11 Panel Discussions

Panel I: Barriers to and Opportunities for Low-Cost Trading of Catastrophic Risk

Robert Litzenberger

What do I think about the impact of securitization? The first thought that comes to mind is disintermediation, analogous to what happened when major corporations issued commercial paper, and thereafter no longer relied on commercial banks for loans.

Similarly, we can think of securitization of insurance resulting in disintermediation at various levels: (1) large nonfinancial companies going to primary insurers, (2) insurers having exposures going to reinsurers, and (3) the reinsurers going to retrocessional market. At each level there are administrative and brokerage costs involved.

Let me talk a bit about disintermediation at the first level. Companies have already learned to self-insure many small risks and need insurance for the very large risks. We can picture a major integrated oil company insuring its oil platforms directly through its securitization. This would require more standardization and considerably less reliance on the legal system for resolutions of claims, so it's not the same as a traditional insurance contract. It might not be the right contract for certain companies that want the traditional insurance coverage.

One major issue in a securitization or a reinsurance contract is maintaining the proper incentives for careful underwriting. Thus, indemnity-based securitizations have to be written so that the original insurers or reinsurers maintain a substantial participation in the risk. Also, most investors don't have the exper-

Robert Litzenberger is a managing director of Goldman Sachs and Co.

tise to sort out the different types of exposures. To avoid adverse selection, the secession rules for a reinsurance securitization have to be written in such a way that cherry picking isn't possible. Partly because of these complications, many securitized transactions will be based on indices that relate to industrywide exposure. If the company has no control over the index, the moral hazard and adverse selection issues don't arise. Of course the problem with an index is the company's basis risk. I think issuers are going to have to think about insurance the way we think about other securities. In order to reduce risk we don't need perfect hedges. Storage of oats creates price exposure that is frequently hedged with another feed grain, corn, because corn futures are more liquid. They don't hedge one to one but minimize the associated tracking error. In government bond markets, on-the-run securities are used to hedge off-the-run securities and there is basis risk. The reliance on indices works out very well with firms with diversified exposures. If you look at a very specialized insurance company, a small company, an index security may create too large a basis risk. There will always be a role for reinsurers but the role may change. The large primary companies that are already adequately diversified may issue index-type securities using the capital markets directly. The small companies probably would use reinsurance. Reinsurers would pool exposures and use their expertise in managing basis risk. For the same amount of capital they could write more reinsurance because they are only exposed to basis risk. They are able to take on more "exposure" because they're able to offset the systematic component within indices and an attempt to balance out their book accordingly.

When discussing the limited capacity of the reinsurance for coverage of major cats, the question often asked is, If returns are so great, why is there not more equity placed in reinsurance companies? The problem is the extreme tail events. For example, consider the losses that are estimated based on current exposures if the following, large historical event were to occur: San Francisco earthquake (1905), $45 billion; New Madrid earthquake (1811), $42 billion; Great New England hurricane (1938), $25 billion. Offering coverage for such super cat exposures requires very high credit quality. Weaker credit reinsurance companies that have major reinsurance exposure to super cat are unlikely to survive such an event. The problem is, a AAA rate reinsurance company would have to have a huge amount of capital to insure such extreme tails. It's just not efficient to put that much equity, for example, in a Bermuda reinsurance company to support this type of activity.

Stewart C. Myers

Our problem is to understand how to obtain efficient, low-cost trading of catastrophic risks ("cat" risks or "cats"). We might start by asking where these risks are traded now.

Stewart C. Myers is the Gordon Y Billard Professor of Finance at the Sloan School of Management, Massachusetts Institute of Technology, and a member of the board of CAT Ltd.

If you buy the stock of a property-casualty company, you are trading catastrophic risk. The stock market is absorbing those risks. We like to think that the stock market is an efficient absorber of risk. Why aren't we done?

The reason is obvious: no property-casualty company can completely avoid or reinsure cat risks. With limited liability, a stockholder in a property-casualty corporation does not bear much of the worst tail of the probability distribution of catastrophes. In order to cover that bad tail, an insurance company would have to carry massive amounts of collateral. Ordinary property-casualty companies don't have enough assets to cover the worst losses.

This raises a tax problem, at least for U.S. insurance companies. The farther you go out in the tail of bad cat outcomes, the greater the ratio of incremental collateral to incremental premium must be to cover possible losses. The worst cats are low-probability events. Once in a blue moon the insurance company's collateral gets hit by an exceptionally bad cat event. But most of the time that collateral just sits there, as if it were in a mutual fund. While it sits there, it is taxed. There is double taxation. The insurance company must compete with mutual funds or other investment vehicles to hold this collateral. The other investment vehicles are not double taxed.

There is a case for tax reform here. Suppose that you could set aside some assets, somehow segregate them, and designate them as collateral for extreme catastrophic losses—losses that haven't occurred yet but are going to occur sooner or later. The income on these segregated assets should not be subject to corporate tax. It could accumulate just like the income inside a pension plan. That would remove the double taxation and therefore the tax disincentive for insurance companies to hold collateral. Last evening, Ross Davidson suggested tax-deductible reserves against cats. This is another way of removing the tax disincentive to hold collateral.

I am not claiming that this tax incentive is the only reason the primary insurers don't hold more collateral in order to self-insure against catastrophes, but I think that it's an important one.

The next step in bearing cat risks is reinsurance. If you buy stock in a cat reinsurance company, you are absorbing cat risks. Given that reinsurers are apparently healthy, why aren't we done? First, they, too, don't have the capacity for much of the worst tail of the probability distribution, that is, for the most extreme cat events. They handle the middle cats, so to speak. Second, they appear to price cat reinsurance policies at a substantial markup over actuarial value. Look at cat risks from the viewpoint of standard capital market theory. These are uncorrelated risks, which do not amount to a large fraction of the total wealth in the economy. Therefore, they ought to be priced out at close to the risk-free rate of interest, of course taking account of the probability of occurrence. But reinsurance premiums are apparently far above that actuarial value, at least for the worst, lowest-probability catastrophes.

Yesterday, these excess reinsurance costs were attributed either to risk aversion or to some kind of capital constraint. I don't find either reason plausible. Something else is going on. I'll tell you what it is. Suppose that you set up a

reinsurance company. You've got to pull together people, systems, and information. There is a substantial setup cost in order to write policies and actually make money off them. These costs are not second order. Once the costs are incurred, the reinsurance company has an intangible asset. Part of the markup of reinsurance premiums above actuarial value is a return on and of this asset.

If the reinsurance company operates successfully, it acquires further intangible assets. For example, good reinsurers learn as much or more about the risks that they are taking on as do their customers, the primary insurance companies. As a consequence, they develop relationships with these companies, and that, too, has an intangible value that shows up in the prices charged for reinsurance policies.

Once intangible assets are acquired, reinsurers begin to act as if they were risk averse—not because their ultimate investors are risk averse, but because their intangible assets are long-lived and they're at risk. If a cat takes on too much catastrophic risk—too many policies that go too far out in the bad tail of cat outcomes—it runs the risk of going bust and losing, or at least damaging, its intangible assets. Notice that the intangible assets are worth most right after the worst catastrophes. This reinforces the apparent risk aversion.

Yesterday, we spent a lot of time talking about what to do and not much time on what was really going on. I do not claim that my story about intangible assets is a complete corporate finance theory of insurance, but at least it is an example of how to think it through. It does not help to build agency models that basically assume one individual buying insurance from another. Reinsurance companies are corporations, with going-concern values and intangible assets. They have access to international capital markets. Corporate finance, not utility or stylized agency theory, is the appropriate mode of analysis.

Now let's turn back and ask why the primary insurers are willing to pay so much above actuarial value for cat reinsurance contracts. It is partly just the value of information. But primary insurers also have intangible assets and therefore act as if they are risk averse. In addition, their managers accept various financial transactions just to get things done—just to get through the day, so to speak. A manager of a primary insurance company has countless things to worry about. If, at small absolute cost, he or she can forget about worrying about a particular cat outcome, a reinsurance contract may be worth signing even though the price is high relative to actuarial value.

I haven't touched on securitization. Bob Litzenberger is the expert on that. But I am convinced that information is the reason that the securitization of cat risks is difficult. As you go further out on the tail of bad cat outcomes, information problems become worse. The further you go out on the tail, the thinner the information becomes. Adverse-selection or moral hazard problems therefore become more serious. Adverse selection may not be costly in absolute dollars, but, relative to the actuarial value of a very low-probability event, it can be fatal to securitization.

Of course, you can try to solve the information problems by designing the

contracts or securities to depend on an index or some other attribute that's outside the control of the insurer. However, that creates a basis risk for the insurer, whose own losses will not match the index or attribute. As Bob Litzenberger pointed out, basis risk is less of a problem for bigger and more diversified companies and much more of a problem for the smaller companies.

Panel II: Similarities and Differences between Catastrophic Risk and Other Markets

Roberto Mendoza

I'd like to make two preliminary comments. The first one is that in reading through the papers that were prepared for this conference, my colleagues and I learned a great deal. An issue often raised is the extent to which fundamental academic research informs, influences, and changes practitioner behavior. I can tell you that in the case of this body of work, the answer is very much so. The second point I'd like to make, not simply in order to be provocative, is the assertion that, in fact, we are done. I do not believe that there is a problem. I think that the market currently securitizes catastrophic risk in an efficient manner.

The topic before us is the similarities and differences between catastrophic risk and other markets, and the fundamental similarity is obvious. You pay some money on day 1 and are faced with a range of outcomes. That is the similarity between catastrophic risk and every other market, whether investment in debt or equity or any kind of investment. Given the particular attributes of catastrophic risk, the differences are also very significant and have the potential to create material inefficiencies. I will address three of them.

First, unlike many other markets, the identity of the purchaser of the instrument is important to the insured. When you have a catastrophe, it makes a big difference as to who is there to pay. As a result, just as we've been discussing, securitization is involved in most cases—some kind of special purpose vehicle and some kind of mechanism to ensure that collateral exists to meet the payment. The creation of that special-purpose vehicle—and what is done with the assets placed in it—creates, in my view, a lack of seamlessness or an inefficiency, and therefore an increased cost.

Second, I would draw a distinction between the outcomes of investment in a so-called cat bond and those of investment in various other forms of high-yield instruments. Often, discussions of payoffs in cat bonds compared to high-yield bonds don't pay sufficient attention to a key difference. With a cat bond, you lose your money or at least a portion of it, but it *is* a loss. In the case of a default with a high-yield bond, you still have a claim, and that claim has optionality embedded in it, which may or may not be fairly valued by the market

Roberto Mendoza is vice chairman of J. P. Morgan.

at the time the default occurs. So, looking at the price of a defaulted bond versus the amount lost on a cat bond and looking at the price at a certain moment in time may not be a fair comparison because of potential market inefficiency in pricing the optionality in the case of the high-yield instrument—an inefficiency which may stem from illiquidity or information asymmetries.

Third, the comparison of the pay-offs of a cat bond and a traditional reinsurance contract often ignores the optionality in the latter when a catastrophe occurs. Reinsurance contracts incorporate an implied, sometimes explicit, renewal option, often at a higher price. As a result, comparing the three instruments—the high-yield bond, which defaults but has embedded optionality; the cat bond, which causes a loss, and that's it; and the traditional reinsurance contract, which has an implicit renewal option—is a complex undertaking. Indeed, it is much more complex than just looking at the quoted price of defaulted high-yield bond versus the loss on a cat bond at a moment in time.

I would argue that the securitization of catastrophic risk may not be debt-like in its nature but equity-like, which has implications for the conclusion of these remarks. The point with respect to the differences between the instruments is that securitization in the form of a cat bond has massive amounts of inefficiency built into it which must be overcome if securitization—in the sense we've been discussing—is going to dominate the alternative to traditional reinsurance.

Why are we going to all this trouble to see if the securitization of catastrophic risk can be done? I tread carefully here, given the audience. As I understand the theory, if you have a portfolio investor to whom you can provide a fairly priced (in an actuarial sense) totally uncorrelated asset, the overall riskiness of the portfolio will be reduced, increasing its value. If you can create such an instrument, the power of diversification will create greater value and therefore attract more capital at a lower rate and create capacity at an efficient price. That's the argument. But the theory has a very high hurdle to overcome—the inefficiencies of the securitization structure.

Is there, in fact, a problem today? This is why I wanted to get back to the assertion that we are done. I'd argue there is no problem today, and this is the reasoning: the assertion that there is a problem somehow relates to a combination of capacity and price. That assertion generally comes from the primary insurers, who say, "I can't get reinsurance at an economic price" or "I can't get it in the $25–$50 billion layer." What they are really saying is that they can only get it at a market price which may not allow them to make a sufficient profit. The market has shown a remarkable ability to generate equity capital to write these risks. And it isn't at all clear that there is a structural market inefficiency which inhibits either capacity or reasonable pricing. It may be that the business of providing primary catastrophic risk insurance is not a good business. It isn't written anywhere that all businesses are good businesses and have high returns on equity. Providing catastrophic risk insurance may not be a good business, and therefore what the insurers are really saying is, "I'm not in a very

good business, and in order to make it a good business, find me some cheap reinsurance somewhere."

I'd like to touch for a moment on the tax point brought up by Professor Myers. It is a real issue, and there is a real solution. You establish the reinsurer in a jurisdiction where there isn't a tax and to which the premium payments are tax deductible. There is such a jurisdiction. It's called *Bermuda.* It's the fastest growing insurance center in the world. That's the reason we don't need legislation—we have an answer.

To repeat the bottom line: The securitization of catastrophic risk is an equity-like risk, not a debt-like risk. I believe the markets have, in effect, securitized catastrophic risk in the most efficient manner possible. They have done so by setting up catastrophic-risk reinsurers in tax-advantaged, favorably regulated jurisdictions, and these catastrophic-risk reinsurers earn very high returns on equity. The answer to the question of why the pricing for reinsurance is substantially above its actuarial value, if that is in fact the case, is that this is exactly why these reinsurers earn very high returns on equity. Not only do they earn very high returns on equity, but almost without exception they are in the process of returning equity to their shareholders. The market is working very elegantly. I submit that, if the insurers who are protesting insufficient capacity or high prices were willing to pay a price attractive to the reinsurers, the capacity would be there.

So, in summary, in my opinion, the objective of creating greater efficiency through securitization is a natural attribute of capital markets, which has occurred already, and we are done. The portfolio manager who buys the theory that the acquisition of a fairly priced, uncorrelated asset increases the value of his portfolio should prefer the common stock of a cat reinsurer to a cat bond, simply because the cat reinsurance company represents a more efficient form of securitization.

Andrew Alper

My conclusion coming down last night was that we were the "gut course" here, so welcome to Reinsurance 101. I'm pleased to be here today to discuss the securitization of insurance risk and to try to draw some comparisons to other securities markets. The comparison is pretty easy because we have a lot of good analogies. As we think about this market, there are many examples of other markets that have developed in a similar fashion to what we expect here.

Let me start by talking about why we are optimistic about the development of this market for securitized insurance risk. We have heard the analogy to mortgages all morning. The market for insurance risk today is relatively illiquid, not unlike the mortgage market of fifteen years ago. Fifteen years ago, banks built lending capacity through the issuance of debt and equity at the bank-holding-company level, through retained earnings, and through deposit

Andrew Alper is a managing director of Goldman Sachs & Co.

liabilities. The assets were originated and held on balance sheets, and there was virtually no liquidity in the secondary market for mortgage assets. Today, the financial flows between the capital markets and the insurance markets are likewise quite constrained. In response to Roberto's point, I think that the reinsurance business is not a very good one today. It doesn't have to be that way, however. I believe that securitization can make reinsurance a very good business, one in which reinsurers get paid, not for their balance sheets, but for value-added services. Mortgage-backed securities enable the free flow of capital between mortgage assets and alternative investments—stocks, bonds, commodities, etc.

In the insurance industry today, the only way to raise the capital to fund insurance risk is through the issuance of debt and equity at the insurance-holding-company level and, of course, the taking in of premiums. So far the analogy is pretty good. This constrained flow of capital means that, first, the capital that is raised tends to be trapped within the industry, hence the cycle. Bermuda was a very efficient reaction to the cats in the late 1980s. But the problem is that now we have $4 billion of capital in Bermuda, and it's trapped there, and we had to go through some fairly inefficient mechanisms to get it out and to try to smooth out the pricing cycle.

Second, there is a fairly long lag time, at least by capital market standards. It took a couple of years to raise the capital in Bermuda, and that's why we saw rates on line shoot up in the reinsurance markets. Now, the rapidity in the development of the capacity of the capital markets to fund risk is evinced by the growth in the mortgage-backed market. A number of people have commented that the mortgage-backed market was really a beneficiary of government assistance of some form, and I think that that is very true. I think that that assistance was a catalyst, but there have been other asset-backed markets that have developed since then that are not beneficiaries of government largesse. Here you see that the mortgage market grew from virtually nothing in the early 1980s to a $100 billion per year market in the 1990s.

When you consider the case of asset-backed securities without government assistance, by and large you see a very similar pattern. There was no issuance in 1985 and $80 billion per year in 1995. That is a lot of capacity flowing back and forth in the capital markets.

An interesting aside here is that the securitization market for consumer receivables dramatically changed the credit-card industry. Ten years ago, the major issuers were basically money-center banks that used their rather large balance sheets to fund consumer receivables. The major credit-card issuers today were unheard of ten years ago—MBNA, ADVANTA, etc.—and they have relatively small balance sheets. These are balance-sheet warehouses, and then they use the capital markets to fund risk. This is the topic of a separate discussion, but it is an interesting question if the same thing happens in the insurance market. What does it mean for the reinsurers and insurers currently in the market? Which will survive? Which will prosper? Which will become dinosaurs?

Clearly, there is some potential for security market activity in the area of natural disasters. The magnitude of the exposures is enormous. A $22 billion Gulf Coast loss dwarfs the $4 billion Bermuda capital. A $70 billion Los Angeles earthquake, a $100 billion New Madrid earthquake, a $75 billion Florida windstorm—these are basically uninsurable events given the capacity in the insurance and reinsurance markets today. There's roughly $230 billion in surplus in the U.S. property-casualty market. The $75 billion of insured losses over this period is a large, large chunk of that. Relative to the U.S. securities markets, various numbers are thrown around, but let's call it $13 trillion. $75 billion is a very small slice of a $13 trillion capital market, so, clearly, the capital markets have the capacity to absorb this kind of cat risk. And, by the way, a 1 percent fluctuation in the U.S. capital markets is an everyday event, so every day roughly $130 billion bounces in and out of the capital markets. I recognize that there is a difference between realized losses and trading losses, but the volatility is something that the market can handle.

The idea of insurance and reinsurance as being fungible with bonds and stocks really isn't all that crazy, and increasingly the insurance world is thinking about it this way. Insurance is just an option on capital, and, depending on the structure of the instrument, it can be either equity, like an excess-of-loss cat instrument, or debt, like finite-risk reinsurance in many forms. When rates shot up in the cat market, Allstate made a conscious decision not to buy reinsurance but instead to issue more equity. That is a direct comparison, a direct trade-off—equity in the balance sheet versus buying cat reinsurance.

Let me give a trivial example of how you might package insurance options to create a principal protected security. Assume that you have a special purpose reinsurer and an insurer buying the reinsurance and that the latter is paying a 10 percent rate on line for coverage. If you issue a $200 million bond and $100 million goes into a ten-year U.S. Treasury investment that rises to par in ten years, that's the principal protection right there. That $100 million is unavailable for reinsurance protection. The other $100 million *is* available for reinsurance protection. Assume that there is a 10 percent rate on line and that it earns, say, 6 percent through short-term investments; that's a 16 percent yield in that portion of it. The investor put in $200 million, so it's an 8 percent current coupon. What happens is that, if a triggering event takes place, the special purpose reinsurer has its assets diminished, and the rate on line goes down, staying in for whatever is left in the trust. At the end of ten years, if no event happens, the investor gets the $100 million from the U.S. Treasuries plus whatever is left in the trust, which gives a fairly attractive yield to maturity.

What are the probabilities of loss? A Moody study of the junk bond market covering roughly fifteen years at default rates reveals about a 4 percent probability of loss. The market today is about four hundred basis points over the U.S. Treasuries, so the market is having a multiple of pure loss of one times. The reinsurance market, however, has a much higher multiple. For a single event with losses totaling $20 billion, I am told that it's about a 4 percent proba-

bility. And these estimates fluctuate anywhere from 12 to 28 percent rate on line. A particular pricing point a month or two ago was a 17 percent rate on line, or four times the pure risk. Now, that figure may be a bit higher today, but it leaves lots of room for the securities market to get interested.

Given the ability to repackage insurance risks and to provide an attractive price in the capital markets, the question is, Who are the buyers, and what are their issues? I won't dwell on the buyers. But here are the issues, and these are my final points. The first is that right now we are in a very soft reinsurance cycle, and, therefore, the reinsurance market is very aggressively trying to capture these opportunities. That will not always be the case. Second, at this point in time, even though in theory the capital markets should be price competitive (because of the uncorrelated nature of the risk) and should price through the reinsurance market, investors in fact are saying, "We're just dumb investors; why should we buy this risk at a price below the reinsurance market where the pros buy it?" Over time, however, the capital markets should come to provide lower-cost reinsurance.

Finally, from the investor's perspective, right now security structures look too complex. A few years from now, however, these will look like trivial exercises. In any new market, it takes a while for people to get used to new structures. Investors must be educated as to what the risk is, what the probabilities are, what the probabilities mean. This is a time-consuming process, and the most important part of it is the availability and credibility of information. People in the market must have confidence that they know what they are buying and that they know how to trade it. There has to be secondary market liquidity. There has to be an ability to build diversified portfolios. We've seen the exact same thing in the junk bond market. We saw it in the swaps market. We saw it in the asset-backed market. What happens is that you have a flurry of activity, a lot of frustration, a lot of wheel spinning. Then, all of a sudden, critical mass is reached, information is available, people are comfortable with the process, liquidity develops, and capital market capacity explodes. I expect to see the same pattern here in the reinsurance and insurance sector.

Martin Feldstein

Thank you very much. What I got from that was that, even if we haven't arrived yet, we are on our way and getting closer every day.

Andrew and Roberto both seem to be saying that there are high rates of return available. Why? Why isn't more money going into this to drive that return down? And Roberto said that the equity is going back out. Given that there is a high rate of return, that this is one of the good businesses, and that there are other businesses that are not so good, why aren't we seeing more capital coming in?

Martin Feldstein is the George F. Baker Professor of Economics at Harvard University and president of the National Bureau of Economic Research.

Roberto Mendoza

I think that the difference between Andrew and me would be that one must distinguish between the economic attractiveness of a reinsurance business and that of the cat business. The cat reinsurance market, I would submit, offers a very high return on equity—on the order of 18–20 percent. Because the insureds aren't willing to pay the price, these businesses don't have sufficient opportunity to deploy their accumulated capital in insuring catastrophic risk and are therefore returning that capital to their investors.

Martin Feldstein

They are willing to pay the price to generate an 18–20 percent return on equity. So the question is, Why isn't there a little more selling moving down that curve so that the return on equity is 17 or 16 percent if that's a much better return than equity can get in some other market?

Roberto Mendoza

My answer to that would be twofold. To take a step back, the first thing would be to ask why an investor would buy this at all. I understand that the argument holds that the efficient frontier in an uncorrelated risk is pushed out. The issue not addressed by the securitized structure is, instead of selling someone securitized catastrophe risk, why not sell him the equity of a cat reinsurer, thereby driving down the cost of the capital for the cat reinsurer and allowing him to price more efficiently to the primary insurer? To answer your point, some of that is going on. But my gut reaction would be that, for the cat reinsurers, there still isn't sufficient demand because, for various reasons, the primary insurers would rather have no reinsurance. They don't protect themselves. They would rather have no reinsurance than pay the price to generate a 15 percent return on equity for the reinsurer.

Andrew Alper

I might repeat two points. One is with regard to the catastrophe reinsurers. As Roberto properly points out, the return is declining for these companies. It has been declining for the last two years. Pricing is off for their core business, and they are therefore returning capital because they don't see the same returns that they thought they could achieve when they were created—for which I applaud them. I think that's the right discipline. What we have not found is an excess profit. I believe that there are other ways to apply capital more efficiently than through a corporate structure with a lot of equity sitting in it. We haven't found that yet, for a variety of reasons. So partly this all comes to the reinsurance market, and part of it is the complexity. Again we are back to the point at which a new market is opened up to a broad investor group: the product must be simple, must be similar to things to which the investors are accustomed, and must fit the rules. That's why equity in Bermuda was perfectly

logical. My firm raised capital for companies in the Bermuda market. It was the right thing to do to fill a void quickly because it was efficient and it was liquid. The real trick—something on which we are all spending a lot of time—is whether there is a next, more efficient mechanism for doing that? Again, we find the complexity burdensome, and it is taking us all longer than we wanted it to take.

Roberto Mendoza

I do believe that a fundamental difference of opinion exists between us on the issue of whether it can be done better. And that difference of opinion revolves around the question of whether an equity-like risk or a debt-like risk has been transferred. I believe that there are more efficient ways of providing contingent liquidity. I'd argue with respect to real risk transfer that the market works just fine right now. And it is an equity market. The securities are liquid, and returns are very high. But, because the primary insurance company has external limitations on fair pricing—legislative, governmental, even societal—the ability to offload the risk to the markets, whether through securitization or the reinsurer, is constrained. That's what makes the primary insurance markets inefficient and unable to price at a level that provides an adequate return. It's not an inefficiency in the markets. The markets *are* efficient. It would be dangerous for us to underestimate the efficiency, liquidity, and reactive capacity of the markets. The inefficiency lies instead in the regulation of the insurer.

Panel III: Evolving Institutions for Redistributing Catastrophic Risk

Richard Sandor

The study of inchoate markets is something that has challenged economists over time, whether it be the structural changes in the sixteenth century in the formation of the Dutch East India Company and the invention of the limited-liability corporation, the standardization in the mortgage market, the development of Ginnie Maes, collateralized mortgage obligations (CMOs), or the junk bond market in the 1980s and 1990s and what happened there. This is just another challenging paradigm of that, and the input that the academic world can have is phenomenal.

We've seen various tools emerge—from an organized futures market in Chicago (the Chicago Board of Trade vis-à-vis the PCS index) to separate efforts by such leading investment bankers as Goldman Sachs, Morgan Stanley, and Merrill Lynch and major intermediaries like Guy Carpenter, all of whom were involved in one way or another in pushing this. I would like to say that, on the one hand, on the Chicago side you now have a contract that seems to be strug-

Richard Sandor is chairman and chief executive officer of Environmental Financial Products, Ltd., and chairman of Hedge Financial Products.

gling by a lot of standards, but, if you look at the numbers, the open interest there is larger than pork bellies and Treasury bills were at a comparable point in time. On the other hand, we have three major investment banks working on bond deals. All these people will give you their opinions on the pros and cons of these new risk-management tools, and then I'll wrap it up.

Richard Kane

I'm delighted to be here and to have this opportunity to share with you some thoughts about the emerging methods and institutions for distributing cat risks. From the start my firm has actually been at the forefront of thinking about this, which I suspect explains the large alumni group that we have here at the conference. During my brief remarks, you will detect some natural bias toward the continuing prominence of the broker in the transactions that we are doing. You shouldn't be surprised at that.

I'd like to offer some thoughts about the changing nature of the business as we look forward. Both the insurance and the reinsurance markets have been historically reactive. Ace and Excel were formed in response to the crisis of the mid-1980s. And, of course, additional Bermuda capacity came together following Hurricane Andrew. Now, for the first time, you can make a case that we are actually thinking ahead as an industry in that we are in the fortunate position of not yet having seen the megaevent that we have all been talking about and some have forecast. So we have the opportunity to prepare ourselves, and that's most of what we're here to talk about.

Most of you are familiar with my firm's view of risk, which is, in fact, the same as Andy Alper's. What you will not find in it is a very big role for government. It seems to me that we ought to be able to figure out how to deal with this as an industry without much government involvement.

A couple of questions as we think about the future: Can the current institutions and distribution methods access this broader, deeper capital base that we think we need to get into, and what should the role of current players be in the new world? I think that the answer to the first question is a definite yes. But, in order to achieve the required level of efficiency, some changes are going to be necessary. The role of the traditional players will also no doubt be questioned and tested as we move forward. In the past, our world was two-dimensional, with a very linear approach to investors. Only recently have we realized that those illusive investors and suppliers of capital are the same as the consumers themselves. I believe that there will be changes in both capital providers and the dynamic nature of the risk-transfer process. As more investors express interest in this emerging asset class, there will be a greater need for professional management. We will find this in risk management, providing new and better techniques. We will see this in approaches to the analysis and

Richard Kane is president and chief executive officer of the global services division of Guy Carpenter & Company, Inc.

management of exposure. There will be a continuing need to get closer to the sources of the deal flow and, in a very large measure, to information. A lot of what we have been talking about here is the need to continue to build on the information that's available to investors about what we are doing. And, finally, there will be a continued need for portfolio diversification within classes of business.

Investors will come at this with different appetites and needs. Some of them will wish to manage their portfolios actively. Clearly, one example of that would be an investment in a cat bond. More likely, we see people managing their own portfolios through exchange trading. Although, as we discussed yesterday, the basis-risk problem must be solved, as those solutions come forward there will be a big opportunity for folks to use the exchanges to deal with these issues. Most investors will require professional management and deal flow. There are a couple of ways to think about that. One is an equity investment in a reinsurance company. You could do that today, and, as Bob Mendoza suggested, you can go in and out of that very easily. The opportunity exists to do that, and it certainly is a way for new capital to participate in this industry. The other way would be participation in a fund. I believe that funds will be developed with special purposes that provide opportunities for investors to come in.

Now, on the subject of information, there was a comment in the *Wall Street Journal* last summer from an investment manager who said that we would have to become experts in meteorology. It would require a considerable investment in time and energy to analyze the new risks involved. This gets back to a point that we were discussing a few minutes ago about some of the issues involved in drawing an analogy between CMOs and cat risk. Information is one of those issues. Virtually all of us believe that we understand what a mortgage is all about, and, even though as the CMOs developed we made that activity much more complex by carving up the investment opportunities into smaller and smaller pieces with different flavors, we felt that we understood the basic mechanisms. This is not necessarily true with cat risk, and as an industry we have a significant need to educate investors so that they really understand what they are investing in.

What does this say about the role of an intermediary in this business? It continues basically the way it has been going. Historically, the brokers have been a catalyst for developing solutions to satisfy client needs. Think, for example, of the development of Centre Re and Mid-Ocean as well as residual market facilities. We need, frankly, to do this for survival purposes but, importantly, also because, in bringing real value to the industry, we need to continue to facilitate efficient risk transfer and to develop alternative markets. What all that means to us is that the intermediaries have an important role in a very complex industry. Transformers, exchanges, and funds are new, and the capacity requirements are significantly larger and will be sourced differently. But the basic business of efficiently providing risk-transfer facilities to insurance is largely unchanged.

Frank Pierson

Historically what has happened is that the insurer has all the cat risk and several different ways of getting rid of that risk. One of them was simply to go to the capital market and raise capital. Alternatively, it could send the risk to its reinsurer, and the reinsurer would then go out and raise capital. I have simplified this, eliminating retrocessional markets, and, yes, brokers are in here somewhere—I don't mean to leave them out. But this is the basic flow. The problem is that this structure causes a dilemma—the capital markets themselves can't, by law, originate the risk directly. I think that, in the future, the capital markets won't be able to go to an individual insured and say, "I can offer you a solution," as they might do when offering other financial products. It's got to be an insurance product of some sort, and an insurer is going to stay in the picture. So we have the starting point in the origination of the risk that is going to stay in place. Now what we have to figure out is how to get from that source out to the capital markets. I think that it's generally believed that insurers for most noncat risk have way too much capital. But for cat risk they don't have enough, and, under the current rate regulation and pricing environment, insurers can't charge enough in cat risk in advance. And, if they could, they have no way to put that money aside for a rainy day because of accounting and tax rules.

So, in trying to get rid of this risk, the insurance industry faces these dilemmas, and something is stopping it from getting to securitization, which I think people think of as the solution. Insurance regulation causes problems. Unlike someone who originates mortgages, insurers can't take their insurance and sell it to someone else. They are always at risk, and they all have to deal with the credit risk. Even if they sell it off to the market, they have a credit risk. If whoever they've sold that risk to doesn't perform, they have to perform.

There is an apparent or perceived information asymmetry that makes the market feel uncomfortable analyzing catastrophe risk, and we've had many conversations about changing the structures and indices involved. A good comment made this morning was that we should have an index based on a model. The actual choice of model doesn't matter, just as long as there is a model on which to base the investment.

A big factor involved in the slow acceptance of new approaches is simple inertia. It just takes a lot of big insurance companies a long time to do something new. Imagine both an insurer wish list and a capital markets wish list. Many items appear on both. Both markets want a commodity product. Unfortunately, by *commodity product* each market means something different. A commodity product in the capital market is standardized; every clause is the same, and everyone knows what it is. The insurance market wants a commodity product that can be customized differently in different situations. Where the capital

Frank Pierson is a managing director of the Zurich Centre Group.

markets want to be able to get in and, more important, get out, want liquidity, want to be able to understand the risks, want something that can be priced, and want some common trigger, insurers want as little basis risk as possible, want a product that's accountant friendly and tax efficient, long term and stable. I think that what's going to happen is that the reinsurer, in whatever form, will bridge these two wish lists.

For new approaches such as securitization to work, certain assumptions must be made. One assumption is that all insurers need short-term capital. They need this transitory capital when they need it, and they don't need it the rest of the time. One assumes that they can and will pay their own losses over a long period of time and that they truly are profitable.

Where does this lead in terms of what I think a reinsurer will look like? As I said earlier, I think that the insurer will still be the originator of risk, and so somehow it has to get rid of the risk. And I think that the insurer will have direct access to capital markets. Insurers will go out and get capital; they'll try cat bonds, CBOT futures, whatever. However they do it, they'll get directly to the capital market. Insurers of all sizes are going to use a reinsurer as an intermediary between them and the capital markets. And they're going to do it in several different ways.

One way is the reinsurer selling perfect hedges to the insurers. The perfect instrument to do that exists today—the reinsurance contract. The reinsurer can approach the insurer about the losses it wants to cede and then offer a contract that does exactly that. It will then turn around and, on the basis of some kind of index, buy imperfect hedges from the capital market. It can keep the basis risk, and it can manage that basis risk because it can craft its portfolio to be as close to or as far away from the index as it wants it to be. It can therefore manage how much it retains and how much it cedes out will be dictated by its own management's view of risk versus reward.

I think that a second role for reinsurers will be the standard role that they have today. They're just going to take a cat risk. They're going to say that it's attractively priced, that it's going to come in to me, and that I'm just going to retain it against my capital.

Finally, I think that the reinsurer is going act as an investor but also in some ways, as people have said, as a value-added manager or provider of information. The reinsurer is going to package risk through contingent equity puts, contingent surplus notes, etc. It's going to be the knowledge provider to the capital market. It's going to go out there and figure out how to craft some deals, figure out what the pricing should be, probably take shares of these deals, perhaps act as an arranger for a fee, perhaps act as a general partner in a partnership, and basically send out and design the covers for the market. Some companies are already doing it. My firm, for example, has a company called Insurance Partners. We go out to a market and say that we're going to design these kind of investments and ask those involved to commit to following our

investment every time we create one. What you get as a result is a pool of committed capital that will back what you as the manager of these funds decide are good investments.

In summary, I think that what will happen is that we are moving away from being a reinsurer (whatever that is today) that takes in cat risk and retains it to being an organization that's going to have at least three different roles: being a basis-risk taker, being the usual cat-risk taker, and being a value-added adviser to the capital markets.

Joseph H. Umansky

The previous panelists as well as those who presented and discussed the papers yesterday cited various statistics regarding the size of a potential catastrophe loss relative to the size of the financial markets. I will therefore forgo the pleasure of requesting statistics. Instead, let us simply presume that there is demand among insurers and other institutions like state governments for large amounts of catastrophe protection. Let us also presume that there are sufficient reasons of return and diversification to make investors interested in accepting and trading insurance risk.

I will first address some of the specific needs of issuers (broadly speaking, the parties wanting protection) and the particular requirements of investors. I will then show several mechanisms for matching those interests.

Issuers

Insurers have not been able to get as much protection from catastrophic losses as they desired. On the supply side, the constraints exist on reinsurance capacity. On the demand side, large insurance portfolios generate huge exposures to single events like earthquakes and hurricanes. However, it is important to note that today there are specific shortfalls for certain types of catastrophes but that, overall, there is excess capital in the industry.

The motivation for buying reinsurance is solvency. But even for the largest firms, like AIG, where solvency is not an issue, there are concerns like earnings volatility and stability of credit ratings that make it desirable to have reasonably priced and collectable catastrophe protection.

In addition, it is necessary to get the proper accounting benefit for both GAAP and statutory purposes, get the appropriate tax treatment, satisfy rating-agency requirements, and maintain the confidence of lenders and investors. In approaching these concerns, the insurers are looking for cost-effective solutions through access to new investors, and, if these solutions are to be effective, they need to get the leverage and hence the pricing right.

Joseph H. Umansky is vice president and deputy comptroller of American International Group, Inc.

Investor Requirements

What do investors want? Like all of us, investors want high returns and low risk. That said, I note that investors are responsive to the idea of risk and return taken together in context. In this case, *context* means portfolio diversification. Pure insurance risk is only remotely connected to world financial markets. It would take a huge disaster actually to move interest rates or affect the stock market.

What do investors look for? They look for spreads above the risk-free rate commensurate with the risk that they are taking. They want manageable credit-risk exposure. Liquidity and secondary markets should not be dismissed as unimportant. They need an understandable product structure and price validation through independent indices or participation by knowledgeable investors.

The question that we now face is how to bring the issues and needs of the insurers together with the requirements of investors. A number of efforts have taken place to date. There are those who say that the reinsurance market works and capital market solutions are not only not required but will not work. I believe that capital market solutions will work, but the most efficient structure is not yet in front of us.

Docking: First Efforts

The first-generation attempts are the Chicago Board of Trade products, the Catastrophe Exchange, act-of-God bonds, and contingent notes.

The CBOT products depend on a poor index; insurers have a significant amount of basis risk. Trading activity has been such that it can provide only relatively low limits of coverage to the insurer and an illiquid security to the investor.

The Catastrophe Exchange swaps risks directly between counterparties. High search costs render it impracticable, and, as much as individual insurers would like to diversify the risk, most believe that they do their job better than someone else with a different risk profile. Therefore, the equivalents are very difficult to work out.

Most of the act-of-God bonds depend on the CBOT index, which creates basis risk for the insurer. If the triggers are based on actual performance, the investor is faced with the moral hazards, thereby creating additional uncertainty on the part of the investors. And the insurer is faced with a claim validation process that is incremental and could be burdensome. Also, the investor may be faced with regulatory issues on actual performance triggers since state insurance commissioners may deem the investment to be participation in the insurance business.

Other issues related to act-of-God bonds are the following:

Liquidity is a concern to investors. There is currently no mechanism to hedge or trade the risks in the bonds.

Initial indications by some investment bankers that the cost to insurers

would be lower than traditional insurance have not materialized. While investors in act-of-God bonds may be new, they are not innocent capacity; they demand rates at least equal to the traditional market. This, together with the initial frictional cost, makes the act-of-God bonds at least as expensive as traditional insurance.

There continue to be a number of unresolved issues regarding the accounting and tax implications of act-of-God bonds. While economically the result may be the same, the steps through which one must go in order to accomplish the same accounting benefits are burdensome, and I question whether they work.

In today's market, act-of-God bonds face an uphill battle. If insurers or reinsurers can get traditional coverage at the same price, why should they take basis risk, accept more restrictive terms, face accounting problems, and go through a prolonged documentation process? Despite the difficulties, conditions are ever changing, and the challenge facing promoters of this product is to make them more friendly.

Contingent notes are standby liquidity facilities in a somewhat innovative form. They do nothing to help earnings, providing only some level of solvency to an insurer. Even when they are structured as surplus notes, there are limitations on the capital benefits. They do not represent true insurance, and they are not even triggered on an insurance contingency. These are very interesting structures, but it's important to note that they provide limited benefit.

Another structure that has been evolving is contingent capital. Contingent capital encompasses various classes of preferred or common stock that are putable to an investor in the event of a catastrophe. These structures provide liquidity and surplus but do not provide earnings relief. They also satisfy the concerns of the rating agencies, who are taking a much harder look at catastrophe exposures.

Docking: A Better Way

Perhaps I've painted an overly bleak picture. It is important to temper this with an observation.

The first car was no real match for a horse. The first steps in a breakthrough are often taken backward. The same is true in the insurance sector. Let me share with you how we can make a better match between issuers and investors, today, and then close with a glimpse of the future.

Pricing validation. Better docking requires first and foremost an index with some key characteristics. These include disaggregation by zip code, credibility on a zip-code basis, elimination or mitigation of variances in underwriting performance, consistency of reporting, and historical replicability. Beyond a credible and independent index, investors will take comfort in the participation of knowledgeable experts and quality issuers.

Credit risk. Once price is settled, someone still has to hold the ante in this game. The solutions to date have relied heavily on one-off trust structures, very

similar to those used in mortgage- and asset-backed securities. A better solution might be a formal exchange, one that not only satisfies the credit function but also maintains valuable trading information, market demand, and price histories.

Future. Where does that leave us? First, issuers and investors must become accustomed to trading in *physical* as distinguished from *financial* risks. By that I mean that a Los Angeles earthquake will have a price just like ten-year Treasuries. Over time, investors will take different flavors of risk, for a price. Initially, the risks may be added on to more traditional securities. Eventually, these risk elements will trade independently of the underlying securities.

Once we have a broad range of freely traded risks, there will be changes in the capitalization of insurance firms. It may become too expensive for insurers to hold and finance all the risks themselves. Rather, the underwriting skills of the best insurers may be deployed as asset managers for pools of specialized investor money. Banks and thrifts both found it better to package and sell risks rather than finance them on balance sheet.

Will this happen in the insurance industry? The competitive environment, conditions in the markets, and regulations will control the nature and timing of any evolution. But the insurance industry might do well to ponder these examples.

Richard Sandor

I'd like to make one or two summary comments. What I heard our panelists talking about is that these are new markets and that a lot of work has to be done. Frank's point I think is right, but it presents an opportunity, not a problem. There is a role for a Myron Scholes, and a Fischer Black, and Harvard and Yale and MIT, in developing these models. There is a Nobel Prize out there for whoever does that. Admittedly the markets are inefficient and illiquid. But some of us like that. In fact, if you look at the early work of Working at Stanford University, he wrote that what hedgers do is speculate on the basis. When gold futures were introduced in the United States, the idea was to buy cheap Peruvian gold that was being dumped, refine it into bars, and sell it on the New York market. When bond futures started, Salomon Brothers went to the New York State Teachers Retirement Fund and tried to find cheap bonds to trade against the Chicago market. When stock index futures started, anybody who could buy the 500 stocks underlying the index could sell the futures. It was a bad hedge, but it was a great arbitrage. So, recognizing inefficient markets, people like myself are in the crop-insurance business. I don't mind when crop-insurance rates stay high and everybody gets disturbed about mad cow disease and pummels the cattle market because one of the legs of my trade holds steady and the other gets killed. The fact that there are disconnected markets and illiquidities just provides arbitrage and basis trading opportunities.

We should also look at the role of the broker, the role of the new insurer, and the credit issue. Some of the difficulties that we are encountering actually

provide opportunities, both for the academics and for the people who view liabilities as dynamic and will trade them on a regular basis. As pointed out, some people want a perfect basis product. Other people will want to take the basis risk because they want basis profits. There is also the International Swap Dealers Association (ISDA) market, the swap market, which we haven't talked about. This is a $50 trillion market—institutional investors alone are represented by thirty banks. So that's another opportunity.

Panel IV: Implications for U.S. Insurers

James M. Stone

As some of you know, I am a person who has worn different hats over the last twenty years. I was an academic, and then I was a regulator, and now I am a business executive. All the papers for this conference appealed to me wearing one hat or another of these three. Since this is largely an academic crowd and that is the hat I least get to wear these days, let me say first that what attracted me most from an academic point of view was Ken Froot's finding that the reinsurance industry was charging fourteen times expected costs. If I were going to make an academic presentation myself this morning, I'd want to look at why he got that result. And I would focus on three things. First, is the figure really fourteen times? I'd argue that it probably isn't, that you get fourteen times only if you assume that the expected future cost for catastrophes looks just like the recent past. Many experts are viewing the past few decades as aberrantly calm, so the overall past cost probably doesn't look like the recent past cost. At least the insurance industry believes that that won't be the case. Second, are prices going to stay that high, or is this price-to-cost ratio a temporary blip? And my bet is that, for various reasons, it's a temporary blip and the price-to-cost ratio won't stay that high. Third, what are the institutional or industry structure reasons that would lead Froot's estimate to be more than you'd expect it to be? I think that the answer has something to do with the nature of the reinsurance industry. In particular, I would look to a subject that was not much talked about today—the importance of relationships and what is not written in the contract. These features of reinsurance cause some strange things to occur in this industry. But I am not going to be an academic today, so I won't pursue this thought any further right now.

Now I'll tell you what I would have talked about if I'd talked about regulation. We have all heard a lot of talk about the role of government in dealing with catastrophe and cataclysm, and we have heard almost as much about securitization. If I were going to talk from a regulator's point of view, I would want to talk about that. I think that securitization is coming, and I think that that's a good thing. I think that securitization and government action together

James M. Stone is chairman of the Plymouth Rock Company.

could be even better. In the climate of the next few years, a rational government program is probably unlikely, so securitization will probably come without it. But, at some point in the more distant future, the government may play some explicit role. In the meantime, I want to emphasize that the government plays a huge implicit role in the homeowner's catastrophe market anyway. It does this through insolvency funds, which affect whether people are credit sensitive when they choose their insurers. It, therefore, affects the capital structure of insurance companies. Companies must decide how much capital they want to put at risk, knowing that the insolvency fund is going to pick up after they stop and that they don't need vast cushions of capital to get customers. And we all assume that, in a cataclysm or a large enough catastrophe, the government is going to play some other bailout role, even though we don't know exactly what that role will be, and that, too, becomes part of the decision-making process as one makes rational business decisions about capitalization and risk. So the government is already playing a major role in this industry. Securitization, so far, is not. In the very near future, securitization will likely be part of the equation as well.

Finally, putting on the hat I am supposed to wear today, that of an executive in private industry, the points that I want to make are few. First, there may be some misimpression about the sophistication of reinsurance pricing. Reinsurance pricing for individual large risks can get pretty sophisticated, but most treaty reinsurance in the property area is very primitively priced now. One of the most important things that's going to happen in the near future (and my company is insisting that its reinsurers begin now) is that pricing will become much more sophisticated. Instead of a reinsurer charging x percent of whatever premium a primary carrier charges your customers, we want reinsurance prices that explicitly reflect location, construction, and concentration, and that means property by property.

Each time we add a property, we should know what it's going to cost us in reinsurance. If we could have that, we would be better off as a company, and I believe that our reinsurers would be better off as well. We would be better off as a company because this knowledge would help us as we select our book of business. We would be underwriting as we went along, taking into account the market pricing of the reinsurance that we're going to have to buy. This, in turn, would help us with the regulators. People have asked me how companies are going to deal with regulators on coming price shocks in property pricing for cat-prone properties. It would help if reinsurance were priced rationally and thus if there were some demonstrable reason why our prices had to reflect that. If we didn't get a rational reaction from the regulators, then it would tell us where to choose our business. So we are strongly urging our reinsurers to give us a more sophisticated method of pricing. That probably couldn't have been done ten years ago. Today, it is quite straightforward and easy to do. More precisely, it's not easy institutionally, but it's easy mathematically.

Let me conclude by returning to the argument here at the panel table: Is

there a big problem today in the catastrophe reinsurance markets? My answer is that that really depends on what you call a problem. Are these markets inefficient? I would say that these markets are quite inefficient. Are they inefficient in a way that causes tremendous harm to either the industry or the public? I doubt it. They're not that inefficient. Are they so inefficient that they should divert government attention? No. Are they inefficient enough to create marvelous business opportunities? Absolutely.

Robert P. Irvan

As you know, I work for an insurance company, and, when people in an insurance company speak to a group like this, it's customary to compare the real world with some other world that academics deal with. I thought that I might relay a few experiences that illustrate this difference. I once had an underwriter tell me that, on a block of business for which he was responsible, he'd averaged 3 percent profit for the last five years, which added up to a 15 percent return on equity! That person has now moved on to the reinsurance industry, which may explain some of the unusual price decreases that the academics here have not been able to understand. We also use a one-hundred-year return period when looking at our capacity and at the maximum amount of catastrophe exposure that we would like to accept. However, we happen to have more than we would like to write on Nantucket and Martha's Vineyard. Some of our underwriters object to our modeling, pointing out, quite logically in their opinion, that most of the homes that we insure there are well over a hundred years old. We point out, on the other hand, that a hundred years ago, those same homes may not have been beachfront properties. These anecdotes do make me wonder just who lives in the real world and who lives in some other world.

The subject today is implications for the insurance industry, and I must admit that I don't know what they are. I believe that that's almost the consensus of the whole group. I'd like to go back to an old economic phrase that can be summarized as, It all depends. And I think that there are a lot of things going on that will make us look back ten years from now and say, We should have seen this coming. But it's probably not predictable.

Very briefly, we are dealing with uncertainty. There are a number of ways to handle uncertainty. We have already talked about them, but the key point is that the competitor with the lowest price wins, time after time and in every field. For that reason, I would expect that companies will be forced to explore aggressively a number of different strategies.

Now, with that in mind, I want to talk about some assumptions that I use. I'm responsible, among other things, for the purchase of reinsurance. My firm spends about $350 million a year on reinsurance. (1) I assume that the frequency of large catastrophes will increase over the next few years, regardless

Robert P. Irvan is senior vice president and chief financial officer of Cigna P&C.

of what anyone thinks about global warming. (2) If nothing else, the values at risk are increasing. (3) Mitigation will not have a major effect within any reasonable time horizon. And I also anticipate that (4) sooner or later, and more likely sooner than later, we will experience a megacatastrophe, in Florida, on the New Madrid, or the like, that will change the entire landscape, both figuratively and literally.

(5) I believe that regulators will continue to behave like regulators, for the most part, reasonable, serving as a buffer between what the industry would like to do in response to events and what the public will accept. But they will also regulate market exit and entry. I have to think about that when I buy reinsurance. We have to think about it when we actually write insurance. Regulators are going to set terms that we would like to change at times. They will continue to be more concerned than we would like with affordability rather than solvency, although over time they do adjust to reality. And, following a major catastrophe, we will face major constraints that will temporarily worsen because the regulators are behaving like a buffer.

Rating agencies are very important to most insurance companies. I believe that they are going to shift their emphasis away from assets and earnings and toward catastrophes and that they will improve the amount of data that they get from companies. They will then increase the importance of a company's cat management on its rating.

I might point out that reinsurers' share of catastrophe losses over the last few years has dropped. Hugo, for example, had a 43 percent share paid by the reinsurers. By the time you get to Northridge, it was 21 percent. Reinsurers are accepting less and less risk, buying more finite reinsurance, transferring less true risk, and engaging in more temporal displacements. In short, regulators are not letting primary companies shift the risk to the insured as fast as the reinsurers are shifting the risk to the primary companies.

I do think that catastrophe modeling will improve and that this is going to make a major difference in the demand for capacity from the capital markets. Company data will become more accurate, companies will continue to find exposures that they did not know they had, underlying science will be updated, and every time we have a major cat, we're going to discover that in some fundamental way the model was wrong. And each time we'll say that, if we had known that, we would have been better off. But then the next cat will reveal another source of uncertainty. Having said that, uncertainty will be reduced. When I think of the way we have handled our risk as an industry over the last few years, I think of a big box of rocks. What the models do is allow us to shake that box a lot and let things settle and then fill up some of the cracks between the large rocks with some gravel and then some sand. As a result of all this, the demand for more capacity outside the industry will lessen. There is a lot of capacity that simply is not being used by insurance companies right now, if they could trade their exposure with other companies or with reinsurers more selectively. Partly because of that unused capacity, the return on equity

on the cat portfolios will improve, and this will dampen the demand for reinsurance.

Capital markets have already found a way to fund catastrophe exposures. We've already mentioned in the last few days what's happened in Bermuda. I also agree that cats tend to be more of an equity issue than a debt issue and while we need a Black-Scholes theory for cats, we also need a Miller-Modigliani to help us decide what the right mix should be. Or maybe there is no right mix.

Reinsurance markets are reasonably effective at transferring risk. That's something that is often not taken into account by people advancing the need for capital market involvement. I think that, in the long run, capital markets will provide a commodity-type product and not the tailor-made product that most reinsurance companies provide and most insurance companies need.

Having said that, I thought about different scenarios. One involves how much more cat cost we're going to have in the future. Will it go up sharply? Or will it stay at about the same level? Will we get some major breakthrough in the capital market? Will we get more government involvement? Over time, the capital markets will probably make some improvements, but, because of inertia, there will be no fundamental change. On the other hand, if we get a lot more cats, and if the capital markets have not responded rapidly enough, then I would anticipate far more government involvement. And that is something that, as a member of the insurance industry and as someone who believes in the free market, I would really not like to see. It is, however, a highly likely occurrence if we get a devastating earthquake along the New Madrid. We will wind up funding a large portion of the losses, but we have very little effect on policy.

Even if the capital markets enter in a major way, if we have a megaloss or another large Andrew or two Andrews, we may still have trouble meeting society's capacity needs immediately afterward.

Having said all this, I believe that the capital markets should continue to try to sell their existing products, both to insurers and, more likely, to reinsurers. Driven by demand, they should innovate, innovate, innovate, while still emulating the coverages that reinsurance companies provide.

Another option, one that I both fear and wonder about, is having the capital markets entering the risk management field in some other way and protecting the balance sheet of a company just beyond cats. Cats would then become just a by-product.

What should insurance companies and reinsurers do? First, prepare for the worst. It's always a good idea. They should control their aggregates with a big margin for error. Do as much as you can on your own risk portfolio first, then seek as much outside help as you can get, including the capital markets, and don't be afraid of innovation because, in the long run, we're going to need it. And after all this you still have to worry a lot at night.

If I had to summarize, I would say that the future will bring us further con-

solidation in the reinsurance and primary markets, which may change the landscape with regard to the purchase of reinsurance. I think that we will see a reduction in the risk charge as more knowledge is traded between insurance companies and reinsurance companies and as the models improve, we'll see cost shifting to exposures causing the cost. Over time, states like California and Florida will be forced to allow their insureds to pay more realistic rates, both on the coast and within the state. And interior states and interior areas will pay less. Insurer portfolios will have more geographic diversity, either by trading or by what they write.

I do anticipate a larger role for capital markets. What I do not know is whether I should put a *much* in front of the *larger.*

Dennis Chookaszian

What I'd like to do is just give you a few thoughts.

First, regarding the comment that Jim made earlier about Ken Froot's finding that the reinsurance industry was charging fourteen times expected costs, that's a very important point, not because the figure is fourteen, but because it's not one. Fourteen is a big number. That's the reason why about five years ago, when people were trying to put together this whole securitization idea, many insurers said, "Hey, we don't want this to happen." Why? Because insurers liked fourteen. Reinsurers were not exactly excited about the idea of having the number come down because of securitization. Even primary insurers were not sure that it was going to help that much. What's changed is that securitization is going to become a reality and that companies must choose sides. One must decide whether it makes sense. Getting in the middle doesn't make any sense at all. Five years ago securitization made no sense. It was contrary to the best interests of many companies. Now that it's going to happen, however, you see a number of insurers jumping in to participate. That's the big change.

My second point is insurers versus reinsurers. Each carries very different implications. My company is both an insurer and a reinsurer, a situation that reminds me of Harry Truman's remark about wanting to have only one-armed economists because the two-armed variety kept saying, "On the other hand . . . on the other hand. . . ." That's very much what happens in our industry. Securitization looks good from one vantage point and bad from another. What might be good for the insurer is not necessarily good for the reinsurer, and vice versa. So you are going to see differences in the industry.

Finally, I'd like to get into the whole question of where it is going to go. And I'll give you the old crystal ball forecast, being ever mindful of the old adage, He who lives by the crystal ball learns to eat cracked glass. But, having said that, let me give you a few thoughts on what's happening in the insurance industry. Over the last five years or so, there have been some major changes taking place in the industry. Andy Grove from Intel wrote a great book on

Dennis Chookaszian is chairman and chief executive officer of CNA.

change. He talks about 10× changes that are ten times more powerful than other changes. It's like the difference between a windstorm and a hurricane. He talks about how important such changes are and about how your objective as a business is to get ahead of such changes and capitalize on the opportunities they bring. I'll give you five changes that I think are 10× changes happening in the insurance industry today. One change is the inroads that banking is making into the insurance business. Another change is the whole employee leasing business and the way it's going to change the distribution of insurance. Another is the Internet and electronic commerce and what these are going to do to the distribution of the product. Another is the outsourcing of business processes by smaller insurers to large service providers. Finally, we have securitization.

These are five transformations that are going to change our industry. In the case of securitization, the effect is going to be set against a backdrop of profound restructuring. The insurance industry is restructuring on three levels. First is a consolidation restructuring. You are going to see more consolidations, similar to what you've seen on the casualty side with CNA's acquisition of Continental and the Travelers/Aetna merger. You're going to see more of that happening, but not that much more. The top twenty property-casualty companies write roughly half the premium volume. My guess is that there will be perhaps three consolidations over the next five years. On the reinsurance side, I think that you'll see a proportionately higher degree of consolidation. The barriers to consolidation are smaller in the reinsurance markets than they are in the primary markets.

The second level is financial restructuring. The industry is no longer supported by the traditional capital base. It is now supported on the mutual company side by the advent of things like surplus notes and greater availability of capital than in the past. And, on the stock company side, you have more investor capital coming in and more of a movement to look to short-term results. You hear more talk about quarterly earnings in the insurance business than I've heard in the last thirty years or so. And the best evidence of this short-term view is the use of the term *exit strategy.* Exit strategy was a leveraged buyout idea of twenty to thirty years ago, and now you hear insurance companies talking about exit strategy. That idea is totally inconsistent with the long-term view of what we're trying to do in insurance. Suppose that you are a customer buying an insurance product that will pay you over fifty years. Then you don't want to know that your insurance company is thinking about an exit strategy. So it isn't a very good thing from a long-term perspective, but it's a reality of life.

Finally, the third level is liability restructuring. It already has started in transactions such as Equitas, the CIGNA good bank/bad bank, and the Home/Zurich consolidation. These are all various forms of liability restructuring, and securitization is nothing more than another attempt to do that. So, in short, what I think you're going to see is a tremendous set of changes that will reshape the industry, changes driven by some of these ideas that I mentioned, and the whole securitization market is going to be a major part of that.

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