PREFACE

Asset allocation investigates the optimal division of a portfolio among different asset classes. Standard theory involves the optimal mix of risky stocks, bonds, and cash together with various subdivisions of these asset classes. Underlying this is the insight that diversification allows for achieving a balance between risk and return: by using different types of investment, losses may be limited and returns are made less volatile without losing too much potential gain.

These insights are made precise using the benchmark theory of mathematical finance, the Black-Scholes-Merton theory, based on Brownian motion as the driving noise process for risky asset prices. Here, the distributions of financial returns of the risky assets in a portfolio are multivariate normal, thus relating to the standard mean-variance portfolio theory of Markowitz with its risk-return paradigm as above.

Recent years have seen many empirical studies shedding doubt on the Black-Scholes-Merton model, and motivating various alternative modeling approaches, which were able to reproduce the stylized facts of asset returns (such as heavy tails and volatility clustering) much better. Also, various new asset classes and specific financial tools for achieving better diversification have been created and entered the investment universe.

This book combines academic research and practical expertise on these new (often called alternative) assets and trading strategies in a unique way. We include the practitioners' viewpoint on new asset classes as well as academic research on modeling approaches, for new asset classes. In particular, alternative asset classes such as power forward contracts, forward freight agreements, and investment in photovoltaic facilities are discussed in detail, both on a stand-alone basis and with a view to their effects on diversification in combination with classical asset. We also analyse credit-related portfolio instruments and their effect in achieving an optimal asset allocation. In this context, we highlight aspects of financial structures which may sometimes be neglected, such as default risk of issuer in case of certificates or the role that model

risk plays within asset allocation problems. This leads naturally to the use of robust asset allocation strategies.

Extending the classical mean-variance portfolio setting, we include dynamic portfolio strategies and illustrate different portfolio protection strategies. In particular, we compare the benefits of such strategies and investigate conditions under which Constant Proportion Portfolio Insurance (CPPI) may be prefered to Option-Based Portfolio Insurance (OBPI) and vice versa. We also contribute to the understanding of gap risk by analyzing this risk for CPPI and Constant Proportion Debt Obligations (CPDO) in a sophisticated modeling framework. Such analyses are supplemented and extended by an investigation of the optimality of hedging approaches such as variance-optimal hedging and semistatic variants of classical hedging strategies.

Many of the articles can serve as guides for the implementation of various models. In addition, we also present state-of-the-art models and explain modern tools from financial mathematics, such as Markov-Switching models, time-changed Lévy models, variants of lognormal approximations, and copula structures.

This books combines a unique mix of authors. Also many of our students improved the outcome of the project with critical and insightful comments. Particular thanks goes to Georg Grüll, Peter Hieber, Julia Kraus, Matthias Lutz, Jan-Frederik Mai, Kathrin Maul, Kevin Metka, Daniela Neykova, Johannes Rauch, Andreas Rupp, Daniela Selch, and Christofer Vogt.

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