

quantities estimation

Show Purpose



error. This raises the natural question: How accurately are Sharpe ratios measured? In this article, I provide an answer by deriving the statistical distributions of the usual Sharpe ratio estimator—sample mean excess return over sample standard deviation—using standard econometric methods under several different sets of assumptions for the statistical properties of the return series on which the ratio is based. Armed with these statistical distributions, I show that confidence intervals, standard errors, and hypothesis tests for the estimated Sharpe ratio can be computed in much the same way that they are computed for regression coefficients, such as portfolio alphas and betas.

The accuracy of Sharpe ratio estimators hinges on the statistical properties of returns (e.g., time-series properties, such as mean reversion, momentum, or time-varying volatilities). Although this may seem like a theoretical exercise best left for statisticians, there is often a direct connection between the investment management process of a portfolio and its statistical properties. For example, a change in the portfolio manager's style from a small-cap value orientation to a large-cap growth orientation will typically have an impact on the portfolio's volatility, degree of mean reversion, and market beta. Even for a fixed investment style, a portfolio's characteristics can change over time because of fund inflows and outflows, capacity constraints (e.g., a microcap fund that is close to its market-capitalization limit), liquidity constraints (e.g., an emerging market or private equity fund), and changes in market conditions (e.g., sudden increases or decreases in market volatility).

At a superficial level, the accuracy of Sharpe ratios could depend on the investment style. For example, a portfolio of more volatile investments would have a higher Sharpe ratio than a portfolio of less volatile investments. However, in this article, I show that the accuracy of Sharpe ratios for mutual funds depends on the statistical properties of the returns, such as the degree of serial correlation. In particular, I show that Sharpe ratios can be biased in the presence of serial correlation, especially if the correlation is negative. For example, if the Sharpe ratio is calculated using monthly returns, the Sharpe ratio will be biased if there is a special correlation structure in the returns. Specifically, if the correlation of the portfolio's returns—can yield Sharpe ratios that are considerably smaller (in the



Although the Sharpe ratio has become part of the canon of modern financial analysis, the results presented in this article suggest that a more sophisticated approach to interpreting Sharpe ratios is called for, one that incorporates information about the investment style that generated the returns and the market environment in which those returns were generated. For example, hedge funds have very different return characteristics from the characteristics of mutual funds; hence, the comparison of Sharpe ratios between these two investment vehicles cannot be performed naively. In light of the recent interest in alternative investments by institutional investors—investors that are accustomed to standardized performance attribution measures such as the annualized Sharpe ratio—there is an even greater need to develop statistics that are consistent with a portfolio's investment style. The empirical example in this article underscores the practical relevance of proper statistical inference for Sharpe ratio estimators: Ignoring the impact of serial correlation of hedge fund returns can yield annualized Sharpe ratios that are overstated by more than 65 percent, understated Sharpe ratios in the case of negatively serially correlated returns, and inconsistent rankings across hedge funds of different styles and objectives. By using the appropriate statistical distribution for quantifying the performance of each return history, the Sharpe ratio can be used to rank hedge funds and to estimate the expected rewards of a broad array of investment strategies.



 Financial Research and Analysis Ltd. [Find out more](#)
 Related

People also read

Recommended articles

Cited by
493

Information for

Authors

R&D professionals

Editors

Librarians

Societies

Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

Open access

Overview

Open journals

Open Select

Dove Medical Press

F1000Research

Help and information

Help and contact

Newsroom

All journals

Books

Keep up to date

Register to receive personalised research and resources
by email



Sign up



Copyright

Accessibility

Register
5 How



or & Francis Group
orma business