HOMEOWNERS EXCESS WIND LOADS: AUGMENTING THE ISO WIND PROCEDURE

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Augmenting the ISO Wind Procedure

BY JOHN BRADSHAW & MARK J. HOMAN

The ISO excess wind procedure is widely used by many companies. However, it has one major flaw. It depends on the loss history in the state to provide a true representation of the future expected wind experience. The procedure presented here removes this flaw. Modeling is used to augment history to yield more accurate wind expectations. The procedure has the added side benefit of providing a means to reflect different wind loadings by territory.

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Overview

The ISO Excess Wind Procedure is a popular procedure that is in use by many companies. The procedure relies on the past history, currently about thirty years, to be a representative sample of true long term wind experience. This assumption is not valid in many cases. Most experts have stated that the past thirty years of experience in Florida have had much less hurricane activity than any other thirty year period. South Carolina's experience now includes Hurricane Hugo. Hugo is treated as if it will recur once every thirty years by the ISO procedure. However, experts feel that Hugo is more likely a one in one hundred year event, if not less frequent.

The procedure outlined in this paper uses modeling to determine the expected wind experience over a longer period of time. In this case, it is a 50 year time period. The procedure augments the scant history in a state like Florida and makes adjustments to allow removal of events like Hurricane Hugo in South Carolina. It still rests primarily on the ISO procedure.

It should be noted that the ISO procedure has been criticized in other ways and other procedures have been developed. [1] However, most companies lack sufficient data to use these other procedures. We are looking for ways to improve the ISO procedure without requiring historical data which may be unobtainable.

ISO Excess Wind Procedure

We will start by explaining the ISO excess wind procedure briefly. As the name implies, the procedure only makes adjustments for excess wind losses. It makes no adjustment for non-wind catastrophes that occur, such as freezing in the South. The procedure determines which losses should be considered excess and removed from an experience period and calculates a long-term load to replace the excluded losses by spreading them over a longer time period.

Currently, the history period used in the ISO procedure in most states is about 30 years. This corresponds to the introduction of the Homeowners policy. History before that period is difficult to use since the coverages were not the same.

Exhibit I shows the calculation of the excess wind threshold and the long term load for a sample state. The procedure starts by breaking down the losses into wind and non-wind categories. The ratio of wind to non-wind is then calculated. The median wind/non-wind ratio is calculated to determine the excess wind threshold.

The excess wind threshold is the greater of 1.5 times the median or 0.25. By using a threshold that is greater than the median, adjustments are only made for the truly unusual wind years rather than for some fairly common events. The use of 0.25 as a minimum threshold eliminates the need to make adjustments in states where the wind experience is relatively light.

Each wind/non-wind ratio is tested against the threshold to determine whether it is an excess year. If the ratio is greater than the threshold, it is an excess year and the excess portion is calculated. The excess ratio is the portion of the wind/non-wind ratio greater than the median. The excess losses are then calculated by taking the excess ratio multiplied by the non-wind losses. The non-excess losses are then calculated by subtracting the excess losses from the total losses.

The excess wind load is calculated by taking the average excess ratio multiplied by the average non-excess ratio.

Modeling

Modeling is used to project expected losses from a fifty year event. A fifty year event is a storm that is expected to occur once every fifty years. A storm of fifty year intensity is determined by the expected wind speeds. The fifty year event differs from area to area due to storm expectations in the area.

The model used to develop this paper is one that was developed at the Hartford Re Management Company. Other reinsurers and reinsurance brokers have developed similar models. The model will not be discussed in detail but a brief outline is needed.

The model uses projected storm tracks through a state or group of states. The storm track includes average wind speeds as the storm moves along the track and a damage matrix based on these wind speeds and the distance from the track. The model applies this information against the distribution of business in a company's book to determine expected losses from the storm.

The expected losses are output by area and in total. We take several possible storm tracks through a state and then average them. Exhibits II and III are the output from the model for the projected storm tracks through New York and Connecticut.

Adding "History"

The average projected losses that we get from the model represent the losses expected from a storm of fifty year severity. In order to include this as "history" in the ISO procedure, we must act as if we have 50 years of data.

Exhibit IV shows how we make this adjustment. We start with the 29 years of data that we already have. Since none of the events in the 29 year period are more severe than the 50 year projection, we do not eliminate any years. We then insert a year to represent the 50 year event.

The non-wind losses used are a projection from the level of losses in the most recent years of data. The company losses should be used for this projection to match the modelled wind losses even though ISO data may be used for the history. The excess calculation continues as before. However, the averages are now weighted averages using the 29 years of history to represent 49 years and the projection from the model to represent the fiftieth year. The median wind/non-wind ratio is not adjusted since it is assumed that one extreme year should have no impact on the median.

The final wind load is used in the same way as the typical ISO wind load. No further adjustments are necessary.

In a case like South Carolina, one additional step would be needed in the above process. A year that was more severe than the 50 year event should be eliminated. In South Carolina, for example, the year of Hurricane Hugo (1989) would be dropped from the 29 year history. We recommend totally eliminating it and using only the remaining years of history, with the addition of the 50 year event from the model. One could also consider replacing 1989 with a "typical" year. Given the difficulty in determining a typical year, we do not recommend this alternative.

Territorial Loadings

An additional benefit of this modeling is that you get information on the distribution of the storm losses by area within the state. This data can be used to develop territorial wind loadings to be used in ratemaking rather than merely using statewide loadings.

To use the model output, you start by taking averages of the losses by area across the various storm tracks modeled as shown in Exhibit III. The expected wind losses by area from the model are then divided by the non-excess losses in the area. This gives a wind to non-excess ratio for each area. The territorial ratio is divided by the statewide ratio to determine a relativity for each area. These indices by area are multiplied by the statewide wind load to determine a wind load for each area. These adjusted wind loads are then applied to the territories that comprise the area when calculating new territorial relativities for ratemaking.

Exhibit V shows this calculation using 5 year incurred losses and 5 year earned premiums at current rates. The loss ratio relativities before the loading show the results that would occur using a typical statewide loading. The relativities after the loading show the more accurate results.

One variation on this procedure that we recommend is using the current in-force amount of insurance by territory instead of non-wind losses. By dividing the wind losses from the model by the exposures, one obtains a damage potential for each territory. Since the exposures form the base for the model, using exposures will be slightly more accurate. The additional accuracy results from removing the variation due to changes in distribution and the random variation in the actual losses.

Conclusion

The ISO procedure has its flaws. However, due to the difficulty in obtaining a sufficient volume of credible data for any other method, it remains the most widely used method. The adjustment outlined in this paper allows for the elimination of one of the major flaws in the ISO procedure, namely its reliance on past history as a representative sample of possible losses. We recognize that not every company has a wind loss model in their company. However, several reinsurance companies and brokers do have these models and contract for their use.

An additional shortcoming of the ISO procedure is that it fails to adjust for demographic shifts. In particular it does not consider the increase in coastal exposures. The adjustment of the model reflects the current distribution of a company's book and can be updated periodically to reflect any shifts. This does not eliminate the ISO shortfalls since many of the years are still based purely on history. However, the additional year from the model will dampen this problem with the ISO procedure.

Finally, the more accurate territorial indications that result allow a company to more accurately charge for the additional exposure in the wind territories.

[1] See the 1990 Pricing Discussion Paper titled "Pricing the Catastrophe Exposure" by David H. Hays and W. Scott Farris, Vol. II pp. 559-603.

Exhibit I

HOMEOWNERS INSURANCE - FORMS 1,2,3&5

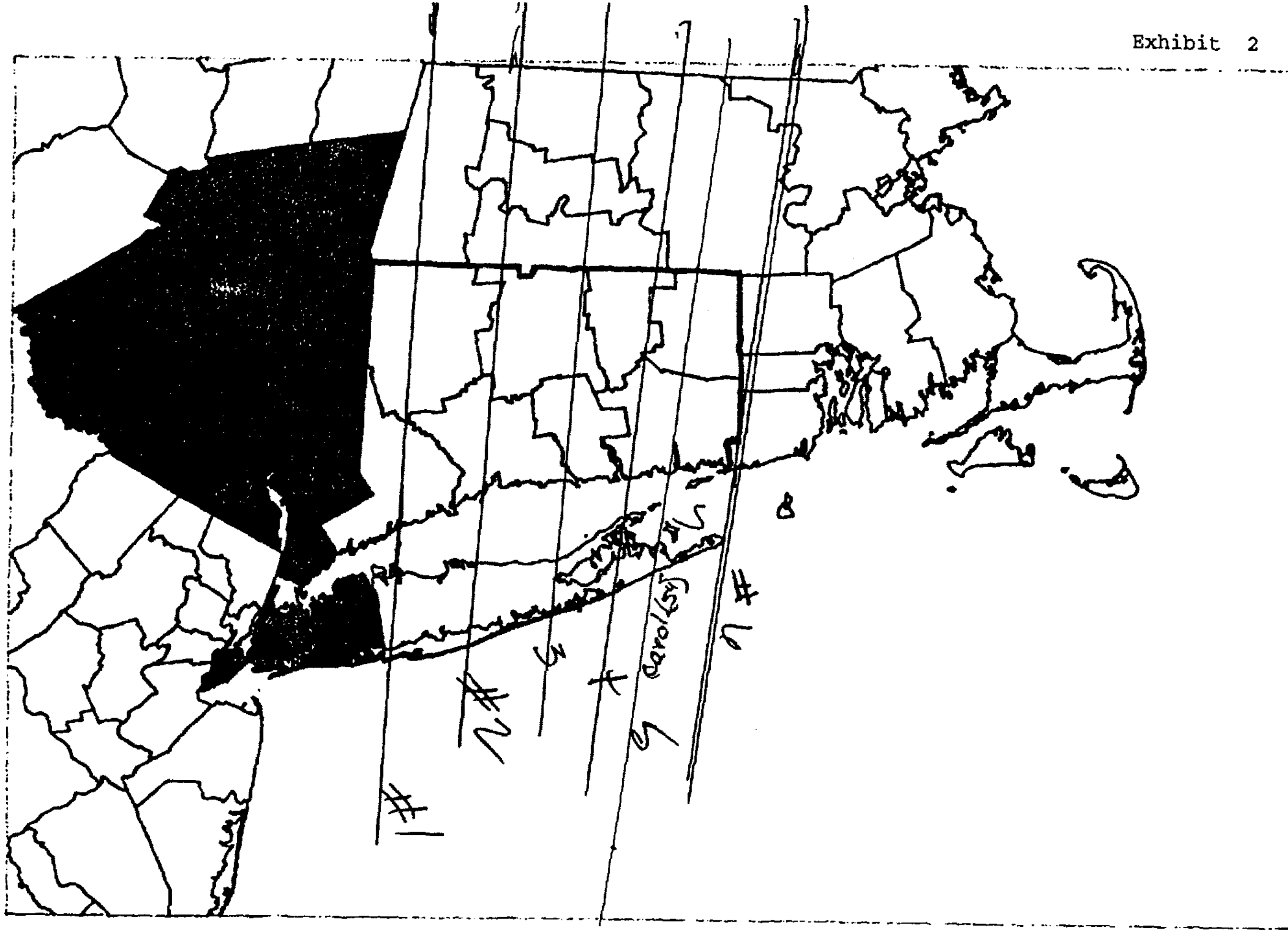
CONNECTICUT

DERIVATION OF EXCESS WIND FACTOR

Year	HO Wind Losses	HO Total Losses	Non-Wind Losses	Wind-to-Non-Wind	Excess Years*	Excess Ratio	Excess Losses	Non-Excess Losses	Non-Wind/ Non-Excess
1961	39180	421841	382661	0.102	0.000	0.000	0	421841	0.907
1962	57857	525788	467931	0.124	0.000	0.000	0	525788	0.890
1963	38690	579712	541022	0.072	0.000	0.000	0	579712	0.933
1964	24077	483403	459326	0.052	0.000	0.000	0	483403	0.950
1965	22309	721579	699270	0.032	0.000	0.000	0	721579	0.969
1966	22428	750139	727711	0.031	0.000	0.000	0	750139	0.970
1967	44329	922439	878110	0.050	0.000	0.000	0	922439	0.952
1968	52551	1064312	1011761	0.052	0.000	0.000	0	1064312	0.951
1969	54499	1276897	1222398	0.045	0.000	0.000	0	1276897	0.957
1970	49047	1493849	1444802	0.034	0.000	0.000	0	1493849	0.967
1971	128182	1639387	1511205	0.085	0.000	0.000	0	1639387	0.922
1972	120507	1871461	1750954	0.069	0.000	0.000	0	1871461	0.936
1973	103326	2653614	2550288	0.041	0.000	0.000	0	2653614	0.961
1974	222439	2854392	2631953	0.085	0.000	0.000	0	2854392	0.922
1975	91049	2679652	2588603	0.035	0.000	0.000	0	2679652	0.966
1976	112610	2618827	2506217	0.045	0.000	0.000	0	2618827	0.957
1977	43872	2309037	2265165	0.019	0.000	0.000	0	2309037	0.981
1978	198862	2160841	1961979	0.101	0.000	0.000	0	2160841	0.908
1979	523824	2899303	2375479	0.221	0.000	0.000	0	2899303	0.819
1980	152170	3088639	2936469	0.052	0.000	0.000	0	3088639	0.951
1981	125697	4422524	4296827	0.029	0.000	0.000	0	4422524	0.972
1982	143262	4229727	4086465	0.035	0.000	0.000	0	4229727	0.966
1983	206742	4414828	4208086	0.049	0.000	0.000	0	4414828	0.953
1984	367046	5290981	4923935	0.075	0.000	0.000	0	5290981	0.931
1985	2772884	8654450	5881566	0.471	0.471	0.420	2468097	6186353	0.951
1986	412685	5954039	5541354	0.074	0.000	0.000	0	5954039	0.931
1987	415849	9040467	8624618	0.048	0.000	0.000	0	9040467	0.954
1988	161040	9480386	9319346	0.017	0.000	0.000	0	9480386	0.983
1989	2310963	12857786	10546823	0.219	0.000	0.000	0	12857786	0.820
Total	9017976	97360300	88342324	2.364		0.420	2468097	94892203	27.230
Average						0.014			0.939
			Median	0.052					
		Excess Wind Factor		1.014		[1 + (0.014 * 0.939)]			

*The ratio for a year must be > 1.5M and at least .250 for that year to qualify as an excess year.

Exhibit 2



81 mile(s)

THE HARTFORD INSURANCE GROUP

Exhibit III

HOMEOWNERS LOSSES FROM 50 YEAR EVENTS
NEW YORK AND CONNECTICUT

	Track #1	Track #2	Track #3	Track #4	Track #5	Track #6	6 Track Average
Connecticut							
Fairfield	30,356	6,071	1,308	336	168	0	6,373
Hartford	689	3,447	2,757	689	1,103	1	1,448
Litchfield	538	269	81	1	1	0	148
Middlesex	274	727	2,341	2,018	1,292	210	1,144
New Haven	3,141	6,853	13,421	1,028	628	114	4,198
New London	73	379	1,895	2,239	2,368	2,497	1,575
Tolland	41	81	326	326	163	163	183
Windham	0	10	10	101	101	81	51
Total	35,112	17,837	22,139	6,738	5,824	3,066	15,119
New York							
Bronx	103	1	0	0	0	0	17
Kings	443	89	0	0	0	0	89
Nassau	35,341	1,767	177	0	353	0	6,273
New York	35	9	0	0	0	0	7
Queens	677	135	0	0	0	0	135
Richmond	125	42	0	0	0	0	28
Suffolk	53,326	59,600	14,429	10,259	6,399	0	24,002
Westchester	1,562	234	0	0	0	0	299
Total	91,612	61,877	14,606	10,259	6,752	0	30,851

* - Tracks are 20 miles apart.

Exhibit IV

CONNECTICUT

HOMEOWNERS INSURANCE - FORMS 1, 2, 3 & 5
DERIVATION OF EXCESS WIND FACTOR

Year	HO Wind Losses	HO Total Losses	Non-Wind Losses	Wind-to-Non-Wind	Excess Years*	Excess Ratio	Excess Losses	Non-Excess Losses	Non-Wind/ Non-Excess
1961	39,180	421,841	382,661	0.102	0.000	0.000	0	421841	0.907
1962	57,857	525,788	467,931	0.124	0.000	0.000	0	525788	0.890
1963	38,690	579,712	541,022	0.072	0.000	0.000	0	579712	0.933
1964	24,077	483,403	459,326	0.052	0.000	0.000	0	483403	0.950
1965	22,309	721,579	699,270	0.032	0.000	0.000	0	721579	0.969
1966	22,428	750,139	727,711	0.031	0.000	0.000	0	750139	0.970
1967	44,329	922,439	878,110	0.050	0.000	0.000	0	922439	0.952
1968	52,551	1,064,312	1,011,761	0.052	0.000	0.000	0	1064312	0.951
1969	54,499	1,276,897	1,222,398	0.045	0.000	0.000	0	1276897	0.957
1970	49,047	1,493,849	1,444,802	0.034	0.000	0.000	0	1493849	0.967
1971	128,182	1,639,387	1,511,205	0.085	0.000	0.000	0	1639387	0.922
1972	120,507	1,871,461	1,750,954	0.069	0.000	0.000	0	1871461	0.936
1973	103,326	2,653,614	2,550,288	0.041	0.000	0.000	0	2653614	0.961
1974	222,439	2,854,392	2,631,953	0.085	0.000	0.000	0	2854392	0.922
1975	91,049	2,679,652	2,588,603	0.035	0.000	0.000	0	2679652	0.966
1976	112,610	2,618,827	2,506,217	0.045	0.000	0.000	0	2618827	0.957
1977	43,872	2,309,037	2,265,165	0.019	0.000	0.000	0	2309037	0.981
1978	198,862	2,160,841	1,961,979	0.101	0.000	0.000	0	2160841	0.908
1979	523,824	2,899,303	2,375,479	0.221	0.000	0.000	0	2899303	0.819
1980	152,170	3,088,639	2,936,469	0.052	0.000	0.000	0	3088639	0.951
1981	125,697	4,422,524	4,296,827	0.029	0.000	0.000	0	4422524	0.972
1982	143,262	4,229,727	4,086,465	0.035	0.000	0.000	0	4229727	0.966
1983	206,742	4,414,828	4,208,086	0.049	0.000	0.000	0	4414828	0.953
1984	367,046	5,290,981	4,923,935	0.075	0.000	0.000	0	5290981	0.931
1985	2,772,884	8,654,450	5,881,566	0.471	0.471	0.420	2468097	6186353	0.951
1986	412,685	5,954,039	5,541,354	0.074	0.000	0.000	0	5954039	0.931
1987	415,849	9,040,467	8,624,618	0.048	0.000	0.000	0	9040467	0.954
1988	161,040	9,480,386	9,319,346	0.017	0.000	0.000	0	9480386	0.983
1989	2,310,963	12,857,786	10,546,823	0.219	0.000	0.000	0	12857786	0.820
Total	9,017,976	97,360,300	88,342,324	2.364		0.420	2468097	94892203	27.230
Average						0.014			0.939
50 Year	15,119,000	26,119,000	11,000,000	1.374	1.374	1.323	14548972	11570028	0.951
Average						0.041			0.939
			Median	0.052					
			Excess Wind Factor	1.038		[1 + (0.041 * 0.939)]			

*The ratio for a year must be > 1.5M and at least .250 for that year to qualify as an excess year.

Exhibit V

HOMEOWNERS TERRITOTIAL EXPERIENCE

CONNECTICUT

TERRITORIAL EXCESS WIND FACTORS

Zone	Earned Premium	Ex-Wind Incurred Losses	Loss Ratio	Loss Ratio Relativity	Territotial Excess Wind Factor	Adjusted Incurred Losses	Loss Ratio	Loss Ratio Relativity
28	1,368,915	672,307	49.1%	1.047	1.059	711,743	52.0%	1.068
29	2,231,951	1,410,928	63.2%	1.348	1.059	1,493,688	66.9%	1.375
31	17,377,565	7,866,176	45.3%	0.965	1.059	8,327,578	47.9%	0.985
32	1,544,439	682,356	44.2%	0.942	1.073	732,222	47.4%	0.974
33	478,717	381,935	79.8%	1.702	1.073	409,847	85.6%	1.759
34	7,623,692	4,195,286	55.0%	1.174	1.073	4,501,877	59.1%	1.213
35	1,587,717	718,700	45.3%	0.965	1.010	725,980	45.7%	0.939
36	3,514,166	1,316,946	37.5%	0.799	1.010	1,330,284	37.9%	0.778
37	991,207	404,694	40.8%	0.871	1.010	408,793	41.2%	0.847
38	22,875,106	10,647,978	46.5%	0.993	1.010	10,755,826	47.0%	0.966
39	3,793,237	1,818,060	47.9%	1.022	1.079	1,962,300	51.7%	1.063
40	3,399,010	1,478,268	43.5%	0.928	1.071	1,582,994	46.6%	0.957
41	6,164,932	2,632,560	42.7%	0.911	1.005	2,646,143	42.9%	0.882
42	4,753,070	2,207,787	46.4%	0.991	1.010	2,229,199	46.9%	0.964
Total	**77,703,724**	**36,433,981**	**46.9%**	**1.000**	**1.038**	**37,818,472**	**48.7%**	**1.000**

Zones	County	Ex-Wind Incurred Losses	50 Year Model Wind Losses	Wind/ Non-Wind Ratio	Wind/ Non-Wind Relativity	Excess Wind Factor
28,29,31	Fairfield	9,949,411	6,373,167	0.641	1.544	1.059
35-38	Hartford	13,088,318	1,447,667	0.111	0.267	1.010
41	Litchfield	2,632,560	148,333	0.056	0.136	1.005
40	Middlesex	1,478,268	1,143,667	0.774	1.864	1.071
32-34	New Haven	5,259,577	4,197,500	0.798	1.923	1.073
39	New London	1,818,060	1,575,167	0.866	2.088	1.079
42	Tolland & Windham	2,207,787	233,833	0.106	0.255	1.010
	Total	36,433,981	15,119,333	0.415	1.000	1.038