Examining Returns and Volatility Across Varying Portfolio Allocations

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Introduction

Optimal asset allocation is a critical strategy for investors seeking to maximize returns and manage risks in their portfolios. Asset allocation is especially of concern to investors forming their retirement investment portfolios, who may have different risk tolerances when it comes to their retirement savings.

The objective of this paper is to investigate the average rate of returns and inherent volatility associated with various ratios of stock and bond allocations, providing valuable insights for investors.

Key terms to define are volatility, returns, and allocation. Volatility measures fluctuations of value and reflects uncertainty or risk, while returns represent financial gains or losses from an investment. Allocation refers to the distribution or assignment of investment resources among different assets or investment categories.

Data

Two distinct datasets are employed to represent the stock and bond markets: the S&P 500 Index spanning from 1928 to 2022 for stocks, and Morningstar's US Core Bond Index covering the period from 2000 to 2022 for bonds.

The datasets are comprised of price data collected at daily or monthly intervals, which were subsequently aggregated and transformed into yearly price data.

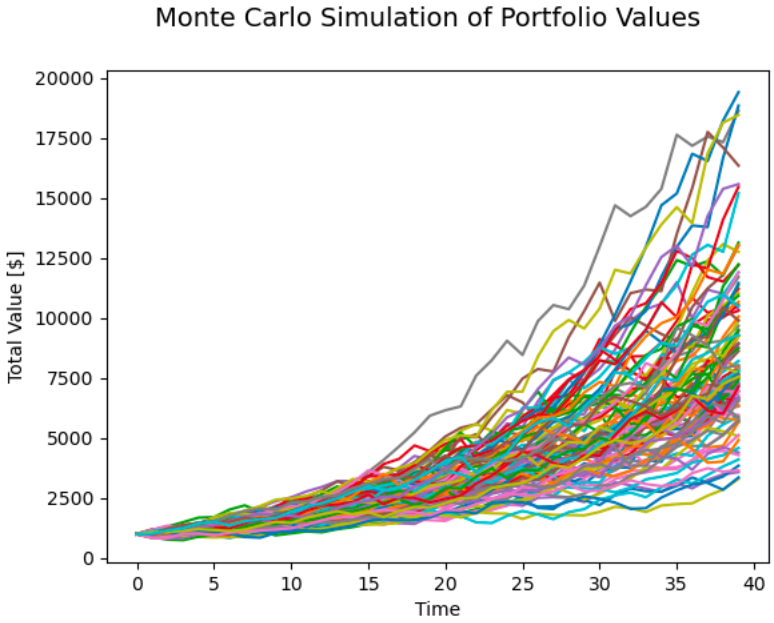
Analysis

While conventional bootstrap sampling assumes independence of individual data points, the existence of bear and bull markets suggests that returns are likely autocorrelated, exhibiting dependence between past and current values and returns. To better capture the structure of historical asset returns, block bootstrap sampling was employed with a block size of five years, allowing the creation of simulated histories from the stock and bond datasets.

Through thousands of iterations, the sampled histories capture a diverse range of outcomes, encompassing both more extreme and more favorable scenarios compared to historical observations and future expectations. This variability proves beneficial for stress testing portfolios

as it exposes them to a wide array of market conditions, facilitating a comprehensive evaluation of their performance.

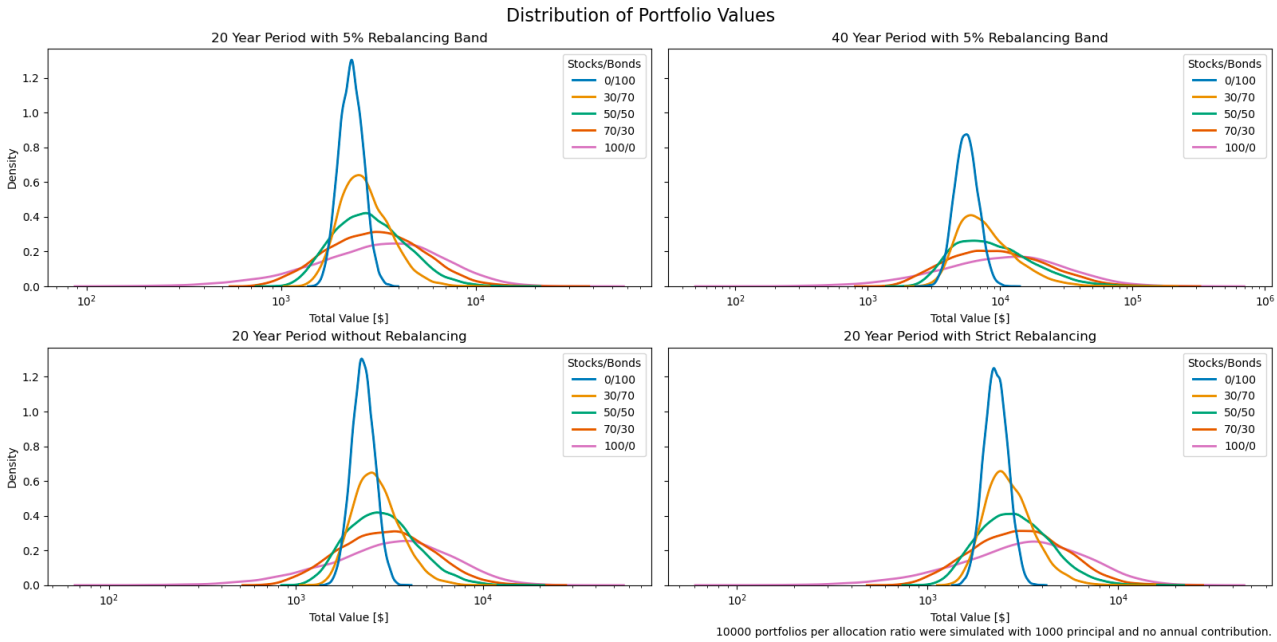
Portfolio simulations were conducted using these pseudo histories, exploring various parameters. These parameters included the number of years of investment, the option to rebalance to a specific allocation, and the threshold or rebalancing band, which determined when to initiate rebalancing.



The depicted figure illustrates a simulation of one hundred portfolios over time, with each portfolio represented by a line. The distribution plot in the next section was constructed using the final values of these portfolios.

Results

The results indicate a significant relationship between portfolio allocations, and both returns and volatility, highlighting the importance of asset allocation strategies in managing investment performance and risk.



The graph presented above illustrates a discernible trend: as the allocation towards stocks in the portfolio increases, there is a corresponding rise in volatility or spread of values. Nonetheless, this increase in risk is accompanied by a noticeable upward shift in average returns.

Although the impact of rebalancing on the shape of the distributions appears to be minimal, in practice, rebalancing remains a valuable approach to align the risk of a portfolio with the investor's desired level. Additionally, it facilitates opportunities to capitalize on market fluctuations by enabling investors to strategically "buy low" and "sell high" within specific asset classes.

Conclusion

Before embarking on their retirement investment journey, it is crucial for investors to carefully consider their risk tolerance and investment time horizon.

For individuals with several decades until retirement, who can endure the inevitable market downturns, a higher allocation to stocks can lead to substantial growth of their principal. However, for those approaching retirement age, it is prudent to contemplate a more bond-heavy allocation. This approach ensures minimal fluctuations in their portfolio and provides a secure foundation for withdrawals, safeguarding against the potential devastation of a market downturn.

By aligning their asset allocation with their risk tolerance and time horizon, investors can optimize their retirement investment strategy and work towards their long-term financial goals.

References

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