BOOK REVIEWS

David C.M. Dickson (2005) *Insurance Risk and Ruin*. Cambridge University Press (CUP). ISBN 0-521-846404.

This book is the first one in the International Series on Actuarial Science published by CUP in conjunction with the Institute of Actuaries and the Faculty of Actuaries. It is a textbook mainly devoted to the two major areas of actuarial risk theory: aggregate claims distributions and ruin theory. It is tailor-made for a first course on risk theory for advanced actuarial university students. The nine chapters are:

1. Probability distributions and insurance applications
2. Utility theory
3. Principle of premium calculation
4. The collective risk model
5. The individual risk model
6. Introduction to ruin theory
7. Classical ruin theory
8. Advanced ruin theory
9. Reinsurance

All chapters end with some exercises whose solutions are outlined at the end of the book.

Chapter 1 provides a brief review of probability distributions, and introduces probability generating functions that are used extensively in the following chapters. It also presents basic insurance applications, especially reinsurance.

The two following chapters are short introductions to utility theory and to principles of premium calculation. The bare essentials are nicely presented.

The collective risk model is treated in chapter 4. As usual, the convolution formula is developed, and the Panjer recursion formula derived. But this chapter also introduces extensions to this recursive formula and discretisation methods. A few words are said about the stability and the danger of numerical underflow/overflow of these recursive formulas.

The individual risk model gets a modern presentation in chapter 5: De Pril's and Kornya's recursive formulas are derived, as well as the classical compound Poisson approximation. The chapter wraps up by illustrating and comparing the different methods.

Chapters 6 and 7 introduce basic and classical ruin theory: at first in discrete time, and then in continuous time (classical model). Fundamental results are derived mainly by renewal arguments, and Laplace transforms. A very short but sufficient primer on Laplace transforms is presented before using the tool

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to obtain important results and solving examples. How to compute ruin probabilities numerically in continuous time or in discrete time is discussed, as well as De Vylder's approximation method.

Several problems of advanced ruin theory are covered in chapter 8: introduction of a barrier, severity of ruin, surplus prior ruin, dividends, etc.

The last chapter is about the effect of reinsurance (proportional and XL) on the insurer's utility and on its ruin probabilities.

This book is well written. It is also well organized. In all chapters, there are many examples. As a textbook it might need to be supplemented with a few more exercises. For practitioners, it may be an interesting reference, and a way to have a good overview of some recent developments in ruin theory.

François DUFRESNE

P. Cizek, W. Härdle, R. Weron (Eds.), 2005, *Statistical Tools for Finance and Insurance*, Springer

The book which is presented in paperback and electronic (pdf and html) edition has been designed for researchers and practitioners with a good knowledge of stochastic processes and gives an overview of recent theoretical work and applied developments in quantitative finance (first part) and insurance (second part).

A look at the table of contents and the impressive lists of recent literature after each chapter reveal a very rich and active research area.

More then 30 contributors were part of the project in a joint initiative from the authors from the Center of Economic Research (CentER), the Centre of Applied Statistics and Economics (C.A.S.E.) and Hugo Steinhaus Centre for Stochastic Models (HSC). It goes without saying that this joint effort is a guarantee for the reader seeking valuable information on the state of the art in his/her discipline.

The Financial part starts with a very useful part on stable distributions. Many financial techniques rely traditionally on the Gaussian distribution but it has been argued that stable distributions often give a better fit to data with heavier tails than the normal distribution. The authors state that "they are valuable models for data sets covering extreme events, like market crashes or natural catastrophes". Different estimation procedures like Maximum Likelihood, and quantile estimation are compared and applied to financial data. Examples include Dow Jones index data (DJIA), Boeing Stock returns and exchange rates.

The growing interest on the evaluation of extreme risk is a motivation for the part on extreme value and copula multivariate models. The concept of tail dependence as a simple measure of dependence for large loss events is introduced and imbedded within the theory of copulas.

CAT bounds received much attention since the mid 1990's. The cat event process is modelled with a compound doubly stochastic Poisson process and applied to 10 year catastrophe data.