Using a Simulation Model to Incorporate the Cost of Catastrophe Excess Reinsurance into the Property Rate Level Indication Using the Net Cost of Reinsurance Method
or
How I Learned to Stop Worrying and Love the Net Cost of Reinsurance Method

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Abstract: Although much has been written on how to properly determine a reinsurance premium, relatively little literature exists on how a primary insurer, once it pays that premium, should incorporate the cost of reinsurance into its rate level indication. This paper discusses two approaches for including the cost of catastrophe excess reinsurance in a primary company's rate level indication, reviews the pros and cons of each, argues why one method is preferred, and then illustrates how the preferred method can be applied with a complete example.

Keywords: Reinsurance; Catastrophe Excess Reinsurance; Catastrophe Modeling;

1. INTRODUCTION

In the simplest possible terms, reinsurance is insurance for insurance companies. In exchange for a premium, the reinsurer agrees to assume all or part of some risk that was previously assumed by the primary insurer. Primary insurers may purchase reinsurance to increase capacity, stabilize underwriting results, provide protection from catastrophes, provide surplus relief, obtain the reinsurer's underwriting expertise, or facilitate withdrawal from a jurisdiction or line of business.[1] Different types of reinsurance agreements exist to meet each of these needs.

This paper will focus on catastrophe excess reinsurance. Under a catastrophe excess agreement, the reinsurer indemnifies the primary insurer for aggregate losses in excess of a given amount, called the retention, arising from an individual catastrophic event. In most

[1] Cass, R. Michael, Peter R. Kensicki, Gary S. Patrik, and Robert C. Reinarz, Reinsurance Practices Volume 1, **1997**, Page 33.

cases, the reinsurer's risk is limited to some amount, which is appropriately called "the limit." Often times, the reinsurer will only indemnify the primary company for a percentage of the losses in excess of the retention.

An example will clarify the idea. Assume that a reinsurance contract provides coverage for 50% of $600 million (the limit) in loss excess of $400 million (the retention). If no event causes losses in excess of $400 million, the reinsurer pays nothing. If an event causes more than $1 billion in loss, the reinsurer pays $300 million ($300 million = 50% x $600 million limit). If an event causes between $400 million and $1 billion in loss, the reinsurer pays 50% of the amount in excess of $400 million.

Insurance companies purchase catastrophe excess reinsurance when catastrophic events could cause an unacceptable drain on surplus or, alternatively, when the company is unable to achieve the required return on the capital it must hold because of the risk of catastrophic events. In either case, the alternative to buying reinsurance is to reduce catastrophe exposure by other means, such as non-renewing policies in exposed areas. To the extent then that reinsurance contributes to the availability of insurance, it serves a legitimate purpose not only to the primary insurer, but to the market as a whole. And as a legitimate business expense, the cost of reinsurance should be included in the determination of the underlying rate level. In fact, its exclusion would contradict Principal 3 of the *Statement of Principles Regarding Property and Casualty Ratemaking*, which states that a rate should provide for "all costs associated with the transfer of risk," and ignore the explicit statement from the Considerations section of the document that "consideration should be given to the effect of reinsurance agreements" in the development of the rate[2].

Despite the guidance provided by the *Statement of Principles* and presumably their own self-interest, many insurers have not explicitly reflected the cost of reinsurance in their indications.[3] And while this may be changing in more recent years, there remains a scarcity of literature describing how it should be done. One of the few papers on the subject, *Reflecting Reinsurance Costs in Rate Indications for Homeowners* by Mark J Homan, describes two possible methods for including the cost of catastrophe excess reinsurance in the indication. This paper reviews those two methods, discusses the pros and cons of each, and suggests the

[2] Casualty Actuarial Society, *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, **1988**.
[3] Homan, Mark J., "Reflecting Reinsurance Costs in Rate Indications for Homeowners Insurance," *Casualty Actuarial Society Forum*, **1997**, 223-254.

approach that Homan dismisses as "theoretical only" and "not practically feasible," is in fact quite feasible and ultimately more illuminating. Finally, this paper illustrates, with a complete example, how the preferred method could be applied.

2. THE REINSURANCE PREMIUM

Before discussing how to incorporate the reinsurance premium into the indication, it is important to understand what comprises that premium. As does a primary insurance premium, a reinsurance premium has three components:

1. Expected Losses and Loss Adjustment Expenses
2. Other Expenses
3. Profit and Risk Load

The amount of losses and loss adjustment expenses the reinsurer ultimately must pay varies with the loss distribution of the risk or risks being reinsured and the terms of the reinsurance contract. The reinsurer may or may not cover loss adjustment expenses. Often times, only allocated loss adjustment expenses are covered.

Other expenses include the remaining costs the reinsurer incurs in the course of doing business, including overhead, taxes, commissions, and other acquisition costs.

The profit and risk load represent the reward to the reinsurer for putting its capital at risk by entering the contract. It should be noted that for certain types of reinsurance where losses are volatile, as in the case of catastrophe excess reinsurance, profit and risk load can make up a substantial percentage of the reinsurance premium.

Of these three components, only two, the reinsurer's expenses and profit/risk load, represent additional costs to the primary insurer. This is because the portion of the reinsurance premium covering expected ceded losses is offset exactly by the corresponding reduction to the primary insurer's expected direct losses. Homan calls the additional costs "transaction costs," and the expected ceded losses the "reinsurance benefit." The separation of the reinsurance premium into its transaction cost and reinsurance benefit components leads to two distinct but theoretically equivalent methods of including the cost of reinsurance in the primary indication.

3. INCLUDING THE COST OF REINSURANCE IN THE RATE LEVEL INDICATION

The first method to include the cost of reinsurance in the indication simply adds the *transaction* costs of the contract as an expense and leaves the expected losses unadjusted. This is called the "Net Cost of Reinsurance Method."

The second method adds the *entire* reinsurance premium as an expense and reduces the amount of expected losses by the expected reinsurance benefit. To preserve consistency within the actuarial literature, Homan's terminology will be used. This is called the "Net Loss Plus Reinsurance Method."

Which of the two methods is preferable? Since the reduction in losses under the Net Loss Plus Reinsurance Method is offset exactly by the inclusion of the additional portion of the reinsurance premium as an expense, both methods should yield identical results. The answer, therefore, is not determined on theoretical grounds. Instead, Homan suggests that practicality necessitates the use of the Net Loss Plus Reinsurance Method. This, he says, is because the Net Cost of Reinsurance Method requires the breakdown of the reinsurance premium into its loss and transaction cost components—a breakdown that is "difficult, if not impossible" to determine because "reinsurers do not file rates nor do they typically release such breakdowns[4]."

But while reinsurers may indeed be reluctant to share information, an estimate of the expected losses is actually required for either method. After all, ceded losses are subtracted from direct losses under the Net Loss Plus Reinsurance Method. Therefore, even if the reinsurer refuses to provide its estimate, the primary insurer can subtract its own estimate of ceded losses from the reinsurance premium and still use the Net Cost of Reinsurance Method.

In the end then, the choice between methods is not based on theoretical or practical grounds, but instead on which method best conveys the information it contains. If the total effect of the reinsurance on the indication is of interest, the Net Cost of Reinsurance Method, by incorporating the net effect of reinsurance fully into one line item, is clearly preferred.

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[4] Homan, Mark J., "Reflecting Reinsurance Costs in Rate Indications for Homeowners Insurance," *Casualty Actuarial Society Forum*, **1997**, 223-254.

An example will better illustrate the point. Assume an insurer expects $100 in loss per policy and has a 20% profit and expense ratio with no other expenses. The indicated rate, as shown in Exhibit 1, Part A, is $125. Now assume the insurer purchases $30 worth of reinsurance per policy for a high layer of loss that is expected to cover, on average, $10 of loss per policy per year. (As shown in Exhibit 1, Part B, the net cost of this reinsurance is $20.)

Using the Net Loss Plus Reinsurance Method, losses in the indication are adjusted from $100 to $90 to account for the expected reinsurance benefit. The entire $30 reinsurance premium is included as an expense and, after adjusting for variable expense and profit, yields an indicated premium of $150, as shown in Exhibit 1, Part C. However, note that the figures in Exhibit 1, Part C alone are insufficient to determine the impact of the reinsurance on the indicated rate. This is because neither the amount of the reinsurance benefit nor the total expected loss per policy is clear from the information provided.

Contrast the Net Loss Plus Reinsurance Method with the Net Cost of Reinsurance Method, as illustrated in Exhibit 1, Part D. The expected losses are left unadjusted at $100, and the net cost of reinsurance of $20 per policy is included as a single line item. The indicated rate, again $150, is the same, but one can quickly quantify the effect of the reinsurance on the indication by removing line item (2) from the calculation and recomputing the indicated rate.

Now this is certainly not an earth-shattering insight, and one could easily imagine ways of presenting the Net Loss Plus Reinsurance Method so that all of the relevant information is captured in one exhibit. The fact remains, however, that the Net Cost of Reinsurance Method more clearly differentiates between the transaction cost and reinsurance benefit portions of the contract and better conveys the total effect of the agreement on the indication. On these grounds, it is preferred to the Net Loss Plus Reinsurance Method.

4. A COMPLETE EXAMPLE

The simple example included in Exhibit 1 belies the potential difficulty in actually calculating the net cost of reinsurance for the indication. It is therefore beneficial to consider a more complete example involving the Flannel Insurance Company (FIC) and the hurricane-prone state of Armstrongland.

Using a Simulation Model

For the purposes of this example, two assumptions must be made. First, it is assumed that the exposure base for the development of the hurricane catastrophe provision is the Amount of Insurance Year (AIY), where 1 AIY = $1000 of dwelling coverage in force for one year. Second, it is assumed that FIC uses a model to simulate a sufficient number of years of hurricane experience from which to develop an expected hurricane loss per AIY.

Pertinent exhibits from the development of the indicated rate level change for Armstrongland, prior to the purchase of reinsurance, are included in Exhibit 2. As can be seen, FIC's current rates seem to be exactly adequate.

After further consideration, however, FIC determines it must purchase reinsurance if it is to continue putting its capital at risk by writing policies in Armstrongland. Consequently, it enters into the contract displayed in Exhibit 3.

In exchange for $11 million, FIC cedes to the reinsurer[5] 50% of its first $400 million in losses excess of $100 million caused by a catastrophic event. Although the contract technically covers any cause of loss, it is assumed that only hurricane events will actually trigger coverage. Armed with the contract, the company turns its focus to the indication.

The first task is to determine the expected loss savings provided by the contract. This estimate can be obtained from the reinsurer or developed internally.

The primary benefit of using the reinsurer's estimate of expected loss is that it eliminates the need for the primary company to develop its own estimate. Unfortunately, the reinsurer's estimate, even assuming it can be obtained, may not be compatible with the primary insurer's estimate of its direct losses in the reinsured layer. For instance, an insurer who expects an average of $10 million in hurricane loss per year could cede all of its hurricane exposure to its reinsurer who estimates the average annual loss to be $12 million. In such a case, it would not make sense for the primary insurer to reduce its expected direct losses by $12 million, since doing so would yield negative net hurricane losses. And while this example is extreme, the same issue may easily arise within any individual layer or portion of loss that might be reinsured. In light of this drawback, primary insurers should use their own estimates of expected loss whenever possible.

[5] Often times, multiple reinsurers assume risk under a single contract, particularly when the reinsured risk is substantial. For the sake of ease, we refer to the "reinsurer" rather than the "group of reinsurers."

Using a Simulation Model

For this example, it has been assumed that a hurricane simulation model is used to determine the average annual hurricane loss and that only hurricanes will pierce the retention. Under these assumptions, the terms of the contract can then be applied to each simulated loss event to determine an average annual savings.

Exhibit 4 displays the output of the simulation model. Before applying the contract terms to each loss, one adjustment must be made. Since the amount of exposure assumed by the model does not match the expected exposure level during the contract period, losses must be restated to the expected exposure level for the period in which the contract is in effect. This is done by multiplying each loss by the ratio of the expected AIYs to be earned during the contract period and the AIYs assumed by the model[6].

Once the losses have been adjusted, the contract terms are applied to each event. As shown in Exhibit 5, losses under $100 million do not trigger coverage, losses over $500 million (= $100 million retention + $400 million limit) trigger maximum coverage of $200 million (= $400 million limit x 50% of layer reinsured), and losses between $100 million and $500 million trigger coverage equal to 50% of the amount excess of $100 million. As can be seen from the exhibit, the estimated annual loss savings due to the contract is $4,767,536. Subtracting this figure from the $11 million reinsurance premium, the net cost of reinsurance is determined to be $6,232,464.

Once the net cost of reinsurance has been determined, there is one remaining hurdle: the period covered by the reinsurance contract, a calendar year, does not match the period for which rates are being set, a policy year[7].

In a perfectly steady state, with no new business being written or non-renewed, the mismatch can be ignored. By treating the calendar year cost as a policy year cost, the insurer will collect the necessary premium to cover the expense, and each policyholder will pay for, and receive, exactly one year of reinsurance coverage.

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[6] The estimate of expected AIYs should consider both the expected change in the average AIYs per policy and the expected change in the number of policies. In this example, it is assumed that 15,891,785 AIYs will be insured during the first year of the reinsurance contract. Although the development of this figure is not displayed, using an exponential trend to estimate the expected average AIYs per policy, and either an exponential or linear trend to estimate the number of policies insured is a reasonable approach.

[7] In fact, under the calendar year contract, *some* reinsurance coverage will be provided to all policies written between one year before the reinsurance takes effect and the last day the contract is in force, a span of two complete policy years.

An example makes this clear. Assume an insurer sets rates on a policy year basis and purchases reinsurance for calendar year 2006. The insurer treats the reinsurance expense as a policy year expense and includes it in the rates for policy year 2006. Policies written in policy year 2005 have a portion of their term, what is left as of January 1, 2006, covered by the reinsurance contract at no cost. Policies written in policy year 2006 include the cost of a full year of reinsurance, but only a portion of their term, that prior to December 31, 2006, is actually reinsured. The amount by which customers overpay in 2006 is offset exactly by the "free" coverage from policy year 2005, and in total, each customer pays for and receives exactly one year of reinsurance coverage.

Unfortunately, companies rarely operate in the perfectly steady state and, therefore, estimates must be made. In the example at hand, FIC has purchased a three-year contract, although the exact terms are only known for the first year. If the company believes that the terms for the remaining years will be similar to those of the first year, it is perhaps easiest to relate the net cost of the agreement to some base, such as house years or AIYs, and assume a constant net cost of reinsurance relative to the base over time[8].

Exhibit 6 displays the development of the net cost of reinsurance per AIY. Exhibit 7 then uses the figure to develop the net cost of reinsurance per policy for the period for which rates are being set and to determine the final indication of 12.2%. The addition of reinsurance increases the average indicated premium of $500 to $560.94. In exchange for the additional premium, policyholders are more assured that coverage will remain available both before and after a catastrophic event, and that their own losses will be paid in the case of such an event.

5. INTERPRETING THE COST OF REINSURANCE

The example contract cost $11 million and was expected to cover, on average, only $4.7 million in losses each year. Even assuming the reinsurer had a 20% expense load ($11 million x 20% = $2.2 million), its expected profit was $4.1 million, or 37%[9] of premium. This figure may seem high compared to the primary insurer's profit provision. Why the difference?

[8] This is somewhat imprecise since expected losses within a specific layer of loss do not change exactly in proportion with exposure. It is, however, a reasonably close and easy to calculate approximation.
[9] While the example is hypothetical, the figures are not necessarily atypical.

Quite simply, risk[10]. Higher layers of loss are more risky and therefore require more capital per dollar of expected loss than do lower layers. As a result, if all capital demands the same return, higher layers of loss will require a greater return per dollar of expected loss than do lower layers.

This point is often lost because, due to theoretical and practical difficulties in allocating capital, primary insurance companies typically use one underwriting profit provision for all states and lines, much less individual layers of loss. This profit provision can be thought of as the average required profit provision over all layers of loss, in all states, for all lines. If the reinsured layer is "riskier than average," it is expected that the reinsurer's profit provision, the market price of risk specific to the layer, will exceed the primary company's, with the difference representing the amount by which the layer is being subsidized by other, less risky layers. In fact, assuming the reinsurer is better diversified than the primary company, the layer of loss may represent less risk to the reinsurer than the primary company. If this is the case, the difference in profit provisions actually represents the lower bound of the amount of subsidization.

6. MULTI-LINE AND MULTI-COMPANY CONTRACTS

The example contract covered one line of insurance for one company in one state. If instead the coverage terms were more broadly defined to include other lines or companies, the same process could still be used. Exhibit 8 includes such an example.

Assume that the sample contract covering Armstrongland Homeowners policies also covered Mobilehomes, but was otherwise unchanged. First, simulated losses for both lines are adjusted individually for differences between the actual exposure level underlying the model and the expected exposure level during the contract period. Next, the contract terms are then applied to the total adjusted losses from each event. Once the total amount of reinsured loss for each event is determined, it is allocated back to the individual lines in proportion to their adjusted losses for that event. The reinsurance premium is then allocated in proportion to the total expected reinsured loss.

[10] It is tempting to site lack of regulation in reinsurance ratemaking as another reason for reinsurance profit loads that exceed primary companies'. However, assuming the reinsurance market is a competitive one, the market will not allow excess profits to persist over time.

The process then continues as before with the Homeowners and Mobilehome lines each developing their own net cost of reinsurance to use in their separate indications.

7. SUMMARY

The reinsurance premium can be divided into two parts: the reinsurance benefit, or expected ceded losses under the contract, and the transaction costs, the reinsurer's expenses and profit that represent additional cost to the primary insurer. When completing an indication after reinsurance has been purchased, the primary insurer can either subtract the expected ceded losses from the expected direct losses and include the entire reinsurance premium as an expense, or leave expected losses unadjusted and include only the transaction costs of the contract as an expense. Because it more clearly illustrates the total impact of the reinsurance agreement on the indication, the latter method, which is called the Net Cost of Reinsurance method, is preferred.

The difficulty in applying the Net Cost of Reinsurance method lies primarily in determining the expected ceded losses under the contract. However, when a simulation model is available, one can simply adjust the simulated losses for each event to the level that would be expected in the period for which the contract is in effect, and then apply the contract terms to the adjusted losses to determine the average ceded loss over an extended period of time. Armed with the expected ceded loss, one can determine the net cost of reinsurance, adjust for differences in the reinsurance and ratemaking time periods, and complete the indication. Once finished, the indication including the net cost of reinsurance will better fulfill the requirements of the *Statement of Principles Regarding Property and Casualty Ratemaking* by giving appropriate consideration to the effect of reinsurance agreements and providing for all costs associated with the transfer of risk.

8. REFERENCES

[1] Cass, R. Michael, Peter R. Kensicki, Gary S. Patrik, and Robert C. Reinarz, Reinsurance Practices Volume 1, **1997**, Page 33.
[2] Casualty Actuarial Society, *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, **1988.**
[3] Homan, Mark J., "Reflecting Reinsurance Costs in Rate Indications for Homeowners Insurance," Casualty Actuarial Society Forum, **1997**, 223-254.

Exhibit 1
Simplified Examples of Indicated Rate Calculations,
with and without Reinsurance

A. Indicated Rate Excluding the Cost of Reinsurance

(1) Expected Losses:	$100
(2) Variable Expense and Profit:	20%
(3) Indicated Premium (1) / [1 - (2)]:	$125

B. Reinsurance Contract Information

(1) Reinsurance Premium:	$30
(2) Expected Losses covered by contract (Reinsurance Benefit):	$10
(3) Net cost of reinsurance (Transaction Costs): (1) - (2)	$20

C. Indicated Rate Including the Cost of Reinsurance-
Net Loss Plus Reinsurance Method

(1) Net Expected Losses:	$90
(2) Reinsurance Expense:	$30
(3) Variable Expense and Profit:	20%
(4) Indicated Premium: [(1) + (2)] / [1 - (3)]	$150

D. Indicated Rate Including the Cost of Reinsurance -
Net Cost of Reinsurance Method

(1) Expected Losses:	$100
(2) Net Reinsurance Expense:	$20
(3) Variable Expense and Profit:	20%
(4) Indicated Premium: [(1) + (2)] / [1 - (3)]	$150

Exhibit 2
Armstrongland
Development of Indicated Rate Level Change[1]

(1)	Projected Average Earned Premium at Current Rate Level:	$500.00
(2)	Indicated Provision for Non-Catastrophe Losses and LAE:	$150.00
(3)	Indicated Provision for Catastrophe Losses and LAE:	$200.00
(4)	Indicated Provision for General and Other Acquisition Expense:	$50.00
(5)	Commissions, Taxes, Profit, and Contingency Provision:	20%
(6)	Indicated Average Premium: [(2) + (3) + (4)] / [1.00 - (5)]	$500.00
(7)	Indicated Rate Level Change: [(6) / (1)] - 1.00	0.0%

Armstrongland
Development of Indicated Provision
for Catastrophe Losses and LAE[1]

(1)	Projected Average AIYs Per Policy:	125.00
(2)	Indicated Non-Hurricane Catastrophe Provision Per AIY:	$0.65
(3)	Indicated Hurricane Catastrophe Provision Per AIY:	$0.95
(4)	Indicated Total Catastrophe Provision Per AIY: (2) + (3)	$1.60
(5)	Indicated Provision for Catastrophe Losses and LAE: (1) x (4)	$200.00

1. All figures are for the policy year January 1, 2006 to December 31, 2006

Exhibit 3
Sample Reinsurance Contract Terms

Type of Contract:	Excess Catastrophe
States Covered:	Armstrongland
Lines Covered:	Homeowners
Perils Covered:	All, although only hurricane events are expected to exceed retention
Time Period:	January 1, 2006 to December 31, 2008, with terms renegotiable at the end of each calendar year
Placement, Retention, and Limit:	50% of the first $400 million in loss[1], excess of $100 million, per catastrophic event
Reinstatement Terms:	Reinstatement is automatic
Reinsurance Premium:	$11 million for the first year

1. Including *all* loss adjustment expenses.

Exhibit 4
Armstrongland
Simulation Model Output

Year #	Event #	Simulated Loss[1]
1	1	6,128,735
2	2	22,090,811
2	3	4,359,872
5	4	97,275,005
6	5	593,781
7	6	3,098,383
8	7	12,090,087
9	8	1,213,789
11	9	14,345,608
12	10	2,526,670
13	11	80,912,765
14	12	3,819,857
15	13	1,381,858
17	14	12,698,935
18	15	10,068,671
18	16	14,651,275
21	17	1,068,056
22	18	1,669,525
23	19	3,615,780
24	20	1,473,317
25	21	1,387,427
27	22	544,510
29	23	505,777,829
33	24	2,133,670
33	25	11,829,695
34	26	1,317,634
36	27	847,174
37	28	9,505,643
39	29	2,348,683
41	30	2,119,024
⋮	⋮	⋮
99,999	70,871	12,380,298
100,000	70,872	6,109,828
Total:		1,258,581,945,000
Average Annual Loss:		12,585,819
Assumed AIYs:		13,248,231
Average Annual Loss per AIY:		$0.95

1. Includes *all* loss adjustment expenses.

Exhibit 5
Armstrongland Simulation Model Output

(1)	(2)	(3)	(4)	(5)
		Simulated	Adj. Simulated	Reinsured
Year #	Event #	Loss[1]	Loss[1]	Loss[1]
1	1	6,128,735	7,351,664	0
2	2	22,090,811	26,498,815	0
2	3	4,359,872	5,229,842	0
5	4	97,275,005	116,685,274	8,342,637
6	5	593,781	712,264	0
7	6	3,098,383	3,716,635	0
8	7	12,090,087	14,502,545	0
9	8	1,213,789	1,455,988	0
11	9	14,345,608	17,208,133	0
12	10	2,526,670	3,030,842	0
13	11	80,912,765	97,058,110	0
14	12	3,819,857	4,582,072	0
15	13	1,381,858	1,657,594	0
17	14	12,698,935	15,232,882	0
18	15	10,068,671	12,077,775	0
18	16	14,651,275	17,574,792	0
21	17	1,068,056	1,281,176	0
22	18	1,669,525	2,002,662	0
23	19	3,615,780	4,337,273	0
24	20	1,473,317	1,767,303	0
25	21	1,387,427	1,664,274	0
27	22	544,510	653,162	0
29	23	505,777,829	606,700,813	200,000,000
33	24	2,133,670	2,559,423	0
33	25	11,829,695	14,190,194	0
34	26	1,317,634	1,580,555	0
36	27	847,174	1,016,219	0
37	28	9,505,643	11,402,400	0
39	29	2,348,683	2,817,340	0
41	30	2,119,024	2,541,855	0
⋮	⋮	⋮	⋮	⋮
99,999	70,871	12,380,298	14,850,665	0
100,000	70,872	6,109,828	7,328,984	0
(6) Total:		1,258,581,945,000	1,509,719,575,000	476,753,600,000
(7) Average Annual Loss:		12,585,819	15,097,196	4,767,536
(8) Assumed AIYs:		13,248,231	15,891,785	15,891,785
(9) Average Annual Loss per AIY:		$0.95	$0.95	$0.30

1. Includes *all* loss adjustment expenses.

Exhibit 6
Armstrongland
Net Cost of Reinsurance Per AIY

(1)	Reinsurance Premium:	$11,000,000
(2)	Expected Loss Savings:	$4,767,536
(3)	Net Cost of Reinsurance: (1) - (2)	$6,232,464
(4)	Expected Reinsured AIYs:	15,891,785
(5)	Net Cost of Reinsurance per AIY: (3) / (4)	$0.39

Exhibit 7
Armstrongland
Development of Indicated Rate Level Change[1]

(1)	Projected Average Earned Premium at Current Rate Level:	$500.00
(2)	Indicated Provision for Non-Catastrophe Losses and LAE:	$150.00
(3)	Indicated Provision for Catastrophe Losses and LAE:	$200.00
(4)	Indicated Provision for Net Cost of Reinsurance:	$48.75
(5)	Indicated Provision for General and Other Acquisition Expense:	$50.00
(6)	Commissions, Taxes, Profit, and Contingency Provision:	20%
(7)	Indicated Average Premium: [(2) + (3) + (4) = (5)] / [1.00 - (6)]	$560.94
(8)	Indicated Rate Level Change: [(6) / (1)] - 1.00	12.2%

Armstrongland
Development of Indicated Provision
for Catastrophe Losses and LAE[1]

(1)	Projected Average AIYs Per Policy:	125.00
(2)	Indicated Non-Hurricane Catastrophe Provision Per AIY:	$0.65
(3)	Indicated Hurricane Catastrophe Provision Per AIY:	$0.95
(4)	Indicated Total Catastrophe Provision Per AIY: (2) + (3)	$1.60
(5)	Indicated Provision for Catastrophe Losses and LAE: (1) x (4)	$200.00

Armstrongland
Development of Indicated Provision
for Net Cost of Reinsurance[1]

(1)	Projected Average AIYs Per Policy:	125.00
(2)	Net Cost of Reinsurance Per AIY:	$0.39
(3)	Indicated Provision for Net Cost of Reinsurance: (1) x (2)	$48.75

1. All figures are for the policy year January 1, 2006 to December 31, 2008

Exhibit 8
Armstrongland
Simulation Model Output

(1)	(2)	(3) Homeowners Simulated	(4) Homeowners Adj. Simulated	(5) Mobilehome Simulated	(6) Mobilehome Adj. Simulated	(7) Total Adj. Simulated	(8) Total Reinsured	(9) Homeowners Reinsured	(10) Mobilehome Reinsured
Year #	Event #	Loss[1]	Loss[1]	Loss[1]	Loss[1]	Loss[1]	Loss[1]	Loss[1]	Loss[1]
1	1	6,128,735	7,351,664	1,064,506	1,266,762	8,618,425	0	0	0
2	2	22,090,811	26,498,815	2,211,113	2,631,224	29,130,039	0	0	0
3	3	4,359,872	5,229,842	541,747	644,679	5,874,520	0	0	0
5	4	97,275,005	116,685,274	14,980,504	17,826,800	134,512,074	17,256,037	14,969,105	2,286,932
6	5	593,781	712,264	101,327	120,579	832,843	0	0	0
7	6	3,098,383	3,716,635	428,279	509,652	4,226,287	0	0	0
8	7	12,090,087	14,502,545	1,764,623	2,099,901	16,602,446	0	0	0
9	8	1,213,789	1,455,988	189,938	226,026	1,682,015	0	0	0
11	9	14,345,608	17,208,133	2,123,263	2,526,683	19,734,816	0	0	0
12	10	2,526,670	3,030,842	269,526	320,735	3,351,578	0	0	0
13	11	80,912,765	97,058,110	2,807,801	3,341,283	100,399,393	199,697	193,051	6,646
14	12	3,819,857	4,582,072	734,259	873,768	5,455,840	0	0	0
15	13	1,381,858	1,657,594	179,206	213,255	1,870,849	0	0	0
17	14	12,698,935	15,232,882	1,962,125	2,334,929	17,567,811	0	0	0
18	15	10,068,671	12,077,775	1,221,862	1,454,016	13,531,792	0	0	0
18	16	14,651,275	17,574,792	1,874,284	2,230,398	19,805,190	0	0	0
21	17	1,068,056	1,281,176	198,133	235,778	1,516,954	0	0	0
22	18	1,669,525	2,002,662	324,915	386,648	2,389,311	0	0	0
23	19	3,615,780	4,337,273	487,932	580,640	4,917,913	0	0	0
24	20	1,473,317	1,767,303	174,723	207,920	1,975,223	0	0	0
25	21	1,387,427	1,664,274	151,894	180,754	1,845,028	0	0	0
27	22	544,510	653,162	61,368	73,028	726,190	0	0	0
29	23	505,777,829	606,700,813	92,895,444	110,545,579	717,246,391	200,000,000	169,175,006	30,824,994
33	24	2,133,670	2,559,423	275,793	328,194	2,887,617	0	0	0
33	25	11,829,695	14,190,194	1,901,636	2,262,946	16,453,140	0	0	0
34	26	1,317,634	1,580,555	206,975	246,301	1,826,856	0	0	0
36	27	847,174	1,016,219	96,096	114,355	1,130,574	0	0	0
37	28	9,505,643	11,402,400	1,262,523	1,502,403	12,904,803	0	0	0
39	29	2,348,683	2,817,340	304,319	362,139	3,179,479	0	0	0
41	30	2,119,024	2,541,855	270,111	321,432	2,863,287	0	0	0
⋮	⋮	⋮	⋮				⋮	⋮	⋮
99,999	70,871	12,380,298	14,850,665	1,684,911	2,005,044	16,855,708	0	0	0
100,000	70,872	6,109,828	7,328,984	1,070,116	1,273,438	8,602,422	0	0	0
(6) Total:		1,258,581,945,000	1,509,719,575,000	213,242,683,193	253,758,792,999			492,645,335,000	61,200,650,076
(7) Average Annual Loss:		12,585,819	15,097,196	2,132,427	2,537,588			4,926,453	612,007
(8) Assumed AIYs:		13,248,231	15,891,785	1,254,369	1,492,699			15,891,785	1,492,699
(9) Average Annual Loss per AIY:		$0.95	$0.95	$1.70	$1.70			$0.31	$0.41

1. Includes *all* loss adjustment expenses.