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## **Session 18PD**

### **Risk Management Practices in the Insurance Industry**

Track: Investment

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Recorder: Thomas M. Grondin

*Summary: The panel presents the results of an industry survey on risk management practices. The survey includes life insurance and property/casualty companies. The panel compares the results to banking industry practices and discusses the survey responses to questions about anticipated changes in practices over the next five years.*

MR. ALLAN BENDER: The whole topic of risk management really came to prominence in the banking industry 15 years ago when the original Basel Accord came out from the Bank for International Settlements. They're really the first ones to make this official connection. There are a number of cases within the Basel Accord in which you get some kind of capital relief, but the price for that is that you have to prove that you have very strong risk management. So, you're allowed to have sometimes a slightly lower capital provision as long as you can prove that the first line of defense is really strong. That means that all of a sudden regulators start looking at a whole bunch of things about what's going on internally in the company. I'm a regulator, so I think that makes sense. That was what was laid out in the Basel Accord. The banking industry worldwide, but certainly in the western part of the world and Japan, has adopted this very seriously. Banks, you'll find, have huge risk management departments.

All of this is moving very quickly into insurance. In Canada, for example, we have this notion of capital requirements for segregated funds or separate accounts in the United States. Basically, think of the variable annuity business. We are going to begin to allow companies to determine their capital requirements using internally based models, models that the companies themselves create and maintain. The cost for that is that they're going to

have to prove an awful lot to us about all the risk management that goes on around that process. We're going to want to know what the models are, and so on. Everything we're doing exactly parallels what's going on in the banking world.

I work for the Office of Financial Institutions which is a Canadian national regulator. What's important is that we're an integrated regulator in the sense that we regulate all financial institutions, perhaps with the exception of stockbrokers, although the largest brokers in the country happen to be subsidiaries of the banks. So, in fact, we see into them as well. The banks aren't always sure what part of their operations are really the banking operations and what part are the brokering operations. So, we see quite a bit.

Because we are an integrated regulator, we get to see the cultures in both industries. One of the things is that because we've seen what's going on in banks, we've adopted a very definite statement—a philosophy about how we supervise not only banks but all financial institutions—in our supervisory framework. The key is risk management. Basically, in supervising, we pay a lot of attention to an institution's risks and to the risk management that mitigates those risks. We come out with a rating based upon net risk, the risk that's left after your mitigation effect. Essentially, the better the institution's rating, the less we're going to bother them. So we're developing ways to evaluate quality of risk management. That's becoming a central issue.

A general impression is that the insurance industry, even though we talk about it being an industry that's here to spread risk, is really way behind the banks in analyzing its own risks. A risk management culture is really only starting to grow. Now that's our perception. The questions really are: What are the facts? How much risk management is going on? It's clear that risk management is going to become increasingly important. Certainly in Canada we're very consciously going to be forcing the industry in that direction. I think that the same thing is going to happen in the United States. Particularly the things that are happening in Canada, with respect to segregated funds, are likely to develop in the U.S. in a very similar track because the discussions that we're having with the C-3 Risk Task Force. They seem to like the stuff that they're seeing here. I think that things will eventually evolve south of the border in a very similar way.

It's clear that this is going to be very important. It's also clear that risk management is a natural extension of a lot of our talent and training—particularly in this age in which we're talking about "Big Tent" and looking for other things for actuaries to do as we see more and more consolidation and concern about shrinking client bases for consultants. It is also a natural thing for actuaries to get into. From that perspective, from the perspective of the finance practice, and within the SOA there's been some consideration of how we get education and research going in this area. The finance practice, in fact, has thought about it, and one of the

first things that we realize is we first need to assess. Before we start talking about developing methods, we need to assess where we are today.

The finance practice and, therefore, the SOA developed a project to study this. The purpose of this discussion is to really talk about what we've achieved and what the project has been. We're going to talk about the project, the project oversight group, and what the project has been trying to do. We prepared an extensive survey, so we'll discuss the results of the survey and the companies we surveyed. The people who did the analysis for us had some experience in the banking industry, so there's a comparison of that. They also have some experience in studying the situation in Europe. We'll be discussing all of these things. Finally, we will end up with a little bit of a discussion of where we go from here.

The finance practice area developed the idea for this project in 1999. The practice was saying that we should figure out reasonable ways to report on risk—particularly within insurance companies. The first question that comes up is, "What's going on right now?" Before we talk about development, we need to find out what's currently happening. Therefore, there is a need to do some research. Once you have an idea for a project within the SOA you take it to the appropriate practice area research committee, present the idea, come up with a reasonable request for proposal, and once the committee decides to proceed, there's a budget set aside. The SOA then sets about establishing a project oversight group.

I got a phone call that asked if I would be chair of the project oversight group. Usually that is somewhat of a task. You have to come up with things like the request for proposal (RFP). You have to find people that you can cajole to serve on the project oversight group (POG) and so on. I must say I had it really, really easy, and I appreciate it. The practice area had already done the RFP. They gave me a list of people who were interested. As a matter of fact, basically the POG formed itself, so that the hardest jobs as far as I'm concerned, in fact, were done. The statistical support from the SOA has been marvelous. I'm just pointing all this out because I hope in the future a number of you will, when asked, serve on POGs because they're an important area for fostering SOA research. Finally, a budget is set aside within the research budget of the Society to do all this.

In terms of the POG, the first two tasks were basically done before we even started, so I won't take any credit for that. We sent out a RFP and got back six viable submissions. They were rather interesting because they included submissions from sole practitioners, from academics, and from some of the leading consulting firms; both actuarial consulting firms and major accounting firms who are into doing surveys and are knowledgeable in the financial services field.

Our first task was to sit through the project and select researchers, and, of course, funds were a consideration and so on. We selected the researchers. The people we selected were extremely capable. Occasionally we would have phone calls to

receive interim reports. There was very little guidance we really had to do since, in fact, we'd selected people who were really as expert in the field as we have in this profession at the moment.

Our remaining task is to accept the final report. The final report is kind of thick, but that just depends upon how you print it. There's a lot of tables and could be made smaller. We are hopefully going to be arranging for publication and dissemination of the results because I think they are of a lot of interest.

The POG members, besides myself, were Tom Grondin, Max Rudolph, and Eric Thorlacius, but we were supported very ably by Tom Edwalds and Joanne Temperly in the SOA office. The project was actually awarded to Tillinghast. Tony Dardis, Francois Morin, Steve Britt, and Mary Gilkison were the researchers. They used the services of another company, Implied Marketing Research, to create the survey and compile the results. This was an incredible survey. It involved several hundred questions. You might wonder how you could cajole companies to answer surveys like this. It was easy because it was all on a floppy disk, and it was very cleverly designed so that you could pass the disk to people who were experts in various areas. For example, it was automatic so that if you hit a series of questions and the answer to the first question was no, it skipped the rest of the questions because they weren't going to be relevant and so on. It was all very well done.

Our objective in all of this was to develop a better understanding of where the insurance industry is with respect to risk position reporting. Risk position reporting means measurement of risk insofar as it can be measured. You have to realize that a large part of this also involves risks, which perhaps are not necessarily quantifiable. Nonetheless, it's extremely important to identify those risks, to know that you have them under control, and to think about methods you can take to influence the outcome that might result from some of them. We were interested in reporting, therefore, we were looking at the types, the depths of these risk position reports, asking companies about how they managed them in terms of how long did it take to prepare them, who got them, and who reviewed them. What was in these reports? How easy it was to put them together? Was the data a real problem or not? For those people who were actively doing this, some questions were about where they thought all of this process was going. It's a new process, and we were looking for some ideas of how, in fact, all of this might evolve.

MR. THOMAS GRONDIN: Overall, 164 surveys were mailed out, primarily to chief actuaries and some senior people in investments or risk management areas. We really compiled a fairly extensive list of people to try to target the right people and to get the best response rate we could. We were targeting major insurers in the U.S., Canada, and Bermuda. Overall, there were 44 respondents. We were hopeful that it could have been closer to about 60. At the end it was really difficult just trying to get those last 15 to 16 companies or so to just complete the survey. A lot of them had already started to fill it out. But in an effort to try to get this out in

a timely manner we did have to cut it off at some point. The sheer size of the survey is 400–500 pages long. It includes the tabular results of everyone's responses, so it's really very, very extensive. The respondents included a fairly good mix—10 property and casualty, 10 life, and then 24 "other" companies, where the "other" is really just some of the larger hybrid companies that operate in multiple lines.

In terms of the structure of the companies, it was a pretty good mix. Although I haven't looked at any data, say, from A.M. Best on the mix of the industry, I thought this was fairly representative of the makeup of the industry. On the earnings metric was 75% GAAP, most of the 32% in statutory would be mutuals and some of the other structures, and 9% the economic value added being mostly insurance companies with European parents.

The basics of the survey structure were broken down between the risks on the asset and the liability side of the balance sheet and then trying to gauge the interaction between the two and how that is being monitored, measured, and managed. I believe the operational aspects are becoming more and more common in the industry. People are starting to try to focus on operational risk and enterprise risk management. I'm not going to be able to go into detail in terms of all of these specific risk attributes within the sectors. As I just mentioned, the survey results are incredibly extensive. Allan will explain how you'll be able to get the survey results in quite a bit of detail if you so desire a little later on.

Starting off with asset reports, just to try to take out a few key reports. The one question that was asked was, "For companies doing asset risk analysis, what sort of analysis is being performed?" Only 35 of the 44 companies, considering that these are quite large companies in general, were doing asset reports. A little low, I felt, but of the 35 companies, 100% of them were doing some sort of duration measurement or monitoring. What's probably not too surprising is, that on the asset side, some of the shortfall is in with the companies on the PC side. It probably explains a fair amount of the shortfall of nine companies with the 44 participants on asset reports. With some P&C insurers, if most of the liabilities are quite short, so their assets might be fairly simple in nature. There was a much stronger response on the life and the other, larger, multi-line companies, as I mentioned. In terms of liquidity testing, P&C companies have not necessarily focused so much on liquidity testing, which certainly makes sense. Only one company out of the 10 is doing some sort of liquidity testing as reported under these results. The other interesting point I'd like to mention is that under the performance measurement, I thought it was a little interesting that under the life-only section, not as many companies were doing some sort of performance measurement and monitoring or attribution analysis on the portfolio side. A lot of what I'm saying is somewhat guesswork, thinking that maybe a lot of them, or some of them certainly, are using a buy-and-hold type of strategy.

To describe a little bit more detail in terms of the asset risk, we felt that the two primary focuses are on the asset portfolio in aggregate and the fixed interest securities, trying to measure duration or liquidity. Much of the focus was on fixed interest securities, and of course analysis of the greeks is largely on derivative instruments.

It is good to see, of course, that senior management is by and large receiving most of these reports. I'm hoping that they're receiving them in some sort of summarized fashion, because otherwise, I can't see them getting a whole lot of use out of a lot of the documentation. Interestingly, external auditors are not getting a lot of these reports. There are probably two factors contributing to that just off the top of my head. The first is, are they asking for it? The second is, the auditing is more of just an accounting framework following accounting rules and principles, and not risk management oriented. I'm sure that every company that has a risk or asset/liability modeling (ALM) committee is receiving these reports. So, that's certainly just indicative of the number of companies that would have such a committee.

One of the things that we tried to do in the survey is—and certainly Tillinghast tried to do—is try to ask qualitative questions. We tried to put a little more of a qualitative aspect to the survey responses and add a little bit more color or information around the quantitative, closed answer questions. The description of some of the most effective reports on the asset side is a good example of this. The companies that were doing partial or key rate duration analysis, for example, gave high marks to those reports. These provide them with intuitive insight into the shapes of the assets and liabilities on their books.

People responding to these already were talking about asset/liability reports, which is good to see. A lot of the qualitative responses are really focused on both the asset/liability interaction, which is good to see because that's where obviously risk reporting needs to be done. There is no surprise on where you'd see reports going in the next five years. People would like to see them be more rigorous and certainly faster. The survey also talked about what would you like to see with these reports in the future. What-if sensitivities would be interesting. I think that's something that could be quite easily done now. It's certainly something that allows you to easily understand how the assets and liabilities are supposed to interact. It's something that you can actually do a fairly good job at doing a peer review or a technical review of the results to make sure that your sensitivity analysis, your deterministic scenarios are actually giving you some of the insights or answers that you expected. If not, you've got a bigger problem.

As we know, liquidity has become a hotter topic recently. The most effective reports include net cash flow results. Well, of course, that's an asset/liability report. You have liquidity and illiquidity on the asset side just like you do on the liabilities, and it's achieving a proper balance between the two—being able to operate in each

market, assets or liabilities, to achieve the proper mix. A lot of the standard liquidity testing that you'd expect some companies to do looks at illiquid securities and how quickly they can be sold versus cash demands from the liability side. Where some people see this going in the future is in the ability to pinpoint areas subject to liquidity risk by knowing your market and knowing the products that you're operating in. The last point I thought was interesting is greater frequency, longer time horizons, and more detail. I think that's a pretty tall order to fill for liquidity testing. Of course, the longer the time horizon you have, the more reliability you're going to lose. For more detail, depending on how deep you're going with the analysis, you're going to start to lose reliability.

In terms of performance measurement, it's interesting to see that some people were looking at sensitivity to economic scenarios in terms of performance measurement against the attribution analysis. This was to try to explain in a value-added context, the gain or loss of value due to realized events different from expected and where people expect to see reports in the next five years. It's interesting, I think, that value at risk (VAR) was coming up quite a bit in terms of seeing more and more VAR reports and comparison to benchmarks. I personally expect to see more value-added type analysis, whether it's through fair value of accounting or other companies just embracing kind of an embedded value approach to measuring the business and performing their own attribution analysis and understanding their business better.

With VAR, just to remind you, 10 companies said they were doing some sort of VAR measure, a lot of them being property/casualty. Where do you see reports being in five years? VAR is going to evolve in terms of its definition reports, and I think that's something that all of us should strive for. It is largely a shorter-term measurement, but I think it's still something fairly new for the industry.

Very few companies are doing derivative reports. It's a lot of risk that's just not well understood by a lot of people because you are trying to understand how your business is going to behave with the different risk measurements.

Now, on to liability risk position reports. In terms of just ranking materiality of liability risks (1-low through 5-high), under claim costs, P&C companies rank them really quite high (3.7), which you would consider because of the severity of some sort of catastrophe event that could occur. Life's certainly not that high (2.67), as you would expect. Certainly none of them rank it a five. Under expenses, companies pretty much across the board rank that fairly low (2.2–2.54), and I think that's because it's not really a risk. I think it's something companies feel they can really keep under their control and something they can manage. Under reserve and pricing adequacy, the amount of volatility is in the different styles of business. For P&C, 40% of the companies rank it a high degree (5) of materiality, and it's just again reflecting the degree of uncertainty where it's a fair amount less so on the life side. But for the hybrid companies, interestingly enough, they've actually

ranked that lower (2) on average, and I would think that's probably more due to the fact that they would tend to be some of the largest companies and certainly have the law of large numbers working on their side. In terms of the catastrophe events under the life-only and all others, I guess I find it a little bit surprising that they basically rank those as not applicable. I don't know what that means, whether they're just not worried about a catastrophe at all. But certainly some of the all other companies, depending on what types of business they're in, there must be some event, some severe market disruption or some severe mortality event like the flu epidemic.

One question being asked of those doing liability risk analysis was, "What types of analysis are being performed?" There was one life-only company considering that, again, these are large companies, not doing some sort of experience study. I'm not really sure they understood what the question was. We didn't get to see the actual survey results in terms of the individual companies. All of that is, of course, kept completely confidential. So in terms of just some responses about the liability reports produced, 50% would calculate the aggregate result, and what's meant there is an aggregate across products for something. In terms of embedded value, life and the multi-line were more likely to calculate which is I think due to the long-term nature of the liabilities. There was nothing terribly surprising under experience studies. Companies are looking at mortality lapse and expense studies with P&C companies looking at loss ratios. We see more analysis with respect to the industry standard. I'm not really sure why that was coming out as a common theme.

Once again, to highlight embedded value by its very nature has to take into account the asset side of things. So again, it's really an ALM report disguised as a liability question. It's really talking about attribution analysis and performance measurement. It's not much the absolute level or value of a particular segment of one's business, but it's the change in value or the reconciliation from Time Period A to Time Period B which is the most relevant to everyone. In terms of expecting reports to change in the next five years or so focusing on profitability drivers, that's obviously key, always wanting to focus on what's driving the profit and loss (P&L) of the business. In terms of refined discount methodology, focus on value but, again, just the relative change.

MR. BRENDER: I'd like to make one comment about the previous topic, which is embedded value. You might find that these things change even from the question of what people expect. In Canada, in particular, up until last year, there were virtually no publicly traded life insurance companies. Then we had the four leading mutual companies demutualized. The other large life company that was stock, in fact, was part of a larger conglomerate. The fact is that we didn't have any analysts who really tracked these things and really understood life insurance. All of the sudden, some of the largest companies listed on the Toronto Stock Exchange are life insurance companies. There's been a big development that the brokerage houses have had to get their analysts up to speed on this sort of thing. The



companies involved under the auspices of the Canadian Institute of Actuaries got together and decided that, well, they had to start disclosing something meaningful that the analysts could understand. They focused on embedded value. That is working quite well. The analysts are beginning to appreciate it. They're learning about embedded value, how it depends upon assumptions, what it means, what it's measuring, what it's not, and so on. There are five Canadian companies now that are disclosing embedded value on a regular quarterly basis. Three of them are traded in New York as well. So, this information I think is getting out and might, in fact, become much more useful and will be produced by these companies as a matter of course. That takes a huge machine to do it, but once you get used to doing it, and it becomes a production item, I think people will start making a lot more use of it. I wouldn't be surprised if it starts to spread on a wider basis into the U.S. as well.

With respect to ALM, one of the things I hope you realize is that we're talking about asset risk, liability risk, and asset/liability matching risk. The Charles Lambert Trowbridge committee of 20 years ago, in the late 1970s, was the committee that came up with these labels: C-1, C-2, C-3, and C-4. C-4 got added later on, but C-1 is asset risk. C-2 is liability risk or product risk. C-3 is basically ALM. C-4 is everything else. The C-4 category has a new, fancy name called operational risk, but it's still everything else. So we had the categories right a long time ago. What we're talking about in terms of asset/liability risk categories are duration mismatch, cash flow mismatch, spreads on crediting rates, particularly for things like UL, interest rate guarantees which have become very important, and perhaps even equity guarantees on guaranteed minimum death benefits (GMDBs), guaranteed minimum income benefits (GMIBs) and things of that kind, and disintermediation. When Trowbridge's committee was working, disintermediation was the hot topic. The policy loans were at 6% and interest rates going up above that. There were huge policy loan demands from policyholders. That's where a lot of this work got its start.

Well then, again, we started looking at who does these kinds of reports. We have lists of types of reports. Transfer pricing means a lot of different things to a lot of different people. If you read the paper, the business pages of *The Globe and Mail*, in Toronto today, you learn that transfer pricing means the price at which Ford Motor Company in the United States pays Ford Motor Company of Canada for their product. There's a story in the paper about how they thought that the price was not right, so no wonder the Canadian company isn't profitable. The parent company is sort of ripping it off. That's not the kind of transfer that's in there, and the taxman is not happy. That's not what we meant by transfer pricing. There was actually a glossary supplied with this questionnaire. Transfer pricing in this context really means that you do reporting of duration convexity. Do you compare them between your assets and your liabilities?

One of the things that I think is interesting here is that, when it comes to ALM within P&C companies, nobody's doing things like stochastic testing. Only a third of the companies are doing deterministic scenario testing. One remark I will make is that the P&C industry has perhaps a different view of the relationship between investment income and what they really do. They see those two things as different. What they really do, in some sense, is not thought to really involve investment income, which, in fact, is not quite the case. I'll tell you that in the next couple of years in Canada we are going to be introducing discounting of P&C liabilities. I suspect that, at least for the Canadian companies, it's going to change some of this kind of behavior because the P&C industry is certainly doing a lot of stochastic work with respect to liabilities, way ahead of what the life industry is doing.

In the P&C industry there's a tremendous amount of deterministic scenario testing, but, of course, the life companies have been doing this kind of testing for a long time.

With respect to strictly life companies, two companies are doing transfer pricing. It's kind of strange that, in fact, there aren't more companies doing that sort of thing. What's striking is that everybody who does these reports does them for the general account life and accumulation annuity type business, but when it gets into equity-indexed and variable annuity business the coverage is a lot less. Now I suspect again once the C-3 Task Force in the U.S. is finished, there's going to be a lot more demand for a lot of this type of testing.

In asking people what they thought was useful, particularly in the U.S., the view that deterministic scenario analysis is purely a regulatory thing was interesting. I suppose everyone has New York Seven and that kind of thing in mind. Yet the interesting thing is that there's a statement later on saying that an important and effective type of testing is testing the stress tests. I would suggest that while stress tests are effective, they are not stochastic tests. Stress tests are things that you make up that are of the variety how bad it can get. The stochastic testing may produce a tail in a distribution eventually. You can call that stress, but most people want to say if such-and-such a thing happens, what does it do to us? That's the kind of stress testing we want. That is deterministic. Clearly, the idea for stochastic testing is to figure out which factors and which ways of operating—on investment policies and matching strategies—which of those things really make a difference? After that, your stochastic testing will identify all of these risk drivers, and let you come up with relative ranking of results. We're interested in tail analysis. This is one way of getting at it. There was a rather interesting talk recently at the CIA meeting on other newly emerging ways, for example, extreme value theory and whether that type of statistical analysis even of testing results might get you some additional information about tails and extreme events as well. I think that that will be an area that we're moving towards. All of these models and all of this testing is very much future cash-flow projection based.

People are certainly thinking that in the next five years, and I definitely concur with this, there will be a distinct move towards stochastic scenario testing. In particular, we will have much more sophisticated techniques with respect to constructing tail risk scenarios. Sophisticated techniques for constructing scenarios might include, for example, the use of load discrepancy sequences for generating random numbers so that you can be sure you cover all parts of the distribution as well. Some of these things are starting to emerge in actuarial literature. In particular, load discrepancy sequences are something that have been studied and my colleagues at the University of Waterloo have certainly produced a lot of information about them. I think it's that kind of thing hopefully that people have in mind.

What do people expect to see out of these reports, particularly with respect to ALM? People don't expect to see much from deterministic testing but will continue to do it. Well, if you intend to do stress testing, there's lots of good information for companies to be gained by doing this kind of testing. Forget about who's reading it. There's deterministic information that is worthwhile doing for internal consumption. People would hope that there will be holistic modeling of all risks. In other words, find some way to have very sophisticated models that can integrate variations in interest rates with variations in, for example, lapse rates. We know what has happened historically. We really don't know what possible relationships are. There's a lot of work to be done, but I think this is the hope. Of course, the whole idea is that eventually we would be able to use these models and this type of work to set our own internal capital requirements. I think most people have in mind setting what's called economic capital requirements. I would imagine most people, even though they might desire to, wouldn't think that they were going to get to set statutory capital requirements this way. I think they might be surprised because we are moving in that direction.

Reports that are considered in the survey to have been the most effective are reports that look at duration convexity liquidity mismatch. I thought that this was exactly what transfer pricing was, yet everybody answered they didn't do that, but that was our definition. It is difficult to understand what is going on in the company in terms of sources of cash and uses of cash and understanding cash flows on a more global basis for the company. People expect that as time goes on, in particular, that we'll be developing economic scenarios that extend beyond interest rate risk. The finance literature has produced a lot of models of interest rate risk mostly because that's the only way they can price their derivatives. Those models are built for pricing derivatives. They're not necessarily the ones we want to be dealing with for a lot of these purposes, but we have to go beyond that. For example, a lot of the variable annuity designs and some of the guarantees that we're seeing now require us to have models of stock market, require us to have models of some other derivatives perhaps, and other pieces of the market. Foreign exchange is going to be important for a lot of companies. I think the hope is that we're going to get integrated models that incorporate all of these things. These models basically are few and far between at the moment. As computers get going,

people hope that there's going to be better use of graphics and, particularly on a technical note, the suggestion of key rate duration analysis.

The whole idea of risk management—of measuring risk—is something that's evolving. We are going to be trying to find different ways to measure this risk, to put dollar values onto it, to properly measure it, and to find reasonable measures for some of these things. Some of the developments that are taking place, such as unified valuation system (UVS), are clearly moving in this direction as well. Finally, I think there's the idea that maybe we'll extend some of this analysis to other products.

When it comes to operational risk it used to be, and still is in many people's minds, defined as everything else. There's an organization of risk managers, risk professionals, called the Global Association of Risk Professionals (GARP), which is mostly people who work in the banking industry. Membership used to be free, but it's not quite free anymore, but it's still a good organization to belong to. They publish a magazine called *GARP Risk Review*, and they had a cover story in it called, "Operational Risk: What is it?" They had a whole section of articles inside it on operational risk, and, of course, the lead article discussed what does operational risk mean? Part of the answer is, we're not quite sure. The next article was a review of software intended to help you measure operational risk. I had a hard time with that. The only thing that we're going to present here is basically a listing of headings for operational risk. Operational risk, as some of these results will show you, is not deeply investigated and thought about yet within the insurance industry.

One category that seems to be emerging is event risk. That includes things that happen to you externally, things that you can't control such as taxation, political sources, regulation and capital markets. Then there are people risks such as integrity, health and safety, and key personnel. They are the risks you face because you have people in your organization. For each one of these issues there was a question asking, "How material do you consider these risks?" People can read that question in different ways. Some people can read it as, "How material do you think the risk is to what you do?" The other way to read it is, "How much do you worry about this risk?" That is a different question really. But, nonetheless, without distinguishing between the two, we got answers. We asked people to rate materiality or significance to them on a score of one to five. One is low. Five is high. The point I want to make is that none of the numbers are at or above three. So, nobody thinks it's even halfway there. I would suggest some of these things are probably, in fact, heavily weighted. The reason some of the numbers are higher is probably because of the P&C companies. The P&C companies insure some of these risks. They must be more aware of them, and the management should, in theory, be a little bit more aware of them in terms of how they apply to their own shop.

Event risk, taxation, and regulation seem to be the things that people are most worried about. If you read an insurance industry description of the regulation risk,

it's the risk that they may do something to us. If you read the International Association of Insurance Supervisors' paper outlining categorizing risks, when it says something like regulatory risk it's the risk that the industry doesn't comply with what we want. Same words. Interestingly enough, people are more worried about retaining top personnel and making sure that the guys at the top are in good shape and not losing them, rather than the integrity of personnel. Other risks include technology risk with inappropriate transactions, lost data and availability and infrastructure. A colleague was pointing out to me that this inappropriate transaction risk is becoming a much more important thing than you might imagine because inappropriate transactions include things like money laundering. They have trouble in the banking system now because the regulators in the system are becoming much more aware of things. What's happening is that this activity is moving into the insurance industry on a worldwide basis, and the insurance industry, in fact, is not prepared to take this on. This is an interesting category, and I would venture that most people answering this question would not have thought about money laundering.

Lost data is certainly a significant risk. That should be people's nightmare. The availability of technology and the infrastructure and changes in technology are important, but still nothing rated at three.

The distribution risk, which includes business volumes, market conduct and sales compliance, is fairly consistently rated over two. Interestingly, I think the sales compliance would include market conduct issues. In spite of the fact that we've seen some of the history that we've had in the last 10 years, it still ranks relatively low. I would venture that is due to all the mentions of catastrophic risks or whatever weightings there are that are. I haven't looked at the numbers, but my own personal guess is that it's all due to the P&C companies.

I'll talk a little bit later about what we're going to do with this report. However, in addition to the report itself, there are four appendices. The first of which is a glossary that lists all the terms which obviously I haven't looked at lately. The second actually lists the participating companies, although I must tell you that there are one or two companies that chose to be anonymous, so we have anonymous life insurance company of anonymous country. There are also comparisons with other Tillinghast studies that have been made with respect to the banking industry and with respect to the European insurance industry, and Eduard's going to talk about those.

MR. EDUARD A. NUNES: As Allan said, the project oversight group decided to look at the risk position reporting practices in the banking industry. The banking industry is considered the closest cousin to the insurance industry, as well as some of the practices used in Europe. I've heard comments that European ALM and risk reporting is more advanced, more sophisticated. So, the idea here was to see how much of that was true, hence, appendices three and four. I'll start with some of the

basic differences between banks and insurance companies. Then I'll discuss briefly some of the risks that banks face. Finally, I'll describe some of the risk reporting positions that the banks commonly engage in.

One thing I should mention is that the comments here in respect to the banks pertain mostly to retail banks as opposed to investment banks or merchant banks. For the insurance companies, there are mostly for life companies, although some of the comments apply to P&C companies as well.

The assets and liabilities of a bank are generally much shorter than those of an insurance company. The examples on the asset side are loans, whether they are car loans or loans for school. Even for mortgage loans, the interest rate guarantee is typically less than five years. On the liability side, you have deposit accounts consisting mainly of demand deposits (your everyday checking and savings accounts) that are obviously very short term. Also, Guaranteed Investment Certificates (GIC) or Term Deposits typically have interest rate guarantees less than five years.

Another major difference between insurance companies and banks is that the typical day-to-day operations of the bank are very transaction intensive—there's a lot of cash and money moving between different accounts. This is as opposed to an insurance company where ideally someone buys a policy, puts it on pre-authorized checking, and you never hear from that policyholder again. Many policyholders may not contact their agent or insurance company for months or years after purchase. A common thing is contact due to an address change. But I think most people will agree that you deal with your bank on a much more frequent basis, whether it is every day or every week, to make sure all your bills are paid.

The insurance company's assets and liabilities are also financial assets, but the secondary markets for a bank's assets and liabilities are much more developed, much more sophisticated. A bank can much more easily take its assets and liabilities and move them off its balance sheet. Arguably, reinsurance provides a similar function on the insurance side, but the market is not as open, so it is not as efficient. It's a question of relative sophistication here.

Now for some of the basic risks that banks face. First is credit risk, the main one. At one end of the spectrum, you have very low risk loans that are collateralized. They are secured by either a house or a car. Another example is the home equity loan. On the other end are high-risk loans, loans that are not secured. The most common example is credit cards. Of course, the interest rates charged on these different types of loans correspond to the level of risk that a bank is facing. Then we also have liquidity risk. I mean liquidity risk as driven from the liability side, the need to retain sufficient liquid assets to cover liability cash withdrawals or cash transactions. This is as opposed to liquidity risk on the asset side. Then there's market risk on the asset side caused by the change in day-to-day prices.

Operational risk is an increasing concern for large multinationals. A recent example

is, if more attention had been paid to operational risk, a century old bank, Barings, would perhaps still be around today.

As for the risk reporting in the banking industry, on the asset side it's focused mostly on credit risk. The banks have been doing this for quite a long time, and their sophistication level is pretty high, and it is still evolving. There's a lot of research still being done on the credit risk side, and this is really the strength of the banks. Similar to what we discussed on the liability side, they look at liquidity risk, or whether they have enough liquid assets to cover cash withdrawals and cash transactions. Then there's the infamous Value at Risk (VAR). A brief definition is the maximum loss that the bank could incur over a short time period, sometimes daily, with a given confidence level, typically 95% or 99%. VAR has its own controversies and its own detractors, but I think that's a whole other session. Suffice it to say that VAR is fairly well entrenched in the banking industry. The other point is that the banks tend to incorporate VAR into some of their risk adjusted return on capital (RAROC) calculations. Experience studies monitor a number of things pretty closely, one of which is the withdrawal experience to make sure that the liquidity risk is covered.

There are just a couple more points, and these relate directly to some of the characteristics of the banks. The first item is the asset/liability risk position. Not that much is done, mainly because the assets and liabilities are so short term. On the operational risk side, the focus has been mainly on trying to execute all of the transactions that are being input to the banking system, making sure these occur as fast as possible and in the most efficient manner possible.

I would like to explain the risk reporting that's carried out in Europe. The content was drawn largely from a survey conducted by my colleagues in Cologne. It focuses on companies that are based in continental Europe with a special emphasis on Germany. Hubert Mueller put together the original presentation material. First I'll talk about the risk reporting from the asset side. Then I'll talk about the liability side and then finally ALM.

Companies were asked about several common asset parameters and whether they were modeling it using a deterministic approach, a full stochastic approach, something in between, or not at all. As expected for all of the equity related and interest rate assumptions, a fairly high percentage indicated the use of stochastic models. Still, overall I'd say that very little is being done stochastically versus deterministically. This goes somewhat against that comment I made earlier that perhaps European practices are more advanced. There are a few items that are not modeled at all including default, credit spreads, pre-payments, exchange rates, and inflation. I'll speculate on perhaps why that's so. The debt sector in Europe that is non-government is relatively small when compared to North America. So, default and credit spreads aren't as big an issue. Also, there aren't as many prepayment and call options embedded in products over there. In terms of exchange rates,

perhaps this was done after the institution of the Euro, so they were not as much of a consideration as if the survey would have been done before the introduction of the Euro. I'm not too sure about inflation, so I'm just going to guess that perhaps it is due to the low inflation environment, because it seems like an odd thing not to model.

Moving on to the liability risk. As is common in North America, most liability parameters are modeled on a deterministic basis. Remember that in Europe, equity-linked products are not as widespread as in North America. I'm referring to continental Europe, not including the U.K. The main exception is crediting strategy. If on the asset side, the interest rates are modeled stochastically, it makes sense that, to the extent the crediting rates are linked, that they do stochastic modeling as well. The non-modeling of loans, premium adjustments, cap risk, and morbidity is mainly due to the nature of the products in Europe versus North America. One surprising thing that I found was that there seems to be a significant portion of mortality that was being stochastically modeled. I wasn't close to the actual survey, but I'd speculate that perhaps they used more parametric models as opposed to tabular models, and that's why they answered the question in that way.

Now I'll discuss some information on ALM. Overall, the techniques used don't seem to be as sophisticated, and it doesn't seem that much different from North America. Most companies use some sort of duration, whether it is Macaulay or effective or partial. There are some pretty high percentages. One thing that was surprising for me was that somewhere between 10% and 20% were using some of the more sophisticated measures of duration, such as key rate and option adjusted duration. Also, as in North America, there was high percentage of companies that are using cash-flow-matching analysis. I'm not quite sure if it's required as much there as it is in the U.S. Looking again at the results, I was surprised that VAR (27%) was as widespread, even more so than convexity analysis (24%). I'll speculate that's partly due to the influence of the banking industry. As many of you know, many European insurance companies are linked to, are owned by, or have cross-ownership with the banks. VAR is definitely widespread on the banking side. One final observation was the relatively high use of market value of liabilities (22%). That concept is now starting to emerge in North America and there's a lot of research being done in that area.

The role of the ALM committee and the chief financial officer is much stronger in Europe than in North America. I'm going to give a few speculative reasons. First, I believe the Appointed Actuary (AA) concept is more entrenched in North America than it is in Europe. Second, the actuarial profession there is relatively less developed compared to the North American system. When I say less developed, I mean that there's a lot more overlap with the other professions. Also, I think in Europe the AA is often the CFO as well, so that can be another reason. Finally,



there is the influence from the banking side, where I expect the CFO plays a larger role.

MR. BRENDER: I just want to tell you what we intend to do with this report. First of all, we've given presentations besides this one. There was a presentation at the Dallas meeting. There'll be a presentation on this work at the annual meeting in New Orleans. In addition, once the POG meets to finally accept this work, we expect that shortly thereafter the report will appear on the SOA Web site. We're hoping to arrange publication preferably in the *North American Actuarial Journal*. It is a rather big report, and it depends upon whether we can get it into shape to fit into the *NAAJ*. One of the standard things in the SOA, when you establish a POG, is you usually have somebody on it who's a liaison to the *NAAJ*, and in this case it happens to be me, one of the members of the *NAAJ* board. So we're working on that. We're also thinking about preparing a number of short articles for publication such as in *Contingencies* or the *Risk and Rewards*, the newsletter of the investment section, or perhaps some other industry publication such as *Best's Review*, and so on. We want to get this kind of information out because we think this is an important area. You're going to be hearing much more about it.