

BOOK REVIEW

HANS U. GERBER: AN INTRODUCTION TO MATHEMATICAL RISK THEORY

*Huebner Foundation Monograph No. 8. Homewood, Ill.: Richard D. Irwin Inc., 1980, xv + 164, paperbound, \$ 15.95*

At the beginning of the 1970s, three new textbooks on risk theory appeared—Beard, Pentikäinen, and Pesonen's introductory *Risk Theory*, Bühlmann's more theoretical *Mathematical Methods in Risk Theory*, and Seal's compendium, *Stochastic Theory of a Risk Business*. Although completely different in style and orientation, these texts were welcomed by the actuarial community because they provided the first summaries of useful new risk models and results developed since the war—a period which coincided with the formation of ASTIN, for example. More importantly, perhaps, the fact that these texts were written in a modern mathematical style made these results accessible to statisticians, economists, engineers, and others outside actuarial circles, and served to further stimulate research activity and to broaden the scope of risk theory.

Now, at the beginning of the 1980s, we have an even newer text by Hans Gerber that reflects the continually increasing activity in this field—for instance, over half of the references cited in the Bibliography have appeared in the past decade. Consider the Table of Contents:

1. A Review of Random Variables
2. Stochastic Processes
3. Martingales
4. The Distribution of Aggregate Claims in One Year
5. Principles of Premium Calculation
6. Credibility and Experience Rating
7. Risk Exchange and Reinsurance
- 8 and 9. Ruin Theory
10. Some Decision Theoretical Problems

The topics in chapters 3, 5, 7, and 10, are hardly touched in earlier works; many results reflect the author's own important and original research contributions (about which, unfortunately, the Bibliography is too modest).

As Jim Hickman points out in the Foreword, Gerber's book is also modern in the sense that many well-known classical results, such as Hattendorf's theorem, approximations to the distribution of aggregate claims, as well as most ruin theory ("Collective theory of risk") formulas, are rederived in an up-to-date, compact, abstract, and often quite ingenious way. Using only 150 pages of text, the author has managed to cram a large number of interesting results into the headings above. Even a few life contingency results may be found (as illustrations of Jensen's inequality and martingales!). ASTIN readers should be warned, however, that this compactness and elegance does not make the text an easy study. One can imagine, for instance, that, when Professor Gerber teaches this course to postgraduate mathematics students, a fair amount of supplementary examples and explanations are necessary; this is not an introductory textbook in the usual sense of the word. Perhaps the casual reader should at first dip into those topics with which he is already familiar to get some idea of the author's style; an even better approach would be to organize a small group for joint discussions. But with continued study, the value of the work will become apparent.

In summary, the author is to be congratulated for introducing us to the essentials of so many up-to-date ideas in risk theory, and for greatly simplifying and modernizing the presentation of the classical topics. I am certain this monograph will be a most desirable addition to the libraries of actuarial students and ASTIN readers.

*William S. Jewell*, ETH Zürich and University of California, Berkeley