BOOK REVIEW

INTRODUCTION TO RISK PARITY AND RISK BUDGETING

Thierry Roncalli, Chapman1Hall/CRC Financial Mathematics Series, 2014.

In this book, Thierry Roncalli provides a timely and comprehensive analysis of Risk-budgeting portfolio management techniques and risk-based investment strategies. Risk budgeting portfolio construction approaches, such as risk parity, have dramatically gained in popularity after the global financial crisis of 2008, as investors have become increasingly focused on capital preservation and risk management, but also due to the pitfalls of the traditional modern portfolio theory. Indeed, numerous empirical studies have documented the ex-post inefficiencies of the market-capitalization indexes, as well as the lack of robustness of the Mean Variance Optimal portfolios. As a consequence, the asset management industry has increasingly relied on alternatives to the Mean-Variance efficient portfolios, with an emphasis on the risk-budgeting solutions: in the multi-asset space for more robustness in the strategic asset allocations; in equities as alternatives to market capitalization benchmarks which are heavily biased towards overvalued stocks and sectors as emphasized by the high exposure to technology-related stocks during the dot-com bubble. To quote the author, since the 2008 financial crisis, "risk management as become more important than performance measurement" for institutional investors. Yet, despite the apparent simplicity of the risk parity concept (e.g. be well-diversified in risk not in capital), practitioners still face difficulties when implementing risk-budgeting solutions, due to some methodological issues and the lack of a unified treatment of risk-based portfolios.

This book fills this gap and aims to help investors in designing their risk-budgeting policy allocations. Much of the book's content builds on previous research materials conducted by the author at Lyxor. Here however the major topics are brought together and organized consistently in a unified setting. The book is mainly divided in two parts: (1) theoretical foundations and practice of modern portfolio theory and risk budgeting approach and (2) applications of risk parity to specific investment universes (equity, fixed-income, alternatives and multi-asset). The first part which is the stronger of the two, lays out the foundations of the risk budgeting approach. After presenting the shortcomings of the traditional portfolio theory and the Euler's linear risk decomposition principle, the author then dives into the main properties of the risk parity portfolios, in particular their existence, Mean-Variance optimality and robustness to estimation errors. Using the volatility risk measure the author compares and contrasts the risk/performance characteristics of popular risk-based investing strategies such as the Equal Risk Contributions (ERC), the Equally Weighted (EW) and Minimum Variance (MV) portfolios. The author also considers additional portfolio risk measures such as the Value-at-Risk and the Expected Shortfall. While the Gaussian hypothesis leads to re-introduce in an elegant manner the expected returns in the Value-at-Risk and Expected Shortfall cases, the use of non-parametric specifications then leads to a natural extension of the risk parity framework to Non-Gaussian distributions. The author also confronts the challenges of a naïve implementation of the risk budgeting approach on asset classes. Because risk parity portfolios are not invariant to "duplication risk" (e.g. sensitivity of the asset allocation to the universe definition), risk budgeting portfolios that are balanced in terms of asset's risk contributions can lead to very unbalanced solutions in terms of factor's risk contributions. The author shows mathematically how it is possible to build risk-balanced portfolios by risk budgeting factors instead of assets. The second part deals with specific applications of the risk budgeting approach to asset classes, such as equities, bonds, and alternative investments. In the first section, the author compares the Equal Risk Contributions (ERC) indexation strategy with other popular "smart beta" or "alternatively weighted" indexing equity solutions, such as the Minimum Variance (MV), the Maximum Diversification (MD) and the Equally-Weighted (EW) portfolios. In the second section, the author provides an extensive treatment of risk budgeting for fixed-income portfolios, including how to model interest and credit risks and conduct sensible risk parity allocations for sovereign bonds. This section is especially useful because risk budgeting is not as fully developed in fixed-income as in equity. The last sections of the book consider applications of risk parity to alternative investments (commodities and fund of hedge funds) and multi-asset classes. This is where the author's expertise shines through with contributions that go from the analysis of the rebalancing bonus of a commodity investment strategy to the incorporation of active views in a multi-asset risk parity framework, not to mention the incorporation of non-Gaussian risk measures in a fund of hedge funds context.

Introduction to Risk Parity and Risk Budgeting is a timely and comprehensive analysis of risk parity portfolios. Although the book mathematical treatment could appear slightly too developed for some readers, yet no other book is comparable to this one in depth and breadth. Thoroughly researched, this book makes a unique and valuable contribution to the science and art of portfolio construction. I highly recommend this book to professional investors as well as academics and students who want to gain serious insight into risk-based asset allocation issues.

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