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Integrated Risk Management

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Summary: In the past, risk management has not been an integrated process in insurance companies. Changes in the financial industry refocused management's attention on risk management. Management is starting to develop new ways to examine financial risks holistically in an integrated model.

MR. JACK L. GIBSON: I'm Jack Gibson, and I'm the life practice leader for North America for Tillinghast. Our other presenter is Al Zlogar. Al is the chief actuary for ING U.S. Retail Financial Services, which is the individual life and annuity area. He has responsibility for all aspects of risk management that relate to that division, as well as for pricing signoff, and he serves as appointed actuary with financial reporting responsibilities as well.

I deal quite a bit in enterprise risk management (ERM), also in mergers and acquisitions (M&A) situations, embedded value and other areas as well. We're here to talk to you today about innovative risk management.

How many of you are aware of Committee of Sponsoring Organizations (COSO) ERM framework? COSO is an accounting body that is sponsored by the IACPA, and it's a whole alphabet list of accounting bodies, not just U.S. and international. They released a proposal for an ERM framework and solicited public feedback on the document until October 15, 2003. Part of the introduction to the document indicates that the framework is intended, and this is a quote, "to become a commonly accepted model for discussing and evaluating the organizations' risk-management processes." This is a general framework; it does not deal specifically with insurance. It applies to all organizations, so it certainly would be viewed by COSO as being applicable to the insurance industry.

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The SOA picked up on this, and so did a number of other actuarial bodies. There was a quick series of e-mails among some of the major subcommittees of the SOA, as well as the Canadian Institute of Actuaries (CIA), among others. They were seeking people to join. Originally it was a series of conference calls. There were two Tillinghast people who were participants in a conference call on September 9. The risks that were cited by the SOA when they sent out the notice for this call was that there was some concern that this could turn into somewhat of a turf battle: that portion of the framework that addresses areas that are traditional actuarial issues, at least certainly with regard to insurance and financial-services entities. The document makes a pretty strong push for accountants to play a more prominent role than they currently do in the risk-management process. There are some specific roles that were cited about chief accounting officers, and that the accountants needed to audit the ERM process both internally and externally.

There is still quite a bit of difference of opinion in the actuarial community about how to react to this. It is a very broad framework. Some would argue that it's a very general framework; it's kind of like mom and apple pie. It doesn't cover a lot of new ground. By being just a framework, there's plenty of opportunity for the actuarial community to step in and personalize it for insurers and really have a strong point of view.

Others feel that this is potentially a push that could lead to other actions, where looking at risk management may take a more distinct accounting bent to it. We need to find the right balance as actuaries between coming in on this issue and having a point of view, but yet not approaching it from an overly technical standpoint. I imagine a number of you are in this room because you deal with the risk-management area for your companies. It is something that deserves attention. For anybody who is interested in more information about this, I'll be happy to get that for you.

From my perspective, there are a number of recent events that have posed serious challenges to insurers. They heighten the focus on risk and the importance of risk. From a life company standpoint, the plunging interest rates, the stock market, the heightened credit losses and the slow economic recovery have put intense pressure on profit margins, upper pressure on reserves and the need for deferred acquisition cost (DAC) write-offs. From a GAAP standpoint, it's really hit people hard.

There are also threats of loss from terrorism and tort liability costs that are more profoundly impacting property and casualty (P&C) companies. Financial scandals in other industries, even though they haven't largely been insurance companies, still have put a focus on corporate governance. Sarbanes-Oxley, which largely emerged as a result of Enron and similar circumstances, has been a driving force for a lot of companies to take ERM more seriously, or take a broader approach to risk management, than they have previously. While there are some specific provisions in Sarbanes-Oxley, such as the control features, Section 404, I also see a number of companies reacting. I feel they're reacting more broadly to the increased

pressures that are placed on the CEOs and CFOs, including the financial and criminal penalties that are put on them. There is a need to understand and a need to manage against unexpected volatility. All of these things are then creating a lot more momentum toward the importance of broadening the way that the risk-management process is approached within the organization, and the way that that information is used and shared with senior management.

So from that standpoint, we've worked with a lot of companies that are looking to develop financial reporting systems that give them a clear understanding of the business. That would include things such as embedded value, and companies may well be doing that largely for internal purposes at this point; it's not necessarily for external purposes. It's also about linking it to an overall framework for ERM in a broader approach to that. I've definitely seen an increased role in the part stochastic modeling plays in the assessment of risk, and the establishment of a stronger link between risk and value.

The basic premise of ERM, at least the way most companies look at it, is that there's obvious recognition that there are many problems that companies face that have some interrelationship. Whether it be the allocation of capital in an efficient or optimal way, looking at maximizing returns given risk tolerance, looking at reinsurance or hedging options or M&A-type options, a variety of things interrelate. Part of the purpose of taking a comprehensive approach to risk management is to try to have more of an integrated look to all that.

In its most basic form, companies that create more of an ERM organization within their companies are looking to create a framework for management to address the risk. That can include steps, including just to feel like you're adequately cataloging the risk, identifying the risks and being able to talk and prioritize those risks in an integrated setting in terms of an integrated collection of representatives from different parts of the organization. It deals with the development, as well as the implementation, and the monitoring of financial and operational strategies. You're looking to assess the risks, to mitigate risks, but to also exploit the risks. This is definitely a two-sided equation. It's not purely defensive, but also offensive in that understanding risks in a more detailed way, you enable companies to arbitrage against their competitors and take advantage of that increased knowledge.

These are the three broad components to the ERM process. There's the development of the best strategies, which includes creating a proper structure to assess the risks and to identify the strategies. You then need to implement those strategies, which can include implementing the proper tools that you need to have a broader look at risk, or being able to look at more than one risk at a time. I talked to a number of companies that feel they're quite adept at knowing and evaluating the risks. But they're looking at one risk at a time, and they don't have a good way to deal with risks more than one at a time. These more complex organizations may be unable to look at risks across major product groups or across geographies.

Then we move on to monitoring the performance and environment. Another tremendous challenge when you're looking at risk and at stochastic modeling results is to make sure you have information broken down in a way that senior management can understand and can act upon it. The key premise here is to increase enterprise value by looking at growth and return, improving consistency of results and understanding of those results, but by factoring in risk and value in an integrated way.

When you look across the risk spectrum and you're looking broadly at risks, both financial and operational, not all risks are equally conducive to a random stochastic scenario of testing 1,000 scenarios or more. Some types of risks are conducive to stochastic simulation. But others demand other approaches. We've had some success when looking at more than one risk, and combining some of these methods to give management a sense of the overall distribution of results and the volatility that results from that.

There are a few different ways that we've tried to get divisions of the company to come together to develop a common view of both cataloging the risks and prioritizing them. The priority clearly has to be to look in terms of the likelihood of the risk causing volatility and the severity of that, and then the quality of the existing controls around that risk.

I'd like to spend some time talking about stochastic modeling applications. As an actuary, I'm excited that we've all been talking about the use of stochastic modeling, but I believe that we're on the brink of seeing a dramatic increase in the way companies use the modeling. Part of that is because it's been enabled by technology, by the advancement of computers. It's been advanced by the theory of the way we look at stochastic modeling, and it's been driven by some of the difficult economic times that we're in. People feel that they need this stochastic modeling to have a deeper understanding of risk.

A key premise is to have well-designed financial models that can help you deal with complex questions about risk and value. The models have to be designed appropriately and have a direct link to your results, so that it's clear that the actions that drive performance are a clear outgrowth of the model.

There is a variety of ways that we're seeing the broadening use of stochastic modeling. One example involves economic capital. I've heard a variety of names given to this term at different companies. At least the internal allocation of capital is linked in some way to the tail end of the distribution of results from stochastic testing. You're looking at either taking the bottom 1 or 5 percent of the scenarios or doing an averaging of those. Either of those approaches works to come up with an economic capital measure.

I wanted to provide a couple examples of what stochastic modeling has done for companies, and the way that I've seen this used as we've worked with companies.

One approach focuses on contrasting the company's current level of statutory surplus against the amount of surplus needed to protect against various ruin probabilities. In another example, there are different subsidiaries included, and then different deterministic shocks to a major deterministic or economic hit to the result and stochastic testing around that.

I've had a lot of success with this type of a presentation, and it can be used in a variety of ways. I'll go back to something I talked about earlier, which was communication. We face tremendous challenges as actuaries to be able to have our senior management feel like we're speaking in English, in a way that they can understand. If we're going to broaden the use of stochastic modeling, and if we're going to have that impact financial decisions, we need to be able to frame the results. We're able to go to senior management, and all they understand is we think we know the answer. They need to understand and be able to touch and feel the answer. An approach like this one can be very powerful.

What I'm talking about here is framing a strategic decision around two different product designs. I've also seen this applied where you're looking at different investment strategy options. It could be looking at entering into a new line of business or an acquisition. There are different ways that you can use this approach. What it allows you to show in a fairly simple one-page graph is not only the mean or the median result, but also the dispersion of the results. It's a fairly simplistic diagram that's not overwhelming to get your arms around. It demonstrates a situation where, for example, the conclusion factor analysis showed that product design A was preferable to product design B, despite the fact that it had lower expected profits. It had significantly lower volatility of earnings than product design B. While you could have had some kind of formulaic approach to come to that conclusion, this type of a graph and a combination approach form a very powerful way to get that point across in communicating to a diverse audience.

I've also had success with use of tornado graphs. You can use these kinds of graphs in a variety of ways. It's a variation on your source of gain analysis, where you're really trying to show the source of volatility, when you look at the stochastic results and are trying to identify which assumptions have the strongest impact on volatility. The times that I find these graphs most useful is when the order of magnitude you're measuring is in terms of your dollars of earnings volatility. If the company is very GAAP-centric, and you're showing one year out or two years out GAAP earnings hit, plus your minus that you have as a risk, then this can be very useful in helping assess priorities in terms of what are the most critical things to assess.

I want to touch on some advances in methodology. To me, it's the centerpiece if you're trying to approach stochastic modeling and really broaden the way that you're adding to the depth of the analysis you're doing, looking at more risks. But it has to be practical as well: that's the real tension. The real tension is between robustness and the run speed. Clearly it is appropriate to give up model accuracy

for run speed if you do it in a thoughtful manner. One way you can do that is, if you're going to do a thousand or thousands of scenarios, you certainly are not going to be looking at every single line of an income statement projected for 30 years. You're going to be picking the key metrics. It may well be that you can cut out significant portions of your calculations, which can be a major way to simplify your model.

It also may be that at the same level of model granularity that you need to do an adequate business planning process, or even adequate cash-flow testing, you may not need that robust of a model for the purpose of doing a thousand or thousands of scenarios. This is a very tricky issue. It's one that takes very careful analysis. Creating a simple model that is not representative of your business, and then coming out with very fast run speed—you can still get the fanciest of graphs with a nonrepresentative model. That's perhaps the most dangerous thing we can do. That's really the tension, and the key is stochastic models have to run quickly enough to be useable. But they still must retain sufficient detail to provide meaningful conclusions.

I want to touch briefly on some things that Tillinghast has done related to last week's stochastic modeling symposium. There was a jointly sponsored CIA and SOA Symposium held in Toronto. I was very pleased that Tillinghast provided three papers for that, and the fourth was provided by Towers Perrin. From our standpoint we feel that these papers, along with the other papers in the symposium, helped push the theory along. But we're also trying to push the practical theory. Again, there's a balance. I do need to say with a fair amount of pride that the top paper there, "Efficiency Stochastic Modeling," received one of the outstanding paper awards of the conference. I believe there were six awards out of 40 papers submitted, and three of them were given to academics and three to nonacademics. This was one of those award winners. The papers are publicly available now. These particular ones either are or will be on our Web site, but there are other ways that you can get all the papers. I encourage you to take a look at them and figure out which ones you want to take a serious look at.

Now, as far as the representative scenario paper, the exciting part about this is that it's trying to extend the theory on trying to run a smaller number of scenarios, but yet have those be representative scenarios that you can use instead of the full complement of stochastic scenarios. It's similar to the stratified sampling approach that's used in statistics. The way that it does that is it uses a relative present value distance method. The basic concept here is that you choose a distance measure that relies on an adequate understanding of the relationship between the firm's cash flows.

Then the method helps you choose a representative sample of the scenarios to be run, such that the samples are sufficiently far apart. I'll give you a little bit more detail on that. The measure also helps you identify the probabilities to weight those scenarios. If all you're worried about is the mean of the distribution, then cutting

down on your number of scenarios is not necessarily a problem. But the key is to do it in such a way that you feel like you're being representative on the tail of distribution. There are a lot of reasons why people are interested in the tail of the distribution. Economic capital is one of them. For the variable annuity, the C-3 risk-based capital, there's a major issue there.

Take, as an example, a case where some testing was done to compare the running of a thousand scenarios to the representative scenarios that were chosen. Fifty scenarios were chosen to be representative of the thousand. The tail regions are over the sample. Near the bottom of the tail, there are quite a few scenarios. But the probability weightings help you get a comparable pattern. In this particular case the correlation between the graphs is much better not just in the mean, but also in the worst half of the tail. The best-case scenario is that the fit is not quite as good, but again, for most applications that's not the important side of the tail that you're worried about.

If you want more detail than this, the paper is published. I'm just taking some highlights from it. Regarding the distance measure, this is actually an example of a distance method. There are a couple presented in the paper. There are ways that you can do this for one variable or for two. As I mentioned before, there needs to be some judgment involved. You need to have a sufficient understanding of what the most important driver is, or perhaps the two most important drivers that are linked to causing volatility. In this particular case it had to do with a block of fixed annuities that were both deferred and immediate. They were comfortable that the thing they wanted to correlate against was the short-term interest rate movements. The measure here helps you identify how distant various scenarios are, in terms of their projected short-term interest rates. It's this measure, then, that is the one that helps you select the scenarios, but then also probability weight those scenarios to be representative.

A second paper that I'm going to explore here is one that was written on stochastic modeling and mortality; it looks at stochastic mortality. In many cases people would model mortality as a deterministic process and would rely on the theory of large numbers. While that is sufficient for a number of purposes, it doesn't deal with either the volatility risk of mortality fluctuations or the misestimation risk. For certain applications these things become extremely important.

Monte Carlo simulation is a common technique. You could use a Monte Carlo technique to simulate the random fluctuation of mortality. There are a couple of examples of some other techniques. These vary in terms of complexity. One technique is a theoretically complex approach that is more time consuming to implement. It focuses on developing a random variable that's based on the time until death, and then looking at the likely distribution in terms of the variability of that assumption. But you then use variable transformation techniques to be able to develop your series of stochastic mortality assumptions.

A somewhat simpler and easier method to implement, but a variation of the theme of what you can do other than using Monte Carlo techniques, is using the function comparable to one that has a linear relationship. It is one in which you have random deviations and random shocks that are both multiplicative and additive.

More and more companies are appreciating that they have to look at a lot more than just interest rate risk. For certain types of products, mortality, or for that matter, morbidity fluctuation is a significant issue.

With regard to corporate-owned life insurance (COLI) reinsurance and the need to sometimes purchase stopwatch reinsurance against catastrophic claims, stochastic mortality and the ability to have a meaningful analysis of more of the tail-type distribution risks are extremely important.

The final paper I summarize here is one that focuses on the impact of dynamic policyholder behavior on capital requirements. While this paper deals with some fairly specific issues that relate to policyholder behaviors that relate to variable annuities and certain guarantees, there's a broader issue here. This is another danger point, that sometimes actuaries are using models that lead them to fall into some traps. Where you're looking at risk, you're doing random fluctuations, but you're not adequately looking at the linkages of how those things fluctuate to other factors. You can't assume that everything is an independent random fluctuation, because some things are very much linked. What this paper focuses on is trying to analyze the policyholder behavior and how to model movements and policyholder behavior under various scenarios.

This paper covers quite a few examples. I've just picked out a couple that I wanted to show you. This particular one was looking at the C-3 requirement sensitivity that's prescribed and looking at a guaranteed minimum income benefit (GMIB) situation. What you can see is that if dynamic lapses are ignored, there's no linkage. With the lapse assumption, you get a certain amount of basis points that you need as far as the size of the issue that you have. The impact of the dynamic lapse has manifested itself in two ways. This is an illustrative sample, and it was intended to be a believable scenario. The introduction of the dynamic lapse in this particular example had a very profound effect, both directly and then also indirectly on the three other pieces. The maximum manual GMIB election rate is increasing to 50 percent.

The final example is looking at a guaranteed minimum withdrawal benefit lapse assumption, and again, trying to look at the impact of dynamic lapse reduction, but then also factoring in other attributes as well. The purpose of my covering these papers is to make you aware of the issues. There are a number of other excellent papers that were presented at that symposium. So in general, I feel very excited by what the CIA and the SOA have done by encouraging such a significant array of papers. It allows us to extend the theory, but we also need to have a practical edge to that as well.

In conclusion, there is a greater need to know, and a greater pressure from senior executives as well. Companies have been very pleased about that. It creates a more open mind for what we as actuaries have to offer. ERM and the broader use of stochastic modeling can be used more extensively by management to put a greater depth of understanding on the causes of volatility on financial results.

MR. ALBERT JOSEPH ZLOGAR: You don't see breaking news in the risk-management area too often. That's interesting. So the accountants are now trying to look at this. It must be as a result of all the Enron-type stuff that's happened.

MR. GIBSON: Right.

MR. ZLOGAR: I work for the individual life and annuity division of ING. I'm here to talk about how we approach everything Jack was talking about: the integrated equity fixed interest, risk-management products, pricing profitability.

It's really a multifaceted approach. The key areas are product design and pricing. We have different governance levels of independent oversight, review and signoff. We have strict consistency of assumptions that we use, as well as focused areas of responsibility, rigorous reporting and monitoring of results.

Obviously product design and pricing are the foundation. It's difficult to manage risks if the products are not designed or priced properly. We all have to deal with the continuous attention balancing the profit hurdles and competitive pressures, as well as short- versus long-term view profitability. It's a challenge that we all have. If there are areas of vulnerabilities or holes in the product where you might not expect sales will gravitate there, you can be assured. You can get burned if you don't carefully look for that ahead of time, as we all know.

You have to continually look at what's coming in the door, what type of cases are coming in. We have a complex and geographically diverse organization and markets. When I first arrived at ING the unit I was in was a standalone variable annuity unit. We pretty much controlled everything there. We had a chief executive, IT operations and pricing, and we were able to keep a close handle on everything. Now we're in the midst of a reorganization that is still ongoing after some acquisitions. We've combined very large operations into different areas; it's much more complex now. You really have to keep an eye open and watch what's coming in.

A lot of the people who are running the business are fairly new, so we're learning and stripping off the layers and everything. We have instituted a review process in which, for the normal sales and new business flow, we put monitoring in place if it's a certain unusual case or size, and we'll have a signoff procedure. We won't go through normal channels. We'll have to stop it and do a risk review.

For pricing where you have nonsymmetric risks, and that is where if you're running multi-scenarios you have path-dependent results, if the mean, or certain percentile results, are worse than the static best estimate assumptions, we put in an extra margin and price that in, as a lot of companies do. I'm not just talking about equity markets, interest rates and dynamic lapses as Jack was talking about with utilization. This is where results can vary widely and you get burned down in the tail. So we keep a close eye on those types of things.

The key is that our financial and risk actuaries are intimately involved with the pricing actuaries up front. I've been at companies where the pricing department is up on the third floor, and the financial and risk people are over here on the eleventh floor or something. At our company we've really tried to strictly keep involvement of all the parties involved right during the pricing review, start to finish. The financial and risk actuaries have to sign off on products before they are released or filed. After careful discussion, we analyze and identify the worst scenarios of vulnerabilities. If there are areas of concern, we either hedge those risks or modify the design with a price.

As far as the interest scenarios and equity scenarios that we use for the stochastic pricing, in the past it was more stable, and you didn't have to worry so much. But we've all been through the extreme volatility and sharp declines in interest rates, so we update our interest scenarios or stochastic scenarios every quarter. We'll generate a new set off whatever the current level of the yield curve is. Equity scenarios at least annually will generate a new set for all the stochastic analysis.

Another part of the integrated risk management approach is that we have levels of oversight of pricing risk in financials. At the business unit level, which is where I'm at, the risk and financial actuaries are responsible for assumptions, and we're intimately involved in product design. We have to review and sign off on the products. Above that we have two more tiers of protection or controls. ING is a global company, and at the global level they set standards for risk profit economic assumptions, the amount of capital you have and the ratings we're trying to maintain. One level underneath the global is our regional oversight, which is the United States in our case, where we have corporate office. There's a group of risk and actuarial folks there. That is also carefully monitored.

We also have the legal and compliance department for various aspects of the business. With the state insurance department, market conduct sales and crediting practices, it's a complex business, and we have to keep an eye on everything. As far as internal audits, the corporate audit department will pick a certain area, and they'll say, "OK, we're going to audit this area for the next couple of months." They'll come in and interview and go through the whole process start to finish. We find that useful. It's just another set of eyes looking at the controls, the data sources and that type of thing.

The next category of the integrated risk management approach is consistent assumptions. We have strict requirements; it seems like a no-brainer sometimes. But you can get divergence there if you don't watch it. As part of our annual planning process we develop assumptions, update all of our assumptions for the new pricing that's going on and for that year's block of sales and the business plan. We're careful to make sure that the business plan and FAS 97 best estimate assumptions are consistent with pricing, or equal to the pricing assumptions in most cases. The results you're monitoring are going to match the products that you're selling. Everything is consistent.

Like most companies, we do a rigorous annual review and update of the key actuarial assumptions. For critical assumptions, we'll pretty much continually monitor those interest rates' market volatility. We have a dedicated data and experience studies department. Sometimes it's hard to get people to work in those areas. They are not the most exciting. But they're of critical importance, and we try to keep those guys happy.

Let's talk a little bit about focus in dilution. One of the big secrets of effective risk management is having focused areas for the different aspects of it. In this day and age, with expense controls and the way the market has been, the tendency is to try to do a lot more with fewer people. So you might have the "four jobs per person" thing. But we have focused units in certain areas; that's all they do. The equity risk management area, for example—that's all they are working on. We keep the fixed-income risk management, asset liability management and equity exposure reinsurance areas out of the financial quagmire work that we call it. It's very easy to consume resources in those jobs. So we try to keep the risk people looking at just the risk areas.

So we have pricing and product design, fixed income risk management, equity, reinsurance mortality, reinsurance and financial reinsurance, and then, of course, the financial reporting, earnings, capital, valuation and cash-flow testing. As I said, we have quarterly asset liability meetings where we put together earnings at risk, embedded value, risk analysis, minimum interest rate exposure—that type of thing. It will be a conference call with the corporate area. We'll walk them through all of our results and exposures and take any action if we have to.

There also is our area that maintains close contact with the investment department. ING's U.S. investment department is centralized at the corporate office, so all the various business units use that department. We have daily discussions with them, as far as the investments backing the products. I mentioned lag risk in protecting interest margins. With the reorganizations that we've done over time, you can have discipline pricing, stochastic haircuts and all that in your spreads. But when the premium comes in the door, if it doesn't flow through the treasury process, get invested when you're on the rate. Your fixed margins can be depressed, I don't care how much analysis you do. So the processes are extremely important, and you've got to look at those, and how much time is involved from start to finish.

Our equity risk management area grew up over the last few years. Over time, with the variable annuity guaranteed benefits, we decided to build an internal hedging program there. That's an extremely calculation-intensive area. Each week we had an entire room walled off with computers looking at all the exposures and setting up the proper hedges.

Analysis of funds: as new funds are perhaps added to variable annuities, maybe distribution wants to get a new fund in there. We do a fairly systematic process where we'll look at the volatility of the fund holdings, and map it into our current overall fund structure. We see how it's going to affect the volatility of the overall results in the hedging program and the guarantees.

The next focused area we have is the reinsurance area. The person who heads up our reinsurance area also is in charge of our underwriting area. There's fairly good synergy there. We feel it is extremely important to pay close attention to mortality experience and maintain that expertise. Over the past several years most companies are out there reinsuring a lot, taking advantage of the experience and pooling of the reinsurers. You can perhaps become lax and say, "Well, you know, they build in mortality improvements; we'll let them worry about it." But after the past few years, with capacity limitations and potential increases in reinsurance rates, it's extremely important to maintain that expertise and not get caught with adverse results.

Our reinsurance unit maintains very strong relationships with reinsurers. Capacity is a big issue these days. For the financial reinsurance, the XXX are reserves and secondary guarantee reserves on universal life. With our credit capacity there, the financial reinsurance is critical. That unit also is on the lookout continuously for creative solutions to these issues.

Finally, the reporting and monitoring of results is a key tool in our risk-management process. We have rigorous reporting and monitoring requirements for the embedded value of the business, how that changed during the year, and the embedded value in ROI of sales during the year. We report that in a very disciplined manner and strictly to management. We walk them through what's going on there. They monitor profit targets and meeting those targets and hurdles. We also have paid close attention to our company expenses versus those built into the pricing. Hedge program performance is a closely monitored item, and our fixed interest margin is another regularly reported and analyzed number. So the reports that we have to do for internal management purposes really force close attention on the risk and financial management. And, of course, there is heavy focus on actual versus expected and priced for results.

MR. HENRY SIEGEL: When you do the embedded value, do you do it stochastically, or do you do it deterministically, and why either way? Or why not?

MR. GIBSON: It depends on the usage. For official embedded value reporting each year, it's a deterministic exercise. But for the real analysis of embedded value at risk, we look at the mean or percentile-embedded value results.

MR. SIEGEL: You do both?

MR. ZLOGAR: Yes. I guess that's the easy way to answer that.

MR. SIEGEL: You mentioned you have a hedging program. What do you hedge?

MR. ZLOGAR: We have a hedging program for guaranteed benefits on variable annuities. So guaranteed minimum death benefits and living benefits.

MR. SIEGEL: You hedge them, or you reinsure them?

MR. ZLOGAR: Both. As we all know, reinsurance became pretty expensive a few years ago, so we built a hedging program.

MR. SIEGEL: You hedge the assets or the liabilities?

MR. ZLOGAR: Liabilities.

MR. ROGER SMITH: I was at a session earlier today, where they were talking about how Enron is going to affect the profession. They stressed documentation, same procedures control, and one of the speakers mentioned that there's an inherent distrust of stochastic processing. I heard earlier that, and I think Jack said this, you have got to get these results out fast enough. So you might have to cut out this and go back to some granularity, find some sample scenarios. My question is, with that happening and the realities that you mentioned—and I agree with you 100 percent—it seems to me that something has to give. Would you agree that there are some forces colliding here in the need to have everything done in a more complete, seriatim basis for the Sarbane-Oxley folks? We've got this need with the way we typically do things to look for ways to find some work-around short cuts, because of intense run times. I wonder if you could comment on which approach might win out?

MR. GIBSON: I think both have their place. The struggle is that we're in the business of uncertainty. So we have to be able to handle that we can get an adequate understanding of the game that we're in, and how we're going to succeed and how we're not going to succeed. So what definitely is not the right answer is to say, everything has got to be seriatim, and I have to calculate everything to the tenth degree of precision and all that. But having said that, I think that when you are looking at trying to do some pretty sophisticated look at risk, looking at more than one risk at a time and so forth, you need to find a way to balance things. If you are going to cut corners, you need to cut corners in a way that you can demonstrate that your results are still representative. One example: there was a

demonstration given of comparing the 1,000-scenario result to the 50-scenario result. I was in one situation where we had a more complex model: we developed a model and did some validation to determine that the smaller model was representative. As we went along with the project, we also selectively did some reruns of the multiple deterministic runs from the more detailed model to be able to continually assess whether we had sufficient balance and the representative results.

MR. ZLOGAR: I think it is a fact of life though. We're going to be much more computer intensive in stochastic analysis, both in the pricing and in the enforced management stuff.

FROM THE FLOOR: I attended that stochastic modeling conference last week in Toronto. Your comment earlier was interesting about the accountants trying to perhaps claim some turf. It's been a long time since I've studied for actuarial exams. But I still like to think I can intimidate an accountant mathematically. On the other hand, when I saw all the things that people are talking about with the real theoreticians, I am very much intimidated. I'm just struggling with this gap of what I see of, yes, you can go off and study some things and come back and present some results, and it could be very, very good work. But if people don't buy it, or if you can't tell anybody about it, it seems to me at some point maybe we have to change how we go about it, and say, OK, if this is the work that we have to do and we agree it's important, here's what it's going to cost, and we've got to build up, ramp up and things like that. I'm just speculating if that might be an answer at some point.

MR. GIBSON: I think those are excellent points. These are the tensions that we have to deal with. You have to balance the practical, like on the run speed, and then you have to balance the theory and the practical from a standpoint of the theory, but if all of it is textbook material, it's not going to do us much good in the real world. I see it somewhat as an iterative process. Sometimes when theory is extended, then we have to take the next step and say, OK, how do we implement this and practice some way that we can actually use it?

MR. ZLOGAR: We can take advantage of the great work being done out there in the industry. I was involved originally on that C-3 Phase Two group and have since pulled out of it. It sounds like it's a fairly simple concept. You have equity scenarios, and then you look at the tail risk and things like that. OK, it shouldn't take, but it's taking a couple of years just to iron out all the different complexities of it. As that work is completed by our profession, I think we can all take advantage of it and the software. We'll come out there, and that helps a lot too.

FROM THE FLOOR: You said that you calibrate and then you create new scenarios. Do you have actual data, or do you trunk it from the back end and keep a fixed amount? What type of scenario calculations do you use?

MR. ZLOGAR: The quarterly generation of scenarios I mentioned is really of interest rates. So it's a typical stochastic interest rate generator that we've been using for years in our profession. But our investment area will generate these: we have some actuaries in our midst that will generate scenarios; they'll transmit them out to the units. They're based on the parameters relatively and the yield curve, that type of thing. So that's a quarterly update of the scenario set that we're going to use. On equity scenarios we've been using both approaches. The log is normal in a lot of cases. We also have been using the regime switching calibrated scenarios more recently. Those are what is going to be required for the new capital requirements, and they capture the tails better.