68. Factors Influencing Motor Insurance Rates

Source Swedish Committee on the Analysis of Risk Premium in Motor Insurance.

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In most countries, motor car insurance is obligatory. The problems concerning this type of insurance are the same, although the technical solution to these problems may vary. The data given in Table 68.1 present Swedish third party motor insurance for 1977 for one of seven geographical zones.*

In Sweden all motor insurance companies apply identical risk arguments to classify customers, and thus their portfolios and their claims statistics can be, and are, combined. The data were compiled by a Swedish Committee on the Analysis of Risk Premium in Motor Insurance. The Committee was asked to look into the problem of analyzing the real influence on claims of the risk arguments and to compare this structure with the actual tariff.

The influence of the tariff arguments represents different types of causal effects:

(i) Exposure is measured in kilometres per year, although the extreme class above 25000 kilometres per year is too wide.

(ii) The zones are given from a detailed investigation of 100 areas in 1972 and represent combinations of traffic intensity, state of roads, climatic differences, etc.

(iii) The bonus is a measure of individual claim history and thus some sort of Bayesian correction, but unfortunately, or rather fortunately, the accident frequency is too low, about 3% per year, to admit a good *a posterior* estimate.

The car models for private cars are classified into 10 premium classes, but in a special investigation for 1977 eight common pure models were chosen and the rest were put in a combined class for reference. A statistician who is not responsible for the tariff might cut out this class, i.e. Class 9. Originally the model year was included for comparison with the ordinary motor insurance. As no influence was shown it has been removed. The influence of the car make is interesting. It is associated not only with vehicle quality but also with the selection of the customers. For example, if one were to add some shiny decoration, put on the letters GT and add something to the price, the associated accident

* The six other geographical regions are available on the tape.

D. F. Andrews et al., *Data*
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frequency is remarkably increased.

For a long time, the Swedish motor insurance companies have agreed upon a common structure, based on the identical classification of risks and of a multiplicative premium model, where the net premium was obtained from a basic premium, multiplied by a factor for each risk classification. In principle each company could use their own factors, although all companies agreed upon common bonus factors. When, a decade ago, the companies added the premium class factor, based on makes and models, it was in order to counteract a tendency by the auto industry to lower the selling prices of cars and to compensate themselves by increased repair prices, which hit the motor insurance companies. The result was good. However, the small companies could not classify the car makes and it was decided to make a common classification, based on the combined material. This was easy, due to common risk classes and to the multiplicative model, which made it possible to 'norm' each risk exposure for all factors but the make, and then to compare these normed claim statistics for all car makes. This method presumes that the multiplicative model is reasonably describing the risk variation, which ought to be studied by the committee. On the other side, the Supervisory Service asked if the companies had made certain that their tariff system was fair to the insured.

It is well-known, that in other countries, the tariff is "additive", i.e. that each risk classification gives constant additions to the premium. During the years, new risk classifications have been added, and the system is not simple to administrate. One of the problems is the subjective roll of the "mileage". Some customers change cars often, and it is very difficult to check the real distances driven except when a claim occurs. Now and then a committee is set up to see if the tariff could not be simplified and this happened in 1977. There is always a young man proposing that all factors except the bonus factor should be abolished, as the man driving short distances on the countryside should obtain a high bonus class. This might have been true if the average claim frequency had been one in the year.

These different reasons caused the Committee for Actuarial Research to appoint the Analysis of Risk group with the object to study the risk premium structure as a function of the risk classification; to see if this structure could reasonably well be described by some well known simple models, or if this were not the case, to look for better approximations; to check if any of the classifications could be abolished without creating systematic injustice to the policy holders.

It should be pointed out that the Analysis of Risk group is independent of the motor insurance companies. The report, unfortunately in Swedish, concluded that the multiplicative model is fairly good, that an additive model is worse but acceptable, that any model better than these two will be complicated to administrate, and that none of the factors used could be left out without biased premiums.

On the other hand the group concluded, that the premium classes based on statistics for separate makes were very uncertain for unusual makes, and might be replaced by classes based on motor strength and car weight.

This report was then handed over to the motor companies' own committees for their consideration.