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Robust Equity Portfolio Management + Website

Formulations, Implementations, and Properties Using MATLAB

WOO CHANG KIM
JANG HO KIM
FRANK J. FABOZZI

WILEY
WCK
To my daughter, Joohyung
JHK
To my wife, Insun Jung
FJF
To my sister, Lucy
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The mean-variance model for constructing portfolios, introduced by Harry Markowitz, changed how portfolio managers analyze portfolios, especially for managing equity portfolios. The model provides a strong foundation for quantifying the return and risk attributes of a portfolio, as well as mathematically forming optimal portfolios. Following the 1952 publication of Markowitz’s mean-variance model, there have been numerous extensions of the original model, particularly starting in the 1990s, that have sought to overcome criticisms of the original model. In this book, we focus on one of these extensions, the construction of robust portfolios for equity portfolio management within the mean-variance framework. We refer to this approach as robust equity portfolio management.

The book will be most helpful for readers who are interested in learning about the quantitative side of equity portfolio management, mainly portfolio optimization and risk analysis. Mean-variance portfolio optimization is covered in detail, leading to an extensive discussion on robust portfolio optimization. Nonetheless, readers without prior knowledge of portfolio management or mathematical modeling should be able to follow the presentation, as basic concepts are covered in each chapter. Furthermore, the main quantitative approaches are presented with MATLAB examples, allowing readers to easily implement portfolio problems in MATLAB or similar modeling software. An online appendix provides the MATLAB codes presented in the chapter boxes (www.wiley.com/go/robustequitypm).

Although this is not the only book on robust portfolio management, it distinguishes itself from other books by focusing solely on quantitative robust equity portfolio management, including step-by-step implementations. Other books, such as Robust Portfolio Optimization and Management by Frank J. Fabozzi, Petter N. Kolm, Dessislava Pachamanova, and Sergio M. Focardi, also introduce robust approaches, but we believe that readers seeking to learn the formulations, implementations, and properties of robust equity portfolios will benefit considerably by studying the chapters in the current book.

Woo Chang Kim
Jang Ho Kim
Frank J. Fabozzi
The foundations of what is popularly referred to as “modern portfolio theory” is attributable to the seminal work of Harry Markowitz, published more than a half a century ago. Markowitz provided a framework for the selection of securities for portfolio construction to obtain an optimal portfolio. To do so, Markowitz suggested that for all assets that are candidates for inclusion in a portfolio, one should measure an asset’s return by its mean return and risk by an asset’s variance of returns. In the selection of assets to include in a portfolio, the Markowitz framework takes into account the co-movement of asset returns by using the covariance between all pairs of assets. The portfolio’s expected return and risk as measured by the portfolio variance are then determined by the weights of each asset included in the portfolio. For this reason, the Markowitz framework is commonly referred to as mean-variance portfolio analysis. Markowitz argued that the optimal portfolio should be selected based on the trade-off between a portfolio’s return and risk. While these concepts are considered the basis of portfolio construction these days, the development of the mean-variance model shaped how investment managers analyze portfolios and sparked an overwhelming volume of research on the theory of portfolio selection.

Once the fundamentals of modern portfolio theory were established, studies addressing the limitations of mean-variance analysis appeared, seeking to improve the effectiveness of the original model under practical situations. Some research efforts concentrated on reducing the sensitivity of portfolios formed from mean-variance analysis. Portfolio sensitivity means that the resulting portfolio constructed using mean-variance analysis and its performance is heavily dependent on the inputs of the model. Hence, if the estimated input values were even slightly different from their true values, the estimated optimal portfolio will actually be far from the best choice. This is especially a drawback when managing equity portfolios because the equity market is one of the more volatile markets, making it difficult to estimate values such as expected returns.

In equity portfolio management, there has been increased interest in the construction of portfolios that offer the potential for more robust performance even during more volatile equity market periods. One common