

Preface

There is hardly any decision in economic activity which is not influenced by uncertainties and risk. While risk has for a long time been the business of Insurance and later in all parts of Finance, it has only recently entered practically all areas of management: Energy, Supply Chains, Transportation and Logistics, Telecommunication, Revenue Management, to mention a few.

This book aims at introducing into the quantification and the optimal management of risks. Statistical parameters have for a long time been designed to describe properties of random distributions. Besides these classical parameters many new ones have been introduced recently under the name of *Risk Measures*. In this book, we prefer the name *Risk Functionals* and reserve the name *measure* for the probability measures: A risk functional is a mapping which assigns a real risk value to a probability measure.

The definition of risk functionals is only one step in the *Risk Analysis Chain*. This Chain consists of the three M's: Modeling, Measuring and Managing risk.

- *Modeling* consists in estimating probability models and designing simulation experiments based on a statistical analysis of the data.
- *Measuring* is the step of risk quantification and assigning risk values to the random distributions.
- *Managing* risk deals with optimal decision making in the presence of risks.

Each subsequent step needs the previous one: Risk can only be measured if it is modeled and can only be managed, if it is measured. The structure

of this book reflects three step analysis: Chapter 1 deals with modeling, Chapters 2 and 3 with measuring and Chapters 5 and 6 with managing risks. A particular emphasis is put on multi-period risk measuring and managing. In the multi-period setting, the link between measuring and managing is especially close, the link is given by multi-period stochastic optimization.

This book does not intend to give a bibliographic overview over all concepts of measuring risk in literature. Instead, we give an introduction into the most important classes of risk functionals in the single-period and multi-period setup with a clear view towards implementation in decision models under uncertainty.

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A list of errors and typos will be provided at Georg Pflug's homepage
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