Reflecting Reinsurance Costs in Rate Indications for Homeowners Insurance

by Mark J. Homan, FCAS

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Biography

Mr. Homan is the Director of Personal Lines Catastrophe Management with ITT Hartford. Prior to this position, he was the Director of State Management for Agency Personal Lines and spent seven years as the Actuary and Director of Personal Property Pricing with ITT Hartford. He received a B.A. degree, *summa cum laude*, with majors in Mathematics and Quantitative Methods from the University of St. Thomas, St. Paul, MN. He is a Fellow of the Casualty Actuarial Society (1987), a Fellow of the Canadian Institute of Actuaries (1990), a Member of the American Academy of Actuaries and a Chartered Property Casualty Underwriter (1995). He has authored two other papers on property ratemaking, *Homeowners Insurance Pricing* and *Homeowners Excess Wind Loads: Augmenting the ISO Wind Procedure.*

Abstract

This paper presents the rationale for reflecting reinsurance costs explicitly in Homeowners indications. Catastrophe reinsurance has become relatively expensive and it should be reflected in rates to ensure rate adequacy. The basic concepts to adjust historical losses for the benefits of reinsurance and to reflect the reinsurance premium will be addressed. One approach for dealing with the concepts will be illustrated with some discussion of possible variations.

Reflecting Reinsurance Costs in Rate Indications for Homeowners Insurance

Overview

Reinsurance costs are widely recognized as a legitimate cost of doing business. In the past, these costs were not **explicitly** reflected in Homeowners rate level indications but were either ignored or only **implicitly** reflected. They were implicitly reflected to the extent that the loss portion of reinsurance costs was assumed to be in the direct losses. The additional transaction costs were not always getting into the indications, and then, only indirectly.

Most often reinsurance costs were simply ignored, since most of the ratemaking procedures used are based on the ISO procedures. Since ISO is a bureau, not an insurance company, they do not purchase reinsurance so they do not recognize it in their techniques. Also, now that ISO produces only loss costs rather than rates, and since reinsurance is an expense item, reinsurance costs should not be part of the ISO loss cost procedure.

In the past, companies relied on the excess wind procedure to give them an adequate loading for catastrophe events. If it were sufficient, then the companies were only overlooking the transaction costs of reinsurance. When the reinsurance costs were

relatively low, the transaction costs were low, so the omission of reinsurance costs had only a small impact on the rate indications.

Now catastrophe reinsurance costs are much higher and we know that the excess wind procedure does not generate an adequate catastrophe loading. It is no longer prudent to omit reinsurance costs from explicit treatment and still expect to produce an adequate rate. Thus, the indication procedure should be changed to allow for direct reflection of reinsurance costs. In many states there is not sufficient room to fully reflect these costs implicitly, if they ever were reflected.

This paper will outline a basic approach that could be taken to reflect reinsurance costs in ratemaking. The paper discusses reflecting the cost of a property catastrophe treaty (referred throughout as catastrophe reinsurance) but the techniques could be applied to any reinsurance treaty.

Underlying Justification

In reviewing the CAS *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, one can find several items that touch on the validity of reflecting reinsurance costs in rates. Two items are of particular interest.

Principle 2 states that "a rate provides for all costs associated with the transfer of risk." Under the Considerations section, the Principles state that "Consideration should be given to the effect of reinsurance arrangements."

There are two primary impacts from a reinsurance arrangement. First is the cost for the risk transfer, the reinsurance premium, and second is the reduction in incurred losses, the loss recoveries. Part of the process of risk transfer that an insurance company uses is the transfer of a portion of their risk to other parties via reinsurance transactions. Such risk transfer is necessary to preserve the financial solvency of the insurer and protect their assets so that claims may be paid. This makes the reinsurance cost a component in the overall cost associated with the transfer of risk. Thus, the Statement of Principles does not merely allow for the reflection of reinsurance costs but compels us to consider such costs.

Some may also question whether catastrophe reinsurance is a legitimate cost of doing business. It seems that its primary function is to protect the insurance company's assets after a significant event. The arguments against catastrophe reinsurance as a legitimate cost are getting much quieter in recent years. It is clear that catastrophe reinsurance is important for a company to maintain it's ability to pay claims. Several companies become insolvent after Hurricane Andrew and the Northridge earthquake. Additional catastrophe reinsurance may have protected many of these companies. In addition, A.M. Best now reviews the catastrophe exposure and catastrophe reinsurance programs of a company as part of their rating procedure. Inadequate management of catastrophes, such as not managing exposure levels with appropriate reinsurance, will lead to a lower rating which may impact a company's marketing. Clearly catastrophe reinsurance has become a necessity for any company with significant property writings. Several states now have

specific regulations allowing the reflection of reinsurance costs in ratemaking, recognizing their validity.

As stated earlier, some companies may have been implicitly reflecting reinsurance costs in their rates through the selection of a rate change based on the indications. More likely, I believe that these costs were basically ignored in the past. To reflect the costs implicitly, there must be sufficient room between the indications filed and the actual change that the company feels is necessary. This gap stems primarily from the allowable profit and contingency load and that the company truly feels it needs. However, as more states are becoming tighter on how profit loads are determined, the gap is getting smaller. At the same time, catastrophe reinsurance costs have increased to historically high levels. This leaves insufficient room in the more cat prone states to reflect these costs implicitly, leading to the need to reflect these costs explicitly, at least for catastrophe reinsurance. The smaller costs from other reinsurance programs are still ignored by most companies, or treated implicitly. In many cases, their costs may be too small to justify the effort to reflect them explicitly.

Basic Outline

At my company, we are only reflecting our catastrophe reinsurance treaty in indications at this time. This paper will only address this one treaty and not the other types of reinsurance that a company may purchase. While other forms of reinsurance could also be reflected using a similar approach to that taken for the catastrophe treaty, I will not develop all the comparable allocations of premium and loss benefit that would be needed.

These other reinsurance treaties do not represent nearly as significant a cost to Homeowners as does a catastrophe treaty. So, at this time, I have chosen to limit my discussion to reflecting catastrophe treaty costs.

A reinsurance premium contains two primary components. The first is the **loss benefit** which represents the recoveries from the reinsurer that should be expected over the long term for the coverage purchased. The second component is the reinsurer's expenses and profit, the **transaction costs**. In theory, the expected loss recoveries **should** already be reflected in the direct loss estimates in traditional indication procedures, so it is only the transaction costs for reinsurance that need to be added.

There are some catastrophe treaties that include a payback provision. In essence, this reduces the loss recovery benefit of the treaty, since the reinsurer is basically loaning the funds that will be paid back. Thus, the loss benefit should be reduced by the funds that will be paid back.

There are two possible approaches to loading in the reinsurance transaction costs. Theoretically, they both will yield the same answer, with perfect information. But the practicalities of applying the methods will drive the choice of which method to use. The first approach would be to break down the reinsurance premium into the loss and transaction cost components and then reflect only the transaction cost portion as an additional expense. However, it is extremely difficult, if not impossible, to determine this breakdown. Reinsurers do not file rates nor do they typically release such breakdowns.

In fact, catastrophe reinsurance costs are as much a function of supply and demand as they are the underlying economics. So this first approach is theoretical only and is not practically feasible.

The second approach eliminates the need to determine the breakdown. This approach reduces the projected losses used in the rate level indications to reflect the expected benefits of reinsurance and then loads the entire reinsurance premium as an expense. It is this second approach that I advocate and will present here.

Net Loss plus Reinsurance Approach

The approach that we have recently developed is referred to as the *Net Loss plus Reinsurance* Approach. The basic procedure is to determine the reinsurance premium by state, adjust the losses to a net basis (after reinsurance) and load the reinsurance cost as an expense item. The following sections will outline each step in more detail. As used herein, the term "net" refers only to net of the reinsurance treaties which costs are being explicitly loaded, not final net of all reinsurance, pools, etc. Also, the premiums are on a direct basis, not net.

Allocating Reinsurance Premium to State

The first step in reflecting the reinsurance costs in the rate indications is to determine what these costs are for each state. Most catastrophe treaties are countrywide, corporate level treaties. Therefore, we must break down the total reinsurance premium to state and line. While this allocation will vary depending on individual company circumstances, a

general approach will be discussed here. An illustration of this allocation is shown in Exhibit 1. The example shown is just for one line. If multiple lines were involved, they could be treated as if they were additional states.

Exhibit 1

Reinsurance Premium Allocation to State

State	Subject Premium	Estimated Annual Loss to Treaty	Allocated Premium Based on Losses *	Residual Allocation Based on Premium	Total Reinsurance Allocation
A	18,975,000	2,345,000	3,165,750	10,071	3,175,821
B	7,650,000	0	0	4,060	4,060
C	17,325,000	1,350,000	1,822,500	9,195	1,831,695
D	11,038,000	0	0	5,858	5,858
E	650,000	0	0	345	345
F	4,650,000	980,000	1,323,000	2,468	1,325,468
G	22,950,000	1,765,000	2,382,750	12,180	2,394,930
H	4,850,000	0	0	2,574	2,574
I	4,425,000	375,000	506,250	2,349	508,599
J	1,225,000	0	0	650	650
Total	93,738,000	6,815,000	9,200,250	49,750	9,250,000

Total Reinsurance Premium	9,250,000
Residual Premium	49,750

* - Estimated Premium is Expected loss loaded by 35% for Expenses, Profit and Risk Load

The allocation is done in two stages. First, the expected losses for major events are determined for each state that has a significant exposure to large catastrophes such as hurricanes or earthquakes. We estimate these losses through the use of models. We use both an in-house single event model for hurricane and earthquake and a simulation model from an outside vendor to develop estimates. These outside vendor models are becoming widely used within the industry and all can provide loss estimates for extreme events on a state basis. Earthquake must be split separate from hurricane since not all of these losses are covered by Homeowners. In fact, the majority are covered under a separate line. Some earthquake losses are covered in certain Homeowners endorsements, such as an "all risks" contents endorsement like the ISO HO-15. This portion of the earthquake losses should be allocated to Homeowners along with the hurricane estimates. These major events represent a significant portion of the catastrophe treaty costs, since these are the events that the treaty is expected to cover.

The expected losses are then loaded by a factor to represent the reinsurer's expenses, risk load and profit. For illustration, the exhibit shows a 35% load. This converts the expected losses to an estimated premium. To the extent possible, the loading should represent that actually used by the reinsurer in the treaty. Often, this is not directly available from the reinsurer, so it must be estimated. The loading, actual or estimated, will vary based on the reinsurance market and the amount of capacity in the market relative to demand. The procedure described is somewhat sensitive to the loading selected. A higher loading will allocate more of the treaty costs based on the expected

losses from major events. Some analysis has estimated this load to run as high as 50% to 100% of the expected losses for some catastrophe treaties.

There is typically some additional cost beyond the major events. This explains why there is some residual reinsurance premium to allocate beyond the major events. The residual premium is then allocated based on subject premium (the premium for lines subject to the treaty). Every state receives some allocation, even if a small one, since there can be multi-state events that will entail a reinsurance recovery. The amount of premium allocated based on subject premium should be fairly small and will depend on the expected losses and loading chosen. Using the subject premium is not completely accurate since states with similar premium volumes may have significantly different exposures to catastrophic events. Further research into the use of loss estimates from certain perils or events rather than subject premium will improve this allocation.

Coastal states will have a greater allocation than the inland states, such as the Midwest, since they have more significant catastrophe potential. In addition, the Homeowners line has more catastrophe potential than Inland Marine or Automobile Physical Damage which are also subject to the catastrophe treaty. So coastal Homeowners states will receive a catastrophe treaty allocation that is greater than the corporate average.

Adjusting Losses to a Net Basis

Since the selected procedure reflects the full reinsurance premium as an expense, we can not reflect the full loss loading. Otherwise, we would be double counting some losses; in

both the reinsurance costs and in the direct losses. Therefore, we adjust the direct losses to a net basis (i.e. after catastrophe reinsurance), to eliminate any double counting. Since most large events are capped to their net basis, it is less important that they are initially estimated accurately. The amount of loss that is removed is not important. These losses are loaded through the reinsurance premium. Thus, the reinsurance premium can serve to provide the necessary loading for larger events.

The actuary should also determine whether certain events are capable of exceeding the upper limit of the treaty. If an event blows through the treaty, the company will be responsible to pay these losses with no recovery. Clearly, these additional losses beyond the treaty limit should continue to be reflected in the rates at a 100% basis.

The method discussed here is based on using an excess wind procedure to develop the underlying loss estimates. Further discussion on variations to the approach based on the method used to determine the underlying loss loading is included in Appendix A. We adjust the losses to a net basis in two ways. First, the excess wind procedure is modified so that any wind event reflected in the long term load is adjusted to a net basis. Second, any event in the 5 year indication experience period that is other than wind or hail, and thus not in the excess wind procedure, and which exceeds the treaty threshold is also capped. The catastrophe treaty threshold is determined by state.

Assuming that the treaty is corporate in nature, Homeowners losses do not need to reach the corporate attachment point to generate recoveries. Recoveries on the Homeowners

line will begin once the total corporate losses exceed the attachment point. To determine the level of losses at which the catastrophe treaty will start to cover Homeowners losses, the ratio of the Homeowners reinsurance premium to the total reinsurance premium for the state is multiplied by the corporate treaty attachment point. For example, if Homeowners represents 39% of a state's reinsurance premium and the corporate treaty attachment point is $50 million; then, the threshold for Homeowners is $19.5 million. This means that that if Homeowners losses exceed $19.5 million, we expect that the corporate losses will exceed $50 million and we will then recover losses above that point from our reinsurer. However, each actual event will have a different mix of damage for each line covered. So while this may be the expected values for line by line retention, it will vary by event. Alternative approaches, such as modeling of each event, may not need to rely on this assumption.

In addition, most catastrophe treaties do not pay 100% of the losses subject to the treaty. There is some copayment by the insurer to make sure that the company is still vigilant in their loss settlement practices. For example, if a catastrophe treaty will pay 95% of the losses subject to the treaty, we should retain 5% of the losses above the threshold. The example shown in Exhibit 2 reflects a 5% copayment.

As mentioned earlier, the basic approach here is based on a variation of the ISO Excess Wind Procedure. The variation on the previous ISO methodology augments the excess wind procedure by reflecting a longer historical period through the application of modeling. A 50 year plus event is reflected to extend the historical period from the

current 35 years or so. In many states, the limited history is inadequate to produce a proper loading (for catastrophes, 35 years is still inadequate). By augmenting the actual history with a projection for more extreme events, a more accurate loading can be developed. Thus, we are no longer at the mercy of what may have happened in the historical period. This event is determined from the models by taking the top two percentile of potential events and deriving an annual expected loss from such events.

We remove any actual year from the historical period any loss that exceeds the modeled 50 year plus level to avoid any overstatement or double counting of extreme events. By weighting the modeled 50 year plus loss event at 2% (once in 50 years) and the remaining history at 98%, we derive an excess wind factor that reflects extreme events. As shown in Exhibit 2, for this example, we weight the 1.030 factor from the historical period with a 1.474 factor from the modeled event to yield a final excess wind factor of 1.039. (.98*1.030 + .02*1.474 = 1.039) However, we are still not reflecting the full spectrum of events since there may be a gap between the historical events and the 50 year plus event. Yet, we are making a more accurate projection of the loading needed to cover excess wind events than is possible using the historical period only.

A sample calculation of adjusting the ISO excess wind procedure is shown in Exhibit 2. The modified excess wind procedure starts with the historical wind and total losses as before. The wind and non-wind losses are then restated to current cost levels in order to apply the current reinsurance treaty coverage. To adjust the losses to current levels, we multiply the historical wind/non-wind ratio by an average of the non-wind losses for the

past three years trended to the projected cost level. This brings the wind losses from their historical level to the projected level using the non-wind losses as a cost index. The resulting wind losses are then capped for the effect of the catastrophe treaty. The wind/non-wind ratio is then recalculated and the calculation proceeds as before from this point. For a discussion of the remaining steps in the calculation, please refer to Appendix B included or to my earlier paper.[1]

The historical losses used can be either industry or company losses. The non-wind projected losses used must be a company basis to allow the reinsurance capping to be applied. The historical years are used to determine a wind/non-wind ratio to multiply the projected non-wind loss average by, on an individual year basis. Because of this, you can even mix industry experience with company experience. This may be advisable since the industry experience typically lags the experience available on a company basis. The example shown is based on company experience for all our Homeowners operations combined. The other exhibits are only for one operation so they will not balance precisely. This is similar to what one would see if we had used industry experience for the excess wind load calculation and company experience for the calculations shown on the other exhibits.

[1] Homan, Mark, *Homeowners Insurance Pricing*, CAS Discussion Paper Program, Pricing-May 1990, pg. 719

State: Example

Homeowners Insurance - Forms 1,2,3,& 5
Derivation of Excess Wind Factor

Exhibit 2

(1) Year	(2) HO Wind Losses	(3) Non-Wind Losses	(4) Wind-to-Non-Wind	(5) Wind Losses	(6) Wind Loss Adj ReIns	(7) Adj Wind/ Non-Wind	(8) Excess Years*	(9) Excess Ratio	(10) Excess Losses	(11) Non-Excess Losses	(12) Non-Wind/ Non-Excess
1961	333,914	1,317,614	0.253	8,111,698	8,111,698	0.253	0.253	0.140	4494736	35625485	0.898
1962	165,136	1,381,151	0.120	3,827,073	3,827,073	0.120	.	0.000	0	35835595	0.893
1963	314,163	1,945,021	0.162	5,170,060	5,170,060	0.162	.	0.000	0	37178582	0.861
1964	300,898	2,651,451	0.113	3,632,458	3,632,458	0.113	.	0.000	0	35640979	0.898
1965	279,773	3,661,664	0.076	2,445,638	2,445,638	0.076	.	0.000	0	34454160	0.929
1966	406,828	3,907,434	0.104	3,332,608	3,332,608	0.104	.	0.000	0	35341130	0.906
1967	647,379	5,424,683	0.119	3,819,880	3,819,880	0.119	.	0.000	0	35828402	0.893
1968	718,958	6,118,069	0.118	3,761,443	3,761,443	0.118	.	0.000	0	35769965	0.895
1969	769,906	6,948,936	0.111	3,546,379	3,546,379	0.111	.	0.000	0	35554900	0.900
1970	709,614	8,283,773	0.086	2,741,950	2,741,950	0.086	.	0.000	0	34750471	0.921
1971	951,449	8,053,825	0.118	3,781,367	3,781,367	0.118	.	0.000	0	35789889	0.894
1972	1,232,940	9,173,544	0.134	4,302,000	4,302,000	0.134	.	0.000	0	36310522	0.882
1973	963,160	12,347,440	0.078	2,496,819	2,496,819	0.078	.	0.000	0	34505341	0.928
1974	2,124,450	14,700,504	0.145	4,625,726	4,625,726	0.145	.	0.000	0	36634248	0.874
1975	2,368,211	16,620,161	0.142	4,560,903	4,560,903	0.142	.	0.000	0	36569424	0.875
1976	2,117,819	12,914,435	0.164	5,249,029	5,249,029	0.164	.	0.000	0	37257551	0.859
1977	1,249,659	14,735,064	0.085	2,714,595	2,714,595	0.085	.	0.000	0	34723116	0.922
1978	1,457,036	12,079,981	0.121	3,860,733	3,860,733	0.121	.	0.000	0	35869254	0.892
1979	1,550,489	13,988,540	0.111	3,547,822	3,547,822	0.111	.	0.000	0	35556344	0.900
1980	1,357,404	18,499,926	0.073	2,348,576	2,348,576	0.073	.	0.000	0	34357098	0.932
1981	8,501,300	12,407,363	0.685	21,931,659	19,669,083	0.614	0.614	0.501	16052120	35625485	0.898
1982	1,233,589	18,804,394	0.066	2,099,794	2,099,794	0.066	.	0.000	0	34108316	0.938
1983	1,380,579	14,345,616	0.096	3,080,403	3,080,403	0.096	.	0.000	0	35088925	0.912
1984	1,846,638	17,438,451	0.106	3,389,529	3,389,529	0.106	.	0.000	0	35398051	0.904
1985	7,489,385	18,063,499	0.415	13,271,191	13,271,191	0.415	0.415	0.302	9654228	35625485	0.898
1986	1,194,155	17,772,839	0.067	2,150,649	2,150,649	0.067	.	0.000	0	34159170	0.937
1987	1,299,821	19,453,024	0.067	2,138,760	2,138,760	0.067	.	0.000	0	34147282	0.937
1988	1,592,569	25,124,761	0.063	2,028,906	2,028,906	0.063	.	0.000	0	34037427	0.940
1989	3,146,335	24,688,970	0.127	4,079,131	4,079,131	0.127	.	0.000	0	36087652	0.887
1990	1,663,199	24,388,796	0.068	2,182,827	2,182,827	0.068	.	0.000	0	34191349	0.936
1991	4,686,796	25,965,580	0.181	5,777,549	5,777,549	0.181	.	0.000	0	37286071	0.897
1992	6,000,910	20,607,290	0.291	9,320,986	9,320,986	0.291	0.291	0.178	5704023	35625485	0.898
1993	3,912,613	23,522,674	0.166	5,324,095	5,324,095	0.166	.	0.000	0	37332616	0.857
1994	2,265,676	40,016,913	0.057	1,812,257	1,812,257	0.057	.	0.000	0	33820779	0.946
Total	66,232,746	477,353,384	0.139					1.122	35905106	1206586546	30.692
Average								0.033			0.903
Projected Non-Wind Loss				32,008,522							
Median Wind/Non-Wind Ratio				0.113							
Excess Wind Factor				1.030	[1 + (0.033 * 0.903)]						
50-Year	38,563,750	32,008,522	1.205	38,563,750	20,500,688	0.640	0.640	0.527	16883725	35625485	0.898
				1.474	[1 + (0.527 * 0.898)]						
Excess Wind Factor				1.039							

*The ratio for a year must be > 1.5H and at least .250 for that year to qualify as an excess year.
Treaty Threshold: 19,550,000

The adjustment of historical losses to current costs is very important to determine the impact of the catastrophe treaty. Early events would appear to be too small for the treaty but there has been significant inflation over the past 30 years. In addition, the non-wind losses reflect the growth in exposures that the company has experienced over time. So, a similar event to one in the historical period may now cost much more since we have more values exposed. Using the non-wind losses as our cost index takes both elements into account and adjusts the wind losses to the level that we would expect if the same event occurred today in terms of both current costs and current exposures. In Exhibit 2, the year 1981 would not be capped by reinsurance if it were not adjusted to current cost and exposure levels.

I would like to make some points on the reinsurance capping. Our company uses a high layer catastrophe reinsurance program. In most years, we do not expect to trigger our reinsurance coverage. Some companies purchase coverage at a working layer that is triggered more frequently. This is a company choice that is driven by their size, desire for stability, etc. With a higher layer program, there will be fewer years that must be capped in this approach. Second, the method as outlined treats the losses in a year as a single event for capping. This is not completely accurate. In the years that must be capped, with a high layer program, we expect that there will have been a large event that would trigger coverage. However, some portion of the losses are likely from other events. If the historical data is available, one should split the losses into the large event, or events, and all other. If they are not available, which is most likely for the older years, this method may overstate the capping and thus understate the load. With a high layer

program, this understatement is small and is then spread over the number of years used in the excess load calculation. We accept this understatement as slightly conservative and not truly significant. Depending on a company's catastrophe reinsurance program, the extent of this understatement should be reviewed and adjustments made if it is considered significant.

There will still be excess wind losses that fall in the range between the normal wind threshold, which is based on the median of the wind/non-wind ratio, and the catastrophe treaty threshold. Most companies purchase catastrophe reinsurance only for protection from extreme events. They should have sufficient financial resources to handle the smaller catastrophes that occur with respectively greater frequency. However, some of these smaller catastrophe events are still treated as excess wind by the excess wind procedure. So there will still be an excess wind factor. The excess wind factor after adjusting for reinsurance is always less than or equal to the excess wind factor before the reinsurance adjustment. It is equal when there are no years in the procedure that would exceed the reinsurance treaty threshold.

For catastrophe events other than wind or hail, the capping is much simpler. Any catastrophe is trended to current costs using the loss trend factors in the indication. If the event would exceed the catastrophe threshold, the loss is capped for the effect of reinsurance.

Splitting Reinsurance Premium by Form Group

Now that we have the losses adjusted to the appropriate level, we move on to the reflection of the reinsurance premium. The reinsurance premium allocated to the state must be split into the two form groups used to develop rate indications. These are the building forms; 1,2,3 and 5; and the content forms; 4 and 6. The contents forms do not represent the same exposure to the treaty as the building forms due to the type of property being covered. The reinsurance premium is split into two parts based on the values exposed. See Exhibit 3 for a sample calculation which also shows State C for comparison purposes.

Exhibit 3

Split of Reinsurance Premium to Forms

	Input Items	
	State A	State C
Reinsurance Allocation	3,175,821	1,831,695
Total State Premium	18,975,000	17,325,000
Average Amount of Insurance		
Forms 2,3 Average AOI	115,375	106,750
Contents Exposure Factor	63.0%	65.0%
Forms 2,3 Adj Avg AOI	188,061	176,138
Forms 4,6 Average AOI	30,466	30,185
Total Values Exposed		
Forms 2,3 Total Values	98.5%	97.3%
Forms 4,6 Total Values	1.5%	2.7%
Written Premium Split		
Forms 2,3 Premium	95.9%	94.8%
Forms 4,6 Premium	4.1%	5.2%

Calculated Items

State A	Reinsurance Premium	Written Premium	Reinsurance Load
Forms 2,3	3,128,183	18,197,025	17.2%
Forms 4,6	47,637	777,975	6.1%
Total	3,175,821	18,975,000	16.7%
State C			
Forms 2,3	1,782,239	16,424,100	10.9%
Forms 4,6	49,456	900,900	5.5%
Total	1,831,695	17,325,000	10.6%

For building forms, the exposed value is the building amount in Coverage A and the contents in Coverage C. A basic Form 3 provides Coverage C at 50% of Coverage A. Many companies have replacement cost on contents endorsements that increase this percentage. In the example, we are using 70% of Coverage A for the increase from the endorsement with 65% of the policies having the endorsement. This yields a contents exposure increase of 63% (.65 * 70% + .35 * 50%). For the tenants forms, there is only Coverage C exposure. For condominium policies (Form 6), there is some structural coverage, Coverage A. Historically, the amount of Coverage A on these policies has been small. However, we are starting to see this increase and we will have to reflect the total amount of exposed values from Coverage A on these policies in future calculations. After allocating the premium by exposure, the reinsurance premium for the form group is then divided by the direct premium for the form group to determine the reinsurance cost as a percentage of premium. This leads to a smaller charge for the contents forms than for the building forms.

Loading the Reinsurance Cost into the Indications

The premium charged for the catastrophe treaty is determined as a percentage of the subject premium. Since most treaties are corporate in nature, the percentage applied to the subject premium represents an average rate for all states and all property lines. Any increase in premium subject to the treaty, beyond our current levels, will increase the reinsurance cost by this corporate rate.

In the example for State A in Exhibit 4, let's assume a catastrophe program that costs 9.9% of the subject premium. Therefore, in the rate indication, the first 9.9% in any state is treated as variable and any portion above 9.9% is considered fixed cost. Any increases in subject written premium will lead to additional reinsurance charges only at the 9.9% rate. So for a sample state, the reinsurance cost for Forms 1,2,3&5 is 16.1%, of which 9.9% is variable and 6.2% fixed. For Forms 4,6, the reinsurance cost is 5.8% which is all considered variable. The variable reinsurance cost is subtracted from the PLR while the fixed portion is added to the adjusted loss ratio. A similar calculation is shown for State C as well.

There may be some shortfall in completely covering the projected reinsurance costs in using this approach, assuming that the reinsurance treaty is priced based on a percentage of the subject premium. A shortfall could occur if there was significant growth in states with lower than average reinsurance charges. The increased premium would increase the reinsurance charge at the higher corporate rate, yet the rates in the state developed by the approach presented here would be based on a lower reinsurance cost. One should be sensitive to this. However, capping the variable portion in states with higher than average reinsurance charges will not necessarily lead to shortfalls. In fact, if they were not capped, the company could collect more premium than is needed to cover the reinsurance costs. This could cause a poor competitive position in the market or possibly negative reactions from the regulators in a state.

Instead, if the reinsurance premium is based on exposure, then the only variable portion is that which adjusts for the increases in value. The remaining cost should be considered fixed. Again, before applying these techniques, an actuary should review the exact framework of the company's reinsurance treaty.

Exhibit 4

Expense Breakdown for Indications

State A	Forms 2,3	Forms 4,6
Current Expenses	28.3%	34.7%
Current PLR	71.7%	65.3%
Reinsurance Expense	17.2%	6.1%
Variable	9.9%	6.1%
Fixed *	7.3%	0.0%
Proposed PLR	61.8%	59.2%

State C	Forms 2,3	Forms 4,6
Current Expenses	28.3%	34.7%
Current PLR	71.7%	65.3%
Reinsurance Expense	10.9%	5.5%
Variable	9.9%	5.5%
Fixed *	1.0%	0.0%
Proposed PLR	61.8%	59.8%

* - Fixed portion is amount over the corporate rate on line.

Summary

Although reinsurance costs have long been recognized as a legitimate cost of doing business, they have not been explicitly reflected in rates until recently. These costs are too significant to be ignored and they must be addressed. Reinsurance costs need to be considered to ensure an adequate rate. It's in the Principles.

Appendix A

Variations in Underlying Loss Loading

The method described herein is dependent on the approach used to reflect the excess losses. There are several methods being used to reflect excess wind losses. Regardless of the method used, the basic concepts remain the same. The initial loss loading must be modified for the expected reinsurance recoveries and then the reinsurance premium can be reflected. The approach to modify the losses for anticipated recoveries will depend on how the losses are reflected.

In the paper, I have been using an excess wind procedure based on the ISO procedure. Historically, such excess wind procedures based their loss estimation only on historical data. During periods when there is a lack of hurricanes or excess wind losses, an excess wind procedure is a limited tool for developing rates since it will understate the expected losses. On the other hand, when there are more events or the presence of extreme events, the excess wind procedure can overstate the expected losses. The variation shown was designed to augment the history used in the ISO procedure with additional losses as needed to avoid understatement and to eliminate the more extreme events from the historical period to avoid overstatement. A more detailed discussion of this augmentation can be found in an earlier paper[2].

[2] Bradshaw, John and Homan, Mark, *Homeowners Excess Wind Loads: Augmenting the ISO Wind Procedure*, CAS Forum, Summer 1993, pg. 339

However, ISO is no longer using an excess wind procedure, so they no longer are updating the industry experience in that format. It may become difficult to obtain the history to use this method. Thus an alternative method has been developed which will tie into the loss distribution from a wind model.

The use of models for estimating hurricane losses has become increasingly widespread. Not all companies have access to such models and many still are uncertain whether the estimates from the models are correct. The approach discussed in this paper can alleviate much of the reliance on the accuracy of such model. Wind models provide estimated losses for the events reflected in the model. A wind model that estimates losses for each individual event is the easiest to use. Such a model allows for the estimated loss to be adjusted for reinsurance on an event by event basis. Thus, one can get the loss projection and the reinsurance adjustment at the same time. Also, since many catastrophe treaties are corporate in nature as are the models, the reinsurance adjustment can be more accurate, assuming the model is run on a corporate level. This makes the line adjustment to the treaty threshold unnecessary eliminating a potential source of error. Some wind models provide loss estimates in terms of average annual costs rather than event by event. To make the necessary adjustments for reinsurance to such models, you must work with the model designers to make the necessary changes within their formulas.

Other companies use all catastrophes in their loadings rather than just wind. Some use hurricanes only. In either case, the historical events should be adjusted to current cost levels and then adjusted for reinsurance using the current program. After adjusting the history to be net to anticipated recoveries, the reinsurance premium can be reflected.

Appendix B

Excess Wind Procedure

This appendix will provide a more detailed explanation of the modified Excess Wind procedure shown in Exhibit 2.

Columns 2 and 3 are the raw data inputs of the wind and non-wind losses. Each year is treated as a sample observation and is treated independent of the other years. The procedure relies on averages of the observed ratios rather than aggregates. This allows for a mixture of industry and company data, which will be at different loss levels. Since industry data is often not as up to date as company data, the company data can be used until industry data is available for the latest year or two.

Column 4 is the ratio of the Wind to Non-wind losses, or column 2 divided by column 3. Column 5 is the ratio from column 4 multiplied by the projected non-wind loss. The projected non-wind loss is the average of the latest three years, trended by the average cost factor used in the indication. In this case, the trend factor is 4.5% for a three year period to go from an average of 1993 to 1996. The wind losses determined by this calculation represent wind losses at current cost and exposure levels as explained in the paper. These losses are needed to determine the impact of the current catastrophe reinsurance treaty to historical losses.

Column 6 are the wind losses adjusted for the impact of reinsurance. If the recalculated wind loss for the year is greater than the treaty threshold (noted on the exhibit), than the wind loss is capped at the treaty amount plus 5% of the loss above the treaty threshold. The 5% is the copayment under the treaty.

Column 7 is the adjusted wind/non-wind ratio calculated by dividing column 6 by the non-wind projected loss. It is important to note that for most years, column 7 is the same as column 4. It is only for years that would trigger the catastrophe reinsurance coverage that the ratio will change. Also, column 7 is always equal to or less than column 4. Column 8 is the wind/non-wind ratio from column 7 for the years that are considered excess years. For a year to be considered excess, the wind/non-wind ratio must excess 1.5 times the median wind ratio and be greater than .250. The second threshold of .250 is important for states with fairly low wind activity. It keeps the excess wind adjustment small for such states so that the adjustment is truly for excess wind. In this example, the .250 is the key value not 1.5 times the median. Only four years in the historical period are considered excess.

Column 9 is the excess ratio. This is the portion of the excess wind/non-wind ratio from column 8 that is greater than the median. While it may at first seem odd that the trigger for an excess year is 1.5 times the median and that the excess portion is the amount over the median, this was intended. The same approach is taken to adjust the five years in the experience period of the indication, so it produces the proper answer.

Column 10 is the amount of the excess losses. This is column 9 times the projected non-wind losses.

Column 11 is the non-excess losses which is the sum of the projected non-wind losses and the wind losses in column 5 minus the excess losses in column 10.
Column 12 is the non-wind losses divided by the non-excess, or the projected non-wind losses divided by column 11.

This provides all the numbers needed to calculate the excess wind factor. The excess wind factor is unity plus the product of the average excess ratio from column 9 and the average non-wind/non-excess ratio from column 12. Since the excess ratio is the ratio of the excess losses to the non-wind losses, the product is the ratio of excess losses to non-excess losses. It is applied to the non-excess losses in the indication procedure, so the result is the excess losses. The unity is to retain the non-excess losses in the final figure. There is one final set of calculations that must be done for the 50-Year event situation. The wind losses used here are for any events in excess of 50 year return periods. It is derived from modeling and represents the expected wind losses from the top two percentile. The non-wind projected losses remain the same as used above. The calculation of all ratios and figures is the same for any individual year as outlined above. The one year is then used to calculate an excess wind factor for these larger events. The two excess factors are then weighted together using 98% weight on the historical period

and 2% for the 50 year plus event. To eliminate any duplication, we drop any year that is in excess of the 50 year event from the historical period.