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Session 45PD
Dynamic Hedging ¾ Fair Valuation for FAS 133

Track: Investment

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Summary: Remaining in compliance with FAS 133 has been challenging for many issuers. This session covers the current status of FAS 133 and extensions such as the proposed statement of position on accounting and reporting by insurance enterprises for certain nontraditional, long-duration contracts and for separate accounts.

MR. MARTIN J. HALL: This session on is on FAS 133. The presenters today are Martin Hall, Ejaz Haroon, and myself. I'm a senior manager with Ernst & Young in Boston, and we deal with a range of risk and value optimization work and have been quite heavily involved in helping clients implement 133 and also reviewing implementation by clients.

Ejaz is an FSA and also a chartered financial analyst and a certified financial planner. And he is an annuity product development actuary with Protective Life in Birmingham, Ala., who primarily deals with fixed annuities, variable annuities and other retail investment products.

This is the agenda that we have planned for this session. We'll start with a reasonably brief introduction to FAS 133. Ejaz is going to talk about the application of 133 to annuity products. I will speak briefly on valuation methods and implementation of 133 in terms of valuing liabilities, discuss hedging and the rules in 133 about what does and doesn't qualify as a hedge accounting, and also speak

briefly on some recent developments related to 133 and similarities to 133, including the new SOP, which covers guaranteed minimum death benefits (GMDBs).

I would like to get a feel from the audience of their current level of knowledge and understanding of 133. Who would classify themselves as having a little or no knowledge? OK — I'll make sure I cover the introduction pretty well. Who would say medium? Anyone here an expert?

Given that, I'll start with an introduction to 133, and my apologies for the people who are in groups two and three if it seems a bit basic, but I do want to cover the ground.

What Is FAS 133?

FAS 133 is a GAAP accounting rule that essentially requires that all derivatives be recorded on the balance sheet at fair value. There is hedge accounting available under FAS 133, but the requirements are fairly stringent, much more stringent than under previous guidance. And as a result, earnings volatility is an almost certainty. It's extremely hard to get very close hedging under 133.

FAS 133 also, for the first time, introduced the concept of embedded derivatives, that is, derivatives within a more complex product. The whole product is not a derivative, but parts of it are, and it is a requirement under certain circumstances that those be split out and accounted for as derivatives separately from the rest of the product.

Also, because of requiring all derivatives to be fair value, there's something of an inconsistency, particularly in the income statement, with other elements that run through the income statement on a historic cost basis. That can produce some unfortunate results with volatility of results.

The FAS board basically had four cornerstone decisions that were key elements to FAS 133. They are:

1. Derivatives are contracts that create rights and obligations, and that makes them assets or liabilities. So they have to be on the balance sheet.
2. Fair value is the earnings relevant measure for derivatives. Previously, there had been other possibilities.
3. Only assets and liabilities should be on the balance sheet. And the reason that is relevant is that, under some of the previous accounting rules, the gain on derivatives could end up being the asset or a liability rather than the actual derivative itself, and they consider that to be something that should be on the income statement and not the balance sheet.
4. Special hedge accounting should be provided, but should be limited to transactions involving offsetting changes in fair value or cash flows for the risk being hedged. The rules are much more restrictive now under FAS 133 than they were previously.

Derivatives Unmasked

So what is a derivative? According to the FASB, one of the key things about FAS 133 is that they define a derivative according to the way it acts rather than what it's called or its legal structure, which is, again, a difference.

Key features include underlying variables, the performance of which changes the pay-off for the derivative.

There's a notional amount or payment provision so there's some notional exposure that the derivative is driven off. If we have a $100-million principal, it doesn't actually change hands, but it's the notional amount on which the SWAP payments are determined.

There's no or relatively small initial net payment. Option premium is an example of the small payment; a SWAP at market is an example of no initial payment.

It's net- settled. That is, you don't actually pay the hundred thousand and get the hundred thousand. In an interest rate SWAP, you only net-settle for the difference in cash flows. And it can either be freestanding or embedded.

Underlying can be an interest rate, a price, an exchange rate, or any variable that's observable.

Notional amount can be a number of currency units, number of shares, bushels of wheat, you name it. And it's applied to the underlying that determines settlement: cost times number of shares, for instance.

Payment Provision. Payment provision is the determinable payment that's provided for under the derivative contract. So the excess over $20 of AIG share price at close on the Oct. 20, 2025, is a determinable value.

Initial Investment. Initial net investment is the payment that actually changes hands when you enter into the contract.

Net Settlement. Net settlement is when you don't actually pass the full amounts, only the differential payment. It can be an effective net settlement; that is, the contract says gross, but the market mechanisms allow you effectively to settle net. Or the contract requires gross that is readily convertible into cash, so it's effectively net.

Net settlement is important because there are some things in insurance contracts that either are or aren't covered by FAS 133, according to whether or not they net-settle. Guaranteed minimum income benefit (GMIB) reinsurance contracts are FAS 133 because they are net-settled. GMIB direct liabilities are not, because they're not net-settled.

Nonqualifiers. What's not a derivative?

- Regular securities trades. There's often a timing thing, if you settle within three days or whatever, but that's not a derivative; that's just the way the market works.
- Certain traditional insurance contracts; there's a specific exclusion under FAS 133 for things like term insurance, whole life.
- Variable annuity contracts are specifically excluded from FAS 133; they might otherwise be caught.
- Derivatives that are impediments to sales accounting, which have their own specific rules.
- Contracts settled in your own stocks; for instance, warrants or convertible bonds.
- Certain nonexchange traded contracts, not based on financial assets. This is more relevant to some of the nonlife insurance companies, which get involved in climatic derivatives, etc.

Embedded Derivatives

Embedded derivatives are a new concept under FAS 133. Embedded derivatives are derivatives in which there are implicit or explicit terms that affect the settlements in a manner similar to a derivative.

Examples include structured notes, convertible securities (which have an embedded equity call option), and securities with caps, floors or collars. These all have embedded derivatives.

There is a process consisting of a set of questions that one can use to decide what is and is not an embedded derivative subject to FAS 133. It is very useful, and it wasn't me who built it, so I can say that.

Consider this thing that might be an embedded derivative. The first question is, would it be a derivative if it was freestanding? The answer is no? That's it. Go home. If yes, then move on to next question.

Next, is it clearly and closely related to the host? For example, an interest rate option on an interest rate host is clearly and closely related and, therefore, not bifurcated — not separated out under FAS 133.

If it's not clearly and closely related, move on. An example would be an equity index or annuity with an equity option on a debt host. Each is a derivative not clearly and closely related to the host.

The next question is, is the contract carried at fair value through earnings? If the whole contract is fair valued anyway, don't bother; just fair-value the whole contract as you would ordinarily. You don't need to spread that out into two separate fair value pieces; you just fair value the whole thing.

Clearly and Closely Related. Clearly and closely related is a function of two things: (1) the economic characteristics of the embedded derivative and of the host and (2) the risks related to each piece.

So what is the host? What is the underlying for the derivative?

Some examples of clearly and closely related are: If the host is debt, which is a very common host, then interest rate, inflation, and credit worthiness all are things that are inherent in interest rates, bonds and things like that, so that underlyings based on those are typically clearly and closely related. There are some exceptions, but typically they're clearly and closely related. You don't need to bifurcate.

There are also equity hosts, where basically equity-underlyings are really the only things that are clearly and closely related. And there are lease hosts, which are not very relevant to insurance.

Debt Host. As I said, there are some exceptions to the rule that debt-type exposures are clearly and closely related to a debt host. They basically relate to things like interest-only, principal-only, residuals and collateralized mortgage obligations, which sometimes have an embedded derivative, just because the extent of the variation from the derivative piece is so large relative to the host that it doesn't stay within the host. You have to split it out. It's just too significant.

Contingently Exercisable Put and Calls. These are at a premium or discount, in the money at the purchase date. For example, you start off with something at an interest rate floor that's already in the money. When the contract is issued, that has to be split out.

Embedded Derivative Accounting. Accounting is one of the key issues in embedded derivatives because of the complexity of derivatives, first of all. Second, that embedded derivative might be a very complicated part of the product.

There are some cases in which the embedded derivative is not reliably identifiable and measurable. An example I've run across is with total return products based on convertible bonds. When you try to figure out what the embedded derivative is and price that separately, it's almost impossible to spread out and determine what is the host and what is the embedded derivative.

You end up with a situation where you have to account for the entire contract at fair value through earnings. And, if that's the case, you can't use that instrument as a hedging instrument—it's rare that you'd want to. In the more normal case, which is reliable, identifiable and measurable, you spread into two pieces—the host and the embedded derivative.

There are no particular rules under FAS 133 saying what to do with the host. It's whatever the guidance would be for whatever is left. For the embedded derivative,

you apply FAS 133, and it can be a hedging instrument. Some examples of things that contain derivatives include convertible bonds and structured notes.

Insurance Products

Classic examples of insurance products potentially subject to FAS 133 are equity-indexed annuities, equity-indexed life, investment guarantees and variable products, subject to them meeting the other constraints. So it's typically GMABs and guaranteed minimum withdrawal benefits that are subject to FAS 133. GMDBs come under the insurance exclusion. Then you have catastrophe bonds and options and synthetic GICs, for which you have to generate an embedded derivative.

Variable Annuities. A variable annuity itself is a host. It's not debt or equity. It's a special case. It's a variable annuity. Guaranteed death benefits are not embedded derivatives because of the insurance exclusion, but accumulation benefits are if they meet the other criteria like net settlement, etc.

GMIBs. These are excluded because they're not net-settled. You have to continue the annuity to get the benefit. That's not net settlement, therefore, no FAS 133. But, if you were sensible and reinsured it, and your reinsurance contract net-settles, then that is subject to FAS 133. So you introduce additional GAAP volatility having protected your economic position. Go figure.

Payout Annuity Guarantees. These can be subject to FAS 133 if you have period-certain contracts. So if you have a period-certain with a payout guarantee, that's effectively caught under FAS 133, because it's a financial contract.

Market-Value-Adjusted (MVA) Annuities. These are not embedded derivatives subject to FAS 133 on the basis that they are interest rate derivatives on an interest rate host, essentially.

Equity-Indexed Products. The fact that there's a death benefit involved in the contract doesn't stop FAS 133 from applying. It's an equity performance-related derivative. It impacts the cash paid to the policyholders. The host is debt. FAS 133 applies, and you have to apply it for the whole period. There was considerable debate about whether it was just for the current option to reset, and FASB said, "No, it's the whole life of the contract." You' have to consider expected resets, etc., and there's no FAS 97 floor. So, there's no minimum reserve under FAS 133 for the cash value or the account balance.

Synthetic GICs. If you can't reliably measure or identify, then do the whole thing through earnings. Synthetic GICs are an example. We have a wrap around assets. So the pension fund owns the underlying assets. You put a wrap around that so that they get a book value guarantee, and that is like a put option and has to be treated as such for GAAP purposes.

Foreign Currency. The fact that you have contracts in non-U.S. dollars doesn't

necessarily require that to be a FAS 133 derivative, provided they're in the currency of one or the other party.

Corporate-Owned Life Insurance. For corporate-owned life insurance/business-owned life insurance, essentially the insurance company has to bifurcate. These are products in which there's company-owned insurance. It's essentially a variable contract, but with a book value, a stable value rider. The insurance company has to bifurcate and treat it under FAS 133, but the policyholder can just have a net realizable value as the fair value, which is different from some earlier guidance and makes it rather simpler for the issuer.

MR. EJAZ HAROON: I'll talk a little about the application of FAS 133 to annuity products. Before I do that, I have a question for the audience. How many of you deal with annuity products in your business? That's pretty good. So I'll try and be more specific about why certain things are excluded from FAS 133, because it seems to me that many people just take it for granted that things are either an embedded derivative or not. And I'll go into the reasoning of why that happens.

I will be making reference to particular sections of FAS 133 as well as to particular sections of the findings of the Derivatives Implementation Group (DIG).

Fixed Annuities

I'm going to start by talking about fixed annuities. This could be either book-value or market-value contracts. Let's talk about some of the provisions for fixed annuity contracts.

Market Value Adjustment. We'll start with the market value adjustment provision. It is a debt type of instrument. It adjusts the value of the contract for changes in interest rates either up or down.

Under FAS 133, if you have an unbounded market value adjustment, which is also called a plain vanilla market value adjustment, it is supposed to be clearly and closely related, and there are three main reasons why that is so.

The first and primary reason, which Martin already alluded to, is that the market value adjustment is considered to be a debt obligation or a debt instrument, and the underlying annuity is also considered a debt instrument. When that happens, then it is considered to be clearly and closely related, according to FAS 133.

The second reason why this is considered to be clearly and closely related is that the prepayment option value in most market value adjustments is zero. All that is saying is that the market value adjustment simply marks to market for changes in interest rates. It is not an option, as such.

The final reason is that the market value adjustment cannot force the client to accept an amount that is less than their investment. That means, if interest rates

go up and the market value adjustment kicks in, then the client gets less than the account value. That's optional. It is really up to the client when they surrender the contract. So, we, as the insurance company, cannot force the client to accept the lower amount, which is why it is considered to be clearly and closely related.

There's also another point here that I would like to make, which is that most market value adjustments are not "in the money" at issue. And that's another point that is part of FAS 133.

Market Value Adjustment on Nonregistered Products

Generally what happens in a nonregistered product is that the market value adjustment is bounded or capped, which means that it is basically limited to, say, principal plus 3 percent interest a year; that is the minimum that we have to pay out to the client. Anything on top of that can be subject to the market value adjustment.

So when you have a bounded market value adjustment, what do you do? As per FAS 133, what would be the treatment of that? The answer is that, because the collar on the market value adjustment is not in the money at issue, and because there's no leverage in the market value adjustment, it is clearly and closely related; therefore, it is not an embedded derivative.

Finally, there are certain market value adjustments in which the interest rates used for the market value adjustment are tied to an external benchmark. For instance, my company uses U.S. Treasuries as the interest rate in the market value adjustment. You can think of that as an external index. Some companies might use the Moody's corporate bond average, and that makes it similar to an index-linked product, although not really an equity index.

What happens when you tie an market value adjustment to an external interest rate or an external index? Because of the same factors that we discussed earlier, which were plain vanilla market value adjustments, we would consider this to be clearly and closely related.

Locks and Annuitizations

What is a rate lock? It simply is an obligation that the insurance company assumes under 1035 exchanges and other noncash types of issues in which you basically are obligated to give the client the interest rate at the time that the app is received, although the money may come in later.

According to FAS 133, this does not meet the criteria for net settlement, because the owner can only benefit from this by buying the annuity contract and continuing the annuity contract. The question is, if they surrender the annuity contract, what happens? In that case, they don't get the benefit of the rate lock because of substantial penalties, such as surrender charges. And, furthermore, there is no current market mechanism or secondary market that exists for them to trade

away the contract and impose that settlement on us. So, because of the lack of net settlement, the rate lock does not qualify as an embedded derivative.
As far as annuitization options are concerned, they do not meet the net settlement criteria of FAS 133. Even if you have a commutable annuitization option, it is only available at a specified maturity date; therefore, the contract owner has to continue the contract up to that specified maturity date, which means there is no net settlement.

Minimum Rate Guarantees
These are considered not to be embedded derivatives, because they do not meet the net settlement criteria of FAS 133. The reason is that the owner can only benefit from these annuities by continuing the contract, and there is no secondary market for most annuities.

Return of Premium Guarantee
In some cases, the insurance company guarantees that, on surrender, the client will never receive less than the initial premium or less than the total premiums paid minus prior withdrawals. What this amounts to is a cap on surrender charges plus a cap on the market value adjustment. Because of that, it is considered to be clearly and closely related. So it's not an embedded derivative.

Death Benefits, Derivatives on Fixed Annuities
Let's talk about death benefits and derivatives on fixed annuities. Like Martin mentioned, death benefits are specifically carved out from FAS 133. Even if the death benefit allows you an upside potential such as participation in equity markets or interest rates, it is still carved out. So it can actually provide for insurance against investment losses as well as the upside of, say, equity markets or interest rates. Regardless of how it works, death benefits are still carved out.

For instance, in many fixed annuities, if the owner or annuitant suffers a long-term-care event, is admitted to a nursing home, becomes terminally ill or dies, we will waive the surrender charges and the market value adjustment. Because these are insurable events, they also come under the carve-out for death benefits, and FAS 133 does not apply to them.

Variable Deferred Annuities
Before I talk about variable annuities, I'd like to make the point that everything that I mentioned about fixed annuities applies to the fixed accounts of variable annuities. For instance, if you have an MVA fixed account within a variable annuity, that's also not considered an embedded derivative because of the same reasons that we talked about for fixed annuities.

Annuitization does not meet net settlement criteria — and that's regular contractual annuitization — for the same reasons as we talked about for fixed annuities.

As far as GMIBs are concerned, they do not meet the net settlement criteria according to DIG issue B25 because, when you elect the GMIB, you have to take out the payments as an annuitized stream. You cannot take them out as a lump sum. If you have a GMIB, hypothetically, where you can take the guaranteed benefit amount in a lump sum, then that might be considered an embedded derivative because it can be net-settled.

FROM THE FLOOR: But on this particular point, if you were past the waiting period, and there were market mechanisms that might facilitate taking a lump sum or a percentage of that, would that meet the net settlement criteria?

MR. HAROON: My impression is that most, if not all, companies have made the GMIB a nonassignable benefit. If you assign it, then the GMIB goes away. The idea was that people could select against the best insurance company if they could assign away the GMIB because, when we price the GMIB, we assume a certain rate of election and a certain rate of people who actually select against us. If those assumptions are not realized, obviously, there's more risk in the product.

Death Benefits and Waivers

There's a relatively new death benefit called the earnings enhancement death benefit or the tax relief benefit.

Like I mentioned previously, all death benefits are carved out of FAS 133, regardless of whether they provide downside protection or not. In the case of the earnings enhancement benefit, it usually does not provide downside protection, but that doesn't mean that it's an embedded derivative. Because it's a death benefit triggered by an insured event, it is carved out.

Guaranteed Minimum Withdrawal Benefits

What exactly is a guaranteed minimum withdrawal benefit (GMWB)? Your typical design is that it allows the policyholder to withdraw all or a portion of their account value with a floor during the deferred period.

For instance, it might say that, during the deferral period, you may withdraw an amount up to 7 percent of your premium each year until you withdraw the entire premium, in which case you would not get less than your premium.

Because a variable annuity host as defined by FAS 133 does not have a guarantee of principal or any floor guarantees during the deferral phase, the GMWB introduces a floor guarantee. Therefore it is considered to be a guarantee of principal and is not clearly and closely related. And the withdrawal provisions appear to imply net settlement.

I would add the caveat that because this is such a recent benefit you need to look at each benefit on its own. Essentially, your accountants and actuaries have to make a decision or a judgment call.

Guaranteed Minimum Accumulation Benefits

Guaranteed minimum accumulation benefits (GMABs)—how exactly do they work? Typically, what happens is that, at the end of a specified period, you get an amount at least equal to your premium paid minus any withdrawals taken. If you go back to the definition of the host variable annuity contract, the host contract is not supposed to have any guarantee of principal or any downside protection during the deferral phase.

Because the GMAB essentially is a guarantee of principal or a floor on the deferral phase of the variable annuity, it is considered to be an embedded derivative subject to FAS 133, as it is not clearly and closely related. And the withdrawal provisions imply net settlement. Effectively, it's a put option on the host contract.

Modeling Issues. Let's talk about some of the modeling issues for GMABs. Some of the key parameters here are the product design and the nature of the guarantee; the volatility of the funds and the mix of funds; termination rates and other election rates; the term of the guarantee (Is it eight years, 10 years?); and the degree that it is in the money, which means, "What is the current account value versus what was the premium?"

The model of liabilities should aim to have each cell homogenous in the key parameters. You need to be careful when you aggregate your data.

Differentiation Effects. Let's look at a matrix on key parameters (Table 1). The first parameter is how much of your benefit is in the money or out of the money, which is shown in the column to your left. So it looks at the account value as a percent of guaranteed value. You can see that, if the account value is more than the guaranteed value by a significant amount, then it would have a very minimal impact as far as FAS 133 is concerned. On the flip side, if you have an account value that is substantially less than your guaranteed value, FAS 133 would have a major impact.

Table 1

		Aggression	
AV/GV	Low	Medium	High
<60	19.4%	16.5%	23.7%
60-90	1.5%	7.9%	13.3%
90-100	0.1%	4.1%	8.4%
100-110	0.0%	3.8%	7.0%
110-160	0.0%	2.7%	6.5%
>160	0.0%	0.8%	1.8%

The second thing on this matrix is the type of funds selected, or the aggression, as it were. If your policyholder has a mix of funds that are considered to be low risk, the impact of FAS 133 will be lower. For instance, look at the figure under the first cell that says if your benefit account value is less than 60 percent of your guaranteed value, and you have picked conservative funds, then the embedded derivative is worth 19.4 percent of account value. On the other hand, if you have picked aggressive funds, that 19.4 becomes 23.7. So it's a pretty major factor.

Accounting. How does FAS 133 account for GMABs? Basically, you have to look at the host contract and the option. What you do is amortize the discount as a percentage of account value. First look at the fair value of the option and subtract that from your host contract. Then solve for a discount rate so that the present value of your maturity amount equals your current host contract amount.

Again on the GMAB, you have to look at the range of investment options. In this case, the policyholder gets the GMAB for a range of investment options, and it guarantees that you get at least your money back after 10 years.

And the guarantee resets at 10 years for the next 10 years. So the embedded derivative is the value of the current guarantee plus all future guarantees, which means the first 10 years plus the next 10 years and so on.

Therefore, we do a stochastic model for projecting the policies based on individual funds, including their correlations. We look at dynamic lapse behavior, capture the pathwise present value at a risk free rate and that is our fair value for the embedded derivative.

For example, let's assume the value of the benefit at issue is 3.4 percent of account value. We take the current account value and subtract the 3.4 percent

because of the embedded derivative. That means the host contract is worth 96.6 percent of account value at issue.

Lets see what happens subsequent to issue. The value of the host contract increases subsequent to issue because the discount (which was 3.4% at issue) is accreted over time. Now, as of the date of valuation, the value of the host has increased to 96.8% of account value. The embedded derivative has increased as well, because initially, at issue, the value of the embedded derivative was 3.4 percent of account value; whereas, at the date of valuation, it has increased to 6.7 percent of account value.

What we do is add the value of the host at the valuation date to the value of the embedded derivative at the valuation date. That's going to be 96.8 percent plus 6.7 percent for a total of 103.5 percent. That means that, as of your valuation date, your total reserve is going to be 103.5 percent of account value.

If the GMAB is an optional rider that you can choose to have or not for the payment of an additional fee, you need to bifurcate the fee off with the rider. This particular product is one in which it is intrinsic to the product; so there was not a separate identifiable fee for this. It wasn't optional to have this feature.

FROM THE FLOOR: It's important to note that these stochastic assumptions are risk-neutral, not at an anticipated market rate, because in risk-neutral, you will use the projection of a 5 percent growth rate, corresponding to the risk-free rate.

MR. HALL: Yes. We'll talk about valuation methods a bit later in a separate section.

FROM THE FLOOR: Regarding assuming a rider has a separate charge, if you have two companies with the same exact benefit—and one chooses to charge five basis points and one chooses to charge 50—are you in a situation where each company would say that the value of the derivative at issue is zero?

MR. HALL: Yes, with the exception that, if the five is inadequate, then you have a problem because, at issue, you will have a non-zero value. So, if the five basis points is not adequate to cover the benefits, then you will have a non-zero value. But as long as it's adequate, as long as it's sufficient on a market value basis, then they will both show zero; they will just have different profit margins in their fees.

MR. HAROON: Let's talk about the accounting for payout benefits during the payout period. Previously we talked about the GMIBs and what the accounting for that is doing during the deferral period. Let's look at the accounting for variable payouts during the payout period.

The typical design here is that it guarantees that your monthly payment will not fall below a certain floor once you have annuitized; this is a variable annuitization that

we're talking about.

Under FAS 133, there was some discussion about how to account for these benefits. It was concluded that a guaranteed payout floor, as far as the payout is concerned, is considered to be an embedded derivative only during the payout period, because the guaranteed payout floor is not clearly and closely related.

There is an exception. If you have a life contingent payout that meets the definition of a life insurance contract under FAS 97, it is considered to be excluded from FAS 133. If you have a life and period-certain, the period-certain is considered to be an embedded derivative. But the lifetime payout portion is not an embedded derivative.

Equity-Indexed Annuities. On equity-indexed annuities, you have to look at two different things. There is the impact of the equity feature on death benefits, which is carved out of FAS 133; and then there's the impact of the equity features on surrender values, which is considered to be an embedded derivative. So it says that, if your equity performance influences the product's surrender values, it is considered to be an embedded derivative.

Now there's another point here, which is FAS 97. Under FAS 97, traditionally, it was considered that FAS 97 applies to equity-indexed annuities and, as you all know, the GAAP reserve under FAS 97 is the account value. According to the rules that have been agreed on by the DIG and the FASB, FAS 97 account value is not applied for valuation of equity-indexed annuities under FAS 133.

Another point is, what do you do with the various options the life of the contract? Typically, under an equity-indexed annuity, you have options that are for different time periods. The question is, do you just consider the current period options or do you consider all future options? And do you value them separately or do you value them as a whole?

I think the conclusion is that you value them as a whole and consider all future options as well. You have to value all of the options over the entire expected life of the contract. Finally, the host contract liability at issue is the amount that funds the guaranteed payments with no surrender charges.

MR. HALL: And it's even stronger than that, because you have to include previous index credits that retain their characteristic as embedded derivatives. This is counterintuitive to most people, because they're fixed now, they've been granted, but they are still part of the indexation feature that caused the balance that the policyowner receives to vary from the guaranteed amount. And they were, when credited, related to equity performance and not debt.

MR. HAROON: Let's talk a little bit more about how you value the embedded derivative for an equity-indexed contract.

At issue, the value of the embedded derivative is the present value of all future cash flows related to the future indexed crediting projected to occur. Basically, all forward-starting options are valued together, which is what we just talked about. So you need assumptions for noneconomic factors, including policyholder behavior and lapses. You need assumptions for contractual terms such as vesting, future caps, and participation rates. Finally you need a model for economic factors, such as future index values.

Here's an example of a cookie-cutter, plain vanilla equity-indexed annuity. It has a premium of $100,000. The equity participation rate is 100 percent of equity returns. There is no vesting before the end of the contract term, and the contract term is three years. The guaranteed rate is 1 percent, which means that, at the end of three years, the minimum guarantee is 1 percent a year for three years, which becomes $103,030.

If you compound $100,000 to the end of three years, you get the maturity value. The implied option strike price is the current Standard & Poor's (S&P) 500 times 1.0303, which is the factor corresponding to the maturity value.

Let's see what this looks like at issue. At issue, your premium is $100,000 and, based on stochastic modeling, you come up with a value of $20,000 for the embedded derivative. So you subtract out the value of the embedded derivative from the host contract, and that gives you a host contract zero-coupon debt obligation of $80,000.

The maturity value is $103,030, which is payable three years in the future. And because the current value of the host is $80,000, this implies that your interest rate on the underlying host is 8.8 percent, which is the rate at which $80,000 goes to $103,030 at the end of three years.

Lets see what this looks like on the firsts contract anniversary. Here are a couple of scenarios:

Scenario 1. The first scenario is where the equity markets perform well, and the S&P goes up by 15 percent. Because it's an equity-indexed product, the value of the option also goes up as the equity market does well. So the embedded option goes up in value to $28,968. This example is actually part of the DIG's notes, so you can look it up.

Based on the product, the embedded option after one year is worth $28,968. What you do next is compute the value of the host. The value of the host is going to be the value of the host as of issue, accumulated to the valuation date. The implied interest rate on the host was 8.8 percent, so the host is going to go from $80,000 to $87,032, which means that the total value of the contract is $87,032 plus $28,968, for a total of $116,000.

Also notice that the underlying contract has grown to a $101,000, because we said that the contract guarantees you 1 percent a year for three years on $100,000. In this case, the FAS 133 value of $116,000 is more than the underlying contract account value of $101,000. So, according to FAS 133, our liability for this contract is $116,000 on the first contract anniversary valuation date.

Scenario 2. For this scenario, we looked at what happens under a different situation. In this case, the S&P goes down by 15 percent. It's an equity-indexed contract, so the value of the embedded derivative also goes down to $7,968 as of year one. So, at the end of the first year, the value of the embedded derivative is $7,968. The value of the underlying host would be the same as in the previous scenario, which is $80,000 accumulated at 8.8 percent for one year, which works out to $87,032.

The FAS 133 hybrid contract value would be the sum of the two, which is $7,968 plus $87,032, or $95,000.

In this case, the FAS 97 account value is $101,000. According to FAS 97, you have to hold your GAAP reserve equal to account value, and the account value is $101,000. But according to FAS 133, you do not look at the FAS 97 value anymore; we ignore the FAS 97 value of $101,000 and only hold a GAAP reserve of $95,000.

MR. HALL: I'm going talk probably quicker than I had planned about valuation methods and hedging.

Fair Value. What does fair value mean? FAS 133 doesn't define fair value completely. You also have to look at the principles' survey.

The key thing about fair value is that it should be a valuation consistent with traded values. So, when you have similar losses or similar liabilities that are trading in the market, you should be getting consistent values under FAS 133 as the market values.

That does put a constraint on your valuation method. A key test that you should do is to ensure that the valuation method reproduces observed market prices. If you have a stochastic model, you want to run through zero-coupon bonds, bonds, equity options, equities and other assets for which you can determine market prices and satisfy yourself that your model is producing values for those that are at least reasonably similar to what you observe in the marketplace.

If that's not happening, there are three reasons why. One is, you're not doing enough scenarios. Two, if it's stochastic modeling, you've got your parameters wrong. Or, three, there's something that you really don't understand about what's going on.

There is an alternate approach that is theoretically justified. It's sort of based on financial markets theory. You can adjust the cash flows to certainty equivalents and then discount at a risk-free rate. That can be hard to do. What is the cash that you would accept for certain as being equivalent to the uncertain pattern? It's hard to determine in many cases. But sometimes there are things you can use to approximate it.

The second thing you can do is modify the probability measure and discount at the risk-free rate. That sounds awfully technical for a working measure. Basically, what you're doing is adjusting your scenarios until you get the right mix of results. So, when you discount at the risk-free rate , you produce good market values. It's easier to do than it is to explain.

The last one is that you can adjust the discount rates. This is commonly done on a number of market instruments. A good example would be convertible bonds, in which there's an option-adjusted spread applied. Sometimes mortgage-backed securities are expressed that way—as an option adjusted spread relative to the equivalent Treasury that gives you the price.

The problem is, you shouldn't think about that as being something that's necessarily constant over time. Option-adjusted spreads change for all sorts of reasons; they're outcomes rather than causes. So you need to be careful about determining at some point and assuming it's going to remain constant thereafter, although that can be a practical measure.

In economic theory, the discount rates ought to vary by scenario. So your modification to the discount rate is scenario-specific, and that's known as real-world projection with deflators. It's theoretically very sound, but it can be hard to do. It produces exactly the same values as the risk-neutral valuation, which is a lot easier to do. Can you guess which way I prefer to do it?

Value of Embedded Derivatives. The value of embedded derivatives is the value of the additional policyholder cash flow attributable to the derivative; but I should clarify that you ignore surrender charges. They're specifically excluded under FAS 133.

Surrender charges upon withdrawal are specifically excluded in terms of calculating fair value. So it's the policyholder cash flows that they would have received, ignoring the surrender charges, that have an impact on the embedded derivative.

It's an important point to understand, because quite often the first thought people have is that what you're valuing is the account balance additions, and that's not what you're doing. The payment that the policyholder receives from an account balance addition is reduced. It's less than face because of the effect of things like mortality and administration charges or other spreads that you have prior to the

ultimate payout—but not the surrender charge piece, just the fees before they actually get their money.

The second point is, when you're valuing an entire contract, FAS 133 requires that the initial fair value of a contract, when it's first bought by a policyholder, should be the same as the premium he or she pays. That's one of the FAS 133 rules. With respect to the point we were talking about, if you treat the GMAB as a separate rider that you can buy or not buy, the premium you pay for that at issue is zero, because the premium is a series of basis points charges over time. So the initial premium for that rider is zero; therefore, its fair value at issue must be zero under FAS 133.
The fair value of the rest of the contract is the premium paid, again, on the assumption that the basis point charge is adequate to cover the benefits.

Those are the two rules that you have to think about, and they're very important to calculating fair value in practice.

Fair Value Shortcuts. Fair value shortcuts are dear to many people's hearts; if only there were more. One possible fair value shortcut is direct observation from the market. If you, for instance, had a GIC contract with a floor with no prepayments due in three years' time, it's a variable contract. It's S&P linked, but it's got a floor in it.

You could say, "Well, that's exactly like a three-year S&P put option." So I can look at what is a three-year S&P put option with that strike price in the market, and that is the fair value of that derivative. Easy. Done.

There aren't many cases where you can do that, which is real sad. In theory, you could use reinsurance for things where there is a reinsurance market for some feature. The problem with that is, it's pretty hard to claim that that's a sufficiently deep and active market, that it is a fair-value-establishing market the way the equity market is.

A second form of shortcuts is closed-form approximations. A good example would be a GMAB that's a put option. It's a put option with a defined maturity date, yet there are adjustable lapses. And therein lies the problem. If lapses were not dependent on the performance of the contract—in other words, if people were just as likely to surrender two months before maturity, when their account balance was 50 percent of the guarantee as they would if it were 150 percent—then you could just put in those fixed lapse rates and do a Black-Scholes calculation for the put option.

Unfortunately, it's implausible that policyholders would be that stupid, though sometimes they surprise you. But there are cases where you can get something that's pretty close, and then you can do some sort of closed-form approximation.

The third thing you can sometimes do is simplify what you're doing into a form that is manageable—not easy, necessarily, but manageable—and one that doesn't require stochastic modeling. I should say I consider a shortcut anything that doesn't require a stochastic modeling or a lattice or something equivalent as a form of a full valuation.

Here's the budget method for equity-indexed annuities. Essentially, this is an approach that uses certain simplifying assumptions that enable the fair value to be calculated as a closed-form approximation. Assume that there is going to be a constant option budget, and that allows you to track what your expected account balance growth is going to be over time.

Account balance growth is related to the spread on the options and, therefore, the value of subsequent options related to the account balance you started with, and so on. You can, essentially, get pretty close to a closed-form approximation subject to those simplified assumptions, provided that the nature of your resets is that you're very unlikely to get caught by your guaranteed minimum participation, your guaranteed minimum cap or however your contract is structured.

I've done some work looking at it; I examined results from a stochastic model relative to budget methods and, subject to the assumptions, found that they can be valid approximations.

Valuation Issues

Here are some issues when you're doing valuation. Do you consider policyholder behavior in actions such as:

1. Propensity to surrender? The answer is yes.
2. Forfeiture of equity returns on surrenders under products like equity-indexed accounts? Yes.

In other words, you don't assume that policyholders are rational actors. Put in your best estimate assumptions of what they really are going to do, which is that some of them will be rational, but many of them aren't.

Do you consider surrender charges embedded in the liability? The answer is no. It's consistent with other GAAP modeling, such as for deferred acquisition cost (DAC) amortization.

And the last point is that the assumptions should reflect management's best estimates and be consistent with your DAC assumptions. You should be able to show consistency across these. They are all supposed to be best estimates of one sort or another. And it's hard to argue the toss if you're in one place assuming one thing and in another place assuming something dramatically different.

I've run cases where people have one set of assumptions they put in for doing the

stochastic modeling — if they're going to have a constant spread on their option budget for equity-indexed annuities — but, for their DAC model, they say, "I'm going to have a constant spread." Those two assumptions aren't consistent; you're either going to do one or the other one.

Risk-Neutral Valuation. Stochastic modeling by risk-neutral valuation is the only way to go. Well, it's not the only way to go, but, boy, it's a lot easier than anything else you might want to do. It's the most common methodology for matching market values to a stochastic model, and it essentially involves adjusting the probability measure. At the end of the day, you end up with the probability distributions from the scenarios being the same as though the market were risk-neutral and everything grew at the risk-free rate. It's not implying that that's what the market thinks. It's a valuation mechanism that works out that way.

Interest rates will vary about the implied forward rates, returns on other assets will vary around the risk-free rates and you get discount factors using the risk-free rates for that part. Then it's the average of those calculated present values that is your estimate.

If you look at the *Financial Economics* text by Panjer et al. that the SOA published a few years ago, it talks about some of the alternative valuations, such as the state prices and deflators. It's doable. It's just so much work, it's not worth it. And risk-neutral gets you the answer with a lot less work. So, the only possible reason for doing it is the need to use the same scenarios. If you use real-world probabilities and these deflators, you can calculate a present value that's consistent. At the same time, you can look at your distribution of returns and look at your risk issues simultaneously. The bottom line is, it's less work to do two lines—one risk-neutral and one real-world — than it is to adjust the real-world to risk-neutral.

You need to ensure that the scenario sets you generate reproduce market prices for similar assets, and there are a number of techniques to make that happen. But that's the key test. If it don't do that, you haven't got it right.

Host Valuation

Valuation of host—we talked a bit about this. Initial host is the premium received minus the initial embedded derivative. The accounting for the host follows appropriate GAAP guidance for its type, whatever it is—VA, GIC, what have you.

The initial discount or premium must be amortized accordingly; that is, it must be in accordance with GAAP guidance.

Now, here's a little tricky one. There are two possible approaches to that amortization. One is you amortize to the final maturity, ignoring exits; so you just do a straight line from here to there and interest rate that solves for that. The other way to do it is to amortize and reflect expected exits; so you include deaths

and surrenders in that calculation.

Both methods are acceptable. I know of at least two or three different accounting firms where some prefer one, some prefer the other. Both of them acknowledge that the other one is acceptable, but they wouldn't recommend it.

I think getting it to final maturity and ignoring exit has a number of valuable characteristics that make it better in most circumstances, unless your exits actually track what you expected, in which case, it's better to do the second one.

As soon as you get actual varying from expected, you get all these true-up type of things with the second approach, whereas, under the first approach, whatever actually falls out that period, you don't get the future expectations fixes flowing through.

Regarding FAS 133 and DAC, I know that everyone here, of course, would have fully reflected the effect of FAS 133 in their DAC calculations already. But some people haven't quite gotten around to that yet. The reserve difference from 133 has to be reflected in your DAC amortization.

So FAS 133 reserves are now the benefit reserves for these contracts. It used to be account balance, but not anymore. It's FAS 133 reserve. So your DAC projection needs to be corresponding to FAS 133 reserves. And that means it's a lot more complicated process to do it right. And then you have to follow-through estimated gross profits (EGPs), which reflect FAS 133 benefit reserves. It makes for a little more complicated calculation, but that's the only way to do it

FROM THE FLOOR: Do you adjust the host contract?

MR. HALL: Not necessarily, but you can say that the expectation, typically, is that the fair value embedded derivative is going to have no EGP emerging. That's your expectation, because it's the actual fair value already, so the expectation is that there's no EGP arising from the fair value piece of the contract. So the answer is yes, but the reason is because you expect it to be nil rather than because it's excluded.