow testing?

A. Actuarial Standard of Practice (ASOP) No. 22 states the following:

> Reserves and related items . . . are considered to make adequate provision for the obligations and expenses of the company, provided satisfactory results are obtained.

The expenses to be considered normally include administrative expenses, investment expenses, and overhead expenses.

Q. Must acquisition expenses be considered?

A. Cash flow testing concentrates cash flows arising from inforce business, and these do not normally include acquisition expenses. However, it is possible that a business in its first year of testing may still have acquisition expenses associated with it, which would therefore be considered expenses related to the business being tested.

Q. How may insurance expenses used in testing be checked for reasonableness?

A. In the 1993 survey of appointed actuaries, 30% of those replying stated that they reconciled the numbers used to annual statement numbers. Of those replying, 55% used a survey of their own company's expenses. Some used industry data, such as the information on expenses from the Life Office Management Association (LOMA). In the above survey, a few respondents stated that pricing expenses were used.

Note: At least one regulator has stated that using industry data alone as a standard for an expense assumption is not acceptable, since it implies that either (1) the company does not have a good management information system, (2) the company is covering up a pricing problem, or (3) the actuary is not taking his or her job seriously.

Q. Some pricing data assume that expenses will decrease over time, as economies of scale are reached. May this be reflected in testing?

A. One way that some actuaries are reflecting possible changes in future expense levels is to split the expenses into fixed and variable expenses, with different assumptions for each. Fixed expenses would normally be increased to account for general price inflation. Another

current practice is to use pricing assumptions, but to also do a sensitivity test that assumes the level of expenses remains at the current level.

Q. Should insurance expenses be adjusted for inflation?

A. In the survey mentioned in the question above, a number of people stated that the expenses were adjusted for inflation. One way to do this is to have per policy (and fixed) expenses increase with the level of inflation appropriate to each scenario. Another comment was that certain expenses, such as those as a percentage of reserves, would automatically increase as the level of reserves per policy increases over time. The level of inflation appropriate to a given scenario may be determined by consideration of the long-term average real returns on the projected investments.

Q. Should sensitivity tests be done on the expense levels assumed in testing?

A. ASOP No. 7 states that the actuary should consider the sensitivity of the model to the effect of variations in key assumptions. For some products and/or companies, expenses may be considered a key variable. The 1993 survey of appointed actuaries showed that at least 17% of those surveyed did some sensitivity testing on expenses.

Q. Should a provision for overhead expenses be included in testing?

A. There is a variety of definitions of *overhead* in use. Additionally, there is a wide range of opinion as to the proper allocation of overhead to tested lines of business.

Certain overhead expenses, such as management salaries, are typically recurring expenses. A number of actuaries assign these expenses to lines of business in proportion to the direct expenses of each line. Other actuaries perform studies to further break down the overhead expenses into *acquisition*, which is not included in the cash flow testing, and *maintenance* expenses, which are included.

Certain overhead expenses are extraordinary. For example, some actuaries argue that *extraordinary* expenses, such as those associated with seeking to acquire a new block of business, are not obligations of the inforce business being tested, but rather will be assigned to the new block of business after it is acquired. Other actuaries point out that a certain level of extraordinary expense occurs each year, and therefore include it as part of the

administrative expenses used in cash flow testing. (*Note*: At least one regulator has expressed a preference for this latter approach to extraordinary expenses.)

Q. How are investment expenses typically handled in cash flow testing?

A. A number of companies develop investment expenses as part of their company expense survey, and these values are used in cash flow testing. Some companies develop formulas that only charge at acquisition and disposition of the asset. Many companies develop a formula of investment expenses as a number of basis points per year for each asset type. Some actuaries directly reflect investment expenses; others net investment expenses against the gross investment earned rates.

Q. How may investment expenses be checked for reasonableness?

A. The results of this question were similar to the results regarding insurance expenses in the 1993 survey of appointed actuaries: 43% of those replying stated that they reconciled the numbers used to annual statement numbers; 40% stated they used a survey of their own company expenses. Some use industry data obtained from a consultant, while at least one stated that the numbers provided by the investment department were used.

LIFE PRACTICE NOTE 1994-14
December 1994

Report Preparation

Introduction

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Q. What type of reports should be prepared in connection with asset adequacy analysis?

A. Many states require the preparation of an actuarial opinion, which is generally filed with the annual statement. In addition, most states require that an actuarial memorandum be prepared, although, at this time, companies may not be required to file the actuarial memorandum with the state insurance department, except as requested. However, the August 1, 1994 draft of the New York *Actuarial Opinion and Memorandum Regulation* would require that the actuarial memorandum be submitted by all licensed insurers (not only domestic companies), unless the company gets a letter from an accredited state that has reviewed the company's memorandum from the prior year.

Some states have also requested an executive summary of the actuarial memorandum. The NAIC model *Actuarial Opinion and Memorandum Regulation* may be changed to require such a document.

Q. What should be contained in an executive summary?

A. A number of actuaries prepared management executive summaries for year end 1993. These differed, depending on which items were of interest to company management. Some executive summaries gave a brief history of why the asset adequacy testing was done, what areas contributed to the study, and results that highlighted the particular concerns of management. For example, some actuaries provided projections of risk-based capital levels at certain future points; others showed interim results for the next few years.

For year end 1993 (and 1994), certain regulators, such as Larry Gorski, Life Actuary of the Illinois Insurance Department, requested an executive summary. Some actuaries provided the same executive summary given to company management; others prepared a separate document specifically addressing the items requested by the regulators.

Q. What is required to be covered in the regulator's executive summary?

A. Any regulator requiring an executive summary will inform companies of such requirements, either by a letter or regulation. The following is a preliminary list of items to be covered in the memorandum executive summary that would be required under proposed changes to the NAIC model *Actuarial Opinion and Memorandum Regulation*:

1. The amount needed to eliminate all *market value* negative surplus at the end of the testing period.

2. Any material differences in assumptions from the year before.

3. The reserves subject to asset adequacy the year before, but not subject in the current opinion.

4. The number of additional interest rate scenarios tested, and the number that produced negative *market value* of surplus.

5. The types of sensitivity tests performed.

6. The comments on interim results.

7. The method used to recognize the impact of reinsurance.

8. Whether the actuary recognized all options embedded in assets.