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Session 750F The Actuary at Risk

Track: Actuary of the Future

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Panelists: W. GRANT HARDY
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Summary: Panelists lead discussion and update members about recent events in the rapidly evolving area of risk management. Actuarial roles and opportunities in enterprise risk management and as chief risk officers are specifically addressed. At the conclusion of this session, attendees understand actuarial prospects in the risk area and the need for action to establish an actuarial presence.

MR. STUART F. WASON: We have an excellent panel to discuss the rapidly evolving area of risk management. Our panelists will discuss the roles and opportunities in enterprise risk management, especially the role of the chief risk officer. We have three great panelists for you this morning. First on our list this morning is Grant Hardy, executive vice president and chief risk officer for RBC Insurance. In this role, he has overall responsibility for building a strong global risk-management operation across his insurance platform through integrated legal, compliance, actuarial and risk-management functions. Prior to joining RBC Insurance, Grant worked at Gerling Global Life Insurance Co., where he held several positions, including executive vice president and chief operating officer. In 1990, Grant became president and CEO of Westbred Canadian Life Insurance Co., and he was appointed president and CEO of RBC Life Insurance Co. in 1997. It was in 2000 that Grant was appointed executive vice president and head of the Canadian Insurance businesses for RBC Insurance. He was appointed to his current position in September 2002.

Our second speaker this morning is Ramy Tadros, senior manager in the insurance practice of Mercer Oliver Wyman. He focuses on the application of risk-based capital frameworks for the purposes of balance sheet optimization, asset liability management and strategic asset allocation for leading insurers and bank assurers.

Ramy led several Mercer Oliver Wyman engagements for global leading insurance and bank assurance groups, with particular focus on life operations in the United States, Europe, Southeast Asia and Australia.

Last, but not least by any means, Neil McKay is senior vice president, chief actuary and chief risk officer for Allianz Life of North America. Neil has been with Allianz for 13 years and he has 16 years of experience in product development. He has occupied the chief actuary role at Allianz for the last three years. So with those introductions, I call upon Grant to come forward and start us off.

MR. W. GRANT HARDY: Good morning and thank you for the opportunity to present to you my perspective on the topic of actuary at risk. As Stuart mentioned, it was a year ago that I became chief risk officer of our insurance platform. Although I am a qualified actuary, my background is more in running businesses. So I understand the dynamics of running a business, and I do, at least, understand the actuarial concepts. That was why I was asked within our insurance operation to become the chief risk officer.

Working within Canada's largest financial institution, by market capitalization with its roots firmly entrenched in the banking sector, provides a unique perspective on the development of a robust risk-management process. RBC Financial Group has significantly enhanced this process during the past 10 years. Its risk-management function is recognized as a leader and as vital to the success and performance of the organization. If you look at our stock, we've had a premium valuation for the last seven or eight years, and clearly we are recognized as a leader in the risk-management process from the banking perspective. We have gone through the last credit cycle relatively unscathed as a financial institution.

Our insurance platform was developed during the last 12 years through a series of acquisitions of relatively small insurance companies, as well as a number of start-up operations. The original approach was to allow these product line operations to operate autonomously because they needed to be set up as separate legal entities and we were building the organization. As the organization has grown, we've been moving toward a shared-services model with centralized oversight in finance, actuarial and risk management at the insurance platform level. RBC Insurance operates in the reinsurance business, life and property catastrophe; the North American life insurance business, including fixed and variable annuities; creditor business through the bank in Canada; home and auto insurance in Canada; and North American travel insurance.

I'd like to provide you with an overview of our risk pyramid or how we look at risk; an organizational perspective from the RBC Financial Group level; an organizational perspective at the RBC Insurance level; and finally, some of the issues and challenges that I see from the perspective of chief risk officer of our insurance platform.

The risk pyramid that was developed on the banking side really starts at the bottom, in terms of those risks that can be readily controlled. You'll see the credit market, liquidity and operational. When the insurance business started up — there was some insurance business back to 1967. But we really got serious in about 1995 and 1996 and ended up adding the little box that said "insurance." We weren't quite sure how exactly to define the insurance risks and the nature of the risk, but recognized that we had to put it into the whole process as an organization.

Then as you move up the pyramid, the ability to control or influence the risk diminishes. Systemic risk, at the peak of the pyramid, is the least controllable risk element. Within RBC Financial Group, issues around credit, market liquidity and operation risk are set at the enterprise level, whereas insurance risk, because of its uniqueness, is primarily set at the insurance platform level. As Canada's leading financial institution and because of the importance of our brand to our success, there's a clear focus on reputational risk across all business platforms.

We have defined the insurance risk as being the risk inherent in the design and underwriting of insurance policies. The principle sources of insurance risk are product design, pricing risk and insurance underwriting risk. The expertise in these areas is clearly at the insurance level, and it is incumbent upon us to clearly articulate the risk being assumed by the organization.

From an organizational perspective, I'd like to point out that RBC Financial Group is structured on the basis of five different business platforms. Each platform owns and is accountable for the risks of the business. We have the banking, RBC Insurance, the investment side -- or wealth management -- capital markets and global services. Business platforms ensure the alignment of business strategy with a corporate risk structure appetite and policy. Business platforms identify, understand, mitigate, manage and report on the risk being taken.

At the top of the pyramid sits the board of directors, and it plays a key role in any successful risk culture. The board's role is to shape, influence and communicate the organization's risk culture and risk appetite and to provide management oversight. The board defines the organizational structure of risk management, including roles, responsibilities and authorities. It is important to note that within RBC Financial Group, at the enterprise level, the chief risk officer reports to the CEO and the Conduct Review and Risk Policy Committee of the board, rather than to the CFO. RBC Financial Group believes the separation of duties of the CFO and the CRO are fundamental to the successful operation of a risk-management culture.

Group Risk Management is positioned in the middle of the pyramid, as it has been delegated responsibility for the following:

- Implementing and maintaining an integrated enterprise-wide risk measurement, management and reporting framework covering all RBC Financial Group businesses, geographies and functions.

- Establishing a comprehensive risk identification and approval process, including enterprise-wide risk policies and procedures.
- Establishing appropriate methodologies for risk measurement — and certainly from the insurance perspective, it's interesting when you're dealing with people from the banking side and trying to figure out how you will measure the various risks that you're taking. It's an interesting challenge — establishing guidelines, risk controls and limits, including credit approval and underwriting standards to ensure appropriate risk diversification and optimization of risk return on both the portfolio and transactional basis.
- Advising the board and senior management of major risks being assumed by or facing the organization.

I'll try to come back to a couple of these responsibilities when I discuss the issues and challenges from an insurance platform perspective within our broader financial services enterprise.

We're looking at it now from the insurance platform level. Because the organization had firmly established the risk pyramid and the risk structure and its own structure at the corporate level, we set about determining how the insurance platform would be structured from a risk perspective. Earlier I mentioned that we were originally operating as autonomous business and legal entities in our various product lines, but that we are moving to a shared services model with centralized oversight and finance, actuarial and risk management at the insurance platform level. There is no doubt that the loss of autonomy for the business lines has created and will continue to create some healthy tensions.

At the platform level, our approach is that risks are identified, measured, mitigated and managed by the business units that we have, with the support of RBC Insurance risk management, corporate actuarial and other functional units. At the insurance platform level, all significant business activities require the approval of a CRO. It's interesting. Corporate-wide, we've defined it as "all significant business activities," but we haven't been willing to put a number on that. It's an interesting process as you go through it — certainly within the banking culture — to say that the organization wants to know what all those significant risks are, but is really concerned about the actual definition of what that might be. It's an interesting working relationship in development with our group risk area. It's important here to note that the chairman and CEO of RBC Insurance signs off on all risk issues presented at the enterprise level, which is consistent with the risk pyramid structure that the business platforms own and are accountable for risks of the business.

Now I'd like to turn to some issues and challenges I face as CRO for the insurance platform within the context of our broader financial services enterprise. Foremost among the challenges is developing the confidence of the product line owners, who are used to running autonomous businesses, to see the CRO for the insurance platform and the risk framework as adding value to their businesses. In my case, I feel it's been a little easier task since my responsibilities, my career, during the past

20 years have been mostly to bottom-line responsibility for various product lines, and I do have experience in most of the product lines that we offer. So far, my colleagues appreciate the perspective I bring to this role.

The second challenge that we've had is in building trust at the enterprise level with group risk management. The need to develop a common language and understanding has been a huge challenge and requires the actuaries to communicate in a way that others understand the world, rather than hoping others will learn insurance terminology and practices.

One must remember that our group risk management will have expertise in banking, wealth management and capital markets, but not in insurance. Their knowledge of insurance might generally come from newspaper headlines. They'll remember the settlements for bad sales practices in Canada, the United Kingdom and the United States. Questions are raised about the risks missed by companies and about segregated funds and guaranteed minimum death benefits.

Our risk-management colleagues at the enterprise level question the level of interest rate risk being assumed by the insurers. The losses incurred from Sept. 11, 2001 and the concentration of exposures on property and catastrophe business seem to have surprised the industry. The lack of underwriting profits in the general insurance industry and the reliance on investment results for profitability is little understood. With the backdrop of all these experiences and their headline coverage, I hope you can understand the challenges of building trust at the enterprise level and that we understand the risks we are taking and have priced for them appropriately. We have communicated in a transparent basis these risks to all of our stakeholders.

As mentioned earlier, group risk has responsibility for establishing appropriate methodologies for risk measurement, and this continues to create challenges for insurance actuaries. As an example, trying to establish counter-party credit limits for catastrophe reinsurance cover presents an interesting challenge. Should the measurement be the treaty limit, the reinsurance premium or the expected claim? Should you use stochastic modeling to determine the measurement of some confidence level? How sophisticated should you become in calculating the measurement, and what value does it add to the business? Does it drive the business to higher retention than they might otherwise choose? That is easier and less expensive than purchasing reinsurance, although it increases volatility. If an event occurs and the value of the claim exceeds the measurement chosen, are you satisfied that the communication to the organization with regard to the outcomes and respect of an actual event has been understood and internalized?

Finally, the last issue challenge I'd like to reference is the establishment of limits. At the enterprise level, the organization is used to establishing limits and communicating those limits to the board of directors. Whether it is aggregate limits for mortgage lending, lending through third-party distribution channels or single-

name limits on credit risk, the insurance platform and its businesses are used to the following approach: "I'll write as much business as I can and if I have capital problems, I'll just reinsure some of the risk." The challenge is to ensure that the business is within the insurance platform. The primary focus of the limits is not to constrain the organization, but to allow the board to fulfill its role to provide appropriate management oversight for an organization that has insurance representing less than 10 percent of its profitability.

In closing, the focus on risk management and the improvement in a structure within financial services organizations provide us as actuaries an opportunity to hone our communication skills, improve transparency and assume roles of increasing importance across the financial services industry.

MR. RAMY TADROS: I would like to talk to you today about some new directions in risk management and solvency regulation. I presented a different version of this earlier last week to the NAIC International Issues Conference, a forum where five or six insurance commissioners, as well as industry bodies, were present. This is a somewhat tailored presentation with specific implications for the evolving role of the actuary as I see it going forward.

I would like to briefly pick up on what I see as two key global trends in risk management and solvency regulation, which are very much in line with what Grant mentioned earlier. One was around the harmonization of regulatory capital requirements across all the financial service industries, so that's life, property and casualty, as well as banking business lines. Second, a related trend that is driven more by the management of financial institutions themselves is a migration from a regulatory to an economic view of the risk and capital position.

By way of background, I have a finance and statistics background, and I started doing risk work initially for the banking sector. To some extent, I was quite surprised about five or six years ago, when I started doing risk and capital work for insurers, about the skepticism that the insurance industry has of ideas and concepts from the banking sector. To my mind, I think credit risk is credit risk, and market risk is market risk, and a lot of ideas from the banking sector have applicability to the insurance sector and vice versa. I see the role of the actuary and the role of the risk manager in a financial institution to be, frankly, quite generic across a number of risks. These trends, in terms of the harmonization of regulatory views of capital and the harmonization of internal economic views of capital, I think, drive home the point.

So I'll start with the regulatory trends. In the European financial services industry, I've looked at the top 10 largest institutions by market capitalization and five of them are bank assurers. What I mean by bank assurers is that something on the order of 30 percent to 60 percent of the net income every year is driven by insurance operations. So if you take Allianz/Dresdner, ING, Bank of Scotland, Credit

Suisse, Barclays or Lloyds TSB with Scottish Widows in the United Kingdom, they are truly the true bank insurers in the sense of overall capital structure. So from a regulatory perspective, there's a clear recognition on the part of European regulators at least that regulation can no longer exist in silos because the institutions being regulated are effectively already integrated.

Now if you look at that list, you can probably add another three that have insurance licenses or that are not major insurance players in their own right, but they're still to some extent in the insurance business. So the clear regulatory rationale here is the prevention of the so-called regulatory capital arbitrage. As a bank insurer, you can choose to place your risks on whichever side of the balance sheet that minimizes your regulatory capital requirements and therefore arbitrage the regulation. The most talked about instance in that case is the use of credit derivatives, with insurers being the single largest buyers of credit derivatives in the global market. They account for roughly 30 percent of the total market. Really, the banks are floating their credit risk to insurance companies' balance sheets, where quite often they will be in sync and attract a more favorable regulatory capital charge.

You can see another instance of this if you look at ING's balance sheet. Roughly 25 percent of ING's insurance balance sheet is sitting in mortgages. This is sort of the overall balance sheet of their Dutch business. Again, there's a question of "why are these assets being placed on the insurance side of the balance sheet?" Are they being placed because they have assets for asset/liability management (ALM) purposes, or are they being placed to optimize the regulatory ratios?

The latest development on the European regulatory side — and I will come back to the relevance of this for U.S. insurers — is that the solvency reforms on a European-wide basis have adopted a three-pillar platform. A three-pillar framework, which is identical to the one being adopted by Basel II. The first pillar is minimum capital requirements. The second is a supervisory review process of the internal capital adequacy requirements. And the third is market discipline.

The minimum capital requirements involve a dual track solvency reporting in terms of the balance sheet. That involves the existing statutory reserving standard, but on top of that, some sort of realistic reserving requirements. I'll come back to what exactly I mean by "realistic," but it's some sort of a fair value or marking to market of insurance liabilities. The focus there is really on a market consistent valuation of liabilities. So what the regulators are saying is, "The fair value debate aside, I need a fair enough value for the liabilities. If insurance companies are in the business of selling options to their policyholders, in effect, we need to mark to market the value of those options and understand how they are managed on the liability side of the balance sheet." Within that realistic valuation framework, the minimum capital requirements that the regulators are setting there are calibrated to BBB, Standard & Poor's (S&P) or Moody's ratings.

The second pillar has been the most contentious in the Basel II context — and I think is actually changing the competitive landscape of the industry — applies to the use of internal capital models for regulatory purposes. In effect, you as an insurer will be allowed to use your own internal capital model for regulatory purposes. This is quite a huge leap, and it's being introduced in phases. At this point, there are no exact prescriptive criteria of what these models should look like, and regulators are still retaining ultimate discretion over the approval of any regulatory capital relief through these models. So it's still an evolving process, but it's one that during the next two or three years will play out, whereby the most sophisticated players on the insurance side will observe tangible benefits in terms of the regulatory capital requirements. This is probably where the banking industry was about four or five years ago with evolution of the Basel II capital requirements, vis-à-vis credit risk. Effective with the introduction of Basel in 2006-2007, these sorts of dynamics will be kicking into the banking industry.

Finally, the third pillar is market discipline and is really about improved disclosure and the idea that the markets can help regulate the financial services industry. What we're seeing in Europe — and a lot of it as well is carrying over to the United States — is that analysts and investors are no longer satisfied with existing statutory reporting. You've seen it in the variable annuity debacle, with a lot of the analysts actually coming up and using their own outside-in measures of assessing liabilities because GAAP reserving, for all intents and purposes, is almost a meaningless number when it comes to guaranteed minimum death benefits (GMDB). But that's an evolving process, and statutory reserving has too much conservatism built into it on the one hand and frankly on the other, quite generous assumptions. So you've seen outside stakeholders, such as analysts and investors, saying, "We actually want to have a different measure that we think reflects better the economics of this business." That's also feeding through to more pressures around increased disclosure. So insurance companies are becoming more proactive in disclosing the economic profile, their own risk profile, to the market, again under external pressure from investors and analysts.

One of the key objectives behind the harmonization is the increased or improved regulatory capital incentives for risk management. This is sort of a stick and carrot kind of framework in which the regulators have basically bought into the idea that the improved regulatory incentives for improved risk management work. The reason the banking industry has been investing so much in their own risk management frameworks and processes during the last five years is because they saw that Basel II will offer them a real reward at the end. This has certainly been at the heart of the reform of the European solvency regulations. The second is the elimination of cross-sector regulator capital arbitrage, which I mentioned earlier. The third is really coming up with an improved set of early warning signs for regulatory purposes, but also for risk and for internal management purposes as well.

What are the implications of this for the actuarial profession? As I mentioned earlier, a silo-based approach to understanding risk is no longer appropriate. That

credit risk, be it on an insurance company's balance sheets or a bank's balance sheet, is ultimately about credit and counter-party risk. The insurance industry has developed its own applications and framework to understanding that credit risk, and so has the banking industry. There needs to be some sort of cross-fertilization between the two. Understanding credit risk solely from an insurance perspective is no longer adequate, and similarly that's true for ALM risk and equity risk. So there is that sort of harmonization of the way risk is being measured and managed.

Now clearly within that context, one needs to bear in mind a lot of the banking- and insurance-specific issues. For example, on the credit risk side, for a lot of the participating business, a lot of the credit risk that the life insurance company might hold can be passed on to the policyholders via some sort of a profit-sharing element. So I think there's clearly within the nature of insurance particular elements that need to be considered.

Second and quite important is an actuarial understanding and critique of the Basel II framework. What are the good and bad lessons of Basel II? I think the actuarial profession has a lot to add into that process. Certainly with the evolution of Basel II and the adoption of the same principles for European insurance regulation, the actuarial profession has been remarkably silent so far vis-à-vis its approach to commenting on the implications of Basel II and whether or not Basel II is a good thing.

I'll move on to the second point, which is the migration from a regulatory to an economic view of risk insolvency. Before I go into this, I would like just to go back to that list of bank assurers. If you look at that top 10 list, Allianz, ING and Munich Re stand out as insurance companies with major U.S. operations, but so clearly missing from here would be the AEGONs of this world, the AXAs of this world, the Prudential U.K. with Jackson National and so on.

In the life industry, given that European insurers are such major players in the U.S. industry, the regulatory reform and the way that's panning through in terms of how capital allocation decisions are being made and how sort of top-down risk limits and appetites are being made from group head offices in Europe, this is starting to filter through to the U.S. market. During the last few years it has driven, in a few instances, changes in the competitive landscape in terms of specific decisions about pulling out of certain markets on the fixed or revenue annuity side and specific pricing decisions. I think the implications and the lessons of this for the United States, particularly the life industry, are quite relevant.

In terms of the migration from a regulatory to an economic view of capital, during the last few years the deteriorating solvency position in financial institutions has really brought into sharp focus the issue of capital allocation. The days of surplus capital are over, so the question is if we have new business opportunities, where do we allocate our capital?

If you look at an AXA or an AEGON, they operate across multiple geographies, each with its own statutory and regulatory requirements. On the top of the house they have an S&P type of rating model for the total capital requirements for the organization. But there isn't a single metric across all these different businesses, even if you're talking simply about life businesses.

Property and casualty (P&C) is a whole different story. There isn't a single metric that allows CEO-level or board-level decision-making in terms of the profitability of the business. Do we look at return on regulatory capital requirements, and how comparable are these regulatory capital requirements from the U.S. risk-based capital (RBC) model to a U.K. free-asset-ratio model to a lot of Asian geographies and so on? The natural response to that question has been: "Let's try to come up with our own framework that will allow us to look at our risks on a consistent basis." That framework has been around as sort of the genesis of these economic capital applications.

Chart 1 shows two examples of that for U.S.-type businesses. On the left is a fixed annuity business, for which I show specifically the ALM capital requirements for three flavors of fixed annuity: resettable with no market value adjusted (MVA), resettable with an MVA and a multiyear sort of MVA bullet contract. This is sort of stylistic, but clearly from an ALM perspective, the non-MVA product is far riskier, even in its first few years of sale, given the exposure to spikes in interest rates.

Now clearly, the S&P and the RBC models tried to make that differentiation, but there's nothing magical or scientific about the way the differentiation is made in the rating agency model. In fact, if you look at the specific charges and you compare the AM Best model with the RBC model with the S&P model, all three of them can tell you very different things. They're not all necessarily related to the risk profile of your liabilities.

Similarly for variable annuities, the right side of Chart 1 plots economic capital requirements for four different guaranteed minimum death benefits (GMDB), from a simple return of premium all the way up to a 5 percent roll-up and combined sort of maximum anniversary benefit. You can see the capital requirements can really increase by a factor of 10 or 15 in these cases, if you just look at the black bars in Chart 1.

But the capital requirements also will be very much driven by the profile of the underlying assets. If you're selling enhanced GMDB benefits and have 75 percent equity investments in your portfolio, you're effectively selling put options in a far more volatile underlying asset profile, which means that those put options are more expensive. The capital requirements for far heavier weighting of equities would be a lot more than those that are far more into fixed income because of the higher volatility of the underlying asset profile. Again, these are just simple instances in which none of the existing metrics on outside-in perspective will allow you to capture those really dramatic differences in capital and risk requirements.

An economic understanding of capital, once you start looking within a given business line, is also pivotal to managing the business. Let's consider an example on a fixed annuity book. The question was, as a fixed annuity player I can either be in the interest rate gapping game or the credit risk game. Does it make sense to take more credit risk, or does it make more sense to take more interest rate risk? For interest rate risk, it really depends on how you think your policyholders would behave. Interest rate risk in a fixed annuity book is very much an outcome of combined policyholder and interest rate behavior. Do you have a sticky customer base? When interest rates spike, do you expect your customers to walk out the door, which can translate into what does your distribution channel look like? Are you selling through a broker channel, an agent channel or a banking channel, and so on? When faced with these types of questions, that sort of understanding of the economic risk of the business can really help you to manage your risk in a superior way.

Look at the capital requirements for ALM risk for a fixed annuity portfolio. If you have high lapse sensitivity — if you think your business will be churned pretty quickly in a spike in interest rates — your capital requirements can be two or three times higher than if you have a far stickier customer base. If you do have a sticky customer base — if you have, for example, five or seven product density per customer, you have a tight agent force — you're better off taking interest rate gapping risk. On a marginal perspective, you believe you're a more efficient taker of that risk because of the profile of your liabilities. Similarly, you can also look at the issue of hedging ALM risk within the context of fixed annuities. You can look, for example, at the present value of your earnings, and you can say, "Should I be buying swaptions to hedge my interest rate exposure?"

Now the rating agencies have a very qualitative approach to the treatment of swaptions. We've heard of instances in which they were questioning why insurance companies had derivatives on the asset side of their balance sheets, not recognizing that these derivatives were actually hedging liability exposures. So they're even questioning the use of derivatives as a risk management option. Clearly in this case, you can also look at the present value of distributable earnings, or you can look at statutory probability of default or so on, and you can compare a hedged versus an unhedged position. You can make a risk-return type of decision on whether swaptions are a good thing or not for your fixed annuity profile. It's this type of thinking that both the management and the regulators are recognizing as having value for risk-management purposes. It's really linking economic insights and risk profile insights of the business to decision-making at the cold face of the business, in terms of taking interest rate versus credit risk or hedging decisions.

Similarly — and I touched upon this earlier, and I'm sure this would be a lively debate — we have this whole issue of realistic valuation of embedded guarantees. As I said earlier, the major European regulators — the Dutch regulators, with ING, AEGON and Fortis; as well as the British regulators, with Prudential Jackson National — have basically said, in effect, "We want to pre-empt the IASB debate,

and we want to see a marking to market of embedded guarantees on life books." In that context, they're making a distinction between regulatory reporting, which does show some sort of realistic balance sheet, versus what you might call financial reporting to external markets. They want to sidestep the whole issue of volatile profit and loss statements (P&Ls), and they say: "We're not that concerned about how you report your P&Ls. We're concerned about whether we can get an accurate view of your balance sheet that represents the true profile of the in-force guarantees that you have."

As I mentioned earlier, rating agencies and analysts are already applying the outside-in adjustments. So to some extent, I think the industry needs to react to this because some of those adjustments sometimes might offer a more penal view of the burden or the cost of those guarantees. Finally, here in the United States, the current regulatory reforms regarding variable annuities are likely to implement what you might call a "pseudo fair value" or "fair enough value" of embedded GMDBs and variable annuity books. So this is a trend. At least for variable annuities in the United States, I think, it pretty much will happen over the next year or two.

So what are the implications? The first is that regulatory and rating-agency compliance is necessary, but it's not its official risk-management tool. Managing your business to 200 percent RBC ratio or a certain S&P capital adequacy ratio is really necessary because that's an external hard constraint on your business, but it doesn't really help you take informed risk-management decisions. Many of the examples I've mentioned attempt to bring that into sharp focus as a requirement.

The second is that risk management for insurers requires a combination of modern finance and actuarial skills. Within that context, the cross-fertilization of what the actuarial profession can bring to the discipline of risk management across the financial services industry is pretty important. But equally important is the ability to understand the capital markets — the dynamics of the capital markets and the dynamic of option valuations. What does it take to put together hedge programs for GMDB risk for variable annuities, for example.

Increasingly we're seeing that many of those decisions are being made by non-actuaries who do not have a solid understanding of the liability profile, the lapse behavior, and so on and so forth. Quite often, if there's a vacuum in this area, we're seeing non-actuaries step into the vacuum and make decisions that are not fully informed because they don't have the sort of actuarial understanding of the liabilities. I think this is an area that clearly needs to be owned and contributed to by the actuarial profession.

MR. NEIL MCKAY: I'll talk a little bit lower-level view. I'm at the entry level. We've been doing enterprise risk management for about a year, and I'll talk about some of the struggles and successes we've had, and how the actuaries are plugged into that.

First of all, I am at Allianz Life. We're foreign-owned. My parent company, as you've already heard, is in the banking markets, life insurance and casualty. They own investment-management companies, so they're across everything, and I have to comply with what they want. At a company level, that puts a very big burden on me not having a physical enterprise risk management process in place. We also are a multi-line business, growing extremely fast in some volatile markets — both fixed and variable annuity — and we also have stop-loss out there on the health side. We have a lot of things to be concerned about and manage.

From a risk management standpoint, on the financial side I think we've had a very good philosophy. We measure the risks, and then we figure out if we can manage them. Like the interest rates on fixed annuities: whether we understand them, like the mortality on the life side, or we transfer them, like our hedging programs in our guaranteed minimum income benefits (GMIB) and guaranteed minimum death benefits (GMDB) and our equity indexed products. Otherwise we don't take them. It's been our philosophy on the financial risks to date. What we want to do from our enterprise risk management is transfer what we've done here beyond just financial risks because what both our prior speakers have talked about goes beyond just the financial side of risk management to operational risk and other risks inside the company.

With our current risk practices, the risks are addressed individually in all of our different business units according to their own philosophies and disciplines. Different disciplines are managing and measuring risks differently. It's a very solid approach to risk management. I wouldn't say it's a bad approach. They are managing the risks. That's one of the sensitivities when you pull together an enterprise risk management. Everyone will say, "What am I doing wrong? Why do you think you can do it better?" It's not that you can do it better; it's that in the changing world we're in, you have to do it differently because you no longer can have that silo view. You have to start breaking down those boundaries. One of the biggest issues we had when we brought together the enterprise risk management committee was the silo view. They were feeling very threatened by someone in the corporate area telling them what they were going to do.

When we did pull together the enterprise risk group, the head of the operational area of our biggest business unit asked why she was there. She did not understand why she was there. I asked her, "Who manages risk in your area?" Her response was, "Well, my actuaries. That's why I have them." I thought, "That's a warm fuzzy feeling. Our head of operations doesn't understand that every day, when the phone is answered or the system is brought up, they have risks that they are managing and controlling, and upon which they decide where to allocate their time and money and resources. After we discussed more about what her responsibility is as a senior management person, all of a sudden her eyes started to light up. She had not realized that she was the owner of those risks and was responsible for managing

them. Now she's one of the biggest advocates of the enterprise risk management team.

Why enterprise risk-management now? I would say four reasons — increased volatility in business cycles, higher visibility of corporate failures and scandals, increased awareness of threats from terrorism and more frequent and severe natural catastrophes — have to do with what I want to manage as an actuary. I want to address the volatility, what's going on, and to make sure that we're doing a good job of pricing our products and everything. Then there's increased scrutiny on risk management from my parent company, rating agencies, regulators and analysts. That's what I have to do. A foreign company owns me. The regulators are asking for it.

My board at my company and the audit committee went through a four-hour audit committee meeting recently. I've never been through one that was more than a half an hour. This one extended to four hours because the audit committee is getting a lot more involved, and they wanted a lot more scrutiny about what's going on. So it's mandatory in the current environment. As an actuary, I want to monitor and measure these things and price for them better.

I want to talk about our goals and objectives for enterprise risk management. First of all, we want to capture all the risks. This is difficult with all the silos out there, especially when you start talking operational risks. I think all the silos know what the risks are, but we've never had a company view of it. There are interrelationships between those because there's a high correlation between what's going on in the investment area and the stock portfolio and what's going on over in the variable area and what they have in the deferred acquisition cost (DAC) assumptions. Low and behold, there are a lot of similarities. Sometimes there are offsets, but more often than not, there are not; it actually makes it worse.

We want a clear understanding of the risks and a consistent measurement. It has been very difficult to take actuarial and financial methods over to the operating areas to figure out what the risk is and to try to quantify it. We constantly are struggling with determining the best way to do that. Then we want consistent management, which means no over- or under-management. The example I use with our enterprise risk management group is that our hedging program with our company is very visible. It's something new. You're doing things. You're constantly going to the regulators to get permission to do it. The parent sees options on your book, and they get all concerned about it. At the end of the day, I'm spending millions of dollars on the hedging program. How much money are we spending on our systems that continually are going down, and what if we can't bring them back up? Are we spending the right amount of time on those operational issues? That's where we want to get a consistent view from a management standpoint, so that we're not overtaking the risk of our parent and under-taking care of the ones that are hidden.

Another goal that I added is the effective management of all the risk projects I have going on. We have five risk projects coming from Allianz AG in which we have been mandated to participate, and two projects inside our own company. To have those siloed and done by different areas was ineffective, so we have rolled all the risk projects under our enterprise risk management committee.

How are we doing this? First of all, we formed a committee that was cross-functional and across divisions. We have representatives from all the business units. We have representatives from all the functions. We have lawyers. We have actuaries. We're actuarially dominated. We probably have more actuaries than anyone on the committee, but we have operational people, and we have compliance people. With that group, we have continually had to communicate because we all speak different languages. Communication has been one of the struggles we've had. You really have to make it a priority for the people; otherwise it fails on the communication side. As for accountability, we've decided that we will have risk owners for every risk. It may not be totally in their area and under their control, but they still are the risk owner and have to manage the risk. Otherwise, it's too easy to say, "That's a risk that someone in a different business unit or different function has to manage," even though they're all intertwined at the end of the day.

An advantage of this accountability is coming out on the Sarbanes-Oxley and our coastal project under operational risk in that if the business unit people own it, as a side benefit, you get a more streamlined effect, and you need fewer auditors. Lastly, we need to make it a process. Enterprise risk management has to be a process that never ends. You need to identify these risks, analyze them, evaluate them and monitor them on a continual basis.

This has been a little struggle, bringing the operational people in. It's akin to the product development process on a product that never gets to market. It's continual. You're constantly reevaluating it. You're prototyping things. You're throwing things away. You're constantly going through this process to try to refine it, and at the end of the day, you're never done. It's the product that never gets to market in product development.

Now, I'll address some of our challenges. First of all, establishing the context of risk guidelines across all the different business units and multiple audiences and disciplines is difficult. The next one was the measurement of choice. We're a public company, so GAAP matters. We're also a growing company, so our statutory income and balance sheet matter because we need the capital to grow. Then, as an actuary, I prefer embedded value (EV) and fair value (FV) because that's really the true value. Which measurement is the right measurement depends on your audience, but at the end of day it's the actuaries who are involved in all these measurements and have to help the business people understand them and make sure they're measuring them correctly.

Comparing operational risk with financial risk has just been a struggle. That's where I get into the prototyping because there is no right answer. Sometimes you just have to make decisions and go with them based on the operational people's feelings.

The efforts to uncover the unknown risks were somewhat difficult because the relationship piece is the key to that. We've struggled with that because you never know where the relationships and the correlations and everything are. Here again, we've only been doing this a year, but that's an area that I've continually struggled with, especially with the operational risk — what are the interrelationships and what are the offsets?

Some of our other challenges are how to measure the non-financial risks consistently. You can't predict it, but it is a risk that we have to look at. We get it back up eventually, but it's costly. But it's difficult to be consistent. On the actuarial side, I can say, "OK, the stock market went down 20 percent last year. What did our hedging program do?" I can calculate a dollar amount that our hedging program protected us from. It's difficult to quantify a dollar amount that we protected ourselves from because our system didn't go down. You didn't even realize that it didn't go down. It's just business as normal. It's very difficult to come up with that measurement of the risk and the value of it.

Evaluating the risk and knowing when to stop analyzing it are important. We've talked with a lot of companies, and people say they get analysis paralysis on enterprise risk management. At some point, you just have to make a decision and do something. Otherwise all you do is analyze and show numbers, and you're really not managing the risk. That's one that our group is very concerned with — when will we see the output from this and the deliverables that add value?

Lastly, achieving the right balance between information and overload is important. You cannot get your hands around the whole enterprise all at the same time, and you have to trust the risk owners to some point. Otherwise you get into policing. You don't want to be policing people; you want to be supporting them and making them better.

This is where I get to be on my soapbox — internal audit's role in enterprise risk management. Every time my parent or someone in the company wants to talk about risk management, they want to audit something. Auditors are great at identifying and analyzing and measuring whether you have the controls in place and reviewing them. An auditor has no role in establishing the company's risk appetite, analyzing the risks or managing the risks. That's the actuaries' and the business unit people's responsibilities.

Our audit committee at our last audit meeting wanted to increase the size of our audit staff because they want more supervision. Because we discussed with them our enterprise risk management and the philosophy we have of getting people to

own their risks, they agreed to postpone it for up to a year, until they see some results. If the businesspeople own it and manage it, then all the auditors have to do is test that they put in place what they said they would. That way, we can keep fewer auditors and fewer actuaries, hopefully, if the businesspeople are doing their jobs, and we've trained them well. At the end of the day, we don't want to have actuaries doing the businesspeople's jobs.

Lastly, I want to talk about the role of the actuary in our enterprise risk management. I am the chief actuary. I'm also the risk officer and the team leader for the enterprise risk management team. I am involved in all the steps. My primary role, though, is establishing a context. For non-financial risk, we want the businesspeople to own and identify the risks and everything below that. But my actuarial staff is integral to that because we have all the techniques. We've been doing this for a long time. I always preach to the actuaries at Allianz Life — I think it's a takeoff on a Siemens commercial — "We don't build the boat; we make the boat go faster." We not only make the boat go faster, but we also make the boat safer to be in. Our job, when we're talking operational risk and helping everyone else, is to be right there alongside the operating people and all the other financial people. We show them what we've done from a risk-management standpoint.

MR. WASON: Well there you have it. I hope you'll agree that these have been three very interesting presentations on the topic of risk management, especially featuring the chief risk officer from three different perspectives. Now it's your turn for comments and questions and discussion on the presentations.

MR. RANDY E. TILLIS: You were talking about the Basel II and the potential arbitrage and all the other things that could be going on. Have you seen any feedback where this might let us use a more economic capital approach as opposed to regulatory plus X and Y? It seems that everything they look at, they're trying to drive more and more safety or solvency or capital needs. It seems that Basel II will drive you the other way, and this just won't let us get there.

MR. TADROS: I think the regulators to some extent are torn between two imperatives. Fundamentally, their mandate for policyholder protection tends to draw them in the direction of extra prudence. But I think at the same time, there's a realization that a zero failure regime is neither possible nor desirable because that would raise the capital requirements and lead ultimately to consumer detriment. Within that context, additional prudence is not always a good thing.

The next questions are, to what extent do we allow more flexibility in terms of our regulatory assessment and to what extent do you want to link that to the use of internal models? I think as a concept, Basel II basically has already gone down that road, but there are a lot of checks and balances around that. So, for example, to become Basel II compliant on that approach for credit risk, there's a set of rigorous criteria under which you must demonstrate that you understand the probability of default or the rating of your counterparties, your collateral and so on and so forth.

I think a similar process is evolving on the insurance side. To some extent, that's about five or six years behind because the models on the insurance side are less mature and less standardized than they are on the banking side. But I think there's recognition on the part of the regulators that additional prudence is not necessarily a good thing. A balance between sound risk management and regulatory capital requirements is needed. I think the C3 sort of Phase II two reforms on the variable annuity side and the reforms of the reserving as well are certainly moving in that direction. The Australian regulator has already implemented an internal economic capital approach for P&C insurers, and it's been in force for about two years. They implemented that after sort of high-profile failures of HIH and so on. So there are instances where this is happening, and it's working in practice.

MR. DAVID K. SANDBERG: The regulator perspective on this has been evolving during the last five years or so. The traditional view that capital is a pot of money set aside to handle rainy days has been transforming into a view that the first line of defense for a healthy company is a sound risk-management program. Then you have capital for the things that you just obviously can't foresee. It allows you to start moving the capital requirements to these more economic-based kinds of activities, and in theory, while it exposes you to more volatility, the risk-management process is now seeing that information and then setting in procedures to manage it. So the standard approach has been to try to develop a set of factors that, in a sense, give a conservative view of capital. Then, as the risk-management process becomes robust and sound, you're able to use less capital. That's the goal of the regulatory direction. Will they be able to accomplish it? We hope so, but it'll take some work to get there.

FROM THE FLOOR: I have a comment on what Dave said, and I'd like to follow up about operational risk because I think that's an interesting challenge. At least in my view, the role of the regulator should be to set minimum standards for solvency. That's kind of lurking in Basel. It's lurking in a lot of these proposals, and I don't think they have anything to do with economic capital. I think that's how you run your company. If you haven't done it before, shame on you because as an actuary, you surely should be aware of what the needs are. The regulatory capital is just a minimum floor that says at this point you're taken over, at least in the U.S. context. I hope that would be true worldwide.

I don't think we want the regulator involved in how much actual capital we should hold. In my opinion, that's the decision for management to make. Some people will decide to hold more; some will decide to hold less. Some will use it for different purposes, and that's fine. That's called the free enterprise system. When we start mixing up economic capital with regulatory capital, I think there should be a chasm between the two. That should be a chasm in the sense of what the measurement is, but not a chasm in the sense of what you do. The minimums should be tied to something that makes some sense.

In your presentation, you started suggesting that somehow the regulator should get involved with economic capital, other than being aware that it exists and being aware that the company — as you and others have expressed so well — comes down to individual risks. It has to be a concern for everyone who's doing his job. They don't have to all be chief risk operators, but they should be aware of where risks are being taken and manage that effectively. I view these as separable and very different. If you think that they should be blended into one, we could debate that. But I do not want the regulator in any way suggesting what the appropriate economic capital or any other kind of capital is for my company. I believe that's an individual company's decision, and we should guard that right. We as actuaries surely shouldn't promote this type of structure to move in that direction.

But more important, I'd like to come back to operational risk because some people are suggesting that operational risk can be 25 percent of your total needs and forget about what we need for the minimum regulatory level. I believe you said during your presentation that it's very difficult, of course, to know how much training you should do. Is the strategic plan right? Do you have the right management? It's easy enough to deal with should you go along or should you take credit risk. The question is, should you train people for one day or five days? Should we check their work? That goes all the way down to the day-to-day stuff, and to do we have the right CEO? I don't think the actuary will be asked that question, but do you have the right strategic direction? The major issue in this area is, is your plan sound, can you implement it and how do you possibly measure this?

I was on a conference call the other day and I said, "Do you try to individualize this to your company?" The answer was: "No, we just use general failure rates of systems or what have you." But I'd like to see if anyone would like to expand on how to go about this in a day-to-day operation for your worldwide enterprise.

MR. MCKAY: For me, that's an easy answer: I'm trying to find it. We really are prototyping and going through it back and forth, trying to find the best answer. As I said, we've been doing this for about a year, and I would turn to a more mature company that's been doing it for a long time to see if they have any better answers. As I said, there is no right answer, and you have to say, just by gut feel at some point, "We've gone far enough." I've heard during a lot of conference calls we've been on of companies that have done this to some very extensive levels and then they say, "Now, where's the value?" They've gone too far, so I don't have an answer for you unfortunately.

There's a huge side benefit that I've talked with our executive management about. When we're done with this, our operating people will have learned a lot of our actuarial techniques concerning how to look at and analyze information, and they will be making better decisions. Whether you can quantify it, at the end of the day, they will be better at what they're doing. They will pay more attention to things such as system failures, as opposed to just day-to-day operations. Their focus is

typically day-to-day, not long-term, but if you get them looking at risk, they will have a longer-term focus.

MR. HARDY: When we first started looking at operational risk — and I think that's probably going back about three years at the banking level — we decided, as you look at Basel, you'll be allocated economic capital around operational risk, so you better start paying some attention to it. Do you go through some loss data collection processes? Do you have all these risk assessment units and what have you and then go through basically an internal audit process? They really started out more, I think, from the economic capital perspective, expecting that may give you a competitive advantage. What we've really worked into more now is, how do we make sure that going through that whole process is adding value to the organization and not just worrying about the economic capital aspect of it.

MR. TADROS: I'd like to make a comment on operational risk, and I'll come back to your first question. I think operational risk is an area where the risk factor itself doesn't lend itself to easy quantification because you're often looking at tail events. You're also looking at such a broad set of events that it's almost a catch-all kind of risk, once you've captured the financial risks. Having said that, I think there's a lot of benefit to be gained from increased discipline in trying to quantify and look at those risks, even if by their own nature they're sort of hard to grapple with.

I'll give you a very specific example. We've been doing a lot of work recently with directors and officer's insurance. Clearly, the premiums have gone through the roof, and it's a product needed frankly just for retention of executive boards and directors. The question was, how much economic capital do we need to have against directors' and officers' risk? We can look at this issue and build very simple models. The key to watch for is over-engineering. You can say that for an institution of your size in your sector, if you look at roughly the last 20 years of claims history, you have some sort of distribution. With that in mind — and given that directors and officers insurance is a risk that usually happens when everything else goes wrong at the same time, one that's highly correlated to the rest of your portfolio. We can look at the capital requirements of that risk on a stand-alone basis and a correlated basis, but those won't be very different. We can look at insurance pricing quotes and help you think more rationally about how you purchase insurance.

We've seen in a couple of cases that these kinds of decisions are being made by the head of procurement for an institution. The person who's buying paper clips is the same person who's buying insurance. They get on the phone with their broker and say, "I want a cheaper premium." But this sort of decision needs to be made by a risk manager who understands the risk and return and some concept of capital at risk and so on. While these concepts do not lend themselves that easily to that type of risk, it certainly is a big step from the paper clip kind of buying process. But again, over-engineering is the word to watch out for.

I'll come back to your first question on the regulatory role. I agree with your statement, but I think the regulators are not there to tell you exactly how much capital you need to hold. The regulators are there to tell you the minimum acceptable level of capital that an institution needs to hold. Over and above that, most institutions hold a lot more because that's dictated by requirements of their own markets. If you want to be a reinsurer or a life insurer or whatever, you have certain targets, capital requirements, which you need to hold to be able to compete and operate in your environment. So nowhere is the regulator going to tell you that you need to hold this much capital. They always specify minimum capital requirements.

Similarly, on the banking side there's a 4 percent tier one ratio. Having understood the minimum and target capital requirements, the question is really around the whole basis of measuring that minimum and that target. I'll come back to the variable annuity example. If the whole basis of measuring the capital requirements is around statutory reserves for GMDBs on an RBC model — which historically didn't even exist for GMDBs — then that's not a basis on which you can set either the minimum or the target. We need a basis that is more linked to the actual risk profile that you're holding.

Once you have that basis — be it a correct tier one ratio or a more refined risk rating say on the banking side, or an economic reserve and some sort of a measure of the risk distribution on the GMDB side — the regulator will say, "I like that metric. Given this metric, I think you should hold this much capital as a minimum." But, of course, you will probably hold multiples of that so that you can compete in your markets and satisfy your policyholders' requirements. So the regulator will never determine absolute levels of capital, but I think they're working around providing the actual basis on which both the minimum and the target will be measured.

MR. WASON: I just had a couple comments regarding your first question, which I think is an excellent one. There are different styles for supervisors to deal with the insurance industry in each of the various jurisdictions — Canada, the United States and Australia, for example. Even within Europe, there are a whole variety of approaches, country by country. I think it's instructive and illustrative for us to observe the differences by territory and reflect on what might happen in our own territory as a result of those changes. I'm relating the question you asked back to some of Neil's comments. We're talking about the importance of communication between the area charged with responsibility for risk management and the lines, the business units themselves, and some of the misunderstandings that can occur; likewise, that can happen between the insurers and the regulators. I think economic capital in some regulator's eyes should be viewed as a good means of communication to the regulator about how we identify risks, how we assess them and how we manage them. In a very good environment where this is happening, hopefully that leads then to a great deal of confidence by the supervisor in the processes of the insurer and leads to a more hands-off monitoring situation. That

allows the supervisor to spend more time with insurers that are not demonstrating their ability to assess and manage risk. It's that type of risk-based supervision that I think could be a win-win for the industry and also for the supervisors in using their resources.

MR. WALTER S. RUGLAND: I think, Stuart, you say that very well. Jim and I have disagreed on this for a long time. We might as well keep disagreeing here. Throughout the world, the way I look at it, Stuart, is that you have two types of regulation: one is punitive, and the other is consultative. In the punitive model, the regulator is looking to find a mistake you made so they can penalize you. You respond to that by saying, "Give me the rules." The more rules you have, the more end runs you can make around the rules. The regulator responds by having the rules be tougher and tougher. I think we have proof in many parts of the world that that system doesn't work. It becomes ineffective, inefficient. It's not the economic model.

The consultative opens the door to an economic model. I don't think we're there in very many places in the world, but the consultative model says, "Our goal is to help you succeed." The regulator becomes a part of making sure you succeed within the parameters that they establish. Risk management becomes a very effective tool in that model. It probably is a management tool in the punitive model, but not the same way as it could be in the consultative model.

MR. JOEL COHN: My question goes toward understanding more the correlation between risks and the work that's being done to understand how one risk correlates with another in terms of what that does for your risk management, in terms of enterprise risk management view of a company's risk.

MR. MCKAY: I get to turn over this one to the experienced guy real quickly. We are just trying to capture the relationships. Right now, I have the same question when it comes to correlations on how a regulator or a rating agency is going to buy into it without doing rocket science. They are so complicated. You have a 500 by 500 matrix out there of all the correlations in everything you do. How do you ever boil that down to something someone can understand? So right now, like I said, we're novices at this. We're struggling through it. We're just trying to figure out where all risks are and where the links are. I'll turn it over to guy who has been doing it a while, and hopefully he has an answer to how you come up with those correlations.

MR. HARDY: I don't think I do have an answer to that. Again, we've been at it for a while. Certainly on the banking side, they've been at it for a long time. On the insurance side, it's really only been in the last year that we've been working toward it. We have been working toward determining the correlations among the various risks and are still struggling with that. At the end of the day, we have to go to our group risk area and get them to approve all the ways that we're going to measure the capital and how we're going to fix up the correlations.

MR. TADROS: Correlation is an area that's quite complicated, and frankly it's the sort of problem that's very easy to get too excited about because you can spend centuries looking at it. I usually approach it from the other end, which is to what extent is it helping us to understand the correlation better? To what extent can that help us manage our business? If you have that question framed in your mind, you can pick specific risks and then start understanding whether correlation will have an important impact on how you manage your business.

To give you an example, consider ALM risk, which I referred to earlier, for a fixed annuity business. If you take a fixed annuity business and bolt on an interest sensitive regular premium life business next to it, the interest sensitive life business is a regular premium. It's much longer term in nature and far stickier, which means it offers a natural hedge from ALM interest rate perspective to a fixed annuity stand-alone business. You're looking at the diversification within the risk types across two specific portfolios, and you can make conclusions or gain insights of strategic nature about their optimal overall business mix, vis-à-vis fixed annuities versus interest sensitive life. I think we have seen the correlation discussion being most useful when it's actually targeted toward such specific applications.

The other point I'll make briefly is around the actual choice around the correlation parameters. You should be aware that you should be looking at tail correlations, not body correlations. The most striking example is if you look at the correlation between the S&P and the FTSE over the last 30 years, it's about 30 percent. The correlation in any given month when either of those two indices dipped below 10 percent is about 90 percent. When something goes wrong in S&P or the FTSE — and every single time when you have the larger than 10 percent dip — you've had very high correlations. You tend to see these sorts of tail correlations more and more — especially in financial risks — that credit spreads will widen globally. You don't have that much diversification benefit, even if you have a European, an Asian and a North American corporate bond portfolio. It's far less within financial risks because of that tail correlation effect you see more and more in today's markets.

MR. WASON: I think the whole topic of risk aggregation is a big one. Is it the allowance for dependencies or is it correlations? Is it allowance for diversification of risk? Are we allowing for tail correlation? Are we allowing for risk concentrations? And as Ramy says, we have to think about practical measures and walk before we run. But those are some of the concepts that we have to try to build in.

FROM THE FLOOR: I chair an effort on this very topic, and we're trying to improve our knowledge of correlation and covariance. We have hired people from the University of Waterloo in Ontario. The work is underway. One of the individuals involved is Professor Harry Panjer of the University of Waterloo and at the moment, it is theoretical — frankly more theoretical than I understand, to be honest. The only reason I am expressing my ignorance before this group is that hopefully someone in this audience is much more knowledgeable about a lot that, as I

understand it, somehow interrelates different distribution systems. But if you're remotely interested in this topic, we welcome all comers, and we particularly welcome those who have the intelligence to fully grasp this. At this point, Phase II is to try to do it in some practical way. I have really simple questions, such as I have five different buying classes and how do I correlate them to produce a certain desired target? I can ask those kinds of questions. That, I can understand. As I've said on the panel, you come up with pragmatic solutions and the best you can do at this moment — pretty much Delphi, I think. What do you think the interrelationships are? In some cases, we have mathematical structure.

If you are interested, we are more than happy to have you join us. If you look at the Web site, that's not the only project going on in the area of risk-management research, but this is one, and I appreciate the opportunity. I can really appreciate help because we have a project oversight group and I think we have some really good people on it, trying to understand it. It's trying to enhance actuarial knowledge so that we can do a better job.

Finishing that commercial, I can't resist responding to Walt. I don't view the regulatory system as punitive or anything else. As another speaker said, the most effective use of the regulators' time is to identify when people are weakly capitalized and then deal with them. As I understand it — Canada is one example, and your point was excellent — different countries have different approaches. My friends are saying in Canada that they're looking to see if you have a structure, and if you do, they're rating people on their structures and trying to improve this whole process. That's one matter. But to me it's not punitive, it's really designed, in my opinion, to have a rough ruler to say, "These companies need more attention than someone else, and the rest of them, hopefully, know enough, they're high enough in their capital or surplus, that we don't need it." So that just shows that two very intelligent people are going to look at the same problem and come up with different answers.

MR. WASON: As we think about broader areas for the actuarial profession, that this whole topic of risk aggregation and the proper ways of doing it — even exploring deeper ways of looking at credit risk and market risk and operational risk— it is very important.

Chart 1

2. Migration from a Regulatory to an Economic View of Risk and Solvency

Deteriorating Solvency Position is Financial Institutions toward a More Driving Top Management Deteriorating Capital Base

Misalignment between Rating Agency/Regulatory vs. Economic Requirements

