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Risk Management at the Corporate Level

Track: Product Development/Reinsurance

Moderator: ANDREW M. ERMAN

Panelists: STEEVE JEAN
WARREN THOMAS LOFTIS
ALASTAIR G. LONGLEY-COOK
DAVID K. SANDBERG

Summary: The risks in life insurance and annuity products can complement or compound each other. Mortality and investment risks that are not managed in the product development process must be addressed on a corporate level. Panelists identify the risks and risk-mitigating actions that an insurer can take. Approaches discussed include reinsurance, investment programs and offsetting risks in one product against those in others.

MR. ANDREW M. ERMAN: This session is on corporate risk management. Since playing it safe is sometimes the biggest risk a corporation can take, we have designed this session to discuss management of the risk that we face at the corporate level.

In the two preceding sessions of this three-part series, we discussed the risks that are taken in underwriting life insurance and annuity business. Here we talk about what the corporation can do to manage those risks so that a structure is designed where diversified risks complement rather than compound each other. We will qualitatively describe these risks, discuss corporate organizational structure around those risks, give an overview of risk metrics and risk management tools, describe

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

risk mitigation and risk controls and, lastly, look at the communication of risk. All of this discussion is at the corporate level.

First, we have Steeve Jean from Ernst & Young, who will start us off with a qualitative discussion of risks.

MR. STEEVE JEAN: We're going to start with an overview of risk management at a corporate level and then talk about risk in general terms. I want to talk about a definition of risk and a risk management policy. I also will talk about a risk management organization and what the roles and responsibilities are. I'll also touch on risk inventory, prioritizing and managing risk, and only briefly mention risk metrics because Mr. Longley-Cook and Mr. Loftis will cover that in more detail.

A risk definition includes what we want to consider as "adverse events" — the unanticipated risks not usually on your radar screen — and "uncertainties." Uncertainties are risks that *do* appear on your radar screen, but they contain some risk in terms of timing and magnitude. The risk categories we want to look at are: financial, operational, legal, regulatory, revenue and capital adequacies, management, and strategic.

Each of these categories presents the risk of adverse events and uncertainty. These risks are more or less quantifiable. When we look at financial risk and operational risk, we can often quantify the risks we're facing. When we look at legal or regulatory risk, it's not as quantifiable, so we have to assess what to do with qualitative analysis of those risks. There's also the interaction between all these risks; you cannot just look at financial risk and operational risk without considering the impact of financial risk on management, strategic risks and others.

An effective risk management policy is going to provide the following information:

- It will identify, measure or assess risk, depending on whether the risk is quantifiable or not.
- It gives you the tools to manage, control and monitor, on a regular basis, the risk you're facing.
- It allows you to aggregate exposures and assess the diversification benefits. To do that, you should use a bottom-up approach. Look at the risk of each entity (subsidiaries or countries) and whatever your structure is, and then roll up all these risks and look at them at a corporate level.

Diversification comes from different operations, different markets, and different countries. Diversification is important when you're considering either acquiring or selling some operations or a block of business. You want to look at the impact of that on your risk management policy. For example, sometimes two operations are diversifying the risk. If you eliminate one of those operations, then the remaining risk has to be managed somehow.

The risk management policy needs to be consistently applied among all the entities, subsidiaries or others. You need consistent criteria for assessing the nonquantifiable risks. You need a consistent risk management approach for those risks that are managed locally and not at a corporate level. You want a consistent basis for measuring the risk and a consistent basis or methodology for managing the risk if it's not managed at the corporate level.

You're going to have a different perception of risk for different entities. For example, different countries could have different risk tolerances or different operations. The risk tolerance at a corporate level is going to be different. The subsidiary currency risk might not have any meaning, but at a corporate level it does. So the risk tolerances vary, depending on whether you look at each entity or across entities and at a corporate level.

You want to create a proactive global framework for managing risk. You don't want to manage risk as it comes to you; you have to be proactive to identify and measure the risk, define your risk management tools and strategies, and then control and monitor the risk on an ongoing basis.

The risk management group has a hierarchy of roles and responsibilities. We have the board of directors on top and the audit committee below it. Then we have the management committee that consists of the chief financial officer (CFO), chief executive officer (CEO), chief actuary, general counsel and chief investment officer.

This is where we want to introduce the concept of the chief risk officer (CRO). The CRO is part of the management team and interacts with all the other members of the management team. If the CRO wants to look at financial risk, he interacts with the CFO or the chief actuary. Legal risk will involve the general counsel. The role of the CRO is to interact with all these different members of the management team, aggregate all these risks and define a risk management policy at a corporate level.

Under the management committee, you're going to have the subsidiary management group consisting of the CEOs of each subsidiary. Each subsidiary has its own risk operations. All these constituents are responsible for successful implementation of the risk management process.

The board of directors needs to enter the existence of an appropriate risk management system. The boards will receive and react to periodic updates from the audit committee. The role of the audit committee is to oversee the risk management process and report periodically to the board of directors. The risk management committee is composed of the senior management process subsidiary executives. This committee needs to direct and learn the overall risk management framework.

So, the CRO is the driving force in the risk management process. His or her responsibilities are to develop and implement a risk management program. To

develop the program, you're going to have to involve all the members of the management team. You're going to have to develop an overall risk management program for each of the categories of risk.

The CRO needs to develop a consistent worldwide framework. That comes back to each subsidiary, country or entity adhering to a consistent way of measuring, managing and reporting risk.

He or she also needs to identify and report the subsidiary and aggregate risks and exposures. The CRO then aggregates all the risk and looks at the diversification and the remaining risk. The non-diversified risk will be handled or managed through the risk management program, and the CRO will report periodically to the risk management committee.

For each subsidiary, the risk management operation is going to be assigned responsibility to report both to the CRO and its senior management (which would be the CEO) and adhere to the risk management policies and process.

So we have the board of directors, the audit committee, and the management committee. The CRO will be the leading force and interact with all the other members. The subsidiary risk operations or group will report to both the CRO and senior management.

What's going to happen at the subsidiary level? They're going to create an inventory of risk and then prioritize risk. The priorities will vary by subsidiary, countries or other, and you may need to manage a risk at a subsidiary level, even though it might be negligible at the corporate level. So, once you identify the risk and prioritize it, at a corporate level, you need to identify risk that is negligible for the corporation but critical to one of the operations or subsidiaries. It is possible that you will still need to manage some risk for some of the operations or subsidiaries.

As for risk segmentation, you want to classify risk as those you want to avoid. That could mean exiting some markets, setting up certain operations or transferring risk, which could be done through reinsurance, for example. You want to mitigate risk, so you could decide to reduce your exposure to certain risks or those that you want to manage actively.

Let's look at examples of risks that can be quantified and those that are less quantifiable. On the financial side, I'm sure you're familiar with the equity market risks, which include volatility, loss of value and loss of derivative value. Other quantifiable financial risks are: currency risk, basis risk and interest-related risk (such as the shape of the yield curve, the change in volatility, the impact on duration and convexity, and call and prepayment). There is also inflation, liquidity, credit for different types of assets (for example counter-party risk, or reinsurance insolvency) and diversification risk (on your asset allocation, product allocation and

geographic risk).

On the liability side, there is pricing adequacy, competitive risk, lapses, long-tail liabilities (and that relates to asset/liability matching), inflation risk and the more actuarial type of risk, which could be mortality risk and guarantees, distribution and so on.

This leads us to the revenue risk, which will look at earnings volatility, capital adequacy and capital allocation. The earnings volatility is your main short-term risk. You have to report quarterly earnings, and you have significant earnings volatility.

Then, if we move on to the less quantifiable risk, you could have fraudulent information and fraudulent claims. That happens on the property and casualty side, with medical claims and claim and asset transactions. If you're going to pay multiple medical claims, or pay claims twice, for example, there are some tools that you can use to fix that.

On the information technology side, there's security risk, but also asset recovery risk. Look at different operations for each subsidiary; if you're going to try to manage the technology or asset recovery side at risk, you could have a program that's going to address each operation or each subsidiary or each country. However, at a corporate level, there might be a better way to manage the risk through interactions between these different subsidiaries or entities.

There are uninsured losses accountability, which means who's accountable? If you have operations or subsidiaries or products where nobody is accountable for the performance or the risk, that is going to create problems.

Bureaucracy is going to create delays or problems in measuring reporting and reacting to the various risks or volatility or variations you can face. That's going to affect both your financial and unmeasurable risks. For example, say that on the financial side, there is a program to manage your assets and liabilities. However, you have poor reporting or delays in reporting or handling and measuring the risk. That's going to be a problem in itself.

Market conduct, sales practice, financial disclosures and regulations are other examples of less quantifiable risks.

On the regulatory side, we have to consider compliance with changes in tax laws, such as estate taxes. We could also throw the changing accounting standards into that group.

We started to talk about international accounting standards, and we have to understand what that's going to involve down the road.

If you try to measure your exposure, you're going to come up with a pretty wide range of legal risk. For insurance companies, you're not only facing legal risk related

to current practices, but you're also facing risk regarding prior practices. We see companies being sued for things that a company that they acquired 10 years ago did 30 years ago.

With aggregate risk, we looked at the correlation effects. There is correlation between the risks and between companies. Markets and economies are going to vary over time, so you can't look at a correlation or a diversification at one point in time and assume that it's going to remain constant. Other examples of aggregate risk are international diversification, different economic policies, political risk, and GAAP accounting differences.

You need standard metrics that each component or each entity or each subsidiary is going to use to report risk to a CRO and senior management. There are different metrics and embedded value, embedded value at risk, earnings at risk, cash-flow exposure and so on. The risk management group policies should include periodic reporting of exposures and transactions, and tolerances and analysis of the risk not easily quantified. If it's not quantifiable, is your exposure changing over time?

MR. ERMAN: Mr. Jean, thank you for that introduction into the risk landscape. We now have looked at the risks that the organization faces, and we also know more about the corporate structures to manage those risks. It seems that we need a means for measuring those risks. To help with this discussion, we have Alastair Longley-Cook, who specializes in enterprise risk management as a senior consultant with Tillinghast-Towers Perrin in Hartford.

MR. ALASTAIR G. LONGLEY-COOK: I'm going to talk about the part of risk management that I think is near and dear to actuaries because this is the quantitative stuff that we do so well. I'm a firm believer in the saying, "if you can't measure it, you can't manage it." Many risk management programs don't really measure the risks adequately, and I'm going to go through some of the good and bad ways of doing that.

I was at Aetna for most of my career. I established the risk management process and served as CRO there before coming to Tillinghast. I'm going to talk about not just the theoretical side, but what actually works and what doesn't work. I can certainly say that more methods don't work than work.

Actuaries do make good CROs, but even if you're not a CRO, you can play a very big role in this part of the risk management process because we're very good at modeling and metrics, which are the two things I'm going to talk about.

Let's take a quick look at the standard models that have been used in the past. You run your models through the same way we did in the past and see what happens. Historical review is obviously limited by the past and, if the future is different, which it usually is, that's not going to work very well.

The methodology that I would say is most commonly used, particularly on the investment side, is what I'd call mean variance/covariance models. This is very common in the banking industry. It's the foundation of value at risk (VAR). You come up with separate distributions for each one of your risk drivers. The risk driver would be whatever perimeter drives your risk — a change in interest rates, equities, returns, mortality improvements or what have you.

There are different distributions for each of those. If you link them with a covariance matrix, you can calculate sensitivity and, perhaps, both the convexity and the duration. You have a delta-gamma, which is a method of figuring out what the implication of a one standard deviation change in the risk driver is on your metric. It could affect earnings or value, and you can calculate your value at risk and other measures.

Although this is probably the most popular method, it has some significant faults. I'll get into the advantages and disadvantages in a minute.

A third method is becoming more popular now as we create better software and models. It is stochastic scenario model. We're familiar with those as actuaries when we do either stochastic pricing or even when we do some of the asset adequacy analysis. If we go beyond the seven deterministic scenarios and maybe do more than that, then we're getting involved in this kind of analysis. You can also use separate distribution models, or you can use an integrated model that models all of those perimeters at the same time. I'll talk more about that.

Those are the three different approaches, and here are the pros and cons. The major problem with the historical method, as I mentioned, is that it's limited by the past. It does not necessarily reflect what's going on today, let alone in the future. It is not dynamic or set in stone.

Mean variance correlation type models reflect the current environment if you program it that way. The biggest problem with these models is that they're geared for short-term changes.

If you think about just duration, you're thinking about just the movement of the value of a bond, for instance, as interest rates move a little bit. Maybe convexity gives you a little better feel, but the further you go out into the tails of the distribution, the less robust that particular model is going to be. On the trading floor, you may be interested in what your VAR is today, or what the movement could be over the next three days.

We in the insurance industry are more interested in what might happen over the next quarter or the next year. Those models tend to break down, so they have a very short-term horizon. The correlations tend not to be dynamic. You end up with these gargantuan matrixes that are set in stone.

As Long-Term Capital Management found, those correlations don't hold up as you get into the tails of the distribution. There were a lot of other problems with Long-Term Capital Management. One of the books said that when the company got into a crisis in the world financial markets, they found that all the correlations went to one.

Scenario models tend to deal with all these problems very well, but they do require more sophisticated models. What does the structure of a simulation model look like?

You start off with your economic scenario generator, which can be either separate distributions or a cascade. You have your actuarial parameter assumptions, asset and liability data and certain constraints. For instance, maybe the state won't allow you to hold more than a certain percentage in junk bonds and certain investment strategies.

Management determines, in terms of what you're going to sell, what price or what you're going to do as certain things arise. Are you going to chase the interest rate with a credited rate? How are you going to handle that? Those would flow into a cash-flow model aggregator and that could be your own home-grown one. It could be a model, such as our own TAS, or it could be a PTS or one of the other models.

Nowadays, most companies tend to be using commercially sold cash-flow models. Out of that, you're going to get rejected financials for each scenario, and if you're doing stochastic modeling, you'll get distributions, which are a must for most of this work. You're going to get the risk metrics.

There are two ways of doing it. I mentioned that one is having separate distributions linked by a covariance matrix. It is easy to run and set up, but populating it becomes a problem. You literally end up with millions and millions of cells in those matrixes. Separate distributions are commonly used, but I would say they are very dangerous. They are OK until you get out into the tails. Then they tend to break down.

The economic scenario generators are so-called cascades. Our own global CAP:Link is a good example so I'll use it. You start with one set of parameters. In our case, we start with the long and short interest rates and the full Treasury yields. By using stochastic differential equations, you build the other parameters that you need.

Let's say you're doing an analysis of your guaranteed minimum income benefit (GMIB) product. You want to project out a distribution of equity rates, but you also want to project out interest rates. If that particular option is taken in a down-equity environment, you want to know whether you can cover the interest spread on the guaranteed income benefit. Rather than running another set of distributions, what you would like to have is a thousand scenarios. Each scenario has 20 years of equity rates, interest rates, and any other parameter you might want. This is what

these models tend to do. The advantage is it gives you all that. The disadvantage is that building it yourself is probably not a good use of your time.

Let's move on to the metrics that you can use once you've run all these models. The metric that many of us are familiar with, which has been the foundation of the risk-based capital (RBC) standards the NAIC has used over the years, is based on a probability of ruin threshold. Let's say that you're running a thousand scenarios and want only five of those, at most, to cause ruin. That might be in the 95 percent confidence level around solvency.

We've based RBC on rating agency criteria as well. Many companies are using this to determine their own internal economic capital, which they can use to allocate capital by product line and maybe do a better job than the RBC or the rating agencies are doing. That provides them with information on their return on capital and how best to allocate capital from a strategic standpoint.

What's emerging now is something called conditional tail expectation (CTE). The Office of the Superintendent of Financial Institutions (OSFI) has used it. The OSFI is a Canadian regulatory body that sets standards for segregated funds, which are similar to our separate account funds and variable annuities. Their RBC standard, which is based on company modeling, is set at the 95th percentile CTE, which is the average you need.

Let's take the 90th percentile. What you're saying is, of those 10 failures out of 100, what is the average failure? The reason you'd go that route is because, with today's products, such as GMIBs, you can have a situation where you're doing fine at the 90th and 95th percentile. Then, at the 97th percentile, it all breaks loose and you lose a lot of money. By looking at the average, you don't get the severity of the ruin. The current proposed standard that the Academy has made to the NAIC for variable products with guarantees has a 90th percentile CTE in the recommendation.

Chart 1 shows a graphic representation of the probability threshold that I talked about. You can look at one point and ask, what is that present value of surplus? With the CTE, you're looking at the average. This chart is actually a little misleading. It looks like we're looking at the area under that, which is not true. All of us know that it's not the area under a cumulative probability distribution that matters; it's the value as you go up. So it would be the average value along that curve.

Let's now look at how some of this has been used in other areas. You need to look at two perspectives. One is not better than the other, but you really need to look at both. One is the shareholders' perspective. The shareholder tends to be more interested in the earnings volatility. That's something consistent with measures of risk in the investment area. Look at volatility of asset values. The volatility of returns in the stock market is an example. While that's most commonly used in finance theory as a measure of risk, some would argue we don't care about the

upside — we just care about the downside. So another measure would be just the downside standard deviation, where you ignore the upside.

Another measure that's used is below target return. This is a real shareholder perspective that is particularly important nowadays. If you don't hit the analysts' estimates, or you fall short by two cents, your stock drops 20 percent. It's that kind of thing. If you're the CRO or if you're engaged in establishing a risk management process and you're meeting with the CFO or the audit committee or the CEO, it's important to learn what their measure of risk is. What keeps them awake at night? It may not be ruin. Actuaries think in terms of ruin. They're not worried about ruin. They're worried about missing their analysts' estimates. One is not better than the other. It helps to have more than one. What is more important at what particular time and for most of your CEO's waking hours?

Some new financial risk metrics are evolving. Two that we recommend capture a lot of the advantages of the others and speak to the needs of the marketplace today. One is what I call economic VAR, which is what I used at Aetna. People are talking about embedded VAR today. I think we're basically talking about the same idea. It's VAR translated into the insurance world.

VAR would be the loss and the value of an asset at a high confidence level, like 99.9 percent, over the next three days. Take that same concept and say, "I want to know what is the loss in economic value, or the present value of distributable earnings over a given time period." I don't care about three days. Let's take a year at a given probability level. When I say a year, though, I'm not going to talk about 99.9 percent; I'm going to talk about maybe 95 percent. It's consistent with the VAR. Those CFOs who have a finance background understand it conceptually, but you need to translate that into the insurance environment.

Earnings at risk speaks to that earnings volatility, which is perhaps a little more important to the CFO and the Wall Street analysts. GAAP earnings deviate a little from a plan for a given reporting period. Let's say it is three years at a given probability level.

Chart 2 is a graph of economic value at risk. We have our S curve, cumulative probability and an expected line. That might be the economic value of your line of business product. It is what you're evaluating there. That would be the present value of future distributable earnings at your deterministic best-estimate assumption.

That's probably as far as most companies get. We need to take them one step further. It's fine if everything works out exactly as planned, but it never does. What's going to happen is it's going to be higher or lower. If our target probability is set at some level like 5 percent, then I can calculate what the loss and value is at that probability level if I run the stochastic scenarios and get the value of the present value of earnings that includes the embedded options. You're not going to

be able to do that unless you run the stochastic scenario. You get the value of it, calculate the sensitivity of it to the risk drivers and calculate what the loss of value would be at the 95 percent confidence level.

Finally, here are some references to take home. We were very interested to hear Dean O'Hare, CEO of Chubb, say in a recent presentation that a few of the top 10 things risk managers can do is create a program, establish the council and establish a CRO.

MR. ERMAN: Now we know more about the risks and have measured those risks, but that is not enough. We also need to know how to manage those risks. And who might help us discuss risk management? A reinsurer, of course. Reinsurers, in their primary role of insuring the insurer, specialize in risk management. We have Tom Loftis from Munich American Reinsurance Company to offer some comments.

MR. WARREN THOMAS LOFTIS: As Mr. Erman said, I'm going to talk briefly about the various risk management tools. As a reinsurer, I'd love to be able to say that reinsurance is your only option, but that's not quite correct. Before we get into these tools, I want to revisit the objectives of risk management.

If you were asked what should the objectives of risk management be, a knee-jerk reaction may be to say they should be either to eliminate or totally minimize each and every risk. However, that's probably not the best answer, particularly for insurance companies that, at their fundamental level, are in the business to take risks and get paid for taking on that risk. A better way to think about it would be: The objectives of risk management should be to determine which risks are smart for your organization and which ones are not smart. So the question is, what is a smart risk for your organization?

I have a couple characteristics. A smart risk is one that must be measurable, and it must be manageable. Furthermore, it should be a risk that your organization understands, and it might have a competitive advantage in managing that risk. It should also be a risk that you'll get compensated for taking. Finally, it has been said many times, but it's very true: It should be a risk that your CEO is comfortable with taking on. So once you've decided what are your smart risks and what are not your smart risks, then you manage each one appropriately.

What are your options other than reinsurance? You can do nothing, you can reduce or eliminate the risk, you can manage the risk or you can transfer the risk. Let's look at each of these options. We'll skip over the option of doing nothing.

The second option is to reduce or eliminate your risks. One way you could try to do this would be to stop sales. However, there are mostly disadvantages with this option. It takes a while for this action alone to change materially the risk profile you're trying to avoid, while immediately affecting the top line. It's very difficult to try to convince people that you should turn off your distribution force.

Diversification, whether through new product offerings or new geographic areas or both, will help reduce your concentration risks and also introduce some offsetting risks. This might also be one reason why it's so important to look at and manage your risks on a corporate basis, as opposed to just a strategic business unit (SBU) level. If you're managing just an SBU level, you might miss some of the offsetting risks you introduced.

I have two very simple examples of offsetting risks. The first example is that future mortality improvements generally will improve the earnings of a life insurance portfolio, while damaging the earnings of an immediate annuity portfolio — and vice versa if mortality deteriorates in the future. With respect to market risk associated with certain annuity features, guaranteed minimum death benefits are generally in the money during a down market, while earnings enhancement riders are not, and vice versa for an up market.

Before I get into asset/liability management (ALM) and hedging, I have just a quick comment about operational risks. As Mr. Longley-Cook said, we actuaries tend to focus on all of our modeling and scenario testing because that's what we were trained to do and that's what we enjoy doing most of the time. However, we need to remember that operational risk is every bit as dangerous as all these other risks. We only need to remember the ramifications from one rogue bond trader in the Far East or one investment manager skipping the country with a couple hundred million dollars to be reminded of this. I would hope and suspect that system security is a risk getting a lot of attention at most of your organizations.

While preparing for this presentation, I came across some comments from a prior Society session, where the speaker was making the distinction between what she called "asset/liability matching" and ALM, which made a certain amount of sense to me. She classified asset/liability matching as being at the product level. This is a classic example from our exam days of first identifying the financial characteristics of your liability and then investing in a matching asset. Each product manager will be doing this for his or her line of business.

One obvious problem with this approach is that when you have multiple product managers doing this for their own lines of business, you're likely going to leave some money on the table. For example, one portfolio might be purchasing bonds while another portfolio is selling virtually the same bond. In addition to the transaction cost, you have the bid-ask spread because you're simultaneously buying and selling the same bond in two separate portfolios.

That problem leads to what she referred to as ALM, where you look at it more at a corporate level. The exercise for the product managers is virtually the same. They're creating benchmark portfolios that match the financial characteristics of the liabilities. Then, at a corporate level, the risk profiles of all the benchmark portfolios are aggregated and then reclassified by asset class. I'll have my aggregate bond

portfolio, for example, and my aggregate mortgage-backed portfolio and so on. The investing is then done within each of these separate asset portfolios at the corporate level.

Of course, the risk profiles of all the asset classes must continue to match the risk profile of your aggregate benchmark portfolios within your organization's tolerance for the risk. Obviously, it's nothing you're going to accomplish overnight or in a matter of a few months, but it might give you something to think about.

Let's go on to the topic of hedging. Here are a couple of simplistic examples of hedges. If you're primarily a variable company, you might find yourself overexposed to declining revenue from your mortality and expense fees in a down market. If that's the situation, you might want to consider swapping some floating rate fees for some fixed-rate fees. There's a good, brief summary of this type of a swap in the February 2002 *Risk & Rewards* newsletter.

With respect to equity-indexed products, there are all kinds of possible ways you could hedge these products. I've used the terms "replication" and "dynamic balancing," but they're probably more words of art than of science. When I say replication, I'm referring to simply purchasing the asset that matches the options you have embedded in your product. These would generally be exchange-traded transactions.

With dynamic balancing, you would have someone create an asset, which might be a combination of options or futures that would mirror the characteristics of your liability. Some potential problems with this approach would be the expense and the lack of liquidity that this asset would have. I don't have the time to get into any of the details of these various approaches; however, I would like to briefly mention several practical issues that are important to consider when evaluating all these options.

Finding the right hedge can be difficult, given the complexity of today's products. For example, you might find yourself overexposed to technology stocks because that's the hot, glamorous stock of today. If that's the situation, trying to hedge these with Standard and Poor's (S&P) options might not cover you very well. There might not be any exchange-traded options that would match your exposures. You could probably create one, as we just discussed, but then that might raise the expense and liquidity concerns.

Even if you have the perfect asset, there are timing issues about when you're purchasing the asset versus when your consumers are investing in your product. Even if you can lick the timing issues, the factual persistency differs materially from what is assumed in your models, and you're going to end up out of balance again.

On the expense side, you'll need some large volumes to spread out the transactions costs, and then, intrinsically, most of these instruments just end up

being a little more expensive in a volatile market.

You have counter-party risks because, in all of these instruments, you're giving someone money today and hoping that you'll get it back in the future.

The liquidity of the hedge is important. Perhaps you will need to trade these over time. And, finally, you'll need to consider the RBC and accounting ramifications of the various instruments.

Let's move on to risk transfer. Reinsurance, securitization and selling the business are three ways you can transfer risk.

There are many kinds of reinsurance available. A coinsurance or modified coinsurance transaction would allow the cedent to transfer all the risk associated with the particular product line to the reinsurer, whereas the YRT type would allow you to carve out just the mortality, for example, and keep the other risks if you're comfortable with those. There are various arrangements, like the quota share. The reinsurer would share proportionately in all the lives covered, whereas with excess, catastrophe coverage, and stop-loss, you'd have some non-proportional coverage.

I'm not going to spend any more time on reinsurance, since most everyone is pretty familiar with it. I will refer to Chart 3, which demonstrates the increased usage of reinsurance over the past several years. In 1995, about 24 percent of the direct sales (this is ordinary life in the U.S.) were reinsured. By 1998, this number was 54 percent, and it has been in the mid-50 percent range within the last three years. Obviously, there are a lot of other reasons, other than risk management, that might cause the company to consider reinsurance, but I thought you might find these figures of interest.

Most folks might not be quite as familiar with the concept of securitization as reinsurance. I'll spend a minute or two talking about this. One way to think about securitization is as a transfer of a balance sheet item to the capital markets. Traditionally, securitization has focused on the asset side of the balance sheet. For example, credit card receivables and mortgage/auto loans are two items that have been successfully securitized. With insurance, both the assets and liabilities can be securitized. Policy loans and cat bonds are both examples of successful securitizations from the insurance industry. To date, the securitization on the liability side has primarily been aimed at the low-frequency, high-severity, and catastrophic-risk type coverage.

Conceptually, an in-force life insurance block could be securitized just as well; however, to date there have been some barriers. I call them "success factors" that have prevented most transactions from coming to fruition. First, it takes a very large block of business for the transaction to make sense. Furthermore, the business should be a fairly homogenous business, so the claims forecasting can be fairly predictable.

There are a fair amount of regulatory issues involved in a potential securitization that will likely require the use of an intermediary to get the transaction done, which raises its own counter-party and insolvency concerns. An investment banker would also likely be required in the transaction.

Life risks and mortality, morbidity and so on are fairly new risks to a lot of the investors who might be considering this type of investment and currently might even be outside the investment guidelines that a lot of these folks are working under.

Finally, all these instruments would need to be rated by the rating agencies, and it would be critical to get high ratings to have the possibility of a successful transaction.

MR. ERMAN: That was a great discussion on risk management. Now that the actuary knows what the company needs to do to manage the risks, we're done, right? Not quite. It is critically important that the extent of the risk and the tools in place to manage those risks are made clear to senior management.

Even if senior management were composed of all actuaries who had an intrinsic understanding of this topic, a discussion would not be complete if we didn't look at how these findings could be communicated. To help with this discussion we have Dave Sandberg from Allianz. Mr. Sandberg has some unique insights in communicating findings to different regulatory bodies and to groups that speak different languages.

MR. DAVID K. SANDBERG: I was looking back at some of the history on risk management, and I came across an old risk management story dealing with a group of people trying to avoid a catastrophe. A flood occurred, and after the flood, people sat down and asked what they could do to manage this risk in the future. They put together a set of tools, and as the story goes, it wasn't the tools that were inadequate; it was the process that they used to build the tower that they had hoped would safeguard them from future floods.

I think this is a good example for some of the challenges that we're looking at today as we try to build a risk management tower within a corporation. I don't think it's so much the tools that we're lacking; it's the way to communicate and create a common language that we're really struggling with. We'd like to feel like there's some organized process going on, and that it has all been simplified and brought together in an actionable way.

Obviously, the biggest challenge is the diverse audiences that we're talking to, which may include policyholders of a mutual company; regulators at a state, federal or banking level; shareholders; private investors; foreign investors; or U.S. owners.

I have worked for a company that was owned by an oil company and another that

was owned by a department store. I've also worked for a small, privately held company and a company that's publicly traded on the stock exchange. Now I work for a subsidiary of a worldwide global organization.

In addition to the diverse audiences, we have very diverse languages of risk measurement. As Mr. Longley-Cook said, measurement is the key, but we have lots of different ways to approach it. There's the NAIC formula-based approaches. The banks have taken what I call a silo-based view, where you segment your risks and go through a process to quantify them.

I have a number for a series of categories, and then I have a way to try to add those or aggregate those together. The Society of Actuaries recently performed a survey that organized the risks in terms of assets, liabilities and the interaction of the assets and liabilities. Then they included the operational and the enterprise risks.

In addition, there is the complicating factor of the time horizon. Mr. Longley-Cook referred to the VAR versus embedded value issues. We also have a desire to look at economic capital, which is a different question than what the NAIC looks at when it looks at its RBC needs. Economic capital is looking for a way to allocate capital across lines of business. The NAIC formula is only meant to be a flag to look at weakly capitalized companies that need regulatory attention.

Federal reserve risks tend to focus on credit risks. Banks don't have the same credit risk that we have. We think of credit risk as the possibility that our assets might default. A bank's credit risk is that they're loaning out money to somebody who might not repay. They want to understand the creditworthiness of the institution they are loaning their money to. In addition, bank regulators look at the liquidity risks, the legal risks, operational risks, and reputational risks. In the end, they come up with a score that they can use.

The life appointed actuary tends to focus on the interest rate segment of risk. Foreign owners are concerned with managing a diverse number of companies that may include property and casualty or life or bank business. They're trying to ask the question of how to rationally allocate capital.

And, as Mr. Longley-Cook so astutely pointed out, since management is often focused on GAAP earnings, that is their perspective, unless of course their bonus is measured by sales growth or assets under management.

So, with all these scorecards and audiences, we find, within the company, that there is a diverse group of people trying to provide the information. There's an appointed actuary, a pricing actuary and a chief underwriter. We seem to have a lot of chiefs, but not many Indians. We certainly are missing the chief legal counsel on this list. I'm sure there are a few more chiefs that will be offended because they are not on the list. They are obviously all vital to the management of the company's risks, and any time the discussion of risk comes up, they ought to be

included. So, as actuaries, we are not alone when we sometimes feel that we're left out of the risk discussion.

With that background, maybe we should just step back a minute and look at the current landscape — the good, the bad, the ugly. What's out there? We've heard some good examples and descriptions of some of the tools and applications that companies are currently using within their framework. We've had a few groups over the last three years try to look at what's going on. The SOA's "Finance Practice Survey" in 1999 looked at risk position reporting in the insurance industry in North America. There are a few others that we'll also go through in detail here.

First, the SOA survey wanted to see what's going on. What are companies doing? RPR is risk position reporting on items such as interest rate spreads, persistency or expenses. The survey wanted to look at their types and depths, turnaround time, who gets them, how frequently they're done, how easy it is for them to work, and where these reports are going.

The survey results were grouped into four types of reports: assets, liabilities, asset/liability and operational risk reports. I suspect that we've covered most of these report descriptions earlier in the presentation — it's the gamma, delta, liquidity, convexity, experience studies, embedded values, looking at duration, convexity, liquidity, and then looking at different ways to look at operational risks.

Tillinghast, almost concurrently, put together an enterprise risk management survey in the insurance industry. This was a broader look. It looked at both North American and worldwide organizations, and it looked at property and casualty, mutual funds and banking. This is more of a worldwide perspective. The key findings showed that very few companies have a CRO. It's more prevalent outside North America. They recognize the importance, but they're facing the challenge of how to get it off the ground. Many individuals feel like they're well suited to get it going but, as I mentioned earlier, I don't think the tools are as much the issue as it is organizational turf. There are processes already going on that need to be maintained.

Most companies include operational risks in their internal audit plan, but far fewer are included in the financial plan. We tend to have a spectrum where the internal audit looks at the fraud issues, the systems safety, the ability of backup systems to work. And then you have that off to one side, and it doesn't really talk to the actuarial financial risk issues. Less than half of them are factoring the interactions among the risk factors into the process of measuring. We're seeing a great deal of independent risks, but little work on being able to pull together what it means in aggregate and what kind of offsets we get.

Earlier today, there was a great session by S&P. They have been reworking their formulas for capital to include the option for companies to use internal models to

augment or supplement or replace the formula that they would get out of the S&P process. This is a good advance. I think there's a lot of value in it, but at the end of the day, they will still have three separate risk categories and will not address covariance at this point. That's the next stage.

We do need to take this a step at a time, but this is the key question that, as actuaries, we're interested in: What is it that is going on in aggregate? The desire is to model all of the risks stochastically, including operational risks, find a common metric and optimizing strategy and then coordinate everything within a coherent framework to execute the strategy. This is a challenging operation.

The good news is that there are a lot of nice things happening externally. I was at a seminar last fall. The banks were looking at operational risks, and they thought it was important that, instead of charging 8 percent of capital for operational risks, that companies be able to model that. What does it take? They're looking at frequency and severity issues. They also believe that they need to develop actuarial models within the banks so they can assess the degree of operational risk and then ask, "Where is it that we stand."

The reason we don't do it today is because we don't have a lot of data. Why don't we have data? Because we haven't asked the question in order to start collecting the data.

The options to managing risk have been well covered earlier, including reduction, integration, diversification, hedging and transfer.

I want to spend a few minutes on risk disclosure because this is a key element that the banking industry has started to focus on. There are a lot of risks that are well quantified. We have ways to assess the risk and come up with a numeric measures. But what do we do with the risks that cannot be reliably quantified?

For banks this is being discussed via a proposed worldwide standard called Basel II. One of the key conceptual pillars for Basel II is the use of disclosure. Disclosure has value both externally and internally. It needs to be seen in a richer context than the commonly assumed one of today's public disclosure via a 10Q and a 10K, where one lists all 500 risks and all 3,000 assumptions.

I think we tend to think of it this way and that is not the best use of the concept. For example, disclosure may mean full disclosure to the regulator. Large complex banking organizations will have a regulator who works at the company who has full access to any meetings. The regulators can show up at any meeting they like, and they can look at any document they like. In fact, the management of the company typically makes sure they're aware of every important decision that they're making. They want them involved at the time the decision is made instead of coming in three years later with 20/20 hindsight and saying that it was the wrong thing. They want to make sure that the regulators are involved in that dialogue.

This is a very different disclosure process than we currently have in insurance regulation where we often want to minimize the information that is provided in order to minimize the dialogue.

Another way to think about disclosure is that the balance sheet is a way of disclosing or aggregating company beliefs about the future. SFAS 97 is an example of this. The company discloses what it believes about the assumptions, and then it publishes those results as a way of publicly disclosing what it believes. Does the public need to know every assumption that went into it? No, it doesn't, but when that picture changes and a company now believes something different about its business, then there is a disclosure process that takes place. It might be that persistency has been worse or better, or perhaps there has been improved yield on the assets or something else that needs to be adjusted for and corrected. How disclosure is defined will impact how to organize the internal and corporate risk-based measurement process.

The last aspect of disclosure has to do with what I'll call improved internal risk disclosure, or in other words, benchmarks. Benchmarks need to stem from models developed to aid in making better business decisions. For example, an investment benchmark for asset managers that reflects the economics of the liabilities.

Expense management is a key item to focus on. Is there a tool, a process, or a metric that feeds back actual expense decisions of projects undertaken after a cost benefit analysis to understand if the project achieves the expected savings?

Another area is persistency. An actuary might get data that says lapses are getting worse, and then only advise changing the assumption, recommend that management take the hit in earnings and go on. But what if there were the ability to collect information from those who are in customer service. This information could sort out whether the company is providing bad service or having a problem with the expectations created by the marketing story. Or is it that equities are not seen as very enticing? All through the 1990s, a expectation of a "guaranteed" return of 10-15 percent on equities began to develop. Once we get an understanding of what's driving customers, we can then take action to respond from a business perspective.

If you have a marketing organization, can you send it a signal that varies its compensation overrides by the risk of the product sold? Can you provide a larger percent payment if the risk on the product is fairly minimal? If the risk is higher, then there is less of an override. Now, they have an incentive to align their marketing story with risks that are consistent with how the company views the risks.

In the end, you realize that, as a company, what we're really talking about is a process where marketing, claims, asset managers, and actuaries are needed to understand what the story of risk is, what we believe about our business, and

whether we have a process that allows us to learn about our business as we go along. We are certainly going to make mistakes, and we're going to have to make assumptions that are wrong. However, in the end, we need to learn from the mistakes. We've invested money in the mistakes, and we need to make sure we have a process that allows us to learn from them. I'll leave it at that as the keys that are needed in order for us perhaps someday to complete our own tower within our own company.

MR. ERMAN: Thank you Mr. Sandberg. Your slides and presentation did a great job concluding our prepared remarks and thank you again to everyone on the panel. I think the whole panel did an excellent job. We can now open this up to questions from the audience.

FROM THE FLOOR: I wanted to start by saying that I'm a recent Fellow. A couple of years ago, we had a study note about a very successful company and how it successfully managed its risk. It took a huge amount of risk but was able to successfully manage its risk so that its share prices shot up from \$10 to \$60 or \$70. The company was Enron.

I would like to ask the following question. We know that there's a problem with measuring various risks, quantifying risks, and covariance. They change over time and all that, but suppose we had solved this problem. What is your ideal risk management unit? What should such a unit do? I can think of a car assembly line. They produce cars at the end of the assembly line. They take some inputs and, at the end of the process, they produce cars.

What do you expect the risk management unit to do year in and year out? From all I understood in this discussion, they probably would produce some reports and then give them to senior management. Is that their end product, or do you have some other things in mind that a risk management unit would produce every quarter?

MR. LONGLEY-COOK: I think the first mistake is to create a risk management unit. You can do that, but if that's all you do and a report is created, then you fail. For a risk management process to work, you have to get all the people involved who should be involved. The communication, as Mr. Sandberg says, is key. You need the CRO, you need the unit, you need to do the modeling, and you need to create the metrics.

All of that will fail if it's done by a corporate unit that devotes all of its time to those aspects and that's as far as it goes. That's because it doesn't get out. The better model is to have a CRO with two people. You have all the work done out in the lines and have the people in the lines identifying the risks. They know the risks, and you don't. Have the CRO in that unit merely providing the methodology and the metrics and the basis. The communication has to go all the way up to the audit committee, the CEO and the CFO. It has to be ongoing and interactive.

Enron is an excellent example of how rules that you set up can be abused. Regulators and Wall Street now know that the rules aren't going to cut it. Greater transparency around your risk exposures and an understanding of what's going on is needed. We need to get inside the companies, as the Basel regulators are doing, so we can understand it. If you just set up a process and say, "Okay, I've done it, here are the metrics, here are the rules and that's it," people are going to abuse it. They're going to get around it and hide things from you. It's not going to work. What we've talked about is a start, but the important thing is getting all of that out and making it work as a process.

MR. SANDBERG: In England and Canada, the financial supervision has been consolidated. So whether I'm a bank, an insurance company or a mutual fund, I'm regulated by the same regulatory authority. So the regulators are asking, "How do I assess the risk of these institutions?"

They are starting to put together a risk assessment process that creates a dialogue with the company. They will go and ask them a series of questions and have an on-site visit. They want to have a dialogue with the managers to see how they respond to the questions. While there are some things that are clearly objective and can be scored, this also provides a gut check on the strength of the management. Do they understand their risks, and do they have a way to respond?

The regulatory question is no different than the obligation the company has when managing its own business. So, at the corporate level, the communications process, as Mr. Longley-Cook said, needs one or two people at the corporate level. They are looking to hear a consistent story when they talk to the marketing person, the underwriter and the claims person, and following up on disconnects. Certainly, there are reports that might need to be going on as you monitor your position. Part of the output is this involvement in a regular communications process.

MR. JEAN: Most of the work should be done within the lines of the subsidiaries. The role of the risk management committee is to aggregate the risk, look at diversification correlations and define or set risk tolerances and manage risk from there on. The other thing they should look at is emerging risks. It's not only the risks they're currently managing and measuring, but what's appearing on the radar screen. I think that's also an important role of the risk management committee.

MR. LARRY GORSKI: I found everyone's comments very interesting, particularly Mr. Longley-Cook's and Mr. Sandberg's. Mr. Longley-Cook, you identified a couple of different approaches to risk management. You alluded to all the different approaches and the problems with communication. We all talk about risk, and we all try to measure risk, but we think of risk relative to a specific accounting framework, whether it's statutory accounting for RBC, fair-value accounting for bank RBC or economic or embedded value. So we always think in terms of risk relative to an accounting system. Maybe this is a chicken and egg problem. Maybe

we should first start standardizing accounting regimes across the board and, once we do that, it might be easier to get everyone on the same page relative to a risk management system. I'd like to hear a few comments on that point.

MR. SANDBERG: That's a good point. I think that's fueling some of the concern with GAAP accounting. GAAP does not deal with risk very well. It's basically a deterministic approach. There is a movement toward more embedded-value accounting, which is used throughout Europe and Canada. I won't call it an accounting process so much as a way of looking at things that facilitate risk management metrics.

To come up with this economic value, I had to make some assumptions out into the future, and we know those assumptions are just that, assumptions, so they can go wrong. Let's run this several different ways and see what changes. I think the movement toward more embedded-value accounting is allowing that kind of risk analysis. I think one of the problems that people are finding with GAAP is it does not encourage that.

MR. JEAN: I think people at the international level agree very much with Mr. Gorski's view that there is a real value of having some standardized scorecards. Regulators also realize that there are other things they can do independent of scorecards. The relationship that you establish with the company, and the way that you communicate might also be as important as the scorecard. They're both important, but they don't have to be worked on sequentially; they can be worked on in parallel.

MR. JAMES F. REISKYTL: Like Mr. Gorski, I applaud the panel. I think you gave us a very broad spectrum of the risk measurement process, including objectives. I think it ought to be a cause for many further discussions among actuaries.

There's not necessarily agreement on a process for what is to be done. It's easy enough to talk about some of these things, but the debate and discussion will surely enhance the profession and the industry's understanding of risk. I commend each of you for your parts in this.

I have a couple of constructive suggestions. These are just minor little quips. I find it amusing that you refer to inflation, but not deflation. Obviously, none of your enterprises are in Japan. We tend to talk about only upside and not downside risk. You might leave a fair amount of the world out of your process if you're limited to that, but I don't think you intended to. If you ever give this speech again, you may think about adding deflation.

When you talked about minimizing risk, I think you left out the most obvious aspect and the one where the actuary has an important role. That aspect was product design and features. It should be an obligation of the actuary not only to provide what marketing wants, but also, hopefully, to put in some constraints to minimize

risk. You didn't say anything about product design. I suspect you had it in mind, but you just didn't say it.

I want to ask a bigger question. If your role as the risk manager is solely dealing with volatility of earnings, then clearly you're in Mr. Gorski's camp from the perspective that you are very dependent on the accounting system. That doesn't trouble me if that's how you want to measure risks. It seems like it's in basic conflict with the goal of your enterprise. You have a water and oil situation.

Why do I say that? Arguably, you make profit because you take risk. If you take risk, you're probably going to have volatility. And if volatility is bad by definition, and if your ultimate goal is to have nice, steady earnings, then you ought not take much risk. Therefore, you ought to be less profitable. Now, I'm with a mutual company, so I probably don't understand any of this.

Mr. Sandberg said that if you're going to be an effective member of management, you want to analyze the risk and see if we get paid the best. If you're constrained by regular earnings, you have to understand that every one of these components is important. After I heard all of your presentations, I wondered, what are you doing all this for? I know why we do it, but I wonder why you do it. If your goal is solely to get at earnings, that is the primary driving force. Be careful about what you ask for; it's probably what you're going to get.

MR. LONGLEY-COOK: I gave two recommended metrics. One was economic VAR and the other one was GAAP earnings at risk. I said you need both, and I mean that. If you have both, then you can get at both of those issues. A way of saying it would be that your ultimate goal would be to maximize long-term economic value on a risk-adjusted basis within the constraint of certain GAAP earnings volatility. If you have too much of that, Wall Street isn't going to enable the stock companies to get to that ultimate goal.

The ultimate goal still ought to be to maximize shareholder value. In today's environment, companies are penalized by missing on the earnings. If you mitigate that somehow, you don't necessarily have to take risks. You can take other risks that will balance that, but you do have to recognize that, as a constraint, it's not necessarily what you're managing to. That's one thing you have to keep an eye on.

MR. SANDBERG: I think it's important to think one step further. As a corporation or a business, you have to be adding value somehow in the marketplace. As a company, you have a competitive advantage if you have more knowledge about what's going on than another company has. In the long run, that should flow through in reduced volatility of earnings. New companies entering into that area are not going to have your experience, and they're going to be exposed to that volatility. That would be my short answer as to what's going on there.

MR. GORSKI: I'll take some exception to Mr. Sandberg's response to my

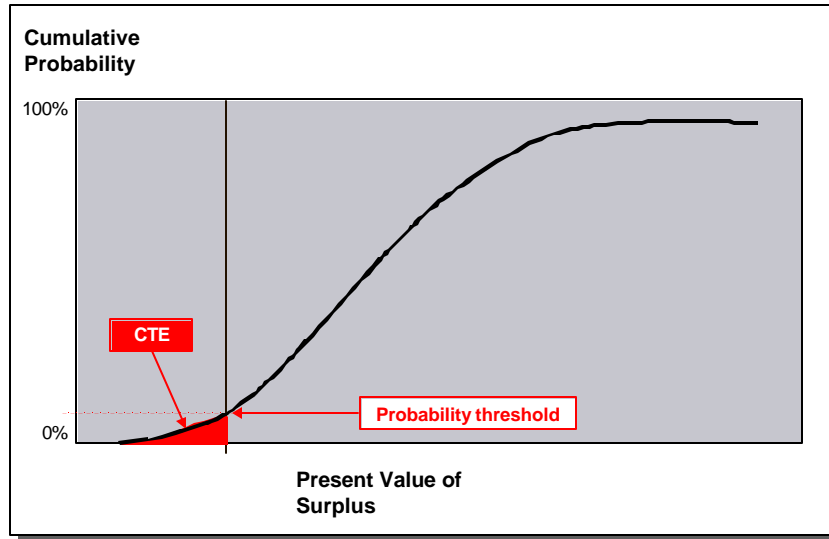
comments about discussions between a company and regulators on one basis versus accounting on another basis. It seems to me that it's a disconnect that does nothing but cause confusion, and it provides you with information that's probably not actionable by either party. I'm not suggesting one accounting framework over another accounting framework. Let those discussions proceed, and let the best one win. I think coming to some resolution of that issue is going to make the other issues concerning risk management go a lot quicker.

MR. SANDBERG: I agree, and I think that's an important point. I would add that the discussion by the regulators is meant to be a discussion that goes beyond what's going on with the accounting. If there's a company, I can say about my pricing that I looked at an economic pricing basis and tried to understand the underlying economics. That's opposed to seeing somebody else's policy features and saying they looked nice. I included them in my policy, and I'll just track the experience and see what happens as it goes along.

Those kinds of questions can come out in the dialogue process. I don't disagree that the accounting is an important disclosure item because it indicates what a company believes about its business, depending on how much value it has.

Chart 1

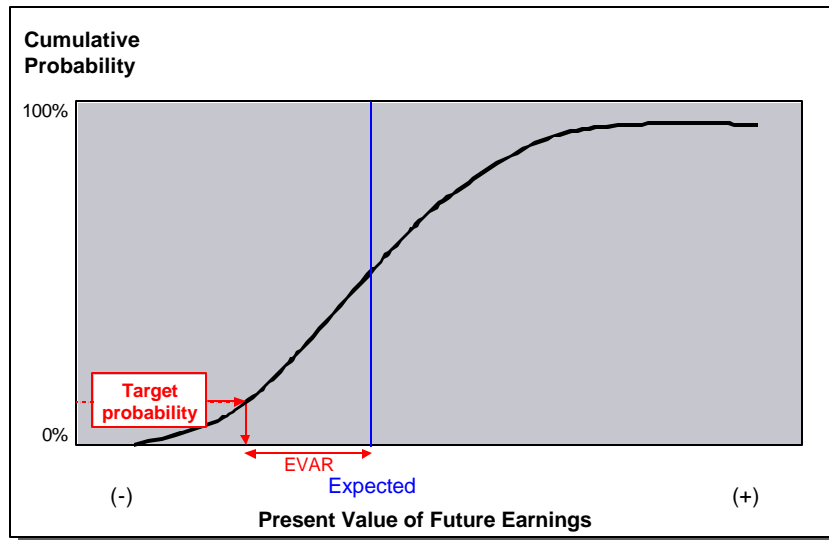
Probability-of-Ruin Threshold versus CTE



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Chart 2

Economic Value at Risk (EVAR)

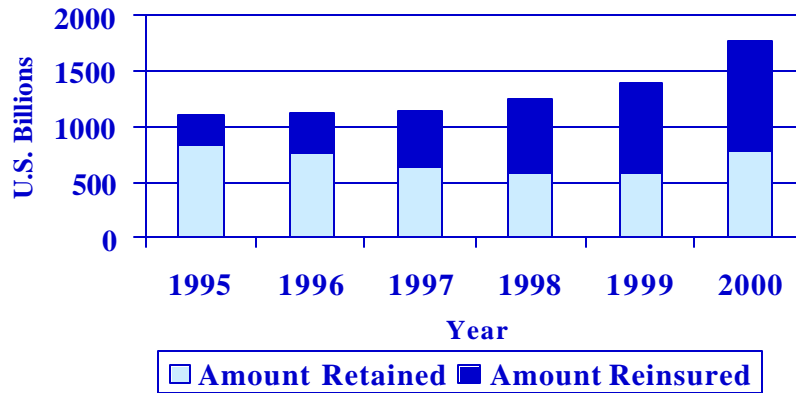


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Chart 3

Use of Reinsurance – U.S.

U.S. Ordinary Individual Life Sales



•Sources: ACLI, Munich American Reinsurance Survey

