Capital Market Innovation
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Executive summary

Many insurance industry participants believe that capital markets have the potential to bear some types of insurance risks more efficiently than insurance markets. In recent years, insurers have begun issuing securities linked to bundles of insurance risk, most commonly catastrophe risk. This report explores the prospects for these capital market solutions by first examining the general nature of financial in innovation and then assessing current market developments.

Financial innovation

Financial innovation — the act of developing new products and processes — has been robust in recent decades. One reflection of this activity is the explosive growth of derivatives trading, which has expanded 20-fold since 1986.

Three types of factors drive financial innovation: demand, supply, and taxes and regulation. Demand-driven innovation occurs in response to the desire of companies to protect themselves from market risks such as the fluctuation of exchange rates, interest rates, and energy prices. Supply-side factors that encourage financial innovation include improvements in technology and heightened competition among financial service firms. Other financial innovation occurs as a rational response to taxes and regulation, as firms seek to minimize the costs that these impose. Once the pace of financial innovation began to accelerate in the 1970s, the impetus to innovate assumed a life of its own. Major Banks and insurers set up product development units that serve as engines of innovation.

Growth of capital market insurance solutions

Following Hurricane Andrew and the Northridge earthquake of the early 1990s, property catastrophe reinsurance was in short supply and premium rates more that doubled. In reaction to this rate spike, some insurers began developing a new class of financial instruments that transfer insurance risk to capital markets. Approximately USD 12.6 billion worth of these capital market insurance solutions have been issued worldwide in the past five years. Nearly two-thirds of these transactions have involved catastrophe bonds, swaps and options. Other transactions include contingent capital and life insurance securitizations. After several years of rapid growth, the pace of issuance slowed in 1999 and 2000.

Capital market insurance solutions offer issuers several advantages, including the potential to reduce counterparty risk and to diversify funding sources. Investors benefit from new opportunities to diversify their portfolios and earn high risk-adjusted returns.

This report reviews ten factors critical to the success of capital market insurance solutions: higher reinsurance prices; liquidity; transparency; resolution of regulatory, accounting, and tax ambiguities; better benchmarks; industry education; ratings agency involvement; new investors; financial sector convergence; and specialization.
The issuance volume of catastrophe securitizations should grow from its current annual level of USD 1 billion to approximately USD 10 billion by 2010. Over time the set of securitized risks will become more diverse. There is vast market potential for capital market insurance solutions linked to non-catastrophe risks. If these solutions fulfill their potential, the range of risks that are deemed insurable will expand.

Capital Market Insurance Solutions

A series of major catastrophes can precipitate a shortage of global property catastrophe reinsurance capacity, driving up prices. For example, reinsurance was in very short supply in the wake of Hurricane Andrew and the Northridge earthquake, causing premium rates to more than double between 1991 and 1994. These events set into motion industry efforts to find alternative sources of reinsurance capacity.
Although property catastrophe reinsurance rates have declined from their 1994 levels, the need for catastrophe insurance continues to expand. Growing population densities, increasing wealth, and rising concentrations of property in endangered areas have created a clear long-term trend toward natural catastrophe losses of increasing severity*. The number of inflation-adjusted billion-dollar natural catastrophes grew from seven in the 1970s to nine in the 1980s and 32 in the 1990s. The reinsurance industry, moreover, regularly experiences capacity constraints for specific catastrophe exposures.

Some of these exposures are of staggering magnitude. Consider :

- An earthquake of magnitude 8.5 on the New Madrid Fault in the central United States can produce insured losses exceeding USD 115 billion.
- A Tokyo earthquake of similar likelihood can produce insured losses of USD 40 billion.
- A Florida hurricane with sustained wind speeds of more than 150 mph can produce insured losses exceeding USD 75 billion.

Because adequate insurance coverage for catastrophe exposures such as these is either prohibitively expensive or unavailable at any price, many catastrophe exposures are only partially insured. Thus, the uninsured losses realized in the wake of one of these catastrophes might be several times larger than the magnitudes listed above. Faced with this sobering reality, industry participants have begun developing capital market insurance solutions to help insure against property catastrophe risks.

The basic logic is compelling. Publicly traded stocks and bonds have a total market value of USD 60 trillion. Imagine that securities investors were to add securities linked to catastrophe risks to their stock and bond portfolios. A USD 250 billion event would represent less than 0.50/o of the global market portfolio. Fluctuations of this magnitude are a normal daily occurrence in securities markets. Capital market insurance solutions also offer advantages for non-catastrophic lines of business, not only for issuers, but also for investors.

Advantages for issuers

Pricing and availability

Large-scale purchasers of reinsurance often find that the coverage they seek is either unavailable or prohibitively expensive. This is because reinsurers limit their exposure to any one risk. Consequently, securitization can sometimes cost less than traditional reinsurance or can offer capacity that is not available on the traditional reinsurance market. Moreover, securitization provides multiyear coverage at a set price. Multiyear pricing insulates the issuer's cost structure from fluctuations in reinsurance prices.

Credit risk

Purchasers of reinsurance take counterparty risk into account when choosing their reinsurers. The times when reinsurance matters most are often the times when reinsurers are undergoing financial stress. Insurers therefore diversify their sources of reinsurance and prefer doing business with financially strong reinsurers. As evidence of this preference, reinsurers rated below AA as of 1999 wrote just one-fifth of reinsurance premiums.

Capital market insurance solutions can be structured to minimize credit risk. when catastrophe bonds are issued, the finds collected are invested in investment-grade securities and guaranteed by a highly rated company. The securities are held as collateral in a trust account for the benefit of the reinsured and the investors. A non-US reinsurer usually establishes the trust account as a special purpose vehicle (SPV), which transforms the risk from reinsurance risk into an investment security. Because the SPV holds capital dollar for dollar against all potential claims, the arrangement can offer greater credit quality than conventional reinsurance, albeit at greater Cost.

Diversifying sources of capacity

Companies seeking to minimize the cost of financing diversify their finding sources. Even if one source of credit is slightly more expensive than another, a company might still access both just to be prepared for changing market conditions. Similarly, even if insurance securitization is now more costly than reinsurance, it may still pay to tap the

market. Doing so will allow quick and easy market access should changing conditions make securitization the lowest-cost source of coverage.

Advantages to investors

High expected returns

Catastrophe bonds typically pay interest rates close to those for similarly rated esoteric structured paper. These rates tend to be higher than those for corporate debt and traditional asset-backed paper (e.g. MBSs, credit card receivables) carrying the same credit rating. In particular, a representative sample of 17 catastrophe bonds issued from 1997 to 2000 were priced at an average spread of *4.20/a* above the risk-flee London Interbank Offered Rate (LIBOR), even though their expected losses averaged just 0.60/o. These high spreads compensate investors for: the relative illiquidity of catastrophe bonds; model risk (concern that expected losses are actually higher than estimated); and the non-traditional nature of the securities.

Portfolio diversification

Empirical analyses show that the occurrence of insurance-related events is un-related with the returns to stocks and bonds. Thus, investing in insurance-linked securities (ILSs) reduces the overall riskiness of an investment portfolio. In recent years, firms have developed a new class of financial instruments that transfer insurance risk to the capital markets. Approximately USD 12.6 billion of these capital market insurance solutions have been issued since 1996.

Recent innovations

Catastrophe bond

Nearly half of insurance securitization transactions to date have involved catastrophe bonds (popularly known as cat bonds). In a typical transaction, an SPV enters into a reinsurance contract with a cedent and simultaneously issues cat bonds to investors. If no loss event occurs, investors receive a return of principal and a stream of coupon payments that compensate them for the use of their finds and their risk exposure. If however, a pre-defined catastrophic event does occur, investors stiffer a loss of interest, principal, or both. These finds are transferred to the cedent, in fulfillment of the reinsurance contract.1'

Catastrophe swaps

Another common way to transfer catastrophe risk is through a swap transaction, in which a series of fixed, predefined payments is exchanged for a series of floating payments whose values depend on the occurrence of an insured event. The transaction can be structured as a swap or an option, but the cash flows are the same. The cedent can enter into the swap directly with counterparties or through a financial intermediary. Swaps, by design, offer benefits over catastrophe bonds. They are simpler to implement and entail fewer fixed costs. Unlike cat bonds, they do not tie up capital in an SPV. Swaps do, however, entail credit risk.

Industry loss warranties

An industry loss warranty (ILW) resembles a catastrophe swap but is structured as a reinsurance transaction. The risk transfer mechanism is a double trigger that is activated only if insurance industry losses and actual losses incurred by the purchaser of the ILW both exceed prespecified thresholds. Because of the indemnity requirement, the ILW can be treated as reinsurance rather than as a swap. The actual loss layer is set so low relative to the industry loss layer, however, that the actual loss event is very likely to occur should the industry loss event occur. As such, the ILW is priced based on the risk associated with the industry loss layer.

Contingent capital

Contingent capital instruments provide the buyer with the right to issue and sell securities at a fixed price for a fixed period of time if a predefined event occurs. These securities may be equity, debt, or some hybrid. For example, an insurance company can purchase the right to issue securities to investors at a pre-negotiated price if catastrophe-related losses exceed a certain threshold. Contingent capital differs from insurance in that **it** does not provide indemnification. It provides access to capital that either dilutes equity or must be repaid.

Exchange-traded options

Although efforts to date to develop exchange-traded catastrophe options such as the PCS options listed on the Chicago Board of Trade have not been successful, exchange-traded instruments may eventually become a widely accepted means of transferring insurance risk to capital markets. PCS exchange-traded catastrophe call options are standardized contracts that provide the purchaser with a cash payment if an index measuring catastrophe losses exceeds a certain level, known as the *strike price.* If the catastrophe index remains below the strike price for the prespecified time period, the options expire worthless and the seller keeps the premium. If, however, the catastrophe loss index exceeds the strike price, the purchaser of the options receives — and the seller provides — cash payment equal to the difference between the catastrophe index and the strike price. An insurer purchasing a catastrophe call option is hedging against the risk that large aggregate market losses, as measured by the index, will exceed the strike price.

Although all these instruments transfer insurance risk to capital markets, some are more suitable than others in particular situations. To illustrate the differences between these instruments, Table 1 highlights the advantages and limitations of capital market insurance solutions vis-a-vis property catastrophe reinsurance, the traditional means of protecting against catastrophe losses. In particular, it compares catastrophe bonds (a debt instrument), PCS options (an exchange-traded instrument), and contingent capital with traditional property catastrophe reinsurance.

Comparison of capital market instruments with reinsurance:

	Cat bonds / swaps	**PCS options**	**Contingent capital**	**Property catastrophe reinsurance**
Compensation / financing	Compensates buyer against losses, subject to basis risk	Compensates buyer against losses, subject to basis risk	Provides financing on pre-agreed terms in case of loss event. No indemnification	Compensated reinsured against losses
Basis risk	Present in deals with trigger based on index	Significant	Depends on the index /trigger used	Minimal
Credit risk	Minimal. Capital is invested in safe securities held by trustee	Minimal. Obligations guaranteed by the exchange	Minimal. Capital is invested in safe securities held by trustee	Depends on solvency of the reinsurer
Liquidity for risk taker	Currently low. Expected to improve as market develops	Currently low. Expected to improve as market develops	Low	Limited to retrocession market
Well-established underwriting accounting rules?	Yes	No	No	Yes
Well-established accounting rules for investors?	Yes	Yeas	No	Yes
Standardization	Customized	Standardized	Customized	Customized
Multiyear pricing	Available	No	Available	Availability depends on market conditions
Transaction costs relative to reinsurance	High , expected to decrease as firms gain experience	Low	High , expected to decrease as firms gain experience	N/A

Market developments

To date, more than USD 5 billion of property catastrophe risk has been securitized worldwide. The first non-exchange-traded capital market product that insured against catastrophe losses was a USD 85 million cat bond issued in 1994 by Hannover Re. Cat risk securitization achieved an annual volume of USD 1 billion in 1997 and USD 1.4 billion in 1998 (Figure 8). This rapid growth raised the expectation among market participants that capital markets would soon develop into a significant channel for sharing catastrophe risk. Then the growth halted. V/hat happened?

A 21% decline in property catastrophe reinsurance prices from 1996 to 1998 made the pricing of securitization deals less attractive by comparison.
Though most securitizations to date have been related to catastrophe events, there have been a few notable life securitization deals as well. Hannover Re transferred its new policy acquisition costs to the capital market in 1998 and has followed with three more offerings. Other companies that have done successful life securitizations include National Provident Institution, American Skandia Life, and Alleanza/Generali. Most of these deals have been motivated by the need for funding as opposed to risk transfer.

Futures and options contracts based on the initial version of the Chicago Board of Trade (CBOT) cat index began trading in December 1992 but there was little activity in the market. Trading in these securities was halted. A second version of the index, compiled by PCS, was introduced in 1995. These securities met with limited success. At its peak, the total capacity created by PCS options was USD 89 million. Trading in these options has slowed to a virtual halt.

In a separate initiative, the Bermuda Commodities Exchange (BCE) was launched in 1997 to trade property catastrophe-linked option contracts. The BCE suspended operations in 1999 due to lack of activity.

These developments suggest two questions: How might capital market insurance solutions evolve in corning years? What will it take for today's spurts of capital market activity to mature into a frill-fledged market?
Discussions with industry participant's point to ten factors that are critical to the successful development of capital market insurance solutions.

Ten Success Factors

1. Hard reinsurance market
By far the most important determinant of the success of capital market insurance solutions are whether they can offer issuers competitive pricing. Rising reinsurance rates in the early 1990s stimulated the demand for capital market insurance solutions to substitute for reinsurance. Just as these solutions began to develop in the mid-1990s, however, reinsurance premium rates declined to levels so low that capital market insurance solutions were, by and large, no longer competitively priced.
A hardening of the reinsurance market would help foster greater acceptance of capital market insurance solutions. A major catastrophe or a downturn in securities prices that renders several insurers insolvent could precipitate this. The unavailability of ample, reasonably priced insurance or reinsurance has spurred innovation before, accelerating the growth of captives in the 1970s and the founding of the Bermuda market in the 1980s.

2. Liquidity
Another key attribute of insurance linked securities (ILSs) is their liquidity. If the secondary market for these securities is active, investors can unwind their positions with a minimum of difficulty and at low cost. The absence of this liquidity makes the securities a less attractive investment vehicle. The need for liquidity is a 'chicken-and-egg' problem: for the pricing on ILSs to improve, more investors must become interested in them. Investors, however, would rather see more deal flow before devoting time and effort to analyzing these securities.

Traditional reinsurance markets are far less liquid than securities markets. An active market for ILSs could make insurance risks substantially more liquid than they are today. Experimentation will include the creation of new contracts on established commodity exchanges and the development of entirely new exchanges dedicated to the efficient exchange of risks among insurers. Both approaches have been tried; each is a reasonable possibility. Just as leading securities firms have found it worthwhile to create new electronic exchanges to facilitate the efficient trading of stocks and bonds, insurers should find value in developing efficient mechanisms for sharing risks.

3. Transparency

A key advantage of capital market insurance solutions is that they permit greater transparency, thereby allowing a larger group of investors to bear a given risk than was previously feasible. This advantage is important because capital market insurance solutions compete with reinsurance, a mature, standardized means of risk transfer that is widely accepted in the marketplace and simple to execute. The reinsurance industry is global, well established, and possesses the expertise needed to underwrite a wide range of risks. For capital market insurance solutions to succeed, the benefits of transparency must outweigh the information advantage and skills that reinsurers possess.

4. *Resolution of regulatory, accounting and tax ambiguities*
Regulatory, legal, tax, and accounting rules heavily influence whether, and how widely, a financial innovation is adopted. As the rules and regulations governing capital market insurance solutions grow clearer, insurers will become more willing to securitize their risks. One survey found this to be a factor critical to the success of capital market insurance solutions. Because of their newness, however, some capital market reinsurance solutions presently receive less favorable regulatory treatment than reinsurance. As tax and regulatory authorities grow familiar with these instruments, they will be better equipped to establish clear standards and regulations.

5. *Development of better benchmarks*
An important step on the road to a liquid market for ILSs is the establishment of benchmarks through which industry participants can monitor the progress of a given region or line of business. The existence of well-accepted stock market indices such as the FTSE100 and the Nikkei 225 and benchmark securities like the ten-year Treasury bond greatly facilitates the development of financial derivatives. Analogous benchmarks for the insurance industry are needed to provide a solid foundation for capital market insurance solutions.

6. *Industry education*
For capital market insurance solutions to win broad acceptance, a critical mass of insurance industry participants must become familiar and comfortable with capital market concepts. This will require an extensive education initiative. Professional leadership by individuals, companies, and industry organizations can help make this happen.

7. *Credit rating agencies*
Credit rating agencies play a crucial role in the development of capital market insurance solutions. Their ratings of ILS deals offer investors an objective assessment of just how risky the securities are. More important, by distributing information to investors on how they rate these transactions rating agencies play an invaluable educational role.

8. Attracting New Investors
ILSs must attract new investors. These early adopters include firms with institutional knowledge of insurance markets. Some insurers and reinsurers invest in the instruments because they offer a simple way to enter a line of business or region without building costly infrastructure. Individuals who have worked in the insurance industry as underwriters, actuaries, or security analysis have begun opening assets management boutiques investing exclusively in these instruments for clients. Hedge funds that invest in a wide range of assets have also expressed an interest in these securities. Many investors favor hedge funds whose returns are uncorrelated with the bond and stock markets. It is precisely this lack of correlation that is a major selling point of ILSs.

9. Financial Sector Convergence
With ongoing financial market deregulation in Europe, Asia and USA. Financial institutions are looking to enter profitable insurance lines of business. These new competitors will force insurers to embrace change.
Some professional risk mangers are beginning to address a wide array of business risks such as interest rates, exchange rates, commodity prices, and even weather.

10. Specialization

Prospects

The exact types of capital market insurance solutions that will win acceptance and their rate of adoption remain uncertain. Despite this ambiguity, the compelling benefits that these solutions offer — reduced credit risk, added risk capacity, and an enhanced ability to shift risks to those best prepared to bear them suggest that convergence of the capital and insurance markets will continue. This section reviews current developments regarding capital market insurance solutions and considers what the future might hold.

Current developments

Several recent developments have strengthened the market outlook for insurance securitization.

Hardening markets
Interest in insurance securitization has been rekindled in recent months because of ~d rising reinsurance premium rates in most markets in 2000. These increases reflect

Substantial property catastrophe losses in 1999, which was the second-worst year on record. In reaction to these catastrophes, a number of insurers suffering severe losses have withdrawn from the market.

At the end of 1999, the two most severe winter storms in a decade devastated areas of Europe, including France, southern Germany, and Switzerland. Storms *Lothar* and *Martin* caused economic losses of USD 12 billion and USD 6 billion, respectively. Nearly half of these damages were insured; reinsured losses for the two storms were USD 3.8 billion and USD 1.6 billion.[19] In response to these events and the resulting hardening of the reinsurance markets in Europe, several major reinsurers issued cat bonds covering European windstorm risk at the end of 200() and the beginning of 2001.

Regulatory, tax, and accounting issues
Several key issues are under debate by regulatory, accounting, and tax authorities.

Insurance Commissioners
Commissioners must approve ILS products, currently several states in US and several European countries are approving these alternatives.

Accounting status if derivatives
Another question that regulators are addressing is how an insurer's purchase of a derivative security to hedge its underwriting risk should be treated for accounting purposes.

Standardization and Education
Standardization and public leadership are valuable means by which to promote the development of a new market.