Basis Opportunity

By Bruce Thomas

Despite soft market conditions, the economic argument for index-based catastrophe risk protection is difficult to ignore. Indices allow catastrophe risk to be standardized, leading to lower transaction costs and greater liquidity. They permit investors to take on insurance risk without having all the accoutrements of an insurance company. By substantially eliminating the regulatory, capital, and human resource burdens that bar entry into this market, catastrophe indices help reduce both operating and capital costs and permit greater risk diversification. The resulting cost savings will be shared between the hedger and the investor, but the hedger will need to weigh the potential for price savings against the cost of basis risk.

Basis risk is the random variation between the hedger's underlying loss experience and the hedge recovery. This tracking error is not inherently bad; sometimes hedgers will get back more money than their underlying loss, sometimes they will get back less. Since basis risk has an expected value of zero, hedgers can trust that they will receive significant long-run savings from using cheaper index-based products. However, if there is too much tracking error, it is quite possible that the hedger may not survive the short-run. But how much basis risk is too much?

One means of answering this question is to construct a matrix showing how many dollars a hedger can save given a certain percentage of recovery shortfall (negative basis) and price discount (see Table I below). By assuming a "worst case" scenario, hedgers can determine the level of price reduction they must have before they are willing to select an index-based product.

Table I: Amount Saved per $100 of Reinsurance

	Reduction in Contract Cost				
Basis	**2.5%**	**5.0%**	**7.5%**	**10.0%**	**15.0%**
-5.0%	$ -	$ 2.50	$ 5.00	$ 7.50	$ 12.50
-10.0%	$ (2.50)	$ -	$ 2.50	$ 5.00	$ 10.00
-15.0%	$ (5.00)	$ (2.50)	$ -	$ 2.50	$ 7.50
-20.0%	$ (7.50)	$ (5.00)	$ (2.50)	$ -	$ 5.00
-30.0%	$(12.50)	$(10.00)	$ (7.50)	$ (5.00)	$ -

To construct this matrix, an assumption must be made about how much of each reinsurance premium dollar will be used to pay for expected losses. This relationship can be derived using a model of loss experience. The tables used in this article were based on a catastrophe reinsurance treaty placed in January of 1999 where expected losses were found to be 50% of reinsurance premiums.

Under this or any other reasonable assumption, a given percentage of price reduction will always outweigh the same percentage of negative basis. This is because basis is measured against loss experience while price savings is measured against the entire cost of reinsurance (including losses, operating expenses, and profits). An example will help clarify this point.

Assume a hedger believes her worst case scenario is a negative basis of 10%, i.e. her hedge recovery will be 10% less than her actual loss experience. Using the information in Table I, she determines that she should buy index-based coverage if she can purchase it for 5% less than comparable reinsurance. This is because negative basis of 10% causes a recovery shortfall of $5 for every $100 of reinsurance (10% times $50 of expected losses), but is offset by a $5 price savings (5% times $100 of reinsurance).

This scenario-based approach works well for hedgers who have a very clear understanding of the potential differences between their companies' loss experience and the index. Nevertheless, basis risk is a range of potential experience, and it is difficult to confidently pick one number as the "worst case."

A good starting point for a more thorough evaluation is to calculate the standard deviation of the difference between hedge recoveries and the hedger's actual loss[1]. This measure of basis risk allows us to put a probability estimate on the amount of negative basis that may occur and permits a more sophisticated analysis of the tradeoff between price reduction and the potential for negative basis (reference Table II).

Table II: Amount Saved per $100 of Reinsurance With 95% Confidence Level

Standard	95% Confidence	Reduction in Contract Cost				
Deviation	Level	4.1%	8.2%	12.3%	16.5%	24.7%
5.0%	-8.2%	$ -	$ 4.11	$ 8.23	$ 12.34	$ 20.56
10.0%	-16.5%	$ (4.11)	$ -	$ 4.11	$ 8.23	$ 16.45
15.0%	-24.7%	$ (8.23)	$ (4.11)	$ -	$ 4.11	$ 12.34
20.0%	-32.9%	$(12.34)	$ (8.23)	$ (4.11)	$ -	$ 8.23
30.0%	-49.4%	$(20.56)	$(16.45)	$(12.34)	$ (8.23)	$ -

For example, a company that has 10% standard deviation of expected loss can be confident that 95% of the time its negative basis will not exceed 16.5% (.10 x 1.645, assuming a normal distribution). Thus a price reduction of 8.2% would more than offset this company's potential for negative basis 95% of the time.

[1] This difference is termed "basis." Conditional upon Hurricane Fran, IndexCo determined that the standard deviation of basis for large homeowner insurers was approximately 5% of expected loss.

In short, economies of scale and distribution can only be achieved with standardization. To take advantage of the price savings that standardized risk transfer products offer, hedgers must weigh the risk of negative basis against the price savings of index-based contracts. Once hedgers understand their potential for basis risk, the choice is relatively simple. Ultimately, the best risk management solution will include a combination of traditional reinsurance and standardized financial contracts, and risk managers must be able to compare these alternatives.

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