

Index-based Pooling: A Cost-effective Way of Reducing Loss Volatility

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A model for small insurers?

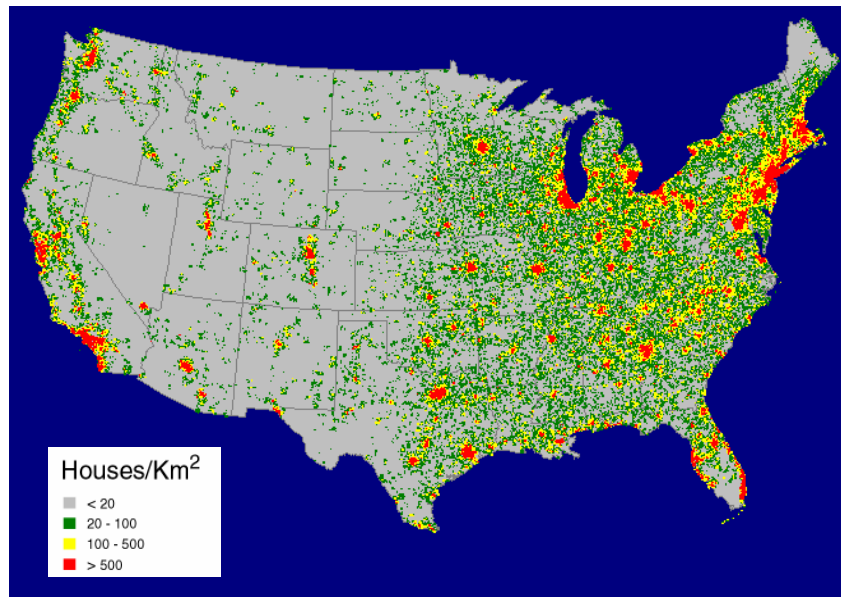


Since catastrophic damage is often confined to relatively small areas, it is reasonable to conclude that catastrophe risk in different geographies is largely independent. Thus, an optimal portfolio¹ of catastrophe risk would cover many geographic areas and consist of an equal amount of risk in each area.

Unfortunately, a number of factors conspire against insurance companies that would like to create such portfolios. First, property exposures in the United States tend to be concentrated along the coasts (reference Map I). Second, regulation often makes it difficult or unattractive to write insurance in all states. Lastly, the channels companies use to distribute their products may also tend to concentrate their property risk geographically.

¹ Assuming that insured risk is priced appropriately, an optimal portfolio can be defined as one that minimizes loss variation.

Map I: Distribution of US Homes



Although it is virtually impossible to take on just the exposures insurers would like, companies typically rebalance their portfolios by buying and selling reinsurance, which increases their underwriting capacity and helps them achieve more stable earnings. Nevertheless, price and capacity fluctuations in the reinsurance market have made it desirable for primary insurers to explore other avenues of risk transfer as well. Reinsurance pooling is one option that has a great deal of promise.

Pooling Problems

By jointly agreeing to share a subset of their combined loss experience, insurers can make certain that risks are spread evenly among pool members. More importantly, reinsurance pools tend to have a price advantage since they make more effective use of members' existing capital rather than attempting to find a new source of capital to fund this risk. Despite these benefits, reinsurance pools are usually considered a last resort because pool administration is often costly, complex, and opaque.

Managing a pool generally requires a staff of professionals to review claims, perform reserve analysis, and maintain the pool's books and records. More troubling than the cost of this effort, is the possibility that some members will benefit at the expense of their peers. Typically member companies are responsible individually for risk selection and claim payment functions. This sets the stage for potential disagreements since some pool members will do a better job of underwriting and mitigating losses. Since losses are shared equally

regardless of their individual efforts, there is an inherent disincentive for superior performance. Ultimately, standards suffer for all pool members.

In addition to moral hazard, lack of standardization and transparency creates problems for everyone associated with a reinsurance pool. The recent brouhaha over the Unicover workers' compensation pool shows how disputatious things can get when it is not clear what risk is being assumed and ceded.

Advantages of Index-based Pooling

Index-based pooling overcomes these weaknesses by using a catastrophe index in place of individual company losses. Management risk is eliminated since companies who beat the index can receive more recoveries than they had in insured losses, in effect, creating a windfall and a strong incentive for good performance. Also, index usage eliminates the need for the pool administrator to audit claims or perform reserve analysis. This makes the calculation of pool settlements a relatively simple matter that is completely transparent and objective.

Although this concept permits endless variation, IndexCo, LLC² has done research that demonstrates how homeowner insurers could use the GCCCI to diversify the geographic component of their catastrophe risk and reduce loss volatility caused by catastrophes. The Geographic Risk Pool provides a mechanism for insurers with different geographic concentrations of risk to swap standardized catastrophe exposures. As more members become participants in the Pool, both the loss experience of the Pool and of each Pool Member begins to look more like the industry as a whole.

A Geographic Risk Pool

Prior to the start of each risk period, Members must agree on a definition of Pool losses, i.e. specific attachment and pool coverage amounts in terms of the GCCCI for each geographic area covered by the Pool. For example, members might decide that the Pool would cover the 90th to the 99th percentile of loss experience. Establishing this range equalizes the risk of loss in different areas. Thus, the likelihood of a member receiving a pool payment would be the same regardless of where its exposures are located.

For each geographic area included in the Pool, the expected GCCCI value in the Pool coverage range is multiplied by each Member's insured exposures to determine how much risk each Member has contributed to the Pool in total. Members fund Pool losses in proportion to how much risk they have contributed to the Pool. For example, if company A contributes exposures amounting to 10% of the Pool's overall risk, it will be responsible for paying 10% of the Pool's ultimate losses. After the risk period is over and the Index has been published, GCCCI values are used to determine the extent of Pool losses, and

² IndexCo, LLC publishes the Guy Carpenter Catastrophe Index (GCCCI). IndexCo is located in Hartford, CT and is a subsidiary of Guy Carpenter & Company.

payments to Members are based on their proportionate share of property exposures in each affected area.

Since the total Member assessments equal the total payments made to Members, it should be clear that the Pooling mechanism is merely a means of homogenizing the geographic component of each Member's catastrophe risk. While the Pool does not change the expected value of a Member's catastrophe losses, it helps stabilize Member underwriting losses. By providing another source of capital to fund catastrophe losses, the Pool also acts as a means of diversifying credit risk.

It sounds good. But just *how* useful is this mechanism to insurance companies?

IndexCo's Research

IndexCo used US Wind³ to estimate the range of loss experience that would constitute a coverage layer equaling the 90th to the 99th percentile of expected loss in each Sectional Center⁴ for every coastal state from Texas through Maine. Using 22 companies' actual exposure information and modeled loss information, it is clear that the Geographic Risk Pool can substantially reduce the underwriting volatility of small, state or regional companies.

Table I: Risk Pool Benefit

Average Market Share⁵	Number of Companies	Average Volatility Reduction
< 1%	14	13.2%
1% - 2%	4	5.4%
2%>	4	3.4%

As Table I indicates, the smallest companies tended to benefit most from the Geographic Risk Pool, with companies having less than 1% market share enjoying an average reduction in volatility of 13.2%. On average the largest insurers in our sample did not enjoy a significant benefit from the Pool, and one can conclude that they are much better able to cope with catastrophe losses than smaller companies due to their greater geographic spread of risk. However in every size grouping, some companies were much more or less diversified than their peer group, indicating that size alone does not guarantee exposure diversification.

³ US Wind is a catastrophe model owned and licensed by EQE International. More information on it can be found at www.eqecat.com.

⁴ A Sectional Center is a unit of geography used by the United States Postal Service and is made up of all the ZIP codes sharing the same first three digits.

⁵ Average market share was derived by taking an average of each company's state level market share for coastal states Texas through Maine as reported by A.M. Best Company, Inc., 1997 P/C State/Line Report.

To reduce loss volatility for any individual member, the Pool must have more diversified exposures than the potential pool member. If the Member’s exposures are more geographically diverse than the Pool exposures, participation in the Pool will increase the Member’s loss volatility. Thus, the Geographic Risk Pool works best when Member companies do not have a significant amount of overlapping exposures. With this criterion in mind, one would think that the state wind pools would be good candidates for this type of Pool.

To test this hypothesis, IndexCo constructed a group of state specific companies with exposures contained within each coastal state from Texas through Maine. Exposures for each hypothetical state-company were compiled by using GCCI exposures within 10 miles of the coastline.

**Table II: Risk Pool Benefits
For State-specific Insurers**

State	Volatility Reduction	State	Volatility Reduction
AL	27.7%	MS	41.9%
CT	16.1%	NH	23.0%
DE	19.1%	NJ	27.0%
FL	19.2%	NY	14.0%
GA	34.3%	NC	27.4%
LA	24.4%	RI	21.4%
ME	21.2%	SC	23.0%
MD	26.8%	TX	54.2%
MA	21.4%	VA	26.5%
		Average	26.0%

Table II shows that the pooling can significantly reduce state-specific insurer volatility by diversifying the geographic component of catastrophe risk. Although there is considerable variation in how effectively this mechanism works, average volatility was reduced by 26% for this group of companies. When compared with the insurers’ loss experience in Table I, it is clear that the Geographic Risk Pool can offer significant benefits to companies whose exposures complement each other well.

Chart I: Loss Value Comparison

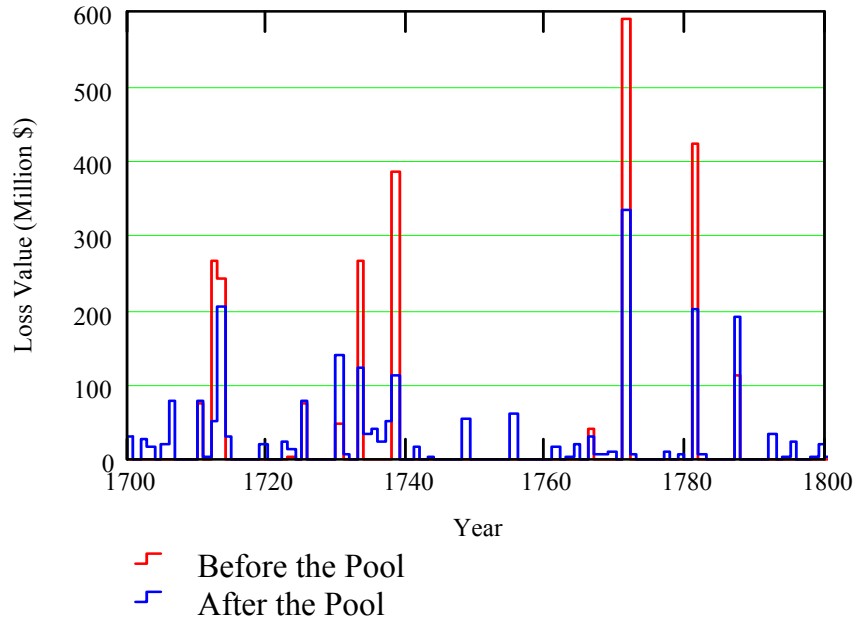
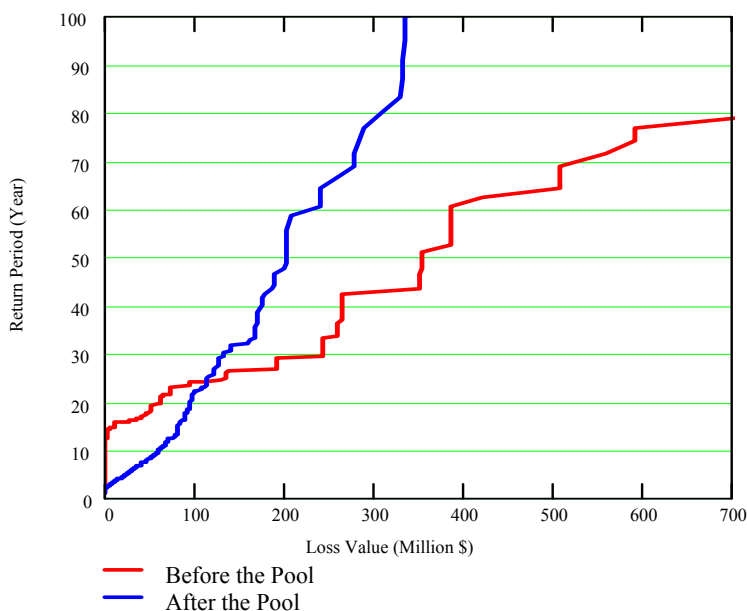


Chart I shows the simulated loss experience of the hypothetical New York Company both before and after the effects of the Risk Pool for a one hundred year period. The red bars indicated the extent of the company's loss experience before joining the pool. The blue bars indicate the net amount of losses that the company would have experienced after participating in the pool. Because of its membership in the Pool, the company will make payments to the Pool when it has few losses and receive money from the Pool when it experiences traumatic losses.

Chart II shows a return period comparison of this company's loss experience before and after joining the Pool.

Chart II: Return Period Comparison



This chart shows that participation in the Geographic Risk Pool would turn the hypothetical New York Company's once in 60 years loss of \$380 million, into a loss of only \$200 million. In payment for this coverage, the company would have to make smaller more frequent payments to the Pool. The expected value of payments to and from the Pool amounts to zero since the Pool does not change the expected value of a company's loss experience.

Reinsurance Comparison

Aside from the fact that this type of index-based Pool acts only to diversify the geographic portion of a company's catastrophe risk, there are several significant differences between it and traditional reinsurance programs. The most striking disparity is that Pool Members pay no premiums, only their share of Pool Losses. This is advantageous in that it insulates the pool from the reinsurance pricing cycle.

Another important difference is that the Pool protects Members against certain prespecified levels of industry loss experience, as determined by the GCCI in certain geographic areas, rather than against a certain amount of overall company dollar losses. This implies that Pool Membership could be especially useful in funding the cost of events that are not significant enough to trigger recoveries under excess of loss reinsurance. It also implies that there will be some amount of basis risk since most companies will not track the Index exactly, creating the possibility of a mismatch between Pool Losses and a Member's actual loss experience.

Basis risk is the random variation between the Member's underlying loss experience and the Pool recovery and will be an important consideration for potential Pool Members. Although basis risk has an expected value of zero, insurers will want to weigh the possibility of a significant recovery shortfall against the cost of other reinsurance alternatives.

Nevertheless, accepting a small amount of basis risk is worthwhile if companies can eliminate most of the operating and transaction costs that accompany other risk management solutions. Also, the Geographic Risk Pool uses each Member's existing capital base more efficiently so no new capital is required to fund Pool losses. Considering both the greater capital efficiency and the reduced administrative costs, it is reasonable to believe that this type of pooling may be as much as 30% - 40% cheaper than reinsurance under even the most favorable of market conditions.

Accounting Treatment

When evaluating how Members should account for their participation in the Pool, three factors should be kept in mind:

1. Members have no collateral or security deposits at stake;
2. Members pay no premium to participate in the Pool; and
3. Membership does not change any Member's expected net loss.

These characteristics allow the Pool to overcome typical accounting issues concerning asset valuation and income and expense recognition that have been problematic for other alternative risk transfer products. Since the Pool is not based on its members' actual losses, it is likely that regulators will not view it as an insurance product. Therefore, one would expect that net amounts due to and from the Pool would be recognized when Members are notified of their Pool Positions and classified as either "other income or expense" or as "investment income or loss".

Summary

Index-based Pools offer homeowner insurers a new way of diversifying the geographic component of their catastrophe risk via a standardized swapping mechanism. While this mechanism may not be very helpful for large insurers with well-diversified exposures, it offers a compelling opportunity for small insurers to band together in the risk management equivalent of a school of small fish.

By joining this type of risk Pool, small insurers can enjoy the greater safety and stability of the Pool as a whole, in effect taking on the exposure characteristics of a much larger insurer. In essence, this risk transfer mechanism is designed to reduce loss volatility by increasing Member losses in unusually good years and decreasing their losses in unusually bad years.

Of course any time an index is used, there is the possibility of basis risk. Thus, companies will have to weigh the potential for basis risk against the other benefits that index-based pools offer, and these benefits can be substantial.

By using an index as a proxy for company loss experience, Index-based Pools are far less difficult and expensive to administer than traditional risk pools. Furthermore, use of an index eliminates potential moral hazard and provides Pool Members with a significant financial incentive to reduce their individual loss costs. However, the most important benefit of this mechanism is that the cost of coverage may be as much as 30% - 40% cheaper than other risk management solutions.

Authors' Note:

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