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Equity-Indexed Annuities: Regulatory Issues

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Summary: The equity-indexed annuities market is rapidly growing. Several regulations continue to be developed, including those addressing distribution, marketing disclosure, and reporting and valuation issues.

Mr. Noel J. Abkemeier: The issue of equity-indexed annuities (EIAs) is something that has been very active for the last two years. Many dimensions have come into play. We will review the adaptations we have made to the different requirements. Our first speaker will be Donna Claire, president of Claire Thinking. She is a Vice President and Treasurer of the SOA and a former chairperson of the AAA Equity-Indexed Products Task Force, Donna will be speaking about the number-crunching side of regulatory issues.

Then we will have Errol Cramer, a senior actuary and director of the Allstate Life Companies who is also a frequent member of Academy of Actuaries task forces. He was also a member of the Equity-Indexed Products Task Force. He will be viewing life through the eyes of an appointed actuary and commenting on various financial reporting issues.

I am consulting actuary from Milliman & Robertson in Chicago. I was also on the Equity-Indexed Products Task Force of the AAA and spent much time on the reserving dimensions of equity-indexed products. I will be talking particularly about the numerical or quantitative implications of draft *Actuarial Guideline ZZZ*.

Ms. Donna R. Claire: How many of you attended the equity-indexed products panel discussion with Lynn Peabody (59PD, Equity-Indexed Products: Now That You Have Them, What Are You Going To Do With Them?) Many of my original remarks were introductory and already covered, so I'll go over them briefly.

First, I disagree with Lynn's characterization of equity-indexed products as being "variable." The Academy group defined them as a fixed product. Our definition is as follows: "An insurance product with a fixed minimum benefit that ties the total benefits payable, above any statutory minimum guaranteed floor (with or without market value adjustment), to the performance of an external index." There are a number of reasons why this is important. First, by saying they were fixed products versus variable, that makes us subject to, for example, the Standard Nonforfeiture (SNF) law and the Commissioner's Annuity Reserve Valuation Method (CARVM). We are not subject to SEC registration of the product because they are not variable products. The SEC can say whatever it wants to, but if you think about it, the guarantee within an equity-indexed product is actually stronger than one under a basic fixed single premium deferred annuity (SPDA). For example, the minimum guarantee for a fixed SPDA is 3%. An EIA not only has a similar fixed guarantee, but also a guarantee of participation in an equity index increase. Yes, it may be based on an equity index, but the guarantee is firm. It may be risky for the company if it's not managing the product correctly.

There is no typical product design, except that most of them are based on the Standard & Poor's (S&P) 500 index. Guarantees are typically in the five- to seven-year range. The minimum guarantee typically is the minimum in the SNF law, which for SPDA annuities would be 90% of premium accumulated at 3%. Typically, it will be lower for the flexible premium deferred annuities (FPDA), or flexible products. The guarantees are not all the way down to the minimum on the FPDAs. The participation rate provides that if the index goes up by, 10% for example, your product will credit perhaps 75% of that increase.

There are a number of product designs in the market. The annual ratchet and the point-to-point both make up about 35% of the market. High watermark, low watermark, and a few other designs represent the remainder.

"Cliquet" is another term for an annual ratchet design. Roughly translated, every year you're guaranteed a participation rate in the index increase. At the end of the year you'll get that participation rate times the index increase or the minimum of 0% guaranteed. The word "cliquet" actually comes from the investment side as the name of the hedging option. Many states like this design. In fact, certain states will allow only this type of product, probably it guarantees this increase once a year; and even if the market goes down the following year, you're not going to take

anything away from a contract holder. Certain states, such as Oklahoma and New York, approve the annual cliquet as their sole design.

It's a nice product. Many people like it in terms of the consumer. What are the disadvantages? It can be expensive because you're guaranteeing every year that you're going to participate in the increase of the market. This is the most expensive option you can buy. Therefore, the participation rate is typically lower than certain other designs. For the "typical" setup, there is a 50%–75% participation rate in the first year. I've seen a participation rate as low as 40%. An advantage from the asset side is that you can use over-the-counter options, which are obviously much more available than having to go to the market for customized options.

For point-to-point guarantees, the benefit is based on the index at the end of a period, such as seven years. Seven years from now you get x% of the increase in the index. It is the most popular design because it shows the highest participation rate (75–110%). The disadvantage is, if the market goes down, the purchaser could wind up with the absolute minimum 3% annual guarantee in that period. Certain states do not like this design and will not allow it to be sold.

A slight twist on the point-to-point design is the point-to-point with averaging, which is very popular. Instead of basing the benefit on the last day of the period, you average the market over a period such as the last six months. Therefore, if the market goes down on the last day, the customer doesn't lose absolutely everything. The options for this are actually cheaper, because the market generally goes up. It also protects the consumer because value doesn't depend on the market on a specific date.

The high watermark basically guarantees that you'll get a benefit based on the highest index on an anniversary from the time you started until the end of the seven-year period. If this happened to be the end of the fifth year and the market reached a peak, you'll get that increase instead of the change between year zero and seven. The participation rate on this is typically lower than the point-to-point (60–75%), but the advantage is that you'll have fewer surrenders because people know that even if the market is going down, at least they have locked in that high point. However, because of the lower participation rate, the high watermark makes up only about 10% of the market.

A twist on this is the low watermark. Lafayette Life, for example, offers such a product, which will credit benefits from the lowest point of a seven-year period until the end. Again, if the market drops, there is less likelihood of surrenders. Both the high watermark and the low watermark are in effect giving some protection against early surrenders, which could have cost the company.

There is a buyer's guide to EIAs. At an earlier session, the regulators were mistakenly referred to as the guide's developers. The regulators did bless this product, but an industry technical advisory group provided most of the input, specifically Charlotte Liptak, who happens to be a lawyer, but we've made her an honorary actuary. She belongs to many of our Academy groups. In effect, the guide explains to the consumer in simple language what an equity-indexed product is. This guide was accepted by the life insurance disclosure working group of the NAIC, which is headed by Tom Foley, and was adopted by the parent committee, which is called the A Committee at the NAIC. The NAIC endorsed this as a voluntary distribution item to all consumers who purchase equity-indexed products. I think it's a great guide. If you don't happen to have it, it is available from the NAIC Web site, www.naic.org. Download and peruse it if you are thinking about getting into the market. I would strongly recommend that this be distributed to all consumers who are thinking about purchasing an equity-indexed product. If you choose not to give it out, you have a greater risk of customer misunderstandings.

On the subject of illustration, there has been a major debate. Should an illustration show actual numbers? There is no NAIC model regulation. The Academy has strongly endorsed that any illustration should show both the positives and the negatives. Larry Gorski deserves credit for coming up with the concept of balancing language. For example, if you say the market might go up 14%, you better say that the market could also go down 14%. But you could still indicate that the customer would be left with the minimum 3% guarantees.

North Dakota, where Tom Foley is the regulatory actuary, has a bulletin that requires certain illustrations. Very few other states require an illustration, mainly because there's no way to come up with an illustration format that wouldn't mislead one way or another. It really is in a company's best interest to explain clearly what the product does, and not oversell it, because lawsuits resulting from misunderstandings could be more expensive than the value of sales.

The product does have upside potential, but a purchaser also can wind up with the minimum guarantee. This is one area where just about every state has the ability to review your illustrations. It is likely that every state will ask for a copy of your illustrations and there will be a number of times when you'll have conversations with legislators about how to make them clearer.

There are very few states with specific contract filing requirements. However, the Academy group did come up with what we thought were reasonable contract filing requirements. Again, these are not required. Some of these items are required in various states: the actuarial memorandum, some disclosure about your hedging strategy, your advertising materials, and a sample policy projection.

If any of you do not have the Academy's equity-indexed products task force report, call the Academy for a copy. I strongly recommend it. If nothing else we did a lot of work on it and want to distribute it to as many people as possible.

The actuarial memorandum is basically similar to any other product filing memorandum. You explain the product contents and, in this case, the index, the calculation of benefits, compliance with the nonforfeiture laws, the reserving method, and the asset adequacy testing methodologies. Certain states, like Florida, have unofficially adopted these rules. If you don't submit these items, you're not going to get an EIA product approved in Florida, at least not without a lot of debate.

The regulators are looking to make sure that a company is not taking on more risk unknowingly. They are concerned because this is a richer product than an SPDA. The EIA product provides a tremendous guarantee, so a number of states have asked for a disclosure of hedging strategy. What type of investments are you using? How often can you change the strategy? Are you using what is called delta hedging or option replication? How often is this reviewed? For example, the Academy group said, "If you're heavily using derivatives, at least once a week would be wonderful." I think we compromised in our report and made it somewhat longer, but in effect, it needs to be reviewed often. What type of investments are you using and are you over- or under-hedged? Are you buying too many or too few options? Are your surrenders what you expect?

Another interesting area is nonforfeiture. The Academy has stated that, "This is a fixed product, it must comply." This means that you must have smooth grading of guaranteed benefits to the benefits at maturity. There are a few states that interpret the SNF law as requiring the grading of what we call the nonguaranteed benefits, basically grading the equity-indexed benefits. Dan Keating, the actuary in Oklahoma and a member of the Academy task force, endorsed the Academy report but disagreed with our conclusion on nonforfeiture. Oklahoma is a state that requires grading of all benefits; therefore, for example, point-to-point products are not going to be sold in Oklahoma anytime soon.

We do not have an answer from the SEC right now. The SEC did ask for opinions about whether or not this should be a registered product the deadline for comments was January. Some people are expecting that there will be a safe harbor while certain products may have to be registered. But it's still an open issue. The NAIC has advised the SEC to recognize equity-indexed products as fixed annuity products that can be regulated by the states.

Where can you get information? The Academy report is technically dated December 1997, but there have been some 1998 updates, so if you ask the

Academy for the latest one it will probably say December but will include some of our updates. The SOA has put on three seminars on equity-indexed products and that information may be available from the Society. Also, the ACLI has material available, as does the National Association of Variable Annuities and the National Association of Indexed Products, which has extensive information on these products. They're perfectly willing to share them with you.

Actuarial Guideline ZZZ is a must-read for everybody. Noel and Errol are going to go into more detail on that. I should also mention that there is an *Actuarial Guideline ZZZZ*, which is the life insurance equivalent. That has just been written, but it's not as far along in the approval process.

Mr. Errol Cramer: What I'll be doing is covering topics of importance to the valuation actuary or appointed actuary. We'll cover four items: selecting a valuation method, quarterly actuarial certifications, cash-flow analysis testing, and financial and other related items.

Donna mentioned there's a proposed *Guideline ZZZ*, the actuarial guideline. It has been in exposure since the end of 1997. Many comments were received and some anticipate of adoption in June, but there are a few minor items that will be changed. And there should be more changes, I believe, in September.

Guideline ZZZ has what's commonly referred to as a dual track of reserving methods. A Type 1 method does not incorporate the actual market value as of the valuation date. The Enhanced Discounted Intrinsic Value Method (EDIM) is the only Type 1 computational method recognized by *Guideline ZZZ*. It is simpler to do, but it does require that "hedged as required" criteria be met. Type 2 methods, such as CARVM with Updated Market Values (CARVM-UMV) and the Market Value Reserve Method (MVRM), do not require "hedged as required" compliance but do require market value calculations of the optionality piece of the liability for each valuation date. One can do either what is called an exact market value calculation, or a shortcut method. One of the shortcut methods is the MVRM. Another is the Black-Scholes projection method, which is a special application of the MVRM. Shortcut methods are permitted under certain conditions.

You need to decide if you're going to use a Type 1 or Type 2 approach by considering your ability to determine the actual option market value on the valuation date. The two generalized approaches are either Black Scholes (BS) or a formula-type approach, but if you have a more complicated product use a Monte Carlo approach. You need to understand your actual option benefits and be able to determine your economic assumptions. You need to set your option pricing assumptions, the most important one being implied volatility. Implied volatility

cannot be computed directly. You can only compute it from observed supply and demand rates in the markets. One way of getting market value rates is to go to an option dealer and get quotes, but I don't think it's a very practical method to get all the option quotes that you want on a regular basis, because there is some work involved on the part of the dealer. If you use a dealer quotes method, you need to validate, because these are supply-and-demand-driven values. Look at dealer quotes to impute the implied volatility if you are calculating your option prices internally.

Your ability to determine the market value will drive whether or not you want to use the Type 1 or Type 2. There are other practical considerations. What can your valuation system do? Are you or are you not willing to live with the hedged-as-required constraints?

The next thing I'd like to look at is the certifications that are required. The certifications would depend on whether you're using a Type 1 method, the book value method, a shortcut Type 2 method, the MVRM method, or an exact market value calculation. The certifications are all covered in *Guideline ZZZ*. The first certification is a general requirement when you select a valuation method. You can use a Type 1 or a shortcut Type 2 only if there's a single dominant benefit and identifiable term. For example, for a point-to-point you can presume that most people are going to hold it for seven years, cash out, collect the funds, and have a product that they can then value.

The other three certifications are quarterly requirements. If using a Type 1 method, you have two items to certify: reasonableness of assumptions and hedged-as-required compliance. Reasonableness of assumptions would cover things such as one may not hedge 100% of the benefit, but one may allow for certain decrements. Can you justify all those assumptions as reasonable?

The next certification is for the hedged-as-required, if you use the book value method. The final one is consistency of assumptions, which applies only to the market value of Type 2 methods. The consistency refers to consistency of determining market value of the options on the asset side as well as on the liability side.

If we consider the hedged-as-required requirements, *Guideline ZZZ* allows two methods. The first is the basic method, which is really option matching. For instance, if you have a one-year product, you buy one-year hedge for the same strike price and participation rate. The other is a delta type of hedging, which is referred to as option replication.

Of the five criteria for hedged as required, the first is equivalence of characteristics. As it's described, if you have a one-year option in your liability, you should also have a one-year hedge. Second is the specified maximum percentage hedged with a maximum of 3% annual elective decrements. You do not need to hedge 100%. Non-elective benefits, such as mortality, may also be recognized as decrements for the primary hedge.

You need a plan for how you're going to hedge interim benefits. Again, this is only used for products with an identifiable term. For interim death benefits, annuitization, or cash out, you need a plan for how you will handle the hedging of those interim benefits. You need a monitoring system. Finally, you need to define a maximum tolerance, which is defined in a practice note as $10 million or 10% of surplus if you have at least $100 million.

There is an acknowledgment that with hedging and the way the market moves, you can very quickly go out of required hedging unintentionally. Luckily, you are allowed two quarters to get back into adequate hedging. In other words, there may be times when you don't meet the requirements at the time of a quarterly certification, but by the next quarter you should have that resolved. It prevents you from going too far out of the required hedge. If you don't resolve it, then you default back to a Type 2 method and will have to do market value calculations and comprehensive disclosure to all the states in which you're licensed.

These are reserve adequacy testing requirements just as with any other fixed annuity. Donna mentioned there are many practice notes. The two sections that apply to cash-flow testing are Sections C and D. I won't go through that because I think they're well covered in the practice notes. Section C assists you in analyzing the risk specific to your particular equity-indexed products. Section D gives you some pointers, once you understand the risk of your product, on how to evaluate the risks.

The key analysis decisions specific to equity-indexed products, discussed in Section D, the disintermediation formula, are all different from fixed products that you've worked with in the past. They may have to be tailor-made to your specific product. The third consideration is how you handle option modeling within your cash-flow testing—not just determination of market value rates within the modeling, but your options strategy or hedge strategy on a dynamic basis. Finally, one has to consider the modeling practicalities. Currently, I don't think there's software that does it all. You can fill in the gaps by doing sensitivity testing.

The first example is an annual ratchet where the product is annually hedged and has current-year-only guarantees. The optionality piece of this product is relatively

small. Typically 95% of the assets would be based on fixed income as for other fixed-income products. The risks are not that different from a fixed product. You have disintermediation risk, the biggest risk being that people surrender when index values go down and the market value of your fixed income portfolio is down as well. The probability of people exercising that cash-out might be different for this product than for an SPDA, but you're pacing for the same type of risk.

Another risk is a floor guarantee if the markets underperform for a period of time. Again, this is an annual ratchet, so each year if the ratchet provides no benefit, you may find that the 3% floor guarantee eventually comes into play. The third item is, given that you're going to buy a hedge each year, you're at risk for increased annual option cost. In this example you can reset the participation each year, but it's similar to an SPDA where the ability to make a spread can get hampered by option cost going up in renewal years. Given the product, your analysis considerations for cash-flow testing may be testing similar interest rates as for fixed SPDA. One would at least want the sensitivity test to allow for a low economic scenario in order to pick up the floor guarantee risk, and one would like to test a period of very high volatility to pick up the cost of the increased annual option costs. In any case, with additional testing, you do not have too different a product from a traditional fixed annuity.

The next example, point-to-point, where one is hedging 80% of the benefit, is more interesting. If there was an allowance of 3% for annual decrements, this might correspond to a five- or six-year point-to-point product. A key risk would be disintermediation, which is really being overhedged. The risk there is, if interest rates are high, a portion of your assets are based on fixed-income investments. If the market is not performing well, or volatility is very low, the market value of your option could decrease substantially. If you have to liquidate either fixed assets or your options, you could suffer disintermediation loss. The other risk is being underhedged—for example, you are using an 80% hedge but 90–100% can stay until the end of the term. The risk there is having to provide more benefits than you hedged for, or having to buy hedges later at a much higher cost than originally priced for. Basically, there is risk if you are either overhedged or underhedged. It can go either way.

For analysis considerations, there are four items. First is the surrender formula. Surrender consideration is how people might perform under different types of scenarios, such as combinations of interest rate, volatility, and past market changes. One would definitely need to do more expanded scenario testing than for the others I have described. At a minimum, one should do seven scenarios by seven different economic trials, or a total of 49 cases. You should do stochastic testing if you have the ability to do so. The important point is, you can't really deduce which is your

best and worst scenario. You need to go through a whole expanded set of situations. The sensitivity test you'd want to perform, given that your key risks are either being overhedged or underhedged, are very much a function of your surrender formula. You'd want to do the sensitivity test by high and low surrenders.

In conclusion, I want to summarize the variety of items that are of importance to the valuation actuary. First is reinsurance of equity risk. By that I mean not reinsuring the product 100%, but merely reinsuring the equity index-related benefits. Related issues would be the transfer of risk provision of the reinsurance regulation. I believe most states would regard this as a 100% risk transfer of at least that piece. The other related issue for reinsurance of equity risk is the reinsurer's reserves, what a reinsurer sets up from the assuming side if he or she doesn't have the entire product, but only the index-related risk piece.

Another consideration would be the investment law of your particular state. Some don't permit derivatives or hedging of any type, so you may need to obtain permission. Most have restrictions on what derivatives you can buy, whether or not they are used for hedging.

The third item is statutory accounting for derivatives. How do you reflect unrealized or realized gains or losses in the annual statement? How do you get those items on a consistent basis with how the benefits are recorded, either as reserve increases or the benefits paid?

The Type 1 and Type 2 methods require different treatments of the statement value of the supporting derivatives, but even within Type 1 or Type 2, every company has tried to solve its own problem. There are a variety of ways in which it's done, but it usually has the same result, which is a matching principle. The NAIC will be looking into that soon.

The final item has to do with the investment reserves: asset valuation reserve (AVR), interest maintenance reserve (IMR), and risk-based capital (RBC). There is not much activity at this stage. Most of the focus has been on the valuation side. By and large, the valuation side requires either that there be hedging or immediate recognition in terms of market value to the extent you are underhedged. More work will be done at a later stage. For RBC, there's a C–3 committee looking at requiring cash-flow adequacy testing of equity-indexed products as well. Noel now will give more specifics on the actuarial valuation methodology.

Mr. Abkemeier: The official name of ZZZ is "The Application of the Commissioners Annuity Reserve Method to Equity-Indexed Annuities."

It was indicated that this is on the track to approval and the Life and Health Actuarial Task Force has approved it. I think it needs a tweak yet, but it will be blessed by the task force. It's on a path to be moved upstream in the NAIC, with approval expected either in September or December. Even if it were knocked off the track, on the official side it will be reality for you as a valuation actuary. In 1997, Illinois and South Carolina were living by the guideline, and in 1998 those two states and a few others will expect you to be following these procedures.

The concepts behind ZZZ are that your reserves have to cover both the fixed guarantees and those guarantees that are implicit in the cost of options. This draws a parallel to what you do with SPDAs. You recognize what's guaranteed to the customer and use that to roll forward into your projections of account values. The same thing is practiced here.

The second aspect is that assets and liabilities must be treated consistently. You heard that in Errol's comments with Type 1 and Type 2. Again, Type 1 is book value reserves and book value hedging assets. Type 2 is market value to market value.

Third, sufficient hedging must be demonstrated. In some cases, this is in relation to Type 1 situations. We'll talk about that a little bit more and, again, Errol had briefly mentioned it.

CARVM-UMV, the leading Type 2 method, is essentially the frame of reference for directing the whole reserve rationale. It is precise and covers all the twists and turns of the liabilities that the insurer is facing. The other methods are all simplifications to make life easier for the actuary in the first two months of each year. The various methods were rigorously tested to make sure that they reasonably adhere closely to the results you would get from CARVM-UMV.

The last method, the MVRM-BS, was brought into the picture to recognize specifically those designs for which the primary guarantees, such as participation rate, are redetermined each year, and where it becomes logical for you to purchase your hedging options one year at a time. The EDIM and MVRM are basically predicated on having a single option, which is going to cover you throughout a full term—six to eight years, for example.

CARVM-UMV can work, but it can get a little more complex in some cases. Whenever you use CARVM-UMV, you have to certify that there's reasonableness and consistency in your assumptions. This correlates with one of Errol's check marks.

When you move to MVRM and MVRM-BS you start off with the same first requirement. The product itself must have what's called a single dominant benefit. The concept is that there must be some feature that essentially will suggest that the option cost you're using is the appropriate one for running forward with the method. The computations must assume that the current term is consistent with the time of the single dominant benefit. The current term is the length of the option that you are buying for the product. Finally, the appointed actuary must demonstrate the single dominant benefit to the regulatory officials before utilizing the methods. At the time of filing, you must get the point across that you have an appropriate term with consistent hedging and that the reserving method is consistent.

The single dominant benefit is the point in time that is the focus of the product. It's determined by various factors. For example, if you have a six-year guaranteed period for your product, and/or your surrender charges are decreasing over that period, or you have a window at the end of the period, that is *prima facie* evidence that six years is the focus of your product. That single dominant benefit ends up defining the term of your product and becomes the period of time over which, for example, you apply the MVRM method.

I don't believe there are any products in the market where it's difficult to figure out the single dominant benefit. But, conceivably, with some creativity, it could become more difficult to make this determination in the future.

If you are using EDIM, the important thing in the first requirement is that the appointed actuary must certify the appropriateness of the initial reserve calculations. On the MVRM, you're certifying on a regular basis because you're redetermining some market value components each year. On EDIM, you will start off at point zero at time of issue with certain market value calculations. The certification is needed after you have made these market value calculations. But once you've made the calculations, the reserving method is on automatic pilot to the end of the term. Therefore, there's no longer a need to recertify the consistency and reasonableness assumptions that relate to market value.

The appointed actuary must certify that the hedged-as-required criteria are met. Although Errol has mentioned this, let me provide some additional background. The market value methods have reasonable accuracy on both assets and liabilities because market values are being used on both sides. When you're using the Type 1 book value method, EDIM in particular, it's recognized that book value methods contain certain imprecisions. However, if you have an imprecise reserve balanced with a consistently imprecise asset, everything works out fine. If you do not have this balancing quantity on both sides, however, your balance sheet can get distorted. The concept of being hedged-as-required makes sure you have sufficient

assets to work with in conjunction with your liabilities; therefore, it is reasonable to assume that your balance sheet is consistent from side to side.

Finally, as with the MVRM, the single dominant benefit must be demonstrated to the regulator before this method is used, so this should be part of your actuarial memorandum.

There are two sets of hedged-as-required criteria: (1) basic, and (2) those you use if you're using replication for your options. For the first basic criterion, you are demonstrating equivalence of the characteristics of the options in your liabilities and relating that to the hedging instruments. It's somewhat different when you get to replication. The second criterion allows you to recognize elective benefit decrements of up to 3% a year. That item and the next one really work hand-in-hand. To the extent that you are recognizing decrements in the second point, you may have to be pulling in other hedging in the third point. If you have interim benefits that are index-driven, they're a function of index movement. You will want some kind of hedging in place to cover the death benefits, which are almost invariably index-driven. That's an interim benefit. If your surrender benefits are a function of the account value that is driven by index movements, that too should be hedged. This may require some hedges with shorter maturities. If a product has a seven-year term, you will probably need some hedging with two-year, four-year, or five-year terms to cover the interim benefits. If interim surrender benefits have no dependence on the index, such as the case with many point-to-point products, then you would not have to hedge interim benefits. The total amount of hedging you buy can be lower than in a case where you have index dependent interim benefits.

We mentioned that there is the concept of option replication. What is it? Option replication is the use of a combination of various derivatives to ultimately replicate or produce the same results as if you had purchased a long-term, over-the-counter option. When you are replicating, you will be spending on hedging items just a small percent of your account value each year. If you were hedging a point-to-point product with a long dated option, you could be spending 18% of your premium for a hedging instrument at the beginning. If you are replicating, you could be spending 4% or 5% at that time, but making subsequent purchases year by year.

If you're using a replication methodology, the rules of the game for hedged-as-required change somewhat. The first item says that you must be demonstrating equivalence of characteristics of the embedded options and the replication target. With a basic hedged-as-required, you're looking at actuarial hedging instruments. Here you're demonstrating equivalence to a target of your replication. You're also annually assuming up to 3% elective benefits, whereas in the basic hedged-as-required you would do this at issue when you're making your major long-term

purchase of an option. On a quarterly basis, you're looking at having enough hedging in place in relation to the assumption of up to 3% termination subsequent to that point. Other items have basically the same considerations as before.

How do we do some of these calculations? I want to cover each of the four methodologies. The first one is CARVM-UMV. First, calculate an option cost for each benefit. You can have various benefits—death benefits, surrender benefits, annuitization benefits, among others. For this presentation, I want to focus on those three benefits, which give us three dimensions. Second, the benefit occurs at each anniversary, so if you have a seven-year product you have seven points in time for which you will evaluate each of these three benefits. Thus, you have 21 items that you are evaluating. Through analysis, you may figure out that some of them are always going to fall lower than others. You can perhaps eliminate some calculations on a practical demonstrated basis but, in concept, you would be coming up with option costs for, in this case, 21 different items. Each would have its own strike price, which would be related to the underlying guarantees in the absence of index benefits, and each would have its own full benefit based on what the formulas are.

Once you have come up with an option cost, this cost is projected to the date of availability of the benefit. The projection rate is the valuation rate. Somebody on Wall Street would say, "You should not project at the valuation rate; it's not the technically right rate. You should be using the risk-free rate." However, the valuation rate has been accepted as a convention for reserving purposes. It does a couple of things. It simplifies life, so you don't have to fish around for rates. Second, it has the arithmetic characteristic that you'll be projecting out at a valuation rate. Yet, when you ultimately do your CARVM calculation, you will be discounting back at the same rate, which means you're bringing into your reserve the exact value of the hedging. There's a certain beauty in that step.

Once you have come up with the index-based benefits, these are added to the guaranteed benefit. You now will have each of these benefits at various points in time, and you can do a CARVM calculation with *Actuarial Guideline 33* methods. The next year you start over again and do the same thing.

As an example, I have a really simple calculation. I'm calculating only the death benefit and the surrender benefit. I'm not putting it into *Guideline 33*, because if you know how to do it, these are the necessary ingredients. Also, demonstrating it on a *Guideline 33* basis just makes the picture a lot more complex. For simplicity, we're looking at a four-year guaranteed compound ratchet. The participation rate is guaranteed at 50% for each of those four years. The underlying guarantee to the customers in no case will be less than 90% at 3%, as his surrender value, with

surrender charges of 4%, 3%, 2%, and 0%. The guaranteed values are driven by the 90% and 3% guarantee I mentioned. The option costs were determined by a Monte Carlo method, since this is a product that is path-dependent. Once we have the option cost, we project it out at 5.5%. Add to that the guaranteed value and you have the projected benefit, which fits neatly into a *Guideline 33* calculation. That is done both for the surrender benefit and for the death benefit.

If we go forward one year, the account value is 1,100. Within it you'll see that the calculations are recognizing the 1,100. The rationale is the same as it was in the first case, except everything is starting 10% higher. This brings you forward to the ingredients you need for your *Guideline 33* calculation.

If we then go to MVRM, it is a clear simplification of the CARVM-UMV view of the process. First of all, determine the cost of an option to hedge the end-of-term benefit. In this case, the single dominant benefit is at the end of the fourth year, so the term is four years. We're looking at the one option that would hedge for that benefit. That is then projected forward at the assumed valuation rate of 5.5%. Once you have the benefit, you then answer the question, "What change in index could have brought me out to this point?" When you have determined that index level at the end of this four-year period, you then determine the growth rate in the index over that period and interpolate geometrically as to where the index would have been at each of the anniversary points leading you out to the end of that four-year period. Once you have the indices at those points, you can then determine the various benefits, whether it's a death benefit level, surrender benefit, or annuiti-zation benefit. When you have those pieces in place, you're ready to proceed with the typical *Guideline 33* calculation.

As an example, at the end of the term, this is the same benefit that you saw with CARVM-UMV, at the end of the term. Your guarantee is 90% accumulating at 3%, which is 1,013. The growth rate is determined by the formula, which is your guarantee plus the option cost projected, divided by your starting point. This gives you an accumulated growth. Take it to the one-fourth power and you have your annual growth. Since there's a 50% participation rate, that annual growth represents one plus half of the growth in the underlying index or, in this case, 9.72%. Once you have that growth rate, the index is just marched forward at 9.72% a year. You then can apply your 50% participation rate, year by year, apply your surrender charges, and it will give you the account value and surrender values.

One year later, and again the account value is 1,100. In the calculation everything is analogous to what we did before, but it happens to come up with a slightly different growth rate. I should have mentioned that for CARVM-UMV, you are using option pricing assumptions that are appropriate at the time you're doing

valuations. In year one, you use the combination of volatility, interest, and dividends in your option values that are appropriate at the time of issue. One year later, you recognize whatever the situation is at that time, so the prevailing interest rate could be quite different. The volatility could be quite different. Dividends could be different. So you could get considerable variations in values. Again, this example shows a slight change, but not much.

The MVRM-BS methodology parallels what was in the basic MVRM. First you determine the cost of annually purchased options to hedge the benefits, because that is the pattern in which you're buying options. Project that option cost to the end of the year. Perhaps you paid 4.5% per option. It is projected to the end of the year at the valuation rate, which yields, 4.75%. From that, determine the index growth that would produce a benefit equal to the projected option value. It develops an index value similar to the basic MVRM. This has projected the index value to the end of the first policy year. You then carry that to the next bucket for your CARVM purposes. This requires determining your cost of the hedging option for the next year, recognizing the minimum guaranteed participation rate for renewal years. Out of that, derive what your increase in the index might be, and use that to march your index values forward.

As you're reaching out beyond the current year in your calculations of the option cost using the Black-Scholes method, you should be recognizing the walk up the yield curve or a walk up or down the volatility curve in the determination of the option cost, which is driving your index movements. Once you have determined your index values year by year, then you can determine the various benefits under the policy, which allows you to perform a basic CARVM calculation.

These steps with MVRM-BS go through the formality of going from the accumulated cost of an option, into index change, and then ultimately back to a benefit, which is somewhat circular. It's intended to have a methodology parallel to basic MVRM. When you're actually applying MVRM-BS to your product, if there are no benefits that would differ from just straight rolling forward the account value at the accumulated cost of your option to project the account value, you may find that's a short calculation that gets you exactly where you should be.

This example is a quick calculation with an initial participation rate of 50%. It's similar to the other products except the participation rates are guaranteed at 50% for one year, whereas the other ones are guaranteed at 50% throughout and then 25% thereafter. Find the initial option cost at 4.52%, projected value of 4.77%, which, with a 50% participation rate, implies an index growth of 9.54%. Out of that you see where the index moves, and how the account values are projected by that. The application of surrender charges provides the surrender values.

If you go forward one year—I assume that volatility went down—the participation rate has jumped up to 55%. At that rate, the options cost about 4.55%, which leads into an index growth of 8.73%. Again, it gives you stream of account values and surrender values for your basic CARVM reserve calculation.

Finally, we consider an example of EDIM. The starting point is, for your at-issue reserve, to calculate a value consistent with one of the other methods, such as MVRM. You then interpolate from that point to the guarantee at the end of the term. This is the fixed guarantee that you get in the absence of any index-based benefits. The reserve is the combination of this interpolated value, which is your guaranteed reserve component, plus the present value of the intrinsic value of your options. The intrinsic value is the payoff that you would get at the end of the term based on the current level of index.

As an example, let's just say the reserve on an MVRM basis is 965. The end-of-term guarantee is the same one we've seen before, 1,013. From that we find out that's a 1.22% annual growth rate, and projecting at 1.22% produces the guaranteed reserve component year by year. The reserve would combine that guarantee component plus the discounted intrinsic value, which you would be discounting at the valuation rate.

Which method do you use? CARVM-UMV gives you precision of calculation. MVRM has a combination of simplicity and hedging flexibility. Simplicity is the most important component. It is probably more theoretical than real. The hedging flexibility simply comes from not having to satisfy hedged-as-required requirements from a regulatory viewpoint. However, if you use common sense as an actuary and financial manager, you'll probably want to have sufficient hedging in place, which probably exceeds the hedged-as-required requirement anyway. MVRM-BS is for annual reset ratchets. Lastly, EDIM provides the simplicity of calculation.

As you look at CARVM-UMV you'll see you need the values of many options in order to implement it. MVRM just needs a single option at any particular time. That's a lot easier and, in many cases, you could get this value from the dealer who sold you the option. This would be the dealers carrying value of the option. With MVRM-BS, if you have Black-Scholes calculation capability, you should have no difficulty with the calculation. Again, for EDIM, the simplest of all, at issue you need to know the market value of the hedging option in order to get things started. Once you've done that, you're on a glide path for simple calculations.

How do the reserves differ? Deep down you're not going to gain or lose much on your balance sheet by choosing one method over another. The EDIM may on the surface look like it gives you lower or higher reserves, but whatever variance there

is, is really balanced on the other side of the balance sheet. For MVRM-BS, reserves are generally lower, but this is analogous to what happens when you look at regular SPDAs where you have long versus short guarantees. An annual reset ratchet product is analogous to having an SPDA with a one-year heavy guarantee and a low, say, 3% subsequent guarantee.

Finally, for practical implications, the long-term EIA is like a fixed annuity with a long, significant guarantee; therefore, reserves are on the high side. If you have just the annual reset, then you can have softer reserves but softer guarantees to the customer. All methods project index-based benefits with current hedging costs. Because volatility is high, you'll find hedging costs are currently quite high and reserves are higher for given benefits. In any case, you are driven by the market situation.

Finally, under the market value methods you'll see reserves soften over years or get higher, but you'll also see the same thing on the asset side of the balance sheet. It's time for questions, and we will let Larry start with the question he wanted to ask before.

Mr. Larry M. Gorski: Donna, I think you spoke incorrectly on the annual ratchet product when you were talking about using over-the-counter options. I think you meant to say exchange traded.

Ms. Claire: Correct.

Mr. Gorski: Following up on that, you seemed to indicate that states were more willing to permit this type of product or in some cases require this type of design. Have there been any problems with states in terms of levels of long-term minimum participation rate guarantees?

Ms. Claire: There have been a few states that have questioned very low minimum rate guarantees. Actually California was the one that originally brought it up. New York wants the same guarantee all the way through. As I said, there's only one product approved in New York anyway, and that one has been withdrawn from the market. There are certain states that really don't like the fact that you can drop exceedingly low even though they permit it. This is similar to the SPDA with the guarantees of only 3%.

Mr. Abkemeier: Could I just make one comment? California has made a U-turn and is actually prohibiting guarantees. They're looking at it from the perspective of the solvency of the insurers. In their words, "You should not guarantee much if anything beyond whatever you're giving as a strong initial guarantee."

Mr. Gorski: Errol, regarding your comments on quarterly certifications, I think Noel's presentation on certifications is probably a more precise assessment of the certification. The question for Errol is, when you talked about the reinsurance of equity risk, I think you implied that states were willing to accept reinsurance treaties and recognize reserve credit for those treaties that only transfer the equity component as opposed to the fixed income component. I guess from my perspective that issue is not nearly as clear cut as you have indicated. I think it's still a significant open question with many regulators. You may want to comment on that.

Mr. Cramer: I agree with Larry. We don't reinsure our equity benefits. But it came up in the Academy task force, and it's in the report, which discusses this in more detail. But Larry is correct. Some states accept it, and some states don't. It's still an open issue.

Mr. Gorski: I have as a follow-up to another comment by Errol on your consistency of recognition of reserve changes and market values of option changes—the consistency issue. I think Illinois, and probably most states, would prefer the situation where you recognize the change in Type 2 reserves through income, including the change in the option value component, and issue a permitted practice letter to allow for the change in option values on the asset side to also be run through income. I think that's the preferred approach. For Noel, you may want to comment, or anyone can comment on the effective date of *Guideline ZZZ*, and the lack of any grandfathering of current practice. I think that may be a significant issue as the time period grows longer and longer, in terms of eventually adopting the guideline. But for you more specifically, Noel, for the MVRM-BS method I think you were using flat yield curves and flat implied volatility curves in order to determine the projected account values down the road. Is that a correct assessment?

Mr. Abkemeier: I indicated early that the rates should be walking up the interest and volatility curves.

Mr. Gorski: The actual rule specifies walking up the curves or down the curves.

Mr. Abkemeier: Right. In response to Larry's comment on the effective date. *ZZZ* is retroactive for all business, so if you already have business on the books, figure out how you're going to fit it into this.

Mr. Mark S. Nelson: Noel, I think you mentioned that most products today have a single dominant benefit. What type of product features might cause a product to not have a single dominant benefit?

Mr. Abkemeier: Some of those have been hypothesized. You could have some kind of benefits which at mid-stream become very strong, some kind of strange mid-stream vesting, which erodes over time. The reality is, if you look at all the products in the market, I don't think there is one that lacks a single dominant benefit. It would have to be some kind of Rube Goldberg type product to really contort things and create some loophole.

Mr. Gorski: When determining the single dominant benefit, the actuary and the regulator at least need to consider not only the actual product, but all the advertising and marketing materials that accompany the product. The determination of a single dominant benefit is obviously going to be a subjective decision, but that decision needs to be based on consideration of all relevant material, not just the policy form itself.

Mr. Donald A. Skokan: Under EDIM, what do you do if you take some of the simplifying assumptions away from the examples that are typically used? For example, when partial withdrawals occur, it's not clear to me how the reserve calculation should reflect someone after a year taking one-third of his or her contract value out in a partial withdrawal. What happens to the initial calculation? Is it to be redone under the original assumptions, or under current assumptions? How is the projected value at the end of the term determined at that point, with or without the partial withdrawal? What about other nonelective benefits? Nursing home riders, for example, are implicitly a part of the MVRM or CARVM-UMV calculation for the initial reserve, but it's not as clear to me how they get reflected in the projected value calculation. Can somebody comment on both of those questions?

Mr. Abkemeier: Good tough question. On the partial withdrawals, I don't believe the answer is to go back and do your calculation from scratch. Rather, take your point in scale and do some scaling down at that point. As to the other benefits, such as a nursing home waiver, that is not addressed well in ZZZ, unless Larry has some comment on it.

Ms. Claire: Use your best judgment with all nonelective benefits. It's similar to death benefits, a year later some people have died and some haven't. If you believe in your nursing home benefit, in terms of the tables that are underlying it, it can be continued. However, if your experience is way out, you should recalculate the additional reserves. On the partial withdrawals, I do want to emphasize that under CARVM you do have to calculate the worst possible path. What Noel presented is not simple. You really do have to look at what is the worst possible path to find the greatest present value.

Mr. Skokan: On CARVM-UMV, is there any reason or requirement that one should develop streams that go beyond the current term?

Mr. Abkemeier: I guess the answer is no. It is going through the term and is stopping at that point. It's cut there.

Ms. Claire: Be careful. You may somehow wind up with a value that can be higher after the current term.

Mr. Skokan: I understand that some weirdness can exist in certain products, and I've seen a few of those. But is there any reason to develop another term to lay on another seven years and do another evaluation for some reason? I didn't see any existing requirements, but I also didn't see as much language against it either for CARVM-UMV.

Mr. Abkemeier: Unless the participation rate or other guarantees beyond the current term are significant, the answer is no. The calculation was cut off at the end of the term. But if there are some significant contractual guarantees, they must be reflected in the current calculation.