

SESSION E3/F3

GENERAL INSURANCE CONVENTION 1991

LLANDRINDOD WELLS 23-26 OCTOBER

STATISTICAL MOTOR RATING

STATISTICAL MOTOR RATING

By Mike Brockman

1.0 INTRODUCTION

- 1.1 In this workshop I would like to discuss the role of the statistical approach to motor rating.

I have used these techniques for over nine years with considerable success in a number of different organisations including both Companies and Lloyds' syndicates. The success is measured by improved profitability. Improved profitability is extremely important to all organisations operating in a market where it is currently questionable whether the returns likely to be achieved justify the capital invested. Indeed I believe it is now not good enough to be an average performer.

- 1.2 To give an idea of my general philosophy, I enclose a copy of an article I have recently written for General Insurance magazine. This is entitled "Finding a Niche in a Competitive Market - A Contradiction?"
- 1.3 The application of statistics in General Insurance is extremely important. However, I question whether Actuaries currently have the necessary skills. Recent developments in the theory of generalised linear models has provided Actuaries with a powerful tool and friend. But many Actuaries do not understand how generalised linear models can help them or why are they different from classical linear models. Generalised linear models are not discussed in any of the Institutes education material. I believe this is a serious mistake.

- 1.4 The statistical modelling approach is a powerful technique which enables the Actuary/Statistician to understand and interpret the patterns in the data. It is the data which determines the rating structure derived. The importance of the influence of each rating factor on the claims experience can be tested statistically, as can the similarity of the claims experience between the levels within each rating factor.
- 1.5 Inevitably there will always be a trade off between finding the simplest model and the model which "best" fits the data. The aim of the statistical modelling process is to find the best compromise between these two objectives.

2.0 STRUCTURE OF WORKSHOP

- 2.1 The workshop is scheduled to last one hour. Unfortunately a full discussion of this subject would take at least two days. I will speak for approximately ½ hour which allows a further ½ hour for discussion.

The topics which I intend to cover include:

- (i) The need to fit sensible models.
 - (ii) The need to analyse the claims experience by type of claim (accidental damage, windscreen, theft, third party property damage, third party bodily injury).
 - (iii) The treatment of NCD. This includes an explanation of why NCD should not always be a rating factor within the model.
 - (iv) Incorporating expenses.
 - (v) Using the results and comparing with the existing rating structure.
 - (vi) Using the results of the statistical analysis to define a sensible standard table.
- 2.2 If there is time I would also like to discuss how the results of the statistical analysis can be extended to enable analyses of postal codes and make/models.

FINDING A NICHE IN A COMPETITIVE MARKET

- A CONTRADICTION?

Most people think of a niche as a specialist sector of a market which may be subject to limited competitive pressures. An Underwriter may have particular expertise in this sector and may thus exploit the position to his greatest advantage. Usually such sectors are relatively small so that they are unattractive to the major insurers. This is certainly true of parts of the fleet and non-standard motor markets where a number of specialist insurers and Lloyd's underwriters continue to perform exceptionally well. This concept of "niche" agrees with the description in most thesaurus dictionaries where niche is grouped with terms such as "secret-place", "hide-out" and "safe deposit" which give an air of mystery.

Perhaps I have slightly exaggerated the popular belief of what a niche is, but I now address the question of whether a niche can exist in the highly competitive market for standard private motor business. The fact that for any one quotation the premium can vary between major Insurers by a factor of anything up to 3.4 times (see GI September/October 1990 Motor Survey) suggests to me that the market is anything but perfect. It would appear therefore that there is certainly potential to exploit such an imperfect market. This point was picked up by brokers Leslie and Godwin in their recent survey relating to household insurance. They were quoted as attributing the wide variation in premium rates between Insurers for the same risk to "the fundamental flaws in the methods insurers use to set premiums". I believe this comment may equally well be applied to the motor market.

If I can define a niche to be an area of the market where an insurer can operate both profitably and competitively, then I have no doubts that a niche or niches exist. A successful strategy for Insurers would then be to maximise the exposure in the profitable areas and minimize exposure in the unprofitable areas of the market. This strategy will become increasingly more important as profit margins are squeezed further by the direct

selling companies who will force rates down as they strive to increase their market share. Certainly only the more successful companies will survive in a market where profit margins historically are already quite low averaging about 4½% of premiums gross of tax over the period 1984 to 1989.

How can increased profitability be achieved?

The problem has already been well described by Chris Tremlett in his article "Niche or be niched" (see GI July/August 1990). Chris stated the four basic private car rating factors to be age of driver, type of car, where it is garaged (district) and cover provided, to which I would add age of car and sex of driver. He commented that "the search for the magic combination which produces consistently acceptable results is unending". The problem of finding this magic combination does appear daunting at first sight. It is possible to generate tens of thousands of different risks from combinations of the above rating factors under most companies rating guides, even more if no claims discount and the other rating factors such as class of use and levels of voluntary excess are included. Many companies argue that since their portfolios are not large enough to contain sufficient risks of each type a sophisticated analysis of their own data is unwarranted. I believe this is a serious mistake. Even the largest companies which collect detailed statistics tend to throw away much of the information collected by producing relatively simple summary underwriting statistics. These simple statistics need to be supplemented by an analysis of the Insurers own historical claims experience using all the data collected. This analysis can be performed successfully on portfolios as small as 50,000 vehicles.

For such an analysis it is necessary that as much information as possible is extracted from an Insurers database since its claims experience may be distorted by features relevant to that particular company only. For example the company's underwriting standards, its methods of distribution or any claim sharing agreements in operation can all affect its claim experience materially. A detailed statistical analysis of this historical claims experience will assess the underlying risk for all combinations of the six principal rating factors described above. The fact that in many of the risk groups there may be few (if any) claims is not necessarily a problem. The analysis should separately identify both the claim frequency and claim severity by each type of claim (windscreen, accidental damage,

third party property damage and third party bodily injury). This separate treatment is important since each of these elements of the total cost of a claim are influenced by the rating factors in different ways. For example, for accidental damage claims the rating factor 'district' will have an extremely important influence on claim frequency, which will be much higher in urban areas than in rural areas. However this same rating factor will have a much smaller influence on the average cost. Variations in the average cost of bodily injury claims are more likely to be due to the influence of random factors than the rating factors. Indeed I have found that policyholder age and vehicle group are the only rating factors which influence the average cost of bodily injury claims significantly. Hence to assess the theoretical premiums to be charged in each rating group, we do not need to assess the claim experience in each of the many thousands of different risk groups independently, since there are important relationships between them. Insurers who overlook these relationships may believe that the estimation process is more complex than it really is!

The degree of complexity may be reduced further if the correct type of statistical model is "fitted" to the historical claims experience. The statistical model will find the rating structure which fits the actual past claims experience the closest. However it is necessary that the resultant rating structure is capable of practical interpretation so there must always be a compromise between simplicity of rating structure and closeness of fit to the past claims experience. Current statistical theory enables one to find the "best" compromise with relative ease.

There are other major advantages of a detailed statistical approach. Firstly the parameters of the statistical model, which are determined from the data, help the ratemaker to understand and interpret what is driving the claims experience for each rating group. Secondly it is possible to test statistically which rating factors are the most important in explaining the variation in risk and whether there are relationships between them ("interactions" in statistical jargon). Finally, the statistical approach helps the Insurer to set the premiums for rating groups where there is little or no historical claims experience.

So far I have not mentioned expenses. They are also an important part of the equation since it is essential that each risk group contributes a fair share towards fixed expenses. The method of distribution of the business plays an important role in this respect as it influences operating costs. Home Service companies will tend to have commissions plus high operating costs, broker based companies may have a higher level of commission but with lower operating costs, and direct selling companies will pay no commissions but have very high operating costs, a large amount of which can be considered fixed. The statistical analysis must take these factors into account.

So much for the theory, how about the practice? The results of a statistical analysis will tell an Insurer how far it should change its existing rating structure in theory but it must have regard to the premium rates being charged by its competitors. These can be obtained from one of the many competitive quotation systems available and analysed by rating group. By combining the two analyses an Insurer can assess the impact on its competitive position by moving its rate for a particular risk toward the theoretical best position. The Insurers' objective will be to concentrate business in the pockets of the market where profitability and competitiveness can be improved, and these pockets do exist! Some parts of the market are more price sensitive than others hence it is usually relatively easy to improve the inherent profitability of an account.

In summary, it is possible for an Insurer to identify areas of the market where it can operate both profitably and competitively. To do this the Insurer must make full use of its own data to obtain maximum advantage. Statistical methods must be employed as these provide the only way to sensibly unravel the mass of information generated from any detailed claims analysis. The methods described above will work on small portfolios. Finally it must be remembered that a "niche" in a competitive market is a moving target and its size and position must be carefully and continually monitored.

Yet another dictionary definition of a "niche" defines it as "a position particularly suitable to the person occupying it". This is I believe, precisely the right definition in the motor insurance context. A niche for one company is not necessarily a niche for another, and will depend to some extent on the individual characteristics of each company. Perhaps it is possible for all companies to operate both profitably and competitively in the same market after all!