BOOK REVIEWS

H. U. GERBER (1986). *Lebensversicherungsmathematik*. Springer Verlag, Berlin etc.; Vereingung Schweizerischer Versicherungs-mathematiker, Zürich. XIII, 125 pages, DM 98.00.

In the past decades there has been — and to a certain extent still is — a gap between practitioners on the one hand and researchers in the field of actuarial mathematics on the other, at least in Germany. While many mathematicians at the universities have been inclined almost to ignore actuarial applications, people from insurance companies have had the impression that stimulating and innovative new ideas for their business were not to be expected from scientists working in the ivory-tower of a university. These facts need to be kept in mind when a new book on life insurance mathematics has to be assessed, written in German by a leading expert in the fields of actuarial mathematics and risk theory.

It is true that for the techniques of life insurance elementary deterministic models based on the calculation of interest suffice and will still suffice for the foreseeable future, at least in the mass business. Nevertheless, these traditional models are unsatisfactory because they do not take into account the random character of insurance processes on the one side nor do they take advantage of data-processing and modern computers on the other.

This is the starting point of the present monograph: mortality tables are replaced by stochastic models based on a random variable T denoting the residual life time of a person, and tabulations of commutation functions and the like are supplanted by algorithms, especially recursions. Compared with this, the topics of the individual chapters are fairly conventional.

Chapter 1. Calculation of Interest. Indispensable preliminaries, presented concisely and elegantly.
Chapter 2. The Future Life Time of a Person Aged x. The stochastic model — the life time variable and distribution — and related notation.
Chapter 3. Capital Assurances. Discussion of the cash value of a capital. Since this is a random variable by definition, not only the net single premium — the expected value — but also the variance of the cash value is of interest.
Chapter 4. Life Annuities. Calculation of cash values and net single premiums.
Chapter 5. Net Premiums. Derivation of well-known formulae for various types of insurance.
Chapter 6. Net Level Premium Reserves. Again, standard results as well as results appearing in the stochastic model only, are proved, e.g. Hattendorf's theorem.
Chapter 7. Several Causes of Decrement. Inclusion of an additional random variable describing the cause of decrement.

Chapter 8. Joint Life Assurance. Here the advantages of the stochastic model are particularly obvious, and analogies with reliability theory are made (joint life status/series structure, last-survivor status/parallel structure).
Chapter 9. Aggregate Claims of a Collective. Risk theoretic considerations, especially the development and numerical treatment of the distribution function of the aggregate claims.
Chapter 10. Inclusion of Expenses. Incorporation of the third base of calculation.
Chapter 11. Estimation of Probabilities of Death. Classical methods and procedures from mathematical statistics.
Appendix A. Commutation Values
Appendix B. Simple Interest.

The present monograph thus has as many chapters as the first volume of Saxer's standard work. Regarding the contents, the amount of overlap is about sixty per cent. The book is written clearly, precisely and elegantly. As in his pioneering book on risk theory, the author succeeds brilliantly in bridging the gap between intuition and rigour.

Compared with this, there are only a few minor points to be criticized. First of all, the use of stochastic models appears to be a bit half-hearted now and then, especially so with respect to their connections with reliability theory. Symptomatically, in the Foreword a probability space (Ω, A, P) is mentioned in passing, whereas in the text the symbol Pr, which is never defined explicitly, is used whenever probabilities are represented — even 'probabilities' of the type $Pr(t < T < t + dt)$.

Naturally, the practical needs of an actuary over and above the technical and mathematical aspects, e.g. statement of accounts, are not met by the present book. However, practitioners from *life* assurance might be interested by the material presented in Chapter 9 under the topic of reinsurance.

These objections, however, cannot detract from the substantial merits of Gerber's excellent book for which success both with practitioners and theorists can be predicted without any risk whatsoever.

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BJØRN SUNDT (1984). *An Introduction to Non-Life Insurance Mathematics.* Veröffentlichungen des Instituts für Versicherungswissenschaft der Universität Mannheim, Vol. 28, Verlag Versicherungswirtschaft, Karlsruhe. 168 pages, DM 24.00.

In his foreword to the book the editor writes: "Textbooks in Non-Life Insurance Mathematics are rare. So it is a pleasure for me that Dr. Sundt was willing to write down his lectures given at Mannheim during the summer of 1983." A practitioner might be deterred by these introductory sentences, since lectures for