

Index-based Reinsurance

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Catastrophe bond use has grown tremendously over the last two years despite continuing softness in reinsurance prices. Investors have become increasingly comfortable with catastrophic risk, decreasing the cost of funding while increasing the funds available for this investment class. Knowledgeable market participants now believe that there are several billion dollars of capital available for investment in these securities.

In spite of insurer willingness to try new risk management strategies and investors' increasing desire to fund catastrophe risk, a number of obstacles must be overcome before capital market instruments can become a viable form of risk transfer for most companies. Chief among these impediments is transaction cost. The work necessary to structure, price, market, and administer these offerings makes them too expensive for most insurance companies. Aside from making transaction costs prohibitive, the dissimilarities between these issues also make them highly illiquid.

Catastrophe indices offer substantial promise that these roadblocks can be overcome. By making catastrophe risk fungible, these indices permit significant transaction efficiencies, more liquidity, and greater access to capital. Although investors have used index-linked securities for many years, index-based catastrophe hedges are still quite new, and many risk managers are somewhat puzzled about how these transactions work.

There are some important differences between index-based hedges and reinsurance even though the basic risk transfer objectives are the same. The most obvious difference is that the Index is used instead of a specific company's losses to determine the contract's settlement value. Less obvious but of similar significance, the Index acts as a surrogate for many of the standard terms in a reinsurance agreement. By designating the risk period, perils, geographic areas, types of loss, and the events that will be covered, the use of an Index eliminates the need for many detailed descriptions and provisions in the risk transfer contract.

Defining Coverage Needs

As with reinsurance, the amount and type of protection must be determined before it is possible to construct a suitable layer of coverage. However, it is relatively easy to develop contract specifications once the insurer's risk management objectives have been established.

Suppose a company writes homeowners insurance on Long Island, New York where Hurricanes are the primary catastrophe risk. The insurer is confident that its loss experience tracks the Guy Carpenter Catastrophe Index (GCCCI) well and would like to find out if an Index-based contract might satisfy its need for catastrophe protection. The GCCCI measures the damage to homeowner properties from atmospheric perils for most ZIP codes.

Based on its catastrophe modeling and dynamic financial analysis, the insurer has decided that it would like protection against the possibility that total atmospheric perils during the period July through December will cause them to pay more than \$50 million in property losses (the attachment point). The company is willing to cap this layer of protection at \$100 million (the exhaustion point), in effect establishing a \$50 million layer of coverage.

Key Contract Terms

Having specified these parameters, all the essential elements of an index-based hedge have been determined. The company can generate a term sheet similar to Table 1 and circulate it to credit-worthy reinsurance and investment companies who may desire to take on this risk.

Table 1: Term Sheet

Risk Period: July – December 1999	
Reference Value: Aggregate ZIP Code Level GCCI Values	
Settlement: To be made quarterly with final settlement to be based on October 2000 GCCI Publication	
Coverage: Notional losses in excess of \$50 million not to exceed \$100 million	
Schedule of Notional Exposures:¹	
Sectional Center	Exposure (In Millions)
116xx	4,265
117xx	2,893
118xx	3,116
119xx	2,541
Total	12,815
Premium: ? to be paid by June 30, 1999	

The term sheet specifies the amount of “notional” or index-based exposures in each ZIP code that the contract will be based on. It is important to recognize that notional exposures are not necessarily the same as the company’s actual exposures. This contract feature gives the insurer flexibility to customize a hedge to meet its specific coverage needs. For instance, an insurer may want to increase the amount of notional exposures if it expects to underwrite more properties during the period. Alternatively, it might be appropriate for a company to decrease notional exposures if it believes that its damage rate profile is substantially better than the GCCI.

¹ Although the definitive schedule would list exposures by ZIP code, exposures have been grouped by their first three digits of each ZIP code to simplify this illustration.

The use of notional exposures is appealing to investors because it is a means of divorcing insurer specific risk from catastrophe risk in general. This provides a significant disincentive for moral and morale hazards and discharges the hedger's obligation to provide information about its historical results, management, underwriting and claim payment practices, and future business plans.

By defining the contractual exposures in terms of the GCCI, interested parties can expeditiously calculate actuarial fair values and determine a contract price. Within a week, the company should have a number of prices that can be compared with reinsurance alternatives. Taking into account the costs of the hedge as well as potential credit risk, an appropriate counterparty can be selected to secure this coverage.

Because the index-linked security described above is not a contract of indemnity, a strong case can be made that it classifies as an over-the-counter investment contract. Since no collateral or security deposits are involved, it can be argued that the hedge has no balance sheet impact. The hedger should expense the cost of the contract over the relevant risk period. Provided the counterparties are trading for their own accounts and are large, credit-worthy institutions such as banks and insurance companies, it is reasonable to conclude that this transaction will be exempt from oversight by state insurance regulators as well as the SEC and CFTC.

Determining Hedge Recoveries

After the risk period is over and Index values have been published, the settlement value of the contract can be determined. Since the contract is structured to provide a high layer of coverage, the attachment point will not be met in most years, and no recovery will be made. Table 2 shows how settlement values would be calculated assuming a relatively severe period of atmospheric loss activity.

Table 2: Calculating Settlement Value

Sectional Center	Notional Exposure (In Millions)	GCCI Value	Notional Losses² (In Millions)
(1)	(2)	(3)	(2 x 3)
116xx	4,265	0.7162%	\$ 31
117xx	2,893	0.6238%	18
118xx	3,116	0.4955%	15
119xx	2,541	0.3289%	8
Total Notional Losses			72
Attachment Point			(50)
Hedge Recovery			\$ 22

² Although definitive notional losses would be calculated by multiplying ZIP level notional exposures by ZIP-level Index values, we have summarized this process for illustration purposes by performing this calculation at the sectional center level, i.e. all ZIPs with the same first three digits.

Notional (contractual) losses are calculated by multiplying the notional exposures times the respective GCCI values. The hedge recovery is the amount by which the total notional losses exceed the attachment point as long as it does not exceed the coverage layer.

Implications for Intermediaries

The foregoing example demonstrates that it is relatively easy to simulate high layers of catastrophe reinsurance using index-based contracts. The use of notional or index-based exposures as a proxy for some segment of an insurer's loss experience provides hedgers with a great deal of coverage flexibility and considerably reduces the time and cost of placing the coverage. Index usage is also a means of establishing the exact quantity and quality of the risk being exchanged. This helps make index-based reinsurance more definitive and transparent than traditional reinsurance.

Index-based coverage can also be useful to intermediaries who are trying to broker deals between insurers and reinsurers when each party believes the other has miscalculated the actuarial fair value of the risk. An insurer may think that its historical loss experience is a poor indication of its on-going property catastrophe risk, or conversely, it may feel that its superior loss history is being overlooked. In either circumstance, an index-based hedge may be the answer.

So long as the company can meet or beat its expectation of loss, relative to the index, the company that uses index-based reinsurance will be rewarded with lower cost coverage and adequate protection. If the company's loss experience proves to be worse than it expected in relationship to the index, it will have paid less for the contract but at the expense of inadequate coverage. Thus, index-based coverage can be a good tool for bridging valuation gaps between insurers and reinsurers, allowing reinsurers to meet their client's demand for lower-priced coverage without bearing the risk of company-specific loss experience.

Author's Note:

This article was published in January 1999 by Financing Risk & Reinsurance.