

## **Hedging Peak Loss Experience**

**By Bruce B. Thomas**

Excess of loss reinsurance works well to protect insurers writing homeowner policies against the financial shock of a large catastrophe, but it tends to be a relatively blunt risk management tool. While companies use this type of reinsurance to obtain a specified layer of aggregate property loss coverage in the event of a major catastrophe, most catastrophes never reach such high layers. This leaves these insurers with the risk of loss from smaller events. While one or two of these events may not pose a problem, insurers often find that a number of minor events engender as much financial damage for them as one large event.

A case in point is the first six months of 1998. The largest event during this period was only \$650 million<sup>1</sup> for the insurance industry as a whole, and individual company losses were far below most companies' reinsurance covers. However, more than 25 catastrophes were reported in total, amounting to more than \$4.6 billion of insured loss. Individually, these events often cause damage that exceeds one year's worth of homeowner insurance premiums in the areas they affect. Furthermore, the combined financial loss of these "small" events forces insurers to contemplate the limitations of their excess of loss reinsurance treaties.

Although aggregate excess reinsurance helps protect insurers writing homeowners policies against the financial effects of a large number of catastrophes, it too has limitations. As with excess of loss reinsurance, a company must attempt to get the coverage it needs by setting deductible and coverage terms that apply across its entire book of property exposures. This is the equivalent of having a stereo system with only two controls, volume and tone. To fine-tune their reinsurance, insurers must be able to adjust their coverage to the particulars of their property exposures in each geographic area where they write business.

One innovative means of addressing these unmet needs for catastrophe protection is to augment existing reinsurance with a Peak Loss Hedge. A Peak Loss Hedge is similar to excess of loss reinsurance in that it specifies a layer of coverage against unusually bad loss experience. However, the attachment and exhaustion points are described in terms of industry-wide damage rates, instead of a company's own losses, and the layer of protection is customized to a company's need for loss protection in relatively small geographic areas.

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<sup>1</sup> As estimated by Property Claims Services, Inc. See [www.AISG.org/](http://www.AISG.org/) for more information about Property Claims Services.

### An Example

Consider XYZ Company, a multi-state homeowners insurer that would like to supplement its excess of loss cover by purchasing peak loss protection for several areas in South Carolina where its exposures are unduly concentrated. By describing its amount of in-force Coverage A insurance and the layer of protection it would like, XYZ can hedge a predetermined slice of loss experience for each of the areas where it writes business (see Table 1).

**Table 1: Term Sheet**

<b>Risk Period:</b> January through December 1999			
<b>Reference Value:</b> Aggregate ZIP Code Level GCCI <sup>2</sup> Values			
<b>Settlement:</b> To be made quarterly with final settlement Based on January 2001 GCCI Publication			
<b>Schedule of Notional Exposures and Coverage Limits</b>			
Sectional Center <sup>3</sup>	Exposure (In Millions)	Retention (GCCCI Value)	Limit (GCCCI Value)
278xx	314	.010	.020
283xx	587	.012	.030
284xx	340	.012	.030
285xx	408	.010	.020
<b>Premium:</b> ? to be paid by January 1, 1999			

Assuming XYZ is highly correlated with the Index and wants to purchase a layer of protection for its entire book, it would list the amount of its coverage A insurance in-force as the “notional” exposure in each area<sup>4</sup>. Nevertheless, increases or decrease in its underlying book of insured properties during the contract period will preclude an exact match between notional and actual exposures.

It is important to note that in some situations, an insurer may not want these amounts to equal. An insurer may want to increase the amount of notional exposures if it expects to underwrite more properties during the period, or decrease notional exposures if it believes that its risk of damage is substantially better than the Index.

<sup>2</sup> The GCCCI represents the average homeowner insurers atmospheric loss-to-insured value ratio and is published quarterly by IndexCo, LLC. More information on the GCCCI can be found at [www.indexco.com](http://www.indexco.com).

<sup>3</sup> Sectional Centers are units of geography used by the United States Postal Service in processing mail. A Sectional Center is made up of all ZIP codes sharing the same first three digits.

<sup>4</sup> Research by IndexCo has shown that insurers writing homeowners policies tend to be highly correlated with the GCCCI. Reference “Index-linked Hedges,” by Bruce B. Thomas in the September 1989 edition of *Financing Risk & Reinsurance*.

The Term Sheet also describes the retentions and limits for each geographic area in terms of Index (GCCCI) values. While the coverage could easily be described in dollar amounts by multiplying the notional exposure value times the respective retention and limit, expressing these terms in Index values helps make the contract more fungible. Using notional exposures and coverage limits allows reinsurers and investors to easily disjoin the contractual risk by geographic area, by notional exposures, and by probability of loss. By structuring the hedge in this fashion, the company-specific character of the risk has been transformed into generic, industry-wide risk that is more transferable and more liquid, increasing the feasibility of secondary transactions.

Assuming the investor decides to retain only half of the risk included in this contract, he can do so by transferring half the notional exposures using a similar contract or series of contracts with the same retentions and limits that were specified in the original agreement. This facilitates record keeping and permits the underlying risk to be transferred without impediment, until it has been fully absorbed in the marketplace.

**Determining Settlement**

Regardless of the number of transactions that may ultimately arise from the original contract or the order in which those transactions occur, settlement value is easily computed. After Index values have been published, the extent by which the Index values exceed the specified retentions determines the contract recovery so long as this amount is not larger than the limit. Table II shows this calculation.

**Table II: Determining Settlement Values  
(In Millions of Dollars)**

Sectional Center	Exposure Values	Retention	Limit	GCCI Value	Coverage Value	Contract Recoveries
278xx	\$ 314	.010	.020	.010	.0000	\$ 0.0
283xx	587	.012	.030	.025	.0130	7.6
284xx	340	.012	.030	.045	.0300	10.2
285xx	408	.010	.020	.015	.0050	2.0
Settlement Value						\$ 19.9

**Insurer Benefits**

The Peak Loss Hedge is advantageous to hedgers for a number of reasons. First and foremost, it is efficient. Insurers can use it to purchase coverage for just those geographic areas where it is truly needed and in just those amounts and coverage layers as is desirable. An insurer may want more coverage in areas where it has a concentration of property risks even if those areas are not particularly prone to hurricanes. For example, a company may find that too much growth in a given area destabilizes the geographic diversification of its property exposures.

By changing the parameters of the notional exposure, retention, and limits conveyed in a Peak Loss Hedge, the insurer can diversify away some or most of this extra risk. When high retention levels are used, the probability of loss diminishes, and this hedge resembles a collection of excess of loss contracts, since it describes separate coverages for a number of relatively small geographic areas.

Of course, the primary benefit of a Peak Loss Hedge is that coverage is based on preselected levels of loss experience for relatively small geographic areas rather than a single dollar amount of total company losses. In this way, a company is much more likely to get recoveries for smaller catastrophes where the losses would never reach the retention level specified in its excess of loss reinsurance treaty.

Regardless of the level of coverage that is ultimately purchased, the Peak Loss Hedge is a good complement to excess of loss reinsurance because insurers do not have to worry about the possibility of overlapping coverage. Since this type of hedge is an investment vehicle rather than an insurance product, an insurer can receive coverage from both risk transfer vehicles without concern for insurance laws prohibiting double recoveries. This provides insurers with tremendous flexibility to customize a Peak Loss Hedge to their exact needs.

### **Investor Benefits**

When investors buy catastrophe bonds from a large national insurer using an excess of loss structure, they take on several types of risk in addition to catastrophe exposure. First, there is the risk that the insurer's losses will be consistently worse than other companies in the industry. In addition to this "company specific risk," investors also get the risk that the insurer's portfolio of exposures is not well diversified.

Since the building stock of the United States is not evenly distributed throughout the country, it is virtually impossible for insurers to achieve a portfolio that is perfectly diversified from a geographic perspective. Thus, investors who underwrite catastrophe bonds for large national insurers are typically taking on concentrations of risk in Texas and Florida since that is where a large portion of housing value is and also where the majority of the largest catastrophes strike.

From these observations, we can conclude that the excess of loss structure typically used in catastrophe reinsurance and bond offerings makes it difficult for reinsurers and investors to build an optimal risk portfolio. In favorable contrast, the Peak Loss Hedge offers potential for maximum risk diversification. Use of the GCCI eliminates the possibility that company specific risk and moral hazard will affect contract valuation and settlement. By standardizing the risk, the Index also permits significant transaction efficiencies and greater liquidity.

In addition, the Peak Loss Hedge offers investors the opportunity to scale retentions and limits to the risk of loss in each geographic area. For instance, investors could sell a Peak Loss Hedge to cover the range of loss experience above the ninety-ninth percentile in each geographic area. By changing retention levels to match the potential for risk in each area, investors can easily develop a portfolio of catastrophe risk that is diversified by company and by geographic area.

Moreover, the Peak Loss Hedge offers investors maximum flexibility in designing secondary transactions. Because the risk has been described in terms of notional exposures, retentions, and limits for very small geographic areas, it can be unbundled and rebundled to suit the needs of every investor. Thus, investors can sell any portions of the notional coverage that they find undesirable, without reference to the original hedge or hedger.

### **Final Consideration**

In summary, the Peak Loss Hedge can help insurers purchase extra coverage for areas where they have undue concentrations of property risk and in just those amounts and coverage layers as they deem worthwhile. It acts as a good complement to excess of loss reinsurance because it provides protection against smaller catastrophes that individually or combined may create undue volatility in a company's earnings. Additionally, Peak Loss Hedge recoveries are classified as investment income and will not reduce the amount of the reinsurance recoveries that an insurer would otherwise be due.

These contracts are similarly advantageous to investors. Because they are based on an Index and can be split apart easily into their geographic, exposure value, and limit components, Peak Loss Hedges can be unbundled and resold in innumerable ways. This increases the liquidity of each transaction considerably and allows investors to select the most appropriate risk for their portfolios. In this way, risk that is unattractive to one investor can be transferred until it has been fully absorbed into the market.

### ***Author's Note:***

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