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A Letter from the Chairperson...
GAAP ROE: Exactly How Meaningful Is It?

by John Bevacqua

Editor's Note: The section's GAAP list serve would be an appropriate forum for discussing concepts in this article.

Return on equity (ROE) is the ratio of annual earnings to the equity position of the company at of the beginning of the year. Fidelity's Web site states that ROE "shows how effectively a company is using its investors' money." The underlying view, it appears, is that management invests its equity into its business each year and, *presto*, the original equity plus its return appears at the end of the year. In the ensuing year, the process is repeated. This is how analysts and the investment community interpret GAAP ROE, as they believe GAAP has been standardized across industries; therefore, a GAAP ROE of a life insurance company should be comparable to a GAAP ROE of an automobile manufacturer.

Upon inspecting the mechanics of GAAP for a life insurance enterprise, it becomes apparent that GAAP ROE says very little, if anything, about the value that management has created during the reported period. This may be seen by separately examining the numerator, the denominator and the relationship between the two.

THE NUMERATOR

With a traditional manufacturer, a "widget" is created and sold to a customer (usually without recourse) within a relatively short period of time. The recorded gain to the manufacturer is the excess of the price received for the widget less the cost of goods sold. Generally speaking, management creates value by identifying strategies that allow them to sell as many widgets as possible at a price that exceeds the cost of goods sold as much as possible. Therefore, the earnings for a traditional manufacturer are closely ascribed to the strategies adopted by management to

continued on page 4

What's Inside

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Articles Needed for the Reporter

Your ideas and contributions are a welcome addition to the content of this newsletter. All articles will include a byline to give you full credit for your effort. *The Financial Reporter* is pleased to publish articles in a second language if a translation is provided by the author. For those of you interested in working in further depth on *The Financial Reporter*, several associate editors are needed. For more information, please call Jerry Enoch, editor, at (765) 477-3220.

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Please e-mail your articles as attachments in either MS Word (.doc) or Simple Text (.txt) files to the newsletter editor. We are able to convert most PC-compatible software packages. Headlines are typed upper and lower case. Please use a 10 point Times New Roman font for the body text. Carriage returns are put in only at the end of paragraphs. The right-hand margin is not justified. Author photos are accepted in .jpg format (300 dpi) to accompany their stories.

If you must submit articles in another manner, please call Joe Adduci, 847-706-3548, at the Society of Actuaries for help.

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Thank you for your help.

SOCIETY OF ACTUARIES

Letter From the Editor

by Jerry Enoch

I see my objective as editor as helping financial reporting actuaries by serving as an intermediary in order to present good, useful material to them. This standard is not particularly high—I'm looking for "good" material, not "great" material. I think we are better served by 10 good articles than by one great article. Furthermore, if we get 10 good articles, I think there's a good chance that one of them will be great, or close to it. One consequence of this is that I am attempting to publish articles for our readers, not keep articles out of publication. When someone submits an article, I look for something in it that will benefit our readers—not for a reason to claim that is unworthy of publication.

The word "useful" needs some explanation, as I use this word in two senses. In the first sense, useful means "practical." My bias is toward articles that are applicable in daily work, because I think that is what practicing actuaries want and need. But other articles are also important. It is also important to have articles that discuss the way things may be in the future in order to help the actuary prepare. Articles about international accounting standards provide a good example. I am also interested in articles that are purely theoretical, because these can help us keep our minds sharp, and they may lead to changes in practice.

In the second sense, I am looking for articles that are useful in that they are "easy to use." Although our readers are very intelligent and can extract meaning out of almost incomprehensible material, your time is very valuable, and you are best served by receiving material that is succinct and clear. Some articles can be effective only if they are long, but my bias here is toward short articles. I greatly admire whoever first wrote, "I would have written a much shorter letter, but I didn't have enough time" (loosely quoting from memory). I could have said the same thing many times. An advantage of writing for a publication with wide readership like *The Financial Reporter* is that the effort of writing a shorter article is highly leveraged by the great number of readers that it benefits. "Easy to use" means more than being short and succinct. It also means well organized, easy to follow and clearly written. It is in this area that the editor may have his or her greatest opportunity to make a contribution to the process. I would like to encourage you to write us an article about a financial reporting topic that interests you. A few good paragraphs is really all it takes.

I would like to welcome Keith Terry, of Farmers New World Life Insurance Company as an associate editor of *The Financial Reporter*. Keith has provided some valuable assistance for this issue, and I look forward to working with him in the future. I would also like to recruit an additional associate editor. If we spread the work around, we will have better ideas about what to do and better quality in what we actually do. If you are interested, please contact me.

I also want to express thanks to three others who have helped with this issue in various ways, but whose names do not appear. They are Tom Nace of PolySystems, my predecessor as editor, John Yanko of Forethought Financial Services, and Barbara Gold of Prudential. You are appreciated!

- Jerry

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market, build, and distribute their products within the recent period.

Life insurance policies, however, have unique characteristics that create a number of challenges when measuring the financial performance of a life insurance enterprise. First, the obligation of the life insurance company to its customers does not stop when the product is sold. Current accounting models dictate that the earnings associated with the sale of a life insurance contract should be recognized ratably during the period of

time over which the life insurance company fulfills its obligation to the policyholder. Given the long duration of many life insurance contracts, a substantial portion of the earnings reported by life insurance companies in a given reported period is associated with policies sold many years ago and are, therefore, more of a byproduct of historical pricing, marketing, underwriting and marketing strategies defined under prior management regimes than by strategies implemented by current management.

The Denominator

The GAAP equity of a life insurance enterprise may be conceptually viewed as consisting of four primary components: (1) unamortized deferred acquisition costs, (2) goodwill and other intangible assets, (3) target surplus, and (4) free surplus. The first three items represent amounts that management effectively cannot deploy to the benefit of stakeholders. A company may monitize its DAC through debt, but its ability to do this is generally limited. As a life insurance company grows and its DAC balance grows, the ability of the company to sustain its profitable growth becomes hampered as an increasing portion of its equity becomes non-deployable.

The Ratio

Going back to the point made at the beginning of this article, GAAP ROE is premised upon the fact that a relationship exists between earnings and equity—more specifically, that the equity was, in fact, used by management to create the earnings. This relationship does not generally hold true for a life insurance business, as:

- Not all of the equity is deployable
- Much of the reported earnings have nothing to do with actions taken by management during the reported period

Therefore, much of the reported earnings are completely unrelated to the GAAP equity that existed at the beginning of the reported period.

Possible Solutions

Do the problems associated with GAAP ROE mean that management can do very little to influence the value of their enterprise? Absolutely not! Life insurance companies can improve the productivity of their distribution channels, the quality of their underwriting and marketing departments and provide exceptional customer service as a means of increasing stakeholder value. This shortcoming of GAAP is its departure from basic economic capital budgeting theory, which is a glaring deficiency as investors and potential investors use this information to decide how to invest their own capital (i.e. should I buy/sell an interest in this corporation?). So, what can management do to provide more useful financial information to the investing public?

This predicament appears to call for the use of non-GAAP measures. Certainly, many of the value-based measurement systems can provide the information that investors are truly seeking. These systems generally recognize the present value of future profits of the business, and the changes in the present value of future profits over a reported period. These measurement systems, in

effect, value the asset of the shareholders and the changes in this value over time.

The AICPA Insurance Liaison Task Force convened on January 8, 2003 and discussed a number of issues, including the disclosure of non-GAAP measures in documents filed with the SEC. Among other requirements, the SEC indicated that non-GAAP measures should be reconciled with GAAP measures with adequate explanation of the appropriateness of the non-GAAP measures. Further, whenever non-GAAP measures are presented, the related GAAP measure should be presented. The question that naturally arises within the context of value-based measurement systems is how, if at all, can we convey value-based concepts within a GAAP context?

One possibility would be to attempt to apply certain value-based concepts to the mechanics used to derive DAC. A couple of ways in which this may be done are as follows:

- Solve for and disclose the discount rate that results in a K-factor of 100%. For SFAS 60 business, the K-factor would be established such that 100% of the gross premium in excess of the net premium would be used to amortize DAC. This should roughly correspond to the internal rate of return on the business sold—to the extent this exceeds the company's cost of capital, management would appear to be adding value to the enterprise. This approach would:
    - Result in no gain or loss upon selling a given contract, which is similar to current GAAP results but different than an Embedded Value approach
    - Create a yield on DAC equal to the IRR, rather than the earned or credit rate of the company.
- Set DAC equal to the present value of future EGPs (Expected Gross Profits under SFAS 97), EGMs (SFAS 120), or excess of gross premiums over net premiums (SFAS 60) using a cost of capital or hurdle rate. To the extent you have worked with purchase accounting, you will recognize this as the method used to calculate VOBA. This approach would:
    - Create a gain or loss upon the sale of a given contract, depending upon the relationship of the adjusted DAC as defined within this method to the actual acquisition costs.
    - Create a yield on DAC equal to the cost of capital or hurdle rate.

I am certain that other approaches may exist, and that further refinements to this methodology may be necessary, but, rest assured, that the investment community stands to benefit significantly by providing an alternative to GAAP ROE for determining management effectivenesss for a life insurance enterprise.

John F. Bevacqua, FSA, MAAA, is partner at Deloitte & Touch LLP in Hartford, CT. He can be reached at jbevacquajr@deloitte.com.

Group Experience Studies

The Group Life Experience Committee is now requesting data for two studies: a group term life experience study and a premium waiver study. The data will serve in updating the 1985-89 Group Life Experience Study (*http://www.soa.org/research/rarchive/glifetab.htm*) and the Krieger Table, also known as the 1970 Intercompany Group Life Disability Study (*http://www.soa.org/library/ tsa/1970-79/TSA71V23PT1N6722.pdf*), respectively, and are critical to pricing and reserving for group life insurance. The specifications for this study can be found on the SOA Web site (*www.soa.org*) under Research. For more information on these studies, please contact either of the experience study chairs, Sue Sames, at samess@towers.com, or Karen Edgerton, at *karen_edgerton@swissre.com*.

Overview of IASB Accounting for Insurance Contracts

by Laura J. Hay and Scott E. Wright

Editor's Note: The section's International Accounting list serve would be an appropriate forum for discussing concepts in this article.

Companies in Europe, Australia and other parts of the world will be required to report using International Accounting Standards (IAS) for calendar year 2005. American subsidiaries that consolidate to a European parent will be required to do so as well. When companies report their first IAS statements, they will also be required to restate their 2004 income statement. This will require balance sheets for 2003, 2004 and 2005 year-ends. There are still many areas under debate with regard to insurance contract accounting under IAS, but some pieces are starting to fall into place.

The International Accounting Standards Board (IASB) has divided insurance contracts into two classifications: "financial instruments" and "insurance contracts." Financial instruments includes products without significant insurance risk, such as some deferred annuities, variable annuities and participating life. Their accounting is determined by IAS 32 and 39. The former addresses disclosure and presentation, the latter addresses recognition and measurement. Both of these standards have been adopted, and both have amendments pending in exposure draft form. Final versions of the standards will likely be seen in the revised standards to be released in 2003, provided the IASB holds to the original timetable.

The IAS will not determine the accounting for insurance contracts until 2007.

Insurance contracts includes contracts that do contain significant insurance risk, such as term insurance, health insurance, and whole life. The IAS will not determine the accounting for insurance contracts until 2007, at the earliest. Until the insurance standard is issued, companies are allowed to use their local GAAP accounting for contracts that are classified as insurance under IAS 32.

For some contracts, it is not clear whether they will be classified as financial contracts or insurance contracts. Two examples are heavily-funded universal life contracts and deferred annuities with certain death benefit provisions.

The Valuation of Financial Contracts

The remainder of this article will examine the valuation of financial contracts, such as variable annuities, focusing on the implications of different approaches to a fair-value calculation. As IAS 39 is currently written (before considering changes in the exposure draft), this business should be valued at amortized cost, described as a constant interest method or level internal rate of return method. Under this method, there is an implicit deferral of acquisition costs, as the commissions are netted from the premium in determining the starting point for determining the IRR.

Proposed changes to IAS 39 will allow a financial instrument to be designated as "trading." A financial instrument designated as trading will be valued at fair value, and changes to fair value will then go through the income statement. IAS 39 suggests broad principles for valuing financial instruments for which there are no quoted market prices from an actively traded exchange. Among the methods allowed are the use of replicating portfolios, M&A valuation approach, discounted future cash flows and other valuation techniques.

Basis for Numerical Examples

To illustrate the various methods under discussion for valuing an insurance company's financial instruments that are liabilities (financial liabilities) under IAS 39, consider the numerical example of a simple variable annuity with cash flows detailed in Table 1, based on the following assumptions:

Term = 10 years
100,000 single premium
Commission = 5%
Fees = 1.3% of the account balance
Expenses = 0.4% of the account balance
Back-ended surrender charges (per year) = 10, 8, 6, 4, 2, 0% thereafter
Lapse rate = 2, 4, 6, 8, 10, 15, 10% thereafter

Table 1
Cash Flows From Sample Variable Annuity

Year	Premium	Fund BOY	1.30% Fees	7% Interest Growth	Lapse Rate	AV Lapsed	Surrender Charge	Surrender Claims Paid	5% Comsn.	0.40% of Fund Expense
1	100,000	100,000	1,300	6,909	2%	2,112	10%	1,901	5,000	400
2		103,497	1,345	7,151	4%	4,367	8%	4,022	0	414
3		104,930	1,364	7,250	6%	6,649	6%	6,250	0	420
4		104,166	1,354	7,197	8%	8,801	4%	8,449	0	417
5		101,208	1,316	6,992	10%	10,689	2%	10,475	0	405
6		96,197	1,251	6,646	15%	15,239	0%	15,239	0	385
7		86,354	1,123	5,966	10%	9,120		9,120	0	345
8		82,077	1,067	5,671	10%	8,668		8,668	0	328
9		78,013	1,014	5,390	10%	8,239		8,239	0	312
10		74,150	964	5,123	100%	78,309		78,309	0	297

Table 2
Valuation of Variable Annuity Using Amortized Cost

Time	Cash Flow	Reserve	Profit	Profit/ Reserve
0	95,000	95,000		
1	4,608	99,095	513	0.54%
2	2,714	101,275	535	0.54%
3	580	101,308	547	0.54%
4	-1,669	99,093	547	0.54%
5	-3,887	94,671	535	0.54%
6	-8,977	85,183	511	0.54%
7	-3499	81,224	460	0.54%
8	-3,326	77,460	438	0.54%
9	-3,161	73,881	418	0.54%
10	-73,483	0	399	0.54%
IRR	-0.54%			

Cash Flow = Premium - Surrenders Claims Paid - Commissions
Reserve = Prior Reserve * (1+IRR) + Cash Flow
Profit = Cash Flow - Increase in Reserve

Account value growth rate = 7%
Annual model with premiums, fees and expenses at the beginning of the year, surrenders at the end of the year
There are no guaranteed minimum death or earnings provisions

The cash flows resulting from these assumptions are shown above in Table 1.

Fair Value: Amortized Cost

As explained above, under the current version of IAS 39, financial instruments such as the sample variable annuity would be valued using amortized cost. Table 2 shows the sample cash flows, the IRR and the resulting profit from this type of calculation. The profit emerges smoothly as a constant percentage of the reserve.

continued on page 8

Table 3
Valuation Of Variable Annuity: Reserve = Account Balance, IAS and US GAAP

		IAS (No DAC)			US GAAP with DAC	
Time	Cash Flows	Reserve	Profit	EOY EGP	DAC	Profit
0		0			5,000	
1	99,608	103,497	-3,889	1,174	4,585	696
2	2,714	104,930	1,281	1,346	4,028	725
3	580	104,166	1,343	1,409	3,392	707
4	-1,669	101,208	1,290	1,355	2,746	644
5	-3887	96,197	1,125	1,188	2,163	542
6	-8,977	86,354	866	926	1,711	413
7	-3,499	82,077	777	832	1,289	355
8	-3,326	78,013	739	790	864	314
9	-3,161	74,150	702	751	435	273
10	-73,483	0	667	714	0	232

7,672 PV at 7%
65% k-factor

Fair Value: Replicating Portfolio

A replicating portfolio is a group of financial instruments with a readily available fair value that has the same cash flows as the financial instrument one is trying to value. If it is possible to find a combination of exchange traded financial instruments that replicate the cash flows of our variable annuity, then we can use the fair value of those exchanged traded instruments as a proxy for the fair value of our annuity.

Some have interpreted this to mean that the account balance, not reduced by surrender charges, is a fair-value reserve, since the assets that back the account value for a variable product constitute a replicating portfolio.

Although the reserve mechanism would then be the same as a U.S. GAAP FAS 97 reserve, acquisition costs cannot be deferred under IAS fair value methods, which creates a large disconnect between the two systems. Table 3 shows reserve and profit under the replicating portfolio approach, with a comparison to U.S. GAAP. The IAS method produces a large loss at issue, which most insurers would not find appropriate.

Fair Value: M&A Valuation Approach

Another method for determining fair value is to approach the valuation similar to the way that you would price the contract in an acquisition. One such method would be to define the reserve as the account balance (fair value of the assets backing the variable annuity) less the present value of the expected margins. This is also consistent with methods used in determining embedded values, which are often used in determining purchase prices for transactions in Europe.

The figures in Table 4 apply this methodology to the variable annuity example, defining the reserve as the account balance less 85% of the present value of future margins. The remaining 15% is an assumed margin for risk and prudence.

Fair Value: Surrender Value Approach

Some of the IAS committee members are leaning towards defining the fair-value reserve as the surrender value. The idea behind this is that this is the amount that the insurance company must pay if the policyholder decides to terminate the

Table 4
Valuation Of Variable Annuity: Reserve = Account Balance – 85% Of Future Margins

Time	End of Year Margins	7% PV Margins	85% Margins	Reserve	Cash Flows	Profit
0		2,672		0		
1	-4,176	7,035	5,980	97,517	99,608	2,091
2	1,346	6,181	5,254	99,676	2,714	555
3	1.409	5,204	4,423	99,743	580	513
4	1,355	4,213	3,581	97,627	-1,669	447
5	1,188	3,320	2,822	93,375	-3,887	365
6	926	2,626	2,232	84,122	-8,977	276
7	832	1,978	1,681	80,396	-3,499	227
8	790	1,326	1,127	76,886	-3,326	185
9	751	667	567	73,583	-3,161	142
10	714	0	0	0	-73,483	100

Margin = (Fees – Commission – % of Fund Expense) * (1 + AV growth rate) + (AV lapsed – Surr Paid)
7% PV Margin = PV of future margins at 7%
Reserve = AV – 85% Margins
Profit = Cash Flow – Increase in Reserve

Table 5
Valuation of Variable Annuity: Reserve = Surrender Value

Time	Cash Flows	Account Balance	Reserve = Surrender Value	Profit
0			0	
1	99,608	103,930	93,147	6,461
2	2,714	104,930	96,535	-674
3	580	104,166	97,916	-801
4	-1,669	101,208	97,160	-912
5	-3,887	96,197	94,273	-1,000
6	-8,977	86,354	86,354	-1,058
7	-3,499	82,077	82,077	777
8	-3,326	78,013	78,013	739
9	-3,161	74,150	74,150	702
10	-73,483	0	0	667

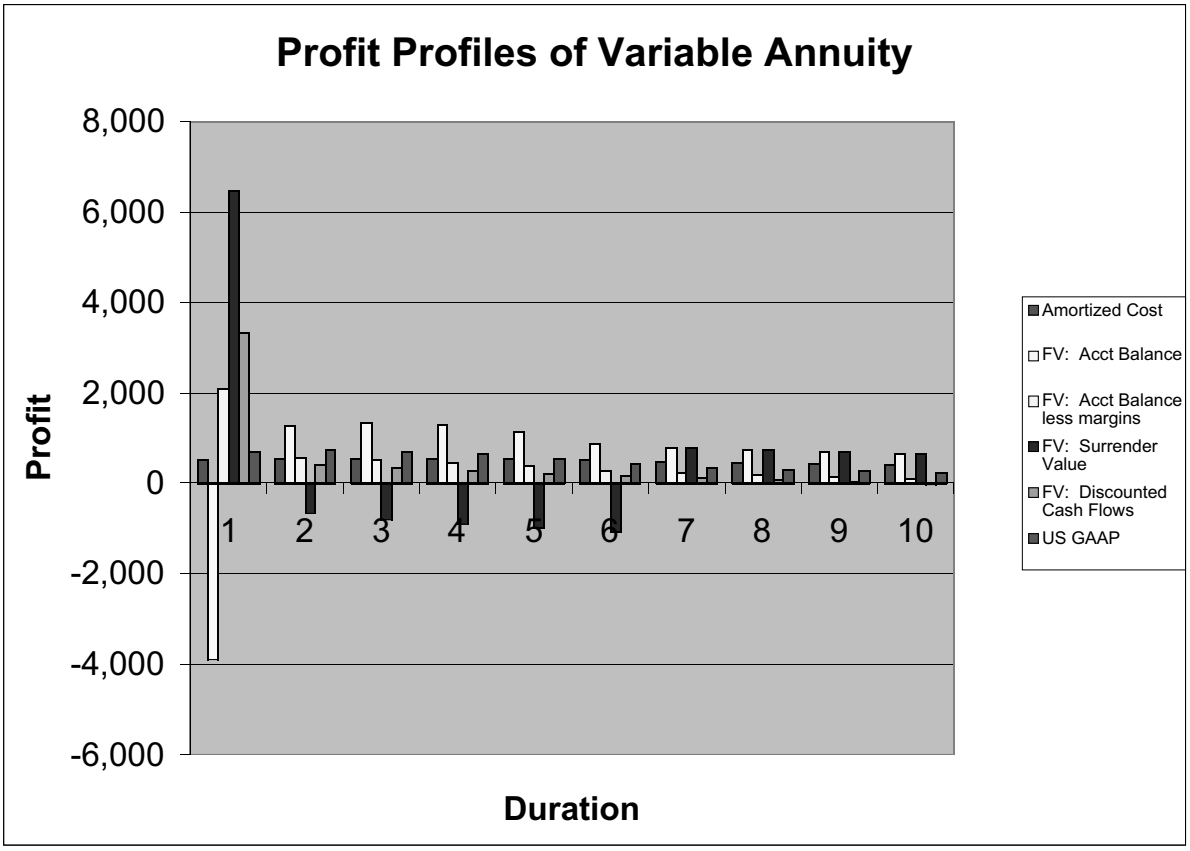
Profit = Cash Flow – Increase in Reserve

continued on page 10

Table 6
Valuation of Variable Annuity: Reserve = PV Benefits & Expense

Time	Cash Flows	Benefits	Expenses	Reserve	Profit
0			0		
1	99,608	1,901	5,400	96,290	3,318
2	2,714	4,022	414	98,594	410
3	580	6,250	420	98,826	348
4	-1,669	8,449	417	96,879	279
5	-3,887	10,475	405	92,781	211
6	-8,977	15,239	385	83,652	152
7	-3,499	9,120	345	80,042	111
8	-3,326	8,668	328	76,649	68
9	-3,161	8,239	312	73,463	25
10	-73,483	78,309	297	0	-19

Expenses = Commission + % of Fund Expense
Reserve = PV of future benefits + PV of future expenses
Profit = Cash Flow – Increase in Reserve



contract. Clearly, this creates a profit timing problem with contracts that have unusually high surrender charges in the early years. Table 5 shows this irregular profit pattern.

Fair Value: Discounted Future Cash Flows

The last method that we examine comes from guidance in IAS 39 that allows for the estimation of fair value based on the discounted future cash flows expected to arise from the financial instrument. The discount rate used should be appropriate for the cash flows. In our annuity example, the assets backing the account value are assumed to earn seven percent, so this seems to be an appropriate rate. The cash flows used in determining the reserve in this example are only those that are paid out in either benefits or expenses. The exact cash flows that will be allowed under this method are currently under debate.

Regular Premium Considerations

The IASB is currently debating the role of future premiums in such a reserving system. It is likely that future premiums will only be recognized if they increase the reserve. The argument in support of this position is that the policyholder is not contractually obligated to pay future premiums; therefore, only if it is advantageous for the policyholder to do so, should future premiums be allowed in the reserving. There is still much debate that will occur on this topic before a final position is decided.

Summary

The chart on page10 summarizes the profiles of each of the methods above. It is evident from the chart that, if the IASB allows free rein with regard to the application of IAS 39 to insurance products classified as financial instruments, the resulting financial statements from similar companies will be far from comparable. There are a variety of logical interpretations that one can make, each with very different results.

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What's Outside

This is a listing of some articles published elsewhere that may interest financial reporting actuaries. If you would like to recommend an article for inclusion in this list in a future issue, please e-mail the editor.

"Regulators Respond to Industry 'Innovation' through Guideline AXXX" provides a summary of each of the eight sections of AXXX, with each section providing guidance about how to apply Guideline AXXX. By Mary J. Bahna-Nolan, *Product Matters!* January 2002.

"The New 2001 CSO Implications for Universal Life Plans" discusses implications of the new table, including statutory reserve effect. By Nancy Winings, *Product Matters!* January 2002.

"International Accounting Standards: Some Pain, Much Gain for Insurers." A four-page overview that examines the challenges, implications, and opportunities presented by international accounting standards, by Peter Duran, Mark Freedman, and Emma McWilliam, *Contingencies*. November/December 2002.

"Market Value Accounting for Insurance Liabilities." A 2.5 page article that addresses why another accounting convention is needed and criticisms of market value accounting. The fair value and entity-specific value of determining the market value of insurance liabilities are described. By Lee Fischbeck, *Contingencies,* January/February 2003.

"The 2001 CSO Mortality Table." After reading page after page about the 2001 CSO, you might enjoy reading this two-page summary by Michael S. Taht, *The Actuary,* December 2002.

Pricing for the Volatility Risk of Traditional Actuarial Risks

by Jay Vadiveloo and Charles Vinsonhaler

Editor's Note: The section's Corporate and Chief Actuaries listserve would be an appropriate forum for discussing concepts in this article.

1. Introduction

Actuarial literature has placed a lot of emphasis on the interest rate risk and asset liability management. For the most part, the traditional actuarial risks such as mortality, morbidity and lapses, have been relegated to experience studies and experience tracking reports. The volatility of interest rates and its impact on asset liability management has been analyzed by looking at complex, stochastically-generated interest rate scenarios and their corresponding impact on a company's future earnings. Risk-based capital formulas and asset-adequacy analysis all seek to quantify and understand this risk, and this kind of analysis has involved the finest of actuarial minds and a large part of the actuarial consulting practice.

On the other hand, the analysis of the traditional actuarial risks, which is the foundation of actuarial science, has pretty much stayed in the deterministic plane. Experience studies and the construction of experience tables are studied only at the early stages of the actuarial exams, and are certainly not one of the sought-after areas for practicing actuaries.

This paper will do the following:

- Explain the reasons for the lack of evolution in the analysis of these traditional actuarial risks.
- Explain why, for certain product designs and markets, understanding, measuring and managing the volatility of these traditional actuarial risks are critical to the financial success of such businesses.
- Provide a general definition of the volatility risk for these traditional actuarial risks.
- Provide a general stochastic methodology to measure this volatility risk and incorporate it in pricing and reserving.
- Provide a general technique to develop a practical, deterministic, formula-based equivalence to this stochastic methodology.
- Provide examples of these formula-based approximations to measure the volatility risk for three insurance products.

2. Scope of paper

The traditional actuarial risks whose volatilitus are being analyzed in this paper are mortality, morbidity and lapse risks. Even though this paper is titled as "pricing for the volatility risk," it is easily extended to reserving or setting capital standards for this risk. In fact, depending on the particular product being analyzed, it may be more appropriate to indirectly price for the volatility risk by first determining the risk-adjusted benefit reserve, risk-adjusting the appropriate actuarial rates and then determining the risk adjusted benefit premium. One of the examples in the final section of this article demonstrates this.

The authors want to emphasize that this paper is analyzing just the volatility risk, and not the misstatement risk, where the underlying base risk has been wrongly estimated. Experience studies, good underwriting practices, claims management and

experience tracking are the best ways to avoid a complete mis-statement of the risk. However, the volatility risk doesn't go away and can be significant, even if the base risks are properly stated.

3. Reasons for lack of development in the analysis of traditional actuarial risks.

As mentioned in the introduction, traditional actuarial risks are analyzed in experience studies and tracked in experience reports. These individual or inter-company studies form the basis of pricing and projection models involving these risks. In order to recognize fluctuations from historical experience, some provisions may be made for adverse deviation. These provisions, which are the only attempt to address the volatility risk in these traditional actuarial risks, are usually arbitrary in nature and have no statistical basis.

In many product designs and markets, this approach to pricing these traditional actuarial risks is adequate. These are product designs and markets where the pooling principle applies and the Central Limit Theorem assures us that the standard deviation (i.e. volatility parameter) of the sample mean (i.e. average benefit premium) converges to zero. In these situations, properly constructed experience studies to get a good estimate of the risk factors (i.e. mortality, morbidity and lapse rates) is the correct approach. Building in some conservatism to these estimates is a prudent way to cover the mis-statement risk, and the volatility risk is non-existent or immaterial.

4. Significance of the volatility risk of traditional actuarial risks.

The pooling principle breaks down under one or more of the following conditions:

A. The block of business affected by these risks is not large enough so that the volatility of the average premium does not converge to zero.[1]

B. The business block is large enough, but the benefit obligations are sufficiently large and varied to offset the convergence to zero caused by the volume effect.

C. The risk factors themselves are imprecise (e.g. old-age mortality and morbidity, or substandard risks) and this generates enough volatility to overcome the convergence to zero by the volume effect.[2]

There are several product designs and markets where one or more of the above conditions could hold. The second-to-die product is an example where all three conditions could hold. The disability income market typically satisfies the first two conditions, reinsurance pricing for substandard mortality and long-term care pricing would involve condition C, and so on. In all these cases, the volatility risk of these traditional actuarial risks can have a significant impact on the earnings of a company, and it is critical that this is reflected in the pricing, reserving and required surplus models for these products.

5. Definition of the volatility risk of traditional actuarial risks.

Let $R = \{ r_1, r_2, \ldots r_n \}$ be a set of risk factors for a given risk.

e.g. R = set of select and ultimate mortality rates for an individual age (x)

or R = set of incidence and termination rates of disability.

Let P(R) be an appropriate present value random variable.

e.g. P(R) = loss-at-issue random variable (i.e. pricing random variable)
= present value of benefits less present value of premiums, at issue.

or P(R) = prospective loss random variable (i.e. reserving random variable)
= present value of future benefits less present value of future premiums, given (x) survives to (x + t).

or P(R) = present value of distributable earnings
(i.e. embedded value random variable).

Current practice is to use the expected value of P(R), E[P(R)], as the estimate of this present value random variable, or E[P(R*)] where R* is R with some provision for adverse deviation.

Consider the distribution of P based on all possible realizations of R. Rank these values and denote them as P1, P2, …PN. Then, for a given confidence level of (100*c)%, PcN or P[(1-c)N] is the appropriate risk adjusted present value random variable. For example, for the pricing random variable, P[(1-c)N] would be the risk adjusted estimate, whereas for the embedded value random variable, PcN, would be the appropriate risk adjusted estimate. The absolute difference between the risk adjusted estimate and the expected value of P is the volatility risk factor at a given confidence level c.

continued on page 14

In many product designs and markets, this approach to pricing these traditional actuarial risks is adequate.

There are several practical limitations to this process of determining the risk adjusted present value random variable at a given confidence level of c.

- In many models, the present value random variable will be impacted by more than one risk set. i.e. P = P(R, S, T,….) for different risk sets R, S, T,……
  e.g. the pricing random variable for long-term care will be impacted by the various combinations of lapse, morbidity and mortality realizations. Then the set of all possible values of P may be impossible to enumerate.

- Even if there was only one risk factor, the risk adjusted present value random variable should be determined for a group of contracts that is being priced or reserved for.
  e.g. P is the average present value random variable for the group of contracts. So if there are N possible realizations of P for a single contract, there will be N possible realizations of the average present value random variable for n contracts. Even for small values of n, this is just not practical to evaluate.

The stochastic simulation is the theoretically best way to determine the risk-adjusted present value random variable.

6. Stochastic Methodology to Measure the Volatility Risk of Traditional Actuarial Risks.

Let P(R,S,T,….) be an appropriate average present value random variable for n contracts, which is impacted by the sets of risk factors R, S, T,…….

Generate N realizations of P by stochastic simulations of R, S, T, ….

Rank the possible values of P, denoted by P1, P2, …PN, and for a given confidence level of c, the risk adjusted estimate of the average present value random variable is PcN or P[(1-c)N].

The following should be noted about this methodology:

- The model can be made as complex and flexible as the actuary desires, and only requires a good random number generator, strong programming skills and a high-speed computer.

- The more complex the model and the more varied the number of risk factors, the greater the number of simulations required to approximate the true underlying distribution of the present value random variable P.

- If there are several risk factors in the model, an assumption should be made about the order of occurrence of these risks in generating the random numbers. For example, if the three risk factors—lapse, morbidity and death—are assumed to occur in that order, the lapse rate is first randomly generated, followed by the incidence rate of disability if the contract did not lapse, and followed by the mortality rate if the incidence rate of disability did not occur.

- The model can incorporate dynamic relationships between the risk factors. For example, as lapses occur in a block of lives being modeled, the mortality rate of the persisting block can be systematically increased if an assumption is made that the healthy lives have a greater propensity of lapsing. For a second-to-die model, the mortality rate of the survivor can be increased upon the first death to replicate the contagion effect.

- To simulate condition C in section 4, the imprecision of the risk factors can be captured by using an interval estimate for the risk factor. For example, if an old age mortality rate q is imprecise and could vary from q to (1 + s)q, s>0, then a uniform random number could first be selected between q and (1+s)q to determine the underlying mortality rate, and then this under lying mortality rate is used in the simulation. Of course, modeling this imprecision in the risk factors increases both the expected value and volatility risk of the present value random variable, as should be the case.

7. Deterministic Approximations to the Risk Adjusted Present Value Random Variable.

The stochastic simulation is theoretically the best way to determine the risk-adjusted present value random variable. However, even with state– of–the–art technology, the processing time becomes unmanageable as the block of business starts to grow. To illustrate, a block of 1000 lives would require one million simulations to generate 1000 realizations of the average present value random variable. The need for a deterministic approximation is clearly necessary.

The general formula to estimate the risk adjusted average present value random variable P for a block of n identical contracts is :

$$E(P)+ z(1-c)\ STD(P)$$

or, $E(P) - z(1-c)\ STD(P)$

where $E(P)$ = the traditional approach to estimating the average present value random variable, without any provision for adverse deviations, $z_{(1-c)}$ = (1-c) percentile value of the standard normal random variable.

$STD(P)$ = standard deviation of the average present value random variable.

Since the n contracts are identical,

$$E(P) = \mu$$

where μ = expected present value for a single contract.

$$STD(P) = \sigma / \sqrt{n}$$

where

σ = standard deviation of the present value for a *single* contract.

The formula can easily be modified when the contracts are distinct. Now,

$$E(P) = \frac{[\mu_1+\mu_2+ \dots \mu_n]}{n}$$

where

μ_i = expected present value for contract i

$Var(P)$ = variance of the average present value random variable

$$= \frac{[\sigma_1^2+\sigma_2^2+ \dots +\sigma_n^2]}{n^2}$$

where

σ_i^2= variance of the present value for contract i

and

$$STD(P)= [Var(P)]^{0.5}$$

More typically, a company would break up its block of business into k groups, where the contracts within a particular group are deemed identical. Then the calculation of the risk adjusted average present value random variable would involve stochastically modeling only k distinct contracts and appropriately modifying the general formula.

The following should be noted about this general formula to calculate the risk adjusted average present value random variable.

- The only stochastic simulation needed is for individual contracts, versus modeling a group of contracts. This allows for spreadsheet models to be used to determine the risk adjusted present value random variable.

- Only the standard deviation of the present value random variable for an individual contract needs to be estimated. The expected value is what is currently calculated in pricing or reserving using best guess estimates.

- In some models, the standard deviation for a single policy can be determined analytically, e.g. pricing for a standard insurance or annuity contract. Then the calculation of the volatility risk in pricing or reserving can be programmed and determined on a seriatim basis.

- In cases where the standard deviation cannot be determined analytically, it has to be estimated. Stochastic simulation of the present

continued on page 16

value random variable for a single policy can be used to estimate the standard deviation parameter. To estimate the volatility risk for a block of such policies, the best technique is to form policy groupings, estimate the standard deviation of the group by simulation, and then determine the overall volatility using the general formula.

- Another technique is to simulate a function of the standard deviation of the present value random variable, and examine its behavior for different characteristics of a single policy. Using statistical techniques, an analytical approximation to the standard deviation function can be developed for any policy. Then the volatility risk for a block of policies can be calculated on a seriation basis.

8. EXAMPLES

The three examples that follow are based on the research work of three graduate students in the University of Connecticut Ph.D. Actuarial Science Program, under the supervision of the authors. All three dissertations have been submitted for publication in various actuarial journals, hence the authors will not go into too much details on the analysis and results.

The first example looks at the volatility risk for a joint and survivor immediate annuity. The analytical solution for the standard deviation of the present value random variable for a single life immediate annuity is well described in the Actuarial Mathematics text, but for a joint and survivor product, with benefits changing upon the first death, the solution is not that clear. Included in the research work is an analytical formula for determining the standard deviation of a joint and survivor immediate annuity, whose benefits could change depending on whether both lives are living or on the particular life that survives.

To illustrate the volatility impact, the net single benefit premium must be increased by five percent for a group of 100 joint and survivor lives of 60-year-old males and females, where the benefit payment amount does not change upon the first death.

The second example considers the volatility risk for an individual disability income policy. The simulation modeling work done in the research shows that the best approach is to start with developing the risk-adjusted claim reserve. Using statistical and actuarial techniques, the research develops a deterministic, analytical approach to calculate the risk-adjusted claim reserve for an arbitrary block of DI claims at a given confidence level. The research then shows how to develop risk adjusted claim costs, risk-adjusted active life reserves and risk-adjusted premiums.

To illustrate the volatility risk for a group of 360 newly-disabled lives at age 45, the claim reserve has to be increased by 18 percent for a 30-day waiting period, benefits to age 65, to achieve a 90 percent confidence level. For the same group with a 90-day waiting period, the volatility risk factor is only 11 percent, demonstrating that the claim reserve volatility decreases as the waiting period increases.

The final example looks at the volatility risk for two typical long-term care product designs in today's marketplace. One is the stand-alone long-term care product that pays out long-term care benefits when the policyholder qualifies to receive such benefits. The other product design has the long-term care benefit as a rider to a life insurance contract. Here the long-term care benefits can be viewed as early payments of the death benefit, and the payment upon death is the difference between the face amount of the policy and the total long-term care benefits paid to date. The cost of the rider long-term care design is effectively the time value of money arising from two different

streams of benefit payments, with or without the rider.

The simulation modeling work done in the research shows that the ratio of the standard deviation to the expected value of the present value random variable has a nice functional form. Using stepwise regression techniques, an analytical formula for this ratio is developed as a function of the age of the insured, benefit level of the long-term care coverage and incidence rate of disability.

The results are quite interesting. While the rider cost is significantly smaller than the stand-alone benefit, the volatility risk for the rider long-term care design is higher (as a percent of the base premium) than the stand-alone design. For example, for a block of 5,000 males, issue age 64, at a 90 percent confidence level, the stand-alone long-term care product requires a 4.7 percent increase in the average net single benefit premium and a 22.9 percent increase in the average annual benefit premium to cover the volatility risk. In contrast, the rider long-term care product design requires a 6.6 percent increase in the average net single benefit premium and 30.1 percent increase in the average annual benefit premium.

The following should be noted about the three examples described above:

- All three use different techniques to arrive at the deterministic, analytical approach to measure the volatility risk. They all involve sophisticated modeling and creative mathematical analysis, which is what our actuarial training and experience equips us to do.

- All three approaches were tested against a full blown stochastic simulation, and the results are very close.

- All three approaches end up with an algorithm that can be implemented by any company in these lines of business.

9. CONCLUSIONS

It is the hope of the authors that this article will stir up the actuarial community to pursue this kind of analysis for other product designs and markets. This is research in the traditional areas of expertise of actuarial science, but now carried to a higher level, utilizing sophisticated stochastic modeling and statistical techniques of analysis. While this paper offers guidelines and a structure about how to price and reserve for the volatility risk of traditional actuarial risks, it is not a cookbook formula that can be applied to any product design or market. The three examples described in this paper show how unique the deterministic approximations are, and hence there is really no limit to the future research that can be done in this area.

The authors wish to emphasize the following:

- Experience studies, experience tracking and good claims management processes remain a critical function and is part of the total analysis of these actuarial risks, including the volatility component. Since the volatility risk analysis utilizes best-guess estimates of these risks, good experience studies and tracking are necessary to ensure that these risks are not misstated.

- Besides developing risk-adjusted pricing and reserving formulas, the ideas in the paper can also be utilized to determine the dividends that should be retained for the volatility risk in a mutual company, the basis for changing premiums for guaranteed renewable contracts, and for solvency or capital standards analysis.

As interest continues to grow in this area, the authors are confident that creative actuarial minds will find other uses and implications for this kind of analysis.

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Reflections of a Regulatory Actuary

by Larry Gorski

Editor's note: the author wrote this article upon retiring after several decades of service at the Illinois Department of Insurance. The section's Statutory Issues listserve would be an appropriate forum for discussing concepts in this article.

One of the interesting aspects of retirement is being given the opportunity to reflect on one's career. I believe that many people retiring today would feel the same way that I feel. We all would comment on the magnitude of the changes that had taken place since the start of our career.

Products

Changes have occurred in the products that life insurers market. I didn't see many universal life products when I started work with the Illinois Department of Insurance nearly 30 years ago. Life insurance products contain non-guaranteed elements, while variable annuities contain guarantees. Similarly, the investments purchased by life insurers have changed dramatically over the years. Yes, they are still called bonds and mortgages and common stock, but the cash flows from some instruments treated as bonds, such as collateralized mortgage obligations and equity linked securities, are driven by the performance of residential mortgages and common stock, respectively.

CARVM and 1980 CSO

The nature of insurance regulation has also changed over the years. While the topics under discussion in insurance departments and at NAIC meetings are pretty much the same, the issues are different. Some of the first projects in which I got involved were the adoption of the Commissioners Annuity Reserve Valuation Method (CARVM) and the 1980 CSO Mortality Tables. Looking back at these projects, one can see a hint of the actions and activity that occurred from 1980 through 2002. CARVM recognizes elective policyholder behavior, a revolutionary idea in 1976. The legislative changes implementing the adoption of the 1980 CSO Mortality Table introduced the idea of dynamic maximum valuation and nonforfeiture interest rates and a process for adopting new mortality tables that did not require legislative action.

Asset Adequacy Analysis

The ink was barely dry on the legislative changes implementing the 1980 CSO Mortality Tables when actuaries like John Montgomery (former chief actuary of the California Department of Insurance), Bob Callahan (former chief actuary of the New York Department of Insurance), Walter Rugland and many others began to shape the tools regulatory actuaries use today. Of course I'm talking about Asset Adequacy Analysis testing of reserves. This tool has changed the relationship between insurers, regulators and the actuarial profession. The appointed actuary is being asked to opine on the adequacy of reserves. Does the appointed actuary work for the insurer or the regulator? The appointed actuary and the regulatory actuary have to understand liability cash flows and asset cash flows. How do regulators acquire the expertise to understand and critique the work of the appointed actuary?

RBC

Following the adoption by the NAIC of the amendments to the Standard Valuation Law and Actuarial Opinion and Memorandum Regulation that implement Asset Adequacy Analysis testing of reserves, my career as a regulatory actuary began to change. From a regulatory perspective, I felt that the success of Asset Adequacy Analysis was dependent on becoming much more knowledgeable in the area of investments. I jumped at every opportunity to get involved in projects involving investments. I became the chair of the NAIC Invested Asset Working Group (IAWG). The IAWG helped change the regulatory framework with respect to the accounting, reporting and analyzing of collateralized mortgage loans and derivative instruments. I wish that more actuaries had been involved in these projects. Some of the people instrumental in bringing these projects to completion were Chris Anderson of Merrill Lynch and Alan Routhenstein of Risk-Solutions Life. The IAWG is still very busy at work. One of the current projects is evaluating the possibility of recognizing effective hedging of credit

risk in the Risk Based Capital (RBC) formula.

While the IAWG has not seen the level of actuarial involvement I would have liked, the NAIC RBC process has benefited from active involvement of the actuarial profession through the American Academy of Actuaries. I can only mention a few of the many actuaries who have helped make the RBC formula. The ones that immediately come to mind are Bob Brown (CIGNA), Joe Dunn (MetLife), Jim Reisktyl (Northwestern Mutual), Mike Zurcher (Lincoln National), Blaine Shepherd (Minnesota Department of Insurance), Bill Weller (Omega Squared) and Cande Olsen (New York Life).

One of the significant projects currently on the agenda of the NAIC Life RBC Working Group deals with Risk-Based Capital requirements for guarantees on variable annuities. This project follows the earlier work on capital requirements for interest rate risk. Both projects are premised on the belief that certain risks can't be properly quantified by a single factor or even a table of factors applied to balance amounts. Proper quantification can be achieved only through a modeling approach.

X Factors

The last major development on which I will comment is the introduction of actuarial judgment in setting the mortality assumption for the calculation of deficiency reserves. I don't think that any of the actuaries that I worked with for 25 years thought that we would ever see something like the X factor in statutory valuations. Changes in underwriting practices and confidence in the appointed actuary made the idea acceptable to regulators. It is now the regulators' task to develop procedures to evaluate the work done by the valuation actuary relative to setting X factors.

Actuarial Judgment

The common thread in these projects is a movement away from assumptions mandated by law or regulation and based on industry-wide experience to company-specific assumptions based on actuarial judgment. The remainder of my comments will extrapolate this trend into the future. One of the major initiatives at the NAIC is the "Risk Assessment Based" financial examination process. The basic idea is for the regulator to identify the risks associated with an insurer's business, analyze the manner in which an insurer manages and/or mitigates its risks and focus the examination process on the residual risks of the company. Unfortunately the project has not been given much attention by actuaries, even though I believe that actuaries should be leading the charge. The project seems to be geared more towards reducing the time and cost of financial examinations and not a better understanding of the risk position of insurers.

I feel strongly that actuaries should be leading the charge because of my experience with reviewing actuarial memorandums that support Asset Adequacy Analysis actuarial opinions. I don't know of any other regulatory tool that gives the same insights into an insurer's operations, but unfortunately, it is virtually unknown outside of actuarial circles. One of my personal goals over the past year was to get as many people (actuaries and non-actuaries) within the Illinois Insurance Department familiar with the actuarial memorandum and internal risk position reports used by insurers. The report produced by the Society of Actuary's Investment and Finance Section concerning risk position reporting has been a gold mine of information for me when discussing risk assessment with department co-workers.

Updating Assumptions by Bayesian Analysis

The one thing that needs a lot of work from both industry and regulatory actuaries is formalization of the process for updating assumptions used in Asset Adequacy Analysis and formulaic reserving using X factors. Some actuaries talk about the "feedback loop." I prefer to talk in terms Bayesian statistical techniques. One of the most interesting projects that I have worked on the last year was to develop a Bayesian statistical model to evaluate the X factors used by insurers. Model input comes from an insurer's internal mortality studies with expected claims and benefits based on the 1980 CSO Mortality Table with 20 year Selection Factors. The item of interest is the X factor(s). Being a Bayesian style analysis, the output from the model is not a point estimate but a distribution. This allows the user of the model to consider not only best estimates (median) but also estimates with specific margins. I believe this approach can be used in other areas. For example, there is no recognized regulatory standard for claim costs or continuance tables for long term care insurance. Experience, coupled with actuarial judgment, is the accepted standard. A Bayesian style approach for updating assumptions used in Asset Adequacy Analysis and the X factors used to calculate deficiency reserves makes sense to me.

It is now the regulators' task to develop procedures to evaluate the work done by the valuation actuary relative to setting X factors.

The Future

A look into the future is incomplete without some mention of the challenges that face regulatory

continued on page 20

actuaries and industry actuaries. With the financial world becoming ever more complex, specialized and competitive, regulatory actuaries will be hard–pressed to keep up with all of the new developments in products, investments and technology. Regulatory actuaries will need to develop new skills to assess risk. How will they find the time and financial resources to do this? No matter how hard regulatory actuaries struggle to keep on top of everything, they will have to place reliance on the work of the appointed actuary and other actuaries that perform work required by law or regulation. This, in turn, puts industry actuaries in the difficult position of, at times, disagreeing with management. It may be that a well-informed regulatory community could provide regulatory support for the industry actuary in a difficult position with management.

Will actuaries be the "blacksmiths" of the 21st century, or can we harness the strength, initiative and courage to shape our destiny? I believe that any group of people who can persevere through a rigorous and demanding educational system like the one that we all did, can meet any challenge the future might hold.

In closing, I would like to thank everyone that I have worked with on actuarial projects. It has been a privilege to work with so many dedicated, professional people.

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Financial Reporting Section Photos

"Old and New" section council members meeting in Boston –

Thanks Barry!
John Bevacqua, incoming section chairperson, presents retiring chairperson, Barry Shemin, with a gift of appreciation for his leadership and support during the past year.

Left to Right – Jerry Enoch (newsletter editor), Mark Freedman, Bob Wilson, Barbara Snyder, Barry Shemin (section chairperson (2001-2002), Jim Greaton and Tom Nace.

Other Council members: John Bevacqua, Ted Kitsos, Dan Kunesh, Mark Peavy and Deb Poorman.

Federal Tax Issues Under the 2001 CSO Mortality Tables

by John T. Adney and John J. Spina

Editor's note: this article is reprinted with permission from the November 2002 issue of Product Matters! The section's Statutory Issues listserve would be an appropriate forum for discussing concepts in this article.

Federal legislation enacted in the 1980s introduced the notion that the tax treatment of life insurers and life insurance contracts should depend on the mortality tables "prevailing" at the time that the contracts are issued and the reserves for the contracts are first established. In 1984, Congress coined and defined the term "prevailing commissioners' standard tables" for life insurance company tax purposes, thereby creating a device by which the deductible amount of life insurance reserves could be restricted to the lowest amount supportable by the officially promulgated mortality standards for determining reserves that were current when the reserves were set up. Then, with some modifications, in 1988 Congress copied this device for the broader purpose of constraining the investment orientation of life insurance. After the 1988 legislation, the prevailing commissioners' standard tables limited the scope of life insurance contracts that could generate tax-free death benefits and a cash-value buildup not currently taxed, and even further limited those from which lifetime distributions could be taken in a tax-favored manner.

The congressional insistence on "currency" in the mortality assumptions to be utilized in calculating the deductible reserve amounts and the maximum premiums or cash values under life insurance contracts necessitated the crafting of a complex set of rules in the tax law—hardly a surprise—including both rules of definition and rules of transition. The definitional rules were needed to say what mortality standard was current, or prevailing, at any given time for a specified class of reserves (and later on for contracts themselves), while the transitional rules were needed to address the prospect that the standard would change with the passage of time. Congress was no stranger to the latter possibility in 1984; the 1980 Commissioners Standard Ordinary Tables ("1980 CSO Tables") were in the process of becoming the new prevailing tables, supplanting their 1958 predecessor, as Congress was completing its historic re-write of the life insurance company tax rules.

Now, with improvements in mortality rates over the two decades since the advent of the 1980 CSO Tables, the NAIC is about to promulgate the 2001 Commissioners Standard Ordinary Tables ("2001 CSO Tables"). Commentators have suggested that the improved mortality rates embedded in the 2001 CSO Tables will reduce life insurers' reserve requirements by an average of some 20 percent. By virtue of tax legislation of the 1980s, these improved rates likewise will lower, per dollar of death benefit, the deductible amounts of life insurers' reserves and the tax law's premium and cash value limits for life insurance contracts.

The manner in which, and the time at which, the advent of the 2001 CSO Tables will affect life insurers' reserve deductions are fairly certain, and yet, given the revenue sums potentially at stake, official guidance applying the governing rules of the federal income tax likely will be forthcoming. In some degree of contrast, the manner and the timing of the new tabular rates' impact on the premium and cash-value limits applicable to life insurance contracts under the tax law are imbued with uncertainty. As life insurance industry representatives have been urging upon government officials of late, formal guidance from the U.S. Department of Treasury and Internal Revenue Service (the "IRS") on the tax law's requirements in this respect is virtually a necessity. Such answers exist, along with the as-yet-unanswered questions and are recounted in the balance of this article.

...the manner and the timing of the new tabbular rates' impact on the premium and cash-value limits applicable to life insurance contracts under the tax law are imbued with uncertainty.

Mortality Tables and Life Insurance Company Taxation

Reserve Requirements

An increase in the amount of a life insurance company's "life insurance reserves" within the meaning of Internal Revenue Code section 807(c)(1)[1] from one taxable year to the next is deductible in determining the company's federal income tax liability.[2] The amount of such reserves is, in turn, determined under section 807(d)(1) with respect to each contract for which life insurance reserves are held; it is the greater of the contract's "net surrender value" or its "federally prescribed reserve."[3] Section 807(d)(2)

continued on page 22

then defines the means for computing this federally prescribed reserve—the device for restricting the deductible amount of the reserve to the lowest amount officially supportable when the reserve was set up—requiring that it be based on (among other elements) the prevailing commissioners' standard tables applicable to the contract underlying the reserve.[4]

Section 807(d)(5)(A) defines these prevailing tables to be used in the federally prescribed reserve calculation by looking to the mortality tables applicable to the reserves for a contract *at the time it was issued*. In particular, the statute says that the prevailing tables, with respect to a contract when it was issued, are the commissioners' standard tables that were then (1) most recently prescribed by the NAIC and (2) permitted to be used by at least 26 states in valuing the reserve for that contract. Because the 2001 CSO Tables will soon be the most recent NAIC-prescribed tables for valuing life insurance liabilities, they will become the prevailing tables under section 807(d) as soon as the 26th State permits their use. In creating the section 807(d) rules in 1984, Congress made use of the NAIC-approved mortality tables, as implemented in a majority of the states, to provide a reserve deduction that was at least as great as the reserve required to be held in most states, but not a greater amount.[5] To achieve the goal of defining the minimum reserve amount generally required under state law, which then would be allowed as a deduction for tax purposes, it was necessary for Congress also to define a maximum interest rate and a reserve method, as well as to address a number of other details. This Congress did this elsewhere in section 807(d) and in section 807(e), while also crafting special rules for market-valued separate account reserves in section 817 (and, in 1996, in section 817A for "modified guaranteed contracts"). However, in an effort to maximize tax revenues during a period of deficit closing in 1987, Congress diverged from the state-defined minimum reserve by requiring the federally prescribed reserves to be based upon an interest rate equal to the greater of the maximum rate allowed by most States and a special version of the "applicable federal rate," one designed (oddly enough) to discount the unpaid losses of property-casualty insurers under section 846. This was done not only to constrict the reserve deduction, potentially augmenting tax revenues from life insurers, but also in recognition of the primacy of the states in (and the absence of federal rules for) regulating life insurance companies and assuring their solvency.

Hence, subject to the transition rules discussed below, the mortality rates in the 2001 CSO Tables will apply in determining the federally prescribed reserves for contracts issued after the use of the new rates is first permitted by the 26th state. Given the tables that are defined by section 807(d)(5) as prevailing are determined when a contract is issued, guidance is needed to clarify how the prevailing-table rule operates in the case of master group contracts. Similarly, given that there can be a number of tables that fit the definition of "prevailing" set forth in section 807(d)(5)(A), and recognizing that Congress made use of the prevailing table concept to limit reserves (from a tax perspective) to the lowest state-required amount, guidance also is needed to clarify how the rule operates where multiple tables potentially apply. This was true under the 1980 CSO Tables, and it certainly will be the case under the 2001 CSO Tables—some 84 of them, by one count.

Master group contracts

The statute endeavors to speak to these needs through two special rules included in the original 1984 enactment. First, a special rule in section 807(e)(2) provides that in the case of a group life insurance contract, the contract's issue date for purposes of section 807(d) is the issue date of the "master plan." That said, however, the statute goes on to stipulate that with respect to a benefit under a group contract that was guaranteed to a "participant" at a date after the master plan's issue date, the later date of that guarantee is the relevant date for section 807(d) purposes. The statute, in other words, views the group contract as if it were merely a collection of individual contracts, with each participant's coverage—presumably

meaning the coverage typically evidenced by a certificate issued to the insured—constituting a separate contract, and consistently with this view it adopts the date that such coverage was guaranteed to the participant as the issue date utilized to identify the mortality table applicable in determining the federally prescribed reserve for the coverage. Thus, under the section 807(e)(2) rule, where a group contract was issued prior to the date when the 2001 CSO Tables become prevailing (taking account of the transition rules described under the next heading), the federally prescribed reserves for the coverages provided under the contract could be determined using two different mortality tables, i.e., the 2001 CSO Tables with respect to coverages guaranteed on or after that date, and the 1980 CSO Tables for the pre-existing coverages.

Multiple Tables/Options

A second special rule, appearing in section 807(d)(5)(E), addresses the problem where multiple tables otherwise fit the definition of prevailing tables in section 807(d)(5)(A). The rule in 807(d)(5)(E) requires that, with respect to any "category of risks" for which two or more tables meet the general definition of prevailing, or for which multiple "options" under one or more tables are prevailing, the table and option "generally" yielding the "lowest reserves" are to be used. (The reference to options was included specifically to address the availability of select and ultimate mortality rates under the 1980 CSO Tables.) This rule is somewhat vague in its phrasing, but it hints liberally at the result desired by describing the production of the lowest reserves as its reason for being.

In the context of the 2001 CSO Tables, this lowest-reserves rule raises questions about the use of (1) select and ultimate mortality versus ultimate mortality and (2) smoker/nonsmoker tables versus composite tables. Anticipating these questions, a recent report by a working group of the American Academy of Actuaries to the NAIC's Life and Health Actuarial Task Force on the 2001 CSO Tables, making use of a study undertaken by the American Council of Life Insurers (ACLI), observed that, "the reserves on an Ultimate basis are less than the reserves on a Select and Ultimate basis for the industry and its current mix of products."[6] In addition, the report noted, "[I]n regards to unismoke versus smoker distinct, the same ACLI study reports that there is no material difference in the aggregate results of using either version."[7] Thus, if the lowest-reserves rule is implemented utilizing the Academy's observations, the federally prescribed reserves will be based upon ultimate mortality and on smoking status as used for annual statement reserves. That said, in view of the paucity of authorities interpreting that rule to date and the tax revenues potentially at stake, the IRS may well decide to review the questions involved and issue its formal guidance for life insurers and revenue agents to follow.

Timing and Transition

At this writing, the proposed 2001 CSO Tables are expected to gain NAIC approval during the association's meeting in December 2002. Whereas the 1980 CSO Tables generally were adopted by statutory enactments in the states, that will not be the case with the 2001 CSO Tables. Rather, pursuant to enabling legislation on the books of virtually every state, the new tables will be adopted by regulations promulgated by each state's insurance regulator. This should lead to adoption of the 2001 CSO Tables with some rapidity, and to facilitate this process, the NAIC will have a proposed model regulation to implement the new mortality standard this December. The model, as currently envisioned, will allow insurers to utilize the 2001 CSO Tables on a plan-by-plan basis, with a requirement that the new tables be used for all products offered for sale beginning on January 1, 2009—the so-called "mandatory date."

Given the ability of the states to adopt the 2001 CSO Tables by regulation, and assuming the NAIC gives its approval to the new tables before the end of 2002, it is possible that the new tables will become prevailing under section 807(d) due to the 26th state's adoption some time in 2003, and it seems quite likely that the requisite State adoptions will have been completed before the end of 2004. The life insurance industry will, of course, be following the state approval process quite closely, and the IRS will undoubtedly be doing the same. As it has done before, the IRS can be expected to issue formal guidance announcing the 26th state's approval, and hence the advent of the 2001 CSO Tables as "prevailing," not long after that approval occurs.

Congress, aware of the practical and other issues involved in a transition to a new mortality standard as it wrote the section 807(d) rules in 1984, provided detailed statutory guidance relating to the transition. This guidance appears in section 807(d)(5)(B) in the form of a three-year transition rule, which is permissive in nature. Specifically, section 807(d)(5)(B) provides that if there is a change to new prevailing tables during a calendar year, the insurer *may* use the previously

continued on page 24

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prevailing tables to value reserves for contracts issued through the end of the calendar year three years after the year of change. Thus, if the 2001 CSO Tables become prevailing in mid-2003, the 1980 CSO Tables may be used for contracts issued through 2006. For purposes of the federally prescribed reserves, the mandatory date (in this example) would then move up to January 1, 2007.

Furthermore, according to the express terms of section 807(d)(5)(B), the permission to continue use of the "old" tables is granted "with respect to any contract." This wording suggests that an insurer may choose to employ the new standard in determining the reserves for some contracts while continuing use of the old standard for others. This grant of discretion to the taxpayer, however, presumably is constrained by the plan-by-plan adoption rule contained in the proposed NAIC model regulation. It also is limited by the section 807(d)(1) rule precluding the federally prescribed reserve for a contract from exceeding the annual statement reserve for the contract.

... this transition to the new standard will bring with it significant reductions per dollar of death benefit in the guideline premiums, net-single premiums, and seven-pay premiums for contracts

Mortality Tables and Life Insurance Product Taxation

Sections 7702 and 7702A

Both section 7702, defining a "life insurance contract" for tax purposes, and section 7702A, defining a "modified endowment contract," make use of the prevailing table rule of section 807(d) by requiring "reasonable" mortality to be assumed in determining the net-single premiums and guideline premiums under section 7702 and the seven-pay premiums under section 7702A. Specifically, section 7702(c)(3)(B)(i) requires the guideline premiums for a life insurance contract to be based, inter alia, on "reasonable mortality charges" which do not exceed the "mortality charges specified" in the prevailing tables within the meaning of section 807(d)(5) as of the time the contract is issued. Section 7702(c)(3)(B)(i), reasonable mortality requirement, introduced into the statute in 1988, applies to net-single premiums under section 7702(b)(2)(B) as well, and to seven-pay premiums under section 7702A(c)(1)(B).[8] Under section 7702(c)(3)(B)(i), the prevailing tabular rates constitute a general ceiling for the mortality assumptions that may be employed in the section 7702 and 7702A calculations, although the statute allows the U.S. Department of Treasury and the IRS to write regulations that increase or decrease these rates, e.g., to raise the ceiling in the case of substandard risks (discussed further below).

When the 2001 CSO Tables become prevailing for section 807(d) purposes, the wording of section 7702(c)(3)(B)(i) will automatically invoke their use in the section 7702 and 7702A calculations. In the context of the life insurance product tax rules, this transition to the new standard will bring with it significant reductions per dollar of death benefit in the guideline premiums, net single premiums, and seven-pay premiums for contracts.[9] The transition also promises to raise many more questions than the few that present themselves in the corporate tax context—primarily for the reason that the transition to the new standard was well thought out in the crafting of the section 807(d) rules in 1984 and was not at all considered when the reasonable mortality requirement was inserted into section 7702 in 1988. The balance of this article addresses a number of these questions.

Which Tables?

As noted above, many 2001 CSO Tables will be published, and one apparent question is which of these tables may be used as providing "reasonable" mortality rates for purposes of sections 7702 and 7702A? Immediately following the 1988 enactment of the reasonable mortality requirement, IRS Notice 88-128[10] generally allowed the use of sex-distinct, smoker/ nonsmoker/aggregate mortality rates under the 1980 CSO Tables for these purposes. Proposed regulations under section 7702, issued in 1991 but never finalized, permitted far greater leeway, subject to a consistency rule.[11] Under the proposed regulations, 1980 CSO-based mortality rates were deemed reasonable, if consistently applied within a class of contracts, whether or not distinctions were made according to the insured's sex or tobacco use. Any new regulations promulgated by the U.S. Department of Treasury and the IRS in response to the advent of the 2001 CSO Tables would do well to follow the earlier proposed regulations in granting similar leeway to insurers. The section 7702 and 7702A calculations with respect to any contract should be able to draw upon any rates derived from the new Tables as appropriate for that contract.

Transition: Three-Year Rule and the Need for Regulations

When the 2001 CSO Tables become prevailing within the meaning of section 807(d), insurers are permitted the three-year transition period as set forth in section 807(d)(5)(B) in determining their federally prescribed reserves for newly issued life insurance contracts. Another question that the transition to the new mortality standard raises under sections 7702 and 7702A is whether or not the same three-year transition period apply? As noted above, the rule in section 807(d)(5)(B) provides that if there is a change to new prevailing tables during a calendar year, the insurer may use the previously prevailing tables for a contract issued through the

end of the calendar year three years after the year of change. Further, the rule is permissive, and the permission to continue to use the old standard is granted contract by contract. The answer appears to be that, it will apply, for the reason that section 7702(c)(3)(B)(i) refers to section 807(d)(5), not simply section 807(d)(5)(A), in its effort to incorporate the prevailing tables as the basis for reasonable mortality. The reference to section 807(d)(5), as a matter of statutory construction, includes section 807(d)(5)(B)—the three-year rule—thus importing that rule into the reasonable mortality requirement.

All that said, whether or not the three-year transition period applies to the section 7702 and 7702A calculations is at best a stalking horse for the deeper concern presented by the arrival of the 2001 CSO Tables as prevailing. The truth is that the section 807(d)(5)(A) rule, built to address the valuation of insurers' liabilities, interacts awkwardly, at best, with the nonforfeiture requirements that state law imposes on life insurance contracts. If state X withholds its approval of the 2001 CSO Tables beyond the time that those tables become prevailing (plus three full years, assuming that section 807(5)(5)(B) applies), contracts issued in state X after that time must continue to meet the requirements of the nonforfeiture law incorporating mortality based upon the 1980 CSO Tables, even though the section 7702 and 7702A premium limits will then be calculated using the rates in the 2001 CSO Tables. Such a conflict raises the specter of a federal "ceiling" that falls below the state "floor," rendering the issuance of a contract problematic and even, in the case of contracts attempting to qualify under section 7702's cash value accumulation test, impossible.

To preclude the occurrence of such difficulties, the ACLI has asked the U.S. Department of Treasury and the IRS to issue formal guidance paving the way for an orderly transition to the 2001 CSO Tables. Such guidance could, of course, adhere strictly to the reserve rules, including the three-year delay, casting aside the problems of coordination with the nonforfeiture law, but the U.S. Department of Treasury and the IRS presumably will work toward achieving a more sensible result. One possibility assuring effective coordination would be to delay the implementation of the 2001 CSO Tables until the mandatory date under the proposed NAIC model regulation. It is questionable, however, whether the government would tolerate continued use of 1980 CSO mortality for new contracts issued until 2009. An alternative for guidance includes the imposition of the 2001 CSO Tables as the reasonable mortality

standard for contracts issued in a given state within a specified period of time after that state allows use of the tables. This, however, brings with it the prospect that different requirements will apply simultaneously in different states.[12] The authors understand that the ACLI is asking the U.S. Department of Treasury and IRS to issue guidance that combines the preceding two ideas, providing that the Notice 88-128 safe harbor remains in place until the earlier of the 2009 mandatory date or the actual date of issue for a contract issued using the 2001 CSO Tables in its underlying computations. Another alternative would entail the stipulation of a uniform period, several years into the future, for transition to the 2001 CSO Tables nationwide. While formal guidance from the U.S. Department of Treasury and the IRS on transition to the 2001 CSO Tables is expected, the timing of such guidance currently is unknown.

Substandard Risks

If formal guidance is forthcoming from the government on the subject of reasonable mortality under the 2001 CSO Tables, that guidance might also address the treatment of substandard risks. Notice 88-128 was silent on this topic, and the 1991 proposed regulations under section 7702, that attempted to address it. It was proved controversial and never has been finalized. This leaves the transition rule provided in TAMRA as the governing law on the matter (i.e., which somewhat vaguely provided that the mortality charges assumed in the section 7702 and 7702A calculations for a contract covering a known substandard risk were reasonable if they did not differ materially from the charges

continued on page 26

actually imposed under the contract.) While the associated uncertainty has not hindered the issuance of coverage on substandard lives, the advent of the 2001 CSO Tables alters the situation to an extent. This follows from the tendency of the new tables to move the "standard" for standard mortality, placing greater pressure on the substandard risk classification. It remains to be seen whether the life insurance industry and the government will seek to give sharper definition to the treatment of substandard risks under sections 7702 and 7702A in the course of dealing with the transition to the new tables.

Maturity Dates

For purposes of the calculations under sections 7702 and 7702A, a life insurance contract's maturity date is deemed to be between the insured's ages 95 and 100. This maximum maturity assumption, imposed by one of the so-called computational rules of section 7702,[13] was consistent with the limiting age of 100 under the 1980 CSO Tables, the "new" mortality standard coming into being when section 7702 was enacted. At the time of its creation, section 7702 contained no external standard of "reasonable" mortality, but instead relied on contractual guarantees to determine the mortality component of its premium limits. The upper-age limit on the computational rule was included in the statute because it was thought to be an appropriate means of discouraging abuse of the statute via contractual charges based upon the assumed post-age 100 survivorship of insureds.

While formal guidance from the Treasury and the IRS on transition to the 2001 CSO Tables is expected, the timing of such guidance is currently unknown.

The facts of mortality have changed with the times, however, and the 2001 CSO Tables now assume that a portion of the cohort of insureds will survive through age 120. Fortunately, nothing in section 7702 requires a life insurance contract to endow at age 100, or precludes an insurer from charging for mortality based upon the more favorable assumptions of the 2001 CSO Tables. The advent of the new tables, however, presents several conceptual challenges to section 7702's maturity date computational rule. First, the use of the statute's age-100 limitation, versus an age-121 limitation derived from the 2001 CSO Tables, leads to slightly higher premium limits under certain assumptions. While this difference would not seem material enough to warrant statutory change, the prospect of insureds surviving past age 100, as more and more people do with the passage of time, leads to the question of whether the premium limits of sections 7702 and 7702A should extend beyond age 100. Under the statute as written, the premium limits arguably would stop at the maximum deemed maturity date of a contract, although that is not entirely clear. What is clear though is that a change in the age-100 rule would require congressional action, and that itself a daunting prospect filled with possibilities and pitfalls for the life insurance industry.

Material Change Issues

At least one more potentially overarching question is presented by the arrival of the 2001 CSO Tables (assuming that they have become prevailing as of a given date for newly issued life insurance contracts): what changes, if any, in a pre-existing contract could require the use of the new tables in the section 7702 and 7702A calculations for that contract? The legislative history of section 7702 provides that certain changes in contracts that are deemed "material" can lead to new-issuance treatment. This is also true with respect to section 7702A, as expressly provided in section 7702A(c)(3) and as built into that statute's own transition rules. While the prospect of new-issuance treatment is not exactly a new concern with respect to the application of sections 7702 or 7702A (or other Internal Revenue Code provisions) to life insurance contracts—a number of IRS private letter rulings have addressed the material change issue—the advent of the new mortality standard will likely bring with it a new focus on the point. Contracts today tend to have maximum flexibility built into their structures, and it is arguable that any adjustment event under section 7702(f)(7)(A) or material change under section 7702A(c)(3) would trigger application of the new standard, potentially posing significant difficulties for compliance with the two statutes.

To obtain clarity on the material change question as it relates to the 2001 CSO Tables, and also to obtain a measure of relief from the possible application of the new standard, the industry may decide to request specific guidance from the U.S. Department of Treasury and the IRS. The government, it would seem, would likewise have an interest in addressing the issue. Any such effort, however, should be undertaken with eyes wide open, as the answers it provokes could prove quite troublesome. The Treasury and the IRS may find it fitting to exclude certain kinds of changes in contractual benefits from categorization as material changes in the 2001 CSO context, but any such conclusion may be difficult to reconcile with broader concepts of material change under the federal tax law. The industry may also find that changes it has not heretofore treated as triggering the application

of new mortality standards, such as when the 1980 CSO Tables replaced their predecessor in the 1980s, would receive contrary treatment in the view of the U.S. Department of Treasury and the IRS.

CONCLUSION

The advent of the 2001 CSO Tables raise significant federal tax issues for life insurers, especially at the product level. It is likely that U.S. Department of Treasury and IRS guidance will be forthcoming to address some of the unanswered questions, although the substance and timing of such guidance currently are unclear. Actuaries and others charged with oversight of corporate income tax obligations or the design of life insurance products will need to pay close attention as action is taken by the federal tax authorities and the mist slowly lifts from the mortality component of the federally prescribed reserve and reasonable mortality rules of the tax law.

FOOTNOTES

1) Unless otherwise noted, all references herein to "sections" are to sections of the Internal Revenue Code of 1986, as amended. References to regulations are to the Income Tax Regulations.

2) The deduction is provided under section 805(a), relying upon the rules of section 807(a) and (b). The latter rules also provide for an income item under section 803(a) in the event of a decline in reserves. Whether a life insurance company is treated as such for federal income tax purposes, invoking the rules discussed in this part, is determined by applying the so-called reserve ratio test set out in section 816(a).

3) Section 807(e)(1)(A) requires the net surrender value of a contract to be determined by subtracting any applicable surrender charges but by disregarding any market value adjustment. In addition, the total amount of the reserve for a contract claimed for tax purposes cannot exceed the contract's reserve as reported on the insurer's annual statement filed with State regulators. *See* section 807(d)(1).

4) The federally prescribed reserve rules were enacted as part of the revision of the life insurance company tax provisions contained in the Deficit Reduction Act of 1984, Pub. L. No. 98-369 ("DEFRA"). Technically, the purpose of the provision was to limit life insurance reserves, in the context of deductions allowed in determining insurers' federal income tax liability, to the state-mandated minimum. Lowering the deducible amounts of life insurance reserves generally had the effect of increasing life insurers' federal income taxes over the amount payable under prior law, all else being equal.

5) The net surrender value of a contract, if greater, is allowed as the deductible amount of the reserve, but this was done with the recognition that the valuation law for life insurance generally would require such a greater amount to be held as the reserve for the contract.

6) Report of the American Academy of Actuaries' Commissioners Standard Ordinary (CSO) Implications Working Group, Presented to the National Association of Insurance Commissioners' Life and Health Actuarial Task Force (Sept. 2002) (the "AAA report"), at p. 10.

7) *Id*. In making the comparison, a weighted average of smoker/nonsmoker reserves was employed, with the weights based upon the underlying distribution of smokers and nonsmokers in the 1990-95 mortality study from which the new standard was derived.

8) The reasonable mortality charge rule was enacted as part of the Technical and Miscellaneous Revenue Act of 1988, or "TAMRA," Pub. L. No. 100-647, with the avowed purpose of combating artificial inflation of mortality assumptions in net single premiums and guideline premiums, and also limiting the 7-pay premiums under the then new modified endowment contract rules.

9) The AAA report lists average reductions in guideline single premiums of up to 30 percent and in 7-pay premiums of up to 15 percent. *See* AAA report at pp. 10-11.

10) 1988-2 C.B. 540.

11) *See* Prop. Treas. Reg. § 1.7702-1.

12) In similar fashion, quite apart from a State-by-State adoption rule, the transition to the new standard raises the prospect that different requirements will apply within the same group contract, as new participants are added under the contract after the new standard takes effect. The only way a regulation could preclude this from occurring would be to treat the contract's "issue date" as being that of the entire group contract, without regard to when a participant joined the group (contrary to the section 807(e)(2) rule). A practical approach to avoiding any such disparity would be to close off new entry into a pre-existing group contract, requiring the issuance of a new contract to cover new participants.

13) *See* section 7702(e)(1)(B).

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