

REVIEWS

Modelling Extremal Events. BY P. EMBRECHTS, C. KLUPPELBERG AND T. MIKOSCH (Springer-Verlag, 1997)

Extremal events are occurrences which are statistically very rare, but, when they happen, are of major significance. Examples are major disasters, huge insurance claims, and extreme environmental events. The rarity of such events makes their statistical treatment both difficult and specialised. In this wonderfully encyclopedic work, the authors collect together, for the first time, all the relevant probabilistic and data analytic techniques appropriate to analysing extremal behaviour — with the exception only of a few very specialised areas, such as multivariate extreme value theory.

The prerequisites for reading the book are a basic knowledge of probability and statistics, at about the level of a first degree in these subjects. It is designed to be used both as a graduate text — in risk theory, extreme value theory, data analysis for extremes, and time series analysis — and also as a reference for researchers in applied fields, notably those of insurance and financial mathematics. In both of these aims it succeeds admirably. Perhaps one reason is the unusually well-controlled treatment of the mathematics. This is developed in sufficient detail to permit understanding without reference to external sources. However, proofs of more classical results are frequently omitted or sketched, as appropriate.

As already suggested, the scope of the book is considerable. The probability theory covers both those models applicable to essentially cumulative events, i.e. extremes of sums of random variables (risk theory), and those appropriate to extremes of individual random variables (extreme value theory). No prior knowledge of these subjects is assumed, yet the most recent research is clearly treated. Particularly welcome is the detailed consideration, in both the above areas, of heavy-tailed distributions — these are frequently those most appropriate to applications. The modern point-process treatment of classical extreme value theory is also comprehensively developed. This throws much light on what was previously a rather obscure subject, clarifying, for example, the relation between maxima and exceedances, and the relative roles of the generalised extreme value and generalised Pareto distributions.

Rather less space is devoted to the more difficult topic of data analysis. However, the authors provide an extremely lucid introduction to current techniques. As is entirely appropriate, there is great emphasis on exploratory and graphical methods.

The book is written with an eye on applications in insurance and finance. Those with an interest in environmental extremes — for example severe storms — are much concerned with problems of seasonality and short-term dependence. The latter topic is treated primarily in the context of financial time series models, while there is relatively little consideration of the former.

A final chapter considers a number of special topics, for example extremal indices and ARCH processes, while an appendix gives a concise treatment of all the background probability theory—surely the first love of the authors. Lest you wish to explore further, the book provides a useful 646 references.

S. ZACHARY

A Sense of Security: 150 Years of Prudential. BY LAURIE DENNETT (Granta Editions, 1998)

Actuaries will enjoy reading this 150th anniversary book. Although long (over 400 pages) it is easy to read; but it is far from a coffee-table book, as it contains the results of some fascinating research, and shows that many of the issues currently facing the life assurance industry have parallels in the past.

The company's name in 1848 was 'The Prudential Mutual Assurance, Industrial & Loan