

JEAN LEMAIRE (1985). *Automobile Insurance: Actuarial Models*. Kluwer & Nijhoff Publishing, Boston/Dordrecht/Lancaster. Huebner International Series on Risk, Insurance and Economic Security. 248 pages, \$44.00.

It does not occur frequently that a book on "Actuarial Models" in the field of non-life insurance is published, even less a book describing models which can be and have been directly applied in practice. It is therefore a pleasure to read Jean Lemaire's book on "Automobile Insurance", all the more because it is excellent work!

As the author remarks: "of all types of non-life insurance, automobile third party liability undoubtedly gives rise to the most heated debate. It is in this field that the most numerous investigations have been made". Almost every country has contributed to these investigations, and most have selected their own system of premium rating. Part I in the book describes the resulting situation in Europe and North America. Peter Johnson (U.K.), Jan Jung (Sweden), Fritz Bichsel (Switzerland) and May Lou O'Neil (U.S.A.) have written for this part, supplying information on their particular country. The comparison of all these essentially different rating systems is of great interest to the specialist, whereas those readers who are less knowledgeable in the field of non-life insurance will probably react rather incredulously when confronted with the inventive "genius" of each country's specialists.

Part II deals with the "A priori classification criteria" of the risks. The portfolio of a Belgian company was observed for a one-year period and analysed by different statistical methods, with a view to selecting the most significant risk variables. The variables in question are attributes of the vehicles (i.e. class, power, cubic capacity, age, etc.) as well as attributes of the driver (sex, age, language, geographical area, etc.).

The author first establishes tables of claim frequencies and loss ratios for each variable under consideration and shows that this marginal approach does not suffice to construct a satisfying tariff: the numerous correlations or interrelations between the variables are not taken into account. The author then applies multivariate techniques to select the most significant variables. Three selection methods in linear regression analysis are presented and elaborated, which all lead to essentially the same significant variables: The statistically "best" risk is an old and married driver of a low-power car, with a maximum bonus, living in the country, driving practically zero km per year, not a tradesman, a Belgian in Belgium (respectively Swiss in Switzerland, etc.). This seems self-explanatory; however, it is interesting to compare this "best" tariff with the ones used in each country!

As a matter of fact, Part II could have been written in a highly technological language, "for advanced statisticians only". It is Lemaire's talent to present it in a very pragmatic, sometimes even gripping way, with a lot of numerical illustrations and interesting annotations. Pure technical problems are elaborated briefly in an appendix.

For the statistical selection methods of Part II a linear regression model is taken as hypothesis and Chapter 10 deals with the criticism of such an assumption.

Especially the assumption of linearity is probably not very convincing, and the more flexible methods introduced by Hallin and Ingenbleek are mentioned by the author.

Experience has shown that one of the most important risk variables in automobile third party liability is the non-observable human factor, and Part III is concerned with "A posteriori classification", the Bonus-Malus systems. The development of actuarial models for the application of Bonus-Malus systems is certainly the most specific contribution by the automobile insurance in the field of non-life insurance. Different problems, several of them of high practical significance, are treated in this part, e.g.:

- The negative binomial model
- Construction of an optimal Bonus-Malus system
- Allowance for severity of claims
- Analysis of the hunger for bonus
- The effect of expense loadings on the bonus system.

Incidentally, Part III is slightly more "mathematical", because of the complexity of the models under consideration. It is, however, clearly the author's intention to present the problem in the most elementary mathematical framework possible, sometimes at the expense of the conciseness and elegance of the demonstrations.

Part IV, the final part, is a short survey of the main statistical methods of evaluating claims provisions.

An especially interesting factor in this book is that all theoretical models have been comprehensively illustrated by practical application, examples and annotations. Summarizing the above, it can be said that "Automobile Insurance" is an excellent, interesting and instructive book. This opinion was obviously shared by more competent readers than the undersigned: Professor Jean Lemaire has obtained the Ernst Meyer Prize 1986 of the "Association de Genève" for this book.

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