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The "Art" Of Alternative Risk Transfer

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Summary: The property and casualty industry for a number of years has been exploring and developing techniques using capital markets to help with capacity issues.

In this session, the panelists briefly discuss the factors which led to the development of alternative risk transfer transactions in the property and casualty markets and review the techniques used to transfer and trade insurance risks within the capital markets. These include derivatives, securitization, and contingent equity. Current alternative risk transfer activity to date, such as Chicago Board of Trade instruments, catastrophe bonds, and equity puts are covered, along with the perspectives of the rating agencies on these transactions. The panel concludes with

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Note: The charts referred to in the text can be found at the end of the manuscript.

a discussion of possible alternative risk transfer opportunities in the life and health markets.

Ms. Mary A. Rohe: Alternative risk transfer (ART) can be defined as a financial or risk management program that integrates techniques from the reinsurance and insurance marketplace with techniques from the banking and/or capital markets. Another way of saying that is, it is a way of transferring insurance risks to the capital market. There's been a lot of ART activity recently in the property and casualty (P&C) industry. We have an expert panel that's going to review the developments in this area.

The ART marketplace developed in the P&C industry for a couple of reasons. First of all, the reinsurance marketplace is very cyclical. After a large event, capacity tends to dry up or become more expensive. Then, as time passes since an event has occurred, pricing becomes more competitive and more capacity is available.

In 1992, Hurricane Andrew whipped through Florida and the insured losses were astronomical. They were larger than any model had predicted that losses could be. The industry experienced insured losses of about $15–16 billion, and the models were saying that a bad hurricane might cause $2 billion in claims. Everyone had to rethink their pricing and their position in the marketplace, and reinsurance rates became quite expensive. On top of that, insurance companies realized that they needed much more coverage then they did before.

In P&C insurance, unlike life, insurers generally layer the risks. So if an insurer buys catastrophic coverage, there would still be a limit at which the reinsurance would stop paying and the insurer would go back on the risk. Insurers found that they needed much more extended coverage than the reinsurance marketplace could probably deliver. There was a need to look for another source of capital. Investors have been taking some of that insurance risk.

Our first speaker is Bill Egan, a managing director in the Insurance Group of Credit Suisse First Boston, a leading global investment bank. Mr. Egan advises both domestic and foreign insurance companies on mergers and acquisitions, restructurings, equity and debt offerings, and demutualizations. He will talk about catastrophe (CAT) bonds, a way to transfer that catastrophic risk to the capital markets.

Our second speaker is Jim Olivo, a principal and head of the Global Capital Markets Group at Swiss Re New Markets, where he oversees the structuring, trading, and distribution of derivatives and securities. He will discuss contingent forms of capital that are being used in the P&C industry.

Next, Lawrence Kwoh will speak from the rating agencies' viewpoint, because many of these securities have been rated. He is a vice president with Moody's Investor Service Structured Finance department, where he is primarily involved with credit derivatives, structured notes, and insurance related products.

Last, but not least, David Mordecai is also going to speak about how these bonds would be rated, looking at the actual modeling of the bond. He is a vice president of financial engineering at AIG Risk Finance, the division of AIG that specializes in alternative-risk transfer using structured transactions that combine insurance and capital market products.

Mr. William J. Egan: I'm going to be talking about bonds or notes that are issued to third-party investors, where the payment of either the principal, the interest, or both is contingent upon the development of some insurance risk. I'm not going to be talking about the options that are traded on the Chicago Board of Trade or other kinds of indexes.

If you look at securitization and how it evolved over the past two years, you start from the perspective that insurance company senior debt is in a way an indirect securitization, because you rely on the business that's written by the insurance company for its ability to pay the debt. Inherently, investors are already comfortable with insurance securitization (in an indirect form) because they buy this senior debt all the time.

After Hurricane Andrew hit, a lot of the big insurers became very concerned about the issue of liquidity. If there was an enormous loss like Andrew, and you are a large insurer with a lot of exposure, like Nationwide or State Farm, you're in a very tough position, because you have a lot of losses that you have to pay very quickly. Put aside the hit to your surplus and you have a cash-flow issue, where you perhaps don't want to liquidate your investment portfolio. So the first thing that came along on the road to true securitization was contingent credit facilities, where companies like Nationwide and State Farm went out and got a very large liquidity line from a bank. The access to the liquidity line wasn't contingent upon a large insurance loss, nor was the repayment of it dependent on the existence or nonexistence of that loss. It was a regular senior debt whose purpose was to be able to have cash available to pay claims in the event of a huge loss.

Nationwide, which is in the investment-grade corporate bond marketplace, developed the surplus notes marketplace in 1994. Surplus notes are obligations that are payable out of the surplus of a company. However, repayment of interest and principal are dependent on the insurance commissioner's approval. The notes are

considered subordinated debt in the investment-grade marketplace, but give statutory surplus credit to the issuing insurance company.

Nationwide said, "The time we really need the surplus notes to be issued would be the time when we have an enormous Hurricane Andrew hit and, by the way, that's the time when nobody would buy our surplus notes." So the company set up a contingent surplus notes facility where it sold notes that could be exchanged and turned into surplus notes at any time. The press picked those up and started calling them "Act of God" bonds. In reality, Nationwide could turn them into surplus notes at any time it wanted, but the thought was Nationwide would do it only at the time when it had to pay out for a severe catastrophe. Again, it wasn't to transfer the risk. The repayment of the obligation didn't have to do with the development of the risk.

After the development of the contingent surplus notes came contingent equity puts. Contingent equity puts are similar to contingent surplus notes for public stock companies. Stock companies would want to issue common stock and increase their stockholders' equity at the time when they've had a huge loss hit their equity, making it hard for them to write new business. A number of companies have issued contingent equity puts, which gives them a right to sell stock at a certain price at a time in the future when you, perhaps, think it would be hard to sell a stock because they had a catastrophic loss.

Up to that point there wasn't any true insurance securitization, where someone says, "I'll buy a bond from you for $100 and you don't have to pay me back if your losses from a catastrophe exceed X dollars." There were some early attempts in 1996 to do true insurance securitization. The first one was attempted by the California Earthquake Authority (CEA). After the Northridge earthquake, there was a real shortage of homeowner coverage in California. The CEA intended to provide support to the homeowner writers in California financed by bonds of $1.5 billion. Those bonds, which would be sold to the public, would be repayable only to the extent that development was positive from the homeowner coverage that was going to be provided by the CEA. However, that deal was replaced when Berkshire Hathaway stepped in and provided reinsurance, which a lot of other reinsurers participated in. So it missed the opportunity to test whether the market would buy a deal of that size, a critical test.

After CEA, Ace Ltd., an excess writer in Bermuda that also has a property catastrophe business, tried to do a deal that didn't work. USAA tried to do a $500 million deal. USAA, which has enormous homeowner coverage in the southeastern United States, was looking for a $500 million bond that wouldn't be payable if there was a massive loss because of a single windstorm event on the East Coast. It went to investors, but it was unable to do the deal.

From the Floor: When you say the bonds would not be payable, is that principal and interest?

Mr. Egan: At this point, it was principal and interest. The key thing that was learned in starting these deals is that investors were not interested in having their principal at risk. There is a fairly practical reason for that. If I'm running the investment portfolio at a life insurer or a pension fund and a new asset class comes along, I don't mind perhaps saying, "I'm not going to have my interest paid." But I have a problem going to my boss and saying, "I'm not getting my principal back because there was a windstorm." With this new asset class, people were uncomfortable with the risk, and it didn't seem that securitization was feasible with true principal at risk.

The first deal that was successful was the St. Paul deal at the very end of 1996. St. Paul's bond was a five-year deal that covered existing exposure and new business to be written in the future. To make the deal more attractive to investors, it "defeased" the principal. By that, I mean the principal is not at risk. It invested part of the bond proceeds in zero-coupon Treasury bills to guarantee the payment of the principal. And a number of deals followed.

The St. Paul deal was sold to U.S. institutional investors. Winterthur issued a three-year convertible equity bond convertible into Winterthur's equity. The interest on the bonds was at risk for adverse European hailstorm losses, for Winterthur. The Winterthur bonds were sold to retail investors, another first for insurance securitizations.

Later in 1997, USAA proposed another deal for $500 million. This time it was successful, because it had defeasance as a element of the deal and the principal was to be protected. The next transaction to market was the Swiss Re Earthquake Fund deal. We worked with Swiss Re on that. That transaction was unique because, although it covered California earthquake exposure, it had only a partial defeasance element, so not all of the principal was protected. Finally, Tokyo Marine did a transaction called Parametric Re, which covered Japanese earthquake exposure.

In 1998, there were quite a few transactions compared to the prior period: The Centre Solutions/Trinity Re deal sold Florida windstorm risk; the USAA/Residential Re deal came back and did another deal replacing the first one, which was only for a one-year period; Yasuda/Pacific Re did a transaction for Japanese windstorm risk; F&G Re did a multiperil U.S. exposure transaction (F&G Re is now owned by St. Paul, so its deal followed on the St. Paul deal from the end of 1996); and Exel, another Bermuda insurer with business similar to Ace Ltd.'s, did a swap transaction.

Why did the insurance securitization market develop now? The three main parties, insurers, investors, and investment bankers, all had different factors that came together at an opportune time during the 1996–98 period. From the insurer's perspective, there had been a lot of catastrophe losses, and there was a shortage of catastrophe capacity, particularly in specific geographic areas, for example, Florida and California. Primary insurers were unable to get adequate coverage in the reinsurance market for these risks. After the property catastrophes occurred in 1992 with Andrew and then Northridge, a Bermuda catastrophe market developed, because the pricing was very advantageous for the reinsurers.

From the investment bankers' perspective, the asset-backed securities market had exploded during the past 10 or 13 years. There was an enormous expansion of classes of securities, moving to more and more diverse asset classes. And there's a constant search for new asset classes to sell to the large investor pool—for example, life insurers, pension funds, hedge funds, etc.—interested in buying the asset-backed securities.

The most critical factor, and the reason I think this market developed when it did, was investor demand. Credit spreads in the corporate bond market have been getting narrower. Credit spreads are the incremental interest above the Treasury rates at which the bonds are sold. A single A bond you bought a year-and-a-half before at a 200-basis-point (BP) spread over Treasuries might be trading at 100 BP over Treasuries today. So if I'm running a pension fund or a life insurer, I need to find additional spread for a comparable risk. I need to find ways to get more yield to be able to fund the annuity or pension fund obligations that I'm paying.

In 1997 and 1998, as the credit-spread situation became tighter and tighter, this became a real issue. At the end of 1996 one investor said, "Six months ago, I wouldn't have looked at this product, but now I'm interested because I need yield; I've got to find a way to get yield."

Over the past two months, the credit spreads have gone completely the other way; widening dramatically. A very significant issue is, what happens to this incipient market now, because it's very expensive to do these deals. Investors are currently very leery of new risks because they can get good credit spreads relative to where they were before in the corporate bond market. Even considering the wider spreads, investors are not buying low-rated corporate bonds right now. The big issue is, what happens to the insurance securitization marketplace? The asset-backed securities market has taken a serious hit. I don't think this marketplace is going away, but there's going to be some adjustment.

The Winterthur, USAA, Tokyo Marine, and Mitsui Marine transactions all were insurer originated. Why did the insurers originate the transactions? I think USAA wanted to have a large amount of capacity for a single risk that was not as cyclical as the property catastrophe reinsurance marketplace. Winterthur wanted to test whether it could sell an insurance risk to retail investors. Tokyo Marine wanted to get long-term earthquake capacity, and I think it also wanted to make a statement about its place in this market.

There were many reinsurer-originated deals as well (e.g., St. Paul Re, Swiss Re Earthquake, Centre Solutions, F&G Re, and Exel). From the reinsurer's perspective, I will say that, for the most part, they would not have thought of these deals as being something they were doing for immediate economic reasons. The real reason they were doing these transactions was to make a statement about their presence in the marketplace, and to gain experience in this developing marketplace.

What are the similarities between the deals that have been done to date? For the most part, they're all catastrophe risk, except for the St. Paul deal, which had some elements of other risks that were going to be written. They're all very high reinsurance layers, generally the 1% probability of loss. They're all indemnity coverages (with a couple of exceptions), rather than being tied to an index. A lot of insurers were not interested in an indexed transaction because their loss experience may not correspond to the index. From an investor base, an index is easier to follow because you can understand how the index moves without becoming knowledgeable about where a particular insurer writes its business.

Winterthur was the first transaction to be sold on a wide-scale (retail) basis. St. Paul was the first transaction to be sold to the institutional investors in the U.S. marketplace. Residential Re/USAA was the first large-scale institutional investor deal in the United States, and that deal was a landmark transaction. Swiss Re Earthquake was the first deal where the entire principal was not defeased, but still received an investment-grade rating for the bond. Parametric Re was a 10-year, long-term capacity deal at a fixed price. This was the first time that had been done in the marketplace. USAA came back in 1998, which showed the strength of this marketplace, and Exel was a swap deal. Exel decided it didn't want to go through the time and expense of selling this through bonds to investors, so it swapped the insurance risk to the investor.

Who buys these bonds? It's the usual pool of asset-backed securities buyers, with a couple of exceptions. Buyers are life insurers, money managers, mutual funds, banks, and hedge funds. There's a question about whether the hedge funds are going to be there in the future, but they had been fairly big players in the deals that

were done in the past, because of the high yield and high spreads you could get in this marketplace.

In almost all of these transactions (except where the issuer didn't want it sold), the P&C reinsurers (like all the property catastrophe writers in Bermuda) actually participated and bought the bonds. They would generally come to a judgment by asking the following questions: Is this bond being sold at a cheaper price than the price at which I would sell my reinsurance cover? Or is it a more expensive price?

Why do the insurers and reinsurers securitize their books? The main reason is market leadership. This market is developing, and it is going to be out there. Right now, it's property catastrophe bonds, but they basically wanted to make a statement that they're in this marketplace and understand it. And you need to understand it from a competitive perspective, because if you don't, the next thing you know, it will replace business that you were going to be writing.

Long-term supply was a big issue for USAA and the Japanese companies. How do I get another source of long-term supply that doesn't rely on the Bermuda property catastrophe market?

Another reason is to develop capacity in key regions. There's still an issue of not having enough capacity for Florida windstorms and California earthquakes because the reinsurers can only take so much of that.

There's a cost issue involved—long-term versus short-term cost. How can I lock in a good long-term cost on this?

Finally, they're also looking for access to diverse capital sources. If you think about it, the insurer could go to the catastrophe reinsurers, to the bond market, or to the equity market themselves. This is another source of capital for the company.

One thing that we discovered as these deals went along was that the investors were getting more comfortable with the risk and credit spreads were tightening. The Residential Re deal, which was priced in June of 1997, was close to 600 BP of credit spread. The second Residential Re deal was down in the 400 BP area. That's a dramatic improvement in a year. It shows two things: (1) You have to pay a lot of premium to get new asset classes sold to investors to begin with and, (2) as they get more comfortable, the pricing is going to come down significantly. Taking into account other market factors, credit spreads have widened dramatically from when those deals were done, so a good question is, what would those deals be done at today? The investors are more comfortable with the risk and more eager to get the yield and buy the deal.

Let's look at the issues for the future on these types of transactions. One of the big issues is the up-front fixed cost to doing these deals. They've come down so much, but they're still significant. Just to do the deal, you have costs for the legal work, the printing, the fees for the sale of the bonds, the experts who are going to help model the bonds, fees for obtaining a rating from the rating agencies. You're going to spend a few hundred thousand dollars. If you do another deal later, a lot of those costs are not going to be repeated, but it's expensive up front.

The credit spreads issue is critical. If corporate bonds are not being purchased at what are considered huge credit spreads, these bonds are going to have to sell at very high spreads. Right now, the property reinsurance marketplace is still very tight; there's still too much capacity. Perhaps there has been a widening over the past two months of the difference between what spreads these could be done at and how much reinsurance would cost in the ordinary marketplace.

The defeasance issue is successfully being phased out, but the defeasance ultimately has to be completely phased out of the deals to make them really economic. If you have to defease the principal by buying Treasuries, for a portion of the principal, that makes the deals increasingly uneconomical.

The rating agencies have increasingly come up to speed and moved quickly and efficiently on determining how to rate these bonds. They particularly understand that they need to rate them investment-grade, because you need to have a large pool of these bonds rated investment-grade to be able to sell them. There's only so much of a marketplace for subinvestment-grade debt.

SEC registration has to be crossed if we're going to sell these bonds to retail investors. So far, it hasn't proven to be essential, but it's tough to see this as a retail marketplace in the near future.

From the investors' perspective, one of the issues is credit spreads versus diversification. If I'm the portfolio manager at a life insurer, I might like these bonds, but only want so many Florida windstorm and California earthquake bonds. Investors are saying, "Give me some other insurance risk here. I like the insurance risk and the fact that it's different from bonds and equities, but I don't want any more windstorm bonds. I want some new type of risk."

From the insurers' perspective, the problem is that it's a very soft market. So given the time and the cost of doing these deals, why do they want to do this? Our biggest problem is finding issuers who want to go out and do more of these bonds in the marketplace, typically bonds at a sizable scale.

Regarding the U.S. insurance regulatory situation, there are a few issues surrounding the accreditation for reinsurance that have to be addressed. For all of these deals, you provide $100 million in coverage and have $100 million in proceeds from the bond. Compared to an insurer or reinsurer who's writing on a leveraged basis against its capital, this makes it harder (or more expensive) to do the deal. So it would be wonderful if, in some way, the leverage issue can be addressed as well as getting regulatory credit for reinsurance.

With respect to possible future areas of securitization, one of them is credit risk. Credit derivatives are very common now and easily understood. Can the credit risk be sold off because investors are already used to that credit risk? They're used to buying credit risk all the time. Another area is country risk or sovereign risk, which is not the best subject these days, but it's another area where investors have become comfortable. Can that be taken in by insurers and then sold off?

Other areas are the product-liability and general-casualty business. I think you're going to see a couple of deals coming along in the next year and a half in the casualty area, particularly the old asbestos and environmental risks because there are a lot more people buying up old asbestos and environmental risks on the books of insurers. Can that be done, packaged efficiently, rated, and sold off into the marketplace?

Finally, there's enormous potential volume here, and the real question I always get is, "Is this an opportunity for me or a threat?" P&C insurers, when they look at securitization, have to look at it as an opportunity. They have to look at it as a source of reinsurance and perhaps cheaper capital, and therefore they should be spending time on it. If you're a reinsurer, you ought to think about taking a risk at X cost, selling it off at X-1, and arbitraging the difference. Reinsurers need to get the expertise in this marketplace so they'll be in a position to be able to do that.

From the Floor: I want to find out how liquid these assets are.

Mr. Egan: Most of the bonds have maturities of one or two years. The liquidity is affected by the size of the deal. If you have a $500 million USAA deal, there's some liquidity because there are enough investors out there. If you have an $80 million deal, there's not a lot of liquidity because of the amount of buying and selling. You need the investment banks that placed these bonds to make a market in the securities and buy them back and forth, which they do, but there again, it gets to be an issue because investment banks only want to do it for deals they've been involved in. So to the extent you don't have a lot of large deals that a lot of investment banks participated in, you have a limited ability to buy and sell them.

Jim could probably speak to that because Swiss Re is very knowledgeable about that.

Mr. James M. Olivo: During the last six months or so, the liquidity in the market has picked up quite a bit. Bill mentioned before that hedge funds were buyers of these bonds, to some degree, in the initial issuances. Recently, they've had to sell some of these bonds to raise capital, and there's been a ready market for them. If you talk to most of the big investment banks that make markets in these bonds, either ourselves, First Boston, or a couple others, you're probably talking about between one-quarter and one-half a point market for most of the issues. The one thing that I think is interesting is that the spreads in the secondary market have not widened in the same way that credit spreads in the regular corporate bond market have. I don't know what that tells us yet. I don't think there are enough data points to say they're going to be insensitive to credit spreads, but they haven't widened out, at least not during the last two or three months.

I'm going to talk about contingent financing. The CAT bond transactions you've seen so far are similar to traditional reinsurance transactions in that you put money up, and if an event occurs, you don't get it back. The transactions I'm going to talk about now are a bit different. You expect to get your money back, but they're really just forms of financing.

Contingent capital is a structured transaction that helps clients access capital quickly and efficiently in times of need. It doesn't provide reinsurance coverage, just liquidity or equity. We look at it in two different ways: post-event debt transactions (or liquidity facilities) and post-event equity transactions, which we view as survival vehicles for the company. The financing can be short term, as with a typical bank credit facility, or it can be longer term in the form of either long-term debt or preferred stock.

Traditional contingent capital is very different from traditional reinsurance. Simply put, who gets paid when is the issue. Traditional reinsurance coverage indemnifies the client for covered losses. If there's a loss, as a reinsurer, we give the insureds money and don't get it back. They pay us a risk premium for that coverage, and that risk premium (depending on the probability of loss) could be substantial.

Contingent capital provides liquidity to meet current cash flow needs. It's useful for a client to know that it could earn its way out of losses, given the time to do so. Capital is provided in exchange for securities or a payment promise with an expected value sufficient to repay the capital. It's an option-to-put debt. The optionholder pays a premium for that, but, as the provider of that debt, we expect to

get paid back. Because of that, the pricing is a lot cheaper than it would be in traditional reinsurance.

There are key differences between the liquidity or debt types of contingent financing and the equity types of contingent financing. Repayment flexibility is different. There are short-term credit facilities that have very tough covenants and repayment schedules, and others that are more flexible with repayment. There are vastly different investor protections, seniority or liquidation preferences in the event of bankruptcy, and conditions under which the puts can be exercised.

The degree of equity credit given by the rating agencies differs, depending on whether it's a liquidity transaction or an equity transaction, and our clients view that as an important factor. There are significant limitations and covenants, and the degree to which the covenants are similar or dissimilar to ones in the bank market vastly affects the pricing of the deal.

One of the reasons clients want to do transactions like this, particularly on the liquidity side, is because their bank credit facilities might be restrictive. They are concerned that, in the event of a major catastrophe, when they really need the money, the clauses and covenants in their bank credit facilities, in particular material adverse change clauses, will not allow them to draw it down.

The first case I'm going to talk about is post-event liquidity financing. In this case, the client needs funds to meet current cash-flow requirements in the event of a catastrophic loss. He's comfortable that he could earn his way out of that loss over time, and needs the funds to meet his current obligations. His repayment method would be to borrow the funds against either future premiums or assessments, in many cases, or he could borrow the funds as a general corporate obligation. This may be most applicable to quasi-governmental agencies, such as the Florida Windstorm Underwriting Association (FWUA).

Clients with illiquid investment portfolios would also consider using this vehicle. If you have enough investments to cover losses, but have difficulty in liquidating those investments, you might want to take out a liquidity facility and get funds in to pay your current claims. Then you liquidate your portfolio, when it's more advantageous to do so, in order to repay the facility.

FWUA is a good example of this facility, and there are others. After Hurricane Andrew, there was a shrinking availability of commercial insurance in Florida. Florida was a mess for quite a few years, and there was no commercial insurance available, so something had to be done. Part of the FWUA was legislated to operate as a residual market mechanism in the state of Florida to provide coverage for

residents who couldn't procure insurance through the normal insurance markets. Most important, it's authorized to levy assessments, not only on the policyholders in the state of Florida, but also on the insurers in Florida, to fund its operating expenses, including claims. Membership in the association is mandatory for any insurer that wants to do property business in Florida. The FWUA residual market became quite big.

The FWUA needed money in the event that claims exceeded windstorm insurance coverage. It wanted to borrow money to pay claims out of assessments. If a big event happens, the FWUA will assess individual insurance policies as well as insurers in Florida, but there are limits to the amount that it can assess in any one year. Therefore, it wanted to extend those assessments out for a longer period of time. By borrowing money from the bank syndicate, and repaying it over a longer period of time, FWUA could make the assessments as little as possible in any one year.

The solution was to take out a $1.75 billion syndicated two-year credit facility, about a year and a half ago. The association also issued $750 million in pre-event notes, and put the money away for a rainy day. The notes are direct obligations of the association, and they rank *pari passu* with the syndicated facility. We used that to make some assessment of the risk of the syndicated facility, which wasn't rated, but the pre-event notes were rated A-/A3 by S&P and Moody's.

Chart 1 shows what the facility looks like right now. There are many layers. There are retentions for the windstorms that they fund with cash, money from the pre-event notes, a payment in the event of a loss from a cash fund that's set up in the state of Florida separate from the FWUA, more layers of pre-event note money, and more retentions that come from assessments. On top of $1.87 billion, there is a $1.75 billion senior credit facility. The facility provides liquidity to the FWUA and minimizes the risk that it will default on its policyholder obligations.

As one of the managing agents on the transaction, we view it as double-trigger risk for us. There's catastrophe risk, because we have to provide liquidity to Florida in the event of a windstorm, and there's credit risk. We don't lose the money if there's a windstorm. As a matter of fact, we might make more money if there's a windstorm. What we worry about is, if there's a windstorm and we have to lend the money, the credit underlying it may not be sufficient to repay both the principal and the interest on the loan. But each event must happen for us or the other debtholders to have an economic loss.

There is collateral in the transaction. It includes emergency assessments that are made, the net premiums to the FWUA from its regular business, and additional

bond proceeds that it might issue. That's all held in trust by collateral agents to repay both the principal and the interest. Do you have any questions on the liquidity facilities?

Mr. Jacques Poulin: How much do they cost?

Mr. Olivo: I'm sorry, I don't remember. They're somewhat higher than a typical bank financing facility, but I don't remember exactly what they are.

Mr. Poulin: What reserves do you have to set up? And do you have to show to the statutory authorities that you have the money?

Mr. Olivo: We have to show to our regulators in Switzerland that we can meet general liquidity needs. We don't do it on a transaction-by-transaction basis. But from our perspective, liquidity is not the issue here, it's repayment of the debt. For most people who are buying this (this is a bank market in general), the liquidity has not been an issue, except in the last couple of weeks. We have seen, from the CEA, that some of the banks originally in the facilities took small pieces in the syndicated market. Some of the lesser-rated banks or banks with liquidity concerns sold those pieces in the open market at a discount, which we also view as positives because we bought them.

From the Floor: What's the difference between the FWUA and the Florida Hurricane Cat Fund?

Mr. Olivo: Now you're asking a noninsurer an insurance question. I don't know the answer to that. One is a residual market mechanism, and one is just purely a fund to help out the other one. Bill, do you know?

Mr. Egan: I think that's correct. I think the FWUA was a residual market for the homeowners insurance, and the other one provides relief to some of the insurers.

Mr. Olivo: They are both set up by separate legislation and complement each other, but they don't overlap.

The second type of coverage is one where we provide surplus to a client, rather than liquidity. A couple of the transactions were Horace Mann, LaSalle Re. This coverage is used typically for a company that writes concentrated CAT business, that is very comfortable with its reinsurance coverage, and believes that post-event rates will go up, business will prosper, and the company will be able to earn its way out of any losses that it may have taken above its reinsurance cover.

The surplus provided post-event will help the client issue equity when it most needs it, at preset rates. This gives the company the comfort of knowing that the rating agencies will view that very positively afterwards, its clients will view it positively, and it will be able to do business after an event and actually take advantage of the higher insurance premiums. The client may need equity to meet solvency guidelines and credit concerns.

For these deals, the repayment obligation has generally been in the form of preferred shares that are convertible into common stock. Another option is to use surplus notes. It's a lower-cost alternative to reinsurance; it's not cheaper. I don't like using the word "cheaper" because it's a different repayment, a different payout and, therefore, a value for the client. But it is a lower-cost alternative to reinsurance. It gives our clients diversified sources of protection so they're not dependent upon their reinsurers, and it gives an increased level of future financial flexibility, most importantly, at a fixed, pre-event cost.

Here is a typical example. XYZ Re acquires an option to sell preferred shares if a qualifying catastrophic event occurs during the exposure period. The exposure period is three years and it's noncancellable. The principal amount in this example is $100 million. The event trigger is either a single-event loss in excess of a certain amount or accumulated aggregate losses in excess of another amount in a single year. XYZ Re pays an option premium for this option.

If the puts are exercised and XYZ Re puts preferred shares to the investors, it has the option to redeem the preferred shares at any time after the end of the first year. There is a call premium if shares are redeemed any time between years one and four. If they're not redeemed within three years, the holders of the preferred shares have the right to convert them into common stock. Neither XYZ Re nor the investors are doing this transaction to give the investors a common ownership stake in XYZ Re. So the transaction is structured and priced such that the parties believe that they'll be redeemed and called before the investors convert them into common stock.

My last example is a very simple option transaction. At initiation of the option contract and throughout the life of the contract, our client pays us an annual premium and we give it an option to put shares to us (we would have the obligation to buy them from the client if the event occurred). After the occurrence of a trigger event and the exercise of the option, we'd give the client capital and it would give us a dividend on the preferred shares. After a period of time, it would either redeem the shares or we would convert them into common stock. At that point, we could sell the common stock in the marketplace.

From the Floor: Does the option writer guarantee that the capital provider will provide the capital?

Mr. Olivo: It's the same entity, so yes. We write the option and we provide the capital.

From the Floor: Can you trade the shares?

Mr. Olivo: Yes. They can be assigned, but only with the agreement of the buyer.

Mr. Lawrence D. Kwoh: This is an exciting field that's expanding rather rapidly despite the small number of deals that the market has seen. Another exciting aspect of the alternative-risk transfer field is that we're seeing not just risk-transfer instruments in the P&C capacity, but a lot of people looking at transferring things such as credit risk, sovereign risk, product liability risk, and environmental risk.

I'm going to talk about how Moody's looks at CAT bonds. I'll give a general overview and try not to get into the technical details of how we go about rating CAT bonds.

One criterion that we have for rating a CAT bond or any insurance-related bond is that it has to be amenable to modeling. We have so far stayed away from deals that involve things such as product and environmental liability, where the outcome of a bond may depend upon a court decision. That's not something that we feel can be modeled. The same thing is true with political risk. We have seen proposals where people are essentially asking, "Can you rate a structure where repayment is dependent upon a couple of projects in a certain country?" They are essentially trying to transfer the political risk, such as the imposition of currency control or the imposition or the cancellation of some contracts for these projects. This is something we don't feel we can necessarily rate, because it's not amenable to modeling, unless it's something at a country level where the sovereign risk is captured in these country ratings. In that case, we will look at it.

Generally, there is a professional consultant involved in CAT bond deals. The consultant is hired by the investment bank and the issuer to do the catastrophe modeling. There are very few firms (about four) in the world that do this type of modeling very well. We have a working relationship with these firms because we understand the fundamentals of how they generate these national catastrophe models. Primarily, the catastrophe being modeled is caused by events such as earthquakes and hurricanes. It's not just for hurricanes in the continental U.S., but for hurricanes or typhoons in, say, Japan. We also are looking at deals that involve windstorms. The windstorms in Europe have similar fundamental relationships.

We look at the work of the consulting firms and try to understand the essential variables driving the outcome of these models. The models culminate in something called the annual exceedance curve and, from that, we will address the results. We also build a simplified internal model based on public information. The simplified modeling we use does not replace the consulting work. Companies essentially have a way for us to calibrate and verify independently the numbers that the consulting companies are producing.

Why do we talk to these consulting companies? Generally, the first question an investor will ask is, "Are there reliable data or information that we can use?" There is a lot of public information available, including government research documentation. In fact, these often are the same documents that a consulting company uses in building its models. We review the information to try to understand what's driving the models. Hurricanes are essentially driven by the following factors: (1) central pressure of a hurricane, where the lower the central pressure, the higher the intensity of the hurricane; (2) landfall location; (3) track direction, because insured losses will depend on whether it goes through areas where there is insurance coverage or residential populations; (4) force of the hurricane, which also impacts the intensity; and (5) radius or maximum speed, which essentially measures how big the eye of the hurricane will be. We talk to consultants and try to understand how all these variables drive the final output.

The same thing is true on the earthquake side. Factors that drive earthquake losses are: (1) recurrence interval, how often an earthquake occurs at a particular fault or in a particular area; (2) swell or fault type; (3) rupture link of a fault, which affects the magnitude of the earthquake, (4) peak acceleration, which measures how fast the force of the earthquake travels outward from the epicenter; and (5) attenuation function, which measures the altitude of the earthquake, which in turn affects the shocks.

Once we are comfortable that the models are robust, we stress test the model. Rating agencies perform stress tests, whether we're looking at a credit deal or a catastrophe deal. Generally, we need two major levels of stress testing of models. The first is to stress test the uncertainty around the key variables, such as the central pressure, the landfall location, fault types, and so on. The second level of stress test is around the whole model itself at the macrolevel.

For example, we stress tested a particular distribution of hurricane frequency. In this particular case, the consultants used a negative binomial distribution function. We asked why they had used certain coefficients, and they explained that the coefficients were the result of historical calibrations, etc. We looked at the historical records also, and in the final analysis, we may agree or disagree. We

might think it's too liberal or too conservative, ask them to change some of the boundaries, and see how robust the result is.

Another example is stress testing central pressure assumptions. This is a key parameter that can change the output in terms of the amount of damage a hurricane can cause once it hits, let's say, the Florida coastline. Different consulting firms, or sometimes even the same consulting firm, can use different distributions. One firm used a Weibull distribution versus a lognormal distribution. The distribution functions have an impact on the loss outcome and the annual exceedance curve. There are some good reasons why people use Weibull for this type of analysis. It essentially captures a lot of small-intensity events, but because of the shape of distribution, it won't capture the high-intensity hurricanes. So, Weibull might calibrate well with your historical record. However, if you're trying to do a deal that focuses on a high-intensity hurricane, it won't necessarily capture these high-intensity events. The lognormal distribution ought to capture the high-intensity event, but not necessarily a low-intensity event.

Here's an example of how we stress test the model uncertainty. This is the Parametric Re deal that we did with Swiss Re and Goldman Sachs, where we stress tested the model assumptions. The results essentially generate two numbers, the annual exceedance curve generated by the historical models and the time-span models. In this particular deal, the historical model, which essentially is based on the historical catalog in Japan (which is over 1,000 years of history of earthquake occurrences) give some higher numbers. Nobody can really explain why they have high numbers from this historical catalog, even though the time-span model, which is essentially the more scientific model, generates lower numbers on the region of Japan where the deal was focused. The way we stress tested it was to incorporate the results from the two models. We assigned equal weights for the historical model and the time-span model by trying to capture results produced by historical model elements. That was one way we would stress test at the model level.

Next, I'd like to discuss how we build our simplified model. You can create a model based on public information, and there is a lot of very good information available. The National Weather Service Bulletin is the fundamental paper that most hurricane models are based on. The USGS and the Department of California Mines and Divisions have a lot of papers that map all the faults in California and tell you where all the recurrences, etc., are coming from. You can use that information to create a very simplified model on your own. Obviously, it takes time. We spent more than a year just putting together the earthquake model, and we are in the process of publishing a paper on our Florida hurricane model.

Once we have these independent simplified models, we try and verify what the consultants are producing. For example, for an indemnity-type bond, where the qualifying event is based upon a specific insurance company's loss experience, the insurance data are very important. We look at the macroinformation and try to understand how the consultant's model would compare with ours on the same basis. In the case of California earthquakes, we can take information such as the value of California houses by zip code and run this through the model instead of the insurance value and ask the consultants to do the same. That way we can see how well the data matches up with what they are producing. Generally, there is some discrepancy. If we are looking at, say, plus or minus 100% and it doesn't change the rating, then we feel relatively comfortable. This is only possible with these types of very unlikely events.

To give you some background, it was mentioned earlier that a lot of deals we have rated essentially are in the subinvestment-grade category. To go from the rating of BA-2 to BA-3 in one year, you essentially have to double the default probability. BA-2 has a default probability of 1%. To get to BA-3, you have to have a default of about 2%. These numbers are small because most deals that we're looking at cover less than one in a 100-year event. Even if you double it wrong both ways, you'll still be within the rating band. That's going to change as the market develops and people shoot for higher ratings. People may start looking for a lower coverage or for a one-in-50-year or a one-in-25-year event. We'll need to do more work, then, in terms of trying to get our confidence up.

At Moody's, we try to provide some independent check against what the consultants are doing. If the occasion permits, we may also use other modeling companies' inputs to verify the work of a particular consultant who has been hired to do the deal.

Mr. David A. Mordecai: Lawrence and I have participated in many of the same transactions. The key elements that are addressed in a rating process for a CAT bond include: (1) risk transfer, (2) issuer bankruptcy (remote and single-purpose entity), (3) full or partial defeasance, (4) cash-flow priorities, (5) counterparty risk, and (6) legal documents.

Risk transfer has to do with actual risk that is being transferred or shifted or a change in incentives for the ceding insurance company (in the case of a book of business) to assure that the ceding insurance company does not change its risk profile as a result of the transaction.

When performing an insurance review, we look at different items, depending upon the type of bond. For book-of-business bonds, we looked at ceding insurer policy

data. On index-based bonds, we look at the insurance loss estimation and the loss index. The key to any CAT bond is to analyze the catastrophic event model. If the model is wrong or not robust, you don't know what you're holding.

Chart 2 an example of an exceedance probability curve. On the vertical axis, you have the approximate marginal probability of loss, and on the horizontal axis, you have losses greater than some amount. The attachment point is denoted by the vertical line. The area below the curve and to the right of the attachment point (out to some exhaustion point) is the expected loss. The key elements that you want to analyze are the slope or the first derivative as well as the curvature or the second derivative of that curve. If you have significant changes in the slope or the curvature of that exceedance probability curve, you can get billions of dollars of difference in expected loss.

When analyzing these risks, it is very important to adjust the attachment point analytically to incorporate qualitative risks such as variance in the policy data, the index or the model itself, or the parameter triggers.

There are three types of bond structures: book-of-business, index-based, or parameter-triggered. Book-of-business bonds are unique because they indemnify the insurer's actual portfolio of policies. One key parameter that was missing from early book-of-business models was demand surge. Demand surge refers to the fact that, after an event, the price of construction materials, labor, and services go right though the roof because of the surge in demand. You want to make sure that you're capturing that in your modeling.

Index-based bonds depend on the performance of an index rather than an individual company's experience. With an index bond, the key component is the review of the loss-estimation company. For example, with PCS options, we want to know if there is anything about the PCS index from a transparency and consistency of reporting standpoint that may affect the bond.

A typical CAT bond structure looks quite a bit like a traditional alternative delivery system structure. The difference is that, rather than having a servicing agreement between the ceding insurer (or the originator) and the trust (or trust agreement), you have a reinsurance agreement.

Catastrophic event models are stochastic. That means that they focus on random events, and the objective is to come up with robust or reliable estimates of random events. To achieve a robust estimate, you have to capture variance adequately; you can't just focus on the point estimate. If you focus on the point estimate, you have to adjust it to make up for the variance and decide how much variance is enough.

You also have to consider the fact that these things might not be normally distributed. They might have fat tails if they're skewed, so you should look at all the moments of the distribution and make the necessary adjustments.

The concept of confidence intervals grows completely meaningless for loss events that are not normally distributed. Rather than confidence intervals, you need to look at the area under the curve. That's one of the reasons people talk about one in 100 or one in 1,000 year events. And yet we might see five of them in 10 or 20 years because these distributions are not normal.

Robust estimates accurately represent the risk of loss from a catastrophic event. How do we evaluate the performance of these models? A key feature in modeling robustness is determining how well the model estimates perform on average. The best guess or approximation of future losses can be based on event occurrence or frequency, intensity of the event, and the resulting damage or losses.

Usually the most reliable models have three components. First, they have something that approximates the rate of occurrence. I didn't use the words "frequency" or "probability," but rather "rate of occurrence," which is an average rate that also captures variance around the rate of occurrence. The second component looks at energy and intensity, and how that influences damages and structures. And the third component is the form of the dollar contract that translates damage into losses.

There are variances around each of those. In some cases, the very, very large variance might be squeezed around two or three components, one of which is the variance around the rate of occurrence. If these things are random, you can only put so much trust in your rate of occurrence component.

A robust model minimizes model risk. The model risk has two components: process risk (how much do we know about the underlying process?) and parameter risk (how well does our model match the underlying process to the best numbers that we have?).

Process risk is minimized when hypothesized assumptions reasonably represent the true nature of actual events (the underlying process). Primarily, the model assumptions are quantified through probability distributions. The selection of probability distributions and the estimation methods used for the parameters of those distributions are critical. The estimation methods you would use for a normal distribution don't work for non-normals, but, in a lot of situations, something called maximum loss expectancy (MLE) will be used. Most of you are familiar with maximum-likelihood versus least–squares models. MLEs don't work for non-normal

distributions because they miss the tails. There are distributions that have fatter than normal tails and others that are more skewed than normal. MLE throws that information away, so you won't know what you have. The first thing to do is test your distribution and determine whether it is normal. If not, adjust for that to capture the information in the tails.

Parameter risk is minimized as the number of simulated draws from a distribution is increased. Parameter risk is about model convergence. Have you done enough draws from your stochastic model to make sure that you're getting enough observations at the tail? Your model will converge if your process risk is minimized (i.e., the hypothesized assumptions are reasonably accurate) and the parameter risk is minimized (i.e., the number of iterations become sufficiently large).

To perform model due diligence, the analyst evaluates the underlying technical integrity of the model from the perspective of process risk minimization, which includes data validation (i.e., measurement error and bias diagnostics), model structure (i.e., model design and distribution assumptions), and model specification (i.e., parameter estimation and simulation).

Ms. Rohe: I would like to make a connection between what we heard earlier regarding the P&C industry, how these concepts might apply to our business, and the possibility of bringing life risk to the capital market. The two main types of transactions discussed were risk transfer, transactions such as CAT bonds where the capital markets are actually assuming those risks, and risk financing transactions such as contingent equity puts and the contingent facilities where the capital markets were able to provide liquidity or surplus financing when a certain insurance need is present. Three main deals are talked about in the life industry: the American Skandia securitization in the U.S., Hannover Re in Germany, and NPI securitization in the U.K.

About two years ago, American Skandia securitized the mortality and expense (M&E) fees in their variable annuities to fund the cash strain. When you sell a variable annuity, you have to put 100% of the premium into the separate account, but you still have to pay the commissions and expenses of issuing that policy, which can cause a cash strain for the company. Because the reserves are less than the full premium, there isn't necessarily a surplus strain involved, but a significant cash strain.

American Skandia, being one of the largest variable-annuity writers, was interested in developing another source of funds for this business, so it securitized its M&E fees. The bond had a six-and-a-half-year term and a fixed rate. The company also went through all the rating agencies' hoops to get the bond rated. The deal was

more of a risk financing transaction than a risk transfer transaction because of the risk reducing techniques in the deal. The guaranteed minimum death benefit risk, which can add a lot of volatility, was hedged with reinsurance so the noteholders didn't have to worry about that risk. In addition, the bond was overcollateralized; the M&E fees that were securitized were more than enough on both an expected and a stressed basis to repay the notes. There was also a reserve account set up to help with fluctuations from period to period. This is similar to what's been done in the mutual fund industry, with 12(b)1 fees.

NPI in the U.K. was able to get equity treatment for something quite similar to Skandia's transaction, but with a much longer term. The bond had two tranches, a 10-year and 25-year. NPI was able to get equity treatment, while American Skandia got debt treatment. The main reason is that you're allowed to have a surplus note on a particular line of business in the U.K., whereas, in the U.S., the surplus note has to be based on the surplus of the entire company.

From the Floor: Has there ever been a loss on any one of these CAT bonds? Has anyone ever been called on them because the loss event in the instrument actually occurred?

Mr. Egan: Not so far, although I think a couple of events might have caused a loss had the funds not been structured.

CHART 1
DOUBLE TRIGGER: CAT RISK
ULTIMATE CREDIT RISK

FWUA **SENIOR CREDIT FACILITY**	
FWUA Retention $350MM From Regular Assessments	
$100MM from Proceeds Of Pre-event Notes issue	FHCF (Cat Fund) Reimbursement $900MM
$252MM Sourced from Proceeds of Pre-event Noted	
FWUA Retention $120 Million	

CHART 2
EXCEEDANCE CURVE FOR LOGNORMAL MODEL