

The Insurance Link to Securities

Securitization, Part I

by J. David Cummins

Projected catastrophes like a \$75 billion Florida hurricane or a \$100 billion California earthquake would severely stress the capacity of insurance and reinsurance markets. However, while \$100 billion represents approximately one-third of the equity capital of U.S. property-liability insurers, such a loss amounts to only about 0.5 percent of the value of U.S. stocks and bonds. Clearly, if a way could be found to access securities markets directly, it would solve the problem of financing catastrophic (CAT) risk. >

In fact, such an entrée into the securities markets already exists—insurance-linked securities that pay off in the event of a CAT loss. These securities are bought by investors, such as hedge funds and pension plans, that receive a premium above usual market yields for bearing the risk of catastrophes. Why would any investor buy a security that creates an exposure to a large loss in the event of a hurricane or earthquake? The answer is that such investments form only a small part of their highly diversified portfolios. CAT securities are valuable to investors because CAT losses are zero-beta events, meaning their correlation with market security returns is close to zero. Zero-beta securities are valuable for diversification purposes because they make it possible for investors to reduce risk for any given level of expected portfolio returns, that is, to improve portfolio efficiency.

Sampling

One version of CAT risk securities are the CAT call spreads currently traded on the Chicago Board of Trade. The payoff structure is identical to excess of loss reinsurance. The contracts pay off when losses exceed a retention level, or lower strike, and continue to pay until losses reach a specified cap, or upper strike.

Unlike reinsurance, however, the contracts do not pay off based on the loss experience of a specific insurer, but rather on industrywide loss indices. The Chicago Board of Trade defines one index point as total industry losses divided by \$100 million. Thus, if insurance industry CAT losses are \$5 billion, the index value would be 50. The payoff on the option is \$200 multiplied by the index minus the lower strike, with a cap determined by the upper strike. Contracts are traded on a national index, five regional indices and three state indices (California, Florida and Texas).

To hedge its risk of Florida hurricane losses, an insurer could buy 40-60 September Florida calls. These calls pay off on the Florida loss index for the third quarter of the year (July, August and September). If \$5.5 billion

in hurricane losses occur, the index would be 55 and the payoff would be $\$200 \times (55 - 40)$, or \$3,000 per contract. The contracts are sold or “written” by investors who receive a premium in return for bearing the risk.

Another important type of insurance-linked security is the CAT bond. A CAT bond is similar to an ordinary corporate or government bond in that investors loan money to the issuer (usually an insurer) and receive coupon payments and the eventual return of the principal. Unlike ordinary bonds, however, the return of principal on CAT bonds is contingent on the occurrence of a catastrophe. If a specified triggering event occurs, the repayment of principal to investors is partly or totally forgiven, and the issuing insurer can use the proceeds of the issue to pay claims.

For example, an insurer might issue CAT bonds totaling \$500 million. The insurer promises to pay interest on the bond and to repay the principal in a year unless the triggering event occurs. The triggering event might be defined as a hurricane of a specified severity causing the insurer at least \$500 million in losses in the southeastern United States. The proceeds of the bond are invested in safe securities, such as U.S. Treasury bonds, that are held in a special trust or by a single purpose reinsurer. If the triggering event occurs, the insurer is permitted to withdraw some or all of the principal from the trust to pay claims. In return for taking the risk, the investors receive the interest rate on safe securities, such as the one-year Treasury bill rate, plus a premium over and above the Treasury rate. A typical premium for CAT bond investors is about 4 percent (400 basis points).

A third type of CAT-linked security is the catastrophic equity put option. This type of security provides the issuer—again, usually an insurance company—with contingent equity financing. The catastrophic equity put gives the insurer the right to issue a prespecified amount of equity, usually preferred stock, at a prespecified price, contingent on the occurrence of a specified triggering catastrophic

event.

The put option may give the insurer the right to issue one million shares of stock at a price of \$60, for example. Suppose the triggering event occurs, causing severe losses and driving the insurer's stock price to \$40. It then becomes advantageous for the insurer to issue shares at the prespecified price of \$60. Again, the option is “written” or sold to the company by investors who are compensated by receiving an option premium from the insurer.

Considerations

There are a number of factors that can affect the success or failure of CAT-linked security offerings, and they are important elements to consider when comparing CAT securities with conventional insurance and reinsurance transactions.

One factor is *credit risk*—the risk that the counterparty to the transaction will fail to pay when the triggering event occurs. In the case of a CAT bond, the counterparty is the trust that holds the Treasury securities purchased with the proceeds of the bond issue. Because the trust is funded with safe securities and exists only for the purpose of this single transaction, the credit risk of a CAT bond is close to zero.

The counterparties in the case of Chicago Board of Trade options are the investors who write the options. However, organized exchanges control credit risk through margin requirements, trading limits and daily settlement, with ultimate guarantees from the exchange's clearing corporation. Hence, the credit risk of exchange traded options is also low.

Credit risk is more important to consider for catastrophic equity put options, because the puts traded thus far are not issued through an organized exchange, much like conventional reinsurance that carries the risk that the reinsurer will fail to pay.

Another important aspect to consider in securitization is *moral hazard*—the possibility that the insurer will write too much insurance in regions protected by the CAT securities or over-report claims in order to collect

more money than is justified. Moral hazard is obviously also a problem in conventional insurance and reinsurance, and provides the economic rationale for underwriting.

Moral hazard is also a potential problem in a CAT security where the contract payoff is based on the losses of the insurer issuing the security. In most of the CAT bonds issued so far, moral hazard is dealt with by including a percentage coinsurance, whereby the insurer collects only 90 percent (for example) of its CAT losses after the triggering event occurs. The purpose of the coinsurance is to reassure bondholders that the insurer will not act against their interests.

One advantage of index-based contracts, such as the Chicago Board of Trade options, is that the payoff is not tied to the experience of any one insurer. The moral hazard of index linked contracts is thus very low. Bonds, or options where the trigger is parametric, eliminate moral hazard. Parametric triggers are based on criteria over which the issuer has no control, such as the strength of a storm (on the Saffir-Simpson scale) or the magnitude (in Richter scale units) of an earthquake. For example, Japanese CAT bonds have been issued where the triggering event is an earthquake of specified Richter scale strength in Tokyo.

One of the most controversial issues in insurance securitization is the importance of *basis risk*. Basis risk is the risk that the payoff of the CAT security will be less than perfectly correlated with an insurer's losses. For CAT bonds and conventional reinsurance, where the payoff is triggered by the hedging insurer's own loss experience, basis risk is low. On the other hand, where the payoff is based on an index or a parametric criterion, the probability exists that the insurer will collect more or less than it expects.

For instance, an insurer may enter into an index-linked CAT option hedge that pays off for a Florida hurricane causing industrywide losses between \$10 and \$20 billion. Suppose, for example, that a \$15 billion hurricane occurs leading to \$4.5 million in losses for the hedging insurer. It is possible that the option contracts will

pay only, say \$3.5 million, or possibly \$5 million, leaving the insurer imperfectly hedged.

Not knowing the degree of basis risk creates problems for insurers because of the uncertainty about the correlation of their losses with the industry loss index. A study currently underway will help to answer that question and give insurers more confidence in using index-linked contracts. The study, conducted jointly by The Wharton School, Applied Insurance Research and the Insurance Services Office, uses simulation analysis to measure the basis risk of insurers operating in Florida, over a wide range of storms. Preliminary analysis reveals that many insurers can hedge effectively using call option spread contracts based on a statewide loss index, and that even small insurers can make effective use of index options.

The Outlook

The securitization of insurance risk has the potential to radically alter the risk management landscape as we know it. The size of potential CAT losses relative to the capital available in the securities markets, as opposed to the insurance industry capacity, is simply too compelling for securitization to fail. Although the CAT bonds issued to date have been private placements, the development of a public market for this type of security is probable within the next few years. The standardization and simplification of CAT bond contracts necessary for the development of a public market will reduce transaction costs to the point where CAT bonds will become feasible for a much wider range of issuers. A wider market will permit investors to better diversify their CAT exposures, thereby reducing the proportionate loss to their portfolios from any given event. Publicly traded CAT bonds could be issued on a wide range of events throughout the world, such as California and Tokyo earthquakes, Australian typhoons, European floods, Florida hurricanes, and so on. Investors can also expect, in the not-too-distant future, the development of CAT risk mutual funds.

Securitization will also be driven by corporations that issue CAT securities directly in capital markets, totally bypassing the insurance and reinsurance markets, and adding to the depth and liquidity of CAT securities markets. In fact, the first issue of a CAT bond by a noninsurer (Oriental Land Company, the owner of Tokyo Disneyland) took place in May of this year. (See page 25 for more details on this particular transaction.)

Securitization will dramatically affect the role of reinsurers. Traditionally, reinsurers have played the role of underwriters and ultimate risk bearers for the industry. In the future, reinsurers will continue to employ their underwriting expertise to select portfolios of reinsurance contracts. However, they will bear less of the risk directly and lay off a higher proportion of risk to the securities markets by buying (and selling) CAT securities. The risk-bearing role of reinsurers will increasingly be replaced by their role as managers of basis risk and designers of innovative hedges for primary insurers.

The future also will bring the widespread securitization of other types of insurance, including automobile property damage, liability insurance and life and health insurance. Many insurers may find their role shifting away from risk bearing and more towards a role as "originators" of primary insurance contracts. The underlying causal factor is that the uniqueness of insurers and reinsurers lies in their underwriting and risk management capabilities, rather than in their ability to serve as ultimate risk bearers. Capital markets are much better suited to perform the latter function.

