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Session 32PD
Understanding and Managing Life Insurance Risks

Track: Product Development

Moderator: PHILIP A. VELAZQUEZ
Panelists: A. GRANT HEMPHILL
CLIFFORD A. LANGE
PHILIP A. VELAZQUEZ

Summary: The panel identifies the risks in various life products and the product development actions that can enable an insurer to manage the risks. Attendees gain an understanding of the features that create risk in life-insurance products and how product design and product management steps mitigate it.

MR. PHILIP A. VELAZQUEZ: This session is the second part of a three-part program. The first part was Session 11, and it dealt with managing annuity risk. Part 3 deals with risk management at the corporate level.

We have two distinguished panelists today, and I'll be your third. Our first speaker is Cliff Lange, senior vice president and chief actuary at GE Financial Assurance, a company with over $100 billion worth of assets under management worldwide. Cliff has been in his current role for just over four years, has 22 years of actuarial experience and serves on GE Financial's risk committee. Cliff will speak about the risk-management process at GE Financial.

Our second speaker is Grant Hemphill, a consulting actuary with Van Elsen Consulting. His experience is varied and includes mortality, underwriting, reinsurance and product-development projects. He has worked on several mortality-related projects for the Society of Actuaries and has published articles on mortality. He is also a would-be academic and social scientist. In this regard, he is a student of game theory and he will tell us that game theory has a lot to say about managing life-insurance risks.

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My name is Phil Velazquez. I'm vice president and actuary at GeneralCologne Life Re of America. My responsibilities include managing the reinsurance-pricing process for the individual life division. I also serve as the risk manager for the individual life division. I will speak about some of the items that you might consider when you evaluate reinsurance as a risk-management tool. So without further ado, I'll turn it over to Cliff Lange.

MR. CLIFFORD A. LANGE: Consolidating for scale, globalization, increased volatility, high employee turnover, changing customer demographics, accelerating technology, ratings downgrades, regulatory environment changes, complex products, equity markets movement, customer savvy increasing, new distribution channels opening, new markets opening and margins squeezed are just some of the changes that have affected the way most of us look at risk. Each of the 14 items on this list is a business reality for many of us. Each year, change seems to move faster than the previous year. When multiple changes occur simultaneously, the effect is compounded.

Four types of risks are: operational risks, regulatory risks, market risks, and product risks. Under operational risks, metrics are key to understanding action plans. For example, in call-center flow, average time to answer and abandon rate are two metrics of success. Since September 11, crisis management and advanced contingency planning have taken on a whole new meaning. The interaction of risks is important to understand.

For example, in the product-risk section, there can be an antiselective impact of lapse on mortality. The healthier risks tend to be the most likely to lapse. Likewise, if credited interest rates aren't competitive, lapses increase in a nonlinear fashion. It's not so important whether you use a power function, an exponential function, a sigmoid function, or some other function to represent dynamics lapses. What counts is how well the assumption fits reality. Some individual risks affect products differently. For example, lapses may be favorable in late durations and unfavorable in early durations. Likewise, low lapses may be unfavorable, in general, for certain products and favorable, in general, for other products.

Risk-management objectives need to be clearly articulated and understood, and need to be periodically revisited. At GE Financial, we take a holistic view of risk. Looking at isolated, single risks can lead to different decisions than a holistic approach. Developing metrics for tracking minimizes the chance of making decisions based on anecdote and emotion. For example, is the goal to maximize growth and economic value-added while meeting earnings-growth constraints? Or is the goal to manage the standard deviation of surplus? You may have a different goal. Ultimately, the goal is to be appropriately compensated for risk, and to balance prudence and boldness to grow intelligently.

Risk management is a separate function at GE Financial. Each business has a risk leader. Our risk committee is formed by a partnership from several disciplines,

including the chief executive officer, chief financial officer, chief risk manager, chief investment officer, chief actuary and other key leaders. Utilizing senior leadership team members ensures the appropriate level of priority and attention. Risk management is a core competency at GE.

We have six sub-processes in risk management at GE Financial. They are identifying risk, measurement of risk, analysis of risk, mitigation of risk, monitoring risk and controlling risk. We establish authority levels and early-warning triggers that are appropriate and relevant. For example, a detailed grid exists in GE Financial that outlines exactly what level of position or committee needs to approve various asset purchases. These approval levels vary by several factors, including size of asset and asset category. To measure whether emerging experience is on track, we have early-warning triggers. These are often set at upper and lower limits. This way, we capture not just unfavorable variations from expected assumptions, but also items that appear "too good to be true."

We transfer best practices and risk management across GE businesses using Six Sigma quality tools, in-force reviews, and learning tools and forums. Our Six Sigma approach uses five phases to improve current processes. They are define, measure, analyze, improve and control — sometimes abbreviated by the acronym DMAIC. For designing entirely new processes, we use define, measure, analyze, design, and verify — known as DMADV. Risk management uses an objective approach outside of normal business processes. One of our best practices is combining experts from insurance and the GE medical systems businesses with outside experts, and to have a periodic GE underwriting and risk-classification forum.

Here are just four risk-mitigation techniques. You can avoid certain risks by changing product features or transferring risks using reinsurance. You can offset risks by taking inversely correlated risks. For example, by selling term insurance and single-premium immediate annuities, there's a built-in mortality hedge. You can diversify risks to mitigate the impact of varying returns and volatility. Ignoring diversification strategies and putting all of the proverbial eggs in one basket is asking for risk issues to heat up.

Many tools exist to help us with risk management. Sensitivity analysis is conducted to study the severity of impact of variation from expected assumptions. It is important to note that linear interpolation or linear extrapolation of a sensitivity test is not necessarily accurate. In addition, the cumulative effect of several sensitivity tests does not necessarily produce the same result as the additive, incremental effect of each one.

Stochastic analysis is conducted to study the probability distribution of results. Graphical representation of results with clearly defined percentiles or confidence intervals aids in communication. For example, saying that a product has an expected return on equity of 12 percent and a 90 percent probability of obtaining an ROE of between eight percent and 16 percent provides some useful information

on central tendency to senior management. Also, having metrics that quantify the severity of the distribution tails are helpful in driving decisions.

Risk-profile curves are helpful for ranking returns for all scenarios and getting a visual picture of risk. Classic asset/liability measures such as duration, convexity, and partial duration are helpful for management. Testing nonparallel twists in the yield curve helps indicate some risks that don't show up in parallel-yield-curve shift tests.

Utilization of multiple measures is key to ensuring robust profitability. For example, if one company relied only on ROE, then products with small equity requirements might meet the ROE hurdle while producing unacceptably low profit margins — as expressed as present value of profits divided by present value of premiums.

Stepwise regression of top risk drivers and a correlation to output variation is another helpful tool. For example, do the top three drivers account for 70 percent of net-income variation or 40 percent of net-income variation? Remember that tools can be helpful, but they don't replace business acumen.

Let's drill down on a life-insurance-mortality example. Key questions include: Are underwriting standards being consistently applied? How sensitive are profits to mortality swings? How likely are mortality swings? Is the steepness of the selection curve appropriate? For example, how wide are the mortality differences between attained-age 45-year-olds issued policies this year versus five years ago versus 10 years ago versus 15 and 20 years ago? How comfortable are you with the underlying data integrity? What's the credibility by each segmented data group? What is your full-credibility threshold? What is your partial-credibility function? Is it a square-root function, a hyperbolic function, or some other function? What's the actual-to-expected experience? Does it vary much by issue age, duration, calendar year, underwriting class, gender, size of policy, premium mode or distribution channel? If so, what are the root causes? What's the actual-to-industry experience? What's the impact of antiselective lapse on mortality?

In summary, for sound risk management, it's important to have clearly defined objectives to establish organization and processes. At GE, we have a dedicated risk-management team at each business. Risk management can take an objective view of the business. I recommend that you develop a strong risk toolkit and focus on the key drivers.

MR. A. GRANT HEMPHILL: I am just going to talk about term insurance — so mostly it's mortality. I might have time to talk about expense. I'm going to talk about the fact that your actual results don't equal your expected results. If yours do, that's interesting. I'd like to hear from you. And the reason actual results don't equal expected results can be broken into two categories. One is specification error, and the other is random error.

Let's talk about random error first. It is modeled by variance or other stochastic methods. C-2 risk; aggregate claim methods (Panjer, Kornya, Dapril, etc.); risk-adjusted capital, risk-adjusted surplus, risk-adjusted pricing; value-at-risk; and X-factor certification are all good tools or machinery for dealing with random error. We also have Monte Carlo methods and some very new techniques for dealing with risk in the tail of the distribution. But, in general, these are stochastic methods, so they are based on variance. I'm not going to go through all of them, except to note that everything here, except the X-factor certification, assumes that you have the right model. If the model does reflect reality, then all these tools apply, and they give you some really great results. For instance, they produce confidence intervals that make sense.

X-factor certification is slightly different. The purpose of X-factor certification is to test whether you have the right model; it doesn't assume you have it. So if you get results that are within a certain range, it confirms your model. And if you don't get results in that range, then you reject the model, and that means that you are dealing with specification error.

Specification error means that you have the wrong model. How did you get the wrong model? Perhaps you left out some important variable. Perhaps you have something in the denominator that should be in the numerator. Maybe you've squared something that should have been cubed. There are a lot of ways you could have the wrong model.

We don't have good tools for dealing with this. The statisticians don't have good tools for dealing with it, really. The one thing I know of that even tries to address this is C-4. As you know, the C-4 part of the risk-based capital formula is not really sophisticated. There is not a whole lot behind it.

Specification error creates bias in your model. If you don't have bias in your model, you get nice confidence intervals on things like aggregate claims or risk-adjusted pricing. But if you've misspecified the model, then all those variance-based methods produce meaningless results.

Actuaries depend a lot on the law of large numbers. All those techniques that are based on variance work better as your company gets bigger. The variance gets smaller as the amount of data gets bigger. That's not aggregate claims, of course, but that's the ratio of actual to expected claims. Or, if you can calculate the confidence interval around the Qx, it is going to get smaller as the amount of data gets bigger. Misspecification or bias is not affected by size. You are just getting a bigger problem as you add more size.

Therefore, as an aside, smaller companies need a larger level of surplus, but that is based only on random error. And that has a surprisingly small impact, actually. I am not aware of indications that the smaller company needs greater surplus because of misspecification error.

When actuaries are doing term insurance, I think the most likely specification error they will make is what the statisticians would call identification error — too much extrapolation. Here's what they're saying, in general. You have a bunch of data, and based on that data, you came up with a theory. So now, can you apply your theory to some new data? Will it work over there? If the answer is "yes," then the statisticians would say your theory travels well, or it is a robust theory. On the other hand, if it doesn't travel well, then it doesn't work on the new data. They would say you have identification error or you extrapolated too far.

How do term-pricing actuaries do that? Perhaps we had some experience or data, and we found that, when we changed the underwriting criteria in a certain way, we got a 10 percent improvement in mortality. So now we are involved in a new situation and make the same change in the underwriting criteria. Will we get that 10 percent improvement in mortality? The answer is "yes" if our theory travels well, but it's "no" if we are extrapolating too far, and there is really no way to know in advance. You can try some judgment, but we don't have actuarial tools to tell us in advance if it's going to work. This is my main point: All of those methods based on variance and stochastic theory don't help when you have misspecified your model.

Is this specification error important? About five years ago, the SOA commissioned Bob Fillingham to do some studies. He looked at dynamic-solvency testing and whether it could have predicted the insolvency of six different companies. He listed the reasons why each of those companies went insolvent. Nothing had anything to do with randomness. There were no big fluctuations in the claims. Basically, they misspecified the model. I'm not necessarily saying the actuary did. Often, the actuary priced the product for one situation, and others sold it in some other situation. Those techniques for random fluctuations do not apply when you price the product for one market or underwriting criteria and then sell it in some other situation.

A few months ago, you received the February issue of the *Actuary*, and in it there was a roundtable discussion about insolvencies. Some of the insolvencies were caused by fraud. Others were caused by strategic error. Again, these people did not even mention random fluctuation. Fillingham had mentioned it, but he said it didn't appear in any of the cases. In this study, they were looking at more than six insolvencies. They had nothing to do with random fluctuation. I see a trend here and a problem. We have tools that deal with random error, and we have insolvencies that are caused by something else — but it's not anything that we seem to have modeled.

The tool we need to use to study strategic error is "game theory." Other social scientists have noted the serious misspecification error that results when strategic behavior is modeled as random behavior. It is very hard to do empirical testing of strategic behavior, but there is a growing group of social scientists trying to develop this.

Now, I want to step back a minute and take a new look at what actuaries do and throw in one more concern. I think what we are doing is making decisions under uncertainty. What should the price be? What should the reserve be? What is the value of this block of business? We make decisions like that, but we do not know what the future holds. We have to make a decision anyway, so we work with various tools for dealing with uncertainty. Mostly, we deal with random outcomes due to states of nature. I am suggesting that there is another very important reason why the future is uncertain: strategic interaction. We don't have many tools — at least we haven't used them as actuaries — for dealing with strategic uncertainty. We are involved in strategic interaction on a lot of different levels with a lot of different players.

What's going on is, we have to make a decision. We have several choices, but some other players in the situation also have decisions to make with a lot of choices. Our outcome is going to depend on what we decide, but it also depends on what they decide. Their outcome depends on what they decide, but also on what we decide. And, so, neither of us can be certain of the result because we don't know what the other is going to decide. That is strategic uncertainty. It is modeled with game theory.

Once upon a time, game theory was on our syllabus. I would call it a rather token approach. I think it should be brought back. To delve into this a little further, mortality, I would say, is usually a random variable. I say "usually" because there is the suicide option. Suicide is not random. It is a strategic choice. So how do we deal with that? In fact, the industry dealt with it very well. Its not covered (fully) in our policies, so that's good for the insurance industry, and it's good public policy not to encourage suicide. The mortality that is left is probably a random variable.

I don't think lapse is ever a random variable. I think, to some extent, we are insulting our policyholders by implying that their decisions are random. The policyholder has several options. He can pay his premium, he could just hold or he could decide to sell his policy back to you. And you have several options. You could credit a higher or lower interest rate, and you could increase or decrease your mortality charges. When you make your decision, you are anticipating how he is going to make his choice. And your policyholder, when he makes a decision, is thinking about what you are deciding. We usually don't consider that. Our policyholders are out there trying to anticipate what we are going to do. But one clear example of that is shock lapse. The policyholder’s decision anticipates the new owner’s decision to increase the mortality charges.

Therefore, I am encouraging you to study some game theory. And I am not implying that there aren't some game theorists here already. Maybe some of you are experts. But if any of you decide to study this, very briefly, you are going to first learn how to set up the game in the strategic form or the extensive form. And then you will learn some simple solutions to games. There is the dominated

strategy solution, if you are lucky. And then you will learn mixed strategies and Nash equilibrium. And isn't that a wonderful thing to learn, because John Nash is the subject of that popular movie, "A Beautiful Mind." Then you will get into really tough stuff. They're now about to lose many students, because they're going to get into games of asymmetric information. In these games, the players don't have equal knowledge of each other's choices and preferences. When they get to this, and it gets really hard, a lot of students start getting lost.

There are two examples that every textbook uses: antiselection and mortality hazard. Those are the key examples of games with asymmetric information. So, as an actuary, I think you will be comfortable at this point. Many of the textbooks will then talk about a claims spiral or a rate spiral as a further example of an asymmetric game.

This is a good time to make a comment about terrorism that, I guess, we all need to consider in risk management these days. I did a search on the Web for "terrorism and game theory" and got hundreds of hits. One of them, interestingly enough, was an article written by an actuary, John Major. He works for a broker, Guy Carpenter. Major has a very interesting illustration to get us to understand the difference between strategic risk and stochastic risk. His example of stochastic risk is the hurricane and his example of strategic risk is the terrorist. If the hurricane is approaching your beach-front hotel property, it is not going to notice that you have just built up the sea wall and, therefore, veer 100 miles north and hit your other property that you haven't fortified. However, the terrorist will. If one airport has greatly increased security and the other one has not, then the terrorist goes where the security has not been increased.

Here is an interesting scenario for you: Three years after beefing up the security at your local hometown airport, some politician or citizen advocate will complain that all that security was a waste of money. In three years, they haven't found one knife, one gun or one bomb. No terrorist has been caught getting on an airplane. They've spent all that money and hassled all those passengers for nothing. Okay, what's the fallacy in that reasoning?

Isn't that what we call the sentinel effect? We have been doing HIV testing for years, and we didn't get near the hits that we expected. If we do a normal, old protective-value study on HIV testing, it doesn't pay for itself. I think it's pretty clear that we're getting the sentinel effect: The HIV-positive applicants don't apply.

Now throughout this, I've been talking about term insurance. I don't know if that was clear all the time, but I hope you caught the subtle references. Here are some very specific comments about term-product design, somewhat based on this idea of dealing with strategic risk as well as stochastic risk.

First, there is distribution risk. I am talking about the fact that you do not make the same profits from every sale. At age 35, preferred-plus male, you don't have much

profit margin. But you have some other cells — different ages, classes — where you might make it up. But what if you happen to sell too much business in those cells where you do not have a significant profit margin? An efficient market is going to lead more applicants to your least profitable cells.

It is possible to mitigate this risk through reinsurance. Ask the reinsurers to give you just one allowance applying to all cells. If they accept that, then you have transferred some of this distribution risk to them. You have probably paid a price, of course.

Concerning risk-class midpoints, let's consider your middle class. Say the cholesterol range runs from 220 to 280. So the midpoint is 250. If you could average the cholesterol for all the people that get this class, it is going to be way over 250. So what is going on? Well, strategically, those who are down at the bottom (near 220) are finding preferred-plus from somebody else. And then you have those up closer to 280, the top of your range, and you are not only getting them, but you are also getting a lot of exceptions who managed to slip over the line. So the midpoint of the range might be 250, but the average of the group that you are getting in there is much higher and climbing because we're getting more and more of this strategic behavior. Some people say we're driving the inefficiency out of the term market.

Concerning internal replacements, I have had the following deal offered to me. One of our top agents came to us and said, "I just love those new term prices. On the other hand, they're kind of embarrassing, because I sold all that old term and I really can't go back to the same people to sell them more. I can't sell to their business partners. I can't embarrass them, because they've got all those high rates. I need to roll all that term over to your new product. And it's going to be a lot of work to do it, so I have to be paid full commission. There are other companies that will pay me full commission to roll it if you don't." The solution to that dilemma depends a lot on your own circumstances. But it's not found in the SOA textbook on life contingencies by C.W. Jordan. It is more likely to be found in some game-theory book.

Concerning risk-classification "outliers," I heard an underwriter explain why you do not want to be an outlier on any underwriting criteria. In other words, you do not want to be the most liberal on any particular item. Today, we can see that by the analogy with terrorism. You do not want to be the airport that is most lax in its security procedure. I often find underwriters think strategically while actuaries think stochastically.

Finally, on term, look at the amount of applications that you are not placing by underwriting class. When your underwriter offers preferred-plus, how many of those get placed? I predict it is 90 percent plus. And when your underwriter offers preferred, how many of those are not taken? I have seen numbers ranging from very high teens to 40 percent. When your underwriter offers standard, I have seen

estimates that up to 50 percent are not placed. Now, that represents a composite, to my way of thinking, of a lot of strategic behavior. There are things going on between your agent and your client, between your agent and your underwriter, between your applicant and your underwriter and between your agent and the other companies he sells for. There is strategic behavior represented in those few numbers. You can learn some things about your own expenses and how strategic behavior is affecting you.

MR. VELAZQUEZ: I'd like to start my presentation by stating, "It's a brave new world in life reinsurance." I'll be covering some of the new issues that are affecting life reinsurance, and how it can impact the ceding company as it considers transferring risk to reinsurers.

Although you may be asking what's new in reinsurance, I'd like to start by stating something that's not so new; that is, reinsurers are very aggressive in pricing. Life reinsurance rates are so attractive to direct companies that now the majority of the death benefit risk is reinsured. First-dollar quota share has become the norm. When I first entered the life reinsurance industry over 20 years ago, excess of fixed-dollar retention was the usual form for allocating reinsurance. For a while, during the term price wars of the 1980's, we were seeing quota share, but once the reinsurers retrenched, we went back to excess retention. In the 1990s, we saw the introduction of more aggressive pricing, especially for term insurance, and first-dollar quota share gained in popularity. However, permanent insurance still remained on an excess basis. Now, every request for a proposal that my company saw last year asked us at least to consider what the impact of a first-dollar quota share would be on pricing. A recent trend is companies approaching reinsurers about in-force deals on business that has been retained, and now they're asking for reinsurers to consider quota sharing the remaining retention.

Unfortunately, last year we saw the risk of terrorism introduced into our workplace, and I fear it will continue to be a factor for the future. Concerns about concentration of risk are an issue, especially in areas like group insurance and corporate-owned life insurance. My company was very surprised when we saw the concentration of risk that we had in one of the World Trade Center towers. One of our large producers of reinsurance had a large agency in one of the towers and they wrote quite a bit of business in that building. Since the company was very proactive in dealing with claims, our early claims really flew in the door, and we were extremely concerned over our eventual total liabilities. Thankfully, the claims slowed after several weeks and they were manageable.

Catastrophic coverage (cat cover) is another concern. Cat cover is generally not available now for reinsurers. It may be available for the direct companies, but at a very exorbitant price.

Let's look at in-force blocks. What are the reasons for the interest in ceding in-force blocks? Well, we're seeing companies shedding non-core business, focusing on

product manufacturing and distribution, freeing up capital and locking in mortality. It's the last item I want to discuss. I believe some companies may not be aware that, in reality, the mortality is not locked in, and they should review the rate guarantees in the reinsurance contract.

During the rest of my discussion I will touch on three types of risk: credit risk, the risk that the cost may change to you and, finally, the handshake risk. Credit risk is the risk that your reinsurer is not going to be around to pay the claims when they're incurred. The risk of changing cost is self-explanatory. The handshake risk means that the person you're working with is not completely trustworthy.

Let's look at coinsurance. The guarantees in coinsurance, generally, follow the rate guarantees in coinsured policies. However, more liberal terms are possible. For example, a provision that I have seen is that, in the event the ceding company should increase its rates, the reinsurer will increase allowances in order to maintain the same net reinsurance costs. However, we now have a problem with that type of provision, and that's caused by the pending NAIC actuarial guideline AXXX. NAIC Actuarial Guideline AXXX, if it becomes effective, will require that higher reserves be held by any reinsurers providing such an adjustment to allowances. It's possible the reinsurers may still provide that form of guarantee, but costs will need to rise because of the higher reserves that will be required.

Let's move over to YRT reinsurance, and here we have to distinguish between the practices in Canada and in the United States. In Canada, the general approach is that YRT reinsurance rates are fully guaranteed. In the United States the standard approach is not to guarantee the YRT rates, at least for periods beyond one policy year. The reason generally given for the origin of this practice was avoidance of deficiency reserves. However, in avoiding those deficiency reserves, the reinsurers left the ceding companies exposed. Of course, reinsurers have been very hesitant to exercise that right. The standard has been for reinsurers not to raise rates either for an individual deal or for a block as a whole, even when faced with large losses.

But you must keep in mind that it is a brave new world for life reinsurers. We are very aggressive in our pricing. We are taking your mortality assumptions or your mortality experience, applying deep discounts to the rates from that experience and offering reinsurance rates that also include projected future mortality improvements. What do you think might happen as more of the reinsured business moves over to that type of pricing? Reinsurers may no longer have the large in-force to generate excess profits to offset losses on recent deals, and we may not be so hesitant to exercise the right to increase rates.
Another provision that I've seen is the reinsurer has the right to raise rates, but if it does, the ceding company may recapture. If I were an actuary at a direct writer, I'd look adversely on that provision. What would cause a reinsurer to raise rates? Probably the mortality on the business is bad, and it's likely to remain so. So what choices does the direct company have? It can either accept the rates, or recapture and take a chance that a replacement reinsurer can be found. But it's possible that

it may not be able to place that business elsewhere, and then the company is stuck with it.

Another provision that I've been approached with is that a reinsurer maintains the right to raise rates, but only if it raises rates on all like deals. In my opinion that's too broad a requirement. What would you consider all like deals? Is it all of the business reinsured by the company? Is it business written on the particular type of policy? Is it business written during a particular issue year or a pricing generation? That provision needs a lot of work.

Another one that I've seen is the one where the reinsurer has the right to raise rates to the extent that the ceding company raises the underlying policy rates. Now, I don't like that provision at all. I'm being asked to reinsure the vast majority of the mortality risk, but then I'm also being asked not to exercise my right to manage that risk. I have a lot of difficulties with that provision. I may ultimately agree to extend that type of provision, but I'm going to charge quite a bit for that option to be removed from my risk-management bag of tricks.

So what I'm saying is that, during the deal negotiations, pay attention to the rate-guarantee provisions. Unfortunately, in the past, that has not always been the case. Realize that a very weak rate guarantee will increase risk to the ceding company. Therefore, it is imperative that you know and trust your partner. Don't be afraid to bring up the subject of future rate increases when your reinsurers come into town and want to take you for lunch or dinner, or when they are negotiating new deals with you. Consider the cost-benefit analysis of a stronger partner.

I'll move next to recapture. This is a provision that has been in the reinsurance treaties long before I got into the business. Recapture states that the company has an underlying right to maintain its full retention. In the event that the company increases its retention after a piece of business has been reinsured, it has the right then to go back and recapture old business in order to maintain its full retention.

There are several conditions for recapture. There is some minimum qualification for duration. A ceding company can either recapture all or none. Companies can't select individual risks. There is usually no recapture on limited retention cases and no recapture on experimental business. I'd classify experimental business as something like critical illness, table-shaving programs, or some simplified underwriting programs.

The risks to consider when you are negotiating recapture with your reinsurers are as follows. First of all, realize that the business may be very profitable for the reinsurer. And if you've negotiated a recapture period of 10 or 20 years, somewhere down the line, your senior management or your boss will say, "What are we doing? Why is all this profit going out the door to our reinsurers?" I've had the occasion of companies coming to me and asking for extra-contractual recapture, and I have to admit I haven't been too inclined to help them out. After

all, the reinsurer took the risk initially and it should be allowed to realize its rewards. You might consider bringing up that subject during the negotiations and, perhaps, have some contingency provisions in your treaty to cover early recapture situations.

Another thing to look at is the transfer of money at recapture. Spell out in the treaty what the financial terms will be at recapture. I know the recapture provisions in my company's prototype treaty are pretty general and don't spell out exactly what the recapture transactions would be, so I have some work to do to clean up my own shop.

Another item to consider is, what happens in the event a reinsurer becomes impaired? Some companies have a provision that allows them to recapture the business in the event that the financial condition of the reinsurer deteriorates. But what is a ceding company going to do with the business? Unless a suitable replacement reinsurer is found, that company must keep the business. It may be prudent to try to set up some contingency plans with other reinsurers to cover those situations.

Another thing to keep in mind is that pure dumb luck may come into play when you recapture. I've seen it happen that a company increases its retention say from $2 million to $4 million, recaptures eligible business, and immediately gets hit with several large claims. So, please keep in mind that, when you institute a recapture program, you're leaving yourself open for Monday-morning quarterbacking from your boss.

Here is an analysis of a recent deal that we were trying to complete with a company. We did some stochastic modeling, initially negotiated a 10-year recapture provision and the company asked if we could move it to a five-year recapture deal. Our initial impression was that it was not doable, but it was a sensitive client, and we needed to discuss this with our CEO, so we went through the analysis.

Under the 10-year deal, the expected profit, as a percentage of premium, is nine percent, as it is for the five-year deal. Expected gain on the 10-year deal is $2.2 million, and for the five-year deal it's $800,000. Maximum cumulative gain for the 10-year deal goes from $6.2 million to $3.8 million if we change to a five-year deal. Maximum cumulative loss is $2.9 million for the 10-year and increases to $3.9 million for the five-year deal. I found that number very upsetting. When you look at the probability of a loss, you see a real problem.
For the 10-year deal, we computed a probability of 7 percent. The reason that probability is so low is because of special experience rating formulas in the reinsurance deal, which allows the reinsurer to recover prior losses. As we move to a five-year period, you'll see that, in some situations, we just can't recover those very early losses, and the probability of loss increased to 24 percent. That was enough to convince all involved that the deal was not a good one for our company.

I'm all for first-dollar quota share. For direct companies, it's a very useful risk-management tool. For reinsurers, it generates quite a bit of premium, which, hopefully, will translate to large profits. It's easier to administer. It allows for the formation of reinsurance pools, which, in turn, reduces credit risk. It's very useful for joint ventures and experimental programs. And, as we've seen, it can be useful for in-force deals. With respect to in-force deals, please keep in mind that when you approach your friendly reinsurer, he will want you to maintain a minimum level of retention. Some of these in-force deals have been heavily reinsured already. If the block has already been reinsured 80 percent, then we're left with 20 percent of the risk to be reinsured. If you're asking me to take 90 percent of that risk, that only leaves two percent with you. That low level of retention may be unacceptable.

Finally I want to touch on the elderly market. At my company, we formed a task force called the "Older Age Group." When I first entered the reinsurance marketplace, our pricing models pretty much capped at age 60 or 65. It was rare that we had to go above that age. Now those maximum ages have crept up, and we include age 85 in our model. We have been asked by some companies to consider going above age 90. I don't know where we are going to get the data to develop mortality assumptions at those issue ages. The data's just not there with respect to an insured population. We have data on the general population, the general U.S. population, and we have some data on pension mortality, but we're in a new ball game when we go to these very old ages.

MR. HEMPHILL: Just extrapolate from 65 on.

MR. VELAZQUEZ: Unfortunately, that's what's happened with many of the existing tables; the high age extensions were based on extrapolating the rates from the younger ages. We've done some work in the senior-settlement market, and we've been surprised at some of the life expectancies that you get with those tables. The numbers look too high.

The other question we'll ask a company when they start talking about the elderly market is, "How comfortable are you retaining at those ages?" We may not want you to retain only 10 percent of the risk at age 90. We may want you to have more "skin in the game." And, we may need to greatly reduce the binding limits at the very old ages. The retrocession market has really cut back, especially after September 11. Those of you who are in the large-case market have probably seen that you can't place the very large cases the way you did prior to September 11. Given the reduced retrocession capacity, the total available capacity at the very old ages may not meet the demand.

Also, what type of underwriting guidelines will we follow for the very old ages? Are we just going to continue the underwriting guidelines from the younger ages, or are we talking about a new type of underwriting — or maybe not so new, maybe something more like what is done for long-term care. I'd encourage you to bring up this subject with your reinsurers.

With respect to pricing the senior market, those of you who do quite a bit of reinsurance know that zero first-year premium is the norm, but I don't know if I'm willing to give zero first-year premium at age 90. Grant, during his presentation, spoke about the way reinsurers try to simplify the allowances or the factors that they apply to mortality tables by taking weighted averages. We may not be able to do that above a certain age. We may even have to use a different type of table. Sometimes reinsurers have been blind-sided by increases to issue age limits. Sometimes we haven't paid attention to the higher age mortality rates in some tables because we weren't covering those ages. The next thing we know, our underwriters have agreed to extend the issue ages. This may happen before the actuaries have had a chance to review the existing rates. The assumption was that, since the rates already exist, no additional pricing review is needed.

Since we have seen increased use of offshore reinsurance as a result of NAIC regulation XXX, I want to look at some of the risks associated with reinsuring offshore. If the ceding company is dealing directly with the offshore company, the reserve credits are backed by letters of credit, and the letters are callable, so the company will get back statutory reserves in the event the offshore reinsurer fails. But if that happens early in the deal, there is a problem. The reason so much of the reinsurance has gone offshore is on account of the strain in the later years, not necessarily the strain during the early years. If a company has to recapture this business, the company will be faced with a reserve problem in the future and probably one that wasn’t priced for.

If those risks are first reinsured with a domestic reinsurance company who later goes offshore, then the reinsurer has the problem. But that will become the ceding company’s problem if the domestic reinsurer subsequently becomes impaired because of its reserve problems.

Next, let’s consider the recapture terms. Suppose you are reinsuring a 20-year level term plan or a 30-year level term plan, but have a shorter recapture period. Exactly what terms will be in place for the recapture? I don’t expect the reinsurer will be willing to give you back the full statutory reserves. I think the refund would be closer to some type of GAAP calculation. But it’s probably wise to tie down those transactions in the reinsurance treaty and not wait until the time you want to recapture.

Finally, with respect to credit risk, definitely do your homework. Look at the reinsurer’s risk-management practices. Inspect its retrocession practices. Invite your reinsurers in to visit with your product committee, your financial people and your senior management, and ask them the difficult questions. It's necessary in order to protect yourselves.

So, in conclusion, I think that the reinsurance tool is a very useful vehicle for managing risk. It's definitely not a risk-free transaction for the ceding company. It's

another risk to manage. However, properly managed by both, the direct company and the reinsurer, the transaction can be a win-win for both.

MR. HEMPHILL: I wanted to hear more about this handshake risk.

MR. VELAZQUEZ: In the old days, the reinsurance transaction was considered a gentleman's agreement. We considered the contract to be boilerplate, and sometimes might make representations that were not included in the treaty. We all knew that there were no contractual rate guarantees, but we would see some language in letters or memos stating that the lack of guarantees was for deficiency reserve purposes only. We naturally couldn't put such a statement in the agreement, but people would acknowledge that guarantees were implicit. As both the direct company and the reinsurers get more pressure on their bottom lines, and the pricing margins become thinner, there is a real risk that some of those understandings that may have existed in the past may not be honored. So that's what I call the handshake risk.

MR. HEMPHILL: And then I was struck by your comment about win-win situations. How do you deal with a client whom you've reinsured some business over the years, and now they're under some pressure, maybe expenses or otherwise? They feel they're losing money on that business, and you're making a big profit on it. Now, how's that win-win? And you said earlier, you don't feel like helping them.

MR. VELAZQUEZ: Well, it isn't that I don't feel like helping them. It's that I wonder if the roles were reversed, how accommodating they would be toward the reinsurers. I would say, though, that, in good faith, we would talk to the ceding company. And, if there really is a windfall, some accommodations might be worked out.

MR. PAUL MARGUS: Do you think that the illustration regulation has created some of this first-dollar quota share demand? I mean, is the reinsurer, behind his black box, pricing for mortality improvement or lapse support?

MR. VELAZQUEZ: Yes, I think that there is some of that in play. It is no secret that reinsurers are assuming mortality improvement in their pricing.

MR. NARIANKADU SHYAMALKUMAR: I have a comment for Mr. Hemphill. He pointed out that there's no statistical approach to dealing with what he termed "specification error," or what people might call mortality risk or systemic error. The thing is that there's a classical theory of statistical robustness that actually deals with it in the sense that, if you take, for example, the usual model, which is a normal model, and if you want to estimate the location parameter, then the most efficient estimator would be a mean. But the thing is that the normal model may be misspecified for more heavily tailed distributions; in fact, the sample mean would perform much worse than a single observation. So this is the reason the theory of robustness would tell us to use the median as a measure of location. Now my

question is, has he considered the applications of this when he talked about modeled risk?

MR. HEMPHILL: I can safely say that I haven't, nor do I have the vaguest idea of what you're talking about, actually. But I've never seen any attempt at helping an actuary understand how data collected from one set of experience applies to another. I find that everything in that area is called judgment.

MR. SHYAMALKUMAR: Yes. The thing is that sometimes what happens is, even if that is a vague attempt to model judgment over time, there is a learning process, a systemic learning process, which is an enforced kind of thing. So it is true, I had to mention that robustness does not always provide solutions, but there are times where there are some successful applications.