

# Preface

Since actuarial education was introduced into China in 1980s, more and more attention have been paid to the theoretical and practical research of actuarial science in China.

In 1998, the National Natural Science Foundation of China approved a 1 million Yuan RMB financial support to a key project «Insurance Information Processing and Actuarial Mathematics Theory & Methodology» (project 19831020), which is the first key project on actuarial science supported by the government of China. From 1999 to 2003, professors and experts from Fudan University, Peking University, Institute of Software of Academia Sinica, East China Normal University, Shanghai University of Finance and Economics, Shanghai University and Jinan University worked together for this project, and achieved important successes in their research work. In a sense, this book is a summation of what they had achieved.

The book consists of seven chapters. Chapter 1 mainly presents the major results about ruin probabilities, the distribution of surplus before and after ruin for a compound Poisson model with a constant premium rate and a constant interest rate. This chapter also gives asymptotic formulas of the low and upper bounds for the distribution of the surplus immediately after ruin under subexponential claims. Chapter 2 introduces some recent results on compound risk models and copula decomposition. For the compound risk models, it includes the recursive evaluation of compound risk models on mixed type severity distribution in one-dimensional case, the bivariate recursive equation on excess-of-loss reinsurance, and the approximation to total loss of homogeneous individual risk model by a compound Poisson random variable. On the copula decomposition, the uniqueness of bivariate copula convex decomposition is proved, while the coefficient of the terms in the decomposition equation is given.

Chapter 3 is concerned with distortion premium principles and some related topics. Apart from the characterization of a distortion premium principle, this chapter also examines the additivities involved in premium pricing and reveals the relationship among the three types of additivities. Furthermore, reduction of distortion premium to standard deviation principle for certain distribution families is investigated. In addition, ordering problem for real-valued risks (beyond the nonnegative risks) is addressed, which suggests that it is more reasonable to order risks in the dual theory than the original theory.

Chapter 4 illustrates the application of fuzzy mathematics in evaluating and analyzing risks for insurance industry. As an example, fuzzy comprehensive evaluation is used to evaluate the risk of suffering from diseases related to better living conditions. Fuzzy information processing (including information distribution and information diffusion) is introduced in this chapter and plays an important role in dealing with the small sample problem. Chapter 5 presents some basic definitions and principles of Fuzzy Set Theory and the fuzzy tools and techniques applied to actuarial science and insurance practice. The fields of application involve insurance game, insurance decision, etc. Chapter 6 is concerned with some applications of financial economics to actuarial mathematics, especially to life insurance and pension. Combining financial economics, actuarial mathematics with partial differential equation, a general framework has been established to study the mathematical model of the fair valuation of life insurance policy or pension. In particular, analytic solutions and numerical results have been obtained for various life insurance policies and pension plans. Chapter 7 provides a working framework for exploring the risk profile and risk assessment of China insurance. It is for the regulatory objective of building a risk-oriented supervision system based on China insurance market profile and consistent to the international development of solvency supervision.

The authors of various chapters of this book are: Professor Rongming Wang of East China Normal University (Chapter 1), Dr. Jingping Yang of Peking University (Chapter 2), Dr. Xianyi Wu of East China Normal University, Dr. Xian Zhou of Hong Kong University and Professor Jinglong Wang of East China Normal University (Chapter 3), Professor Hanji Shang of Fudan University (Chapter 4), Professor Yuchu Lu of Shanghai University (Chapter 5), Professor Weixi Shen of Fudan University (Chapter 6) and Professor Zhigang Xie of Shanghai University of Finance & Economics (Chapter 7). As the editor, I am most grateful to all authors for their cooperation. I would like to thank Professor Tatsien Li, Professor Zhongqin

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