

Research Paper Number 24

Assessing Market Risk for Hedge Funds Portfolios

Author:

François-Serge LHABITANT - Union Bancaire Privée and Thunderbird, the American Graduate School of International Management

Date:

March 2001

This paper has now been published and is no longer available as a part of our Research Paper Series. The reference to this paper is:

Lhabitant, F.-S. (2001): Assessing Market Risk For Hedge Funds Portfolios. The Journal of Risk Finance, Spring, pp.1-17.

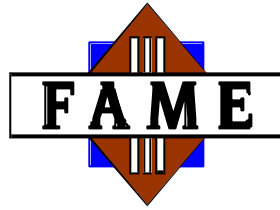
Abstract:

We suggest an empirical model to analyze the investment style of individual hedge funds and funds of funds. Our approach is based on a mixture of the style analysis approach suggested by Sharpe (1988), the factor push approach used in stress testing, and historical simulation. An interesting and straightforward extension of this model is the estimation of value-at-risk (VaR) figures. This extension is tested using a very intuitive implementation over a large sample of 2,934 hedge funds over the 1994-2000 period. Both the in-the-sample and the out-of-sample results suggest that the proposed approach is useful and may constitute a valuable tool for assessing the investment style and risk of hedge funds.

Executive Summary:

Interest in hedge funds has been growing steadily in the nineties, with investors seeking alternative assets with low correlation to traditional cash, fixed income and equity portfolios. However, the term “hedge fund” is frequently used beyond the scope of its original meaning to refer to any pooled investment vehicle that is not a conventional investment fund. As a consequence, all hedge funds are not created equal – investment returns, volatility, and risk vary enormously among the different hedge fund strategies.

From a functional perspective, hedge funds’ investment activities are typically focused on market making and/or proprietary trading, two domains long reserved to large financial institutions’ trading rooms. Despite the similarity, trading rooms and hedge funds have adopted rather

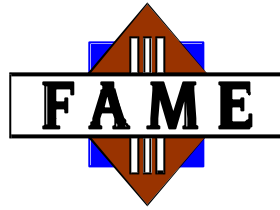


opposite views on risk management. On the one hand, risk management in trading rooms is entirely quantitative. Encouraged by regulators, large financial institutions have progressively adopted value at risk 1 (VaR) for measuring, controlling and reporting on a regular basis the market risk exposures of their proprietary trading desks. On the other hand, hedge funds advisors and investors rely on qualitative factors to assess risk, due to the lack of available information. Hedge fund managers are still reluctant to report anything about their positions or strategies, including risk figures. They claim to focus on absolute returns and ignore risk-adjusted performance. Still too often, the most that one can observe is a non-audited monthly net asset value provided by a hedge fund performance-reporting agency. This is clearly unsatisfactory.

On the medium run, there is no doubt that transparency will increase in the hedge fund kingdom, particularly if managers want to attract institutional investors. However, in the mean time, given the complexities involved with hedge funds' strategies, qualitative approaches to risk and performance evaluation are not sufficient. Therefore, there is a need to introduce new quantitative tools to assist investors assessing the investment characteristics and the risks of hedge funds. This paper should be seen as an answer to this need. Using only net asset values from a hedge fund, we propose a methodology to 1) identify its strategic and tactical asset allocations; 2) compare its performance against an ad-hoc benchmark; 3) measure its effective risk. The method on which we rely is called returns-based style analysis and was introduced by Nobel-winner William Sharpe in 1988.

Based on a constrained linear factor model, returns-based style analysis consists essentially in creating a fictive passive portfolio of pre-specified asset classes that best "describes" the return of an actively managed fund. This passive portfolio is then typically used to 1) verify whether or not a fund manager sticks to his strategic asset allocation; 2) assess his investment skills with respect to a benchmark adapted to his investment style. The beauty of the technique is that investors need not examine every asset in the fund, but simply have to provide monthly returns on the fund and on the indices representing the selected asset classes. Unfortunately, the technique is not directly applicable to hedge funds. Leverage and derivatives result in non-linear exposures to traditional asset classes, which is incorrectly captured by a linear factor model. However, if we use hedge funds indices rather than traditional asset classes, the non-linearity problem disappears. The hedge funds indices themselves should absorb the non-linear aspects. In a sense, we then view a hedge fund as a portfolio of hedge funds indices. Each of these indices represents an investment style, which may be linearly or non-linearly related to traditional asset classes.

We tested our model on a sample of 2934 hedge funds, over the January 1994-December 2000 period and using a three-year estimation period. For the hedge funds indices, we selected the CSFB Tremont indices, currently the only ones in the industry that are fully transparent, use



audited net asset values for hedge funds with at least \$10 million of assets, and are asset-weighted. The corresponding investment styles are Convertible Arbitrage, Dedicated Short Bias, Event Driven, Global Macro, Long Short Equity, Emerging Markets, Fixed Income Arbitrage, Market Neutral and Managed Futures. Our model evidenced a high explanatory power, and allowed for a fast and accurate categorization of hedge funds based on their investment style.

An interesting and straightforward extension of our model is the estimation of value at risk figures. Say for instance that one wants to compute the VaR of a given hedge fund at a 99 percent confidence level and using a monthly holding period. The procedure would be as follows. First, compute the extreme move for each hedge fund style index as being the first percentile of its monthly return distribution (e.g. its worst return, 99% of the time). Next, measure the hedge fund exposure to each of the style indices, using our returns-based style analysis model. Then, “push” the return of each style index to its extreme move, and work out the combined effect of such changes on the return of the hedge fund, accounting for correlation between the hedge funds styles. This will be the VaR figure due to the investment style, a quantity that we called value at market risk (VaMR).

But hedge funds may also have also an important part of their risk that is fund-specific and not related to investment styles. Our model also allows us to capture such a risk. The difference between the total volatility of the hedge fund and the volatility of its “associated” portfolio of hedge funds indices gives us the volatility portion that is not captured by the style indices, but rather specific to the hedge fund. We then “push” this specific risk component by a factor equal to 2.33 (for a 99 percent confidence interval) to obtain the value at specific risk (VaSR). We then just need to aggregate the VaMR and VaSR accounting for their zero correlation to obtain the total VaR of the considered hedge fund.

We back-tested our VaR model on the same sample of 2934 hedge funds over the January 1994-December 2000 period. For each possible three-year estimation period, we compute the VaR and compare it to the return realized the first month following the estimation period. If the observed return is lower than the value at risk, this is recorded as an exception, a case that should not happen more than one percent of the time. Once again, our model performed well, despite the inclusion of several market crashes in the sample period.

We therefore believe that our model is a promising tool for hedge fund investors, allowing them to bypass the low transparency that prevails in the industry and quantify the degree of risk in their portfolios. It could fundamentally change the way investors and analysts assess alternative asset managers.