if $\frac{\sigma_2}{q}$ could be made more nearly 1.00, that is, if rating territorial, occupational, etc. classifications could be made more homogeneous than they are today.

APPENDIX

Formulae for Computing Distribution of 100,000 Risks and Expected Means on a 3-Year Experience Basis

$(q = .1 \text{ and } b = .06)$

No. of Accidents in 3 Years	Risks		Expected Mean Value (1 Year)	
	Symbol	Formula	Symbol	Formula
0	A_0	$100{,}000\left(\frac{1}{1+3b}\right)^{\frac{q}{b}}$	V_0	$\frac{q}{1+3b}$
1	A_1	$\left(\frac{3q}{1+3b}\right) A_0$	V_1	$V_0 + \frac{b}{1+3b}$
2	A_2	$\frac{3(q+b)}{2(1+3b)} A_1$	V_2	$V_0 + \frac{2b}{1+3b}$
3	A_3	$\frac{3(q+2b)}{3(1+3b)} A_2$	V_3	$V_0 + \frac{3b}{1+3b}$
4	A_4	$\frac{3(q+3b)}{4(1+3b)} A_3$	V_4	$V_0 + \frac{4b}{1+3b}$
5	A_5	$\frac{3(q+4b)}{5(1+3b)} A_4$	V_5	$V_0 + \frac{5b}{1+3b}$

MULTIPLE PERIL RATING PROBLEMS—SOME STATISTICAL CONSIDERATIONS

BY

ROBERT L. HURLEY

Volume XLVI, Page 196

DISCUSSION BY P. M. OTTESON

Mr. Hurley's paper represents a valuable contribution to the literature on multiple peril rating. The paper is most interesting to read and study; it reveals much of the author's thinking and philosophy concerning the general problems of insurance statistics and ratemaking and should provoke thought, study and discussion on a most timely subject.

The Homeowners policy is used to illustrate the multiple peril statistical

and ratemaking problems. No consideration is given to other types of "composite" coverages.

The multiple peril idea as represented by the Homeowners policy is considered as very desirable to the policyholder; this is in contrast to the difficulties it poses from the standpoint of analyzing prospective loss costs for ratemaking purposes. The fact that "multiple peril" does not represent any fixed combination of hazards but is always a "moving target" is brought out very capably.

The problem of the interplay of experience and rates between multiple peril policies and individual policies is discussed thoroughly and well. The danger of differences in rate levels based on pure chance rather than difference in inherent hazard is very real in a policy which includes unpredictable catastrophe windstorm losses in the same composite as high frequency liability claims and minor property losses. The basic question suggested is this: when different policy types of the same classification insure certain hazards which are common to each policy, should the proportion of the rate based on these common hazards consider the combined experience of all policy types? Or on the other hand, should the rates for each policy type stand on its own experience? This question must be answered in determining rate relativities between Homeowners Forms 1 and 2, as well as between Homeowners and individual coverage dwelling policies. A stronger and more positive position on this basic point by the author would have made the presentation more effective.

The weakness of relating loss costs to premiums instead of a fixed type of exposure unit is revealed; the weaknesses of the loss ratio approach are enumerated.

The discussion concerning losses by cause brings out the point that it would be highly desirable in any coverage involving windstorm to be able to segregate a certain percentage of the annual exposure and earmark it for catastrophe windstorm losses. The likelihood of changes in coverage and the need to establish proper rate relativities among even the various forms of Homeowners coverages further establishes the need for exposure information and losses by cause.

The author's review of the statistical devices used in establishing ratemaking statistics brings up the most vital question on this entire problem—what is Homeowners exposure and how can it be defined and measured? Would the auto "unit basis" coupled with an increased limits table to take care of high severity claims prove effective? Is the summation of amount at risk a proper base? Is a combination of bases necessary? Why is the premium for the first $8,000 of insurance higher than for the next $8,000 in Homeowners policies but not in dwelling policies? A more specific proposal or recommendation as to exposure base would have been most desirable.

A subsidiary class plan which would classify risks according to many possible variants such as occupation, income level, etc. is suggested. Some further elaboration as to why such items as income level or occupation would make one risk different from another would seem appropriate.

A most interesting tabulation concerning number and amount of loss at various size classifications for an entire book of fire business is presented. This

information should be most useful in analyzing variations in loss experience on fire coverage overall but there would seem to be some question as to what interpretations could be resolved which would be applicable to Homeowners coverage. The pattern for the dwelling type of risk exclusively would probably run along different lines. For samples of comparable size the consistency should run higher in the dwelling losses because the "probable loss" range would be narrower. It would be exceedingly interesting if this type of tabulation could be made available for dwelling or Homeowners policies within a certain size classification. A size of loss breakdown for these policies where the amount of insurance carried was $10,000 as compared with $20,000 for example would present interesting information for determining the increased premium necessary to take care of additional losses as the amount of insurance increases.

Concerning the element of hazard attributable to tropical windstorms, the 42-year record indicates that the number of storms reaching the United States per year averages 1.88 and that the observed frequency follows the Poisson distribution very closely. Some additional observations as to how these facts could be applied in determining an overall loading for catastrophe losses from this cause in the Homeowners rate would have been appropriate. The author's study further suggests the question as to whether or not we can assume that the tornadoes and hailstorms of the mid-western states would follow a similar distribution. These latter hazards assume substantial proportions in many areas.

The distribution of the number of fire catastrophes over a 45-year period did not fit the Poisson distribution closely. This suggests that the conditions producing catastrophe fires do change over the years and even vary from year to year. Here again, the question arises as to how this data could be interpreted with a view to determining Homeowners expected losses.

A "square root" credibility table is submitted as part of this paper without designation as to where or how this table was constructed. The author feels that a table of this kind may be dangerous and even represent an obstacle to the use of sound judgment in a line of business such as Homeowners because of the catastrophe elements of some of the coverage components. This is a sound conclusion. The swing in losses as a result of chance would not approach the zero point at a $5,000,000 premium level with a reasonable and usual proportion of the book subject to the same catastrophe.

The author definitely saved the best until the last. The increased credibility of individual risk experience resulting from the combination of coverages definitely is an important factor in distinguishing Homeowners from the regular dwelling policies. The average overall frequency of 20 claims per hundred risks makes the Homeowners policy reasonably comparable to an all-coverage automobile policy from a loss frequency standpoint. Although this point is not mentioned specifically as such, the temptation to transfer the merit rating thinking prevalent in the private passenger automobile field over into the Homeowners field is irresistible. A sound basis for a merit rating approach appears to be borne out by the author's research studies. Concerning this phase of the study, further developments appear likely as the competitive struggle for Homeowners business accelerates.