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Securitization of Insurance Company Assets and Liabilities

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Summary: Securitization has become a popular method for improving returns and cleaning up balance sheets. The focus of this session is on securitization techniques insurance companies may employ to achieve these goals.

Mr. Prakash A. Shimpi: Mark Retik from Lehman Brothers will be co-managing this session with me. We will concentrate our efforts on the securitization of insurance liabilities. There have been seminars and discussions on the securitization of insurance assets. When we developed the program we had thought that we would talk about the assets because we weren't sure how far down the road the securitization of liabilities would succeed given the record of last year when several transactions were proposed and didn't occur.

But this year we've had a good record. Every one that was proposed has been done and others in the pipeline are due to close before the end of the year. Thus far, there have been no opportunities for the Society to have a discussion on the securitization of liabilities or insurance risk, so we will form a tag team and talk about a couple of related issues.

Jumping quickly into the topic, we're going to take the perspective first of the company issuing or involved in the issuance process. Why do this? Why is this of interest? Why should you be thinking about securitizing the risks that you as insurers have on your balance sheet? Mark will then address the issues from the other side. What are the investor related issues? Why is it interesting for investors to look at this? Because these two elements are intertwined, no doubt we will

touch on each other's perspectives. But we will try to stay within our focus and give you a sense of the buyer and seller ideas and issues.

We have two transactions to use as cases underlying our discussion. The first one is the residential resecuritization, popularly referred to as the United States Auto Association (USAA) securitization. There are some reasons, and we will get into that in our discussion, why Residential Re was the issuer and USAA the insurer. Nevertheless, it's called the USAA transaction. The second transaction, chronologically, but the one that I will be discussing first, is the Swiss Re (SR) earthquake fund securitization, popularly known as the SR securitization. To say that I was intimately involved with the SR securitization would probably be an understatement.

Let me start out with an introduction to the securitization of insurance risks. I will talk about the general idea of risk management within primarily the nonlife side. You might be curious why we're discussing nonlife insurance at an SOA conference. Well, risk is risk. We're all in that business, and on Wall Street there are life actuaries who are at the forefront. We are both members of the Society, and there are several life actuaries in Goldman Sachs, Morgan Stanley, and Lehman Brothers as well who, through the experience that we've had in the investments arena are now well-positioned to participate in this growing market. If you are thinking of the investments arena as a future career choice, here is an opportunity to get in on the ground floor of something that is developing and evolving quickly.

My topics include the changing industry, the concept of risk management, some of the motivations related to the source of capital, who the market participants are from a reinsurance standpoint, what it means to be a reinsurer in this evolving world, and why that leads to securitization. There are two motivations within securitization. One, issuing bonds related to catastrophes are motivated by the need for capacity to cover these risks. The second is an interesting underlying economic issue, enhancing ROE, whether there's capacity or not.

What are the changing client needs in a changing industry? Many of the clients insurance companies and reinsurers are dealing with now have a much more holistic view of risk. They're looking at a combination of financial and insurance. In the life insurance industry, you might wonder why this is even a point because all our life products are, in effect, combinations of insurance events of getting run over by a car or something similar that causes that mortality probability to be nonzero—and financial elements which are the timing issues. But in nonlife risk there is much interest in what's going on with the combination of the underlying insurance risks and financial risks. For example, you can have large corporations that feel the need to hedge the balance sheet exposure to property risks, liabilities,

interest rates, and foreign exchange, all within a combined insurance policy. That being said, the clients are in a general sense now thinking about the magnitude and mix of risks.

What's the optimal risk profile at an individual level, a corporate level, or an insurance company level? What risk management strategy should you use? Once upon a time in the life of the insurance industry the objective was to protect against the event of death and safeguard the family—the protection motivation. Now there's a major investment motivation. I don't think any of that has been dampened by the events in the market yesterday. If anything, several people may be looking at this as a good buy opportunity. The tax accounting regulatory issues now become very important. Capital requirements therefore underlie all of these considerations. The insurance industry has an interesting monopoly. I would recommend reading *Against the Gods: The Remarkable Story of Risk*, Peter L. Burnstein, Wiley, New York, 1996. It talks about the evolution of risk and risk management as a business. The insurance industry and, in fact, actuaries have long had the franchise on contingent claims mathematics and the ability to take insurance risks.

Of course, in the last 15 years all of that has changed with the evolution of the derivatives market. Whereas actuaries once dominated the risk mathematic, that's no longer the case. In terms of risk spreading and capital needs, that's what the reinsurance business is about at the next level of the insurance industry. The reinsurance industry has become the capital provider. New things have since developed. The first is alternative risk mathematics, which is the whole area of derivatives mathematics, and managing financial risks. There has been explosive growth in the derivatives business. With all this change, people are now looking at the insurance risks from the capital market side and asking, "What's the big deal? Why is this only the domain of the insurance companies and the actuaries? What happens to the insurers and the reinsurers as they look at their business? On the nonlife side—and I'll address this for the nonlife primarily because on the life side some of the financial risks are clearly recognized—for the traditional business there is credit exposure and insurance exposure. To be effective in the business, you need a customer franchise, the ability to do your underlying actuarial risk analysis, and the capacity to absorb and keep risk. Of course, that risk absorption is the function of the capital that you have available to do that. With the development of financial markets, and you've seen it already happen in the life business, you need the ability to structure across these markets, access your customers, and do the analysis to absorb financial risk as well. That has already changed the face of the life business, and it will soon change the face of the nonlife business.

What does this mean for risk management and capital? Risk management in the insurance industry is tied to the amount of capital that an insurer has available to

cover the risk. That sounds simple enough. If I have so much capital, there are some rules about how much I can write based on that capital. Some of those rules may be set by regulation, but others are set by mere prudence, which is sometimes tough to come by. Risk management in the banking business, though, is a very different type of animal. It's a passing through of risks. You certainly need a certain amount of capital to hold the risk that you're going to retain on the balance sheet, but you can leverage your expertise in risk analysis and risk management by bringing the risks in and passing them out. You don't have to hold your own balance sheet. You can see the whole explosion in the securitization market in mortgage-backed securities and asset-backed securities as a manifestation of this. Why not the insurance industry as well?

Here are some famous words from Walter Wriston: "The fact is that bankers are in the business of managing risk, pure and simple. That is the business of banking." The same can be said for reinsurers. Come to think of it, reinsurers are bankers to the insurance industry and we can take insurance risks. This is important, because if the bankers think they're in the insurance risk business and we in the insurance industry think that we're in the insurance risk business, are we both right or are we both wrong? Maybe this is part of this convergence of the industries that we're talking about.

But let's think about the dimensions of risk. First we must classify the risks. I've heard that one of the commandments, maybe the 11th or 12th, was the classification of risk: Thou shalt consider these risks insurance risks and these risks financial risks. Then there's the whole question of insurable risk versus noninsurable risk. Why is something considered insurable? Is it because we're insuring it? If something is not insured does that mean, by definition, that it's not insurable? Or does it mean that we don't have the capacity or the capital to put behind that risk? There are certainly questions with respect to the frequency of the event, the magnitude of the event, and what we call risk houses. When you're managing risk, you must be able to put it in your buckets or your houses in order to manage those pieces well. That helps you then figure out whether or not you have accumulating risks or diversifying risks.

With regard to the separability of risks, let's say I have an interest rate cap triggered only by a California earthquake of magnitude 7 on the Richter scale. I had an interest rate cap but it's locked in by this earthquake, so I have an insurance risk event and a financial consequence. Are they separable risks? Can I split that into an insurance piece and a financial piece? The accountants would like us to do that, but I don't know how we can do it cleanly. If you can't separate the risk, we have a technical term for that in our shop, which is the hairball risk. Somebody has to be able to manage and analyze that hairball risk. Don't forget all the risk management

techniques that we're talking about nowadays. Insurance risk management operates on one word: diversification. Insurance risks, in general, are aggregated in pools. The large number of risks reduces the variance of the results. Risks in excess of tolerance are sold. Risk exposure is managed in annual steps, which is a tremendous innovation over managing risks on an annual basis. If only the capital markets would learn from us there.

Investment risk management is not always integrated. And risk capacity is directly related to your capital. What's the difference between this and the banking market? Banking risk management certainly employs diversification, but it has now evolved to replication. First they split the banking risks into components and use the large number to reduce the variance of the results. Certainly risks in excess of tolerance are sold, but they have this unfortunate habit of managing their risk exposures daily. That causes a lot of marked-to-market accounting, which we in the insurance industry haven't yet adopted on both sides of our balance sheet.

The investment risk management is fully integrated with the liability side, so risk capacity is not directly related to the bank's capital. There has to be room for both of these to work. Therefore, one of the issues is capital. This is where the nonlife industry particularly started salivating. They said that if we looked at the U.S. capital markets, \$19 trillion with the daily standard deviation of \$133 billion—although I don't know what happens when you add yesterday's statistic into the equation—you expect the market to come back. You may have a deviation there, but it's not a total loss necessarily. If you have an earthquake hit the house, you don't expect the house to resurrect itself. But the problem is that the U.S. primary insurance capital and surplus for a nonlife industry is about \$190 billion, and the U.S. reinsurance capital and surplus is an additional \$20 billion. That's not much capital given the amount of losses that one can incur. But it's probably sufficient capital if you think about the fact that not all of these catastrophes are going to hit at the same time.

And if that's the case, do we really need more capital? The problem is not so much that you have too little or too much capital across the board, but that you may have too little or too much capital in buckets. The major area where the nonlife industry has seen capacity constraints is in catastrophes to a few zones in the U.S.: California for earthquakes, Florida for its hurricane exposure, and Texas just for being Texas. There is a need for additional capital in pockets. Can we in the insurance industry tap the capital market by borrowing available techniques move that may better manage our risks and leverage our expertise in underwriting these risks. What are the obstacles for new capital? As an investor I have limited forms of investment in insurance risk. There are restrictions by investment policy on what I can buy. If I'm a fixed-income investor, most of these life insurance company

representatives will have a sizable fixed-income portfolio and, because of the NAIC, issue a fairly modest equity portfolio. As a fixed-income investor, there are not that many bonds you can buy that expose you to insurance risk. There are surplus notes, debt of insurance holding companies, and things like that but, by and large, compared to the industry as a whole and to other industries, there are not many fixed-income opportunities.

There is a derivatives market that has been trying to break out of its infancy, but it hasn't gotten there yet. There are various markets for insurance risk at the Chicago Board of Trade, but there are no real securities again where this is growing. If you want to attract new capital, you have to think about the risks that new capital is willing to play with. I can issue bonds as an insurance company or as a reinsurer, but that doesn't count as the capital that you need. The regulators are not going to like that because you have offsetting assets and liabilities. But if I want to attract these investors, maybe I should give them a piece of the insurance risk, not just the overall enterprise risk. Should you separate the enterprise risk from the underlying insurance risk? After all, your management philosophy will dictate the types of risks that you can take. Even if you wanted to, can you separate them? The premiums that you use in your underlying business include the average cost of managing the business.

The enterprise risk certainly is present. When you isolate risks into buckets to sell to investors, you're losing that diversification effect. You may be increasing the amount of capital that you need to cover your risks—maybe not your own capital, but certainly capital in a general sense. Investors may want finite risk. There's only so much and, once you hit that limit, no more. I think it's a good idea for insurers to want that too, but our definitions may vary. Ultimately, if you want to get investors involved, you must have a risk they can understand so that it can be traded in the broader capital market.

Who are the market participants? There are two types of participants, hedgers and risk takers. Hedgers are subdivided into the insured, the insurer, and the reinsurer. They own the risk already, and they need to hedge that risk. Risk takers are investors and speculators. As far as the hedgers are concerned, the difference between insured, insurer, and reinsurer really boils down to the size of the capital base that you have to play with, and the diversification of risk exposure.

Which of these parties require exact hedging? What about the degrees of hedging and who needs what? I call this the insurance food chain. The insured needs an exact hedge. I have one house in New Jersey. If something hits my house, I want it covered. I want an exact hedge specific to my house and a customized reinsurance contract. I have a very low capital base and no risk diversification. I sold my

chateau in Jersey City earlier this year for a sizable tax loss, so I have no diversification. I need an insurance policy on my one house. If the insurance company sells me a policy that pays off on the average loss of the average house in New Jersey, it's not going to do me any good. I need an exact hedge. Suppose I get this from a local insurance company, not a worldwide giant. The insurance company also needs an exact hedge. Again, its capital base is fairly limited and its business is fairly undiversified. The company may have five different lines of business, but they are generally related. And they don't have a humongous risk capital. They go to a reinsurer and get a customized reinsurance contract against their own risk. If you're a property writer in New Jersey, it doesn't help you to have the payout on your reinsurance policy to be the average losses of all the insurance companies in the U.S. You want losses relating to your book. So, once again, how much risk can you take? Who's left holding the bag? Reinsurers by and large are in the best position to absorb the basis risk. We have probably the most diversified book and a significant piece of the business at an excess layer, not at what would be called the working layer, so it's useful for the reinsurers and larger insurers to act as an interface with capital markets.

Think about this in the mortgage-backed analogy. The insurance company is the origination network. You have the customer contacts and develop the business, just like the mortgage banks do today. You then go into your highly customized insurance policy with your reinsurer. The reinsurer can act as a force to standardize the insurance contract features. You have this messy, fuzzy object that is your customized contract. The capital markets want a very standardized cube with nice clean sharp edges. Somebody has to keep the difference, that basis risk. The reinsurer acts as a distribution network to transfer risk to the capital markets.

What about the risk takers? Mark is going to address the investor issues, but you basically need both investors and speculators to develop an active market in traded insurance risks. We have seen evidence that pension funds, mutual funds, insurance companies, and other corporate investors are actively involved in this. Roughly, 40% of the buyers for the issues have come from the life insurance industry, so that indicates that even if none of you in this room have been involved, there have been many others even in this business, which means you should considering looking into it too. Speculators operate to enhance the efficiency of the market. How can an investor understand this product? How does the investor know if an insurance-linked investment is fairly priced? We could go into the theory of complete and incomplete markets, which is probably not what we want to do in this forum.

Suffice it to say, in the capital markets, one has gotten used to transparency of pricing. You can look at other instruments in the capital markets and basically

develop the price of your security. In the insurance market, and particularly in the reinsurance market, it is difficult to get to that because the price of risk is actually a function of the risk appetite that I may have as a reinsurer versus somebody else as a reinsurer, depending on the amount of business and the types of business. Are investors able to evaluate the insurance risk? Are there insurance risk models?

Many years ago, when I first got in this business, I was talking to somebody about prepayment models. It was tough to come by, because everybody was yielding 12-year prepaid life. Nowadays you can go to any grocery shop and buy your own insurance risk model. They're available everywhere as a prepayment model. Today there are no insurance risk models that you can get off Bloomberg, but maybe one day there will be. Until then, how do you make investors comfortable that the risks are adequately underwritten? In terms of what the future holds, here are the techniques one looks at for capital management for the insurance and reinsurance industry: self-insurance; traditional reinsurance; financial reinsurance, which is a mixture of commercial banking and insurance and helps you manage your cash flows; surplus notes; bank-financed reinsurance; securitization; derivatives; and corporate capital (debt, equity, and so on).

Who can best deliver to the client? Clients require risk management backed by capital and diverse positions of reinsurers and bankers, two groups that are working hand-in-hand in developing this market. As the market evolves it will be interesting to see how those roles also evolve.

What are the issues related to their relative positions, such as the risk appetite or credit quality? Reinsurance companies are used to keeping risk in their balance sheets. Banks are not used to that, but they do have insurance operations that are. The primary motivation for the securitization of catastrophe risk has nothing to do with all the other economics we talked about; it's the flight to quality and the credit risk. The other issues include capital sources, which are related to the credit risk, and the regulatory ease of being able to do this business.

There's an inevitability, as I said before, of joining forces initially. Ultimately, will banks become reinsurers or will reinsurers develop as banks? Years ago, traditional reinsurers retained the insurance risk. Then they started to hold financial reinsurance. When I say reinsurer, I mean the reinsurers and the very large direct insurance companies as well. So for financial reinsurance, they decided that they couldn't just consider insurance risks alone, but also financial risks. All of these things are kept on your balance sheet. We're seeing forces leading to writing more business that you can pass through to the capital markets.

Let's review the catastrophe (CAT) bond example. What are the motivations for a CAT securitization from an insurer's standpoint? First, you can diversify the capital sources. If you are subject to peak risks, catastrophes, earthquakes, hurricanes, and so on, when that happens you have to pay for losses. The major question becomes, do you have the wherewithal to pay those losses? You need enough funds not only to pay those losses, but also to continue writing business in the future; otherwise you're out of business. You want to have sufficient capital sources that don't dry up when you need them. You might wonder, "Why don't I just go to a bank and get a standby letter of credit and draw on it? After the catastrophe if you need to go to the bank to negotiate and get the funds from the standby letter of credit, depending on the magnitude of that loss, it could become a tough negotiation.

The credit quality of reinsurance is a grave concern from the standpoint of the direct writing insurance companies and the large corporations that work directly with reinsurers. Let's say I'm a AAA insurance company, and I only have two or three AAA reinsurers to go to, with the rest being AA, or A. If I'm a AAA insurance company and my reinsurer doesn't have the same credit quality, I am now taking a tremendous amount of credit risk. When the event occurs I may not be able to count on that money to show up when I need it. Using capital markets mitigates that risk. As you may know, the reinsurance market did respond to the lack of catastrophe capacity many years ago by forming the Bermuda Catastrophe Reinsurers. That was additional capacity, but it was primarily funded through equity once again, not through the debt market. Since financial markets are a large source of capital, the thought is that, if only we can find a robust securitization structure, the risk appetite can be found and the whole market will unlock itself. In developing this structure, and I've been involved in this for the last three years, there are some very basic ideas that we adopted to translate a finite segment of underwriting risk to the capital markets.

First, we have to repackage the insurance cash flows into bond cash flows; otherwise the bondholders will not understand it. Then you have to make sure that the bond flows are sufficient and insurance cash flows are customized to provide acceptable risk to bondholders. Third, you don't want to create a new type of security that will be difficult for investors to put in their portfolio, so you want to look at the various types of security models that are out there. The ones that are more commonly talked about are the asset-backed models, which is why you see tranching in these securities, and the high-yield model, which is why you see the loss of these bonds being related to credit losses on high-yield bonds. Ultimately, you want to deliver it in such a way that, when you buy one of these things, you know what the regulatory, accounting, and tax issues are as well. That makes it easier for investors to buy it.

The mechanics of CAT bonds is very simple. There are three transactions that occur. First, in looking at the exposure, this is a real risk to the carrier, which is the reinsurer in this case. You have your traditional reinsurance contracts. Actually, they are traditional in form but there may be some nontraditional elements in them because we have a customized contract that goes to the bondholder. This has not been common so far for the nonlife side, multiyear reinsurance policy and some contract features that get you from the beginning to the end. But, by and large, this is a conventional reinsurance contract. As far as insurers are concerned, they have their conventional accounting and don't have to worry about the issues that might arise if they had to do it in some other form.

There is another step from the reinsurer to the special-purpose company. I mentioned Residential Re earlier and SR earthquake fund, which are both special-purpose companies that have been set up only to be involved in this transaction. There is a retrocession to this special purpose company, so once again this is a reinsurance contract, but there may be differences between what happened in the first reinsurance contract and the second reinsurance contract. If you have a very large company, by the way, you can skip this process because you can go directly from the exposure to the special purpose company. In the case of the Swiss Re Group, when it wants you to issue it or be involved in the transaction, basically it has no individual insurance company identified. It was the old portfolio exposures, and those were all backed by reinsurance contracts anyway.

The special-purpose company is thinly equity capitalized so it's set up in a jurisdiction where rules allow a more diverse capital base. You have the special-purpose company that now is able to write this business on the basis of the capital that it receives, which is primarily bond proceeds from the bondholders, and so it is the issuer of the so-called CAT bonds. It's not complex at all.

What are the key parameters of a CAT bond? There is a period of loss exposure—one-year losses or multiple years of losses. For the nonlife business, it's more difficult than the life business because with a one-year loss you have a certain development of your cash flow. On a multiyear, you have issues of policies canceling out and new policies coming in, and those issues can complicate matters.

The next parameter is the bond maturity—a one-year bond, a two-year bond, and a ten-year bond. The one-year bond is the easiest one to do in terms of relating the exposure to the bond maturity, but there are issues with that as well. How much of the bond's principal is exposed to loss? Some of it? All of it? None of it? That is a tremendously important question as far as the issuer is concerned because that relates to how much money you get as an issuer if the event occurs. If you have no principal loss you're not going to get much money if all you have is a coupon to

play with, you do need principal exposure from the bondholder in order to pay the losses.

Is the coupon type fixed or floating? What's the frequency or magnitude of a peril type? How diverse are the perils in the bond? And what's the geographic diversification? The SR bond demonstrated that the markets will allow us to issue a bond related to a single market, which was a question mark before. In the Georgetown-St. Paul Re deal, there was \$52 million in tranche A of which \$25 million was exposed for loss and \$25 million for tranche B, both interest and principal at exposure, based on the actual losses.

In Switzerland, there was a humongous issue size, 400 million Swiss francs, but the risk capital was only 9 million Swiss francs. It wasn't the CAT bond or the type that we're talking about, but it did have losses based on the amount of damage that a hailstorm could do to automobiles on a single day with principal and interest there as well.

With the Swiss Re CAT bond, the Swiss Re capital markets and Credit Suisse First Boston placed \$137 million of these catastrophe bonds in the capital markets. The sponsor was Swiss Re. The issuer, the special-purpose reinsurer here was SR earthquake fund. The risk in this bond was a California earthquake and the cover that Swiss Re was able to buy on the basis of this bond was \$112.2 million.

The bonds can extend to three years if the earthquake hit at the end of the second year. Because this bond does not relate to the Swiss Re owned book of business, this is where the basis risk issue comes in. The losses are based on an index that is generated by the property claim service (PCS). This is a clear example of basis risk between Swiss Re's own book of insurance risk and the index that has been taken. The original design was to place \$115 million of securities with \$75 million of it at risk, but there was such overwhelming demand for the bond that the risk piece was increased. I will not go through the exact structure here. The thing about this bond that was very important and moved the market to develop significantly was that a significant risk was taken in getting this bond rated on the merits of the underlying risk. So the rating agencies, in this case, Moody's and Fitch, were very involved in looking at the underlying models, the causals, and so on, and that got the bonds rated. The bonds were then taken to the NAIC and the Securities Valuation Office (SVO) where they are still in the process of getting the investment rating. But that's the ruling.

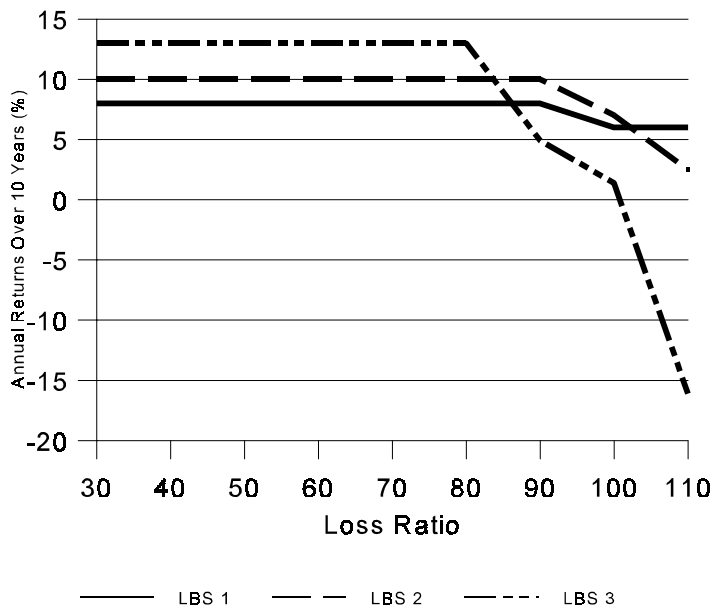
That CAT model was based on credit risk, but there's a motivation for securitization of the insurance industry that has not yet emerged. The same motivation that exists in the asset-backed market, and that is enhancing your returns. If you found the risk

in the market, how does that effect your own risk/return profile? You are passing through risks, so if you get any money in the process it has to be good for you. Let's take a very simple example. I have a bond with three tranches. Equity is \$10 million. I have \$40 million in tranche 1, \$25 million in tranche 2, \$25 million in tranche 3. Tranche 1 is 100% principal guaranteed, with a minimum interest rate of 6% and a maximum interest rate of 8%. Tranche 2 has a 50% guarantee. Tranche 3 has no guarantee. I'm going to do an eight-year retrocession but a bond with ten years. After the last event occurs, it takes two years for all the losses to come in.

This is unusual for the life industry, but let me ask you to think about the nonlife world where they base everything on loss ratios. Chart 1 is a continuum of loss ratios. If I say a particular loss ratio number, that's the same loss ratio that's going to occur every year for ten years. If I include the bonds, I find that in this particular stylized example, the first bond performs well to a 90% per annum loss ratio, and then it goes down to its minimum above that. We see similar patterns in the other tranches, as well. Everything looks fine until an 80% or 90% per annum loss ratio whereupon it starts going downhill.

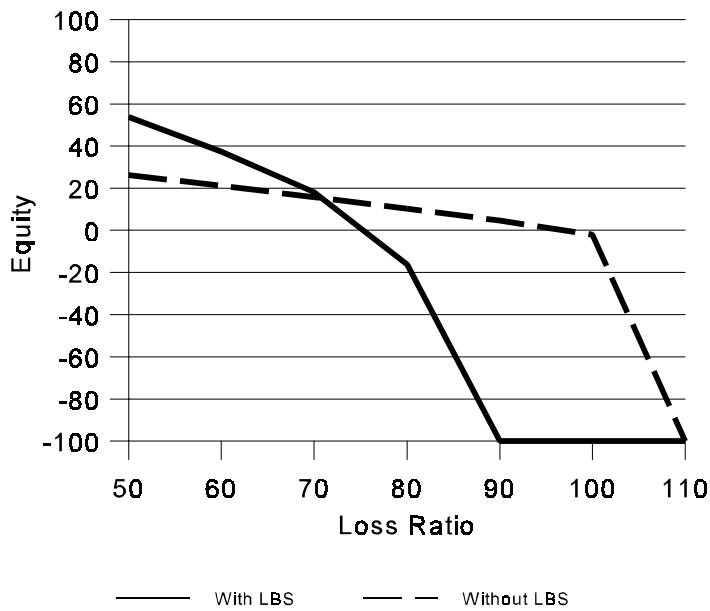
Now look at the equity returns (Chart 2), which is the more important piece. Without the bonds, I have fairly decent returns up to 80% loss ratio, and at the 90% level they start going bad. It should be no surprise that, with the bonds, I do really well at the lower loss ratios and a lot worse at the higher loss ratios. It's not a surprise because I changed the risk/return profile. It's easy to demonstrate on the nonlife side, but I'm not sure how to demonstrate on the life side. When an insurer writes its business, it will assume perhaps a 70% loss ratio per annum. If I want to pick a number, this is where I'm instructing the underwriters to look at the maximum possible loss (MPL) that they can get. In reality we're writing our business at the 50% level, but if I'm writing my business at 50% level and I am looking at the 70% level. For a margin above pricing, this dotted line which is without hedge, covers me for this area between 70–100% I don't feel I'm ever going to reach. What I want to do is use this 70% loss ratio as a pivot, accepting the risk of lower returns above that mark in exchange that area at the top. I am now boosting my potential in the area where I expect to be, which is the 50% mark. I'm literally doubling the ROE on the piece of the business that I'm selling now. From an issuer's perspective, that's a very powerful argument. The problem is getting to this level of analysis in your own book. It's not always easy to do. But we're heading in that direction.

CHART 1
LIABILITY-BACKED SECURITY ANNUAL RETURN



Source: Swiss Re New Markets

CHART 2
EQUITY ANNUAL RETURN



Source: Swiss Re New Markets

Mr. Mark G. Retik: Prakash talked in general about the securitization of insurance risk, and then focused on issuers of CAT bonds. I will focus on the investment side of the market, specifically the USAA/Residential Re transaction. We are focusing on USAA because it was a watershed transaction in the CAT bond marketplace for a number of reasons. It was the largest securitization of catastrophe risk, in this case hurricane risk, to date. It was a \$477 million issue. I believe it was also the first to offer a unique structural element called principal protection, which has been modified in various forms in subsequent issues. And, finally, it was the first to attract a broad base of investors.

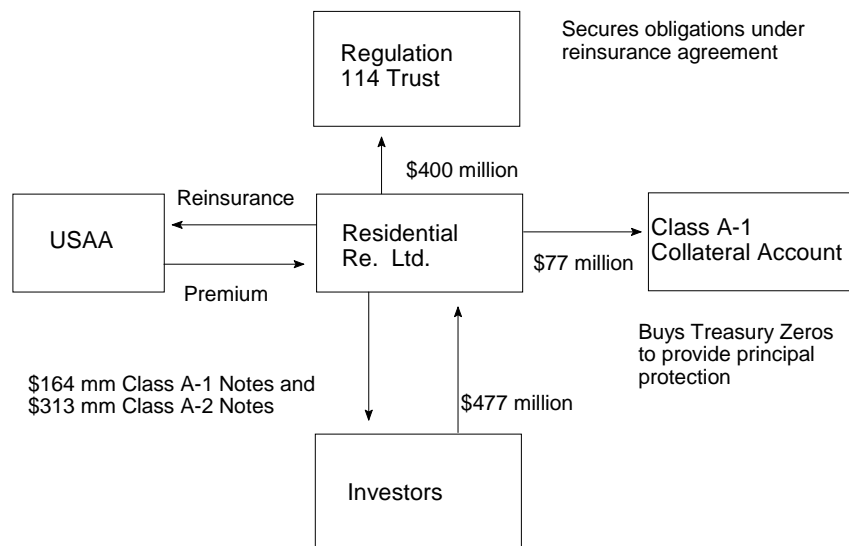
It's impossible to distance yourself from the issuer's side perspective even when your focus is on the investment side. First, I'm going to talk a bit about what the objectives for both USAA and investors in this transaction. Second, I'll talk about the structure of the transaction and how the special purpose of the insurance company, Residential Re, has been set up to accomplish the objectives. Third, I'll spend some time on hurricane modeling, which is a technology that has become extremely important both to the nonlife insurance and reinsurance industries, as well as the burgeoning CAT bond market. Fourth, I'll briefly talk about the rating agency and regulatory perspective, the NAIC perspectives on this market from an investment perspective. Fifth, I'll highlight the valuation of these notes relative to comparably rated fixed-income securities. And sixth, I'll highlight the composition of the investors buying these securities.

USAA had a fundamental objective in issuing these notes. Plain and simple, executives were striving for a long-term, low-cost source of reinsurance capacity for hurricane risk. They had a view that the traditional reinsurance markets would not be able to satisfy this objective as well as the capital markets. I think Prakash effectively showed the relative magnitude of capacity from the capital markets to the reinsurance markets, which speaks to their view. They were looking to diversify their sources of reinsurance capital, establish a long-term source of renewable capacity that they wanted to renew year after year at a reasonable price, develop a broad base of investors to continue to replenish their supply of reinsurance capacity, and specifically, obtain protection from hurricane losses along the U.S. eastern seaboard for a \$500-million layer between \$1 billion and \$1.5 billion.

Investors, on the other hand, had a simpler set of objectives. They were, as many investors are, looking for a yield. They wanted more yield than they could get from comparable investments on a risk-adjusted basis. They wanted portfolio diversification and the ability to push out their efficient frontier, if you will, in order to obtain a better risk-adjusted return. And finally, a subset of the investor base wanted to be able to participate in pure catastrophe risk absent the risk indigenous to other securities markets.

Chart 3 shows how this transaction was structured. What I'd like to do is focus on a couple of places. First of all, the relationship between USAA and Residential Re. USAA, in Prakash's terms, is the sponsor company. Residential Re is a Cayman Islands-based special-purpose reinsurance company that was set up exclusively for this transaction. There is a reinsurance agreement between the two. USAA is ceding hurricane risk to Residential Re; they're paying a premium and they're receiving reinsurance protection in exchange. Where is that reinsurance protection coming from? It's coming from investors who capitalize this otherwise thinly capitalized offshore specialty insurance company with bonds, and the proceeds go to collateralize the reinsurance obligation or the reinsurance agreement that USAA has with Residential Re. You can view this fundamentally as a pass-through provided by investors. You can look at it as retrocession by Residential Re, which is reinsuring USAA.

CHART 3
STRUCTURE OF TRANSACTION



Source: Lehman Brothers

Two classes of securities were issued to investors in exchange for the proceeds. These elements at the top of Chart 3 are structural elements that were necessary in the transaction. To comply with accounting, the Regulation 114 trust enabled USAA to receive a credit for reinsurance based on a New York state regulation. The class A-1 collateral account was used to afford the class A-1 investors with principal protection, which I'll speak about in a second. There were two sets of securities, or two tranches, that were issued: class A-1, which offered principal

protection, and class A-2, which were fully principal at risk. Because of that the full face value of the class A-2 securities went toward providing risk capital whereas only half of the A-1 securities went toward capital.

Instrumental in the success of this transaction was the fact that we were able to get ratings on these securities from all four major rating agencies. The class A-1 was rated AAA, and the class A-2 was rated BB. The A-1 was priced LIBOR + 273¢ and the A-2, LIBOR + 576¢. We'll get back to pricing when we talk about relative value to give you a sense of how these were priced relative to other securities.

One last piece here is the USAA co-participation. This was a structural element designed to ensure that investors felt comfortable that USAA would not be subject to moral hazard in this transaction. As it turns out, there was \$500 million in protection. There was actually \$400 million in protection, total risk capital, and a 20% coinsurance agreement arrangement with USAA. They would share pro rata losses between \$1-1.5 billion levels.

Let's examine the nature of the reinsurance agreement. Given the choice between receiving an exact hedge or a partial hedge where USAA or someone else would have to assume basis risk, USAA felt it was very important to receive an exact hedge in this transaction. In fact, we were able to structure the transaction in such a way as to provide USAA with that exact hedge. The investors were subject to the exact underlying policies that USAA had issued: homeowners, dwelling, condominium owners, pleasure boat, and inland marine floater. These were the exact USAA policies that were evident in the transaction. USAA's exposure was in the 20 states along the U.S. eastern seaboard beginning from Maine and going all the way down through the Gulf Coastal region to Texas. The losses themselves were USAA's own policy losses and loss adjustment expenses, so the agreement was actually structured to protect USAA almost exactly from losses. That was a key feature for USAA to go through with the transaction. How do the notes mature? It depends on what happens. It's a contingent maturity. If there is no qualifying hurricane, then both tranches of the securities mature after one year. It's a one-year exposure period. They were issued on June 15, 1997, and would mature on June 15, 1998. If there is a qualifying hurricane and the losses turn out to be less than \$1 billion, then both would mature at the end of 18 months as opposed to 12 months. Again, that's because there's a six-month lag in order to true up what the actual losses would be.

Finally, if it's determined that losses exceed \$1 billion and exceed the attachment point or trigger, there's going to be some principal impairment, and the A-2 securities, which were principal at risk, will mature at the end of the extended claims period. The A-1, which are principal-protected extend for ten years.

Principal protection in a sense is a funny term. When you receive protection for something, there's always something you have to give up in the process. In this case, we felt that investors would be willing to give up on extension in exchange for principal protection. If there are losses greater than \$1 billion, the A-1 security holders would get all of their principal back, albeit in ten years. We're able to structure that through use of a purchase of U.S. Treasury zero-coupon bonds that were priced at \$50 and matured at par at the end of ten years. The unknown is the hurricane season which runs, according to the National Hurricane Center, from June 1 to Nov. 30. The peak hurricane season, however, really lasts from Aug. 15 to Oct. 31. As of Oct. 28, there have been seven hurricanes, none of which registered as a qualifying hurricane. We had only one that actually hit landfall. I think we're in the right shape to endure for the rest of the maturity.

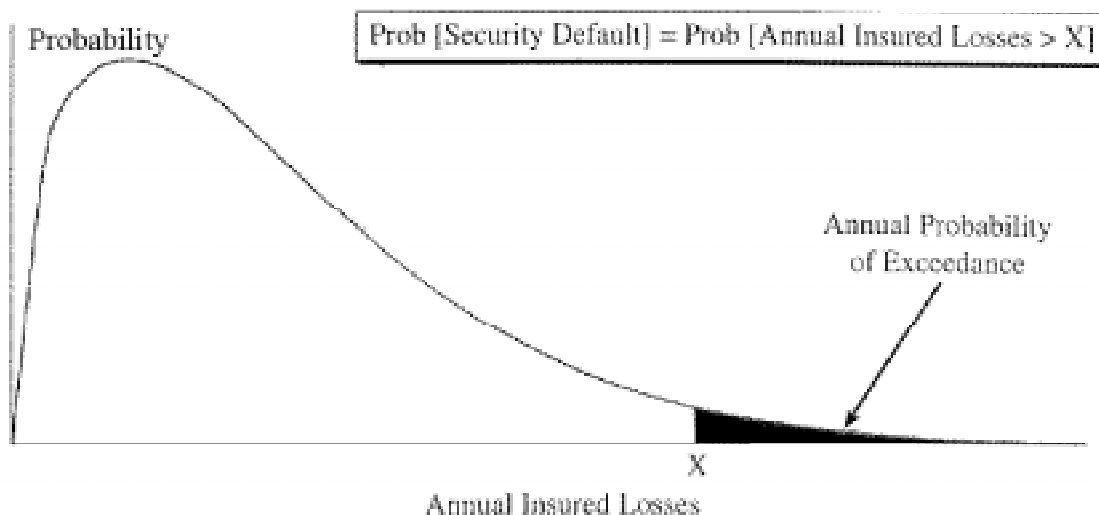
We expect the first scenario to be the one that's relevant here. That's nice from an investor perspective but the larger picture is that, for borderline investors who decided to invest, it will provide a level of comfort that will be necessary to continue to move the market forward. What are we trying to model and how are models used? Over the last five years the level of sophisticated technology to model natural hazards has increased sharply. That has enabled insurance and reinsurance companies, as well as investors, to assess catastrophe risks more precisely. In fact, the modeling technology has been instrumental in enabling investors to gain comfort with these types of investments. What does a model do? From an investor perspective, it models the probability that their security will default. How do you get there? It's important to note that there are two elements to this determination. One is the hurricane behavior itself, and the second is the sensitivity or susceptibility of insured property to hurricanes.

By combining hurricane event simulation and property susceptibility, you can generate a damage distribution, which is really no more than a probability distribution of damages. There are a variety of simulation techniques used to get to that point. For the modeling companies we worked with on this transaction, I used the Monte Carlo technique. You can then create an insured loss distribution by superimposing the specific insurance policy provisions, deductibles, and exclusions on the damage distribution. Again, it's a probability distribution for insured losses. Finally, superimposing the insurance agreement that's part of the transaction enables you to conduct a security default analysis. That again is a new probability of distribution adjusted for insurance policy provisions and the reinsurance agreement that's in force.

Chart 4 illustrates what such a probability distribution could be. This wasn't specific to this transaction. I think I used a Weibull distribution to show that you have a long tail. For a given attachment point X , the probability that your security

will default under that type of a reinsurance agreement is just the area under the curve to the right. It's a fairly simple concept. We call that in this lingo the "annual probability of exceedance," so for our example the X would be \$1 billion.

CHART 4
HURRICANE MODELING



Source: Lehman Brothers

The company that we used with respect to this transaction was a firm known as AIR, Applied Insurance Research, located in Boston. I am grossly oversimplifying a highly sophisticated, highly technical scientific exercise that these firms, AIR among others go through to generate these loss distributions. The whole modeling technology fascinates me because it's a highly interdisciplinary science. You have people employed at these companies from a wide variety of disciplines. AIR, for example, has actuaries, statisticians, meteorologists, civil engineers, and, for the earthquake modeling, seismologists. If you think about the type of problem that they're trying to solve, it's apparent that they would need that level of expertise in those very different areas to make their product work.

Since the turn of the century, there has been a concentration of land-falling hurricanes in Florida and the Gulf region. A variety of hurricanes that have taken place offshore, but we are only concerned with the land-falling ones. Hurricanes in general can be measured in terms of both their frequency and their intensity. There is an industry-accepted scale known as the Saffir Symptom scale that measures hurricane intensity in terms of wind speed. A qualifying hurricane has to be at least a category 3. In other words, it has to have at least 111-mile-per-hour winds to qualify under this reinsurance agreement. Hurricane Andrew, the largest and most devastating hurricane to hit the U.S. in history, was a category 4 hurricane. A key

attribute of the models is that you're able to generate some analysis that is helpful to potential investors in CAT bonds. Table 1 shows how we've looked at a variety of different hurricanes and their losses, both on an industry basis and just for USAA. Hurricane Andrew, the most devastating hurricane, while generating \$15.5 billion on an industry basis, generated only \$555 million in losses to USAA. We're talking about protection in excess of \$1 billion. From an investor's standpoint, only a hurricane almost twice the strength of a Hurricane Andrew could trigger a possible loss of performance.

TABLE 1
HURRICANE MODELING—IMPACT OF RECENT HURRICANES

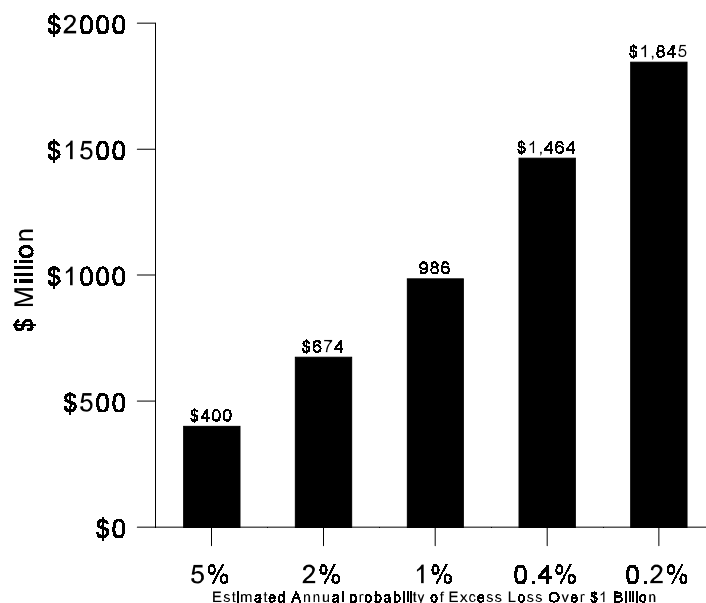
Year	Hurricane	Losses (\$ millions)	
		USAA	Industry
1983	Alicia	18	676
1985	Elena	13	543
	Gloria	11	419
1989	Hugo	105	4,200
1992	Andrew	555	15,500
	Iniki	26	1,600
1995	Opal	67	2,100
	Erin	31	375
1996	Fran	73	1,600
	Bertha	14	135

Source: Lehman Brothers

Chart 5 displays simulated USAA hurricane loss probabilities. On the Y axis we have annual insured losses. On the X axis we have the annual probability that losses will be exceeded. This is close to \$1.5 billion, so this analysis would suggest that there's about 1%, maybe a 0.9%, chance that the trigger will be reached. There's basically a 0.4% chance that the entire layer will be taken out by the experience.

These models are great because you can generate so many interesting types of analysis that can be helpful for any number of interested parties. Table 2 is what I call a stress test, where we simulate the largest possible hurricanes that can hit various regions and assign probabilities, based on that hurricane, that the trigger will be exceeded. I guess the one number that jumps out is Florida. You have the large simulated hurricane, a category 5, that can generate \$7 billion in USAA losses. Obviously, that would blow through the trigger, but if you look at the probability, there's only a 0.01% chance that's going to happen. Again, this is another type of analysis that an investor can use to assess the risk involved in purchasing these securities. That's modeling.

CHART 5
SIMULATED USAA HURRICANE LOSS PROBABILITIES



*Based on 10,000 annual scenarios incorporating more than 17,000 hypothetical hurricanes in the covered states.

Source: AIR/Lehman Brothers

TABLE 2
HURRICANE MODELING—LARGEST SIMULATED HURRICANES BY REGION

Region	Landfall Location	Category	USAA Est. Loss (\$MM)	Est. Annual Probability of Exceedance
Northeast	Staten Island, NY	4	\$1,994	0.18%
Mid-Atlantic	Atlantic, NC	4	1,625	0.34
Southeast (ex-Florida)	Edisto Island, SC	4	800	1.54
Gulf (ex-Texas)	Long Beach, MS	4	530	3.22
Florida	Dania, FL	5	7,122	0.01
Texas	Armstrong, TX	5	844	1.39

Source: Lehman Brothers

I'm going to touch briefly on rating agency criteria. I mentioned that an important aspect of the transaction was the fact that we were able to get all four of the rating agencies to rate the transactions. This is the type of analysis that the rating agencies had to employ in order to arrive at their ratings. The structural analysis is more of a traditional analysis that they would use in a structured transaction. The insurance risk analysis, however, was new to them, and it took them quite a while to develop

the in-house expertise in partnership with the modeling firms to become comfortable their ratings. The type of analysis is validating the models, looking at the quality of the insurance data, stress testing, etc.

As Prakash mentioned before, there has been some NAIC activity regarding CAT bonds. Basically, the NAIC has decided or is in the process of deciding that for CAT bonds that are rated and monitored by nationally recognized statistical rating organizations (NRSROs), these organizations will receive debt treatment. That enables you to receive more favorable risk-based capital treatment. If it's not rated, you have equity treatment, and that's 30% risk-based capital. Getting the securities rated by NRSROs was a welcome incentive to attract life insurance company investors.

From an investor's perspective, these securities offer two sources of relative value. One, as a stand-alone investment, they offer a risk-adjusted yield that is well in excess (at least at the time that they were issued) of what was available from other fixed income markets. Two, they offered diversification benefits. The securities were subject to hurricane risk and not subject to the systematic risks associated with the other fixed income and equity markets, so from a portfolio management perspective, it allowed a more advantageous point on the efficient frontier. You can compare on a relative value basis these bonds with comparably rated corporate bonds. This is the punch line: both types of bonds trade on a spread-to-Treasuries basis. Basically, the Treasury securities are risk-free assets, so the spread is the risk or yield that an investor can take in excess of a risk-free rate. The securities were rated BA-2 by Moody's. If you compare the Res Re bonds, both the class A-1 and the class A-2, with other comparably rated corporate bonds, you can see that they offer yields well in excess of what an investor can get otherwise. An investor can get about 115 basis points off a short-term Treasury on a BA-2 credit, yet the Res Re bonds offer significantly higher yields. This is I think probably the most compelling reason for investors to participate. It allows many of them overcome their fears, and uncertainty associated with catastrophe risk.

I mentioned two sources of relative value. The first is extra-risk-adjusted yield, which this analysis illustrates. Second, these bonds are subject to hurricane risk only. There are no market risks associated with the bonds. It's somewhat debatable but fundamentally it's pure catastrophe risk. If you look at the securities issued by property and casualty companies, they contain both debt and equity, catastrophe risks as well as systematic risks associated with the securities markets. These notes are devoid of those risks. There are also no principal agent risks and you don't have the risk that equity holders can agree to restructure debt in a way that's unfavorable to bondholders.

For these reasons, CAT bonds offer superior diversification benefits. The returns are uncorrelated with returns in other markets. The PCS index is a measurement of catastrophe loss experience for the industry. If you correlate that with the S&P 500, there's only a 14% correlation, which we deem to be insignificant. And that comparison looks at a portfolio of ten reinsurance companies' securities stocks that have a 0.83 beta with the S&P 500. Clearly, adding some uncorrelated assets to a portfolio can increase expected returns and reduce risk. No matter how you measure it, whether it's sharp ratio, or what have you, your efficient frontier is pushed out. Risk will be reduced more dramatically by buying one uncorrelated asset rather than many assets with some correlation to the portfolio.

Who's buying portfolios? There was significant insurance company participation, particularly in a principal protected tranche, primarily because life insurance companies could get more favorable treatment from a regulatory perspective. What was the demand? The bonds issued were in the face amount of \$477 million. There were actually orders for more than \$1 billion in both the class A-1 and class A-2. They were highly oversubscribed. Unfortunately, we had to cut back on allocations, but it certainly is an indication that there's going to be substantial future interest in the investor community for these types of securities.

In wrapping up, what were the success factors in the transaction? As Prakash mentioned, having a bond-like structure was incredibly important. We were able to offer attractive pricing. The availability and sophistication of the modeling technology helped us and investors. The risk was pure and uncorrelated with other risks. We were also involved in a significant investor education campaign, which continues to educate investors about this market.

What's our outlook? We think that the catastrophe-linked bond market will grow significantly in the years ahead, primarily as a result of the need by the insurance industry for additional reinsurance capacity and investor desire for excess uncorrelated returns. Spreads on these securities will tighten considerably as the market matures. In fact, I just checked this morning and the class A-1 tranche has tightened. It was issued at LIBOR 273, it's tightened to LIBOR 50. As hurricane season comes to a close, A-2 has tightened from LIBOR 576 to LIBOR 100, which also offers the issuer some opportunity for lower funding costs. Finally, catastrophe risk is just the first step. I think that in the future you'll be seeing a variety of other types of insurance risks being securitized in the future.

Mr. Steven P. Miller: I want to challenge the statement you made that because hurricanes are only \$555 million for USAA, it would take almost twice the strength of Andrew to reach \$1 billion. If Andrew had gone 30 miles north, it probably would have gone through \$1 billion and maybe more.

Mr. Retik: You're absolutely right. If it had hit Miami, bonds would be out of the money. But again, there's no definitive way of analyzing these securities. You have to look at it on a scenario-by-scenario basis and that's just one way that some people look at it.

Mr. Jim Ellis: Was Residential Re set up only for this transaction as a requirement by both the investors and USAA? Who required it to be set up only for this transaction, and will it be used for future transactions with other companies?

Mr. Retik: It was a special-purpose reinsurer set up just for this transaction. The requirement was to preserve efficient economics for both the issuer and investors. The domicile selected was the Cayman Islands, which has favorable tax treatment.

Mr. Shimpi: Likewise for the SR earthquake fund. It wasn't a requirement by investors or by the issuers specifically; it was a requirement, in effect, on the structure of getting the transaction done.

Mr. Shimpi: I didn't go into the details of the rating of the Swiss Re-related bond, but there was no full principal protection, so it didn't get a triple gain by virtue of the principal being protected. Had we drawn this graph for that, it might have been a little clearer.

From the Floor: Is Moody's direction generally referred to as the credit component as opposed to the risk component?

Mr. Shimpi: No, I don't think that's accurate. But they do have some guidelines.

From the Floor: Did you compare the cost of doing the securitization to the cost of transferring risks through the traditional markets?

Mr. Shimpi: Absolutely. This was, and remains, a major issue. One could argue, for example, that Swiss Re could have done this transaction cheaper in the capital market. However, the argument fails because the question is, whom would we reinsure with? We retain just about all of this catastrophic exposure ourselves, so you can come up with a theoretical price, and, if you add brokerage costs you are almost there. If you try to do it, you will not find the market. USAA is using markets to be competitive, but their issue is also the number of insurers in their program. Are you trading off the cost for the credit risk?

Mr. Retik: Right. There's very low credit risk for USAA. The reinsurance agreement is fully collateralized in the Regulation 114 Trust, which I showed before. The money in that trust is invested in short-term, high-quality investments.

So they have virtually no credit risk while diversifying their sources of reinsurance capital. USAA was a pioneer in the sense that it was looking to break open this market and issue the watershed transaction. Given the softness in the reinsurance market, USAA might have been able to do so. I don't know for a fact, but it might have been able to receive more favorable pricing from traditional reinsurance; however, USAA was more long-term-oriented, and wanted to realize the value associated with getting investors comfortable with their risks. USAA has done an excellent job in doing that.

From the Floor: Did the CAT futures market pick up after these were issued? Do you see the two markets coexisting or does this replace that? Also, what type of liabilities are in pipeline now that you're resecuritizing in the future?

Mr. Retik: You can buy catastrophe derivative contracts on the Chicago Board of Trade, which is what I believe you were alluding to. Activity in those contracts has picked up over the course of the year. It's unclear though whether that pickup is in direct relation to issuance of these types of securities or whether it's just traditional reinsurance companies looking to hedge their own books of business, so I don't have the answer to that question. Activity has picked up, although the general level of creating activity on those contracts in that market is still quite low.

Mr. Shimpi: It was serious for us. We have been involved at Swiss Re in the Chicago Board of Trade market, and we kept our eyes and ears open when we issued our earthquake fund security. Because it was based on the PCS index, we wondered whether investors would seek to hedge their exposure. We saw some inquiries in the market, but nothing close because one of the problems in that market is the mixed match between buyers and sellers. Inquiries picked up, but we didn't see the execution or the follow-through.

In terms of the second question, what deals are in the pipeline on a real transaction-to-happen basis, there are several deals in the pipeline. Some non-U.S. exposures that you might be reading about in the press have been talked about. There are also discussions about nonpeak risks looking at automobile insurance, for example, and there might be a study of homogeneous risks along the lines of asset-backed securities. And for those of us who have reasonable life insurance operations, there are also investigations into what we might be able to do in that sector. But it's a new and working market, so anything you can think of is candid enough when you figure out there are tough modeling problems getting to the risk in the first place. There are also education issues. But the forces are there, and there is enough emphasis in the marketplace. We were very happy to have the USAA transaction occur because it created a whole class of investors who wanted to buy the Swiss Re

deal to diversify. The more these transactions occur, the more appetite you will see.

From the Floor: I noticed the large difference in the spread between the A-2 and A-1 classes, yet they still received the same Moody's rating. I was wondering if Moody's doesn't understand the risk between the two.

Mr. Retik: No, this is hard to illustrate. The class A-1 bonds technically were rated AAA by Moody's, but it was only the principal component that was rated. There are no corporate bonds out there whose principal only has been rated, so there's no basis for comparison. Yet the underlying risk is still similar, and we can make the argument that it's a AAA bond, yet it's offering you 300 basis points over. You can look at it in a variety of different ways.

Mr. Shimpi: The difficulty is in getting the group with the structure, which, if you think about it, is fairly straightforward. The AAA rating comes.