Preface

Most of the existing portfolio selection models are based on the probability theory. Though they often deal with the uncertainty via probabilistic approaches, we have to mention that the probabilistic approaches only partly capture the reality. Some other techniques have also been applied to handle the uncertainty of the financial markets, for instance, the fuzzy set theory [Zadeh (1965)]. In reality, many events with fuzziness are characterized by probabilistic approaches, although they are not random events. The fuzzy set theory has been widely used to solve many practical problems, including financial risk management. By using fuzzy mathematical approaches, quantitative analysis, qualitative analysis, the experts’ knowledge and the investors’ subjective opinions can be better integrated into a portfolio selection model.

The contents of this book mainly comprise of the authors’ research results for fuzzy portfolio selection problems in recent years. In addition, in the book, the authors will also introduce some other important progress in the field of fuzzy portfolio optimization. Some fundamental issues and problems of portfolio selection have been studied systematically and extensively by the authors to apply fuzzy systems theory and optimization methods. A new framework for investment analysis is presented in this book. A series of portfolio selection models are given and some of them might be more efficient for practical applications. Some application examples are given to illustrate these models by using real data from the Chinese securities markets. The main innovative results of this book include: portfolio selection models with fuzzy liquidity constraints in a frictional securities market are proposed; based on the fuzzy decision theory, fuzzy portfolio selection models with $S$ shape fuzzy numbers are formulated; an estimation approach for interval returns of securities is proposed; the concept of semi-absolute deviation interval risk function is given, portfolio selection models with interval returns and interval risk are formulated; and the semi-definite programming approach for estimating possibility distribution of returns of securities is proposed. Moreover, the center spread possibility distribution portfolio selection models in a frictional securities market are formulated, and the four fuzzy index tracking portfolio selection models
are formulated, based on the four different measuring methods for tracking index error.

We would like to thank many friends and colleagues for their help and support in preparing this monograph. First, we thank Prof. Shushang Zhu of Fudan University, Prof. Jiuping Xu of Sichuan University, Prof. Masao Fukushima of Kyoto University and Prof. Duan Li of Chinese University of Hong Kong for their contributions to the book. Three chapters are based on the results that we achieved jointly with them. We would like to thank several scientists for their helpful suggestions and valuable comments on our research in this area, among them are Prof. Shu-Cherng Fang of North Carolina State University, Prof. Baoding Liu of Tsinghua University, Prof. M. Makowski of International Institute of Applied Systems Analysis, Prof. Yong Shi of University of Nebraska at Omaha, and Prof. Y. Yamamoto of Tsukuba University. Besides, we have to thank many colleagues who made important contributions in this promising area, including Prof. Hideo Tanaka of Hiroshima International University, Prof. Peijun Guo of Kagawa University, Prof. Masahiro Inuiuchishi of Osaka University, Prof. Srichander Ramaswamy of Bank for International Settlements, Prof. Enriqueta Vercher of Universitat de València and Prof. Christer Carlsson of Åbo Akademi University because their research stimulated us to join this area of research. Finally, we would like to thank the National Natural Science Foundation of China, Chinese Academy of Sciences (CAS), Academy of Mathematics and Systems Science of CAS, Hong Kong Research Granting Committee and City University of Hong Kong for their financial support to our research.

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Fuzzy Portfolio Optimization
Theory and Methods
Fang, Y.; Lai, K.K.; Wang, S.
2008, X, 176 p. 18 illus., Softcover
ISBN: 978-3-540-77925-4