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Konrad Wölms

Lehner Investments

QUANTITATIVE RESEARCHER ASSESSMENT

Dear Konrad Wölms,

I am submitting my solution to the Quantitative Researcher Assessment from Lehner Investments. Please contact me if there are any further questions regarding my application. Thank you for your consideration.

INFORMATION RATIOS

The Sharpe Ratio (Sharpe, 1966) measures the return of a portfolio in excess of the risk-free rate, over the total risk of the portfolio (its standard deviation). Although this ratio offers significant possibilities for evaluating portfolio performance while remaining simple to calculate, it has been subject to generalizations.
One of the most common variations on the Sharpe Ratio is called the Information Ratio (Sharpe 1994), where the risk-free asset is replaced with a benchmark portfolio. Both measures are most useful for evaluating portfolios with normal expected return distributions and are not applicable to such asymmetric return strategies as those frequently used by hedge funds. Neither ratios take into account dynamic correlations between asset classes. Since the Sharpe Ratio assumes the same benchmark – the risk-free rate – for all portfolios, investors using this measure can compare funds within their risk tolerance for the best risk-adjusted returns. The Information Ratio, on the other hand, is best used by investors to measure manager performance. Both the Sharpe Ratio and the Information Ratio are highly dependent on the time period under measurement. While very long time periods may increase a portfolio's Sharpe Ratio due to lower volatility for longer periods, Information Ratios are more valuable when based on longer periods, since they indicate persistence in manager skill. Investors should be mindful that the choice of benchmark index will likely have a significant effect on the Information Ratio.

Further variations of the Sharpe Ratio include the Treynor Ratio and the Sortino Ratio. The Treynor Ratio measures the relationship between the excess return on the portfolio and its systematic risk (the portfolio's beta). As it takes only the systematic risk of the portfolio into account, this measure is applicable to well diversified portfolios. This is in contrast to the Sharpe Ratio which is based on the total risk (i.e., the unsystematic risk taken by the manager is included), which makes it possible to

evaluate portfolios that are not well diversified. Another well known indicator is the Sortino Ratio. It's formula is similar to that of the Sharpe Ratio: the minimum acceptable rate of return (MARR) replaces the risk-free rate and the downside deviation of the returns replaces the standard deviation.

The Prediction Model

All the above metrics are based on historical data, and one cannot assume that past performance is indicative of future results. Some research (see reference below) shows that the Information Ratio may have predictive power for the future, while others believe it has little information content regarding future performance.

For a prediction model I would set the goal to investigate autocorrelation (serial correlation) of the Information Ratio and other predictive ratios mentioned above. For the analysis, we consider a ratio (e. g., the Information Ratio) and compare metrics measured in two periods of equal length (e.g., 12 months) separated by some delay. Running the analysis for a pool of funds, if positive correlation between a ratio and some of its lagged version is found for some funds, this shows some indication of future performance of the fund.

Since the text of the assessment specifies that we are interested in the future performance of a fund (and not a portfolio of funds), I did not create a function which is able to compute information ratios for a portfolio including multiple securities. However, diversification has utmost importance in every investment strategy.

Reference: The Predictive Power of Information Ratios, AlphaBetaWorks, a division of Alpha Beta Analysitcs, LLC. , Published: August 17, 2016 on abwcharts.com