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SUMMER SESSIONS

Refresh your knowledge of essential topics in investing

Asset Allocation: From Theory to Practice and Beyond, Part I – Fundamentals Presented by Mark Kritzman

Key Points

- While mean-variance analysis is an elegant portfolio optimization tool, it sometimes fails to accommodate real-world complexities.
- For example, some investors face return thresholds, asset returns are not always elliptically distributed, and risks emerge at different frequencies.
- Full-scale optimization overcomes these challenges by considering every feature of the data and allowing for nuanced investor preferences.

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Mean-variance analysis was first introduced by Harry Markowitz in 1952. Since then, it has served as a foundational mathematical framework for assembling a portfolio of assets to maximize utility for an investor's given risk tolerance. By elegantly balancing expected returns and risk, it enables investors to generate an “efficient frontier” of assets and determine the optimal mix for their particular preferences. Despite its elegance, however, its underlying assumptions are often challenged by real-world complexities.

For mean-variance analysis to generate a truly optimal solution, the two following assumptions must hold: (1) asset returns are elliptically distributed, which means they are symmetric and have stable correlations, and (2) investor preferences are well described by the portfolio's expected return and risk, as measured by its variance.

Unfortunately, both assumptions often do not hold empirically. For example, return correlations are not constant through time, and they are not constant across different return intervals. Moreover, due to compounding, return distributions are skewed. Additionally, investors often have multiple investment horizons since they care about shocks that occur suddenly, such as pandemics, geopolitical crises, and financial crises, as well drifts that emerge slowly such as demographic shifts, technological displacement, and climate change. Lastly, investor preferences are usually nuanced and may be characterized by “kinked” aversion to losses below a certain threshold.

To address these challenges, investors can take a “**full-scale optimization**” approach. In this method, we stack asset returns across various time horizons such as quarterly, annual, and 5-year intervals and search for


the asset mix that maximizes utility as defined by any set of investor preferences. With this approach, we consider every feature of the data, including how volatility and correlation vary and scale through time, as well as asymmetric return distributions. Importantly, the method also considers nuanced investor preferences, such as abrupt changes in risk preferences and a dual focus on short-term shocks and drifts that emerge gradually.

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