

SO YOU WANT TO ISSUE A CAT BOND

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EDITOR'S NOTE: In this article, AIR senior vice president David Lalonde and risk consultant Pascal Karsenti offer a primer on the catastrophe bond issuance process, including an overview of some of the most common structures and trigger types.

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Insurance-linked securities, such as catastrophe bonds, are mechanisms by which catastrophe risk is transferred from one party—called the sponsor—to the capital markets. These securities are known for providing full collateralization and multi-year coverage and, increasingly, they are becoming a standard part of insurers' and reinsurers' risk transfer strategies as a supplement to reinsurance or retrocession cover. Close to \$7 billion in property catastrophe (cat) bonds were issued in 2007 alone.

Cat bonds are typically sponsored by insurance and reinsurance companies, governments, and cat-exposed corporations—all of which are susceptible to a wide range of risk. These organizations appreciate a cat bonds' flexibility. Today, cat bonds are issued to protect against virtually every peril for which established catastrophe models exist.

AIR Worldwide has modeled the risk profile for bonds protecting against hurricanes, earthquakes, typhoons, extratropical cyclones (winter storms), severe thunderstorms and wildfires in North America, Europe and Asia. In fact, in 2007, AIR was the modeling agent for more than \$3 billion of all property catastrophe bond capital issued. With models

covering more than 50 countries worldwide and experience working with all types of bonds, AIR can help companies understand their global exposure to catastrophe risk and explore potential securitization options.

The issuance process for catastrophe bonds is fairly standard, with some variations that depend on the complexity of the structure and the bond's trigger type. In general, the process begins with the selection of a modeling agent—a catastrophe modeling firm such as AIR—and a structuring agent—an investment bank or broker that provides advice on designing and placing the bond. Together, the sponsor and the structuring agent select the mechanism by which the bond will pay out, or trigger.

The modeling agent then performs a risk analysis resulting in a loss distribution for the relevant exposure. Once the sponsor has identified the layer to be protected by the bond, the modeling agent collaborates with the structuring agent to write offering documentation, which provides detailed information about the bond. This information is then offered to rating agencies, which give the bond its rating. Finally, the sponsor and structuring agent embark on a road show



to sell the bond to investors. The modeling agent attends to answer any questions about the models and risk analysis.

ISSUING A CAT BOND

Once the decision has been made to issue a cat bond of a certain trigger type, the modeling agent will employ catastrophe models to estimate the risk to which the sponsor is exposed. It is in the sponsor's interest to provide accurate exposure information for the analysis, since good correlation between modeled and actual exposure will tend to reduce the bond's basis risk. The result of the risk analysis is an estimate of potential losses at various probabilities and return periods. This can be used directly to estimate the risk profile of indemnity or notional portfolio bonds. As will be discussed later, industry loss index and parametric bonds may require an additional step to express losses in terms of industry loss or event parameters, respectively, while further minimizing the basis risk to the sponsor.

After the portfolio's risk profile has been identified, the sponsor works with a structuring agent—usually an investment bank or the capital markets arm of a major broker or reinsurer—to identify the most appropriate level of risk against which to obtain protection. The structuring agent will also assist the sponsor in placing the bond with investors, much as a broker would for a reinsurance contract.

Once the trigger type and level of protection has been selected—\$200 million excess of \$500 million with a notional portfolio trigger, for example—AIR creates a series of exhibits detailing the risk to the proposed bond. The purpose of these is to educate rating agencies and potential investors. The exhibits typically include:

- >> Probability of attachment, or the likelihood that the bond will suffer some losses. In our example, this is the probability that the sponsor's book will suffer modeled losses of \$500 million or higher.
- >> Probability of exhaustion, or the likelihood that the bond will suffer a complete loss. In our example, this is the probability of a modeled loss of at least \$500 million + \$200 million, or \$700 million.
- >> Expected loss, or the amount investors should expect to lose on the bond in any given year. It is typically expressed as a percentage of the issue size, which is \$200 million in our example.

>> A loss distribution and sample modeled loss scenarios, to give investors some information about the types of events (location, magnitude, etc.) likely to cause a loss to their investment.

>> A set of historical simulations showing how the bond would fare if past catastrophic events were to happen today. Examples include Europe's windstorm Kyrill (2007), Hurricane Katrina (2005) and the 1906 San Francisco earthquake in the U.S., or the 1995 Kobe (Great Hanshin) earthquake in Japan.

>> The distribution of loss to the bond amongst the various perils and regions covered.

>> Sensitivity analyses showing, for instance, the impact of more frequent hurricanes than were experienced historically over the long term.

Credit rating agencies use the information outlined above to review the proposed bond's quality, expressing their opinion as a letter rating such as BBB or A-. These agencies, which act as independent third parties, review all aspects of the bond. When they issue their rating, AIR's risk analysis is one of the most important elements they consider.

After the bond receives a rating, the sponsor and structuring agent embark on a "road show" during which they introduce the bond to potential investors. AIR (modeling agent) accompanies them in an advisory and educational capacity, answering any questions that might arise concerning either the model(s) or the risk analysis performed. This road show typically lasts three to ten days and covers the main capital market centers in North America and Europe and, in some cases, Asia.

By the end of the road show, the pricing is finalized and the bond is sold to qualified investors. Once the bond is in the market, investors are free to sell it to investment banks (broker-dealers) who engage in secondary trading of cat bonds. The ownership of the bond at any given time has no impact on the sponsor because cat bonds are fully collateralized; that is, the entire amount of promised protection has been provided up front and placed in a safe account which can only be accessed to pay losses emanating from that specific bond. This mechanism greatly reduces the counterparty risk inherent in traditional reinsurance contracts, particularly if the bond provides protection for an extreme event.

Should a triggering event occur during the life of the bond, the sponsor will receive a payout for the appropriate amount. For example, if a catastrophe event causes \$600 million in modeled losses to the \$200 million excess \$500 million notional portfolio bond described earlier, the sponsor will receive a recovery of \$100 million (\$600 million – \$500 million), or half of the bond’s original principal amount.

The following section provides more details on the way a cat bond is actually structured and the different trigger types available.

CAT BOND STRUCTURE

A cat bond is structured as a reinsurance contract between the sponsor (the party seeking protection) and a special purpose vehicle (SPV). The SPV obtains the capital necessary to underwrite and fully collateralize the reinsurance contract by selling a bond to capital market investors. This bond is an exact mirror of the reinsurance contract; it is valued at the same amount at issuance and can only lose money according to the terms of the reinsurance contract. Because this bond is issued directly by the SPV it is not affected by the sponsor’s credit rating, nor is it considered to be a debt of the sponsor.

The proceeds from the sale of the bond are placed in an account that can be used for no other purpose than paying claims on the reinsurance contract to which it is linked. The revenue stream obtained from investing this money is swapped with a highly-rated swap counterparty—usually a bank—that guarantees a specific rate of return in order to minimize investment risk.

The SPV thus functions like a fully-collateralized reinsurer with the sponsor as its sole client and the proceeds from the bond as its source of financing. This is a valuable feature, as it eliminates the risk that the reinsurance contract would not be honored by a reinsurer bankrupted by other obligations in a truly catastrophic event.

Investors are compensated for their risk by receiving a coupon, usually paid quarterly. The coupon is funded by a combination of reinsurance premiums paid by the sponsor and the proceeds of investing the bond’s principal. The coupon rate is typically set based in part on the probability, as determined by AIR, that the bond will lose money due

to a catastrophe event. The coupon rate is also based on market factors such as the supply of similar insurance-linked securities and investor demand.

Figure 1 below illustrates the financial flows for a typical reinsurance contract. These can be compared, in Figure 2, with the financial flows for a typical catastrophe bond. Note that in the case of the reinsurance contract the reinsurer would have similar relationships with numerous other cedants. Because most reinsurance contracts are not fully collateralized, cedants may find themselves in competition for the reinsurer’s surplus when collecting recoveries after a catastrophic event.

Investors obtain further confidence in all aspects of the bond’s structure through the rating process. Since the first large-scale cat bond issuance in 1997, AIR-modeled Residential Re, investor and rating agencies have become sufficiently knowledgeable and comfortable with cat bonds’ risk modeling and trigger mechanisms to expand these instruments’ range across much of the risk spectrum. Bonds can now provide protection all the way from near working layers to the most remote levels of risk. In fact, approximately one-third of catastrophe bond protection

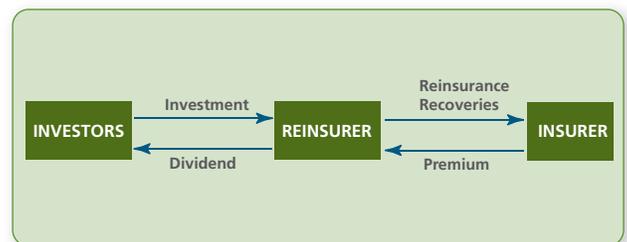


Figure 1: Financial Flows for a Typical Reinsurance Contract

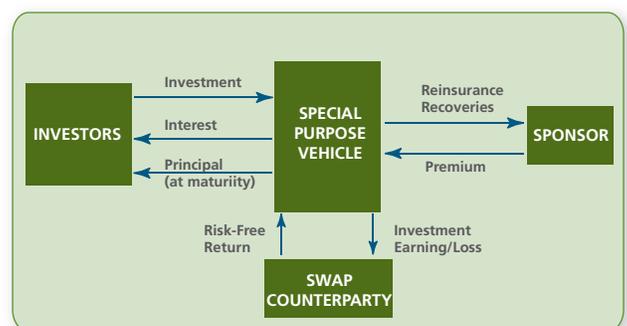


Figure 2: Financial Flows for a Catastrophe Bond

issued in 2007 was investment grade (rated Baa and above by Moody's, or BBB and above by Standard & Poor's or Fitch), with one AIR-modeled bond given the highest possible rating.

Should a defined event occur (the so-called "trigger" event), the SPV will use part or all of the funds lent to it by investors to pay the appropriate recovery to the sponsor. If no loss-causing events occur, the bond's principal is returned to investors after the bond's scheduled lifetime elapses. Most bonds last from one to five years.

TRIGGER MECHANISMS

Trigger mechanisms vary from bond to bond. Each represents an equilibrium between the preferences of the sponsor and the investor. For instance, the payout from an indemnity bond is based on actual losses to the sponsor. Sponsors appreciate this type of trigger because it eliminates basis risk—the difference between their losses and the bond's payout. However, this situation creates a moral hazard from the investor's point of view, as the sponsor could become less vigilant in settling claims or write new, riskier policies. Also, the final loss to the bond may not be known for many months as claims develop, creating uncertainty. Basis risk is an important issue for most sponsors, and AIR can help clients understand and quantify the basis risk associated with each trigger type.

A bond's trigger type and level of protection is typically arrived at through an iterative process between the sponsor and the structuring agent. AIR may assist in this process by providing interim risk analyses. Triggers typically fall under one of four broad types defined below, although these can be customized to match the transaction's needs. AIR has extensive experience working with all trigger types, and has modeled some of the most innovative structures in the market.

INDEMNITY: recovery is based on the sponsor's actual losses, just as in most reinsurance contracts. The modeling agent estimates the transaction's risk based on the sponsor's actual portfolio of exposure.

NOTIONAL PORTFOLIO (also called modeled loss): the loss to the bond is determined by the modeling agent by collecting actual events' parameters, such as magnitude and epicenter location for earthquakes, recreating them in its catastrophe model, and estimating their financial impact on the notional portfolio originally used to estimate the bond's risk. This portfolio may or may not be similar to the sponsor's actual exposure.

INDUSTRY LOSS INDEX: the bond is triggered based on actual losses to the insurance industry as a whole. In the U.S., the loss is typically measured by Property Claims Services®, which is why this is often referred to as a "PCS® trigger." The sponsor does not need to divulge the details of its portfolio to investors for this type of trigger; instead, the modeling agent uses its own database of insured industry exposure to estimate the bond's probability of being triggered. A risk analysis of the sponsor's portfolio can also be performed in order to estimate correlations between the sponsor and the industry's risk profile, and select an industry loss trigger that will minimize basis risk.

PARAMETRIC: recovery is based on objective measurements, such as a hurricane's maximum wind speed and landfall location, or the ground motion measured by multiple seismometers after an earthquake. In order to minimize the sponsor's basis risk, a detailed risk analysis of the sponsor's portfolio is performed before deciding on the parameters of a qualifying event.

FOR THE INVESTOR

AIR's extensive consulting and modeling capabilities are also available to insurance-linked securities (ILS) investors. Investors who use AIR's CATRADER® can obtain, upon request and at no additional fee, detailed instructions for remodeling approximately 85% of all cat bonds currently in the market, regardless of whether AIR was the original modeler of the bond. Investors use this information to analyze bonds' suitability and correlation with their existing portfolio of cat risk, just as they would any reinsurance contract. Reinsurers and specialist cat bond investors alike have used this feature to both control their cat exposure and make decisions to issue their own cat bonds to protect portfolios of reinsurance contracts, Industry Loss Warranties (ILW) and cat bond investments. AIR is the only cat modeler to date to support these innovative transactions, including the first actively-managed Collateralized Debt Obligation (CDO).

RESETS

Most cat bonds provide protection against losses over multiple years. However, the risk to non-parametric bonds is estimated based on the exposure (the sponsor's or the industry's, depending on the trigger) in force at issuance. The combination of a fast-growing exposure base and an indemnity or industry loss trigger could expose investors, over time, to a substantially greater risk than that for which they are being compensated. Similarly, the growing disconnects between the risk analysis and the exposure in later years will cause the sponsor's basis risk to increase over time. Sponsors can prevent this by maintaining a close fit between their risk and the bond's trigger. This is done by regularly remodeling the bond based on the most current exposure, adjusting the trigger to maintain the bond's probability of loss at the level defined at issuance. For transactions lasting three or more years, resets are typically performed on an annual basis, as this is sufficient time for the original risk analysis to become materially removed from the sponsor's actual risk profile.

CONCLUSION

By some estimates, the property catastrophe bond market is likely to grow from the current \$15 billion of principal at risk to \$50 billion in five years, and as much as \$150 billion in ten years.

Close to \$7 billion in property catastrophe bonds were issued last year and all indications suggest that 2008 will be another active year. As the market has matured, the process of issuing a catastrophe bond has become easier and companies considering securitization have powerful resources at their disposal through AIR.

Whether you are considering issuing a catastrophe bond or are a potential investor and would like more information, please contact your AIR representative. We have the experience and expertise to guide you through the process.

ABOUT AIR WORLDWIDE CORPORATION

AIR Worldwide Corporation (AIR) is the scientific leader and most respected provider of risk modeling software and consulting services. AIR founded the catastrophe modeling industry in 1987 and today models the risk from natural catastrophes and terrorism in more than 50 countries. More than 400 insurance, reinsurance, financial, corporate and government clients rely on AIR software and services for catastrophe risk management, insurance-linked securities, site-specific seismic engineering analysis, and property replacement cost valuation. AIR is a member of the ISO family of companies and is headquartered in Boston with additional offices in North America, Europe and Asia. For more information, please visit www.air-worldwide.com.

