Book Review

Loss Models: From Data to Decisions, 4th Edition, by Stuart A. Klugman, Harry H. Panjer and Gordon E. Willmot: Wiley Series in Probability and Statistics, 2012, 512pp. ISBN: 978-1-118-31532-3

The fourth edition of this renowned book on actuarial science is reorganized to focus on the Exam 4/C syllabus of the Casualty Actuarial Society and the Society of Actuaries. Ideal for UK actuarial students studying CT subjects, this book is also tremendously useful for financial professionals dealing with data analysis and quantitative modelling.

Part 1: Introduction

Basic concepts of random variables and distributional quantities are introduced. However, unlike an average textbook, it starts with a flow chart of the modelling process which echoes the principle of actuarial control cycle and, surprisingly, Solvency II internal model requirement on expert judgements and use test.

Part 2: Actuarial Models

This part begins with high-level overviews of different models (continuous vs. discrete, parametric vs. non-parametric, and frequency vs. severity) and gradually builds up to the discussion of aggregate loss models in Chapter 9, which are widely used in actuarial science. Transformation of a distribution to a new distribution and fat-tailed (extreme value) distributions in Chapter 5 are particularly useful and practical topics.

Part 3: Construction of Empirical Models

"Empirical models" is better known as "survival models" and the three chapters here are relatively short but complete, with reference to a rich list of actuarial literature dedicated to this subject for readers with deeper interest.

Part 4: Parametric Statistical Methods

This part of the book is probably most relevant for (and most referenced by) a "modeller" where a "model" is simply interpreted as fitting to a known distribution and calibrating the model parameters using historical data. If so then Chapter 16 is highly recommended which illustrates the selection of a (parametric) model based on various goodness-of-fit tests as well as other quantitative and qualitative judgements.

Part 5: Credibility

Readers familiar with the credibility theory or empirical Bayesian estimation will often be baffled by the unhelpful notations but not in this book as the derivation of the Bühlmann-Straub model in Chapter 18 is very clearly structured and exemplified.

Part 6: Simulation

Given the use of computers in today's finance and insurance industry, a single-chapter discussion on Monte Carlo simulation may look rather brief although it does cover some of the basic concepts and techniques such as Normal inverse, Box-Muller transformation, and bootstrap.

As can be expected, this book also contains 50-page appendices which are of great help for students and practitioners. Insurance case studies are used in both the examples and the exercises throughout the book but almost all the models are generically applicable to some other areas in financial mathematics. In spite of this, and unlikely many other finance textbooks, it does not include a CD with Excel spreadsheets. Nonetheless, all the dataset used are available at the Wiley ftp site.

The strength of this book is its intensive coverage of three main actuarial models, namely risk theory, loss distributions and survival model. However, probably because of its focus on the exam syllabus, multivariate distributions including copulas are not discussed in this edition, despite the fact that Chapter 3 has a dedicated section on Value-at-risk and Tail Value-at-risk. UK actuaries, who are more obsessed with solvency capital modelling and risk calibrations these days, may find it slightly disappointing!

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