



SOCIETY OF ACTUARIES

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## Editor's Notes

by Thomas Nace

As I write this column, I am deep into what has been commonly known as "March Madness." For some, this evokes the image and sound of sneakers squeaking their way across a basketball court as time on the clock runs down. For others, it means putting on a full court press, in order that the last interest scenario might be run and the final touches on the Actuarial Memorandum might be made, again as the sound of time winding down echoes like a ref's whistle.

For many, it is like a much-needed time out. Having survived the flurry of activity called year-end, it is time to take a breath and re-evaluate your game plan for the coming year. You now realize that all of the projects that you planned to get done over a 12-month period still have to get done, but now you have less than 10 months.

For others yet, somewhat closer to home, it means getting those last articles in hand and reviewed so that putting the next issue of the *Financial Reporter* in the hands of Section members on a timely basis becomes a mere slam-dunk.

There are many instances where "Madness" is not the name of the game, however. For example, March was the month when the NAIC Actuarial Life and Health Task Force (LHATF) meeting was held, as well as the American Academy of Actuaries' Committee on Life Insurance Financial Reporting (COLIFR) meeting. At the March LHATF meeting, AG-ZZZZ (reserving) was adopted.

Also at this meeting, the status of several hot projects was discussed. (See Don Maves' article in this issue on page 4). One of these topics was Variable Annuity Guaranteed Life Benefits (VAGLB). As it just so happens, we are fortunate to have in this issue an article by Jim Lamson discussing this concept and the latest developments.

One of the other topics discussed at the March meeting was a status on UVS — a Unified Valuation System. Dave Sandberg made the status report at the LHATF meeting and has also contributed an in-depth article

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## An Actuarial Analysis of FAS 133 (Part 2)

by Anson J. Glacy, Jr.

Part 1 of this paper, contained in the February 2000 edition of *The Financial Reporter*, described the basic objective and provisions of the Financial Accounting Standards Board's new standard on derivatives, Statement of Financial Accounting Standards No. 133, Accounting for Derivative Instruments and Hedging Activities. FAS 133 requires that all derivatives, including those embedded in non-derivative instruments, be recognized in the balance sheet at fair value.

The Statement dramatically changes the way hedging relationships are reported and creates earnings and capital volatility that may be unavoidable. The principles embodied in FAS 133 are complex and controversial, particularly as they relate to insurers using derivatives to hedge capital market risks. Part 2 of this paper presents a case study of how FAS 133 affects the accounting for perhaps its most interesting application in the life insurance industry: the equity-indexed annuity. Please note that this analysis does not constitute accounting advice and is not a substitute for a comprehensive assessment of how the Statement may affect your organization.



### Brief Recap of FAS 133

FAS 133 requires that all derivatives be recognized in the balance sheet at fair value. The Statement retains a type of hedge accounting that attempts to preserve the intent of a hedging relationship, but the qualification criteria for this treatment are complex and potentially onerous. FAS 133 defines derivatives based on distinguishing characteristics rather than by reference to specific types of instruments and consequently finds

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derivatives embedded in non-derivative financial contracts.

The Statement excludes traditional insurance contracts that compensate the policyholder as a result of an identifiable insurable event or of an adverse change in the value of a specific asset or liability for which the policyholder is at risk.

However, the FASB believes that some insurance contracts may contain derivative-like features, and these contracts receive specialized accounting treatment.

FAS 133 is effective for fiscal years beginning after June 15, 2000, but companies may early-adopt as of the beginning of any fiscal quarter. Most insurers will delay adopting FAS 133 until January 1, 2001, when adoption is required.

### The Equity-Indexed Annuity

Emerging within the past five years, the equity-indexed annuity (EIA) is a variant of a traditional deferred annuity and links a portion of credited interest to some external index (typically the Standard and Poor's 500 stock price index). The EIA thus replaces interest credits determined largely at the discretion of the insurance company with those defined through formula based on movements in the S&P 500. A wide variety of product designs are found in the EIA world, depending on the specific crediting formula employed. For example, a point-to-point design bases credited interest on the change in the S&P 500 over two discrete points in time, say five years apart. In this case, excess interest over and above that contractually guaranteed might be defined as some participation rate (like 75%) multiplied by the five-year percentage change in the S&P 500, but no less than zero. In contrast, an annual reset design bases excess interest on yearly changes in the S&P 500.

### FAS 133 Treatment of Equity-Indexed Annuities

According to FAS 133 paragraphs 10c, 12, 61h and 185, instruments containing

cash flows or other exchanges linked to the performance of an equity index are considered under FAS 133 to comprise two components: (1) a traditional debt instrument and (2) a series of forward options on the index. As such, the equity-indexed annuity is treated as a traditional deferred annuity combined with a series of forward-starting equity-indexed embedded derivatives. Since the economic characteristics of the embedded derivatives are not clearly and closely related to the economic characteristics of the host policy, they must be separated by bifurcation from the host policy and marked-to-market through income. As a result, FAS 133 will introduce earnings volatility for the EIA writer to the extent that it is unable to "hedge" these exposures with other assets that are also marked-to-market through income.

At inception of the policy, the carrying amount of the host policy would be determined by independently calculating the fair value of the embedded derivative and then assigning the remainder of the EIA deposit to the host. (This treatment is consistent with the fundamental GAAP principle that gains and losses emerge over time.) The host policy would then be accreted from its inception value to its guaranteed liquidation value at a constant interest rate. The guaranteed liquidation value would be a contractual surrender, death or annuitization value available at the policy maturity or other expiry date. This approach is consistent with FASB staff guidance contained in FAS 133 Implementation Issue B6, Embedded Derivative: Allocating the Basis of a Hybrid Investment to the Host Contract and the Embedded Derivative.

For financial reporting purposes, the hybrid instrument (the host policy and the embedded derivative) would be reported as a single item. Some observers believe that the total policy remains subject to the requirements of FAS 97, Accounting and Reporting by Insurance Enterprises for Certain Long-Duration Contracts and for Realized Gains and Losses from the Sale of Investments. FAS 97 calls for the use

of the retrospective deposit method for universal life-type contracts, whereby the account balance accruing to the benefit of the policyholder is defined as the policy liability. Therefore, if an EIA policy's carrying amount under FAS 133 is less than its corresponding FAS 97 carrying amount, an adjustment would be required.

A minimum interest guarantee in an equity-indexed annuity is considered to be an embedded derivative that is clearly and closely related to the economic characteristics of the host policy and thus does not require bifurcation. Similarly, the market-value adjustment, which may be found in some equity-indexed annuities, represents an embedded derivative that is also clearly and closely related to movements in interest rates and not subject to bifurcation. Finally, the S&P 500-indexed embedded derivative contained in equity-indexed annuities cannot be treated as a hedged item since (i) all derivatives must be recorded in the balance sheet at fair value and (ii) paragraph 405 of FAS 133 prohibits hedge accounting if the hedged item is measured at fair value.

Conceivably, these embedded derivatives, once separated from the host policies, could be designated as hedging instruments in other company hedging relationships.

### Valuation of the Embedded Derivative

For actuaries, the S&P 500-based embedded derivative contained in equity-indexed annuities poses a new and challenging valuation exercise. FAS 133 requires that this derivative be measured at fair value, which paragraph 3 describes as "the only relevant measure for derivative instruments." Fair value is defined as the amount at which willing and unencumbered counterparties could transact an instrument. Active markets with quoted prices give the best evidence of fair value and should be used as the basis for measurement. In their absence, estimates of fair value should consider prices for similar instruments and results of valuation techniques (like option-pricing

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models) consistent with the objective of measuring fair value.

While little valuation guidance exists in GAAP, of most relevance for an equity-indexed embedded derivative may be FAS 123, Accounting for Stock-Based Compensation. FAS 123 states that “the fair value of a stock option (or its equivalent) ... shall be estimated using an option-pricing model (for example, the Black-Scholes or a binomial model) that takes into account ... the exercise price and expected life of the option, the current price of the underlying stock and its expected volatility, expected dividends on the stock, and the risk-free interest rate for the expected term of the option.” Further, the FASB believes “it should be possible to reasonably estimate the fair value of most stock options and other equity instruments” and finds that only in “unusual circumstances” will the terms of a stock option or other equity instrument make it impossible to reasonably estimate the instrument’s fair value. (Appendix B of FAS 123 illustrates techniques for estimating the fair values of options with complicated features that may have relevance in the EIA world.) Finally, in estimating the expected life of a stock option, FAS 123 looks to “expectations ... about employees’ exercise behavior.”

In applying option-pricing concepts to the embedded derivative in an equity-indexed annuity, valuation actuaries will need to observe the following considerations:

- In option-pricing, one is not generally free to select the capital market assumptions to be used. Wise Nobel prize winners have demonstrated through arbitrage arguments how a “law of one price” prevails. Governing valuation assumptions (e.g., volatility) for S&P 500-based instruments are observable in the marketplace. Further, invoking what’s known as “risk-neutral” capital market assumptions has been found to greatly simplify the valuation exercise.

- Value under option-pricing theory derives only from how and when financial instruments turn into cash. So, in valuing the EIA embedded derivative, the policy is followed through to its ultimate liquidation via surrender, death or annuitization. This means that accounting-inspired accruals (like credited interest) will not play a role in the valuation.

- The valuation actuary will need to identify the portion of the liquidation value attributable to changes in the S&P 500 by removing amounts related to the guaranteed liquidation value from it.

Only this residual piece enters into the value of the embedded derivative.

- The two principal options in the indexed annuity (the company’s limited right to reset certain crediting features and the policyholder’s right to “put” the contract back to the company for cash) should be reflected through appropriate behavioral assumptions. Since policyholder behavior regarding equity-indexed policies is not yet well defined, this valuation assumption will demand considerable attention from the actuary.

- A Monte Carlo approach to the valuation, wherein movements in the S&P 500 occur in a randomized fashion, is most intuitive and straight forward, although other methods are possible. The valuation apparatus employed by the actuary may need to model correlated changes in interest rates if these are thought to play a role in inducing policyholder or insurer behavior.

### Character of the Embedded Derivative

In accepting an EIA deposit, an insurance company agrees to make equity-indexed interest credits throughout the life of the policy. (To complicate the valuation exercise further, some companies also permit policyholders to “transfer” at specific times in the policy’s life by electing a

different method of crediting interest.) Certainly, the company’s liability to the EIA policyholder extends beyond the interest credits to be made at the end of the current policy year. Proper valuation of the EIA embedded derivative recognizes the intertemporal nature of the liability. Intertemporal effects reflect how capital market events, the insurance company’s subsequent credited rate response to them, and the policyholder’s resulting lapse/no-lapse decision can change the size and timing of a policy’s ultimate liquidation value. Recall that option-pricing theory derives value only from how and when financial instruments turn into cash. Thus, proper valuation recognizes the multi-term character of the embedded derivative and its ultimate “payoff” in the form of surrender, death or annuitization benefits.

### Representative Accounting Depiction

The above discussion demonstrates that the application of FAS 133 to equity-indexed annuities is a complex undertaking. Besides the proper identification of the embedded derivative and its valuation at fair value, issues of coordination and consistency with prior FASB statements (like FAS 97 and 123, but not limited to them) come into play. Using a hypothetical product design of a five-year point-to-point liability with no deaths, premature surrenders or renewals, Table 1 displays a spreadsheet (<http://www.soa.org/sections/finrep.html>) developed to clarify the mechanics of EIA bifurcation. Note that the depiction sidesteps some of the difficult valuation issues discussed above (e.g., policyholder psychology, multi-term valuation) by modeling a single index term only. Also note that important considerations like DAC, Federal Income Taxes and general expenses are ignored for purposes of illustration.

The spreadsheet depicts the emergence of earnings over the five-year period in response to a saw-tooth-like pattern of S&P 500 performance. In addition to bifurcating the liability into its host policy

and embedded derivative components, the spreadsheet funds the liability with a combination of a zero-coupon bond and an S&P 500 call option, both timed to mature in year five. Together, the bond and the call option fully defease the EIA liability regardless of where the S&P 500 winds up. Since the call option and the embedded derivative mirror each other and the zero-coupon bond and the host policy are both accreted at a constant interest rate, accounting symmetry is attained and smooth earnings emergence can be expected.

However, the aforementioned FAS 97 floor disrupts accounting symmetry in year one, when an equity market downdraft depresses the fair values of both the call option and the embedded derivative by an equal amount. But since the total value of the hybrid instrument (the host policy together with the embedded derivative) is not permitted to pierce the FAS 97 floor, the spreadsheet depicts the loss resulting from the artificially elevated liability level. (See the explanatory calculations at the bottom of Table 1 on the Web site). This year-one loss will then lead to higher future-period earnings, as the flooring adjustment subsequently reverses. This asymmetry may be further exacerbated to the extent that the purchased S&P 500 call option fails to match the characteristics of the embedded derivative contained in the equity-indexed

Table 1

Illustration of GAAP Accounting: 5-Year Point-to-Point Liability						
Deposit	10,000					
Participation Rate	75%					
Zero-Coupon Bond Rate	7.00%					
<b>Capital Markets</b>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Index Growth		-10%	20%	-10%	20%	20%
Index Level	1,500	1,350	1,620	1,458	1,750	2,104
Implied Volatility	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
Risk-Free Rate	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Dividend Rate	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%
<b>Calculation of Black-Scholes Option Values</b>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Minimum Guarantee (SNFL)	10,433					
Guaranteed Growth in Policy Value	4.33%					
Liability Option Strike	1,587					
Time to Expiry	5	4	3	2	1	0
d1	0.6145	0.2847	0.6190	0.1890	0.7702	
d2	0.1226	-0.1553	0.2380	-0.1221	0.5502	
Black-Scholes Price	384.39	238.94	354.97	182.34	287.40	517.11
<b>Balance Sheet</b>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Market Value of Option	1,922	1,195	1,775	912	1,437	2,586
Zero-Coupon Bond (HTM)	8,078	8,644	9,249	9,896	10,589	11,330
Total Assets	10,000	9,838	11,023	10,808	12,026	13,915
Market Value of Embedded Dx	1,922	1,195	1,775	912	1,437	2,586
FAS 133 Host	8,078	8,502	8,949	9,418	9,913	10,433
FAS 97 Floor	10,000	10,085	10,171	10,258	10,345	10,433
Total Liabilities	10,000	10,085	10,723	10,330	11,350	13,019
Equity	-	(247)	300	478	676	896
Pre-Tax Income		(247)	547	178	198	221

annuity. In this context, the important valuation considerations discussed above will be key to ensuring a reasonable pattern of EIA earnings emergence.

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**Chairperson's Corner**

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bigger, and it's urgent. We can't stay a small, exclusive profession. The exclusivity of our profession does not keep salaries high. All it does is restrict the scope and volume of work performed by actuaries.

Once again, a challenge and opportunity is presenting itself. On past occasions our profession has been too small, too parochial, or perhaps both, to see the

needs of business and society as opportunities to provide valuable services. Once again, the need is there. Now that the "Big Tent" concept and the activities of the SOA's Strategic Planning Committee are familiar to most of our members, our perspective is broader. Once again our profession is being challenged. This time around, I think we're ready.

The next Chairperson's Corner will talk about how your participation can make a difference and how you can get involved.

*Mike McLaughlin, ASA, is a partner with Ernst and Young LLP in Chicago, IL.*