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Session #19PD
How to Make Guarantees on VAs Worth More than the Paper They're Written on

Track: Product Development

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Summary: Guaranteed benefits within variable products have received much more attention recently, both regulatory and media. This session discusses emerging capital and reserve requirements on VAs with guaranteed benefits and the reduction effect that hedging/capital management strategies can have.

MR. ARI JOSEPH LINDNER: Jason's been kind enough to fill in at the last minute. Unfortunately, that means that some of the subjects that are listed in this session we may not hit quite as hard as one might hope. Jason is going to talk a lot about the new capital and reserve requirements and give some sample calculations. I'm going to talk about some strategies for reducing a reserve in capital but more from the standpoint of how reinsurance can help you do that.

I am going to hit hedging a little bit. I'll talk a little bit about the pros and cons of reinsurance in hedging. For those of you who aren't aware, the NAIC has decided that the risk-based capital (RBC) C-3, Phase II, capital requirement is not going to be in effect as of this year-end. The decision was made in the last week or two that it's going to be put off till presumably next year-end. They'll hopefully get there by then.

MR. JASON E. KEHRBERG: I'm going to start with talking about the background, the scope and the general approach that the American Academy of Actuaries had when coming up with their recommendations to the NAIC for new capital

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requirements. I'll also talk about other considerations that companies might want to consider when implementing C-3, Phase II, for year-end 2005 or later. We did some testing of the RBC C-3, Phase II, results, and I'll go over the model that we used to test those results as well as the results themselves. Lastly, I'll talk about some updates. I'll touch briefly on the New York single scenario or New York standard scenario that some of you may have heard of.

The move to scenario modeling started in the early 1990s when asset-adequacy analysis became part of the life insurance company reserve opinion. The RBC requirements were introduced shortly thereafter, but they were not scenario-based. They were factor-based. As far as scenario-based RBC, that was implemented on December 31, 2000 with the Phase I of RBC C-3. Phase II applied mainly to the interest rate risk in fixed annuities and single-premium life insurance. The NAIC is not on target to implement Phase II for December 31, 2004. As Ari mentioned, it has been pushed back a year for various reasons.

The scope of the recommendation from the Academy includes VAs, group annuities containing variable annuities with guaranteed living benefits (VAGLBs) and guaranteed minimum death benefits (GMDBs) for their equity funds and life insurance contracts with GMDBs for equity fund performance. It does not include equity-indexed products. It doesn't include separate account products that guarantee an index. They're covered on another recommendation from the Academy. The recommendation also doesn't include variable life insurance.

The general approach set out in the recommendation is basically a stochastic modeling approach. It involves aggregating the results of several thousand scenarios. I usually see between 1,000 and 10,000 scenarios. After the scenarios have been run through a cash-flow model similar to your cash-flow-matching model, the results are aggregated. A couple of statistics are calculated that I'll go over, and that's the RBC C-3, Phase II, amount. It does include cash flows from fixed account options. It gives guidance to the actuary to use prudent best estimate assumptions. So, to the extent that an assumption is very well known, it really doesn't require a provision for adverse deviation (PAD). But if an assumption is not that well known (and a lot of lapse rates and annuitization rates for the elective guarantees, the guaranteed minimum income benefits (GMIBs) and a lot of the election rates are not exactly known), there would be guidance to pad those estimates on the conservative side.

The recommendation also requires the use of calibrated scenarios to ensure fat tails, and I'll talk a little bit more about that. One of the differences from the factor approach is that in doing this modeling it's not like you're doing a valuation. You don't have to run your valuation model 10,000 times. You can group your funds and your contracts together and come up with hopefully a really nice compact model. The reason for that is because it's going to have to be run 1,000 or maybe 10,000 times, depending on the guarantees and embedded options involved in the contracts.

There are things to consider in grouping. For instance, you could group by various breakpoints for "in the moneyness," grouping together perhaps all contracts greater than 150 percent, from 125 percent to 150 percent in the money, funds that have similar risk return characteristics and various product variations. For example, the various types of living and/or death benefits could be grouped together to save on time. You could also group by issue age, the duration of the contract, the market it was sold to or the distribution channel. These are all factors that could significantly impact the results, and you would want to do some sensitivity testing to make sure that your grouping isn't adversely affecting the results. To the extent that you can group and your model validates, then you'd want to group so you can run the scenarios more quickly.

I will mention, though, that the guidance does call for 1,000 to 10,000 scenarios. It does mention that fewer than 1,000 scenarios may be used provided the actuary has determined through prior testing perhaps on a subset of the portfolio that the conditional tail expectation (CTE) results materially reproduce the values obtained from running a larger scenario set. So, to the extent that you're really concerned about runtime, that may be an avenue that you'd want to pursue.

I would like to talk about actually coming up with the RBC C-3, Phase II (or sometimes I'll just call it the C-3, Phase II) amount. The first thing to do is to determine what's termed the additional asset requirement for each scenario. The additional asset requirement is simply the minimum of the year-end present value of surplus over your model runtime. If you run your model for 30 years, you're going to have surplus amounts at the end of each year for 30 years. You'd have 30 values plus your starting surplus, so it's actually 31 values. You would need to present value it, which would be the interest rate in your model which may or may not be scenario specific. You would then take the minimum of that and multiply that times a negative one, and that's the additional asset requirement.

Starting assets are defined to be equal to statutory reserves held. The modeled statutory reserve for simplicity purposes is equal to the cash surrender value. The next step is to calculate the total asset requirement for each scenario, which is the additional asset requirement plus starting assets. Then we're well on our way to having the final result. One thing is that the final result is based on what's called a CTE rather than a percentile. It's very similar to a percentile. The 90th conditional CTE would be roughly equivalent to the 95th percentile, especially if it's a normal distribution and they would be roughly equivalent. If the tails have some really, really extreme scenarios, that's going to pull down the CTE, whereas it wouldn't affect the 95th percentile because it's just based on one or possibly two results, whereas this takes the average of the worst 10 percent.

The total asset requirements are sorted, and the average of the highest 10 percent is taken. That's CTE 90. The C-3, Phase II, RBC is set equal to the CTE 90 of the total asset requirement less statutory reserves held, and for covariance purposes this piece is combined with the common stock component for C-1. In addition,

confidential actuarial memorandum containing the supporting documentation and justification for all the assumptions and grouping that was used in the approach must be prepared and made available to regulators. Appropriate sensitivity tests should also be included in that. I'd also mention that the current RBC formula includes NC-1, a reflection of the risk of commissioner's annuity reserve valuation method (CARVM) allowance recovery. This amount is no longer necessary. It provides for the possible nonrecovery of the full CARVM allowance if the stock market performs poorly, and it's no longer needed because it's considered in the calculations recommended by the report in other ways. So that's gone.

There are some other factors that companies might want to consider when calculating the C-3, Phase II, amount. Credit for hedges is a pretty big one. The report definitely encourages prudent risk reduction by recognizing the impact of hedges. The costs and the benefits of the expected hedge positions held in the future under an approved hedging strategy are also included as long as it's in an "approved" hedging strategy, which means it's been defined by the board of directors and approved by the board of directors or some other authorized committee. Ari is going to talk about the reinsurance aspects because you also get credit for reinsurance held.

The interest rates are prevalent throughout any actuarial models, and there are different approaches you can take to the modeling of interest rates for calculating C-3, Phase II. Keep in mind it's used for discounting future surplus needs and calculating the earnings on projected general account investments, as well as calculating GMIB purchase rate margins. The guidance in the report says that you can use stochastic or deterministic interest rates. Justification for doing so should be included in the memorandum.

If you use stochastic rates, you are to use one-year Treasury rates from an integrated scenario generator, or you can use independent stochastic interest rates if the actuary deems it appropriate. The guidance recommends that you give reasons why you chose either the integrated or the independent stochastic rates. If you use deterministic rates, it recommends implied current forward swap rates from the current yield curve, and the GMIB results need to reflect the impact of the uncertainty in interest rates. If you do use deterministic interest rates, the guidance requires subtracting 30 basis points off the interest rates when calculating your GMIB purchase rates.

I would like to discuss the calibration points for the equity rates. I mentioned earlier that the equity scenarios have to meet the calibration points in the recommendation. The calibration points are given in a table, and it's based on what's called a regime-switching lognormal two model calibrated to historical Standard & Poor's (S&P) 500 returns. The scenarios that you use don't have to explicitly satisfy all calibration points, but the actuary should be satisfied differences won't materially impact capital requirements. For instance, if your company's C-3, Phase II, amount is dependent entirely upon the left side of the return distribution,

it really doesn't matter if your scenarios satisfy the right-hand tail calibration points because they're not going to come into play in calculating C-3, Phase II.

For instance, 2.5 percent of the time the five-year accumulation factor needs to be less than 0.78. For the 10-year factor, 2.5 percent of the time the accumulation factor would have to lose money over a 10-year period, and 97.5 percent of the time the rates would accumulate wealth during a 10-year period. If you use mean reversion or path dependency in your model, it needs to be well documented and supported by research.

Chart 1 shows a graph of the regime-switching lognormal two model, which is a model that switches between a normal stock market environment that has been used a lot in the past to measure equity returns and a second regime, regime two, that is much worse than folks would typically believe the S&P 500 to perform. It switches back and forth between these two regimes according to parameters that are given in that proposal. If you look at the resulting distribution, it fattens especially the left-hand tail of the distribution.

After all that talk about the scenarios and coming up with them, it might seem a little complicated, but I'd certainly advise you to experiment with the scenarios that are available on the Academy's Web site (www.actuary.org). They're already generated, and they have 10,000 scenarios for all kinds of asset classes that are typically needed in stochastic cash-flow projections of VAs. The asset classes are U.S. Treasury yields, money market yields, U.S. bonds, equity, diversified funds, and you can pick and choose however many scenarios from the 10,000 that you'll need.

When starting to calculate RBC C-3, Phase II, I wouldn't expect that you'd want to use more than 10,000 scenarios. In fact, you'd probably want to use less, and the supplement document also includes a utility that allows companies to select a subset of representative scenarios from the full sample of 10,000. So, if you want to, you can just take 1,000 random scenarios instead of 10,000. If you'd like to use a representative scenario technique to actually choose scenarios that you think are going to exhibit the tails of the distributions, then you can use the methodology in the utility that's included on the Academy's Web site. That should help you choose the scenarios that are going to provide for really bad results, but then the probabilities of those scenarios would be adjusted accordingly.

One thing I'll mention is that if you're just writing GMDB risks on your VAs, you don't have to go through the whole stochastic exercise. You can just use a factor approach like what has been used in the past, and the factors were actually calculated using the prepackaged scenarios. There are some other considerations when choosing your scenarios. Interest rate risk should be considered. It's recommended that C-3 interest rate risk of the guaranteed fixed fund option be recognized for all VAs in calculating the C-3, Phase II, according to the methods outlined in the proposal. Policyholder behavior should also be looked at. As I

mentioned earlier, for absent empirical data with GMIB and living benefit election rates, the actuary should set conservative behavior assumptions for the prudent best estimate with a margin for error directly related to the uncertainty in the underlying risk factor. For multiple products, aggregate results within scenarios if possible, otherwise you have to calculate RBC product by product and add it up. In order to take advantage of offsetting risk profiles, you'd want to aggregate results within scenarios across products if possible.

The alternative method approach is outlined in the proposal and, as I'd mentioned earlier, allows companies with only GMDBs to calculate C-3, Phase II, with a factor approach. Life insurers offering only VAs with GMDBs can use this alternative approach. GMDBs provided under group annuity contracts or insurance contracts and all living benefit guarantees, however, need to be evaluated by scenario testing. The alternative factors allow an approximate sense of the impact for companies with known exposure data.

Even if you use the stochastic approach, you can gain a lot of insight by using the alternative method to see what your C-3, Phase II, amount would be under that approach. That also might be useful in pricing. For factors such as the issue age and the gender, you look at the factor, apply it to the policy and come up with the C-3, Phase II, amount quickly and pretty easily. There's a spreadsheet on the Academy's Web site that, if you take a little while to get to know it, calculates the factors for you. It's pretty well automated.

The factors were developed using CTE 90, and it is expected that the alternative methodology will be applied on a seriatim basis. They were still deciding whether to use 65 percent or 100 percent of the MGDB 94 table. There are examples on the Academy's Web site of the alternative approach and the full-blown stochastic approach, and results are actually compared. You can look at the comparison between results using the alternative approach and a model that the Academy put together to test RBC C-3, Phase II. I took a look at it, and results using the alternative methodology were 105 percent to 150 percent larger than the scenario testing with their model. That's, of course, very specific and dependent upon the assumptions that they used in their model, but I believe that's a rough estimate that results will be a little higher with the alternative model.

I'll just talk briefly about our model and then go to the results. We focused on the C-3, Phase II, amount. That was our end statistic. We used a VA model. We started at one month after issue to avoid point-of-sale costs, and we had special statutory reserves equal to cash surrender value. We based the assumptions and specifications on what we thought was a typical VA available in the marketplace. Some of the fees have increased a little bit, but the results are still certainly meaningful. These are the guarantees that we modeled, the fees that we charged and just some of the key specifications and assumptions. A $50,000 policy was issued to a male age 65 invested in S&P 500. We included a risk charge of 1.5 percent, an advisory fee of 1 percent, and I have the surrender charge scale and

our lapse rate assumption.

We used a deterministic interest rate because as a sensitivity we ran with stochastic interest rates, but for the base case we wanted to mainly focus on the effect that the stochastic equity scenarios were having on results. Our base case used a flat surplus earned rate. This is just one set of results. You could see what the Academy and the NAIC are worried about (Chart 2). They're worried about the left-hand tail. So 90 percent of the time there was no negative surplus. Another 10 percent of the time there was a negative surplus over the 30-year projection period, and those in some cases were quite extreme.

Then we looked at our baseline results for duration zero. As expected, the return of premium is one of the lowest ones, along with the enhanced death benefit, and rollup and ratchet are more expensive. The numbers are dependent on a couple of things that I'd like to mention. The numbers are dependent on the fees charged. To the extent the fees change, the numbers would go up or down. So, as a sensitivity, I zeroed out all fees just to see the absolute relationship between the different guarantees. At duration zero the account value is, by definition, $50,000 for every guarantee, but as we move forward into duration three-and-a-half, and I also looked at six-and-a-half and nine, the guarantees are actually at different points because the account value on the return of premium for 140 percent in the money would be 140 per or 40 percent below 50,000. For rollup, the account value would actually be a little higher. The starting values at these durations were a little bit different, which can cause the results to sometimes be counterintuitive.

As we move forward in time, the RBC C-3, Phase II, percentages decrease significantly, and that's mainly due to the surrender charge and the fact that we set reserves equal to cash surrender value. As a sensitivity, I set reserves equal to fund value, and they start off much lower and stay lower. So, the main thing to take away from this with reserves equal to cash surrender value the reserves do decrease over time due to the surrender charge decreasing, and that, of course, is specific just to this particular policy. Running for a book of business, having several policies issued over several years, you wouldn't see this drastic effect.

Compared to the current RBC requirements, the percentages can be quite high, especially on the GMIB side. At 15.4 percent for GMIBs, 140 percent in the money is quite high. This, of course, is not taking into account the reinsurance that you have or any hedging strategies. In our model we left that at zero. Just to compare it to the current C-1 and C-3 requirements, the percentages (especially for GMIB or GMDB benefits) are a lot lower. We were looking at percentages 1 percent, 2 percent and 3 percent. We looked at the current C-1 and C-3 as a percentage of account value times zero for GMDBs as 0.57 percent. That stays quite low throughout the durations, and GMIBs are anywhere from 1 percent to 2.5 percent. For some of the earlier scenarios, we were seeing percentages in the teens.

We produced a table of all the sensitivities that we ran. The baseline results that we

looked at, for duration zero, have a common reference point. The baseline results are as follows. Return of premium, 1.04 percent of account value for the capital requirement, and it changes over different sensitivities. One of the things I did is zero-out the fees because it is a little counterintuitive. In the baseline version the rollup costs are higher than the high or max benefit which is the max of rollup and ratchet. That was due to the fees that were charged. Without fees, the rollup is 3.81 percent, which is, as you would expect, lower than the 3.93 percent associated with the high or max guarantee.

Setting reserve equal to fund value had a dramatic effect on this (remember this is just for one policy for the general account), that drastically reduced the capital requirements. As expected, modifying the gender or the issue ages or the mortality affected results, I think for the most part, as one would expect. Turning off dynamic lapses had a significant reduction in the capital requirement, and some of the sensitivities only applied to GMIBs. For instance, instead of using stochastic purchase rate, we used a flat purchase interest rate, and that increased the results relative to our stochastic rates. Instead of going with 10-year annuity, the baseline used a 15-year certain annuity. Going with a 10-year life certain annuity decreased the capital requirements a bit. Of course, when turning off dynamic annuitization drastically, the results were about one-half to one-third of the baseline.

The total asset requirement can be quite volatile, and the C-3, Phase II, capital requirement can vary substantially from period to period due to market movements. The excess asset requirements can change. When the guarantees move from 20 percent out of the money to 20 percent in the money, the excess asset requirements can move from a fraction of 1 percent to several percent for GMDBs and from 1 percent or 2 percent to the lower mid teens for guaranteed living benefits. There are several views as to whether this volatility is desirable or not. Volatility is consistent with most financial economic models that are in use today. It also may properly encourage companies to address the risk management issues associated with these products. To the extent that you have a good reinsurance program or hedging program in place, the volatility will, of course, be reduced. There were also methods that were being looked at. In the end, this is a tool for regulators, and if they want to dampen the volatility, they can. There were a few things they were looking at as ways to dampen volatility. I'm not sure whether or not that was included in the final version.

You may have heard that there's also a Variable Annuity Reserve Working Group. They've been working quite closely with the Variable Annuity Risk-Based Capital Working Group, and this would have a huge impact on the way reserves are calculated. Rather than a factor-based valuation approach, it would be more of a principles-based reserve and would revise the statutory reserve standards and methodology for VAs to make them more consistent with the C-3, Phase II, approach, which is believed to be more principles-based. Rather than using the 90 percent CTE, they would use the 60 percent or 65 percent CTE. It's not going to be implemented before the C-3, Phase II, approach.

The New York regulators, during the process of coming up with the capital requirements, really were quite interested in a standard scenario alternative minimum. They thought that this would help them be able to quickly and easily calculate some sort of capital requirement just by knowing their exposure and not having to run 1,000 stochastic scenarios. This was probably one of the sticking points of why it wasn't implemented year-end 2004. In addition to stochastic scenario analysis, the single scenario minimum would require insurers to perform a seriatim valuation using a single defined standard scenario. It would have prescribed fund returns, and it would also have prescribed liability or actuarial assumptions. What this would do is it would serve as a floor for the VA RBC, and another single scenario would serve as a floor for the VA reserves.

The advantages would allow regulators to compare standard results for different companies. It could also be used to get a formula reserve on a policy-by-policy basis. It's more in line with what's been done in the past, and it had a lot of appeal to the regulators. Some think that a 0.5 percent RBC floor seemed excessive for some situations and penalized companies that have conservative reserves. In addition to the single scenario, they were also considering a 0.5 percent reserves floor for the RBC amount. I think that was left out, though. I haven't done a lot of analysis of the equity scenario because it keeps on changing.

There are several versions of the single scenario, and I'm kind of waiting for it to be finalized before I add it to my tests. One of the versions had an equity scenario where for RBC the capital scenario had a 20 percent drop in year one, followed by annual returns equal to the 10-year Treasury plus 0.5 percent. It's changed since then. I think it might be a 10-year with two 10 percent drops in years one and two and then the 10-year Treasury plus 0.5 percent. But I just dropped this in the model and didn't change any of the other assumptions, and it gave results around 90 CTE. I can see what they're trying to do. For instance, with that particular scenario, there is a 20 percent drop in year one, followed by annual returns equal to the 10-year Treasury plus 0.5 percent. It would make a 5 percent rollup product under the current interest rate environment, which is kind of interesting.

What conclusions can we reach from what the Academy has done? They've certainly put a lot of effort into the proposal on the recommendations that they've handed over to the NAIC. They feel they're addressing a lot of the shortcomings of the factor-based approach to setting capital and are going with the more principles-based approach. Adopting the proposal will require a significant effort in order to avoid the likely higher capital requirements associated with the alternative method. Adopting the alternative method is somewhat similar to the factor method. It's quite a bit more involved than the current method, but it would be a lot easier than the stochastic method. Regardless, the capital will likely be higher than what was previously used.

All companies will be affected differently depending on their product mix, their

asset mix and other economic conditions, whether or not they have a hedging program in place, the reinsurance environment and products that they have. But companies with substantial enhanced VA guarantees could really face the significant RBC at today's equity levels.

Companies, I think, are likely to do a lot more to examine and implement risk management strategies, and that's what Ari will be talking about. They'll have a direct impact on the capital requirement with the credit for hedges and the credit for reinsurance included in the proposal. I think also greater use will be made of asset-allocation mixes for hedging. This will help keep the fees for providing the additional capital reasonable. Lastly, if you do implement the stochastic approach, more than just being able to calculate C-3, Phase II, you can gain a lot more insight into the risk exposure associated with your VA products. I think it will enable companies to also price products appropriately and find the best risk mitigation strategies for their particular products in order to reduce the capital requirement for the product.

MR. LINDNER: I wanted to talk a little bit about the magnitude of reserves and capital, the way we've calculated them. Everybody's going to come up with some different numbers based on the stochastic calculations that each company's using. I will also talk a little bit about risk management strategies, some pros and cons, and just sort of the way that I look at the risk management. I am not going to talk in as great a detail about the impact of hedging, but I do want to hit some of the impact of reinsurance.

We did some calculations ourselves to see how much we could cut down the reserves and capital of a direct writer through a reinsurance program. We built a model from a direct writer's perspective, which is unusual for us as a reinsurer. We put in the commissions and the mortality & expenses (M&E) and all that stuff that we don't usually pay that much attention to. We tried to base it off of an industry average. Obviously, we have some insight into what everybody else is doing based on the information that we have from our clients. We used a single policyholder male, age 65, with 100 percent equity allocation, and we used some basic writer charges. Please don't call me and ask me if these are the appropriate charges for your product because they're probably not. They may look a little low to some of you, I know they did to me, but we wanted to give some general idea of what things look like with some numbers that people could feel somewhat comfortable with and probably aren't too far off the mark in terms of where some of the prices are and ought to be.

The first thing we did was look at reserves at a 65 CTE level, and you heard Jason talk a little bit about the reserve work group. They're targeting 65 CTE, as opposed to the Guideline 34 drop and recover and the Guideline 39. We wanted to get an idea of what the statutory reserves would look like for various products. Different agents and/or different product designs are going to have some different numbers.

Have any of you ever worked for a company that has VAs with guarantees? Have any of you started to use the stochastic modeling for this 90 CTE type of stuff? (About 80 percent of the audience responded yes.) That's pretty good. Have you finished modeling the 90 CTE? (Only one audience member raised their hand.) We all have some work to do.

Let's consider an example. We calculate the capital. It is not, in fact, the 90 CTE. It's the amount that you need in excess of the statutory reserve in order to meet the capital requirement. We ran it at AA—that is to say, 150 percent of whatever the number is when you subtract the statutory reserve from the total 90 CTE amount that you get. That is the total asset requirement. The numbers are not small. These are fairly substantial figures, and they should figure into product design, which I know is on the list of topics we're supposed to talk about. How does this affect product design? If this is the kind of capital you have to put up, then you have to earn a return on that capital.

One of the things I won't use is guaranteed minimum withdrawal benefit (GMWB). I know that's the big popular benefit of the day. I've been public on this before, so I'm not hesitant to do it again. I don't like that benefit. I don't like the current structure or the price that it's at. We don't reinsure it. I think the return on capital that you get for that benefit, the way it's currently priced and structured, is not sufficient for me looking at the benefit in a vacuum. That may be a perfectly good reason for a direct writer to put it out for competitive purposes. You have other places where you make profits, but for me to look at it on an isolated basis at a 5 percent or 6 percent return just doesn't make a lot of sense for me.

We hit briefly on some risk management strategies. Now I will talk a little bit about some advantages and disadvantages. There is one that's commonly overlooked, which I think is a key is in your product design, and I can't stress this enough. Risk avoidance is a lot easier than risk management. If you don't take the risk in, you don't have to worry about it. I feel it is limited only by imagination. That is to say, you can do whatever you want. You can put age limits. You can change the risk that you take in and leave as much as you want with the policyholders. You don't have to take it on. Unfortunately you have competition. So, you obviously can't do anything. But there are a lot of different ways to think about it, slice and dice the risk and think about what you might be able to leave with your policyholders. Typically I would say only a minor risk reduction is achievable, with the exception of anti-selective features.

Everybody knows now about the dollar-for-dollar withdrawal feature and its associated problems. Whenever I hear about a new benefit, which I do from time to time, the first thing I think about is: How can the policyholder select against the risk taker? We all know that if there's a way, they'll eventually figure it out, even with the dollar-for-dollar withdrawals. When we started telling our clients back in the mid 1990s that this may be a problem some day, they said, "Nobody will ever figure that out." I always felt that if a television program said, "Everybody with a

VA, now the market has gone down, you can all get free life insurance," that it might be a problem. It has been to a certain degree for some companies more than others, but these are one of the things that you want to watch out for in the product design. Some of these risk features, some of the anti-selective features, are very difficult to manage for the risk through any means.

Reinsurance would be one risk feature, but if you try to go to the capital markets and do it through a hedge, and you have some of these—for example, a dollar-for-dollar feature—I don't see how you can reasonably lay that risk off. Run the risk. That's a strategy. The advantage there is that you get to keep all the profits. If you priced it right and structured it right, then you get to keep everything, which is good. You don't need anybody else to help you with it, which is also an advantage. Obviously disadvantages include, but aren't limited to, the fact that you have to hold all the reserves in capital. We will talk about how those might be reduced.

One disadvantage is that eventually somebody is going to say how much of this total risk do you want to take? I get asked that question by my management. I'm sure you do by yours as well. If your risk management strategy is running the risk, the only way to limit the risk that you have is to stop writing, which is not really a good answer for you or for me. It means that you have to use alternate risk management strategies eventually. You can't take an unlimited amount of this risk. Another disadvantage is that analysts, rating agencies and, again, your management may be breathing down your necks and may not be very excited about the risk you're taking on. Whether or not you can sleep at night is a big reason why you would go out and find alternate means of laying off some of the risk that you've taken on.

My favorite topic, reinsurance, has its advantages and disadvantages. One of the advantages is what has been referred to as a perfect hedge. There's no basis risk. It pays your claim. You have a claim. We pay the claim, typically. We'll pay the exact claim that you have. The costs can mirror the revenue stream. That is to say, if you are charging 30, 40 or 50 basis points annually, or you receive a charge monthly from your policyholder, that is what you pay the reinsurer. With hedges, frequently the costs may come up at different times. There may be upfront costs that then have to be amortized, and there may be some mismatch. Reinsurance has a very flexible structure. We can slice and dice the risk any way you want with deductibles and limits. You can move things around. There are so many different ways to cut this risk up to concentrate on the piece that you want to get rid of, yet it's relatively straightforward. You don't need a team of 10 people to run the thing every day and determine new deltas and Greeks and things like you will need for hedges.

The number-one disadvantage is availability and cost. Availability, everybody knows, has been, and continues to be, an issue, especially with regard to GMWBs where, as far as I know, it's not available. Otherwise you don't have a lot of choices right now, and the cost may not be what you want to pay. It may be higher than

you anticipated. It may be higher than you think it is worth. There are claim limits on the reinsurance. I don't know anybody that's writing reinsurance without some type of limit on the claim. These are not stop-loss deals. We always leave our clients with the far, far tail, and we can talk about where that is and where you think it ought to be, but we never take it up to infinity.

There's always some way that we've got off the risk and left some amount with our clients. There may be a difference of opinion on how much that is, but you can't get an unlimited reinsurance cover, whereas you can get unlimited cover with hedges. Of course, there's credit risk of your reinsurer. We're fine, of course, but there's always credit risk to consider, especially given the lack of availability of the reinsurance. We certainly run into situations with our clients when they say, "Well, how much more of this do I really want to put with a simple company?" These are issues to think of when you're considering your risk management.

I'm going to split hedging into two different sections—static and dynamic. I'm going to talk first about static hedging. With static hedging, we're talking about relatively straightforward hedging strategies without a lot of calculations of Greeks, without a lot of rebalancing on a frequent basis and without a huge investment in resources. It is easily obtained from highly rated counterparties at a fairly predictable cost depending on the strategy. If you use short futures, that's free. That's a pretty predictable cost. If you're getting puts, you can know within certain tolerances what the costs are going to be, and you don't necessarily need a huge investment of resources. Static hedging will give you an accounting mismatch. Your liabilities move around above the line, and your hedges move around below the line. You may, as I said before, have a revenue and cost mismatch issue. That is to say, you may be paying for your hedges at different times than you're receiving the revenue, and that may be an issue for you that you want to think about.

You have claim payment mismatch. I mentioned before reinsurance as sort of a perfect hedge that pays the claim that you have. A capital markets hedge will pay whatever the formula is. Regardless of how many people die or annuitize, it will pay that amount. Plus it's typically benchmarked to an index, whereas your policyholders are free to move money around from equities to bonds and back again, typically when it's the worst time for them to do that. In this case I've defined static hedging as infrequent rebalancing, favoring cost over efficiency. That is to say, it won't be the most efficient hedge. It won't move exactly in the right direction at exactly the right amount, where you might be able to get that with a dynamic hedge, but it will typically be cheaper to implement both from a resource standpoint as well as from a bid/ask standpoint, which I'll hit when we talk about the dynamic hedging.

Dynamic hedging again is fairly readily available and theoretically more efficient than the static hedge. You can design a dynamic hedge to match very accurately your expectation of how things might go if equity or interest rate markets move in a certain way. You have the same type of disadvantages that you had with the

static hedge, that is to say, in accounting, revenue mismatch and claim mismatch. Frequent rebalancing, however, favors efficiency over cost. Every time you rebalance your hedge—every time the market goes up, you hedge less; the market goes down, so you hedge more. On a very rough basis that is typically the way the dynamic hedging works. You're sacrificing some profit because you're always buying high and selling low to market.

Depending on how often you rebalance and how you set your thresholds, you can set it to be more or less accurate; there's always a tradeoff. The more accurate you want to get, the more cost is going to come into play. Dynamic hedging requires, I think, a fairly significant investment of resources either in outsourcing the appropriate work to folks who are all readily available to sell you their theories of how dynamic hedging ought to be done or to hire and build your own shop and your own expertise. For the companies that have done that, and there are some, it's a fairly substantial exercise. It is not something you could do with one person working half time. You're talking about many, many highly experienced and fairly expensive people to run this for you.

We assumed for GMDB and GMIB that you're going to pay three basis points less than you charge, and we threw some limits. My example includes fairly standard, plain limits for us, but they're always, as I said before, subject to whatever you like. We can move limits around. We can add deductibles. We can do lots of different things in terms of structure. This was just to sort of give you an idea of a plain structure. For the death benefit, an annual claim is 200 basis points of account value. Two percent of the underlying account value is the most in aggregate claims will pay in a given year. GMIB has a claim limit of, say, 10 percent of the guaranteed value and an additional limit of 15 percent of the eligible population to annuitize in a single year.

There's obviously disagreement about how many people will ever annuitize for GMIB and how many would do it in a single year, but my data represents a lot of times where we fall out. Some companies will say it'll never be more than 5 percent in a single year. I say, "Fine, we'll write that into the reinsurance treaty. Then, if it's more than 5 percent, you have to pay." Well, they're not so excited about the 5 percent anymore, and we end up somewhere in the 15 percent to 20 percent ballpark. We showed a reserve reduction that is, again, at the 65 CTE. It is a ways off. But just as a representative number, reserve reduction, it is a little bit off by the product design. For the death benefit anywhere from 70 percent to 90 percent of reserves were removed under this structure, and presumably different structures with higher or lower limits might have different impacts.

The GMIB, I thought, was an interesting one because when we ran the numbers with those limits, it actually removed almost all of the reserves at the 65 CTE level. The capital reduction again varied from product to product. By applying the same type of claim limit to a rollup that you apply to a ratchet or a return of premium, you may not be getting the same type of tail cover. When we looked at the

reserves, it's much lower than the other two. For those of you who are not quite finished with calculating 90 CTE, this is something that you ought to be looking at when you go to manage your risk because this is where your capital's going to be.

You get measured on your return on capital on your products. This is something you need to know because when you do come out and get reinsurance or a hedge, you want to know what impact it's going to have on your capital. You want to be able to weigh the cost benefit of payment for the reinsurance or the hedge versus the capital reduction you're going to get. The GMIB numbers are pretty good. I think the limits in my example are higher proportionately than the limits we showed for the death benefit.

We also ran just the annual ratchet at a 20 percent in the money. So an account value has dropped by 20 percent. Reserves doubled. Capital was up by one-third. The reinsurance reduced the reserves by about the same amount, a little more, versus the at-the-money numbers. It reduced capital by a little less. We saw the interplay of some of those. Limits may be coming into play a little more often when the thing is already 20 percent in the money, but still giving you doubled reserves, and you're still getting an 80 percent to 85 percent reduction of reserves. Now it's starting to look like maybe it has some value for you that you might not have seen when you ran the thing at the money. So it's important to look at all different scenarios when you run it.

Reserves in capital can be big. At the money we're looking at 2 percent to 7 percent—2 percent for reserves; 7 percent for capital. These are in general where the benefits are. They can obviously be a lot higher when the thing moves in the money. One of the issues that we've been asked to talk about is the effect of the new capital and reserve requirements on product design, and you need to ensure an appropriate return on the capital when you design a product. We talked before about how you can use product design to limit the risk that comes in, but if you're still rolling out products and issuing policies with guarantees, and you don't know what the 90 CTE is, then you have no way of determining what your return on capital is, and mistakes can be made one way or the other. You can charge too much. You can charge too little. You can make mistakes in your risk management. You can buy hedges that you don't need or buy the wrong type. You can buy reinsurance that you don't need or buy the wrong type. Product design needs to be a key element in the risk management strategy. Again, you don't have to manage the risks that you don't take in. When setting things like age limits and taking care of those anti-selective features, be careful of things like optional resets for the policyholder. These are very, very difficult features to quantify and underwrite and manage. The capital markets do not sell you options that have optional reset features on them based on what your policyholders do. It's not there. It is something to think about.

Reinsurance and hedging can reduce your reserves in capital, but you need to think about the advantages and disadvantages. Typically hedging, especially a static

hedge or something that's a little simpler in nature, can help you dampen the impact of some disastrous scenarios. Something that moves in generally the right direction, in generally the right magnitude, is what we use. That's what we have. That can go a long way towards helping you sleep at night and giving you the confidence that what you have is not going to turn into a company killer. Reinsurance, on the other hand, is more useful I think for financial statement relief. We talked about the accounting mismatch a little bit, the hedges and the liabilities that move on different lines, and it may be difficult to explain to management or analysts how the offset works.

FROM THE FLOOR: It seems like it'd be challenging to try to figure out how to hedge these if you're the direct writer. I presume you might be doing some hedging. How do you go about doing that if the reinsurer doesn't have the same detailed level and timeliness of the information from what's going on with the policyholders, their asset allocation, etc.? What kind of information do you request and how often?

MR. LINDNER: I didn't talk about data, but data is obviously key. Direct writers are closer than we are. We get monthly seriatim lists from our clients. We can't have it any other way. If we don't get monthly seriatim quality data, we just don't know where we stand. If you don't know where you stand, you don't know how to manage the risk. The advantages that we have over, say, a direct writer (and our data is lagged, obviously) are that we have a more diversified book of risk. Because of the flexibility of the reinsurance design I have some clients where I cover first dollar and others with deductibles. I have some that are long-term and some are short-term.

I have some income benefits and death benefit all across the industry with different designs and different features. We look at our book of risk on a holistic sort of portfolio basis, and it doesn't necessarily have the same type of features. In aggregate, when the market goes down, it's bad—it's the same for me as it is for you—but it doesn't necessarily have the same shape and the same feel to the risk as somebody with just one benefit and one product.

We use that as a little bit of an offset, plus we have the risk limits built into our treaties. In terms of your question about data and how we do that, yes, our data's a little bit lagged, but we can estimate that, and most policies are roughly x percent equity. That number's moved around a lot in the last couple of years, but we can follow it, and we can guess over the course of a couple of weeks if the equity markets have moved a certain percentage how the policies behaved.

MR. ANTHONY DARDIS: My question has more to do with the general implications of C-3, Phase II, rather than just the focus on VAs. The International Actuarial Association has set up a working group that is looking at establishing a worldwide method of establishing RBC requirements that would be applicable for regulators on a worldwide basis. Is C-3, Phase II, really a sort of first step in going towards a

much broader RBC approach in the United States, which would be consistent with the international approach, in other words, not just applying to the products but actually applying to all products?

Is there a very big debate happening internationally about the CTE? What's the appropriate level for the CTE? Some debate is taking place. Is CTE 90 actually enough? If that's roughly the 95th percentile, that effectively means that five times out of 100 you're going to have to look for some more capital, I think. I'd be interested in your thoughts from your experience. Do you feel from your experience that CTE 90 is indeed an appropriate level for us to be targeting for RBC?

MR. KEHRBERG: I don't know if I can answer all your questions, but as far as whether or not C-3, Phase II, is going to be moved into other product lines, I would think that the Academy and the NAIC are kind of looking at this as a prototype or a trial. It's definitely what some people would call a principles-based approach to reserving and setting capital requirements, which is a lot different than the factor-based approaches that have been used in the past. I think they're kind of taking a wait-and-see approach as to whether or not they think it's a good tool for regulators and also for reserving and capital.

As far as whether or not CTE 90 is enough, ever since I got involved with the project, it was always set at CTE 90. I wasn't present when they decided which level to go with, but it's been at that level ever since I got involved with the working group and started paying attention to what was going on in the C-3, Phase II, arena.

MR. LINDNER: I can't speak for the NAIC, but I think moving to a stochastic approach for anything in the United States is a pretty big step for the fact that they're considering for statutory reserves as well as capital. They're sort of following what they've done up in Canada, which I believe is CTE 95, actually, for their minimum continuing capital and surplus requirements (MCCSR). The fact that they're moving to stochastic is an indication that it's possible that they could move to stochastic standards for other lines of business. In the past I would say it would be not very likely that they would even consider that kind of approach. Is 90 CTE enough? I would argue it's not typically the 95th percentile for this type of product.

For a catastrophic risk product, there tends to be a very big slope at the tail. So, 90 CTE in my experience tends to run 96 percent to 98 percent depending on the product. That's not a bad number. I don't think 97th percentile is such a bad number. Are we holding that amount? We actually hold a little more. Will we move to the 90 CTE when that comes out? Yes, we'll probably do that. I think 95 CTE, that may be a little heavy, and 90 CTE, arguably, may be a little light. If there was a round number between 90 and 95, they'd probably use that, but there isn't. I think the number is not bad. My final point on it is it's better than zero. It's more than most companies are using today, and it's better that they have something that they put out there that's reasonable than let it continue. I started working on the

VAGLB group, and I got off of it pretty quickly when I saw the time investment involved, but that was like seven years ago. Guideline 39 is kind of temporary. There's just no real regulation set on that. How much reserves and how much capital to hold guidelines have not been set, and these products have been around for 10 years. That's why I subtitled my presentation what I did. The NAIC is catching up. It's been a long time coming, but now what? Now are my products appropriately priced? Are they appropriately structured? What do I do about it? You can debate back and forth whether 90 CTE is a good number, but it's a far sight better than where they are today.

MR. KEHRBERG: One other thing to keep in mind is a lot of companies do have multiple lines of business in addition to just VAs.

FROM THE FLOOR: Just as Regulation XXX is a statutory issue that does affect GAAP equity because the statutory reserves are assets that appear as equity on a GAAP balance sheet, when this C-3, Phase II, happens, how will this affect GAAP results? Why is this thing being pushed back? You said for several reasons. Are the companies basically beating up on the NAIC, and they just keep pushing it back? We might not see it till 2006. What's going on here?

MR. KEHRBERG: As far as why it's being pushed back, I think they just had trouble. I participated in a few calls, and the regulators and the companies are having trouble agreeing on the single standard scenario. It was a stumbling block. A lot of people really wanted to get it out by year-end, but they couldn't agree on the single standard scenario and a couple other sticking points.

MR. LINDNER: If you ask nine actuaries, you get 10 answers. They're getting close. They knew it'd be a stretch to get it in by this year, and the single standard scenario issue came up from the New York regulators and threw a bit of a wrench into the works in terms of getting agreement on that. I think there have been companies, and I listened in to a few calls, saying it's too hard to get done by that timeframe. There were basically probably 20 people in this audience with companies that have VA guarantees. This thing potentially could have been right around the corner. Six months is not a long time to get ready, and we're sort of ready. This is not a straightforward calculation. It's not easy to do and takes a while.

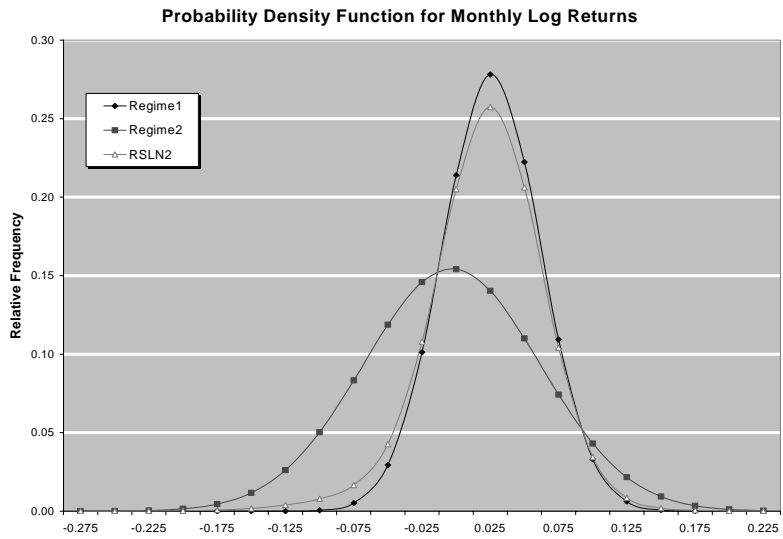**FROM THE FLOOR:** Would this affect the GAAP financial statements?

MR. LINDNER: I don't know if I have a good answer for that. I suspect that it doesn't have a significant impact. I would say it has an impact on capital.

FROM THE FLOOR: I would think that if you have reserves on a statutory basis, those liabilities have to be assets backing them, and that's going to be equity on a GAAP financial statement.

MR. LINDNER: It will have impact from that standpoint. Fortunately the GAAP reserving is complete, and so we know what the GAAP reserves are. We all saw companies in the first quarter taking hits to put up the appropriate GAAP reserves. That's going to impact profitability of the products going forward from a GAAP standpoint. From a statutory standpoint, there's at least been a regulation for a while so companies are used to the number not being zero. I think the real question has been: What's the capital going to be and are companies holding enough? I've had more than one rating agency call me saying we are not happy with the pace of the NAIC. We want something in place by year-end, and we're going to talk to the folks that we rate and make sure that the capital is up to our standards. Expect to get questions from rating agencies. They're done. It's been 10 years. What they said to me is that it's ridiculous. These products have been around long enough. Figure something out. Zero is not the right answer.
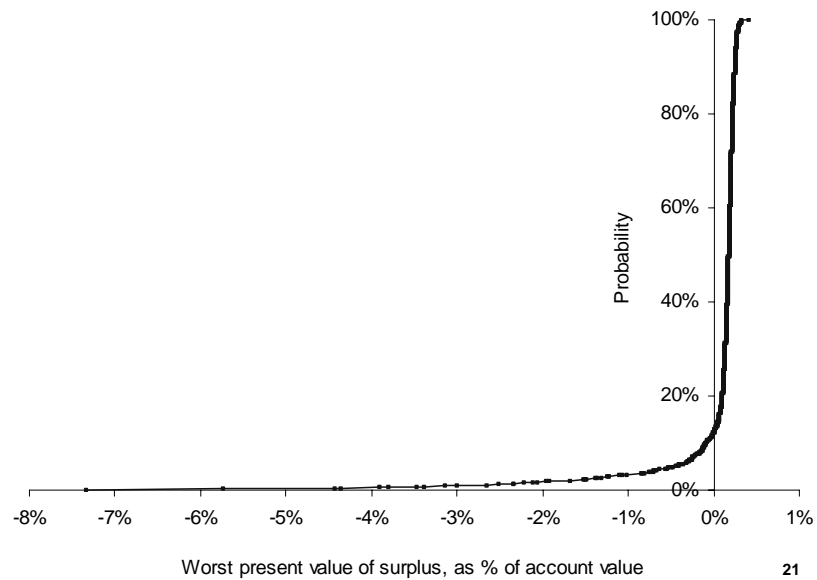
Chart 1

Example of RSLN2

Probability Density Function for Monthly Log Returns

13

Chart 2

Cumulative distribution function for ROP GMDB

Worst present value of surplus, as % of account value   **21**