BOOK REVIEWS

Modern Actuarial Risk Theory by Rob Kaas, Marc Goovaerts, Jan Dhaene and Michel Denuit [Kluwer Academic Publishers, Boston, 2001]

The publication of a book on Risk Theory is a sufficiently rare occurrence for it to be greeted enthusiastically. My enthusiasm for this book increased when I read in the authors' Preface that its intended readership is students in the final year of a bachelors program in quantitative economics or mathematical statistics or a masters program in actuarial science or in quantitative financial economics. Too few of the texts on risk theory are suitable for university students at this level. Gerber's (1979) book is a classic, but more suited to researchers, and, at the other end of the spectrum, Daykin *et al.*'s (1994) book covers many of the practical aspects of its subject well, but at the expense of a clear technical development. An exception to this is the excellent, albeit almost encyclopaedic, book by Klugman *et al.* (1998).

Modern Actuarial Risk Theory is a translation into English of a book which has been used in universities in The Netherlands and Belgium for more than ten years. The chapters in this book are:

1. Utility theory and insurance
2. The individual risk model
3. Collective risk models
4. Ruin theory
5. Premium principles
6. Bonus-malus systems
7. Credibility theory
8. Generalized linear models
9. IBNR techniques
10. Ordering of risks

There are a large number of, mostly short, exercises at the end of each chapter and a section at the end of the book containing answers or hints on how to complete the exercises.

The chapter titles are broadly in line with what I would expect to see in an undergraduate text on Risk Theory. However, the four authors have collectively made an enormous contribution to the development of actuarial science in recent years and some chapters of the book, notably Chapters 5 and 10, clearly reflect their interests.

A novel, and welcome, feature of such a book is the inclusion of generalized linear models (GLMs, Chapter 8). Such models are extremely useful in many branches of actuarial science and the authors demonstrate this in Chapter 9 where they model claims run-off data using a GLM and then show that

several standard numerical methods, notably the chain ladder method, can be derived as special cases of this GLM. Surely this is a more satisfactory way to treat this subject than is usually found in textbooks.

A less welcome feature of the book is that it treats most topics in a mathematical way and provides little insurance context to motivate these topics. A good example of this is reinsurance. This is mentioned frequently throughout the book but there is no real discussion of how and why it operates. Presumably, lecturers teaching a course based on this book would be expected to provide this background material from other sources. Chapter 6 on Bonus-malus systems is an exception – it does have a good motivational introduction based on the Dutch system.

Another less welcome feature is that nowhere in the book, apart from one table in Chapter 7, do the authors use real insurance data to illustrate their technical development. This is a pity. The use of such data would inevitably require a brief description of the origin of the data, thereby giving the reader greater understanding of why the mathematical development is useful and an appreciation that Risk Theory is useful in practice. This is in marked contrast to the book by Klugman *et al.* (1998), where real data are used extensively.

Amazon's website gives the price of Modern Actuarial Risk Theory as US$144. This is on the high side, even by today's standards, for a "must buy" text for an undergraduate course. The same website gives the price of Loss Models as (no more than) US$110.

References

Daykin, C., Pentikäinen, T. and Pesonen, E. (1994) *Practical Risk Theory for Actuaries*. Chapman and Hall, London.

Gerber, H. (1979) *An Introduction to Mathematical Risk Theory*. S.S. Huebner Foundation, Philadelphia.

Klugman, S., Panjer, H. and Willmot, G. (1998) *Loss Models: From Data to Decisions*. Wiley, New York.

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