

The Financial Reporter

June 2006 Issue No. 65

The Newsletter of the Life Insurance Company Financial Reporting Section

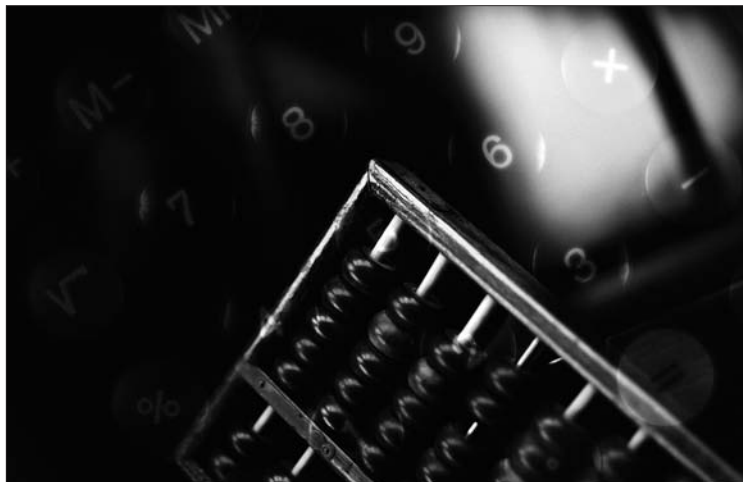
FASB Releases Exposure Draft on Business Combinations

by Ken LaSorella

On June 30, 2005, the Financial Accounting Standards Board (FASB) introduced an exposure draft of Proposed Statement of Financial Accounting Standards, Business Combinations, a replacement of FASB Statement No. 141 (SFAS 141). For convenience, the exposure draft will be referred to in this article as either "141R" or "the draft." In essence, "141R" provides guidance for application of the acquisition method, which was previously called the purchase method. The draft requires that all business combinations (including the merger of mutual insurance companies) be accounted for by the acquisition method. The draft is an extensive document of 236 pages (including appendices). It would take several articles to cover the substantive issues of the draft. As a result, this article comments only on three select issues concerning the draft and subsequently discusses the issues addressed by the Life Financial Reporting Committee (LFRC) comment letter of Dec. 14, 2005.

Joint Effort of IASB and FASB

The draft is the product of extensive collaboration between the FASB and the International Accounting Standards Board (IASB). As part of a convergence project, a joint effort was made to deliver a common and comprehensive standard for the accounting of business combinations that could be used for both domestic and cross-border financial reporting. In this regard, the FASB is replacing "SFAS 141" while the IASB is



replacing International Financial Reporting Standard 3 "IFRS 3", both called Business Combinations. While there still may be subtle differences between the two final replacement documents, the substance of the two will be essentially the same.

Recognition of VOBA as an Intangible Asset

Since the introduction of "SFAS 141", some actuaries had questioned whether the value of business acquired (VOBA) was an intangible asset as described in "SFAS 141." Some believed that VOBA could not be separated and sold and, consequently, they concluded that VOBA was not an intangible asset. This view created a potential problem regarding the amortization of

continued on page 3 >>

Actuaries

The Best-Kept Secret in Business™

The Financial Reporter

June 2006 Issue No. 65

Published by the Life Insurance Company
Financial Reporting Section of the Society
of Actuaries

475 N. Martingale Road, Suite 600
Schaumburg, Illinois 60173
p: 847.706.3500
f: 847.706.3599
w: www.soa.org

This newsletter is free to section members. A subscription is \$15.00. Current-year issues are available from the communications department. Back issues of section newsletters have been placed in the SOA library and on the SOA Web site (www.soa.org). Photocopies of back issues may be requested for a nominal fee.

2005-2006 Section Leadership
Darin G. Zimmerman, Chairperson
Henry W. Siegel, Vice-Chairperson
Jerry F. Enoch, Secretary
Richard H. Browne, Treasurer
Errol Cramer, Board Partner
Kerry A. Krantz, Council Member
(Web Liaison)
Mike Leung, Council Member
Raymond T. Schlude, Council Member
Yiji S. Starr, Council Member
Vincent Y.Y. Tsang, Council Member

Rick Browne, Newsletter Editor
KPMG LLP
303 East Wacker Drive • Chicago, IL • 60601
p: 312.665.8511
f: 312.275.8509
e: rhbrowne@kpmg.com

Jerry Enoch, Associate Editor
e: Jerry_F_Enoch@LafayetteLife.com

Carol Marler, Associate Editor
e: carol.marler@ge.com

Keith Terry, Associate Editor
e: keith_terry@farmersinsurance.com

Joe Adduci, DTP Coordinator
e: jadduci@soa.org
p: 847.706.3548

Clay Baznik, Publications Director
e: cbaznik@soa.org

Jeremy Webber, Project Support Specialist
e: jwebber@soa.org

Facts and opinions contained herein are the sole responsibility of the persons expressing them and shall not be attributed to the Society of Actuaries, its committees, the Life Insurance Company Financial Reporting Section or the employers of the authors. We will promptly correct errors brought to our attention.

Copyright ©2006 Society of Actuaries.
All rights reserved.
Printed in the United States of America.

What's Inside

1 FASB Releases Exposure Draft on Business Combinations

A review of a proposed replacement of FASB Statement 141 that provides guidance for the acquisition method to be required for all business combinations. This is part of a series of articles by the American Academy's Life Insurance Financial Reporting Committee.

Ken LaSorella

7 Chairperson's Corner: Thoughts from the Chair

Comments on the Financial Reporting Section's growing surplus and how we might best employ it.

Darin G. Zimmerman

8 Setting the Level of Margins in a Principles-Based Valuation using a Cost-of-Capital Approach with Exponential Utility

A mathematical model that relates the level of margin and the market price of risk as measured by the cost of capital, making use of the theory of utility and an exponential utility curve.

Stephen J. Strommen

14 Letter to the Editor

The continuing debate on the fair value of insurance liabilities.

Luke Girard

15 Spreadsheets—Yea or Nay?

A look at when to (and when not to) use spreadsheets for financial reporting work.

Bob Crompton

19 End-User Applications in Actuarial Processes: Risks and Controls

A discussion of risk and control issues associated with spreadsheets and other end user applications in the SOX 404 context.

Arnold A. Dicke and P. Shane Elenbass

23 Toastmasters—or, How I Learned to Stop Staring at My Shoes

An actuary describes his experience with the Toastmasters Club.

David Hippen

24 Articles Needed for *The Financial Reporter*

VOBA. Treating VOBA as a contra-liability, as suggested by some, would have allowed a wide range of amortization methods, including methods linked to the runoff of underlying base reserves.

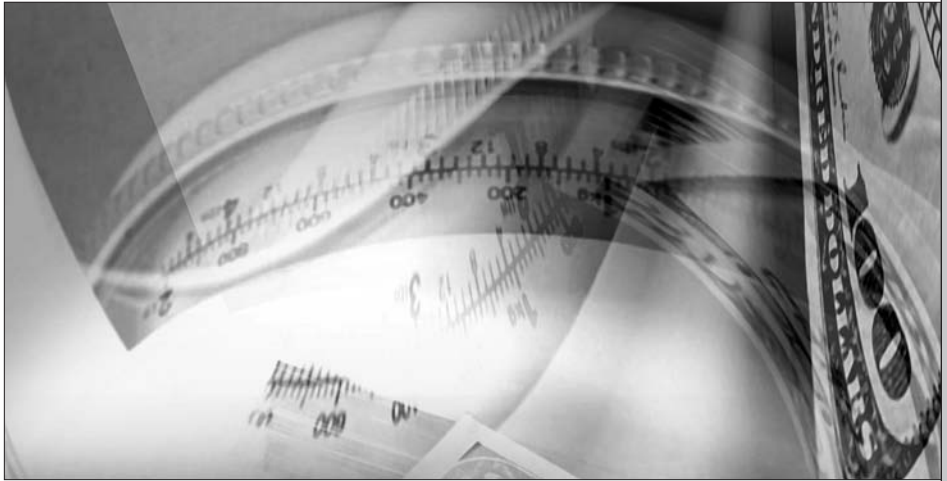
Prior to SFAS 141, Emerging Issues Task Force Issue No. 92-9 “EITF 92-9”, Accounting for the Present Value of Future Profits Resulting from the Acquisition of a Life Insurance Company, discussed the amortization of the present value of profits (PVP), another acronym for VOBA. In essence, the EITF inferred that amortization of PVP should follow the amortization methodology for deferred acquisition costs (DAC). If it were concluded that VOBA was not an intangible asset, it would lose its correspondence to DAC and, hence, the proper amortization methodology would become unclear.

Fortunately, “141R” recognizes VOBA as an intangible asset. Paragraph A49.d.(2) makes reference to an expanded presentation required by “SFAS 60” (as amended by paragraph D13 of the draft) that splits the fair value of acquired insurance contracts into a liability component, measured in accordance with accounting policies for insurance contracts, and an intangible asset, representing the fair value of contractual rights and obligations acquired. By clarifying that VOBA is an intangible asset, 141R suggests that amortization concepts discussed in “EITF 92-9” (and encountered in practice) remain valid.

New Criteria for Business Combination Determination

SFAS 142, Goodwill and Other Intangible Assets, specified that the cost of a group of assets acquired in a transaction that was not a business combination should be allocated to individual assets based on relative fair values and should not give rise to goodwill. Goodwill could only arise as a result of a business combination—hence, the importance of business combination determination.

Until now, the primary guidance for determining whether a business combination has taken place has been provided by “EITF 98-3”, Determining Whether a Nonmonetary Transaction Involves Receipt of Productive Assets or of a Business. The EITF indicated that a business is a self-sustaining integrated set of activities and assets that are



managed to provide a return to investors. It further indicated that a business consists of inputs (*e.g.*, employees), processes applied to those inputs (*e.g.*, systems), and outputs used to generate revenues. It also stated that a transferred set of assets and activities fails to meet the definition of a business if one or more of the above items are excluded and it is not possible for the set to continue normal operations and sustain a revenue stream. However, if the excluded items are deemed to be minor (based on degree of difficulty and investment necessary to replace any missing items) the transferred set is a business. The EITF also gave a number of examples with specific items missing, and provided reasoning for determining whether such missing items were minor.

Surprisingly, after providing detailed criteria for determining whether the transferred set was a business, the EITF specified that if goodwill were present in the transaction, then it should be presumed that the excluded items were minor and the transferred set was a business. Since the whole purpose of determining whether the transferred set constituted a business was to determine whether goodwill could be set up, reference to the presence of goodwill as a criterion for a business appeared to introduce circular logic.

The draft provides a broader definition of a business than did “EITF 98-3.” Paragraph A2 (expanding on paragraph 3.d) defines a business as: “... an



Kenneth A. LaSorella, FSA, MAAA, is vice president, US GAAP, at Sun Life Financial in Wellesley Hills, Mass., and is vice-chair of the American Academy of Actuaries Life Financial Reporting Committee (LFRC). He may be reached at ken.lasorella@sunlife.com. Ken would like to thank Robert Frasca (also a member of LFRC) for his contribution to this article.

continued on page 4 >>

... 141R does not require the transferred set of assets and activities to have been operated as a stand-alone business by the acquired entity prior to acquisition.

integrated set of activities and assets that is capable of being conducted and managed for the purpose of providing either: (a) a return to investors or (b) dividends, lower costs or other economic benefits directly and proportionately to owners, members or partici-

pants.” In addition, while similar elements of input, process and output are identified, “141R” does not require the transferred set of assets and activities to have been operated as a stand-alone business by the acquired entity prior to acquisition. Nor does it require the transferred set to be operated as a business by the acquirer after acquisition. The draft only requires that the integrated set of activities and assets must be capable of being operated and managed as a business by a willing acquirer. In short, it is acceptable for the transferred set to be missing some requirements for a business that the acquiring company is capable of supplying upon integration.

As with “EITF 98-3”, “141R” also has a condition for business determination based on the presence of goodwill. It specifies: “If goodwill is present in a particular set of assets and activities, then, in the absence of evidence to the contrary, the set shall be presumed to be a business.” However, with the qualifier, “in the absence of evidence to the contrary,” and taken in the context of the draft’s more liberal definition of a business, the logic behind the presence of goodwill as a criterion for a business no longer appears circular. In essence, if the purchase price exceeds the fair value of the net assets and activities acquired, in absence of evidence to the contrary, there is a high likelihood that a business has been acquired.

LFRC Comment Letter

While attempting to avoid technical details, the LFRC comment letter of Dec. 14, 2005 presented three issues. It recommended amended wording for two and sought clarification for a third. The balance of this article discusses issues addressed by the LFRC letter.

1. Negative VOBA (or an Intangible Liability)

The first point addressed by the response letter was the draft’s reference to the intangible asset for the difference between the fair value of a contingency (call this a fair value liability) and the SFAS 60 liability. [Note: Specific reference to SFAS 60 in the draft is intended to include all other related FASB state-

ments (e.g. 97, 113, 120, etc.) applicable to contracts issued by insurance enterprises to which SFAS 60 applies.]

As previously mentioned, it was important for the draft to give formal recognition to the existence of an intangible asset for VOBA. Under normal circumstances, the fair value liability (FVL) would be less than the SFAS 60 reserve. For example, a universal life (UL) product with an account value (AV) of \$1,000 (considered to be a “SFAS 60” reserve for draft purposes) might possibly have an FVL of \$900, resulting in an intangible asset of \$100. However, there can be circumstances where the FVL is greater than the AV. For example, a UL contract with an AV of \$1000 might have a guaranteed credited rate that is supported by investment returns of a mature portfolio of assets. If the acquisition is made in a subsequent lower interest rate environment, such a guaranteed credited rate might well be in excess of then current market interest rates. In this case, it is possible that the FVL could be \$1,050, resulting in an intangible asset of negative \$50 (or, alternatively, an intangible liability of \$50). Consequently, LFRC suggested that the wording of paragraph 36.b.(2) of the draft be expanded to recognize the possibility of an intangible liability as follows: “...including the intangible asset or liability, if any, recognized for the difference between the amounts recognized on the acquisition date at fair value and the amounts that would be recognized in accordance with Statement 60.”

While amortization was a concern, the LFRC letter avoided the complexity of a detailed discussion of amortization of VOBA. When VOBA is positive, i.e., an intangible asset, the concepts of “EITF 92-9” (discussed above) would seem to apply. However, when VOBA is negative, i.e., an intangible liability, amortization methodology is less clear. It seemed a case could be made to amortize the intangible liability either in an equivalent pattern to that for amortization of an intangible asset, or in some relation to the underlying “SFAS 60” liability. The LFRC letter, as a first step, sought recognition of an intangible liability; the next step would then be to seek guidance on amortization.

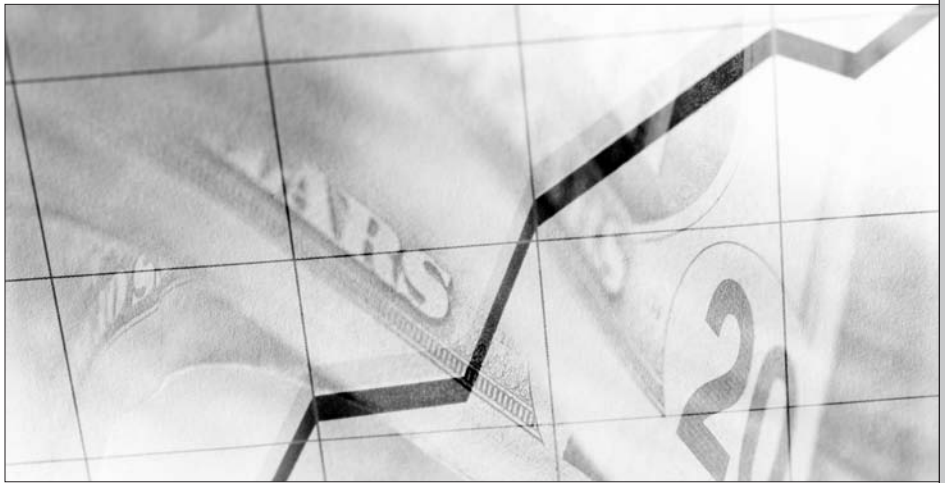
2. Negative Goodwill

The second issue addressed by the LFRC comment letter had to do with negative goodwill that is not a result of a bargain purchase. Paragraph 59 combined goodwill that results from a bargain purchase with that which can arise simply because all net assets

acquired are not measured at fair value as of the acquisition date. Paragraphs 43-48 made reference to assets held for sale, deferred taxes, operating leases and employee benefit plans, each valued at the date of acquisition in accordance with applicable FASB statements rather than at fair value. Assuming the purchase price is equal to the fair value of the acquiree; goodwill can be defined as the excess of the purchase price over the net amount of recognized identifiable assets acquired and liabilities assumed. Assume, for example, that the value of future new business capacity is relatively small. *[Note: This can be due to a variety of reasons: low sales expectations, narrow profit margins or simply products priced with hurdle rates close to the risk discount rate used for fair value determination.]* In this case, the purchase price might be very close to the fair value of net assets acquired. However, it is possible for negative goodwill to arise simply because certain assets acquired might be recognized at amounts greater than fair value and/or certain liabilities assumed might be recognized at amounts less than fair value.

The draft appears to deal appropriately with the treatment of negative goodwill arising from a bargain purchase, which, in some cases, might legitimately result in immediate recognition of a gain. However, it is less clear that the same treatment should be applied to negative goodwill arising from assets and/or liabilities that are not recognized at fair value at the date of acquisition. The comment letter asked for clarification. The LFRC example dealt with a deferred tax asset that is carried at \$100 million, but has a fair value of only \$40 million. The purchase price reflects only the \$40 million, creating a potential negative goodwill. In short, the LFRC letter asked whether a purchase made at fair value should result in: (1) an unadjusted acquired asset of \$100 million, goodwill of zero and a gain at acquisition of \$60 million (even though there is no bargain purchase), or (2) an unadjusted acquired asset of \$100 million and negative goodwill of \$60 million, or (3) an acquired asset adjusted to fair value of \$40 million and goodwill of zero.

[Note: The objective of the LFRC example is not to seek a solution to a specific deferred tax problem, but merely to examine potential treatments of negative goodwill arising from acquired net assets valued at other than fair value. It is recognized that there may be alternative solutions to the specific problem presented. For example, if the deferred tax asset is assigned entirely to in-force business, it is possible for VOBA to be adjusted to absorb



tax timing differences. The Society of Actuaries' textbook, "Insurance Industry Mergers & Acquisitions," devotes a couple of pages to such interaction of VOBA and deferred tax.]

3. Expanded Presentation of SFAS 60

Finally, the third issue addressed by the LFRC comment letter dealt with the expanded presentation of "SFAS 60" as amended by paragraph "D13" of the draft (discussed earlier). Paragraph "D13" does not actually show an expanded presentation that splits the fair value of acquired insurance contracts into two components, as suggested by paragraph "A49.d" of the draft. Rather, "D13" amends the wording of "SFAS 60" paragraph 33, which defines a premium deficiency (loss recognition) for short-duration contracts. With revised wording underlined for convenience, the amended definition of premium deficiency reads: "A premium deficiency shall be recognized if the sum of expected claim costs and claim adjustment expenses, expected dividends to policyholders, unamortized acquisition costs, intangible assets recognized for acquired contracts, and maintenance costs exceeds related unearned premiums."

Considering the relative magnitude of VOBA typically derived from the acquisition of long-duration contracts, the comment letter asked for consistent treatment in defining a premium deficiency for long-duration contracts. Consequently, the suggestion was to also amend "SFAS 60" paragraph 35 to recognize the existence of intangible assets. In essence, paragraph 35 defines a premium deficiency as the excess (if any) of the gross premium reserves, computed with best-estimate assumptions (*i.e.*, without provision for adverse deviation), over the

continued on page 6 >>

As accounting guidance, 141R reflects how far the conceptual thinking around accounting for mergers and acquisitions has advanced since the introduction of SFAS 141 in 2001.

net GAAP liability (book reserves less DAC). With suggested wording underlined for convenience, the section of paragraph 35 that deals with the subtraction of the net GAAP liability should read: "... less the liability for future policy benefits at the valuation date, reduced by unamortized

acquisition costs and intangible assets recognized for acquired contracts."

Finally, a subtle suggestion introduced by the inclusion of intangible assets in premium deficiency tests is that such intangible assets would not be subject to fair value impairment tests. This is further corroborated in paragraph "A49.d.(2)" of the draft which, dealing with an example in which AC is the acquirer, states: "... this intangible asset is excluded from the scope of Statement 142 and FASB Statement No. 144, Accounting for the Impairment or Disposal of Long-Lived Assets. After the business combination, AC is required to measure that intangible asset on a basis consistent with the measurement of the related insurance liability." The words imply that after acquisition, VOBA would escape fair value revaluation and would not be subject to impairment tests. The requirement to value VOBA on a basis consistent with the related insurance liability confirms VOBA must be amortized. This would likely result in an amortization methodology for VOBA consistent with that for DAC (as prescribed by "EITF 92-9" and encountered in practice).

While this article touched on some of the issues discussed in 141R that might be of interest to actuaries, there are many other issues addressed in the exposure draft that have significant implications for the accounting for business combinations. As accounting guidance, 141R reflects how far the conceptual thinking around accounting for mergers and acquisitions has advanced since the introduction of SFAS 141 in 2001. As a cooperative effort, it shows how interaction between the IASB and the FASB continues to progress and is an early indication of their ability to achieve acceptable convergence of international accounting standards with US GAAP. Practitioners working in the business combination arena, in the United States and internationally, are well advised to review the entire exposure draft and to consider fully its implications as it moves forward to adoption by the FASB. §

Thoughts from the Chair

by Darin G. Zimmerman

This issue's Chairperson's Corner is dedicated to a problem that the section council members discussed extensively during our recent face-to-face meeting in Chicago. This problem is peculiar to our section and it has made us the envy of all of the other sections in the SOA. There is a very broad consensus that our section's operating surplus is too high.

Every Actuary's Favorite Phrase

"Okay, let's look at the numbers." At 12/31/2005 our operating surplus was just under \$400,000. Under Tom Nace's stewardship during 2005 our surplus grew 10 percent over the previous year-end. Annual dues will be approximately \$75,000 this year; about half will go to pay the administrative costs assessed by the SOA. During 2005, we made a profit of about \$60,000 conducting seminars and Webcasts. We made approximately \$30,000 on sales of the *US GAAP* textbook. On the expense side, our last research effort, the survey of public disclosure practices, cost \$75,000. We also spent a couple thousand dollars helping one of the other sections sponsor an educational event that the council members thought was particularly worthwhile.

So, Why Is This a Problem?

Francis Bacon is credited with the quote, "Money is like manure, of very little use except it be spread." Some have paraphrased Bacon by saying that, like manure, if you pile money up, it just stinks. I think the problem with big piles of money isn't that they stink; it's that big piles of money attract trial lawyers and other parasites, the way big piles of manure attract maggots and other vermin.

But Seriously Folks

As council members, we have a fiduciary duty to use the section's funds to benefit our section's members. By creating an inviting "target" out of our funds, we create a situation that isn't prudent from a risk management standpoint.


During our meeting, the council members discussed ways of spending the current surplus for the benefit of our members. We plan to waive the cost of our hot breakfast at the SOA Annual Meeting in Chicago this year. We discussed a small rebate for section members who purchase the new edition of our *US GAAP* textbook. (This will largely depend upon administrative capabilities.) We discussed hiring professional speakers

for certain sessions at the spring and annual meetings. We plan to adjust the pricing of Web casts to reduce the surplus they generate, although this may have implications beyond the section.

Beyond these ideas, we also talked about generating and funding more research ideas. Financial reporting is unique when it comes to research. Research is closely associated with creativity, yet "creativity" can have a negative connotation when applied to compliance with regulations. We can perform surveys, but many research dollars are aimed at creating a "better way." We are often limited in our ability to employ a "better way" if it doesn't comply with existing accounting guidance.

Vision for the Future

My vision for the future is to find ways to use a larger portion of the surplus for the benefit of our members. This is a near term objective aimed at significantly reducing our level of surplus. We will attempt to formalize a policy regarding appropriate surplus levels. But we need your help to generate ideas regarding research topics that will be the most beneficial to practicing financial reporting actuaries. We are working on a general request for proposal regarding research ideas, but any time you have any ideas please send them to me or to one of the other council members.

We need your suggestions for research or other educational programs. Please send them to dzimmerman@aegonusa.com. 



Darin G. Zimmerman, FSA, MAAA, is managing actuary with AEGON USA, Inc. in Cedar Rapids, Iowa. He may be reached at dzimmerman@aegonusa.com.

continued on page 8 >>

Setting the Level of Margins in a Principles-Based Valuation Using a Cost-of-Capital Approach with Exponential Utility

by Stephen J. Strommen



One of the central problems in accounting for insurance is the valuation of the liability for future benefits under an insurance policy. Since the liability is uncertain in amount, an estimate is required. And under most accounting frameworks, the estimate of an uncertain amount should be conservative, that is, it should contain some sort of margin for uncertainty. However, it is not clear how to set the size of that margin. This paper provides a mathematical connection between that margin and the market price of risk as measured by the cost of capital. The connection makes use of the theory of utility and an exponential utility curve.

There are three sections to this paper. First, the main concepts to be applied in the paper are reviewed. Then the mathematics of applying an exponential utility curve to the valuation of an insurance liability is developed. Following this is a discussion of the results and their implications.

Conceptual Background

Several concepts form the backdrop for the mathematical relationships in this paper. The concepts include the need for capital in connection with risky (uncertain) liabilities, the cost of capital as the market price of risk, declining marginal utility of increases in wealth and the release-from-risk framework of accounting for risky liabilities.

The need for capital

When an insurer issues a policy, there is usually a chance that the benefits eventually paid will exceed the initial premium. In order to avoid insolvency, the insurer must have some extra money to pay the claims in such a situation. That extra money must be available before the policy can be issued, and that extra money is at risk as long as the policy is in force. That extra money is the capital that the insurer must maintain.

The cost of capital as the market price of risk

The owners of an insurer expect a return on their capital. Since the capital has been put at risk, the return that they expect is greater than most market interest rates. And the greater the risk, the larger the expected return. The excess of the return they expect over the return they would get based on risk-free interest rates is the cost of capital. This cost must be provided for in the pricing of an insurance policy so that the insurer can provide the expected return to the owners of its capital.

The cost of capital can be considered the market price for risk, because it is the compensation that owners of capital demand for putting their capital at risk.

Declining marginal utility

The idea that a dollar has more value to a poor person than to a rich one is very helpful in modeling economic decision-making. The same concept can be extended to the valuation of uncertainty or risk in an insurance setting. Insurers want to be profitable, but they must remain solvent. So a dollar of profits in excess of those expected has less economic impact than a dollar of benefit costs in excess of those expected. One can simulate this mathematically by weighting incremental or marginal profits with a weight that declines exponentially as profits increase. The weighting applied to each dollar is referred to as its utility. When this is done, the utility-weighted value of an uncertain profit will be less than the best estimate expected value, and the utility-weighted value of an uncertain benefit payment will be greater than its expected value.

The release-from-risk framework for accounting

The release from risk framework for insurance accounting recognizes any profit on an insurance policy over time as the risk in any insurance policy gradually disappears. The full profit is not recognized until the policy expires.

Under a release-from-risk framework there is no profit or loss when an insurance policy is first put in force—all profit or loss occurs later as time passes and risk expires. For this to happen, the valuation of the liability for the policy must be done on assumptions that make the present value of premiums equal to the present value of benefits and expenses at the time of issue. That equality will only be achieved under valuation assumptions that produce zero future profits. In other words, the margin included in valuation assumptions must be equal to the expected (best estimate) profit margins included in the price of the policy.

This framework only makes sense for policies that are priced to return a reasonable profit under best estimate assumptions. The evaluation of what is reasonable requires some professional judgment. However, the mathematical framework presented here allows some quantification of reasonableness in terms of a degree of risk aversion.

Mathematical Development

Consider a simple insurance policy such that a premium is paid to the insurer at the beginning of the year, and an uncertain amount of claims or benefits is paid by the insurer during the year. We will characterize the uncertain amount of benefits as having a value to be taken from a Gaussian or “normal” distribution. The parameters of the distribution are:

- μ = The mean or expected present value of benefits (best estimate)
- σ = The standard error of the present value of benefits

We will refer to the ratio $v = \sigma/\mu$ as the volatility ratio.

The actual present value of claims will be X . We can define $x = (X-\mu) / \sigma$ is a unit normal random variable with mean zero and variance 1.

The probability density function of x is

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

We will assume that a company holding this liability holds an amount of capital equal to $r * \sigma$. That is, the amount of capital held is sufficient to cover an unfavorable variance from expected benefits in the amount of r times the standard error. Typically one might assume that r would be greater than two, probably greater than three, so that the company could survive all but the most extreme adverse events.

Finally, we will assume that the company’s utility for profits at a level other than best estimate is characterized by $U(x) = e^{-kx}$. That is, the utility of profits equal to best estimates is $U(0) = 1$, and this utility decreases by a factor of e^{-k} for each standard error by which profits increase. Conversely, utility increases proportionally for each standard error by which profits decrease.

The variable k represents the degree of risk aversion, with higher values implying greater aversion to risk. The value $k = 0$ implies no aversion to risk, that is, risk neutrality.¹

A corresponding utility curve can be used to value the liability. The utility curve for benefit costs is $V(x) = e^{kx}$. Here the sign of the exponent is reversed because higher benefits mean lower profits. Based on this utility curve, the utility of benefits at the expected (best estimate) level is $V(0) = 1$.

Noting that the random variable for the present value of benefits is $X = \mu + x\sigma$, we have:

The release-from-risk framework for insurance accounting recognizes any profit on an insurance policy over time as the risk in any insurance policy gradually disappears.

continued on page 10 >>

¹ In other literature on exponential utility, the variable $\tau=1/k$ is more commonly used, and is referred to as the degree of risk tolerance rather than the degree of risk aversion.

Liability value, ignoring utility =

$$\int_{-\infty}^{\infty} (\mu + x\sigma) \cdot f(x) dx = \int_{-\infty}^{\infty} (\mu + x\sigma) \cdot \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} dx = \mu$$

Liability value, reflecting utility =

$$\begin{aligned} \int_{-\infty}^{\infty} (\mu + (V(x) \cdot x\sigma)) \cdot f(x) dx &= \int_{-\infty}^{\infty} (\mu + e^{kx} x\sigma) \cdot \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} dx \\ &= \mu + k\sigma e^{k^2/2} \end{aligned}$$

One can observe that larger values of the risk aversion parameter k lead to larger liability values reflecting utility.

We will denote the excess of the value reflecting utility over the value ignoring utility as M for margin. We will denote the margin as a proportion of expected benefits by $m = M/\mu$. We can use our definition of m as a proportional margin to derive another expression for m using the formula above for liability value. We have $\mu \cdot (1+m) = \mu + k\sigma e^{k^2/2}$, which leads to $m = kve^{k^2/2}$.

The liability value reflecting utility is the price an insurer would charge for taking on the liability. Since this will be greater than the expected benefits by an amount M , the price would include a present value of profit equal to M if the best estimate of benefit costs is realized. We can express this profit in terms of a pre-tax return on equity if we make two additional assumptions. Let:

- $r =$ The level of capital as a multiple of σ . That is, capital is equal to $r \cdot \sigma$.
- $i =$ The pre-tax investment return on invested assets.

Then the pre-tax return on equity created by a pricing margin of M is:

$$ROE = i + \frac{M}{r\sigma} = i + \frac{m\mu}{r\sigma} = i + \frac{ke^{k^2/2}}{r}$$

These expressions for the return on equity behave in a very intuitive way as the parameters are changed. Based on this expression, if one holds the level of risk aversion constant, one can observe all of the following implications.

- If pricing margins are increased, the ROE increases.
- If the level of capital ($r\sigma$) is increased while pricing margins ($m\mu$) remain unchanged, the ROE declines.
- Smaller percentage margins (m) are needed to achieve the same ROE when the volatility ratio σ/μ is smaller.
- As the level of risk aversion (k) is increased, the ROE arising from this formula is increased.

A surprising result is that the ROE is independent of the volatility ratio, as indicated by

$$ROE = i + \frac{ke^{k^2/2}}{r}$$

This result occurs because we assumed that the company holds capital proportional to the standard deviation of the liability value. As the volatility ratio increases, the amount of capital increases and the cost of maintaining the capital increases in dollar terms, but the rate of return under this mathematical framework does not change.

Discussion

The mathematical framework presented here provides a way to connect the market price of risk as measured by ROE with the margins that would be consistent with valuation assumptions to be used in a release from risk accounting framework. Regulators, in particular, could use this approach to select a level of risk aversion and translate it into guidance on the level of risk margins that would be appropriate for statutory valuation.

Regulatory Minimums

If regulators wish to set some sort of minimum on aggregate margins for a product, they could use the formula for ROE in a particular way. The formula

$$ROE = i + \frac{M}{r\sigma} = i + \frac{m\mu}{r\sigma}$$

includes an add-on term that implies a price for risk.

The add-on term is $\frac{m\mu}{r\sigma}$, or $\frac{m}{rv}$. Regulators could

set a minimum for this add-on, call it Z . If we use

the expression $Z = \frac{m}{rv}$ then the minimum amount

of margins as a percentage of the present value of benefits is $m = Zrv$. If one selects values² for r and Z of, say, three and 0.08, then the minimum percentage margin becomes $0.24v$. That is, the minimum margin as a fraction of the expected present value of benefits is 0.24 times the volatility ratio. More volatile (or uncertain) business would require higher margins.

The application of this approach in a regulatory context requires the valuation actuary to quantify and document two items:

1. The volatility ratio v applicable to the present value of benefits. Note that this is not the volatility ratio of the reserve (which would be net of future premiums), so the present value of benefits must be computed and some stochastic analysis applied to determine the volatility ratio of that present value.
2. The aggregate amount added to the reserve due to the introduction of margins in valuation assumptions. This amount must be at least Zrv times the present value of benefits under best-estimate assumptions.

This sort of framework for minimum margins moves the focus of a valuation to the underlying best-estimate assumptions. Controls on overly aggressive “best-estimate” assumptions could be applied at the best-estimate level before any required margins are added. In addition, it is not necessary to determine a margin separately for each assumption used in the reserve calculation. The focus is directly on the aggregate effect of all margins included in the reported reserve.

Quantifying prudence

In the United States, the term “prudent best estimate” has been proposed to characterize the level of assumptions that should be used in valuation for statutory purposes. Prudent best estimates can be characterized verbally in many ways. However, using the concepts in this paper, we can quantitatively characterize the “prudence” we have introduced into our estimate of the benefit costs. We can do this by determining where our risk-averse price falls in the distribution of benefit costs. That is, we can determine the percentile point on the distribution corresponding to the risk-averse price.

Under the mathematical framework presented here, if the actual distribution of benefit costs is Gaussian with mean μ and standard error σ , and we have a risk aversion parameter of k , one can show that the

distribution underlying our risk-averse valuation has mean $\mu + \sigma ke^{k^2/2}$. Since we know that μ is the 50 percent point on the distribution, we know that $\mu + \sigma ke^{k^2/2}$ is at a percentile greater than 50 percent. Given a value for k , we can easily look up the associated percentile in standard tables. For example, if $k = 0.75$, the associated percentile is 84 percent.

But we don't know the value of k . Fortunately, the mathematics we've developed allows us to determine the value of k that is consistent with pricing for a given pre-tax return on equity, when equity is equal to a given multiple of the standard deviation of benefit value, and we also know the return on invested assets.

Recall that $ROE = i + \frac{ke^{k^2/2}}{r}$. It would be ideal

if we could solve this to obtain an expression for k as a function of ROE , i and r . That has proven difficult. In the absence of an expression, one can use Newton's method to solve for values of k that satisfy the equation, given values of ROE , i and r . The table below shows values of k as they depend on ROE and r when the investment return is 6 percent.

Values of k as a function of ROE and r assuming investment yield of 6%

		r (capital measured in standard deviations)			
		2	3	4	5
pre-tax ROE	8%	0.040	0.060	0.080	0.100
	10%	0.080	0.119	0.158	0.196
	12%	0.119	0.177	0.234	0.288
	14%	0.158	0.234	0.305	0.373
	16%	0.196	0.288	0.373	0.452

The author feels that realistic values of k are near the diagonal from bottom left to top right in the table above. That puts k in the general neighborhood of 0.2. The percentile points associated with $\mu + \sigma ke^{k^2/2}$ when $k = 0.2$ is 58 percent. This is substantially less than the 80 percent or so that has often been discussed as the expected level for reserves. Pricing for a percentile level of 80 percent implies $k = 0.67$ which, based on the table above, implies pricing for

continued on page 12 >>

² The values selected here are purely arbitrary and not meant as suggested regulatory criteria.

Controls on overly aggressive “best-estimate” assumptions could be applied at the best-estimate level, before any required margins are added.



a pre-tax return on equity well in excess of normal market returns for insurance companies.

The surprising conclusion is that the principles-based reserve for our simple one-year contract in a release-from-risk accounting framework should be held at something closer to the 60 percent level rather than the 80 percent level. If reserves are more conservative, then a loss will normally be reported upon issue of products that are priced to achieve reasonable levels of profit.

One can only speculate as to why this has not been widely understood previously. Part of the answer may be revealed by a discussion of contracts with long-term guarantees. The margins needed in the first year of a contract with long-term guarantees are greater than those needed for a one-year contract because of the typically greater risk and greater capital requirement. The next section discusses the implications of this and extends the mathematical development presented above.

Long-term contracts

The mathematical presentation has been in the context of a one-year contract under which all profit emerges in a single period. However, the same concepts apply in the multi-year case that is more common with life insurance.

In the multi-year case we still wish to express the level of capital as $r\sigma$. This requires the mean μ and standard error σ of the value of benefits to be based on the present value of all future benefits, not just those in the first period. That way capital of $r\sigma$ still provides the same probability level of ultimate security, but this time over the life of the policy rather than over just one year.

Now recall that the return on equity for a single year is $ROE = i + m\mu/r\sigma$.

This formula uses the proportional margin m , which is now a proportion of the present value of all future benefits μ . Let's determine what the margin is as a proportion of just the benefits in the current year. To do this we start using the subscript (t) to refer to policy year, and define the following terms:

$b(t)$ = Present value of benefits in policy year t , measured at beginning of policy year t

$P(t)$ = (Present value of all future benefits)/ $b(t)$, measured at beginning of policy year t

Note that in the last year of a contract $P(t)$ is 1.0, and in earlier years $P(t)$ is generally greater than 1.0.

We then have $\mu = P(t)b(t)$, and therefore the total margin for a single year is $m\mu = mP(t)b(t) = [mP(t)]b(t)$. Since $b(t)$ is the claim cost for the current year, we see that the proportional margin is $mP(t)$. Since $P(t)$ is typically greater than one, the margin as a proportion of current year claims is greater than m , potentially several times greater.

If the margin to be released in each year of a long-term contract (before the last year) is greater than for a one-year contract, then the reserve for a long-term contract is at a higher probability level than the reserve for a short-term contract. This explains why something like an 80 percent probability level has been discussed in connection with long-term life insurance reserves even though we've shown that reserves for short-term contracts might logically be near the 60 percent level.

Let's consider how one might use this approach to determine the aggregate reserve margin needed for a long-term contract. Recall that the margin needed for a one-year contract is $M = Zr\sigma$. For a long-term contract, we need to release margins in an amount based on that formula each year. The present value of those annual margins is the aggregate margin needed on the valuation date. We know that Z and r do not vary by duration, but σ does vary by duration. We can therefore express the aggregate margin as follows:

$$M = \sum_t Zr\sigma_t(1+i)^{-(t-1)}$$

If we observe that $r\sigma_t$ is the economic capital held at the beginning of year t , we see that the aggregate margin is Z times the present value of future economic capital associated with this liability.

Possible regulatory application

The above discussion of long-term contracts suggests a simple approach to determine whether aggregate reserving margins are reasonable. One could require disclosure of the value of Z associated with the reserves being held. Expressed verbally,

$$Z = (\text{Reserve actually held} - \text{Best-estimate liability value}) / (\text{present value of economic capital})$$

Expressed mathematically,

$$Z = \frac{M}{\sum_t r\sigma_t (1+i)^{-(t-1)}}.$$

Higher values of Z correspond to more conservative reserves. With time, regulators would gain experience in evaluating the value of Z and determining when a company seems outside the normal range.

Considerations that arise from this approach include the following:

- Knowing the value of true economic capital is difficult. However, one could use current regulatory risk-based capital requirements as a proxy. One can expect that, over time, regulatory capital requirements will change to better reflect economic capital.
- This approach may allow the focus of regulatory oversight of principles-based reserves to shift from the level of margins to the level of best-estimate assumptions. This could lead to improved monitoring of whether actual experience is in line with reserving estimates.
- To the extent that minimum regulatory capital is generally smaller than economic capital, higher values of Z should be expected from the formula above than might correspond with market returns on equity.

Summary

This article has shown how the concept of risk aversion can be applied mathematically to the pricing of a single-period insurance contract, and how the same concepts can be applied to determine reasonable



aggregate reserving margins in long-term contracts within a release from risk accounting framework.

One surprising result is that the probability level at which the liability is held under a release-from-risk accounting framework is not always the same. It is higher for long-term contracts than for short-term contracts. This has important implications for “principles-based” reserving, where it has often been assumed that reserves for most all contracts should be set at some common probability level.

If one cannot rely on the probability level to help determine an aggregate reserve margin, another approach is needed. The Z -factor approach of this paper was developed with that end in mind. §



Stephen J. Strommen, FSA, MAAA, is senior actuary with Northwestern Mutual in Milwaukee, Wis. He may be reached at stevestrommen@northwesternmutual.com.

On the Fair Value of Insurance Liabilities: The Continuing Debate

by Luke Girard

The March 2006 issue of *The Financial Reporter* contained an article by Don Solow with the same title as above. Mr. Solow's article was a response to a rebuttal of his original article. That rebuttal and his original article were published in the September 2005 and December 2005 issues.

In his March 2006 article, Mr. Solow says, "Mr. Girard appears to agree with my argument that a policyholder, in purchasing a policy or contract from an insurance corporation, writes a credit put to the owner of the corporation." The author actually quotes my September 2005 article "The put arises because of the limited liability of the corporation, thus the company owns the put written by the policyholders. And because the company owns it, it inures to the benefit of the owner of the company." On the contrary, I do not agree with Mr. Solow that the policyholder writes a credit put directly to the owner of the corporation. The owner owns the equity interest in the company, which value includes the credit put that the company owns.

Mr. Solow ably quotes various reputable sources concerning the meaning of limited liability that the owner, not the company, has limited liability. This reminds me what Winston Churchill famously said that "Britain and America are two nations separated by a common language." There is no question that the owner benefits from limited liability just as the owner benefits from any other interest the company may own, all of which is reflected in the value of the company's equity. But the conclusion that the shareholder directly owns the credit put because the shareholder benefits from limited liability is not a well reasoned argument.

Mr. Solow asserts that limited liability does not mean that shareholders' equity cannot be negative. To the contrary this is exactly what limited liability means. We should also note that while the shareholders of a regulated insurance company benefit from limited liability, they also incur a regulatory cost, which effectively reduces the value of this limited liability benefit. See my article "On the Fair Value of Insurance Liabilities: The Regulator's Option" in the December, 2005 issue of *The Financial Reporter*.

Mr. Solow argues, "Mr. Girard takes the position that the credit put belongs on the corporation's balance sheet as a component of shareholder equity. In order for this to be true, the credit put must be shown to be an asset of the corporation." I have not argued that the credit put should be recognized as an asset of the corporation, but rather in the fair valuation of the liability.

Mr. Solow brings up the interesting example of agency risk involving a company with a Three Stooges management style. He concludes that such a company's credit risk would be higher and fair valuation would be lower as a result. The idea behind this example is that management is squandering company assets. If management is doing this, then what is preventing the owners from firing such managers and recapturing the value the Three Stooges have presumably lost? Also, if the company is regulated, then regulators could intervene resulting in losses to the owners and reducing the value of own credit risk. The same example is not limited to Three Stooges and can be repeated with Three Wise Men. Management could be increasing risk and simultaneously enhancing the value of own credit risk to the owners. This self interest is another reason why insurance companies must operate under regulatory supervision.

Finally Mr. Solow compares a company that issues a policy backed by its general resources to another policy supported by risk-free assets, i.e., a defeasement. He argues that these two policies should be valued identically. Actually, the defeasement provides greater security and thus increases value to the policyholder relative to the general obligation. The defeasement is also more costly to the issuer. Thus the two are not identical financial instruments.

I also would like to commend Mr. Solow for ably presenting the views from the other side and I also am sure the debate will continue. §



Luke N. Girard, FSA, MAAA, is president of LNG Consulting in Fort Wayne, Ind. He may be reached at lukegirard@comcast.net.

Spreadsheets – Yay or Nay?

by Bob Crompton

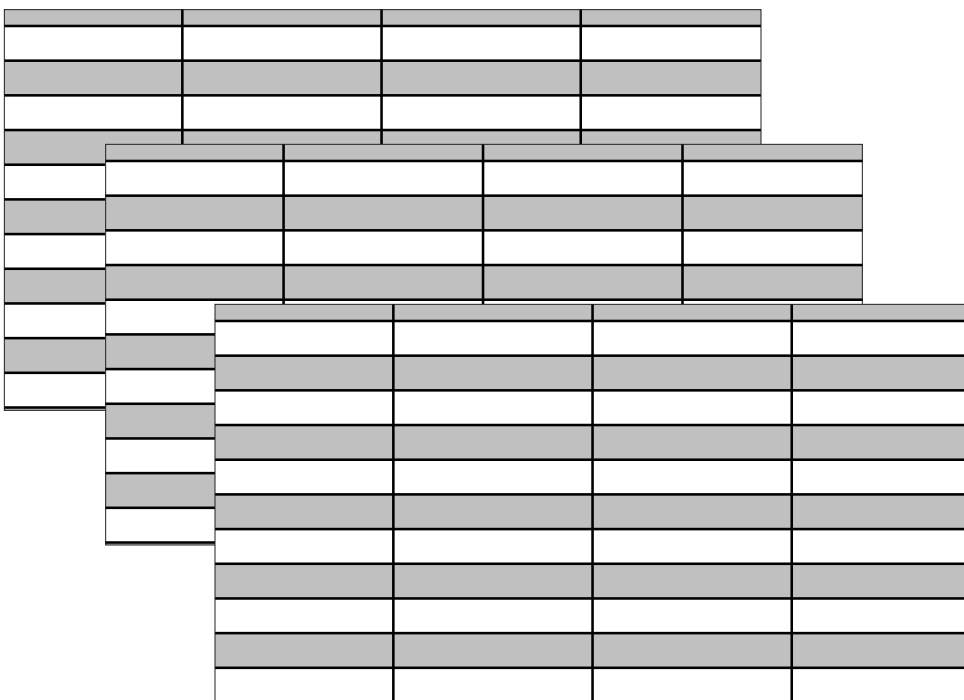
When I was a young actuary working in product development, we used an in-house system written in APL to perform our pricing work. Although the system was quite good for its day, it suffered from the usual shortcomings—limited documentation, inability to incorporate new features without significant coding and subtle bugs that would appear at inopportune moments—usually when I was working on a tight deadline.

One day the head of the department brought in a representative from a brokerage house in an attempt to set up another distribution channel. In his naïveté, the rep asked how long it would take to develop a new product with this system. The department head answered, “With this system, we can do it in a day.”

Of course this statement was an egregious exaggeration, and could only be true if referring to a minor tweak to an existing product. I later told the department head that he was fortunate that the system didn’t crash when the brokerage house rep was looking. Since that time, the proliferation of electronic spreadsheets has significantly improved actuaries’ ability to respond in a timely manner to both market place developments and financial reporting requirements. Although a new product in a day may still be unrealistic, spreadsheets have improved response time over the bad old days of APL pricing systems.

However, spreadsheets have a dark side. Because of their nearly infinite flexibility, they can be used in many situations, including situations where they should not be used. Spreadsheets should be used when a quick solution is needed or when there is no existing programmatic solution. Spreadsheets should not be used for *production*—that is, for ongoing, periodic calculations or compilations of amounts for financial or management reporting.

Sarbanes-Oxley has put a spotlight on how errors can creep into spreadsheets. The horror stories relating to spreadsheet errors were so sufficiently circulated during the initial phases of Sarbanes-Oxley implementation that no repetition is necessary. These errors are, however, a red herring. It is possible to



manage spreadsheets so that there are no material errors.

The real problem with spreadsheets is deeper and more endemic than intimated by Sarbanes-Oxley. Any spreadsheet used for production work is a nexus of inefficiency and a sinkhole of opportunity costs. Spreadsheets used for production work convert actuaries from risk analyzers into spreadsheet managers. The constant attention that these spreadsheets need drains resources that could be more profitably employed elsewhere. Actuaries, with their can-do attitude and facility with spreadsheets, have become enablers of poor management.

This problem is not amenable to correction, the way common errors are. Any spreadsheet that is complex enough to require an actuary is complex enough to require ongoing actuarial support. This ongoing support, combined with the notorious lack of documentation skills found in most actuarial shops results in business processes that devour valuable resources.

In the table on page 16, I compare some of the strengths of spreadsheets to some of the strengths of

continued on page 16 >>

formal programs. In this context, a formal program is used in the general sense of a program written in a formal programming language with a specific syntax and semantics, rather than in a more specialized sense of a program written or analyzed using formal methods.

Strengths

Spreadsheets

Ubiquity
Facility
Rapidity

Formal Programs

Scarcity
Complexity
Deliberateness

Ubiquity versus Scarcity

Spreadsheets are everywhere in the electronic ecology. Almost every single business computer has some form of spreadsheet installed. This widespread availability means that spreadsheets are ideal for dealing with urgent tasks.

The ubiquity of spreadsheets allows for the implementation of urgent processes by those who are directly concerned with the process—those who best understand the “what” and “how” of the *res* of the process.

Spreadsheets are everywhere in the electronic ecology. Almost every single business computer has some form of spreadsheet installed. This widespread availability means that spreadsheets are ideal for dealing with urgent tasks.

Formal programs on the other hand, at least those used for insurance company production purposes, have a limited existence. Such programs exist in one place, or perhaps in a few places. This scarcity is appropriate for business processes that are mature and well defined. Scarcity prevents mutant versions of the program. Changes are not made willy-nilly, but are

made in a controlled manner, complete with testing.

Facility versus Complexity

While it may take a village to raise a child, it only takes a village idiot to create a spreadsheet. Spreadsheets are easy to learn. In fact, where I live, mothers routinely enroll their newborns in spreadsheet training classes so they will have a leg up for enrollment in private kindergarten.

Spreadsheets’ ease of use makes it useful to people with no programming skills. In fact, this ease of use sometimes seems to unleash a great deal of creativity. I have seen spreadsheets of fascinating sophistication and breathtaking scope.

The facility of spreadsheets is closely connected to their ubiquity. Their ease of use is what makes them so useful on a widespread basis.

Formal programs, on the other hand, are written in a programming language with strict syntax and semantics that requires education and practice to use properly. This formalized structure is designed to deal with complex data structures in a precise manner.

Writing good code is a skill that requires both some theoretical knowledge as well as practical experience. In fact, writing good code is somewhat like actuarial science in the sense that most individual tasks are not very difficult—but there are a lot of individual tasks and both the programmer and the actuary have to exercise due care in making sure that all of the individual pieces fit together properly. One such area of fitting is in data structures.

Data structures used for insurance production work are often more complex than is appropriate, or even possible, to use in a spreadsheet, where data and processing are mixed together in an electronic goulash. The complexity of formal programs allows for separation of data from processing, and for each to be designed for efficiency and effectiveness.

Rapidity versus Deliberateness

Rapidity here refers to the time between conceptualization and calculation. Spreadsheets can be created quickly—even spreadsheets of great complexity. And while developing a completely new product in a day may still be a fairy tale, the use of spreadsheets for development of new products or features can create significant efficiencies.

This speed advantage is the greatest benefit that spreadsheets bring to any enterprise. The ability to complete a project in weeks rather than the months or years required with formal programs is of inestimable value.

Formal programs, on the other hand, are developed with deliberateness. Although quicker is always better, the strength of formal programs is the process used to consider the business rules and possible circumstances likely to occur in practice and to design code to deal with these circumstances. Spreadsheets, on the other hand, are often operated on a hindsight basis, where results are certified by a review for reasonableness after the fact, with little or no before the fact review.

In addition, a formal program makes provision for situations that “don’t compute.” Rather than the dreaded #VALUE! that a spreadsheet will generate, a formal program has a specified procedure to deal with exceptions—even if it is only to print out the exception list so someone can perform processing manually (that is, on a spreadsheet!).

Formal programs also have extensive testing procedures to ensure that what the program does is what it was intended to do. This points out the distinction between spreadsheets and programs. Spreadsheets are ideal for testing (among other things), while programs are ideal for ongoing and extensive calculations. In addition, formal documentation rules for formal programs encapsulate the thought processes and business rules that lie behind the items being processed.

The deliberateness of formal programs is an investment and becomes part of the operating leverage of the enterprise.

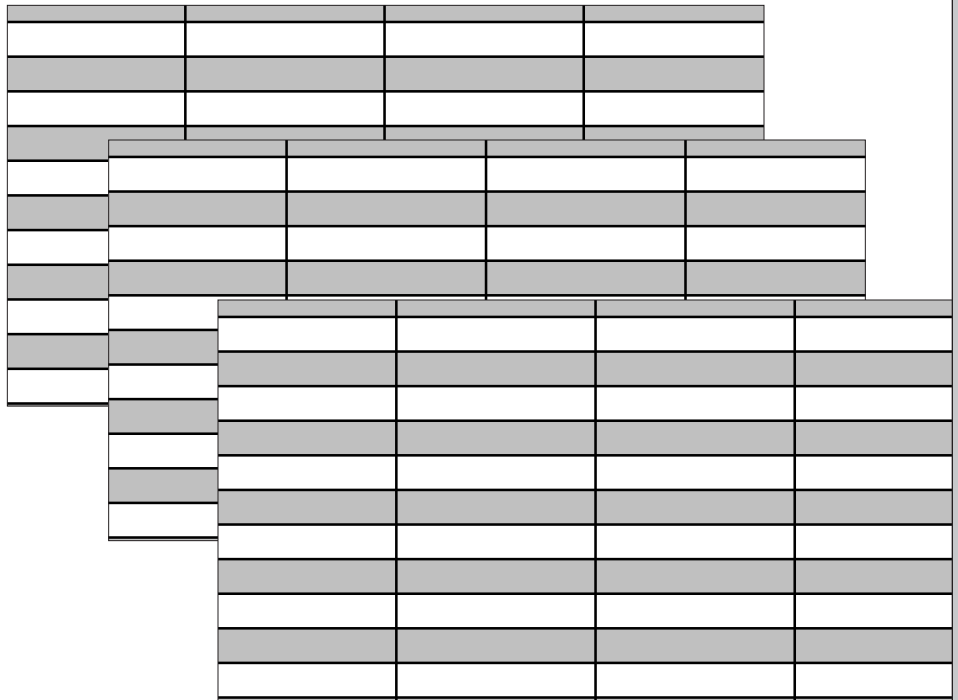
Some Examples

Three examples are given below. One is a good example of the use of spreadsheets, one is a bad example and the third is somewhere between good and bad.

Example 1: The Good—SOP 03-1

When SOP 03-1 became a requirement, some (perhaps many) companies had no formalized valuation process in place for this GAAP requirement. Because there was no off-the-shelf solution available, and because lead time for in-house coding was insufficient for many companies to implement formalized programs to handle SOP 03-1 (given the amount of time for actuaries to become aware of the pronouncement, digest the requirements and then write programming specifications, followed by the normal Code-Test-Revise cycle of the programmers), the first time through SOP 03-1 for some companies was performed on spreadsheets.

This use of spreadsheets as a stopgap valuation measure fits well with spreadsheets’ strengths (ubiquity, facility and rapidity). SOP 03-1 knowledge was not typically widespread at year-end 2004, but spreadsheets were available to actuaries who were knowledgeable. These actuaries, often working under tight deadlines, were able to craft temporary solutions to the SOP 03-1 requirement.



In addition, the use of spreadsheets to prototype SOP 03-1 calculations, or to prototype any type of involved and extensive set of calculations, seems to fit better with our “natural” way of thinking than does the stylized “Plan–Implement–Test” way of thinking that is used in formalized systems. Working out prototypes on a spreadsheet seems to enhance the process of intellectual discovery, to assist in thinking through issues and to give a more complete definition to the problem being analyzed.

Example 2: The Bad—VOBA Amortization

One bad example I have seen is VOBA amortization performed on a gigantic spreadsheet (multi-gigabyte size). This spreadsheet is updated quarterly, requiring several days of actuarial involvement at each update. The personnel involved were experienced ASAs or higher, rather than lower-level actuaries. Checking and sign-off of the results was performed at an even higher level of actuarial experience.

Although this process has produced results that are acceptable for financial reporting purposes, there is a business issue lurking behind the spreadsheet. Why has so much time and effort been invested in such an inherently inefficient process? Sure, it keeps a few actuaries off the streets who might otherwise be involved in mortality table fraud or deferred premium shell games, but it is a drain on the enterprise’s resources. With both a global oversupply of programmers and the availability of reasonable off-the-shelf valuation products, it makes no sense to tie up actuarial talent on this process. None of the strengths of spreadsheets apply here, while the strengths of

continued on page 18 >>

formalized code (scarcity, complexity and deliberateness) since the process is stable and well defined.

Example 3: The In-Between—DAC Amortization

The following example illustrates that an enterprise can recognize an issue and take at least some corrective action, even if there was no implementation of formalized code. Low hanging fruit is everywhere—you just have to look!

For this enterprise, DAC amortization schedules (both FAS 60 and FAS 97) are created by actuaries, but are passed to the financial area for periodic financial reporting. Application and updates of existing schedules are performed almost entirely by accountants rather than actuaries. Ongoing actuarial involvement is limited to final review and sign-off and any FAS 97 unlocking.

This solution relieves the enterprise of the ongoing opportunity cost attributable to maintenance of spreadsheets by actuaries. Even though there are still improvements that can be made, this is a better solution than leaving the spreadsheets in the hands of the actuaries.

These examples further suggest when spreadsheets are appropriate and when they are not appropriate. The chart below captures the idea that spreadsheets are appropriate to use for processes that are new and for which understanding of the process is not widely dispersed through the enterprise.

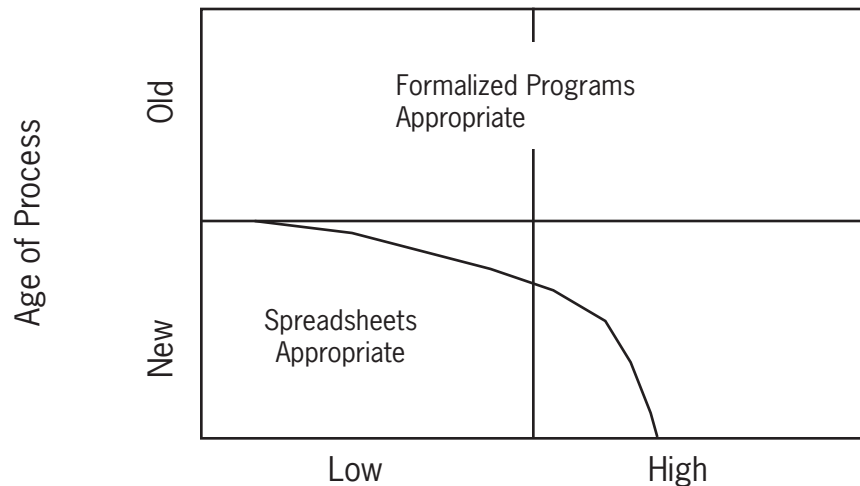
This chart below also points out an interesting side-light—that is, that one of the ways in which actuaries add value to an enterprise is through broadening the knowledge base so that normal processes can be accomplished without constant high-priced intervention.

Conclusion

Spreadsheets are valuable for urgent tasks or exploratory tasks. The ability to quickly generate results in spreadsheets has enabled insurance companies to be more nimble and responsive.

However, spreadsheets have also been used in situations where their use is inappropriate, sometimes resulting in considerable inefficiency. Actuaries who are too in love with their numbers to relinquish their spreadsheets do a disservice to their organizations. S

Dispersal of Knowledge



Robert B. Crompton, FSA, MAAA, is a consulting actuary with Actuarial Resources Corporation in Alpharetta, Ga. He may be reached at bob.crompton@arcga.com.

End-User Applications in Actuarial Processes: Risks and Controls

by Arnold A. Dicke and P. Shane Elenbass

Section 404 of the Sarbanes-Oxley Act has caused companies, including life insurers, to review and, in most cases, substantially strengthen their internal controls over financial reporting. All those involved in GAAP financial reporting, actuaries included, have felt the impact of Section 404.

Nowhere has the impact of the new rules been felt more keenly by actuaries than in their implications for some of actuaries' favorite tools: spreadsheets and databases. These tools are computer applications and as such might be thought to fall under the purview of information technology general controls (ITGC). They are set apart, however, by the degree of access to computational logic and data input and output structures enjoyed by the end-user of the application. Such end-user applications (EUAs) create unique risks and thus unique control issues.

Actuarial Processes that Commonly Employ End-User Applications

Almost every department that contributes information to the annual statement makes use of one or more types of EUA. What makes the impact on the actuarial function special, if not unique, is the number of such applications employed in actuarial processes, the complexity of the calculations and data transformations performed by these EUAs, and the materiality of the information that flows from the actuarial EUAs into the financial statements.

Exhibit 1 on page 20 lists actuarial processes that commonly employ EUAs. Most significant tend to be reserve, DAC and VOBA calculations, which in aggregate can account for a large percentage of the liabilities or assets on the balance sheet. The change in these items is frequently as large as or larger than the net income. Moreover, the calculations are complex, involving the projection of cash flows under an array of assumptions. Of course, the entire reserve liability or DAC asset is rarely calculated using EUAs. However, a significant fraction of these values may be calculated at least in part by EUAs, and EUA-based calculations are often fundamental for just those reserve and DAC numbers that are most subject to error: those arising from new blocks or



blocks that cannot be easily fit into standard IT applications. Furthermore, many vendor-produced software packages have EUA-like features (*e.g.*, manipulable input data and parameters, user-defined output reports, user access to calculational logic, etc.)

Control Issues Connected with End-User Applications

Spreadsheets are popular with end-users for a reason: their design focuses on user-friendliness, almost to the exclusion of control-friendly features such as access-limitation, automatic documentation of changes, etc. Cell-based formulas are very easy to manipulate. Data can be input in a variety of ways—typing, cutting and pasting, linking—and the output changes as soon as new input data arrives.

These user-friendly features create control-design headaches. Some, but not all, of the issues raised by these features are:

1. The need to assure data is correctly identified in formulas,
2. The need to assure the data set is fully updated,
3. The need to assure calculations are correctly performed in all cells, and

continued on page 20 >>

Exhibit 1: Actuarial Processes Commonly Using End-User Applications

Life and health actuarial processes that commonly employ end-user applications include:

- DAC/URL/VOBA valuations: for each FAS classification and/or LOB/product groupings
- Reserve valuations: especially for smaller blocks, blocks of riders or blocks in run-off, as well as for “new” reserve requirements such as Actuarial Guideline 38 and GMDDB liabilities under SOP 03-1.
- IBNR Reserves
- Manual adjustments to reserves or DAC: for shortfalls of or errors in the valuation system
- Assumption-setting: for each FAS classification and/or LOB/product grouping
- Loss recognition or premium deficiency testing
- Embedded value: if used as part of GAAP valuation process
- Review/ analysis: of financials, impact of varying assumptions/ experience, understanding new products
- Reinsurance: for ceded (retroceded) and assumed, various amounts and analyses
- Mergers, acquisitions of companies or blocks of business: evaluation and due diligence

EUAs may also be used for, or in support of, other actuarial processes:

- Calculation of Experience Studies
- Statutory reserving and annual statement entries
- Tax Reserving
- Pricing
- Product Development
- Underwriting
- Sign-off of valuation results by chief/corporate actuary

4. The need to assure that output relied upon for financial statements is not lost or compromised through subsequent use of the spreadsheet.

Similar issues affect other EUAs, including personal databases and, in some cases, user-accessible aspects of vendor-supplied actuarial applications.

During the documentation and testing of controls for processes that include EUAs, companies report difficulties in attempting to assure that controls are applied to all EUAs in the beginning-to-end process chain, that data is handed off correctly from one EUA to another and from the EUAs to other processes, and that EUAs and EUA output relied upon for financial statements is not lost through subsequent revision or user of the EUA.

EUA Control Policies

In response to these special difficulties, many companies have developed special control policies for EUAs. While a large range of practices emerged from the initial efforts to comply with Section 404, many of the approaches involved at least the following steps:

1. Identifying and inventorying EUAs,
2. Determining the significance of, and prioritizing, the EUAs,
3. Deciding what types of controls are needed, and
4. Documenting.

When the EUAs being used in the financial reporting process are inventoried, the number identified often surprises even the managers of the areas carrying out the processes. Companies often find it difficult to determine which EUAs should be scoped-in for SOX purposes. Consider, for example, EUAs used for experience studies for business accounted for under SFAS 60. The output of these EUAs may be used to set assumptions for new issues or when loss recognition occurs. Is this sufficient cause to sweep these EUAs into the SOX process? Does the answer depend on the facts and circumstances in a given reporting period?

Many companies attempt to rank EUAs according to the significance of the risk to the accuracy of the financial statements posed by their use. The level of significance of an EUA depends on both its purpose—financial (*i.e.*, supplying information that will appear in the financial statements), analytical (providing the means to assess the accuracy of financial statement items) or operational (used in the process, but not creating the same risks as financial or analytical EUAs)—and its complexity (the degree to which errors will not be apparent to the EUA user).

Determining the significance of financial and analytic EUAs is often corollary to the determination of scope for the overall SOX compliance effort. For many companies, scoping a SOX project involves

Exhibit 2

Example of how some actuarial processes using EUAs could fall into the Prioritization Grid (caution: same processes may fall elsewhere in the Grid for some companies):

Purpose	Complexity		
	Low	Moderate	High
<i>Financial</i>	Actuarial compilation spreadsheet	Reinsurance accounting spreadsheet	EUAs for DAC, URL, VOBA, SOP 03-1, and AG 38
<i>Analytical</i>	Duplicative analyses	Trends analysis spreadsheet	DAC roll-forward EUAs
	Assumptions review EUA	Account balance roll-forward spreadsheet	Source of profits EUAs
<i>Operational</i>	Claim listing database	Mortality A/E spreadsheet	Pricing spreadsheets (except ones that impact financial items)

decisions about materiality. The purpose of the control structure is to assure that financial statements do not contain erroneous information that would mislead the users of the statements. The likelihood that a misstatement in material is greater for numbers of greater magnitude. Thus, a common measure of the significance of an EUA is the magnitude of any financial statement number it impacts and the directness of that impact. Similarly, the likelihood of misstatement may increase with the complexity of the EUA, especially in cases where the approximate size of the outcome is hard to predict from past outcomes. Exhibit 2 shows how some common EUAs might be placed in the purpose-complexity grid. The degree of significance—and thus the need for controls—can be determined from the placement in the grid.

The types of controls that are often considered in connection with EUAs include access controls, input and output controls, base-lining and change controls, version and backup controls, as well as

other controls. Each company determines its own set of categories. Within each category, there may be choices of specific control alternatives that can be applied. For example, some degree of access control can be provided either by password policies, by secure directories or by a combination of the two.

Most EUAs will not have a full set of controls in place when first inventoried. Documentation requirements usually include documentation of the initial state followed by documentation of the remediation activities. It is important that the dates of remediation are documented, since auditors and others may need to know the state of controls on each date within a period.

It is widely agreed that the need for controls on an EUA may be reduced or eliminated by the presence of a downstream control that mitigates one or more of the risks posed by the EUA. For example, a professional sign-off on a reserve amount at a

continued on page 22 >>

point in the process subsequent to the calculation of the reserve by an EUA may obviate the need for controls on the EUA. However, if the downstream control relies on the EUA output as evidence of its assertion, the need for EUA controls remains.

Designing EUA Controls for Life and Health Actuarial Processes

Do special considerations apply to the design of controls for EUAs that are involved in actuarial processes?

For example, can actuarial review of formulas and calculations in EUAs represent a valuable control? Actuarial calculations often involve too many branches for independent recalculations to be a practical approach to proving reliability. However, a review of the formulas by a qualified actuary can often uncover problems even for rarely-seen combinations of inputs. For this reason, some companies believe the overzealous protection of formulas, if it inhibits review, can actually mask errors.

A professional actuarial sign-off is more likely to be effective as a control if there is a clear statement of what is actually being signed-off, accompanied by an indication that the signer possesses appropriate qualifications. Different categories of sign-offs may require different qualifications. Sign-offs regarding the accuracy of input items that do not require professional judgment, such as data, fall into one such category. Sign-offs on assumptions, where professional judgment is essential, fall into another. Other categories include formula reviews (both on new and on existing EUAs), independent recalculations of samples, and output reviews. The requirements management sets for a sign-off on EUA controls will likely differ for each of these categories.

As a second example, if putting in place formal IT applications for very complex actuarial calculations (say for a new kind of product) is judged by the company to be impractical or even impossible to do in time to meet financial reporting deadlines, is it appropriate to use a spreadsheet so that values can be prepared in a timely manner, even if the control environment of the spreadsheet is not entirely satisfactory?

Third, can controls be designed to take account of the ability of actuaries, through training and experience, to verify the plausibility of certain kinds of outputs, such as reserve factors at common ages, and to recognize the departure of a series of outputs from

expected patterns? Offsetting this may be a lack of training and experience in accounting and auditing procedures that often characterize actuaries, even those specializing in valuation.

Modularization of EUAs is often used to reduce the risk of financial misstatement connected with an EUA. In designing or remediating a spreadsheet, inputs, calculations and output can be placed in separate worksheets—or even in separate spreadsheets. Modularization of this sort might, for example, permit strict controls on access to calculation modules while allowing broader access to input and output modules.

Also, “internal” controls offer a possible method to mitigate risk in an EUA. Many EUAs contain, for example, secondary summations that can be used to reconcile count and arithmetic totals. For actuarial EUAs, a larger variety of internal controls based on standard actuarial formulas may be available. Internal controls can sometimes be designed to assure the integrity of actuarial formulas. For example, if the quarterly progression of results is reasonably predictable, a flag could be provided on current quarter results that vary by more than a specified tolerance from the comparable prior quarter result.

Sustainability and EUA Design

The control regime established Section 404 requires annual review and certification. Most companies have completed their initial pass through the SOX process. The short time frame and resource constraints forced many choices to be based on short-term expediency. In the case of EUAs, remediation often focused on improved documentation and the “grafting on” of easily defined internal controls. Going forward, some companies are considering more substantive redesign, or even replacement, of significant EUAs. Since this requires substantial resources, the decision requires careful consideration. However, if change control is not possible with the current design, the initial decision to cut corners may result in huge re-base-lining costs in later years.

The demands of Sarbanes-Oxley Section 404, as well as any statutory counterpart that may be adopted in the future, are recurring. The process that satisfies these demands must be sustainable. For the actuary, this means the tools and processes that impact the financial statements must be designed, not just to “get the answer,” but also to provide support for the belief that the risk that the answer is incorrect has been appropriately mitigated. §



Arnold A. Dicke, FSA, MAAA, is senior manager at KPMG LLP in New York, NY. He may be reached at adicke@kpmg.com.



P. Shane Elenbass, FSA, MAAA, is a senior manager at KPMG LLP in New York, NY. He may be reached at pelenbass@kpmg.com.

Toastmasters—or, How I Learned to Stop Staring at My Shoes

by David Hippen

Editor's Note: Last year, the SOA Board of Governors approved a set of initiatives proposed by the Business and Communication Skills Task Force aimed at creating more persuasive, articulate and business savvy actuaries. SOA member and market research identified these areas as the ones most in need of improvement. One initiative focused on getting more members involved in the highly successful Toastmasters International program. Since 1924, Toastmasters International has helped millions of men and women become more confident in front of an audience. Their network of clubs and their learn-by-doing program are sure to help you become a better speaker and leader. Visit www.toastmasters.org for a list of clubs in your area.

As I finished my last actuarial exam, part of my job duties included assisting Transamerica (L.A.) compliance analysts. One of the analysts told me about the Toastmasters Club that met weekly during lunch. She said she thought I would like it and invited me to a meeting.

Although finishing the exams freed up my study time, Toastmasters wasn't first on my list of how I expected to use my new "extra" time. Success with exams can confer a false feeling of having done all that's needed to succeed at work, making other challenges seem less important. Besides, who needs to conquer the fear of having to stand up in front of people to talk?!

Thankfully, my friend was persistent and persuasive, so I slunk into the back at the next meeting. Despite my obvious nervousness, it was clear that this was a casual, comfortable place to eat my lunch. It was quite a change from "swallow-a-sandwich-and-study" lunchtimes I had endured for actuarial exams.

I went back to Toastmasters the next week. By the end of a second meeting with this friendly group, it no longer felt like being with a bunch of strangers. The club treasurer disclosed that semiannual dues were very minimal, so I decided to sign up.

Upon payment of dues, Toastmasters International sent me a manual with simple guidelines for

preparing speeches. It looked pretty easy—and it was! Before long, I agreed to give my first speech, called the "Icebreaker," which consisted of telling about myself for a few minutes.

Despite the simplicity of the process, I found myself working very hard to improve my speaking. The experience quickly began to transfer to communicating more easily at work. For many, finishing the FSA thrusts the new actuary into a new world of managers, most of whom look for the actuary who presents results well in English, not actuarial jargon.

Many financial reporting actuaries find that although exams and pre-FSA experience enable them to establish appropriate reserves, post-FSA positions require them to describe and defend them as well. When asked to report to the company financial reporting committee on my research regarding new FASB requirements, I was glad Toastmasters experience had taught me how to convert my nervousness into dynamic speaking. Also, explaining valuation results, e.g., to regulators or the board, is much easier after giving impromptu speeches in Toastmasters.

Toastmasters gave me good management training, too—a less known but equally important second goal of Toastmasters. Successfully completing terms in various club offices prepared me to better handle duties as an actuarial manager. Challenged to compete in club contests, it was great to win trophies and new friends at the same time.

When I took new jobs in new places, Toastmasters turned out to be a quick source of new friends. Now I can list more than FSA, MAAA after my name, having gone from CTM (Competent Toastmaster) through ATM-Gold (Advanced Toastmaster). My experience with four separate clubs (L.A., St. Louis, Tallahassee and Pittsburgh) has been consistent—the atmosphere is supportive, positive and progressive.

Try it—I think you'll like it! §

David J. Hippen, FSA, MAAA, is a consulting actuary in Wexford, Pa. He may be reached at hptigereye@comcast.net.

Articles Needed for *The Financial Reporter*

Your ideas and contributions are the most important component of this newsletter. All articles will include a byline to give you full credit for your effort.

The Financial Reporter is published quarterly as follows:

Publication Date	Submission Deadline
September 2006	June 7, 2006
December 2006	September 8, 2006

Preferred Format

Please e-mail your articles as MS Word documents (.doc) to the newsletter editor. Headlines are typed upper and lower case. Please use a 12-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) with dimensions of at least 2" x 2" to accompany their articles.

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

Please send articles via e-mail or in hard copy to:

Rick Browne, FSA
KPMG LLP
303 East Wacker Drive
Chicago, IL 60601
Phone: (312) 665-8511 | Fax: (312) 275-8509
E-mail: rhbrowne@kpmg.com

Thank you for your help.

Volunteer Opportunities

As part of the FSA component of the education redesign, we are in the process of designing a Financial Reporting module for candidates in the Finance/ERM and Investment tracks. The primary goal of the module is to develop candidate understanding of financial reporting and its impact on actuarial work. Candidates will become familiar with financial reporting concepts, standards and management. Key content areas include GAAP, STAT, CALM, Taxes, and Management Reporting.

Volunteers are needed and critical to the effective design and development of the module. If you are interested in this volunteer opportunity, please contact Judy Powills, 847-706-3563 jpowills@soa.org, and let us know your particular area of interest.