Beyond Sharpe ratio: Optimal asset allocation using different performance ratios

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Abstract

As the assumption of normality in return distributions is relaxed, classic Sharpe ratio and its descendants become questionable tools for constructing optimal portfolios. In order to overcome the problem, asymmetrical parameter-dependent performance ratios have been recently proposed in the literature. The aim of this note is to develop an integrated decision aid system for asset allocation based on a toolkit of eleven performance ratios. A multi-period portfolio optimization up covering a fixed horizon is set up: at first, bootstrapping of asset return distributions is assessed to recover all ratios calculations; at second, optimal rebalanced-weights are achieved; at third, optimal final wealth is simulated for each ratios. Eventually, we make a robustness test on best performance ratios. Empirical simulations confirm the weakness in forecasting of Sharpe ratio, whereas asymmetrical parameter-dependent ratios, such as the Generalized Rachev, Sortino–Satchell and Farinelli–Tibiletti ratios show satisfactorily robustness.
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1. Introduction[1,2]

An *evergreen* question in modern asset allocation modelling and managing techniques is how to choose the best fitting performance ratio to use. Starting from the seminal idea of Roy (1952), Sharpe (1966) introduced the well-known Sharpe Ratio for managing mutual funds. Subsequently, Zenios (1993), Zenios and Kang (1993) and Sharpe (1994) improved the ratio suggesting to refer the performance to a benchmark. Although Sharpe ratio and its descendants fully hit the point as the returns are assumed Gaussian distributed, they flag as soon as this property is relaxed. As we tend to align the model to what a vast literature has documented on the asymmetry in stock index distributions (see the recent analysis of Ekholm and Pasternack, 2005 and Leland, 1999 for a sound criticisms to normality assumption) we are bound to skip from the Gaussian world. So a number of different alternatives have been proposed in the literature. Some of these redefine the risk measure such as the Gini ratio (e.g., Shalit and

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