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Session 21PD
Variable Annuity Riders: Pricing and Risk Considerations in Today's Market Environment

Track: Product Development

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Summary: This session provides an update on variable annuity (VA) riders, including guaranteed minimum death benefits (GMDBs), guaranteed minimum income benefits (GMIBs), guaranteed minimum accumulation benefits (GMABs) and guaranteed minimum withdrawal benefits (GMWBs). Discussions include pricing and risk considerations, as well as the current market environment. Attendees gain a better understanding of the shifting market appetite for these riders, considerations in design and pricing for analyzing risk and financial reporting and reserving requirements.

MR. ROBERT P. STONE: Today we have with us, Ari Lindner from the Ace Tempest Re in Bermuda and Tim Hill from Milliman USA in Chicago. I believe Tim will start us off and then Ari will speak, followed by some more of Tim.

MR. TIMOTHY E. HILL: I will talk a little bit about what's going on in the market, what's hot, what's not in the variable annuity (VA) market. Ari will talk about product design and pricing, and then I will come back and talk a little bit about the regulatory environment, what's going on there.

So to get started, what's going on in the market? If you're in the VA market, you're not going to hear a whole lot that you don't already know. Profitability has been hurt by shrunken asset values. That's probably an understatement. When all of your revenue is driven based on asset values through mortality and expense (M&E) charges and when the market goes down by as much as it has, that will hurt your incomes. One of the biggest places in which companies are seeing this is in

Note: The chart(s) referred to in the text can be found at the end of the manuscript.

deferred acquisition cost (DAC) write-offs. Other sessions will address what's going on as far as DAC write-offs in VA products. Basically what's starting to happen is, because you have a much smaller base of business when you do your gross profit projections, you're not coming up with quite as many profits. So, you're looking at some DAC write-offs, and some companies have had to take some fairly decent-sized DAC write-offs recently.

Commissions are not the place where companies are typically trying to make up for some of this lost profitability. Everybody is still trying to grow top-line growth. They have sales targets for 2003 that they still want to achieve if they can, and they know that if there's a significant drop in commissions, they won't achieve those sales targets.

Revenue sharing, it seems, is more important than ever. We see higher and higher numbers coming up as far as revenue sharing is concerned. It used to be that 25 basis points were good; the biggest companies were getting more like 40 or 50. Now it seems that we see numbers as high as 65 basis points for revenue sharing. If a product has a return on assets (ROA) in the 20-basis-point range, now—some companies are pricing for that—all that profitability is coming through revenue sharing. So it seems that's even more important than ever.

A couple of other things that are going on include ratings agency downgrades. There have been a couple of pretty decent downgrades. A lot of this was driven by DAC unlocking and profitability concerns—stability of profitability, to be more specific—and then also the guaranteed benefits that are embedded in a lot of the products, the GMDBs and the other things that we'll talk about more today. Last, there have been some mergers and acquisitions; a few pretty good-sized ones. In most cases, it seems like it was companies that were a little short on capital and just needed to be purchased by a larger company.

Other items: just in the VA market in general, we've experienced the removal of short-duration fixed accounts. You don't see many one-year market value adjusted (MVA) accounts anymore. Interest rates are just so low that many companies have removed those short-duration fixed accounts. An issue that a lot of companies are dealing with is negative returns on money market funds. After all of your M&E charges and charges for various benefits, your money market could very well be giving a negative return. Will you really do that, or will you adjust your charges somehow to try to make sure that they're at least zero in the money market?

The L share products are the more recent product design. These typically have moderate upfront commissions, five to six percent, with a fairly sizable tail, oftentimes starting after a very short surrender charge period. That's maybe four or five years on the longer end, but it's not a four, three, two, one surrender charge. It starts at a higher point—eight, seven, six, five and then zero is what we often see for these L share-type products, and they seem to be one of the hotter areas of product development.

New fund choices: there are more fund choices being added all the time, but it's at a much slower pace than it was two years ago, when everybody was going from 20 subaccounts to 50 subaccounts. Now they may be removing a couple and adding a couple, but that activity has slowed way down.

GMDBs: What's going on with the riders that are being put on VAs? I'd say the general sentiment is that there's a scaling back; companies are trying to reel in some of the generous GMDBs that they've put on in the past. Many companies are just deciding they're not offering certain benefits, that they've had a six-percent roll-up in the past, and they've just said, "We're not going to offer that product anymore." Or, they have brought it down to a five-percent roll-up. They're just basically bringing back the benefits, scaling them down a little bit.

Some companies have decided basically to get out of everything except return of premiums. They've even removed their maximum-anniversary-value GMDBs and have just basically decided to get out of the GMDB market.

There are increased charges for these benefits if they are going to stick around. It's not uncommon to see benefits that were 15 to 30 basis points a year ago now being written for 30 to 60 basis points, a significant increase in charges to try to help pay for some of the potential risk-based capital (RBC) implications that are coming up and, I think to a certain extent, just to discourage some purchases. They're not trying to push these products as much as they have, so why not charge a little bit more? If people don't buy it, then they're not all that disappointed.

I'd like to say a little more about GMDB dollar-for-dollar partial withdrawals. Many companies have a fair amount of dollar-for-dollar partial withdrawal of GMDB inforce. For those of you who aren't familiar with this, basically what this means is that if somebody were to take a partial withdrawal, the death benefit would be reduced on a dollar-for-dollar basis. If I took out $1,000 and my death benefit was $100,000 and my account value was down at $50,000, my death benefit would become $99,000 and my account value would be $49,000. That's what we call dollar-for-dollar partial withdrawals. In contrast, for pro rata partial withdrawals, a $1,000 partial withdrawal, with a $50,000 account value, would result in a $2,000 reduction to the death benefit. So it's proportional reduction versus dollar-for-dollar.

We don't see these nearly as often, and there are some reasons for that. If we do see them, they seem to be capped at a roll-up percent. So a fair number of products have that you can take dollar-for-dollar partials up to five percent, if it's a five-percent roll-up product. Basically, you can take your increase for the year on a dollar-for-dollar basis, but that's all.

Many companies are looking at their inforce and are concerned with their exposure to these dollar-for-dollar partials. A large part of the reason for that is *The Wall Street Journal* article that came out six or seven months ago that showed in a little

chart exactly how you could break up your VA into two pieces and essentially arbitrage the dollar-for-dollar withdrawal benefit. That attracted a lot of people's attention. It was on the front page of the business section of *The Wall Street Journal*, and it just laid it out for you right there.

It turns out, though, that many companies are monitoring this activity to see if it really will be a source of abuse. I think the general sentiment is that no, they haven't seen a lot of this type of activity in which somebody essentially drains his entire account value, leaving $1,000 in there and still having a very high death benefit, and then transferring that money over to another product. They're just not seeing it actually happen, so that's good news from a producer standpoint.

The other item with dollar-for-dollar partial withdrawals is that New York has taken a stance on reserving—or at least there are discussions occurring about reserving. Many companies, when they do reserves for these products in the AG 33, AG 34 standard, are not really assuming that one of the streams of cash flow is full utilization of this dollar-for-dollar partial withdrawal. They're saying, "That's not really going to happen. We haven't seen that in the past. We'll assume historic-type levels of partial withdrawals, but we won't do the worst possible cash-flow-type projections and assume full utilization of the dollar-for-dollar partial."

But New York and a few other states are saying, "Well, why aren't you?" AG 33 and AG 34 say to look at every possible stream of cash flow and take the greatest present value, period. If that were to be adopted or taken up by many more states, it would have a pretty significant impact on reserves for companies that have a large amount of dollar-for-dollar partial withdrawal GMDB on their books. So that's something to watch. There are a variety of conference calls occurring to discuss the topic.

Another death benefit out there is the earnings enhancement benefit (EEB). This is the pay-your-taxes-type of death benefit in which 40% of the gain is paid as a death benefit at the time of death. These benefits were the hottest thing out there a couple of years ago, but they've moved to the back burner now. A big reason for that is that people aren't typically worried about large taxable gains. They're worried about having any gains. So the concern is just not there as much. They still are out there, and I think that they were in the infancy of their product life when the market really tanked. I think that the next time the market starts back up again we'll see a resurgence in these benefits, and they'll be right back out there as one of the hot things.

Kind of a compliment to these EEBs are living EEBs as a category, where you would get some type of a benefit based on your gain for certain living events, either annuitizations or taking partial withdrawals or other kinds of living events. These are non-death-benefit-type products. I think that will become a source for more product development in the future. One company has a product that is similar to that, and some others are definitely thinking about it. Probably the next time the

market is in a bull market again, we'll see some more of these living EEBs coming around.

As for GMIBs, many companies have just pulled these from the market. They said, "We don't want to be in the GMIB market anymore. We're just going to stop selling these." We also oftentimes have seen some fairly substantial increases in charges. Twenty-five basis points are not out of the question. That's going from 30 to 40 basis points up to a 50-, 60- or 70-basis-point charge for these GMIBs.

Some carriers have provided a small enhancement with these charge increases. A small enhancement is the key there. They're offering a token additional benefit so that they can justify a higher charge, but mostly the higher charge is for the risk associated with the product and the potential for much higher capital requirements. Again, we'll talk about the RBC implications later.

We've also seen a fair amount of product restructuring. A producer who wants to sell a GMIB will have to take a lower commission for that product. So instead of a seven-percent commission, they'll have to take a 3.5% commission. That's how companies are trying to offset some of the benefit, by taking it away from the producers. But it could be that if the producers are getting a lot of sales from that GMIB, it might be worth it to take that commission cut.

We also have seen a fair amount of lowering of the roll-up rates. You don't see the six-percent roll-ups as much. It's five percent and then oftentimes they've pulled that roll-up benefit. They are only going to offer a maximum-anniversary-value-type GMIB. That seems to be another approach.

Turning to GMABs, there are only a handful of these out in the market. It seemed that in late 2001 and in 2002, we were getting a lot of calls saying, "We'd like to do a GMAB. Can you help us price out some of these benefits?" Oftentimes it seemed that the charge we would be showing, based on our stochastic modeling, would be higher than what they really thought the market would bear. There are a couple of companies out there that have a fairly low charge for these benefits. They just didn't think that they could compete with those benefits unless they could be in that charge range.

There are also some implications with Financial Accounting Standard (FAS) 133 in hedging for these benefits. Some of the early GMABs restricted you to only a Standard & Poor's (S&P) 500-type subaccount. A lot of companies don't want to do that anymore. They wanted to allow any subaccounts, but then you have some real hedging problems. If they can choose any subaccounts they want and move their money around, what's the appropriate hedge to have for that business? Then also, FAS 133 says that with GMABs, you're selling a put option, and you have to mark that option to market. If you wanted to go naked on one of these benefits and take the risk, there were some fairly substantial FAS 133 implications.

A new type of GMAB that has come out offers a dynamic asset allocation strategy. What I mean by this is that there is some kind of forced asset allocation underlying the product. It will automatically move money from the variable subaccounts to the fixed subaccounts on a daily, monthly or weekly basis, whatever the company has defined as their formula. Basically, what the companies do is kind of a built-in delta hedging or contingent immunization-type strategies. Portfolio insurance is another name for it. If the market goes down, more and more money goes over to the fixed side. As the market goes back up, money can filter back to the variable side. But the goal would be that at the end of a seven-year or 10-year period, you would have at least your principal back. It's a GMAB, but one in which the customer gives up upside potential in order to have this same guarantee. So it's a way to offer a GMAB without having near the risk of just simply guaranteeing the account value.

Another type of offshoot to these products is principal guaranteed funds. Now these are a different type of subaccount. They typically have some kind of an offering period, a three-month period in which money going into it will just accumulate at interest. Then, from the kickoff date to let's say a five-year time horizon, the fund has the goal of at least getting back to the starting asset value by the end of the five years. Essentially within the fund, they'll do delta hedging or portfolio insurance or whatever their specific hedging type of activity is. They'll be moving money from the fixed account to the variable account and back.

These funds have become more popular. There was about $3 billion in these funds at the end of 2002, 95% of that with a single company. There are a few other companies that have these funds among their offerings. It's a way to offer the same type of return of premium guarantee—maybe guarantee is a little strong—return of premium targets with these types of subaccounts without the insurance company having to take on quite as much risk. It also might be a way to get around some of the regulatory requirements, such as Actuarial Guideline 39, which I'll talk about a little later, and RBC C3 Phase 2.

Guaranteed payout annuity floors—these are immediate annuities, immediate VAs, to be more specific. This guarantees that if you bought the product—let's say that your first payment was $1,000—and it will fluctuate with the market, but they're going to guarantee that it'll never be lower than $900 per month. So that's the kind of structure that you would see in one of these types of products. Again, there are only a handful of these in the market. The immediate annuity market just has not blossomed quite enough to really spur a lot of activity for these types of products. Many companies have really tried to get people to look at the immediate annuity side. But the sales just haven't been there yet, so these benefits just aren't all that prevalent.

There are some innovative ways that companies are paying for this. They're not just saying, "If your benefit should have been $800 for this month and we guaranteed $900, we're just going to top it off with $100." They're saying, "We'll give you the $900, but we'll spread it out over time. We'll give you either longer or

shorter period-certains." So if the payments are for life, and you have a 10-year period-certain, let's say you're in a situation in which the calculated payment would only be $800 and the guaranteed payment is $900. What they might do is shorten that period-certain so that you would still have the $900 payment. But going forward, you would have a shorter period-certain. Or if it was above a certain target, you could lengthen the period-certain. So there are some creative ways the companies are avoiding just having to pay for these benefits right out of pocket.

The GMWB is the next topic, and this is definitely the hottest topic that we're seeing these days. We get a lot of calls for information on GMWBs and wanting to price GMWBs. There are about six of these in the market right now. One of them has been around for several years. Other companies see this as a way to provide some kind of a living benefit without as much risk as some of the others. There's a handful more that are in the filing stage right now, and there are probably six to 12 more that are being looked at and priced and will presumably be filed within the next few months.

This particular benefit, in case you're not familiar with it, guarantees a periodic withdrawal amount. The typical structure would be a seven-percent-of-premium–partial-withdrawal guarantee. So, if I have $100,000 of premium, I'm guaranteeing the customer that he can take out $7,000 per year until the premium is all gone. If you do that math, that takes about 14.3 years to pull out all of that money. But that's essentially what the guarantee is. The withdrawals, though, are elective. They don't have to take them in any specific years. They can not take any and then take some later, start and restart, and stop. Oftentimes there are also some resets that would adjust the benefit upward if no partials were taken or if the market did better than expected. Sometimes the benefit can be reset at a higher point.

In my opinion, there are two ways that this benefit could be sold. It's either a return of premium, but you must take it over a long period—namely 14 years. Or it can be seen as an income plan and sold to people who are looking to get money out. They see this $7,000 for the next 14 years and they say, "I'll take that." They still have upside potential, but it could be sold to people who are looking to actually take their money out in the form of income.

The issues we're seeing with these benefits are some type of a waiting period, such as a five-year waiting period—no partials in the first five years, and then you can start taking these seven-percent-of-premium-type partials. Or maybe they phrase it as, if you don't take any for the first five years, then you'll get 10% of premium partials until the premiums are all gone versus the seven percent. They'll offer a little higher benefit if you wait to take some of the payments. Then, we've seen a few higher payout percentages, so not the seven percent, but 10 percent or even higher than that.

That is where I am going to stop and bring Ari up here to talk a little bit about pricing.

MR. ARI JOSEPH LINDNER: Thanks, Tim. I'm Ari Lindner. I will start today by talking about the design and pricing of VA riders, what's been going on. We just heard about the interest in the market. My goal is to talk a little bit about the considerations when you're talking about design and pricing of VA riders, important things to consider.

I want to talk about design and pricing from a risk management context. As a reinsurer, I don't have a good insight into the marketing reasons you should have all these benefits. Some product actuaries may or may not have a good feeling for why the marketers want to have them. So my goal is to talk about the risk inherent in the design and the pricing implications. I will finish up with a few conclusions, mostly geared toward the pricing and product actuaries.

And I want to talk a little bit about GMWB because, as Tim mentioned, that is the hottest topic. As some of you may know already, I have some strong feelings about GMWB, which I will share with the rest of you.

When you start to think about the VA riders and how you will design them, the way I like to think of it is that you have point-of-sale risks and then you have some after-sale risks that you need to think about when you put your rider together. The age of the population, obviously, for death benefits—but also for living benefits—is a consideration. For those of you who are aware of Allmerica's problems, they primarily stem from a significantly older age population than the average company, so it is a consideration when you design it. The health of the population may be a consideration. People who have one foot in the grave may not be the best population to be selling to.

You do want to consider the male-female split, although there is not much you can do about it in designing the rider. But it is something to think about; it is a risk. What do you do with joint annuitants? Do you pay on first to die, or how is that dealt with? There are also policy-size and asset-concentration considerations. Is there a policy size too big to write? Is there a policy size too small? If you write a $1,000 policy, is it worth it for your administrative costs?

Asset allocation is a key thing that's coming in now. Today we're seeing a lot of companies have asset allocations that are significantly more in the fixed accounts and the fixed income than they have been in the past. It wasn't that long ago that 90% equities was a very common mix for many companies, with many of the policyholders going 100%. That's not happening these days for obvious reasons. But is that temporary? Will it turn itself around? It will vary from company to company, distribution system to distribution system.

What is the take rate of this enhanced benefit you will write? I guess that's sort of point-of-sale risk. How many people will take these options? I think Tim mentioned the increased charges on some options, and one of the possible goals may be to reduce the take rate. But it's something to consider. More than a few companies

may have an enhanced benefit that they're very excited about, but that doesn't take off for some reason. It doesn't really justify all the work they did developing it. Other companies have the opposite problem. They have a benefit that they're not all that excited about. But they want to roll it out to be competitive, and it ends up with a 40% take rate when they hoped it would be more like five percent.

And then, of course, the last one, which is kind of a throwaway—the model pricing risk. That, I think, is a key. Everybody talks about it. Everybody mentions it. But what's really gone into the model and the pricing of the rider? What's gone into the design, and what may you have left out? Has it been peer-reviewed? Has everybody taken a look at it? Have some people from maybe a non-actuarial perspective taken a look at it to see what it is that you might be missing?

After-sale risks include the obvious investment return volatility. I include interest-rate risk. Obviously interest-rate risk is a big deal if you'll be hedging. That's also true from the standpoint of GMIBs—they have significant interest rate risk associated with them. Mortality for obvious reasons, lapse and annuitization—I put those together because for death benefit risks, particularly lapse and annuitization, it kind of counts as the same thing. It's people leaving without dying, so you don't have to pay. Asset transfer is an issue, again with hedging and some other questions. Will people move their money around a lot? Statistics show they don't, but then again, companies have put in limits in some of their contracts of how many times a year you can be moving your money. And if you price your product today, based on the fact that 40% or 50% of the money is going into a fixed account, what happens two years from now when everybody moves into equities because the market takes off again? Are you still priced adequately? It's too late to change.

Then there is anti-selection. Will unhealthy people be more likely to take enhanced death benefits? It's a possibility, something you should be tracking, something you should be thinking about and looking at as things move forward. The last two are legal/regulatory and accounting. Again, these are risks that a lot of times in our actuarial towers we may not think about that carefully. If there's a change in the tax law, how does it affect your EEB? It's designed to pay off the taxes on death. If the tax law changes, will that still be as interesting to policyholders to have? There are legal risks obviously. There is market conduct and some other things that go in there and then accounting risks. The accounting for things is still relatively undefined. We do have current reserving requirements that Tim will talk about later—Guidelines 34 and 39. Guideline 39 is temporary; 34 may change. The RBC is not well defined yet. So you have the risk when you put out a product today you don't know what the reserving and RBC requirements will be tomorrow. Will it be profitable or as profitable as you think it might be?

I wanted to spend a little time on risks that are more inherent, or magnified, in the living benefits. Obviously the main one for GMIB is utilization, annuitization—how many people will take it, when and under what circumstances? Everybody has a

different opinion. I think all eyes will be on Equitable next year as their first GMIBs with seven-year wait come due. They are in the money. There's no question about it. Will people take it and to what extent will they take it?

Interest rate is a huge risk. A low-interest-rate environment gets close to or in some cases may be under your guarantee, as a possibility. What does that do to the claim versus a high-interest-rate environment in which the claim amounts are much less? Longevity—I have the luxury of not having to worry about that. As a reinsurer, I pay you on a net settle basis, but you pay on a monthly basis. So if 10 years from now there's a remarkable change in the health-care system and people are living to 200, you have problems with the GMIBs. You will have to pay these people based on the guaranteed mortality built into your prospectus for a lot of years that you didn't anticipate.

Magnified risks that are also in the death benefit—but I think are more important in the living benefits or in the GMIB—are the model and the pricing risks. Clearly this is a more catastrophic risk than most VA death benefit risks. It's more of a low-frequency, high-severity risk than the death benefits are, so there is more of a chance to make an error. There are also a lot more moving pieces, especially with utilization and interest rates. Persistency—and here in persistency, I include mortality for the same reason that I included annuitization with persistency for the death benefits—for living benefits—if you die, it's the same as a lapse because you don't have to pay the GMIB. People are leaving without making a claim.

Anti-selection is an issue. Again, there are one, possibly two companies that made the mistake of throwing out GMIBs with dollar-for-dollar withdrawals and found that to be a pretty big mistake. Whether people will really utilize that or not, I don't know. But I do know that creating free life insurance for yourself, which is what you can do with the death benefit, is not nearly as attractive as creating free money, which is what you can do with a GMIB. And again, legal and regulatory risk—here, I'm talking both about statutory, GAAP and RBC issues, as well as market conduct and whether these were sold appropriately. Do people understand what they were buying? I think this is a big question in everybody's mind. Well, we're kind of crossing our fingers on that one.

With the GMWB, a big question will be: How many people will use this? How many people will take the seven percent every year? How many people will wait? Will people pay for a benefit they won't use? What will the asset allocation be? That's a huge risk for GMABs and GMWBs, more so than for the other benefits. If everybody put some money into the Tech Fund in March of 2000, you have huge problems today.

I'll get to this third point later, short-term investment return and volatility. It doesn't affect the GMAB as much, but for the GMWB, my opinion is that what you really guaranteed is the market returns for the next three years. How comfortable are you with that guarantee?

Again, model and pricing risk can be huge. Anybody who makes it to 10 years on the GMAB is getting paid. Again, there are even higher severity and lower frequency potentially than with the GMIB, so there's more of a chance to make errors. Persistency, mortality and anti-selection are concerns for sure—anti-selection in the case of lapses. For death benefits and income benefits, you may argue differently, but for GMAB if you're eight years into a 10-year guarantee, and you're underwater, why would you lapse the policy? I just don't see that happening, so you have to make sure that you've accounted for that appropriately in the design and the pricing and again, also for regulatory and accounting risk.

So what can you do about it? What can you do about all these risks that I talked about as opposed to hide in the ground and hope they go away? You have issue-age limits, which most companies do have. Again, this is a key and at the top of the presentation, when we said wouldn't you prefer to avoid making a mess than to clean one up—the design of the product is the way to avoid making a mess. The design of the product is the way to limit the risk that you take in. You don't have to manage it if you don't take it in, and that's something that I hit on a lot. People are calling Tim for help, calling me for help. You don't have to pay for or worry about a risk that you didn't take on in the first place.

Issue-age limits are key for death benefits. Attained age limits are key, so you have required annuitization age. A lot of times it's the later of 85 or 10 years or something along those lines, but kick those people out. If everybody in a death benefit were under 60, it wouldn't cost anything. It's the 60s and 70s and 80s. That's where the risk is. That's where the money is. That's where the reserves are, and the claims. Most companies do have benefit limits, caps on their GMDB value, caps on the EEB value, freezing the benefit at a certain age. Again, these are all ways of just putting limits and caps and controls around the risk before it comes in the door.

Policy size limits, we talked about. The accumulation of risk—if you have one guy with a $50 million dollar policy and 1,000 guys with $50,000 policies, how exposed are you to that type of risk? Most companies do have limits—$1 million or $3 million. It varies from company to company. But every once in awhile somebody will come along with $20 million, and say, "I want a GMIB," and you have to make a decision on whether or not it makes sense to take that in.

For joint policies, a decision has to be made when you design this rider on whether you will pay last-to-die or first-to-die, and you have to make sure that that's priced appropriately.

Tim talked about dollar-for-dollar reductions versus proportional. The only thing I can add to that, in terms of the dollar-for-dollar, is how do you quantify that risk? As actuaries, that's where we come in. We're supposed to be quantifying the risk. How do you quantify the risk with dollar-to-dollar benefit? The Guideline 33 suggestion that we should assume that everybody utilizes it probably is a little

harsh. On the other hand, if you have two policies side by side, and one had a dollar-for-dollar and one didn't, shouldn't the option that you've given that policyholder be valued at something?

Policyholder reset options are the same thing. I'm talking about my opinion. This may not be everybody's. Policyholder reset options involve giving policyholders the ability or the right to reset the guarantees. You see these on GMWBs. You saw them on GMABs and the Canadian seg fund market. You do see them occasionally. What is your risk of that? How do you quantify that? How do you underwrite that risk? How do you define it? It's not easy, and you could argue that there may be many different answers.

Another topic I hear about with some regularity involves ratchets more frequently than annual. "Gee, I'd love to have a monthly, weekly or daily ratchet to be bigger and better than everybody else in the market." There are some now that are daily, but they only ratchet whenever the account value reaches, let's say, 10% above the last time your policy ratcheted.

Here again, it's not really a quantifiable risk so much. It depends on the fineness of your model. If you're modeling on a daily basis, more power to you. I know we're not. And one of the sort of subjective and nonquantifiable issues is when you write these things, you have some diversification across time. Not every policyholder bought a policy in March of 2000, when the S&P was at 1,500. If they did, they'd all be 40% underwater. But they're not, so when your management comes to you and says, "What's the deal? Why would anybody be crazy enough to write these annual ratchet policies?" Well now, wait a minute. There are guys with October ratchets that may have ratcheted the S&P at 1,350, and there are other guys with March ratchets that may ratchet at 1,500. They're both underwater, but there are certainly very different characteristics. You have this sense that there is some diversification across time, that not everybody is buying into the market at the same time. This kind of gets rid of that. If everybody is ratcheting at the same time—everybody has S&P 1,500 or everybody has NASDAQ 5,000—you don't have that comfort.

Another thing that you're starting to hear about a little bit is that companies are thinking about starting to charge their death benefit riders based on cost of insurance (COI) to pass the equity-market risk back to the policyholder. You don't have to manage it if you don't bring it in, right? I think there's only so far you can go with this. I don't object to it at all. I think it's a fine plan. My concern is the day that the 85-year-old gets a statement that shows he's had to pay 500 basis points that year for his death benefit—how are you going to answer that question? He's in the money and you can take the COIs out, but pretty soon, it's a pretty huge chunk out of his account.

You see waiting periods in the rider designs on the GMIBs. Many companies are charging off the benefit base, as opposed to the account value, which prevents

them from having a situation in which their premium falls as the risk increases, which can be helpful.

Something a lot of companies don't consider is the choice they give their policyholders on annuitization of the GMIB. Many companies say life only or 10-year certain and life only, that's it. We like those companies. Other companies have other possibilities, 20-year certain and life, 30-year certain and life, or certain periods only. You're starting to get close to offering commutation. How will that affect your utilization? If a guy can take a 30-year certain in life, and he's 75 or 80 years old, that's essentially a 30-year certain. Then he can go get structured settlement. Now he can monetize the difference between his account and GMIB in a way he couldn't before when he had to give up liquidity for a life only or a 10-year certain in life. How should this ability to monetize the benefit affect your pricing?

Commissions on GMIB annuitization—again, it's just a way of controlling how many people will use it. Then, your guaranteed interest rate, guaranteed mortality table—we're starting to see companies put in age setbacks more frequently on the guaranteed mortality tables. It's sort of a sneaky way to reduce the risk without anybody actually finding out about it. Whether that's a good idea or not, I'm not going to say because I don't know.

Asset-allocation restrictions—you're starting to see that, as Tim mentioned, mostly on the GMABs. Companies are requiring their policyholders to have a certain amount in a fixed account or maintain a certain asset allocation. That can be very helpful—certainly an all-equity GMAB. My personal opinion is that in today's interest rate and volatility environment, a 10-year return of premium has to be 200 basis points, easy. Can you even write it? I don't know. If you have somebody put 50% of their money in a fixed account that's earning three to four percent for 10 years, now you have a different story.

Companies are bundling their benefits. We've seen more than one company in the last six months roll out benefits saying, "Okay, if you want an enhanced death benefit, you have to take it with an EEB." These are, to a certain degree, offsetting. I know earlier today in this room, we saw some graphs that suggested otherwise, but I would argue that it's very capital-efficient to bundle your death benefit with your EEB. The worst case cannot happen for both at the same time. Your CTE-90, when you go and you figure that out, is not going to be the same for both at the same time. So there is capital efficiency and, therefore, pricing efficiency to be gained by bundling these.

The last thing I want to comment on here is just about simplification. If you have three or four different death benefit choices, and a number of different EEB, GMIB, GMAB, GMWB, A share, B share, C share, L share, bonus, without bonus—how many choices are too many? I've had companies come to me and say, "I want these 64 different choices priced." I think you're starting to see companies that had gone fully unbundled starting to pull back a little bit. I think most of your sales

force probably doesn't offer all of these to their policyholders as such. They probably say, "Here are your three choices. You have your stripped-down; you have your middle-of-the-road; and you have your Cadillac." Again, I'm not as close to the marketing as you are, but that's certainly the way we see things coming in when they are sold. People have a lot of riders, a couple or none. There doesn't seem to be a tremendous amount of desire or need, certainly on the part of the people who are selling it, to have real true menu-style. It also complicates administration tremendously.

Now I've moved on from design to pricing. When you start pricing you need a bunch of assumptions. I know I need assumptions when I'm pricing your benefits, so I'm sure you do. What will the age distribution be? What will the average deposit be? What's your male/female split? Your tax-qualified percentage, how is that going to play out? Why does that matter? Required minimum distribution at age 70.5 will affect your lapses.

The retail fees drag on fund returns. If you increase your retail fees from 30 to 50, your benefit should cost more. The account value is losing more money every year automatically on an apples-to-apples basis. What's the surrender charge schedule? Again, it affects lapse behavior. Age and benefit limits—what are those? Will they be effective at capping off your risk? How will you put those in there?

What about the portfolio-return generator you're going to need in your pricing? You have to have a portfolio-return generator. Again, there are other sessions on how to generate your market returns, but suffice it to say, interest rates are key, asset class returns are key and correlations are key. If you are running a model with a nine-percent mean, a 16% standard deviation and normal distribution and are using that price, you may be leaving something out. You want to be aware that there are some things you may be missing if you oversimplify this.

For your mortality assumptions, do you include mortality improvements? Do you include them when you price long-term life business? Do you include them when you price your GMDB? I don't see why not. Mortalities are expected to improve. Throw something in for that.

Antiselective behavior—in today's market, which is down, who's more likely to lapse, young, healthy policyholders or old, sick policyholders? If you have an in-the-money death benefit, who is more likely to lapse? As people lapse, will the mortality of the remaining people get worse? It's the same as in the life insurance business.

Your lapse assumption—what will you do about that—make it a flat six percent every year? I don't think that anybody is doing that anymore. You may want to vary it by issue age. You may want to vary it by attained age. Again, the 70½ is a key age for tax-qualified policies. Sixty-five may be a key age. Seventy-five may be a key age. The duration of the policy based on a strategized schedule or any benefit

waiting periods—eight years into a 10-year GMAB or GMIB waiting period, you may want to take a good, hard look at the market performance, coordinate that with the benefit waiting period and duration of where you are and make a call on what the lapses will be.

You may want to look at multiple measures of market performance. Is it more important what happened in the market last year or in cumulative since the policy started? Well, on a GMAB, cumulative is more important in terms of whether or not they're in the money. Last year could have been great, or it could have been terrible, and they still may be way in or out of the money with respect to the benefit. And you may want to change your lapse assumption by benefit type. Again, eight years into a 10-year GMAB, somebody who is in the money will stick around, but on the death benefit, maybe not so much. Nobody is sitting around hoping, man, I hope I die and collect my death benefit. But they may be feeling differently on the living benefits.

So you hear all that. You put it on the model, and you have your return generator and all your assumptions and your benefit. You run that all through. Then what? What's the price? There are a lot of different names, ways of talking about it. But I think at the end it boils down to a return on capital. How much capital do you have to put into this, and what will your return be? There's not necessarily a right answer for that, but that's something that has to be the end result. The end result of this will be the amount of capital, and it boils back up to the shareholders. It's the amount of capital and what the return is. You set the capital at 90-CTE—Tim will talk about that in a minute. There are a lot of numbers and letters, but suffice it to say the RBC that's coming out looks like it will be 90-CTE which, for those of you who don't know, is the average of the worst 10% of scenarios. Your market return generators can be calibrated. It's a pretty volatile calibration if you look at how bad things can get.

Some companies are holding a lot of capital right now, and some companies aren't holding very much. When this thing comes down, where will you be, and how much more will you have to put? Or are you comfortable with where you are? And more importantly, is your management aware that this is going to happen?

Each benefit should be priced separately and together. Sometimes there are interactions that you may not have thought of. Death benefit-EEB is the obvious. There's an offset. For death benefit-GMIB, there is a mild offset. You can't collect on both. So price things separately, and price them together.

I don't want you to take this to the bank. I'm going to talk a little bit about pricing, the way I see it these days and the way the reinsurance market sees it. Return-of-premium death benefits have been killed by interest rates falling. Today's interest rate and volatility environment has increased the price of return-of-premium far more than any of the other benefits. We're looking today at roughly 20 to 30 basis points for return-of-premium death benefit. People will reinsure it for that price, so

I can't be too far off.

An annual ratchet in the good old days—who remembers 15 basis points for an annual ratchet? We're up in the 40s now. I'd say 40 to 50 is probably fair now. All of these will vary based on your age distribution, asset allocation and a lot of other things. But this is just a rough idea of what you can expect. A five-percent roll-up is more like 50 to 60. Your standard, everyday EEB, the standard benefit which is at 40% of growth, but 25% after a certain age, with a 100% cap—again, I think we're at 20 to 30. I'm looking at my pricing guide, and you can correct me if I'm wrong. And a five-percent roll-up GMIB, which we're continuing to look at—we'll say roughly 60 to 80. That's rough. But when you see companies increasing the charges, pulling back on benefits and things like that, these are the numbers they have in mind. These are the things that they're looking at because of the interest-rate environment, the volatility environment today. Offering a six-percent roll-up when the interest rate is six percent or seven percent is not nearly the same as offering a six-percent roll-up when the interest rate is three percent. You have to think about that.

And then the final thing I'll get into is the GMWB. Tim talked about the seven-percent withdrawal. I'll make an assumption when we do an example of a 35-basis-point charge, which I think is about what the main players are charging. I'll assume one policy at $100 with full utilization—the full $7 coming out every year (Chart 1). I picked a scenario straight out of our model. This is not the 99th percentile scenario. This is not a particularly bad scenario. Neither is it that far-fetched. Out of 15 years, for four years, the market goes down, and in three of those years, it's less than 10%. It's not so bad. For four years, the market goes up, but less than 10%. The arithmetic average over 15 years is more than six percent. It's not a great scenario, certainly, but it's not outside the realm of possibility. Your problem is right there—a 40% drop in Year Two. Is that that far-fetched? Well, a fall of 40% isn't far from that of the last three years in total.

The first column shows account value if no fees are being taken out and no withdrawals are being taken out. It's not a great result, but by the end of the 15th year, it's not too bad. Now again, I picked this out of our group of returns. It does happen to have obviously all the good returns coming in the later years, the years when for a GMWB it doesn't matter. But I'm using it to illustrate my point that a GMWB really guarantees early-year market performance. If you look at the second column, I only wanted to illustrate what the 2.5% fees that are taken out of the account value do to the account every year in a pretty bad market scenario. It's much worse when you get out to Year 10, Year 11, Year 12—20% to 30% less money. And then if you're taking out $7 every year, you run out of money around Year 12. Now you have a 14-year guarantee and run out of money in Year 12. That doesn't really sound all that bad. But look at your net present value at six percent of the claims. Here are the claims—$7 for two years, plus a little extra left over and something in Year 12. That's just about $10 on a $100 policy on a present value basis and not that bad a scenario.

So what will capital be for a GMWB? Again, this is my opinion, and these are my models. What will capital be, 15% of your volume? What's your return on capital at 35 basis points? Even if it's only 10%, will it be 3.5% plus whatever interest you're earning on capital? What does that make, seven percent?

My point here involves two things. One is that I don't think the guarantee is what it appears to be. It is not a long-term guarantee. I am not convinced that it is less risky than a GMAB. On the contrary, I think it's more risky, and it guarantees early-year market performance. If the market goes up 40% in the first couple of years, you're home free, with the possible exception of anybody who has put resets into their GMWB. Then it starts all over again. But barring that, you're home free after the first couple of years if market returns are good. If they're bad, I'll use another simple example.

Somebody wrote the policy in 2000. The S&P is down 40%. If they took out $7 a year for three years, they have $40 left out of $100—$40 taken out with the market falling and $20 by themselves. They're down to $40. Now the back-of-the-envelope calculations that I did in my hotel room this morning suggest that the market would have to return 15% a year forever in order for you not to lose money on that guy. So, if you wrote this policy three years ago, you are in big trouble. What will the reserve be? These are all the things you have to think about. And at the end of the day, the real question is: What is the return on capital on this? Your job is just to communicate that, and there may be perfectly valid reasons to write a six-percent return on capital benefit—more volume, competition. You make money on the M&Es. You make money in all kinds of ways that I don't. But I look at the benefit in isolation because that's how I make my money. Now I wrote the benefit in isolation, and so I make and lose my money. I put up capital towards this benefit by itself, and if I'm not earning an appropriate return on the capital, I can't write it, and we don't. The price and the structure in today's market are far from where I could even touch the benefit.

I want to talk a little bit about risk management. How many GMDB policyholders will take the dollar-for-dollar withdrawals? How many will GMIB annuitize? Will they stick around long enough to collect the GMAB? Will they use their GMWB benefits? Nobody really knows. What will the reserves be because even if nobody is going to do it, you may have a reserve issue between now and then?

Capital markets techniques, static versus dynamic hedging—there are a lot of pros and cons to all these risk management methods. I'll run through these quickly. There's significant capacity—no question about it—for options and a lot of stuff. You can go right out in the market and short futures and buy options. You can do it online in your own personal account. You can get unlimited risk coverage. If you buy a put on the S&P with the strike at 900, and the market goes to zero, you get paid $900. There are no limits. There is, however, significant basis risk. You have to make sure that you have all that lined up as appropriately as you can. Fortunately, most funds have a pretty high beta, but you have to consider that. Static hedging

will have an upfront payment involved if you're in options. It's not so much if you're in futures and not so much dynamic hedging. But that might be a consideration. Do you already have enough DAC problems without having an upfront payment for an option that you may or may not get enough money to pay off?

It will typically require a heavy investment of resources. In the session we had yesterday, it started to look like six or eight people are required at a minimum for a hedge shop. Does your company write enough business to justify hiring six to eight qualified people to run a hedge shop? A critical mass is required for this. If you're writing a $100 million or $200 million a year, you're a lot worse off if you do it wrong than maybe if you don't do it all. You might consider something else or getting some help.

Reinsurance is another option. It does limit the basis risk. There are limits. You can't get around it—or you can, but not with us. It is uniquely customizable. You can write in different caps and limits. You may want to make a play based on lapses. You think that for your GMIB, no more than 25% of your population will still be around 10 years later, and I think it's more because I'm at risk if it is more. But you don't care if it's more because you get more M&E if it is. We'll write that into the contract. If there are more than 25% of the people, I don't have to pay all the claims. You can't do that with options.

It doesn't require as many resources. It doesn't require a critical mass. However, there is a limited capacity and a limited number of reinsurance writers—and by limited, I mean one. And risk coverage will have limits.

This is a bit of a segue into the next section, although I do have some conclusions. People are starting to think a lot about the income statement volatility. Even if you have it all priced right and everything looks fine, management and analysts are not that excited about income statement volatility.

So here are some conclusions. If haven't made this point, I think I failed. Consider all the risk factors carefully during the product design phase. You have many things going on, a lot of different moving pieces and a lot of different moving parts. Think about them, and make sure you've considered them. Even if you plan to ignore them, know that they were there and put that somewhere. I chose to ignore the fact that I could get unhealthy policyholders. I could put in a waiting period before they received the death benefit to eliminate that antiselection possibility, but I chose not to do that because nobody does it and it's crazy. At least show that you considered it. You don't have to price, manage, hold reserves or capital, or worry about or get questioned by management, have analysts yell at you or get fired over risks that you then take on because of your product design. You can choose a design with fewer limits and restrictions or with more advantages and options for the policyholder, but the charge must be appropriate for the risk. There's just no getting around it.

Product design should be a key element in your risk management strategy. It goes

right back to not having to manage the risk you don't take in. That should be coordinated with any hedging or reinsurance you plan to do. Product design needs to be a key element in that. Hedging or reinsurance is available with advantages and disadvantages. You should be modeling, to the extent possible, the financial statement impact of your product design and your risk management strategy. Even if everything looks great and 10 years from now there's no chance you'll ever have to pay a claim, if you have to put up a huge reserve tomorrow, you may not be around to reap the benefits when you get 10 years from now and everything looks great.

Finally, your charge must be sufficient to provide adequate return on the capital that you put toward the risk. Disasters happen. The product actuary, if you'll allow me to get back on my soapbox for just a minute, is ultimately responsible for what? To ensure that the risk-return tradeoff and the expected return on capital are communicated to the decision makers. I can't tell you how many times I've talked to a product actuary who says, "I know we have a crummy benefit or the price is too low and the optionality is too high, but we had a fight with marketing and we lost." No you didn't. You're thinking about it the wrong way. You can't lose. You can make a recommendation, and the decision maker can choose to go another way. But your job is to put on the table in front of the decision makers all the tools that they need to make the decision. If they know that this thing can lose a ton of money and make the decision to go ahead anyway, your job is done. If they know that the expected return on capital is six percent and not 15%, and they do it anyway, your job is done. You did what you came to do. That's the only thing actuaries are here for—to quantify the risk, to talk about risks that are not quantifiable and to give examples of when they can hurt.

If it comes back and happens—and hurricanes happen and people cover all kinds of risks—and the management comes, they won't come after marketing. They'll come after you, and they'll want to know, "Why did we write this risk? Why didn't you tell me? Why is it out there? Why are we taking this beating in reserving? Why are we taking this beating from the analysts? Our share price is down because we wrote this risk. Why?" And you have two choices. You can either say, "Well, we just didn't think this could possibly happen. It was outside of the realm of our scenarios. We never thought those people would do this. We never thought *The Wall Street Journal* would publish an article on dollar-for-dollar withdrawals. We just never thought the market could go down, the NASDAQ could go down, 70% over three years. It couldn't possibly happen." That is not a good answer.

I'm not saying the other answer will make management any happier that you're losing a ton of money, but at least if you said, "Look, here are the options I laid out for you. We knew these were the risks going in. This is at the 95^{th}, 98^{th} or whatever percentile scenario. Things could get better. They could get worse. But this was not outside the realm of possibility of what we knew could happen." How can I get angry with you? How can I say you haven't done your job properly? You have to lay it all on the table. It's your responsibility. Management knows, the decision makers

know, the consequences of the actions they're going to take. That means a six-percent return on capital, and they will write it anyway, fine.

The other thing you need to communicate is the risk management implications. Will you be able to hedge it? Will you be able to reinsure it? Will you be able to unload it if you want to get out? Do you have an exit strategy? I can't tell you how many companies you see today that have gone through mergers and acquisitions and sales and have changed hands, but the VA block gets left behind. Why? Because it has these risks, and nobody knows what to do with them. That's the key, and that's what I wanted to leave you with is that that's your responsibility—communicating the implications and consequences to the decision maker of whatever action they choose to take. So, it's not that you lost the fight with management or lost the fight with marketing, but that management made a decision. Maybe you didn't agree with it, but at least you did what actuaries are here to do.

MR. HILL: Okay there are two things I want to talk about here, and we'll move fairly quickly. They are Actuarial Guideline 39 and then the new RBC C3 Phase 2. Actuarial Guideline 39 went into place late last year. So for those of you who have living benefits in your inforce, you presumably did something with Actuarial Guideline 39 at the end of the year. Basically, it's an interim reserving requirement that was put in place. The long-term vision for reserving is that it probably will follow along the same lines as the capital requirement, a lower CTE number, but that's the long-term target. This was put in place as something in the interim. If you have a living benefit, then you must be looking at Actuarial Guideline 39 and using it in your reserving. The reserve that you would calculate is the reserve for the VA without the guaranteed living benefit—so cash surrender value, AG 33-type reserving—with an AG 34 reserve for any kind of a death benefit, plus a retrospective accumulation of charges. So, if you're charging 40 basis points for your GMIB, you must accumulate those 40 basis points and that's held in addition to the base product essentially. However, you do have to test that accumulation in an asset-adequacy-testing-type structure.

Let's talk a little bit about some of the details of this retrospective accumulation of charges. Basically the accumulation is of the full charge if you're charging for the benefit. It's only on policies that are still in force, so if you have lapses, you don't have to have accumulation for those policies. It's only for the policies that are still in force and eligible for the benefit.

If you don't have explicit charge, if you just have a GMIB that comes along with the policy, then you have to impute a charge, and there are whole sections on questions and how you calculate this imputed charge. You can do it in a couple of different ways. You could look in the market and say, "It looks like people are charging 30 basis points for that." You could look at your pricing, take an 80th, 90th percentile, or something in that neighborhood, and that way double with an imputed charge.

The next question is: Is this accumulation done at an interest rate? Technically the guideline is written as just the sum of the charges collected, so that would imply that you don't do this accumulation with interest. Now that I have this big tub of money that I'm building up, how can I release these reserves? If the benefit is deep out of the money, can I let some of this go? That's not specified in the guideline. This was seen as being something just for the interim. It won't be around for a long time—hopefully just a few years—so, they weren't really all that concerned with releasing reserves at specific periods of time, except for if the policyholder is ineligible or they've lapsed.

Now let's talk a little bit about this stand-alone asset-adequacy analysis. Let's say my GMIB has been in force for three years, so I have three years' worth of 40-basis-point charges in a pot of money to back my GMIB. Is that enough for the risk associated with the product? Actuarial Guideline 39 says that you must do stand-alone asset adequacy testing. So you consider income, meaning charges for the benefits, investment income on reserves and any kind of reinsurance payments that you might be getting. The cash out—the expenses—are benefits paid, reinsurance premiums and taxes, essentially.

So you don't get to look at your whole policy as a whole. You must break out that GMIB, or whatever the living benefit is, on a stand-alone basis to see if this accumulation of charges is adequate. If you have a hedging strategy, you should obviously include those assets into the hedging strategy. It's basically cash-flow testing at this point. It's to say, "Yes, I have this pot of money, but is it adequate?"

In the few companies that I've talked to that have had to do this, the answer has generally been no, that it has not been adequate, that these benefits are deep in the money, that the 40 basis points that we've accumulated for three years are not adequate because our GMIB is so deep in the money. When we do our modeling, it says no. We really need to have more reserves than that. So people are having to beef up this reserve. I don't have a good feel for how much—double the accumulation is probably in the ballpark, maybe even higher than that. So, I don't know exactly who in the room had to do this testing, but if you determine that you needed more reserves, you're not alone.

Let's move on to RBC. I think this topic is a little more substantial and a little meatier. It's a very interesting topic right now.

The current RBC requirements for variable annuities there are pretty minimal. Except for the C3 piece—where there's one percent or two percent if you have a living benefit, based on whether it's in the money or not—you have a couple of trickles of RBC, and there really isn't a very substantial requirement. Most companies without the living benefit would price their product maybe assuming 50 basis points of capital for the product in doing their investment reserves (IR) calculations. So essentially you have a fairly low-capital-usage product, which was always the intent of variable annuities. There's not as much risk. The policyholder's

taking the risk, and so it's not that capital-intensive.

I want to touch a little bit on C3 Phase 1 because it gives a lot of insight as to what direction has been taken for C3 Phase 2. I assume a couple of you had to do C3 Phase 1 testing. This was meant for companies that had an inordinate or high amount of fixed annuities or single-premium life products in relationship to other life insurance. There are these calculations you had to do to see if you qualified for the testing. I think only a dozen or so companies actually have to do the testing. It's typically big annuity writers that have to do this type of testing.

The goal of this was to move away from this low, medium and high approach to much more of a modeling type, RBC-type calculation. Companies were expected to use their cash-flow testing model and 50 scenarios that were generated based on the Academy-provided scenario generator. Or they could use a smaller group of 12, and there were reasons for using one or the other. But basically, it was a more stochastic analysis than the typical New York 7-type cash flow testing. The calculation that had to be done was the worst present value of statutory surplus, so you were accumulating your statutory surplus and profits throughout the model. You picked the worst possible point of your statutory surplus on a present value basis, and that's the number that you pick up for each scenario. Then, based on that number, you took a 95th percentile, and that was kind of the structure of C3 Phase 1.

Now we move to C3 Phase 2. There are a lot of things that are following from Phase 1 basically. It is a stochastic-modeling-type exercise. This does apply to all variable annuities with a GMDB or living benefit, and that does include EEBs. So even if it's just a return-of-premium guarantee, this will apply to you. The model that you'll have to create is your entire inforce with guarantees. You'll be doing a large number of scenarios. When I say a large number of scenarios, 1,000 and 10,000 have been throw out as being the number of scenarios that you'll have to run. So we're talking absolutely gigantic models with all your inforce business and doing even 1,000 scenarios. That's huge.

I don't know how many of you have inforce models for your variable business, but it's my impression that a lot of companies don't build really rigorous inforce models for their business. When they're doing their plan, they've assumed seven- to eight-percent growth, and that's for budgeting and things like that. That's how they've treated their variable business. You haven't been building rigorous VA models in the past, and this is going to require some very rigorous models.

Calculation details are similar to the Phase 1. It's a profit retention model. You're looking to get your worst present value of surplus at some point in time along the model. You're discounting statutory surplus at after-tax, one-year Treasury rates. Why were one-year Treasury rates chosen? For one reason, it was assumed that if you use something like your actual asset investment strategy, then you have gains and losses on that. So then you have a whole other layer of risk. This was seen as a

conservative rate, kind of a risk-freeish rate. You won't have gains and losses that are going to accentuate your gains and losses on surplus.

For each scenario, you calculate this worse present value of statutory surplus. Once you have this for all of your scenarios, then you calculate this 90-CTE, contingent tail expectation, and then, as Ari showed us, the average of the worst 10th percentile. But you essentially zero out any scenarios that said you wouldn't need additional capital. So you're only looking at the scenario values that say you need to have additional capital. You're zeroing out all the rest, or you're taking the average of the worst 10%.

How will you set your assumptions for this? It's similar in spirit to cash-flow testing. Where you have good experience, use it. Where you don't have good experience, you need to be on the conservative side of your estimate. So I'd say just in general, that it's in the same spirit as cash-flow testing, and that's the way to think of how you'll set your assumptions for this modeling.

As far as the scenarios you'll use for this modeling, the Academy group will not come out with specific scenarios, saying that you have to use these. For those companies that don't have a generator or don't wish to develop one, they'll just provide a set of S&P 500 scenarios. What they are going to provide is calibration requirements. That means that you'll have to generate your scenarios, you'll have to look at the first, fifth and tenth durations, and your 99th percentile scenario will have to be at least as good as this calibration point. Your first percentile scenario will have to be at least as bad. That's how they'll govern some consistency across models, to make sure that people have conservative enough scenarios. This will only be done for the S&P 500. The rest of the subaccounts will have to follow general efficient-frontier-type guidelines, meaning that if there is more volatility, there can be a higher return; with less volatility, there has to be a lower mean return. But they're not going to come out and say that for small caps, you have to do this and for bond funds, you have to do this. It would just be impossible to try to encapsulate everything. A lot will be left up to the valuation actuary to determine for these benefits.

For interest rates with these models, you can use an arbitrage-free interest rate generator. Or if you just have GMDBs and you don't think interest rate risk is all that significant, you could just use the swap curve, forward rates implied by a swap curve—just a single set of interest rates to go along with your stochastically generated equity scenario. That's kind of a simplification of the model for those who don't think that interest rates are significant in their risk portfolio.

Let's take a look at a few sample values. My point in providing these values is not so much for you to say, "Okay, I need to go run my model to see if I get that same number," because these numbers depend on an awful lot of pieces. They depend on tail commissions, expenses, M&Es—all kinds of things will determine what this number is. This is more to show you a few sample values and, even more, so you

can see relationships between benefits, not necessarily as much the absolute value. I've done four different GMDBs: a return of premium, a five-percent roll-up, maximum anniversary and a greater of five-percent roll-up and a maximum anniversary. I've tried to model a middle-of-the-road product, nothing too fancy, with reasonable M&E charges—reasonably competitive charge—for these benefits.

The percent that I have on the table is percent of account value that this RBC calculation would give. Another caveat is that these are done in isolation, so I'm doing a single return-of-premium policy. I don't have any offsets between a variety of policies or anything like that, so this is kind of on the extreme end of values that you might see.

So for return-of-premium death benefit you see one-percent capital, going all the way up to almost five percent for a five-percent roll-up, back down significantly for a maximum anniversary benefit. The difference between the five-percent roll-up and the maximum anniversary, I think, is significant. Oftentimes we would think of those benefits as being fairly equivalent from a pricing standpoint. We charge approximately 20 to 25 basis points for either one of those. They're fairly similar at lower percentiles. But the big difference is the tail risk that goes along with the five-percent roll-up GMDB versus the maximum anniversary. It's a much lower frequency, but a much higher severity, and this 90-CTE, since it looks at the entire tail, really penalizes you for those high-severity, low-frequency events that other measures, such as just a 95th percentile or 83rd percentile or something like that, doesn't even consider. This looks at the entire tail, so it really penalizes roll-up benefits much more so than maximum-anniversary-type benefits.

There's a modeling subgroup of the C3 Phase 2 working group, and they sent out a memo the other day. They had some numbers in it, so I just wanted to show you how my numbers are different from theirs for the most part. In one calculation the modeling group had for the greater of the maximum anniversary and a five-percent roll-up about 30 basis points of account value for the RBC. This was at duration 3½ years into the policy. They did this calculation, zero percent in the money, and they came up with 30 basis points. What wasn't in what they sent out is something they sent out about a week prior to that. It showed that at time zero, that same benefit had about a one percent of the account value capital requirement.

I've tried to lay on the table some assumption differences, the big one being that I had 90% of the 1994 mortality table and they had 65%. That will be company-dependent. The difference there is fairly substantial. It turned my five percent into 3.66%.

The next item is that I have dynamic lapses, meaning that the more the benefit is in the money, the less likely people will be to lapse. They did their work with static lapses, fully intending, though, that they will do dynamic lapses. But all they've done so far is static lapses. That has a very large difference. That means that those really bad scenarios in which people not only die with big death benefits, but they

persist in dying with big death benefits, have a very big impact on the results. Then the last one is just a small discounting difference.

I just wanted to show you that my five-percent number versus their 30 basis points—which if you did it at time zero, would be more like one percent. It's not that different, based on these assumption differences.

One of the things that really varies the capital is "in-the-moneyness," which is kind of an obvious one. The deeper the benefit is in the money, you can see, the higher and higher the values get, as Ari already said. This is all S&P 500, by the way. So 40% in the money is not out of the question at all right now. So we were looking at an almost 15% capital requirement for these types of death benefits. This is effective on all inforce, retrospective, so there's really not much you can do about your inforce business right now, except for hedging or reinsurance or something like that. So this is going to be substantial.

If you had a GMIB with greater of five-percent roll-up and maximum account value (MAV), you can see what some of the numbers do. One of the things you can do to reduce this capital requirement is to incorporate asset-allocation constraints. Ari mentioned it a lot. Here are some indications of what it will do your capital requirement. A 100% equity allocation will generally result in a higher capital requirement than a 25% equity/75% bond allocation. But a 25% equity/75% bond allocation may not result in a higher capital requirement than a 100% bond allocation. The 100% bond actually can't keep up very well with the five-percent roll-up, so you may have a little higher capital requirement. So there's a very big difference, the more and more you can push people to the bond side.

What will a higher charge do? In my opinion, the higher charge is not always the best way to reduce your capital requirement because, as Ari said, the more charges you take out, the more you drag down your account value. And if you do have to pay benefits, you just have to give back all those charges because you have to pay it off to the guarantee. So in my opinion, higher charges are simply not necessarily the best way to reduce your capital. It does have an impact, but I don't think it's quite as substantial as some people would hope that it would be or think that it would be. A less generous product, obviously, will help—five percent versus a three-percent roll-up. That's a pretty substantial difference in capital. But again, I think the biggest thing is asset allocation. It's kind of a theme that's emerging here.

Other things that you can use include hedging strategies. If you plan to model hedging strategies, though, they have to be very well defined and approved by a board or whoever has to approve this. You can't just say, "My capital number came out pretty high, so I bet we'll do hedging in a few years. Therefore, I'll model that and reduce my capital." It must be something for which you've talked to whoever you need to talk to about. It's very well defined before you can have it in your model.

Reinsurance is something that would be included in your model. If you have reinsurance, you model it, and that would help to reduce your capital potentially. And then there's the maximum anniversary product that we talked about earlier. The roll-ups seem to be much more impacted by this type of RBC calculation than the maximum-anniversary benefits are.

The goal for having this capital requirement in effect is probably year-end 2004 now. Awhile back it was year-end 2003, but that will not happen. So year-end 2004 is the new goal.

There are also a number of outstanding items as far as interim reserves and modeling. Currently we're leaning more towards the cash-surrender-value-type approach, but should we be taking this 65 CTE-type reserving into account within the model? That has yet to be determined. There are final calibration criteria—what will the table look like? How conservative will it be? There are simplification methods. It looks like variable universal life, which was to be included initially in this requirement, will be excluded. I think that's the right decision. There is required documentation. And then there is just what will the regulators be looking for in these filings. So with that, let's move on to questions.

FROM THE FLOOR: I'm not a pricing actuary anymore, but it would seem for something like this that you'd want to price most of these benefits almost like an option, and then you keep some sort of option chart. Is that a common approach to its use—even to say, "Price it one time like an option and one time not, and then assume the option is not going to be exercised at the optimum moment. Then, land on an option/benefit cost in between the two"? I also have just one small comment. I see general use of IR, and the thing that always gives me a problem about them is the correlation of returns between bonds and equities. Over a decade it might be stable, and over another decade it might be stable. But one is positive, and the other one is negative and statistically significantly different. So with respect to the investment return modeling process, I almost always take a salt shaker with this.

MR. HILL: I'll try the pricing one. If you're talking about option pricing from a risk-free interest rate, implied volatility kind of standpoint, there is definitely some basis for that, and that would be the hedge cost for the benefit. If nothing else, that's the answer. That's what it would cost to hedge. It comes up with very high numbers, though, and companies don't like those numbers, for better or for worse. There is, in my opinion, some rationalization that the market is expected, over the long run, to do better than the 90-day, risk-free Treasury rate, so I think there is some evidence for historic-type pricing. But you do have to do some kind of risk management, and you will at some point have to do some hedging most likely. So it's good at least not to ignore an option-pricing-type approach completely. But it's definitely a challenge to do also.

MR. LINDNER: This has been an argument since time immemorial, between

historical and risk neutral. But if you do it right, you should get the same answer. The main difference is the risk-neutral approach. Because there's a lot of path dependency, and lapses and everything, my personal opinion is stochastic is the best way to go. You can do a stochastic with a risk-neutral approach, but then you want to take the expected value over your thousand scenarios. If you have historical approach, then you're concentrating more on like a 90-CTE-type of value. If you do it right, you should get the same answer, and the easy way to check is to use whatever model you're using for GMDBs to price options. It's not that hard. You just change mortality to one in Year One, and you have a one-year put option. It's not that complicated. Just check it against what you can get off Bloomberg. I'm not saying you should get exactly the same answer, but you should be in the ballpark. Given that you have to post capital at 90-CTE, and earn a return on that capital, that should get you to a number and, I've found actually, frequently a higher number than what the capital market charges. They don't have to post capital and earn 15% return on it and you do. So if you do it right, the numbers should be pretty close.

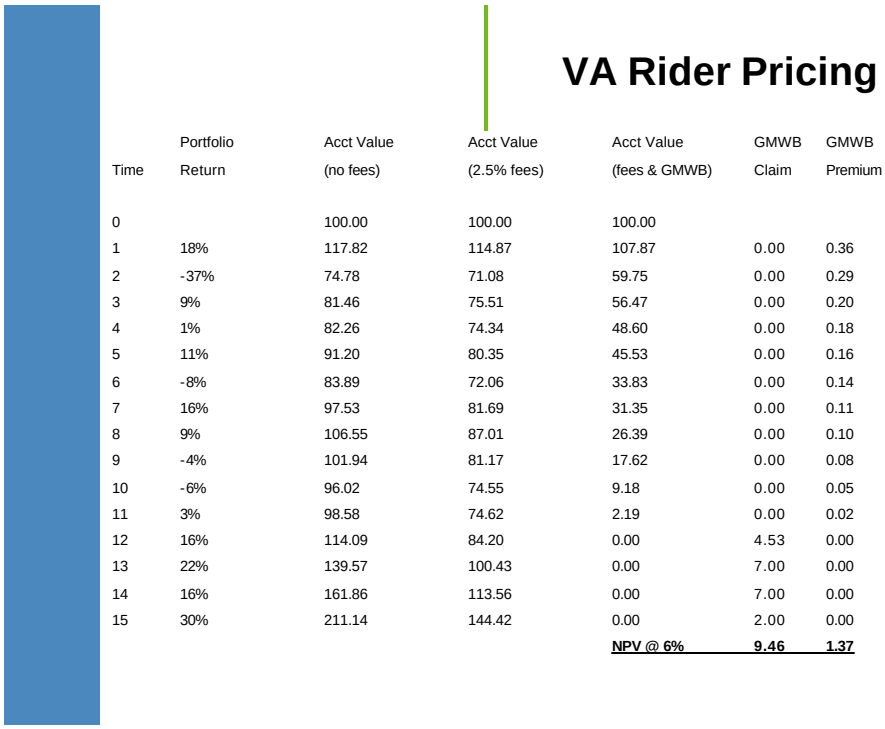
MR. HILL: As for the scenario regenerator, that's one of the reasons the Academy group did not want to say, "Use this generator and use these parameters." There's evidence for so many different parameters that they didn't want to tell some company that has put a lot of time into developing some generator that it couldn't use it. The debate over the right parameters for scenarios and correlations and things like that is an eternal debate. I think that's why they want to provide flexibility for once.

FROM THE FLOOR: If the only check on parameterization, as you say, is the task of the extremes on this correlative standard that they're setting up, then we can sit down right now and design a scenario generator that ignores certain moments in a parameterized model that will lower or minimize RBC. I think that will come out in the next couple of years, that it is particularly sensitive to the higher moments instead of being inconsistent or even exploited.

MR. HILL: There are definitely ways that you can create scenarios that would just barely meet the 95th percentile requirement. The requirement will be across a variety of percentiles—90th, 95th, 99th—so it's not just a couple of points. It's a little more complete than that. But there is definitely a possibility for abuses in that they're saying, here's a table, meet this table. Any time you do that, people will push it to just to meet that table and go no farther. I guess what they're relying on is abuse of your fiduciary responsibility or whatever you want to call it. As a valuation actuary, you are entrusted to do the right thing, and abuses such as that are not the right things to do. The Canadian approach has always been to put a little more responsibility on their actuaries to do the right thing, and the U.S. approach has been: Here are the rules. Fit within the rules. People have gotten into the framework of just fitting within the rules and not any more than that. Let's push the rules. I think the regulators would love to be able to say, "Do the right thing." But they're just worried that people won't do the right thing. So this is maybe a

chance for us to step up a little bit, I guess.

Chart 1



VA Rider Pricing

Time	Portfolio Return	Acct Value (no fees)	Acct Value (2.5% fees)	Acct Value (fees & GMWB)	GMWB Claim	GMWB Premium
0		100.00	100.00	100.00		
1	18%	117.82	114.87	107.87	0.00	0.36
2	-37%	74.78	71.08	59.75	0.00	0.29
3	9%	81.46	75.51	56.47	0.00	0.20
4	1%	82.26	74.34	48.60	0.00	0.18
5	11%	91.20	80.35	45.53	0.00	0.16
6	-8%	83.89	72.06	33.83	0.00	0.14
7	16%	97.53	81.69	31.35	0.00	0.11
8	9%	106.55	87.01	26.39	0.00	0.10
9	-4%	101.94	81.17	17.62	0.00	0.08
10	-6%	96.02	74.55	9.18	0.00	0.05
11	3%	98.58	74.62	2.19	0.00	0.02
12	16%	114.09	84.20	0.00	4.53	0.00
13	22%	139.57	100.43	0.00	7.00	0.00
14	16%	161.86	113.56	0.00	7.00	0.00
15	30%	211.14	144.42	0.00	2.00	0.00
				NPV @ 6%	**9.46**	**1.37**