DISCUSSION BY WILLIAM S. GILLAM AND DANIEL P. FRAME

In this paper Mr. Bickerstaff presents a proposed ratemaking procedure for automobile collision insurance which incorporates two concepts not currently reflected in the standard ratemaking techniques on which we will comment in this review. The first is the reflection of the physical characteristics of vehicles in terms of their "damageability" and "repairability". That is, their relative susceptibility to damage given a certain collsion situation and their relative cost of repair parts and labor given a certain degree of damage. The second is the use of the lognormal distribution as a model for the distribution by size of automobile collision claims and the use of this model to determine the relationships between the rates for different deductibles.

As far as damageability and repairability are concerned, Mr. Bickerstaff in his paper recognizes the practical problems involved in collecting claim cost statistics by make and model of vehicle within a time frame that would permit their use in prospective ratemaking. He concludes that the answer would be to find a means of estimating the expected average repair costs of particular models on an *a priori* basis by means of engineering analyses. He briefly summarizes several of the studies that are being made by the industry and optimistically concludes that it would be safe to assume that the insurance industry will not stop "until there is developed completely a feasible means to determine for each new automobile model a reasonably accurate expected average repair cost which would take into consideration the parts/labor costs and the damageability over the full spectrum of possible collisions." He further states that "The ideas in this paper are predicated on that assumption."

In his summary of studies under way in this area he does not mention the continuing study of collision loss statistics that has been initiated by the Insurance Institute for Highway Safety in cooperation with a relatively small number of automobile insurers that, nevertheless, account for a very sizeable share of the automobile insurance market. For a summary of this project see the report submitted by Dr. William Haddon, Jr., President of the Institute, to the Automobile Insurance Problems (D3) Subcommittee of the NAIC at its meeting in December of 1971.

We can only echo Mr. Bickerstaff's hope that the industry will be able to develop a feasible way to measure differences in expected average repair

costs due to differences in the physical characteristics of vehicles so as to make possible their reflection in collision insurance rating. The progress made to date in this regard does not lead us to be as optimistic as Mr. Bickerstaff that this will be accomplished in the near future.

As far as the use of the lognormal distribution is concerned, we will leave to others more mathematically inclined to comment on the appropriateness of this distribution as a model for the distribution by size of automobile collision claims. They may also comment on his solutions to the problem of estimating the parameters of the lognormal to be fitted to actual data that are reported net as to a deductible. The problems created by the fact that there is in the real world an upper bound to the distribution, represented by the actual cash value of the insured vehicle at the time of the accident, need to be commented upon also.

As to the application of the lognormal model in the determination of the relationships between the rates for different deductibles, Mr. Bickerstaff concludes that the relationship between the net loss costs for $50 and $100 deductible collision is, for all practical purposes, a constant dollar difference. He feels that using a constant percentage relationship as one goes from the lower cost groups to the higher ones would "undoubtedly lead to an understatement of the loss costs for the higher groups and an overstatement in the lower groups."

However, in developing his net loss cost relationships by repair cost group for various deductibles, he "assumed that the absolute frequency (the frequency of all claims if no deductible were purchased) is the same for all repair cost groups, and that there is no reason to expect that, all other rating characteristics being equal, the absolute frequency of a risk would be any different carrying one deductible than it would carrying another."

We suggest that the absolute frequency should be expected to vary according to various characteristics of the risk such as the age, sex, and marital status of the operators. The uses to which the car is to be put, the income of the owner, and the expected annual mileage should also have some effect on the absolute frequency. We also believe that these considerations will affect the choice of the type of car owned, and hence its repair cost group, and ultimately the selection of a deductible.

In other words, the one thing we know for certain is that the people who purchase $50 deductible coverage are a completely different set of people than those who purchase $100 deductible coverage.

Therefore, rather than to switch to the use of a mathematical model based upon such assumptions, why not continue to develop rates for the two basic collision coverages, $50 and $100 deductible. More than 95% of the private passenger automobile insureds purchase these coverages, so why not use their actual experience? In the standard automobile physical damage ratemaking procedure the overall statewide rate levels and the base premiums for each territory are determined separately for $50 deductible and $100 deductible coverages based on the actual experience. This reflects all the characteristics of the two groups of risks that will affect their losses. The relationships between the rates for the current symbol groups are determined based upon analysis of experience separately for $50 deductible and $100 deductible coverages.

If the industry is successful in developing a feasible way to measure differences in the expected average repair costs of the different models of cars and if these lead to the development of classifications based upon such expected average repair costs, either in place of, or in addition to, the current symbol classifications based upon the value of the car—new, or as Mr. Bickerstaff expresses it, "crude groupings of cars by left rear window price stickers," there is no reason why the appropriate relationships cannot be determined from the real world data separately for $50 deductible and $100 deductible.

For deductibles higher than $100, where the volume of experience is not sufficient to permit analysis by state and territory and by symbol classification, the use of the lognormal to determine appropriate relationships warrants, in our judgment, further study.

Based upon the use of the lognormal and the expected average repair costs of each year's new car production by make and model, Mr. Bickerstaff constructs a mathematical model for complete collision rating which also incorporates a depreciation factor, trends in repair costs and frequency decrements by age group. Evaluation of this model is beyond the scope of our review. Suffice to say that the ideas underlying it should serve to stimulate those concerned with automobile collision insurance ratemaking to re-examine current procedures and to test Mr. Bickerstaff's assumptions against the real world collision experience for automobiles of Age Group 2 and older.