

THE RATING OF CROP-HAIL INSURANCE

BY

RICHARD J. ROTH

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DISCUSSION BY W. J. HAZAM

Mr. Roth's paper is a welcome addition to our *Proceedings*, dealing, as it does, with a phase of property insurance that is somewhat foreign to the scope of the actuarial experience and activity of most of our membership, including myself. His comprehensive survey is, to my knowledge, the first and most complete documentation on the subject of crop-hail insurance ratemaking. We should take a great deal of pride in having this "first" within the publications of our Society.

The historical, meteorological and agricultural background, so necessary to the understanding of the many and diverse problems peculiar to ratemaking for this line of insurance, are clearly and concisely presented. I do not expect any serious difficulty will confront the reader because he may be neither meteorologist nor farmer.

I am impressed by the momentous task, after Public Law 15, facing the newly organized Crop-Hail Actuarial Association in the transition from what appears to have been a subjective process of ratemaking to one showing a generous measure of meteorological and statistical inference.

It may be somewhat surprising to casualty actuaries that here we have a line of insurance that uses as many years of experience as is available in establishing base rates—i. e., the all-time experience. In examples set forth in the paper, as many as the latest 35 years have been used. As a former meteorologist painfully familiar with the promiscuity of weather and hailstorms in particular and as an actuary concerned with rating a catastrophe coverage in a manner to avoid adverse selection, I am completely convinced of the wisdom and necessity for long experience periods as a basic foundation for ratemaking in this line of insurance.

Rates in property lines of insurance are developed mainly from a consideration of physical rather than statistical factors. As Mr. Roth shows, it has been just the reverse for Crop-Hail Insurance. Stemming from *a priori* meteorological considerations, Mr. Roth sets forth a very convincing statistical justification for the recognition of one physical factor,—namely, elevation in the grading of township rates. The correlations of the means of average loss costs of townships of like elevation and the elevation are extremely high. Meteorologically speaking, I would have expected a greater thunderstorm sensitivity to slope of land *per se*, of which perhaps elevation is one form of expression. It will be interesting to see the results of Mr. Roth's intended investigations of loss costs by classifications of townships by elevation *and* by slope.

I can understand the need for refinement of geographical areas into rating zones which reflect, to a reasonable degree, differences in exposure to the

meteorological hazard. This is necessary to avoid adverse underwriting selection. However, it is not clear why the refinement is so small as a township. In developing base loss costs for a particular township, the Township, County and Elevation Loss Cost are weighted 25, 25 and 50% respectively. Since hail will not fall at a given location in most years, chance plays a large part in determining township and county experience during the 25-year period. There is no real recognition of credibility when, for example, the following experience on page 15 for two townships receive identical credibilities of 25%:

<u>Locality</u>	<u>Township</u>	<u>Range</u>	<u>Liability</u> <u>(Exposure)</u>	<u>Losses</u>	<u>Pure Premium</u>
Reno	22 S	5W	239,582	7,750	3.23
Reno	33 S	7W	3,229,095	157,900	4.89

It would seem that casualty insurance techniques of graded credibility weighting depending on expected loss costs suggest some possible areas of adaptability here. While the concept of rate limitations described later in the paper is reasonable, it probably would not be imposed as often if graded credibilities were used.

With respect to the use of crop differentials in the ratemaking process, I have a few comments to make that will no doubt reveal my city-boy ignorance on matters agricultural. The desirability and reasonability of developing base rates in terms of the major crop grown in a particular state are apparent. The development of crop differentials by which losses in minor crops are converted to the common loss level of the major crop relies on indicated differentials of the state experience exclusively. In private passenger automobile liability, we have our class differentials based largely on countrywide experience. I do not contend this is best either and I do have certain misgivings with the automobile approach. On the other hand, I have similar misgivings with the Crop-Hail approach. Both lines of insurance seem to be at opposite extremes to where *a priori* considerations would say they should be. Perhaps somewhere nearer the middle for both may give a better answer. Again, credibility weighting between state and national experience, if feasible, should be investigated.

Policy form factors of conversion are apparently constant for the state. For example, for the State of Nebraska, the excess over 10% loss endorsement is 80% of the Annual Percentage form for each and every crop. Should there not be differences in policy form factors by type of crop? For example, if the average damage to sugar beets was 20%, the loss relativity of the two forms would be .50 ($10\% \div 20\%$). But if the average for cantaloupes was 80%, the loss relativity between the two forms would be .875 ($70\% \div 80\%$). Does not the current rating procedure lead to adverse underwriting selection of policy form?

The method of reporting crop-hail experience for ratemaking purposes arouses a few thoughts. It is stated that "loss information cannot be reported by punched card because of large possibility of error in coding and proper handling". Our automobile bureau companies do report loss information

monthly on punched cards and, I trust, are reasonably satisfied with the accuracy of performance. I am not cognizant of the relative complexity of such a basis of reporting to suggest that it be adopted for crop-hail. I do submit, however, that their system of controls suggests the possibility of serious compensatory errors that might still produce figures in the allowable range of deviation.

Incidentally, the sample page of the 1958 Kansas Statistical Summary of experience should contain some explanation of the columns and abbreviated notations within certain columns.

In general, the underlying research, meteorological and statistical, involved in the development of crop-hail rates speaks well for the Crop-Hail Insurance Actuarial Association's continuing search for more scientific ratemaking techniques. They are to be commended for their constant encouragement of scientific interest into the whys and wherefores of hailstorms in the hope of offsetting devastating results such storms can and do produce.

I hope these comments and thoughts of a casualty actuary, a true stranger in this field, suggest some areas of possible fruitful investigation in this difficult line of ratemaking.

Mr. Roth is to be congratulated for the overall excellence of his paper and for his very valuable contribution to our Society's expressed objectives of having in its *Proceedings* a complete catalogue of papers on ratemaking for all lines of casualty and property insurance.