
Risk Analysis: A Quantitative Guide, 3rd edition

by David Vose

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This is the third edition of David Vose's text and is substantially rewritten. This book is based on the author's extensive consulting experience in the area of risk analysis. The text is divided into two parts, in addition to which there are four appendices.

The first part (about one-sixth of the book) consists of five chapters and is aimed at managers. It provides an understanding of risk analysis and explains its use in the decision-making process.

The first four chapters are definitely of an applied nature. They describe the main objectives of risk analysis (Chapter 1), planning risk analysis (Chapter 2), the quality of risk analysis (Chapter 3) and a discussion on the structure of the models used in risk analysis (Chapter 4). These chapters contain many useful hints for present and prospective risk analysts and managers, particularly:

- remarks on the selection of good risk managers;
- introducing the 'probability-impact' (P/I score) framework;
- a description of different types of risk models (Chapter 4);
- making a distinction between variability (being the function of the studied system) and uncertainty (being the lack of knowledge).

This distinction is given further consideration in the second part of the book. The reviewer considers this approach to be particularly useful.

On the other hand, the author's proposed distinction between 'risk' and 'opportunity', in which risk is a purely negative notion, while opportunity has positive meaning (p. 3), may create confusion for some. This is because in certain disciplines, such as finance, 'risk' often has a neutral meaning, and can present both threat and opportunity.

Chapter 5 is the largest and, at least from a modelling perspective, probably the most important chapter in the first part of the book. The remarks on report structure as well as the review of tools for the graphical presentation of reporting are particularly useful. This chapter contains some material which is also presented in some chapters of the second part of the book. Although this repetition might have been avoided, it could well have been the author's intention for the two parts to be read by different audiences.

As the title of the book indicates, it is meant to be a guide to the quantitative methods used in risk analysis. This is particularly true of the second part of the book, containing Chapters 6–22. Most of these chapters are constructed on the basis of a simple idea: the description of quantitative tools, illustrated by examples from different applied areas. It is worth mentioning that the author starts with the very basics and then moves to very specific methods.

The consecutive chapters contain:

- the basics of probability theory and statistics (Chapter 6);
- useful hints as to the building models used in risk analysis, including a description of common mistakes made in risk analysis (Chapter 7);
- basic stochastic processes, including

binomial, Poisson and hypergeometric (Chapter 8);

- the basics of statistical inference, with particular attention to the Bayesian approach and bootstrapping methods (Chapter 9);
- the use of simple statistical methods (including regression) in fitting statistical distributions to data (Chapter 10);
- methods used to determine the sum of random variables (Chapter 11);
- forecasting methods for time series data, using stochastic processes in continuous and discrete time (Chapter 12);
- modelling dependencies, including copulas (Chapter 13);
- deriving estimates using expert opinions (Chapter 14);
- practical issues related to causal analysis (Chapter 15);
- optimisation methods, written by Francisco Zagmutt (Chapter 16);
- the validation-of-risk model (Chapter 17);
- discounted cash-flow model (Chapter 18);
- project risk analysis (Chapter 19);
- methods used in the modelling of financial and insurance risk (Chapter 20);
- methods used in microbial food safety risk analysis (Chapter 21);
- methods used in animal import risk analysis (Chapter 22).

The reviewer would like to have seen Chapter 11 included in Chapter 6, as they both contain basic probability theory.

This book contains many examples

from different disciplines. Two types of software are used to conduct calculations. The first is simply Microsoft Excel, which makes examples readable for even the least advanced reader. The second one is the ModelRisk system, developed and used by the author's company.

In addition, the book contains four appendices. Three of them are relatively short, these are:

- a useful guide for lecturers to design possible course structures using the book;
- a description of the ModelRisk system;
- a list of recommended publications for further reading.

The fourth appendix, written by Michael van Hauwermeiren, is a 120-page compendium of statistical distributions. It is an excellent reference, to be used separately for teaching purposes.

The book is a very valuable source of information for those risk analysts who want to use quantitative methods, particularly Monte Carlo simulation, in the process of risk analysis and management. Nonetheless, the author may want to consider some structural improvements for the next edition.

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