

**1997 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS**

SESSION 16

Equity-Indexed Products: Valuation Issues

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EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

MR. EDWIN R. REOLIQUIO: We are going to be providing you with a status report on the projects and activities within the subgroups of the Equity-Indexed Product Task Force of the American Academy of Actuaries. We will discuss recommendations we have made or will be making in certain aspects of equity-indexed products. I'm the moderator for this session, and I'm with the SunAmerica Life Companies. I am also the co-chairperson of the reserving subgroup of the Equity-Indexed Products Task Force.

We're fortunate to have on our panel some members of the task force who are very close to the issues that we have been discussing all along. The first speaker is Noel Abkemeier. Noel is principal at the Milliman and Robertson (M&R) Chicago office, and he specializes in the design and pricing of annuity and life insurance products. He will be speaking to us about reserve methodologies, valuation actuary issues in relation to the practice note that was distributed at this session, and nonforfeiture issues.

Our second speaker is Errol Cramer. He is a senior actuary and director at Allstate Life Insurance Company. He has been involved in many industry-wide efforts, such as the NAIC Risk-Based Capital (RBC) Task Force and the Asset Valuation Reserve/Interest Maintenance Reserve (AVR/IMR) Interested Parties Working Group. He is also the chairperson of the Equity-Indexed Products Task Force Subgroup on AVR/IMR RBC. He is also the appointed actuary of the Allstate Life Companies.

After Errol's discussion, I will discuss with you the product filing requirements that we're recommending to the NAIC, and then, Michael Shumrak will speak. He is vice president and general manager of SS&C Analytics, which focuses on pioneering new technologies and techniques for product pricing and the valuation of insurance and financial services operations. Without further ado, I'd like to turn the podium over to Noel. Our discussion today actually assumes that you have

some basic knowledge of the various plan types and designs existing in the market today of equity-indexed products.

MR. NOEL J. ABKEMEIER: I want to start off speaking about the reserve methods under consideration for equity-indexed annuities. The Academy of Actuaries Task Force has been working on this since the beginning of the year and made recommendations first in March, then in June, and again in August. As more recommendations come to the surface this week, there will be some final recommendations in December. These recommendations are intended to help bring the NAIC to a position on what its reserving practice will be. Larry Gorski, an actuary from the Illinois state insurance department, has prepared a draft of an actuarial guideline that he is presenting Thursday at the NAIC meeting, which will be embodying many of the ideas that have been in the Academy recommendation. Larry has been an integral part, so he's very up to date with it.

The recommendation is a dual-track approach. There are two kinds of methods for developing reserves within the CRVM regime: market-value methods and book-value methods. The market-value methods are those that derive their value from the market value of the option, although they're not literally fully market value. Book-value methods are those that derive their value from the initial cost of the option or the current value of the index. This approach should give reasonable flexibility to companies.

The nature of book-value approaches dictates that it's not as sensitive to changes in the environment as the market-value approach might be. The insensitivity is typically balanced by counterinsensitivity on the asset side. So there's a dependence on a balance between the assets and the liabilities. Within equity-indexed reserving, the concept is if you're going to use a book-value method and therefore have some insensitivity, you must be sufficiently hedged, which is technically called "hedged as required." So there is a requirement that there be enough hedging, and I will later get into the specifics of what criteria you must meet to be hedged as required.

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

Finally, within the reserves, the current consideration is that these be Type C reserves. This is based on the fact that there are significant fixed guarantees that could be subject to disintermediation.

To be hedged as required, there are five criteria that must be met. First is that the hedge must have characteristics that match your liability. So your hedging should be consistent with the term of the index benefit, the benefit design, the degree of averaging, the participation rate, and so forth. Second, you must have an adequate amount of hedge. This recognizes that you have perhaps three kinds of index-sensitive benefits: the maturity benefit at the end of an index term, interim surrender values that are functions, and the index change and death benefits that could be a function of index change. The second criterion is targeting the maturity benefits, saying you must be buying enough options so that they will be covering conservatively the liability that lies at the end of the index term. Within this, the recognition is that you should have realistic lapse rates, but not in excess of 3% per year. You also may recognize mortality, which is probably in the neighborhood of 1% a year. Consequently you could be buying hedges for the final benefit that are in the neighborhood of 80-85% of the initial purchasers.

The third criterion is a plan for hedging interim benefits. If your death benefits are a function of index movement, and if your interim surrender benefits are a function of index movement, you should be purchasing some kind of hedges to recognize that liability. Fourth, you need a system to monitor the effectiveness of the hedging. Is it delivering the hedging you want?

Finally, does it fall within a tolerance for expected vs. actual results of the hedge? The current proposal for the tolerance is that the variance between the value of your hedge and the planned value of the hedge should not exceed 10% of the first \$100,000 of capital and surplus at the end of any given quarter. If you fail the tolerance at any given time, you have until the next quarter to purchase more hedges, to rebalance, and to get yourself back into shape. If you fail it, then your reserving method may have to move from the book-value method, which you're probably using, to one of the market-value methods.

1997 VALUATION ACTUARY SYMPOSIUM

There are four specific methods -- two market value and two book value. I'll go through each one of them. The first is the Commissioners Annuity Reserve Valuation Method (CARVM) with the Updated Market Value (UMV), or the CARVM-UMV. This method is kind of the baseline method, and it develops reserves as a combination of a reserve for the guaranteed benefit and for the index-sensitive benefit. In CARVM, you are looking at what the guaranteed value is at the next anniversary, the anniversary after that, and so forth, through the end of the index term. For this approach, as you look at each benefit, for example, the surrender benefit at the end of the next year, the projected benefit would be the combination of the projected guaranteed benefit plus the projected value of an option that would be hedging the index-sensitive benefits above the guarantee. The projected value of the death benefit one year down the road is its guarantee plus the projected value of an option that would hedge the index-sensitive component. By just projecting one year forward, you need a couple of option values as part of your calculation process. As you go one year forward from that, you need two more options, and then you need two more for each year until the end of the term. It's an approach that is quite precise.

On the other hand, it requires a great deal of input that can be moderately difficult under some circumstances. If you have benefits that are path dependent, these option costs are going to be difficult to obtain. It's a heavy load to carry out this kind of approach. It is, however, the most precise and is the frame of reference.

The second method, the market-value-reserve method (MVRM) is a simplification of the first method. In this method, the benefits are projected as the guaranteed benefit at the maturity of the term, plus the projected value of an option which would fund the index-sensitive benefit. So you're adding the value of the option to the guarantee. By comparing current account value and future account value, you can determine an average projected index growth rate year by year, and that will be used to project your index year by year. It will give an estimation of the value of benefits during the interim period. In this method, at the point of sale, you need the market value of the option to carry out this process, and on each valuation date, you again need the market value of the option at that time to fully fund the index-sensitive benefits to the end of the term. During each valuation,

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

you're coming up with a new projection percentage for how the index is going to grow over the years. This method is much easier than the first one because you actually need only one option value at any given time to carry it out.

The third method, the option-cost-based method (OCBM) is a first cousin of the second method. At the time of issue the calculation method is identical to the second method. You are taking the cost of the option to hedge the benefit, adding that to the guarantee at the end, and coming up with an annual projected growth in the index. Where this method differs from the second method is that once, at issue, you have determined this projection rate for the index year by year, you will use this same projection rate in all future years. You do not recalculate it. You would take whatever the index is at the valuation time and take the initial growth rate and project it forward. So the advantage of it on the reserve side is that you do not have to come up with another option value at the time of valuation. On the other hand, the method also recognizes the market value of the option on the asset side. So the advantage you gained on the liability side by not needing the option gets washed away a bit by needing that very same option on the asset side. From a pure valuation standpoint, it is slightly simpler than the previous method.

The fourth method, the enhanced discounted intrinsic method, is somewhat different from the other three methods. It is a method that, again, is separating the guaranteed benefits from the index-sensitive benefits. The reserve at point zero is a reasonably determined valuation amount. A strong probability is that you might use the initial reserve as developed under, say, the market-value reserve method (MVRM), which was the second method, and use that as your initial reserving amount. Also recognize that your guarantee at maturity is whatever is stated in the contract, and this is the final reserve for the guarantee. Your guaranteed reserve from issue to maturity is the geometrically interpolated amount. So at the time of issue, your guaranteed benefits reserve is carved in stone.

Second, at each valuation time, the present value of the intrinsic value of an option that will fund the index-sensitive benefits is added to this guaranteed reserve that was originally determined. Each time you're taking a fixed predictable guaranteed reserve and adding an intrinsic value to that. You

will find in this method, on the asset side, that you're also going to be recognizing that same intrinsic value with the result that the assets coming out of this method are very predictable in that the asset consists of the option cost amortized over the index term, plus the intrinsic value. The liabilities are fixed guaranteed reserve, plus the intrinsic value. As you can see, both sides include the intrinsic value; therefore, the difference between the asset and the liability is set at issue. The advantage of this method is that you do not have to go to the market value of the option at any time. Again, that can be a great advantage because getting market values of options isn't always the simplest thing to do.

With the various reserve methods, there are open issues. As part of the process within the Academy of Actuaries and the interaction with the NAIC, there is the effort to determine whether these methods all give comparable results. You want to have great similarity, so that there aren't opportunities for cherry picking of reserve methods that are more favorable. You want to have the greatest consistency to smooth the discussions with the IRS concerning recognizable reserves for tax purposes. Currently, stochastic testing is being done with the various methods and various scenarios to see if they produce reserves similar to each other. The first method, the CARVM-UMV method, is the frame of reference and it's fine. It appears that the second method, the MVRM, tracks it quite well. It will probably survive. We hope the other two methods will survive, too, but again, they are going to be subjected to testing to see if they are producing true reserve values that are reliable.

I mentioned before that it's probable that reserves are Type C, but they're still being researched to see whether there's justification for recognizing these as Type B reserves because of some similarities between index sensitivity and market-value adjustments.

Finally, there is another issue that applies to equity-indexed products. Most companies are purchasing long-term options to fully hedge their liability at the time of annuity purchase. However, there is another approach called option replication. Rather than buying a long-term option, you buy a basket of short-term options which function, over that short period, the same way that a long-term

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

option would. After that replication is done, you purchase another one for a short period. You'll have a whole sequence of baskets of replications. Right now, a company that uses such an approach does not have recognition under the hedged-as-required criteria. If you are using option replication, you will have to be using one of the first two reserving methods. In option replication, where you do have a mixture of derivatives rather than having one option, you may have a series of puts, a series of calls, and some futures all blended together, such that their sensitivities are the same as the long-term option.

On the life insurance side, those considerations are early in the discussion phase, but the way things seem to be leaning is that the appropriate reserving would be CRVM, as if it were not equity indexed, plus some part of the option value. This recognizes that if you have a regular fixed UL, your interest is accruing throughout the year, and therefore it's being recognized in your reserving process. On equity-indexed products, interest credits are made at the end of the year; therefore, as you're midway through the year, there is not yet a recognition of what has been accrued. As a result, bringing part of the option value in (as a recognition of the accrued value) seems to be appropriate.

The draft of the life practice note for equity-indexed products is broken up into four parts: the actuarial opinion, certifications, analysis of risk, and asset adequacy analysis considerations. I want to touch on each one. The actuarial opinion memorandum has a proposal that asset adequacy analysis be required for companies with material exposure of equity-indexed annuities, and equity-indexed life also. So there's no surprise there. In the area of certifications, you would have to provide the certification regardless of the reserving method. If you're using a book-value method, you would be certifying that the hedged-as-required requirement was being satisfied. If you're using a market-value approach, you're certifying that the market values of the options that you're using are reasonable in relationship to the economic conditions and reasonable for the asset valuation.

Next, the risk elements that you have to watch out for as a valuation actuary are disintermediation risk, hedging risk, enhanced benefit risk, guaranteed element risk, credit/counterparty risk, and reinsurance risk. I want to touch briefly on most of these. The disintermediation risk brings in a

new dimension in that, at the time you sell some of your assets, the option pricing is a function of interest rate, index volatility, the dividend of the underlying index. This applies whether you're divesting yourself of an option or having to buy it. There is another dimension to bring into the picture. Just as on traditional annuities, you must recognize interest-sensitive lapses here. The analog is you must recognize index-sensitive lapses in cash-flow testing.

In hedging the risk, you must properly recognize the reinvestment and disinvestment strategies and the impact of market conditions on volatility and the option cost. The prices for the options are enhanced as volatility and interest go up; they are depressed as volatility and interest go down. The liquidity of your options can be crucial. If you're buying options in quantum units, you may wish to unload a small portion, which maybe you cannot do. You may not be able to sell a portion of the hedge that you purchased. It also may be that there just may not be as good a market as you would like for the option when you're trying to sell it. These factors should be brought into your considerations. You also must be developing a system to monitor the hedges in if you are subject to the hedged-as-required criteria. Is your hedge program doing what it's supposed to do?

You must recognize the various enhanced benefits within your product. These can be event-specific, such as a death benefit, a nursing home waiver, or a waiver for terminal illness. All of these eliminate surrender charges at the time. You may have annuitization benefits which are marching to a different drummer from your surrender benefits that would have to be brought into the picture for valuation or cash-flow testing.

For asset adequacy analysis, you must, at all times, be recognizing the index level and the index volatility in the process. As you're developing scenarios for cash-flow testing, there is an issue as to what extent you should coordinate the interest change scenarios and the index change scenarios. There is a correlation. It has been demonstrated that there is some mild correlation between the change in the value of bond with a duration of about 3.5 with the change in value of an equities index. To what extent do you bring that into your scenario development? Finally, there's the decision of whether you should at all or to what extent you should be relying on deterministic versus

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

stochastic testing. There are many moving parts in this, such as the stochastic testing. Asset adequacy analysis never has been easy, and it will be many times more difficult now.

Finally, just a couple of comments on nonforfeiture issues. The standard nonforfeiture law, not surprisingly, does not recognize equity-indexed products explicitly. It certainly predated them by quite a bit. The Academy is recommending that the nonforfeiture law not be used as a vehicle to limit the availability of any particular kind of product. Do not use it to rule out the use of point-to-point products, which some states seem to be trying to do; rather leave the availability of products in the marketplace to proper disclosure and illustrations. The basic recommendation is to apply the standard nonforfeiture law in its normal fashion; this includes the retrospective and the prospective tests. The retrospective test is satisfied if the guaranteed values exceed 90% of the premium accumulating at 3% on a single premium product or, if it's a flexible premium product, 65% of the first-year premium and 87.5% of subsequent premium, all accumulating at 3%. That's believed to be an appropriate standard to continue to use. Prospectively, regardless of what is being credited and regardless of what the structure is, we believe that the methodology should be just as it is on the traditional fixed annuities, projecting out at some guaranteed rate, discounting back at 1% more. This could include cases where all the interest is credited in the last year of the term, where you may be projecting forward for several years at 0% and then you'll have an enormous jump, like 40%, and then you're discounting back at 41% for one year and 1% for several years. Just stick with the mechanics of the prospective nonforfeiture law as it exists right now.

Within this picture, in equity-indexed annuities, a number of products use vesting schedules and the recommendation is that, to the extent that vesting is applicable -- nonvested amounts should not be considered part of the account value when you're determining your projection forward and discount back. If you were to recognize the vested as part of the account value, it makes it very difficult to comply with the prospective test. Finally there are some products in the market that are market-value adjusted, and if that is the case, obviously the prospective test does not apply. Those are my comments.

MR. ERROL CRAMER: I'll be covering a somewhat mixed bag of topics that might be of interest to valuation actuaries. I'll start off with SEC issues, get a bit into risk-based capital, and then deal with accounting issues, AVR/IMR and basically the guaranteed fund assessment.

Regarding SEC registration issues, the real issue is, should all, some, or none of these products be registered? In terms of registering all the products, that would be disastrous to many companies that don't have a brokerage system or distribution channel that's licensed to issue registered products. I think there would be a lot of very unhappy insurers if the SEC came down on their position. On the other hand, there are insurers who do wish to make theirs a registered product, either because they already have an NASD licensed distribution channel or because that's how they care to market the product. Also for complicated product designs it might provide more protection against market conduct issues if it's a registered product. It's clear that some companies would want to ensure that they can sell equity-indexed products as exempt products, and others will want to register them. The choice isn't entirely at the insurer's option. There is a law that requires all products be registered unless they're expressly exempt and that's the famous Section 3(a)(8) exemption. There are two items in that exemption. One is that there exist state regulations (these products are, by and large, either bank or insurance type products). The expectation is that there will be state regulation for equity-indexed products. That's expected of both the provider as well as the product itself. The second requirement for exemption is that the company, i.e., the insurer, is essentially bearing the investment risk.

There have been two major court decisions dealing with the interpretation of Section 3(a)(8). The first involved Variable Annuity Life Insurance Company (VALIC). It's not surprising that VALIC issues variable annuity products. There was some disagreement about whether these are securities or not; i.e., do they fall under the exemption of insurance products? The courts decided that variable products are securities that should be registered, which is what we accept today.

This came up again in another case involving United Benefit Life Insurance Company. They had a registered product and they assigned a return of premium guarantee. The issue there was, given

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

that the insurer now bears some of the investment risk, does this not qualify for exemption? The answer is no. The nature of the product itself is equity, and passing a minimal amount of risk onto the insurer does not, in itself, exempt the product.

An interesting thing that also came up in the United Benefit case was consideration given to the way in which the product was marketed.

Next came development of SEC Rule 151, which is a safe harbor. It deals with interpretation of insurer investment risk, and it specifies, among other things, that there be a minimum guarantee which can be complied with if you follow the standard nonforfeiture law. The minimum guarantee is essentially 90% of premium accumulated at 3% interest. Equity-indexed products are designed for the same guarantee, i.e., 90% accumulated of 3%. The second requirement is that the excess interest rates cannot be reset more frequently than once a year. If you reset rates monthly or daily, it gets to look very much like you're passing through the returns directly to the policyholder. There has been some discussion about how indexed products fit in with the excess interest requirements as those are not explicitly covered in Rule 151. Some take the position that indexed credits are equivalent to excess interest, and they would satisfy the Rule 151 requirement as long as you don't reset the provisions of the index-crediting formula more frequently than annually. For example, if you have a nonguaranteed participation rate, you probably want to reset it no more frequently than once a year in advance. The third requirement that it deals with is the extent to which you market it as an investment product.

So this is the environment in which insurers have been operating, in terms of developing and selling equity-indexed products but not registering them. It has come to the SEC's attention, and the SEC recently released what it calls a concept paper -- it's paper number 33-7458. The concept paper is a request for specific examples and information on equity-indexed products. It would be naïve to assume that the SEC staff are not already well aware of these products. The SEC invited many insurers, on a one-by-one basis, to come to Washington and download whatever information they could on these products. The SEC is thus very familiar with the products and undoubtedly has a

1997 VALUATION ACTUARY SYMPOSIUM

very strong position. Before it goes ahead and provides a ruling, however, it is at least going through some due diligence. My personal opinion is that we should take it that its thinking is these should be registered products, and we must somehow justify why they should not be. Comments are due November 20, 1997.

I'm aware that the American Academy Equity-Indexed Products Task Force is going to prepare a response working with the NAIC. The ACLI has a group working on a response, and undoubtedly, other trade groups will be responding. Individual companies are also invited to respond. There are many avenues that you can use for getting your responses and comments to the SEC.

The concept paper talks of four specific items they would like the comments on: the extent to which there are state insurance laws and regulations governing those products; the investment risk; the marketing; and the mortality risk. Regarding the latter, the exemption states that mortality can be a consideration for exempting a product. The end result will be some type of SEC guidance that may prescribe registration of all these products, or it may provide guidelines for exemption, but it's too premature to know.

The next topic I'd like to talk about is risk-based capital (RBC). RBC is considered to be the tail end of the American Academy work as reserving, and other things really have to be in place before we can determine what RBC they ought to hold. For 1997, the RBC rules have been clarified. It's essentially going to result in treatment as for a nonindex-related counterpart.

On the C-3 side, some questioned whether these products could be considered more variable than fixed in nature. If you have it fully hedged, and you pass through the investment risk, in effect, should these not be subject to lower C-3 RBC? This follows the argument that, technically, the C-3 component covers interest rate risk, but doesn't cover equity-indexed risk. That has been clarified now for the 1997 instructions. The instructions will make clear that C-3 does cover equity-indexed risk, as well as interest rate risk, and it will make clear that the determination of a surrender charge is based on what the fixed surrender charges are.

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

Another technical issue had been raised about C-3, the Section 8 Opinion reduction in the factor. There are some smaller companies who are Section 7 companies and who might be required to do a stand-alone test for equity-indexed if they do not do the cash-flow testing in general for the company. A decision was made by the NAIC that the C-3 reduction only applies to Section 8 companies. The final issue that had not been clear was whether the C-4 factor, 2% of premium, applies. The answer is, yes. One is the classic disintermediation risk when interest rates go up and people take their money out and losses are realized on fixed-income investments supporting the products. There's also the disintermediation risk of people withdrawing when the equity market is down and losses are realized on the market value of options hedging the products. The second risk is hedge mismatch risk. There's no requirement that a company must hedge.

The potential future RBC refinements depend on what develops with the reserve requirements. Regarding the reserve development, it appears that, other than "hedged as required" products, there will be direct recognition of any market value mismatch in the reserves. A company might choose not to closely hedge, but then there will be accelerated recognition of any problem that arises. It won't pick up the potential mismatch, so there will still be a need for cash-flow testing. There is a subgroup of the Life RBC, the C-3 subgroup, that is looking at theoretical testing of the C-3 risk. It's still in development, but it may require cash-flow testing of the formula C-3 amounts, and you may need to hold higher C-3 if inadequate, much like reserve adequacy testing.

Other possible refinements in the C-3 factors may include making recognition of specific product design features. For example, in the reserve development, it has become evident that American, European, Asian, lookback, annual ratchet, and other products have very different reserve adequacy levels.

The next topic talks of AVR/IMR. In reality that cannot be addressed until accounting issues are addressed. The essential issue is that one needs to have consistency on the asset and liability sides. That's a basic principal of any accounting system. Statutory hedge accounting is well defined on the asset side, but less clear on the liability hedge side. The first issue is for realized derivative

gains. There is a geography issue in that the realized gain is a capital gain, whereas the liability change goes through gain from operations. The second issue has to do with unrealized gains and losses. These are direct adjustments to surplus, whereas, the reserve of benefit change goes through net income. This can create meaningless financial statements; however, surplus is unchanged.

The third issue has to do with unrealized gains which don't show up at all on the statements. These can arise in two situations: (1) with underlying assets of book value that aren't marked to market, and (2) with off-balance-sheet items, such as interest swaps or futures. By and large, they are still very significant accounting issues. In the short term, you may need to approach your home state for permission to use a permitted practice, if that makes sense, or wait for a longer-term solution, which hopefully will come out of accounting.

The final and very quick point I'd like to cover is the Guaranty Fund assessment. Those who have looked into it on a legal basis have established that it is indeed covered. There are issues though with the level of coverage, as there are limits to what guaranteed funds will cover.

MR. REOLIUO: I'm going to go over the proposed contract filing requirements. The purpose in establishing contract filing requirements for equity-indexed products was to facilitate the regulators' understanding of these products and thereby expedite the review process. The contract filing requirements proposed and primarily modeled after the NAIC interest index annuity model regulation adjusted to reflect the characteristics unique to equity-indexed products. The contract filing requirements include the actuarial memorandum, which I'll discuss later, the materials provided by the company to the policyholder after the sale of the policy, advertising materials, hedging policy, and assembled policy projections. The company can actually request the filed materials to be kept confidential by the insurance department. On the actuarial memorandum, we would have to include a description of the product, a description of the index used, a description of how index-based interest rates are calculated. We would have to demonstrate compliance with the standard nonforfeiture law, include a description of the reserving method and a brief description of the asset adequacy testing methodologies used.

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

Materials provided to the policyholder after the sale of a policy include policy form and application, including policy data; the policy summary, which is the cost and benefit information and a sample policy annual report. If not available at the time of filing, you may indicate that it will be submitted to the insurance department within the first six months of the first policy sold. Advertising materials are defined in the NAIC model rules governing the advertising for life insurance, which includes illustrations. You have the invitation to contract advertising materials and subsequent sale changes, which should be filed for informational purposes. An invitation to inquire about advertising materials may not be filed. Of course requirements above are subject to state-specific requirements.

On the hedging policy, you would have to include a description of the hedging instruments; details concerning methods used to determine the amount and type of hedging; the extent of rebalancing the portfolio and frequency of rebalancing; who's responsible for hedging in your company; and, how the company handles risks associated with purchasing hedging instruments (those were described by Noel earlier). You would also have to include a hedge as a required criterion, satisfaction of those requirements. With respect to sample policy projections, the equity-indexed task force is recommending that companies not be required to provide a sample projection to all states, but if a state requires that, the task force is recommending that the index scenarios be provided by the insurance department.

On marketing materials and disclosure, these guidelines were likewise developed for regulators to use in reviewing marketing materials used in the sale of equity-indexed products. We recommend that they be consistent with the NAIC model rules governing the advertising of life insurance, including annuity products. The invitation to inquire and the invitation to contract are covered under the NAIC model rules, and it says that they be truthful and not misleading. They must be sufficiently complete and clear as to avoid deception and not have the capacity or tendency to mislead or deceive. The compliance of advertising materials with the rules is measured by overall impression. Then we're recommending that there be a balancing language that will give attention to both the negatives and positives of the product features.

There are examples of balancing language. On disclosure we are recommending that they be consistent with the proposed NAIC annuity disclosure model regulation and the NAIC model rules governing the advertising of life insurance. We must disclose all fully guaranteed benefits and values and all guaranteed parameters related to the nonguaranteed equity-indexed design. Disclosure documents must have a description of guaranteed and nonguaranteed elements of the contract and their limitations and an explanation of how they operate. There has to be a disclosure of total amounts of nonguaranteed elements. That is optional. The disclosure of total amounts of nonguaranteed elements is optional, and if shown, may be in narrative form, or based on tabular, single or multiple scenarios. Like I said earlier, the balancing language is important.

We are also recommending that annual reports be provided to the consumers of equity-indexed annuities. I'm going to turn the discussion over to Michael Shumrak, who is going to be talking about what's different about these products in relation to the regular types of products or the nonindexed relatives and the challenges one faces in cash-flow testing in addition to the products.

MR. H. MICHAEL SHUMRAK: The focus of my discussion is going to be a short discussion of what aspects of these products make them different from other products. These would be cash-flow testing and asset adequacy issues. I'm also going to get into, if they're so different, why is that important? I'm going to sort of talk about why the differences are so important and what the impact of the differences are. Once we know why they're different and what we have to worry about, we'll go through a little bit of the overview of the practical considerations of how to handle the situation.

There are probably far more differences than these, but I'm thinking in terms of cash-flow testing considerations. First, you have a situation unlike regular SPVAs where you're going to be working with something like 80% of the premium you collect from the customer to fund the guarantees. Again the guarantees are modest, but they're still there. The other 20% is going to be invested in derivatives that have their own characteristics in terms of volatility and complexities; they are both practical and theoretical. To me, the most important element is the unknown customer behavior. We really don't have any data; we're not even near the point of having data. I think there are some

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

indexed mutual fund products, and years ago, there were some insurance products that sort of had some of the same features, but there's really nothing that we can hang our hat on. Despite not having historically relevant distributor and end buyer behavioral data, we can still develop an approach to gain an insight into the risk dynamics. We will elaborate on this later in our discussion. Finally, we consider the typical approach to static product pricing's so-called "base case" to be particularly misleading in the case of equity-indexed insurance products. In particular, how reasonable is it to use the long-term average index appreciation trend -- such as 8% for the S&P as a proxy for what we expect over a much shorter time frame such as four to seven years or even ten to twenty years, the typical product pricing time horizon? In fact, when you consider the actual possible patterns of equity, interest rate and competitor price patterns in concert with customer behavior, basing product pricing on the single "8%" scenario does not provide us with much confidence that our pricing will hold up.

This just further illustrates on a typical equity-indexed annuity product what's happening with the money. In this example the profit would be after tax, so pre-tax, it might be 4-5%, as a percentage of the present value of the premiums at an earn rate just describing what you're looking at. The expenses would include the marketing expenses, the issue expenses, and the maintenance expenses, and the investment expenses might run about 8%. Then, like we said before, of the money that's being put to work in assets, you might have about 20% in option funding or whatever derivatives you're using to hedge the option-based liabilities, and the rest is going into fixed-income vehicles.

Let's talk about the first element to be concerned about. Typically, for most products, companies are offering the 90%, 3% and after three or four years, you're guaranteeing, in effect, 100% of the premium back. For some products and in some regulatory environments, you're sort of obligated to start at a 100% rate off, so you're already responsible for all the money the customer paid you, even though the day you took off, you've only got about 80% of it working.

Finally, a useful way to break in and understand how these products work is to take a product and say I'll do a buy-and-hold strategy and take that 20% or 80% of the money and buy zero-coupon

bonds if you could really do that economically and make the product work; you probably much can't, but at least conceptually you can see the mechanics. You do that and have a zero-coupon bond that's going to mature for this guaranteed value. You then buy enough option, so that at the end of the index period, it can pay off the excess over the zero coupon that pays the index benefit.

One of the issues surrounding the 20% or so that is invested in the derivatives is you have the price risk on the derivatives. If they're indexed options over the counter, you have volatility risk and liquidity risk as we've discussed. You could have very thin markets or customized markets where you can work with a counterpart. On paper everything works. In a simplistic static environment, everything holds together, but in reality you are dealing with several moving targets and some very important practical problems regarding setting up and managing your hedge. For example, if the size of a cohort of issued policies is too small or gets too small, it may not be economic to buy extremely small lots of the derivatives required for the hedge.

Then we have the unknown customer behavior, which again is the one that is most important. Of course, the tough thing is we don't have the data, but we can at least start to think about these things. We've seen many products directly or through reinsurers that are very generally described in terms of who's selling it and who they're selling it to. Sometimes they don't know and I think that's critically important to consider. In terms of buyers, there are the captive agents and regional banks. Regional banks arguably could be higher on the list, and then there are regional Personal Producing General Agents (PPGAs), which are sort of like general agencies. The big hitter general agencies have been the stock broker distributed type.

The same thing applies to buyers. You have CD buyers, fixed annuity buyers, conservative variable annuity buyers, and sophisticated investors. Once you're into any one of those stock brokers selling to conservative variable annuity prospects, then you start talking about the behavioral drivers. Logically, you must consider: the forfeiture penalties involved, whether you have vesting, surrender charges, and opportunity costs. How is the index performance going at issue through the end of the year as compared to other available products, SPDAs, and other market products? How does the

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

guaranteed floor come out as the economic environment develops? Of course, the compensation structure is a behavioral driver for the distributors.

To give you a more specific example than just saying the words is, using some dynamic lapse formulas that we've developed. Again, there's nothing magical to them. They just reasonably create dynamics. If I'm characterizing hot money or cold money or something in between, you can turn the dial on these logistic formulas to at least get a feel of a rationale, rather than just throwing our hands up and saying, well we don't know what the lapses will be. I'm describing a situation where you might have a typical equity-indexed annuity that doesn't pay anything until the end of the seventh year -- then you get the increase in the S&P, European. So if it went from \$500 to \$1,000, the money doubled and that's what you get if you stay in for the seven years. I've sold people that product and then sometime during the first year (maybe at the end of the first year) interest rates spiked up 300 basis points. If the market drops 30%, then I run through my dynamic lapse formula and this gives me a relative feel for the types of lapses we're talking about. Another important point is that much of the work done to date to price equity-indexed-based insurance options and hedges has been done by the Wall Street quants. In the absence of customer behavior data and/or modeling techniques, Wall Street naturally prices these options assuming the buyers and sellers are highly sophisticated individuals with up-to-date information. They have no idea that in some markets and through some distribution channels, customer behavior may be much less sensitive to every move in the market that effects the efficient price of the option involved. In these cases, Wall Street and its insurer clients are grossly overpricing the cost of hedging the equity-indexed-based elements of their products.

The "8% level growth" equity-indexed approach may not be an unreasonable way to get the product launched and might support your preliminary risk analysis with an extensive battery of deterministic tests. In fact, New York has recently introduced such an approach for equity-indexed annuities. They specify 15 different equity and interest rate scenarios for insurers to use to test the adequacy of their reserves. In our work, we typically start with some static sensitivity tests. We search for "boundary situations," that is, extreme situations that we believe are just beyond the extremes we

might see when we later expand our analysis to include stochastic risk analysis. For example, we will analyze the situation where interest rates spike up by 300 basis points and the equity index plummets by 30% both right after we issue a block of new products. However, this is not a good substitute for running some stochastic tests. While we usually do not see individual stochastic scenarios that are as extreme as the “+300bps/-30%,” we do see a wide variety of shapes in the distribution of adverse scenarios. In some cases, there are very few and in other cases, there are many more. Also, we find it very instructive to review the equity index, interest rate and customer behavior patterns underlying the worst stochastic cases.

In much of the early work done statically to price equity-indexed annuities, pricing actuaries since treated the expected cost of the hedge as an expense allowance budget. For example, they might determine that 20% of the single premium received is available to fund the hedge program. This 20%-based number may have been true when the product was priced, but even the day after this pricing work is completed, this changes with changes in the financial markets -- interest rates, volatility, the demand/supply of the underlying hedges required. Therefore, the 20% number has to be trued up each time a company is about to sell a block of these policies and then re-examined for each of these blocks of policies each time the financial environment shifts.

The final point is, each business cohort has its own identity; the yield curve or the volatility in turn reflects how richer or poorer the options prices are. They're shifting all the time. We were working on a five-year product, then also doing seven to ten just in case, while getting ready to do the market research with the client. But this was late last summer; of course, the interest rates kept dropping and the volatility increased, so the option pricing environment, that drove the fact that the five-year product would work, was no longer any good, so we had to move to the seven-year product. From a cash-testing point of view, that means that you're going to most likely have many cohorts that are going to have different situations in terms of the underlying deal as it kicked off and the underlying risk characteristics as you track them through time. You have different head strategies and tactics. We talked about buy and hold. We talked about rebalancing, saying there's the replication of strategies we heard about earlier. We talked about projecting distributor customer behavior.

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

Of course, what's last but certainly not the easiest is you'll have to deal with yield curve and index predictions and dynamics. Let's discuss more details of each of the issues in the hedge design. First is the pricing assumptions persistency. I recommend that until there are general data or until companies start all these products and truly track the data, insurers who track their customers' behavior will have a proprietary advantage for a while, because they will actually have gotten to know the actual behavior by distribution channel and by end buyer type in each sales situation. Until then, I'd recommend you take a look at some version of the dynamic lapse formula. It will reasonably assure you that you're just not placing them all as if they were your top money, and you're not pricing them all like they're captive agents. Then again, by directly reflecting the hedges, we already discussed the limits of liability and only pricing risk analysis. It's fine at that point in time, but as soon as a week goes by, it's out of date and other things are happening as you're managing products. Then you have to consider the type of hedge. Most of the companies are using various over-the-counter options, but we've seen products where they've done equity for fixed swaps and other combinations of things. We'll probably see more as creativity takes hold and the pressure increases to keep the cost of insurance on the hedges down, and to keep it flexible.

Pricing and reevaluation of the hedge derivatives for counting and reserving purposes. Do you have the track predicting the update prices of the options? You really want to be doing that because the swings in your economic circumstances can move wildly; that's because it moves with the market and it moves with the volatility of the yield curve. You have option pricing models and market prices, and again, there are both closed and open option pricing formulas. Actuaries using stochastic risk analysis tools should be very careful to calibrate the results they are getting with the realities of the market in terms of the trends in both the prices (richness or cheapness) and the trading volume robustness (or thinness). Paper trading-based risk analysis that does not recognize the realities of the marketplace may quickly fall apart in practice.

Finally, what are some of the ways to sort of tackle all this and try to go quickly so there will be time for questions? In terms of these differences, we recommend modeling both assets and liabilities. In terms of the assets, I'm talking about modeling the derivatives and having some facility to

estimate future market values through various scenarios, investment, disinvestment and also the logistics of how am I hedging. What am I buying? Which options am I selling? If I'm doing a ladder approach, where I'm going to buy them each year and update them, I want to be able to reflect that.

We already talked about deterministic analysis. It's a decent starting point. Will this product work roughly in terms of the traditional marketing cost and benefit cost? At one point in time, what might be the hedging cost? Then again, you want to develop some sort of adjusted dynamic lapse model, even if you're off to the side, assuming it's 2% in all years or 10% in all years. I recommend that you do some sort of lapse model that reflects the forfeiture costs and the opportunity costs and the other competitive considerations that various buyers and distributors will be looking at. There's the deterministic mode. Try to look at the worse case, like the 300 basis point 30% deal. After that, especially if you're not going to do any stochastic testing, expand out the array of situations to gain a sense of sensitivity to the yield curve and the index movement. We talked about the lapse drivers, the return the day before, and even the S&P index dividend because it's worth a couple percent at least.

Let's discuss a hypothetical example. It's not necessarily one we use all the time, but it's an example of a framework for this kind of dynamic lapse formula. You have your current market rate, your annualized return date, your guaranteed return and then you define some logistical formulas that take account of the opportunity cost and the forfeiture cost and what's out there in the marketplace. You may want to put a cap on the minimum and maximum lapse rates allowable using the dynamic lapse models. For example, you may say that lapses will never be less than 2% or higher than 50%. From a practical point of view you may want to floor it and say, it'll never be more than 2%. In some cases maybe you'll want to cut it off at the top, although again, I'd be careful because if you have some reasonable behavior model, then you really want to find out if it's likely you could lose 50% of them in a certain situation. Again, this just gives you a rough feel for the dynamics of differences and indexed growth rates and interest rates and what the lapse rates could be. So it's a very volatile situation and that's why I say it is the most important element to study. I think you can

EQUITY-INDEXED PRODUCTS: VALUATION ISSUES

study it with hard data, but at least you can intelligently consider distribution and the end buyer and get some feel for what you might be dealing with. Then use the data meaningfully in your stochastic analysis. You need to carefully review the portion of total assets that must be allocated to hedges to fund the indexed enhanced liabilities as well as the portion required to support the minimum interest rate or floor guaranteed.

In terms of stochastic analysis, the first thing I try to do is validate. I hope that I do not miss my boundary estimates of the extreme situations. I almost never see one of the stochastic scenarios be the same or worse than something like the 300/-30% (a spike in the yield curve of 300 basis points accompanied by a drop in the underlying equity index of 30%). In reviewing the stochastic results, it is very interesting to compare the best and worst cases to your static boundary cases you developed. Even though extreme cases like the "300/-30" may not emerge, the distribution of results is important. For example, with some product/hedge designs, the mean profitability may be very attractive [say 15% GAAP return on equity (ROE)], but the distribution of results may show 20% of the trials with losses. A second hedge design on the same product may produce a 13% GAAP ROE but have only 5% of the stochastic trials losing money. I've just seen things that I never would have imagined when doing deterministic testing. When you run the stochastic testing, you then poll the worst or the best and ask, what was going on with the Standard and Poor's (S&P) and what was going on with the yield curve? What did the customer do? That's where you really want to look. There are a number of scenarios, such as stochastic generation of yield curve and equity price scenarios.

We've already mentioned an earlier degree of correlation between the yield curve and equity prices. There's no right answer, but it's not necessarily zero. Then, if it isn't complicated enough, you have the volatility of the index-option volatilities. At any time, you have an option price, and it's based on several factors, including the volatility of the option, but if that tracks around while you're stochastically analyzing things, that's still another challenge. Then what results to analyze the percentage of negative scenarios? Like I said, just don't look at the negative results or positive results, but look back and say, what drove those results in terms of customer behavior; then test

1997 VALUATION ACTUARY SYMPOSIUM

alternative hedging strategies to fine tune. Then, if you have a nonguaranteed participation rate, analyze how that might play out because you have that degree of freedom to say, maybe I don't have that much risk because I can knock the participation rate from 80% down to 70%, but then, depending upon market conditions, maybe you can't.