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Summary: Industry experts address continuing developments in the implementation of FAS 133.

Topics include:

- *Marking derivatives to market*
- *Hedging criteria*
- *Liabilities with embedded derivatives*
- *Variable annuities with guaranteed living benefits*
- *Deferred acquisition cost (DAC) on liabilities with embedded derivatives*
- *Practical implementation*

MR. DARIN G. ZIMMERMAN: With exactly one reporting period of experience under our belts, there are probably one or two questions left unanswered out there. Hopefully, we can get those all tied up today, and put everything to rest. Andy Chua is the junior member of our speaking team with only 20 years of experience in the life insurance industry. Andy works for ING, in the variable annuity business unit. He's the manager of asset/liability modeling (ALM), and has developed their dynamic equity hedging program.

Mark Walker is a senior consulting actuary with Ernst & Young based in Atlanta. Mark has over 21 years of experience in the life insurance industry. His main talents and focuses have been U.S. GAAP and total Deferred Acquisition Cost (DAC). He has focused on financial reporting issues, including foreign company conversions to U.S. GAAP and implementation of reserving methodologies such as FAS 133.

MR. ANDREW D. CHUA: I'd like to start off with some basics and a very general discussion regarding the real core of FAS 133, which is the FASB's definition of what constitutes a derivative. In cases of hedging activities, what sort of accounting

options do you have? They are elective. If you do elect those accounting treatments, what sort of requirements would you have to comply with in particular, and what is a test of hedge effectiveness? I will end with a couple of summary points.

FAS 133 provides a standard for the recognition and measurement of derivatives and hedging activities. It defines what is and what is not a derivative. It defines how a derivative should be recorded. It's typically fair value. In fact, there is no exception, unless it's one that's specifically excluded. It also defines valid hedging activities for the purpose of special accounting treatment. To the extent that you do elect special accounting treatments, you can realize certain benefits. In particular, one might try to mitigate some of the earnings in equity volatility resulting from fair value accounting.

FAS 133 is applicable for fiscal years beginning after June 15, 2000, so for most insurers that means the fiscal year that starts January 1, 2001. Incidentally, it was originally supposed to have an effective date of June 15, 1999, but this was modified with the issuance of Statement 137.

FAS 133 is quite complex and difficult to implement, particularly for insurers. Their systems and procedures are more in tune with book or amortized cost accounting. This is because fair value measurements are required at least quarterly, and in some cases, even more often. Because of fair value measurements, unless you comply with certain requirements, FAS 133 may introduce earnings volatility and/or equity volatility. To mitigate that, as I've said, you could elect hedge accounting treatments, but even those have requirements that can be quite intimidating.

Derivatives, according to FAS 133, must be reported at fair value. There are some specific exceptions listed in the statements, but everything else uses fair value. Fair value represents an amount for which an asset or a liability could be bought or sold between willing parties under normal conditions—with an emphasis on normal conditions. Prices that are derived through forced liquidations, or forced sale if you will, are not viewed as fair value. In general, only derivatives can be used for hedging activities. There are a couple of exceptions to this rule, particularly in the foreign currency hedging exercises, but most insurance companies—at least in the United States—are not heavily involved in those types of activities. In general, the gains and losses from derivatives and hedging strategies should not be deferred. They should be reflected in current income, again, unless management elects—and the key is it's an elective process—to follow special accounting treatments and comply with the hedging criteria.

To understand the implementation of FAS 133, it is essential to understand how FAS 133 defines derivatives. FAS 133 defines them in terms of properties of derivatives; and as I said, there are a whole host of exemptions. These properties include: having one or more underlying variables, being based on notional amounts, and requiring insignificant or zero initial investments.

The fourth property, which is not typical of a definition of derivative, is that the settlement of the derivative must be in terms of cash or cash equivalent. This fourth property may, in fact, take certain derivatives out of the domain of FAS 133.

Examples of underlying variables are three months London Interbank Offered Rate (LIBOR) in an interest rate swap, or the Standard and Poor's (S&P) index in an option. The key item here is that the underlying variable would cause the fair value or the cash flow of the derivative to change, and typically those are capital market-driven activities. There must be a notional amount, one or more, which is defined to be a fixed amount that determines the size of the change in fair value of the derivative. An example is the number of shares in an S&P futures contract—typically, 250 shares per contract. In the case of an interest rate swap, it's very similar to the concept of face amount.

The concept of requiring an insignificant or zero initial net investment is that a derivative is viewed to represent a change in the value of the underlying variable times the notional amount, and typical derivatives do not have cash exchanged at inception. Examples would be forward contracts, futures, or interest rate swaps. Some derivatives do, in fact, require small investments representing the time value of an instrument, or, in certain cases, "off market" terms. An example would be options. If you have an up-front cost, and in-the-money options, this would be viewed as an off-market term.

Settlement must be in cash or a cash equivalent. By that, FAS 133 means assets or liabilities that have interchangeable units, a quoted price in an active market which must be large enough that prices would not be affected by the transaction. Examples are Treasuries or IBM stock. Incidentally, an option that would pay in terms of, say, a phantom stock or stocks with a thinly traded market would not meet the definition of derivative under FAS 133.

Typical of a statement as complex as FAS 133, there are always specific exclusions. Certain insurance contracts are excluded such as property/casualty and traditional life insurance. Typical insurance contracts that are included would be Equity Indexed Annuities (EIAs). The way FAS 133 defines "certain financial guarantees" is: an option to pay if a borrower were to forfeit on his or her obligation is treated as an option under this category, but is excluded from FAS 133. However, a credit derivative, where one is paying for a change in the quality of an underlying asset, is viewed as a derivative. Contracts issued in connection with stock option plans and contracts issued as part of a business combination are not treated as derivatives under FAS 133. An example of a contract that pays contingent on a business combination would be one where the buyer is entitled to a fee if the transaction is not fulfilled. Typical examples of non-exchange traded contracts are contracts in which the underlying asset is traded in a thinly traded market, and contracts like flood insurance or earthquake insurance.

An interesting concept that probably affects actuaries more than the others is that of embedded derivatives. These derivatives are attached to a host contract. Whether or not these derivatives fall under FAS 133 depends on a fairly broad description of what they are. The key phrase here is "clearly and closely related to the economics of the host contract." If this is the case, then it would be exempt from FAS 133, and the accounting for that embedded derivative would follow whatever accounting treatment is used for that host contract.

Examples of exempt derivatives include Guaranteed Minimum Death Benefits (GMDBs), which are very popular in variable annuities; Guaranteed Minimum

Income Benefits (GMIBs); options in callable or putable bonds; and minimum interest guarantees. With GMDBs, the derivative is closely tied to the death benefit feature of insurance products, and is viewed as a derivative outside of FAS 133. The same is true for GMIBs; the derivative value is one of the contractually offered pay-out options provided in most life insurance products. As for the minimum interest guarantee, conceptually, that is an option on an interest rate swap that includes putable and callable options in the bonds. The reason for the exemption is more historical, as I understand it. These features have been around for a long time and are part of the mechanism of those products; therefore, they have been explicitly excluded from FAS 133.

Certain contract features are viewed as not being clearly and closely related to the host contracts. As such, they must be bifurcated and accounted for at fair value. This creates potential ramifications for product development actuaries who, as they develop more creative products and more hybrid products, may create products that fall into this category. Examples would be the options embedded in EIAs. The idea is that the host contract is dependent upon prevailing interest rates, while the option is dependent upon performance of the S&P 500 index.

There is an interesting aside here that relates to the options that are embedded in convertible debt and held as investments. What is interesting is that the treatment of derivatives may be different between the issuer and the holder of the contract. Typical insurance companies buy convertible debt and have to fair value the option that's embedded in the convertible debt or structured note. However, the issuer of the convertible debt is explicitly exempt from having to fair value the option under FAS 133.

As I've indicated, FAS 133 requires derivatives to be accounted for in terms of fair value. As a result, unless an offset is provided, companies will experience more earnings volatility as a result of changes in the fair value of those derivatives. In general, a derivative's gains or losses should affect current income and never be deferred through conventional accounting mechanisms. Management has the ability to elect special accounting treatments for hedging activities that they feel are appropriate either from an asset/liability management standpoint or from a risk management standpoint.

FAS 133 provides for these three different classifications: fair value hedges, cash flow hedges, and foreign currency net investment hedges. There is also a provision for a shortcut method that would only be applicable to interest rate swaps if they are perfectly hedged. "Perfectly" means there is no basis risk FAS 133 provides certain requirements in order to meet the definition of a "perfectly effective" interest rate swap. The benefit of the shortcut method is that the change in the fair value of the derivative is deemed to be the change in the fair value of the hedged item. As a perfect hedge, there is no current period income effect due to changes in the capital markets.

Fair value hedges protect assets, liabilities or "firm commitments." That term is defined under FAS 133 and I will talk about it more in a moment. They provide protection against changes in value of fixed-term prices or interest rate swaps. In general, FAS 133 requires that gains and losses of a fair value hedge be recognized into current period income. In particular, that means that the change in the fair

value of the derivatives must also be recognized into current period income. The change in the fair value of the hedged item, which has to be both designated and effective, would also be recognized into current period income as an offset to the derivative's change. To the extent that the hedging activity becomes ineffective, the derivative would still be fair valued; but the hedge item would not be, which would tend to increase the volatility of earnings.

This type of accounting has numerous applications for many of the insurance products currently sold. This is particularly true with GMDBs or GMIBs. As I indicated, GMDB, for example, does not meet the definition of a derivative under FAS 133. In fact, U.S. GAAP accounting right now does not require one to hold any specific reserve. It's almost like an off balance sheet obligation. If management feels it is appropriate to hedge out that risk through the use of options or some sort of a dynamic hedging program, they could take advantage of this accounting treatment to reduce earnings volatility due to changes in capital markets. The same is true for GMIBs.

The distinguishing characteristic of cash flow hedges is that the features of the transactions are uncertain or are variable in nature. An example of that would be the issuance of a variable note, in which the interest obligation is dependent upon the interest environment at the time of payment. A typical transaction that would fall under this type of accounting would be a "forecasted transaction." The FASB defined that term as any transaction that does not meet the definition of a firm commitment.

A firm commitment is defined by the FASB as meeting four criteria: it must be an agreement with an unrelated party; it must be binding on both parties; it must be legally enforceable; and there must be sufficient disincentive for non-performance or non-completion of the transaction so that completion is determined to be probable. In particular, the terms must be specified and known. If a transaction does not meet this definition, then it's viewed as a forecasted transaction. Therefore, if management decided to implement some sort of hedging strategy associated with that particular type of transaction, proper accounting treatment would be determined by the cash flow hedging rules.

Proper accounting treatment dictates that the gains or losses on the hedging instrument are recorded in other comprehensive income, which is a component of shareholder equity. This recording would later be reflected in earnings when the hedge item starts affecting earnings itself. As you're going through this hedging process, the accounting for the hedged item is not affected until it actually hits earnings.

Foreign currency net investment hedges are not my strong suit, but I included this topic for the sake of completeness. Essentially, this involves trying to hedge the currency risk of investments in parts of the company that are outside the domicile country. The change in fair value of the derivative would be recorded in other comprehensive income, but only to the extent that the translation gains or losses are also recorded in other comprehensive income. To the effect that the hedging is not effective, then those gains and losses will be recognized into current period income.

What hedging criteria must be met in order to take advantage of the special accounting treatments? They are, unfortunately, quite extensive and intimidating. There are criteria that apply to the hedging instrument as well as to the hedged items. Incidentally, as far as the hedged item is concerned, it only applies to fair value and cash flow hedges, because with foreign currency, the hedged item is typically known.

There are several criteria for the hedging instrument: it must be documented at inception; the relationship between the derivative and the hedged item must be known, documented and explained; the reasons why one is using the hedge must be provided; and one has to define specifically the risk that is to be hedged. One can deconstruct the risk into several pieces and then identify those pieces for which hedge effectiveness can be demonstrated. To the extent that the non-hedged pieces affect the fair value of the instrument, changes in the fair value of those pieces would be recognized into current period income with no offset.

The effectiveness of the hedge has to be explainable, identifiable and measurable. Currently, though, the standards are not well-defined. A correlation of 80-85% seems to be an acceptable level of effectiveness. The demonstration of effectiveness must occur on an ongoing basis. It must be consistent with what one has defined at inception. One could not, in the middle of the process, choose to change that. If one does, then the offset against the fair value of one's derivative would not be accepted, which would necessitate starting all over again.

The hedged item in FAS 133 must represent some sort of risk that affects earnings in order to be available for this type of hedge accounting. It cannot be an item that is already accounted for on a fair value basis with changes in values affecting current period earnings. Take, for example, EIAs. The options are already viewed as an embedded derivative. Changes in EIA option values have to be recognized into current period earnings and must be recorded at fair value. Therefore, one can't use EIAs as a hedge item for hedging purposes. Another requirement is that the hedged item cannot be related in anyway to either the purchase or sale of a subsidiary or business combination. Typically, those are balance sheet items, and the idea is to not allow their value to be recognized prematurely into your financial statement current period earnings.

There are a number of risks that could be designated as hedged items, and FAS 133 splits them into categories. The risk being hedged may be designated as all of the risks combined; or only certain risks may be designated specifically, such as interest rate risk, default risk, credit risk, foreign currency risk, or some combinations of those. Typically basis risk would not be allowed as a hedge item. For cash flow hedges, the forecasted transaction must also be formally documented and all the accounting items that would be involved or affected would have to be specified. Finally, the forecasted transaction must be with a third party.

Hedge effectiveness is the heart of the special accounting rule. Again, a hedge has to be defined at inception and has to be re-assessed periodically. That is why fair value accounting or measurement may, in fact, be required more often than quarterly. To the extent that hedge effectiveness cannot be demonstrated, then fair value hedge accounting would not be permitted. Also, it would not be permitted to offset the change in fair value of your derivative. In the case of currency hedges or

cash flow hedges, the change in the fair value of the derivative would not be allowed to be reflected into equity and would have to be fully reflected into current period income.

As I said before, FAS 133 allows one to carve out certain risks when demonstrating hedge effectiveness. One could exclude certain risks that were not intended to be covered by the hedging strategy. To the extent that those risks affect the value of the derivatives, unfortunately, the gains and losses associated with the risks will materialize in current period income.

In summary, hedge accounting and fair value accounting can be very daunting requirements. But as the FASB has indicated, although FAS 133 is still in its infancy, it is a good first step in reaching the ultimate goal of using fair value accounting in all financial statements in the United States. Going forward, it is my opinion that FAS 133 will have a big impact on product development. Now hybrid product features that historically were not viewed as part of the host contracts will have to be bifurcated. One will have to be more diligent in terms of managing risk factors that could potentially produce very volatile earnings. There will be a need for the risk manager, the product development actuary, and the financial actuary to work more closely with one another.

I believe that, although fair value of assets is the domain of the capitol market, fair value of liabilities is the domain of the actuarial profession. I've always heard people use capital market pricing in terms of liability valuation. I think that applies on the asset side where concepts are well-defined and accepted. But in the case of liabilities, there are ways of valuing liabilities using fair value concepts that can be different from capital market pricing concepts. In particular, take EIAs where it's typical to value the embedded option using capital market assumptions. However, those kinds of options, in fact, do not have continuous pricing. If one goes back to first principles to examine the capital market concepts, or talks to people on Wall Street, I think one might well find that the true fair value of those options might be lower than the amount capital market techniques would indicate.

MR. MARK A. WALKER: My talk today will focus on some of the practical aspects of FAS 133 as they relate to valuing insurance liabilities. I'm going to discuss reserving issues related to several key insurance products that are addressed by FAS 133, the first of which is equity-indexed life and annuities. You may have heard about some of these reserving techniques before, but we're going to discuss several of them today as we consider the broad range of product designs out there. Second, we're going to talk about variable annuities with secondary guarantees. These types of products are starting to receive considerably more attention around the industry with respect to reserving implications of FAS 133. Finally, I'm just going to touch very briefly on synthetic GICs.

I would like to use Chart 1 as a template for determining whether to apply FAS 133 to an insurance contract. As Andy said, there's a general exemption for property/casualty insurance and for traditional life insurance, but there are some life insurance products that qualify. As we run through this template, the decision analysis answers whether or not FAS 133 applies. As an example, we will find that FAS 133 does not apply to annuities with Market Value Adjustments (MVAs).

We will try to answer the first question that appears on my template up here. Would the market value adjustment within an MVA annuity be a derivative if it were a freestanding contract? Let's answer that by considering the four properties of derivatives, as set forth by Andy. The derivative's fair value or cash flows must vary with changes in one or more underlying variables. Does an MVA meet these criteria? Yes, it does. The derivative must also be based on one or more notional amounts. Is an MVA based on a notional amount? Typically, the adjustment factor is applied to the account balance or the premium consideration, so yes; it is based on a notional amount. Is it true that as a derivative, the MVA feature requires insignificant or zero initial net investment? The consideration that changed hands at issue is like the deposit for a single premium deferred annuity, not the MVA, so the third criterion is met. As for the final criterion, the MVA is settled by adjusting the amount of cash delivered to the annuitant relative to the base cash surrender value, so that criterion is met as well.

According to Andy's criteria, our MVA would clearly be a derivative if it were freestanding, so it is not exempted from FAS 133 by this first question on Chart 1. The second point we must consider asks if the MVA is clearly and closely related to the host contract. The answer is yes, since the adjustment depends primarily upon the relationship of prevailing interest rates at time of surrender as compared to the interest rate credited upon inception of the contract. Therefore, FAS 133 does not apply.

I would like to note that the answer to the third question in this template, "Is the contract carried at fair value for earnings?" would be no. Existing account rules do not employ any fair value techniques in reserving for MVA annuity liabilities. Therefore, if the answer to the second question had been no, then MVA annuities would not be exempt from FAS 133 and a company would subsequently need to start carrying them at fair value as of the effective date.

This example for determining whether FAS 133 applies is dealt with by the FASB's Derivative Implementation Group (DIG) in issue paper B9. It and other issue papers can be found on the FASB's Web site at www.fasb.org. You're not going to see it right away, but click on the Technical Issues button and you'll eventually get there. The DIG issued several papers; I'm going to refer to many of them throughout today's presentation.

Having said that, at Ernst & Young, one of our electronic newsletters declared "Ding Dong, the DIG is dead." The DIG, which has been creating all of these "clarifications," has decided to postpone its next meeting indefinitely and all future meetings have been canceled until further notice. So if you're wondering about further clarifications, it doesn't appear as though there'll be any more. I am cautiously optimistic, but before you become delirious with enthusiasm—remember, technically it's just postponed.

Certain traditional life insurance products are included under FAS 133, although there is a general exemption for most of them, which is clarified in the DIG's issue paper B10. B10 says that if a product has a death benefit that is tied to an underlying index, then FAS 133 does not apply because that feature would be considered under the insurance exemption. However, if a product's surrender values are tied to the underlying index, that constitutes an embedded derivative.

Therefore, EIAs or equity indexed life insurance products would require bifurcation of the embedded derivative and the host under FAS 133.

There is another important pronouncement in the DIG's issue paper B29, which applies to periodic reset or ratchet equity indexed products. B29 states that the reset provision constitutes a series of forward starting options and these options are part of the embedded derivative taken over the life of the product. We'll be talking about B29 in more detail later.

So what do we do with EIAs? As Andy mentioned, one needs to identify the embedded derivative and then record it at its fair value at issuance of the contract. The remainder of the deposit becomes the host instrument and is subject to FAS 97. The host liability will accrete to the underlying guaranteed value at the maturity date; therefore, the host instrument is fixed for the life of the contract.

I'm going to quickly go through an example using a point-to-point contract design, but the practical aspects of valuing a contract with a ratchet design are far more complex. There are several different approaches that we could use to determine the fair value of the embedded option, but on a simple point-to-point case, I can use the Black-Scholes formula for valuing the embedded option. The time to maturity and strike values are known quantities for any given liability. All other input parameters to the Black-Scholes formula, which includes index volatility, risk-free rates, assumed dividend rate of the underlying index, and current cash price of the index can be observed for similar instruments traded in the capital markets. When determining aggregate FAS 133 liabilities, one should use best estimate assumptions for non-economic factors such as persistency, mortality, free partial withdrawals, or other contingencies which are appropriate to the underlying product.

In determining the assumptions to be used for calculating DAC amortization, I should emphasize that one should look all the way to the contract's maturity and not to the end of the DAC amortization period. I'm going to use a very typical five-year point-to-point example where the original deposit is $10,000 and the underlying minimum guarantee is 3% growth on 90% of the original deposit. The contract's guaranteed participation rate is 75% of the appreciation in the underlying index. I'm going to use "participation" in a very generic sense of the word. It could mean spreads, caps and floors, or any other parameter of equity participation the product has.

There will be no equity crediting for this product given to the policyholder before maturity and none after the five-year period. In other words, it's not a periodic reset or ratchet product. For market parameters I'm assuming market volatility of 22% and a risk-free rate of 6%. The dividend assumption is 125 basis points. We are going to assume that 90% of the annuitants will persist to maturity at the end of the five-year period to receive the equity participation. Using Black-Scholes and expected persistency, we calculate that the embedded value of the derivative on a $10,000 deposit is $1,730. This result is calculated using a strike price that is 104.33% of the current cash market level on the date of issue. The strike price is a function of the underlying guarantee provided at the end of the five-year period. The remainder of the deposit is the initial value of the host instrument, which is

$8,270. That amount is going to accrete at an annual rate of 4.76% until the end of five years when it reaches the underlying guarantee of the $10,433.

Now let's take a look at what will happen one year later if the cash price of the index has declined by10%. That actually puts our embedded option a little bit further out of the money. And let's assume there's a slight decline in interest rates, so that the four-year risk-free rate is 4.8%. Further, let's assume volatility remains constant at 22%. Using the Black-Scholes formula combined with persistency, the value of the embedded derivative declined to $1,079. Again, for this example I assumed that some people lapsed in the first year, but it's the remaining persistency to the end of year five that affects the calculation. The value of the host increased by 4.76% and is now $8,664. The total liability now is $9,743. That's less than the original deposit. The decrease in the total liabilities will run through the income statement.

Now, again, that might not be a real-world example, but I use it only as a base to start off with. In fact, a Black-Scholes formula doesn't apply to the embedded derivatives in a number of EIAs. Examples include high water mark products or annual ratchet designs that are addressed in B29. So for this, I would say that a more generic approach for determining the fair value of the derivative would employ Monte Carlo or stochastic computer models. When we do that, we should consider how changes in the prevailing economic environment might interplay with non-economic factors based on policyholder behavior.

B29 states that there are three considerations in determining the fair value for ratchet designs and the special considerations that we have for the series of forward starting options. First, future index values need to be estimated to determine both notional amounts at each ratchet date and future strike prices for the forward starting options. In other words, we have to make some kind of projections of the future market growth. Second, we need to make best estimates of future equity crediting such as participation rates, spreads, caps and floors, subject to the maximums and minimums that we would believe management is going to offer under those various economic scenarios. Again, we have to consider non-economic factors of policyholder behavior such as surrenders and mortality. Those are used as examples, but we could also throw in free partial withdrawals or other benefits which are inherent in the product.

One thing that tends to be elusive in developing these methodologies is, what exactly are we trying to measure? I've put Chart 2 together to try illustrate that. The first box of each set is the underlying guarantee, and though I've said it was 90% carried forward at 3%, what I've substituted here is the greater of the original deposit or the underlying guarantee. What the FASB is trying to achieve with FAS 133 is to capture on the balance sheet what percentage of our liabilities is subject to movement in the underlying index. So if I had a policy that was given no equity crediting for one year and I still had my original balance of $10,000, my value of the embedded derivative should be zero for that instance and not the difference between the account balance and the underlying guarantee.

What I've shown on the second box of each set in Chart 2 is just a hypothetical case where we have a 5% increase in the first year. We're given an additional $900 in the second year. The market does not produce any index credits for the following

two years and then in the final year a final credit is earned so that the final account balance is $12,500. The difference of $500 at the end of the first year is the value of the embedded derivative for people who would have surrendered at year and so on. You'll note that in the fourth year, the value of the embedded derivative actually declined. Given that, under each stochastic scenario what we're going to do is measure the portion of the projected account balance that is attributable to the movement in the index at each event such as lapse, death, and free partial withdrawal.

Now, as we put together this economic scenario like cash flow testing and other dynamic valuation techniques, we should have dynamic assumptions. Let me give you two examples of those. Take, for example, lapse rates. Suppose we have a product for which the participation rates are based upon the yield of an underlying fixed income portfolio that we invest at the date of issue. To the extent that interest rates increase, new products out on the market are probably going to offer more attractive participation rates that could cause existing policyholders to make the decision to terminate, so we should consider a dynamic lapse rate assumption. Along the same line, again, remember the second consideration of B29 requires us to project the future participation rates we're going to offer. Perhaps in that environment, in order to curb extra lapses, management may decide to raise participation rates, so we need a competitor index to follow as well as pricing parameters. Again, those are very similar to the types of assumptions that you see with other cash flow testing.

Stochastic methods can be rather onerous on a seriatim basis, so careful consideration should be given to grouping, as in any dynamic, and stochastic testing. A first consideration would be cost factors and, again, here's a simple one—participation rates. You might have a block of business that's at an 80% participation rate and another block that's at a 70% participation rate. Even within those, we should take a look at "moneyness." Suppose there was a three-month period in which the company was offering an 80% participation rate, but the underlying index decreased 20% within that three-month period. We would probably expect different behavior from a policyholder that is 10% in-the-money as compared to a policyholder that is 10% out-of-the-money. So when we do our grouping, we should be very careful to assure that all contracts within a model cell have similar "moneyness" characteristics.

I also include "issue date" in these considerations. Perhaps a more generic description would be "deposit date," because I could have a flexible premium EIA and want to reflect the fact that I'm probably supporting more than one participation rate and degree of moneyness per contract. There's also the potential that the prevailing interest environments are different for various deposit dates, so care should be taken when determining model groupings.

Once we have our model groupings, we generate hundreds, if not thousands, of economic scenarios. For each scenario, we develop an expected cash flow of the embedded derivative. Then we discount those cash flows at the path-wise risk-free rate so we wind up with, for each scenario, the present value of the embedded derivative. If all scenarios have equal likelihood, our fair value is the arithmetic mean of those scenarios.

As you reflect on stochastic testing of cash flows, or other valuation methods, you'll find there's a wealth of information that you can learn about the dynamics of the product. But stochastic testing will also capture the full dynamics of the offering that you have, and I would say that stochastic modeling of an EIA is likely the only alternative that will produce the complete economic picture of the product.

Having said all that, I would like to suggest that as a potential method for valuing the embedded derivative. In some instances, I don't think you can use anything short of a stochastic model to value certain EIAs. However, for other EIAs there may be a single-scenario alternative. There are a couple of things that, if they are true for a product or portfolio of products, the single-scenario alternative might be available. Once such situation is a ratchet design, as long as it doesn't have an onerous renewal minimum equity participation rate. As an extreme example, let's say that our participation rate on all renewals can be as low as zero—in that instance, this method would apply.

A second such situation would be if management's best estimate is that equity crediting will remain within profitability parameters. In other words, a budget is developed in pricing, and even if the pricing people can't automatically tell you the budget, usually it can be developed from the pricing runs. We can combine the first two required considerations of B29 to develop projected account balances and required cash flows to value the embedded derivative.

Since this is a single scenario, we would discount the cash flows at the current risk-free rate.

Let me describe a little bit about how the budget method works. Once we issue an EIA and give it its initial participation rate, we have actually offered an embedded call option for the first year. Now we can value that call option by a Black-Scholes method—for example, as part of its hedging strategy, a company actually goes out to the capital markets and purchases a number of call options to support the liabilities, which match your persistency. Maybe we can use that as a proxy for fair value if we adjust for transaction costs or other minor adjustments that might be needed. Or, perhaps, we can use other tools for determining fair value, which are basically just versions of the Black-Scholes formula. Either way, we can come up with a value of the next call option in the series of forward starting options. That will be the present value of our anticipated equity crediting for the first anniversary. Once I have that value, then I just accrete that amount by my one-year spot rate to its reset date.
On the next reset date, my call options mature and become cash. If my underlying bond portfolio has coupons, they become cash, and perhaps are reinvested. I have a bunch of fixed investments, but at that time I take a specific amount of the cash flow and buy some more call options to support the underlying liability. That resulting coverage percentage is then translated into my participation rate. And so I spend, let's say, 5% of my money, which then becomes the present value of the next equity-crediting amount. So I calculate that forward value by using the risk-free forward rate.

For example, if I have a 5% budget in the third year with a risk-free forward rate of 5.2% applicable to that year, then I estimate that my accumulation for the third year is 5.26; in other words, 5% multiplied by 1.052. With that I can estimate the

fund growth. I can compute my underlying guarantee and premiums that I considered, given the haircut, so that I create a cash flow for the embedded option.

Let's take a look at an example of an annual ratchet product that is similar to our other product, which has a $10,000 deposit and the same underlying guarantee. I'll assume a 5% issued option budget that we can always meet, our last equity participation is given in five years and no equity participation beyond that point. We also assume that there's a termination rate of 2% each year for lapses and deaths.

Using the budget method, we're going to project the future cash flows and we're also going to discount those cash flows at the appropriate risk-free rates. This means I'll end up with an embedded value of $1,890. The remaining $8,110 becomes the host liability, which has to accrete at 5.17% to reach the underlying guarantee at the end of five years.

Now let's perform a valuation one year after issue. Again, let's assume that the market index has dropped by 10%. We didn't credit anything to the policyholder, so the account balance is still $10,000. The risk-free rates now change slightly, and I assume volatility remains constant. It really doesn't matter because the company is going to turn right around and take 5% of the account balances, which are the options that they're going to buy. They're using the new projections of the funds with persistency, so the value of the embedded option actually declines to $1,481. Now, it doesn't decline as much as the derivative in the point-to-point example because, as forward options, their strike prices will not be based on the current cash price of the index at issue.

We have a new set of forward strike prices, and they are behaving exactly the way the product was designed to behave. The host contract increases by 5.17% to $8,529 and the total liability grows by a meager ten basis points to $10,010. This increase is completely attributable to interest accretion. Unlike the point-to-point example, our ratchet design product now has a liability that is greater than both our original deposit and the current account balance.

Another important consideration when using the budget method includes the fact that the budget is largely based on our fixed income portfolio. So, to the extent that we have reinvestment activity, or even changes in non-economic assumptions like lapses, our budget could potentially change from time to time, so we have to unlock that assumption from time to time. Our budget doesn't have to remain constant from year to year either, as we look forward. Alternatively, a company could determine the budget as a spread from the forward rates, and that would create a crediting strategy more like a new money product than a portfolio product.

There are limitations to the budget method. Before you use the budget method, you should do some stress testing to find the market circumstances under which minimum equity participations would kick in and the likelihood of that happening. If it's considered remote, you should at least be able to demonstrate that.

It is very important when using the budget method that the most basic underlying assumption—that the company can maintain the budget—is reasonable. If for some reason, be it marketing considerations or just administrative convenience, a company's participation rate declaration differs slightly from the budget, that ends

up being reflected in the value of the issued call options. Eventually, this will carry forward, affect the value of the embedded derivative and flow through to the financial statement. So a deviation in the current actual-to-budget participation rates has an impact on the current period financials, but it won't affect the valuation of the future options. As long as management's best estimate is that they'll be able to achieve the budget of X% into the future, this can still be applied.

Also, the effect of equity participation and the underlying guarantee should be considered. For example, if the underlying guarantee is reset at some future date to the account balance. If it is higher, you're going to have to modify the method that I just described. However, one is definitely not required to reset the guarantee. The host contract accounts for benefits that are guaranteed at issue. It is entirely possible that an EIA will have a guaranteed surrender value in excess of the host amount. The "excess" guarantee is accounted for as part of the derivative because it is a result of the equity-related performance of the contract.

Another thing to keep in mind is that the sum of the host and the derivative might be less than the current cash surrender value for any particular contract. This is why it is important to include dynamic decrements in the aggregate calculations so that if the issued call options get to a point where they are far out of the money, a spike in lapse rates could cause some big losses upon termination. This is also why I have to emphasize that a single-scenario test does not really capture the full economics of the product; so, again, even though it's more onerous, the more generic stochastic methods would be preferred.

Now, I'll talk very briefly about variable annuities. There is some question about guaranteed minimum income benefits. If this product applies to you, I invite you to read very carefully issue paper number B25. There are a couple of conclusions that you can draw from B25. First of all, if my guaranteed income benefit is completely life contingent, it is exempt from treatment under FAS 133. If it is certain only, it's quite clear that FAS 133 would apply. But what about a certain-and-life guaranteed income benefit? A portion of the reading would imply that it may apply, yet, glimmer that it may not apply is addressed later, so I would be very careful. I'm still discussing this with some people within Ernst & Young.

I'm going to suggest two methods of valuing the embedded derivative under guaranteed accumulation products. Under Method One, I'm going to say that the host liability is equal to the variable annuity account balance. I'll make no changes just because of FAS 133. At issue, I'm going to say that a percentage of my fees that are associated for funding this charge will fund the guarantee. I'm going to set that reserve at issue at zero, and for all future valuation dates the reserve is the present value of the benefit less the present value of the net revenues.

Under Method Two, the embedded option at issue is equal to the embedded put. The host liability then becomes the difference between the variable annuity account balance and the embedded option—exactly the same thing that you saw under the neck of the index annuity. The host will eventually accrete to the full account balance at the date of the guarantee.

You have to be very careful about the application of Method One. It should be done only if there's a specific charge that is funding a guaranteed minimum accumulation

benefit or if it's documented for regulators that this percentage of charges is associated with the guaranteed accumulation benefits.

Now let's take a look at a variable annuity example of a $100,000 deposit. The underlying guarantee is that I'm going to have returns of at least the same amount as the deposits at the end of ten years. Again, I'm just going to use the Black-Scholes formula to calculate the present value of the embedded option at the date of issue as $11,159. My best estimate is that my funds are going to have a net growth rate of 8%. Under Method One, I'm going to take that revenue stream in my underlying example and impose an asset base charge. Then, I'm going to equate the net consideration as a level charge like a mortality and expense (M&E) or a specific asset base charge. So under Method One, my host liability is just the growth in the account balance. However, since there is a steadily increasing projected account balance on all of the future anniversary dates, the embedded put gets further and further out of the money and I actually end up with a small but negative liability.

Under Method Two, total liability at issue is equal to the amount of the deposit. At the end of ten years, it's still equal to the amount of the deposit. But as we move further and further out of the money, the value of the embedded option keeps decreasing, and the value of the host keeps approaching the variable annuity account balance. We started off with $11,159 as the value of the embedded put, therefore, we have $88,841, or 88.8% of our variable annuity account balance as our host instrument. We gradually increase that percentage until we reach 100% on the date that the guarantee accumulation kicks in.

Now how do these compare? Chart 3 shows the account balance to the left and Methods One and Two to the right. There's really not much difference between the total liability these two methods produce. Remember, in order to use Method One there must be some explicitly identifiable revenue that is going to fund the benefit that is not included in estimated growth profits. And to the extent that my embedded liability under Method Two for the embedded option is going to change from year to year, that change is going to be included in estimated growth profits.

My final point relates to synthetic GICs. I'm going to refer to the DIG's issue paper A16. A synthetic GIC is an underlying guarantee, which is actually a wrap given by an insurer around a trust held by the GIC holder, so it is clearly an embedded put option. Whether or not a lot of the principles mentioned in the section of A16 related to variable annuities depends on the value of the embedded derivative for a synthetic GIC, which depends almost exclusively on the funding arrangement between the issuer and the GIC holder.

MR. T. EUGENE DIMITRIOU: I'm with Morgan Stanley Dean Witter. My question is in regard to hedge accounting. It seems that often times the only accounting option available for derivative instruments is fair value; however, for bonds one can choose either book value or market value. As companies are being required to hold more liabilities at fair value, are they also choosing to hold more assets at fair value in order to minimize the effects on income that occur when the assets and the liabilities are valued on different bases?

MR. CHUA: Hedge accounting has been used on the asset side for insurance companies for firm commitments in particular. Going forward with GMDBs and GMIBs (depending on whether or not FAS 133 applies to GMIBs), and as products become more complex and their values are based on capital market equities, I suspect there will be more dissimilar treatment between portions of the assets and liabilities. I would not be surprised to see the management of many companies decide that using fair value methods consistently for all assets and liabilities is the way to go. This is particularly true given the current reinsurance market. I think fair value accounting will become more and more popular across the board.

MR. PETER M. BIRKEY: I'm with AmerUs Capital Management. Does anybody know what embedded derivative system companies are using? What area of the company do you see producing the management information reports?

MR. CHUA: We found that building our system in-house gives us a lot more flexibility. It allows us to customize our hedge strategy and be more adaptive to product development requirements. As far as who's responsible for the system, it's typically a joint effort. In fact, it encourages the liability folks and the asset folks to work much more closely together, particularly with regard to fair value accounting, where in fact, mark-to-market is essentially what it's about. In order to manage properly the effect on earnings, a good attribution process as well as constant monitoring is essential.

MR. QING D. WANG: I'm with CNA Insurance Companies. What happens if an asset is purchased to hedge a particular liability, but the liability is specifically excluded from being subject to FAS 133? Is the company still required to use hedge accounting for the asset?

MR. WALKER: Yes, fair value hedge accounting could mitigate earnings.

MR. DAVID SCHEINERMAN: I'm with PricewaterhouseCoopers. Most companies use capital market for hedging. Most of the time the hedges available match up with the liabilities pretty well. Of course, sometimes they don't. Do any of the panelists know if there are special rules to determine how close a hedge has to be in accounting?

MR. CHUA: It gets back to the hedging requirements to apply the special accounting rules. You need documentation for what you're trying to hedge, what type of hedging instruments are needed, and what risks you are designating as the risk you're trying to hedge. All of the above would have to be properly defined. In the case of GMDB, it's typically the market movement of your underlying mutual funds in the case of variable annuities, so you have to define that. As far as effectiveness is concerned, I think that an industry consensus is still developing. My understanding is that an 80–85% hedge effectiveness seems to be acceptable.

MR. MARTIN J. HALL: I'm with Ernst and Young. I have a follow-up to the question about the minimum death benefit guarantee. I want to point out that there will be a new SOP coming out, essentially getting a fair value to those liabilities that will, to some degree, mitigate some of the volatility. In fair valuing the FAS 133 liability on EIAs, you were discounting at the risk-free rate. I'm wondering what

your thoughts are about imputing a credit spread, given that most life insurance companies have some spread on their commercial paper that they issue.

MR. WALKER: Fair value methodology is still a developing area. It is a clearly accepted practice to discount at the risk-free rate. As the body of knowledge continues to develop regarding fair market value, the spread notion is being discussed quite a bit. It's almost as if you were eavesdropping on the three of us at breakfast this morning because we were discussing just that. The fact is that if you look at the market value of other derivatives that are out on the market right now, it's really not the risk-free rate that's determining their value; it's more attributable to the swap rate. Nonetheless, the concept that you've brought out is clearly one of the directions in which fair market value is going.

MR. CHUA: You also have to recognize the kind of options that we provide as an insurer. In fact, we do not have continuous pricing requirements since most contracts price at a particular day's close. Based on my own work, I have found that you are able to use other types of interest rate assumptions and still demonstrate effectiveness.

Chart 1

Background on handling embedded derivatives

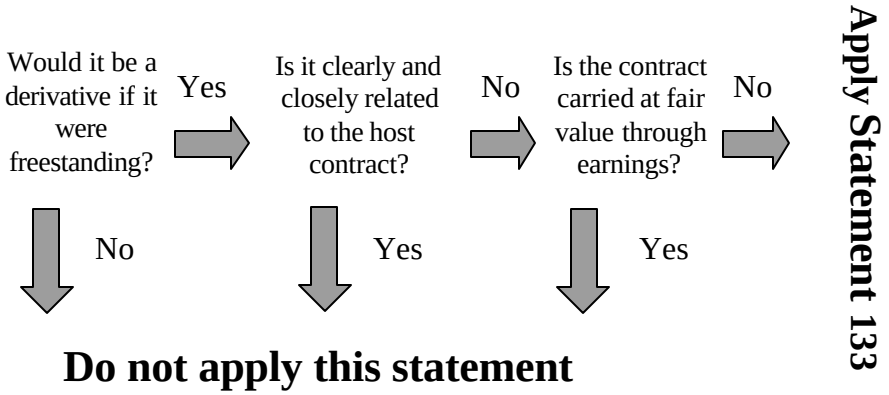

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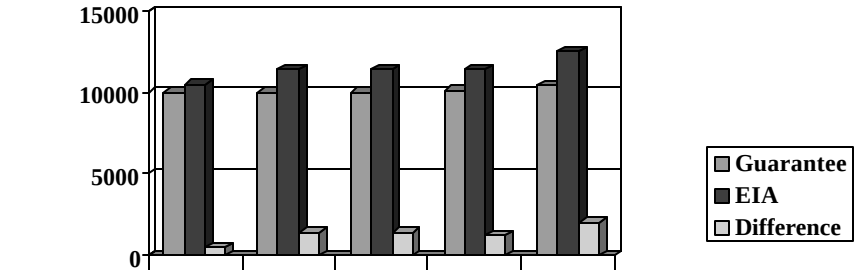
Chart 2

What is being measured



	Year 1	Year 2	Year 3	Year 4	Year 5
Guarantee	10000	10000	10000	10130	10433
EIA	10500	11400	11400	11400	12500
Difference	500	1400	1400	1270	2067

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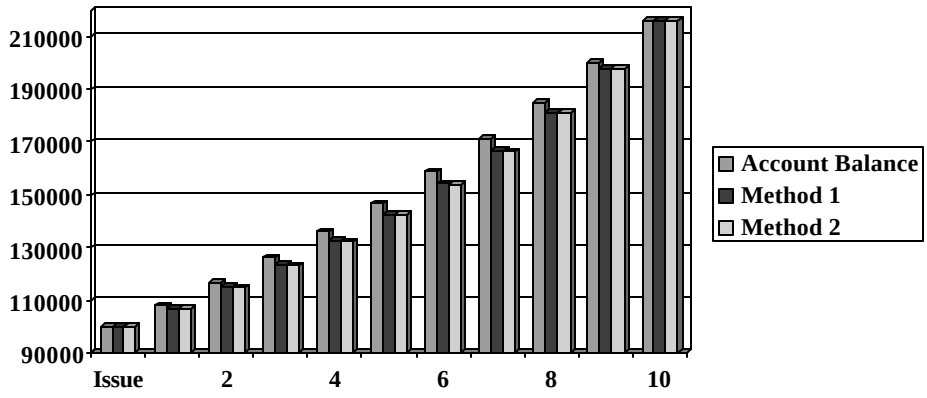
Chart 3

Comparison of Liabilities



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