The Risk Considerations Unique to Hedge Funds

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EDHEC is one of the top five business schools in France owing to the high quality of its academic staff (104 permanent lecturers from France and abroad) and its privileged relationship with professionals that the school has been developing since its establishment in 1906. EDHEC Business School has decided to draw on its extensive knowledge of the professional environment and has therefore concentrated its research on themes that satisfy the needs of professionals.

EDHEC pursues an active research policy in the field of finance. Its “Risk and Asset Management Research Centre” carries out numerous research programs in the areas of asset allocation and risk management in both the traditional and alternative investment universes.
This article continues in the spirit of the August 2002 Quantitative Finance feature on “Measuring Risk-Adjusted Returns in Alternative Investments.” The August article noted that a number of hedge fund strategies appear to be earning risk premia. In other words, they earn returns because they are performing an economic function, which involves some form of risk transfer. One consequence is that they have short-option-like return profiles.

The August article discussed the new risk assessment techniques that are being used to evaluate hedge fund strategies, which may have highly asymmetric outcomes. Traditional risk measures that were designed for diversified baskets of equities, which have symmetric outcomes, are frequently inappropriate for the evaluation of hedge funds.

A further distinguishing feature in evaluating the risk of hedge fund strategies is the relative paucity of data, as noted by Feldman et al [2002]. This creates great discomfort in attempting to apply statistical techniques to sparse datasets.

This article will discuss five further approaches that academics and practitioners have proposed since this summer for addressing the risk considerations that are unique to hedge funds.

Non Standard Performance Characteristics
The following section will briefly discuss three risk measures that researchers have recently proposed for evaluating hedge funds strategies.

• Conditional Value-at-Risk
Agarwal and Naik [2002] recommend applying the Conditional Value-at-Risk (CVaR) framework to hedge funds. They advocate replacing Value-at-Risk (VaR), which has been popular among traditional asset managers. The authors explain that:

“[Whereas] VaR measures the maximum loss for a given confidence interval, ... CVaR corresponds to the expected loss conditional on the loss being greater than or equal to the VaR.”

By using CVaR, the authors are able to capture the left-tail risk of those hedge fund strategies that have short put option-like exposures.

They additionally show that the application of the mean–variance framework in the case of some hedge fund strategies can result in underestimation of tail risk by as much as 50%.

The authors conclude that if an investor’s goal is to create portfolios for which the magnitude of extreme losses is kept under control, then that investor should consider using CVaR as their risk constraint.

• Modified Value-at-Risk
When one cannot assume that an investment’s returns are distributed normally (or at least symmetrically distributed), Signer and Favre [2002] propose a risk measure that takes into consideration the third and fourth moments of an investment’s distribution. They describe a statistical method for adjusting VaR to incorporate skewness and kurtosis; they refer to this new measure as “modified VaR.”

The authors advocate using modified VaR as the risk constraint for portfolios that include hedge funds because:

“nearly all hedge fund strategies show negatively skewed return distributions with positive excess kurtosis.”
The authors provide an example that shows how the efficient frontier is changed when using modified VaR rather than VaR as the risk constraint. Exhibit 1:

“shows the degree to which [a] … sample portfolio with a hedge fund portion of maximum 10% is represented too positively (in the sense of returns being too favorably risk-adjusted) by not taking account of the skewness and kurtosis of the return distributions.”

The authors conclude that an evaluation of the benefits of hedge funds needs to incorporate the higher moments of an investment strategy's return distribution.

• Excess Downside Deviation as an Adjustment to the Sharpe Ratio

Johnson et al [2002] note that many hedge fund strategies appear to be in effect “short option” strategies that bear overpriced risks associated with rare events.

The authors advocate examining the downside deviation of an investment strategy's return distribution. The downside deviation measures the degree to which the overall return distribution is due to returns below a threshold level.

Given that the Sharpe ratio is so prevalent as a performance measure, the authors propose making an adjustment to this ratio to incorporate the extra information from the downside deviation calculation. (The Sharpe ratio is the expected excess return divided by its standard deviation.)

Their “adjusted Sharpe ratio” is defined as:

“the Sharpe ratio that would be implied by the fund's observed downside deviation if returns were distributed normally.”

The authors show one example hedge fund strategy where this adjustment can be quite dramatic:

“a Sharpe ratio of over 2.50 is reduced to 0.79 [for one particular fund.]”

The researchers conclude that their framework has the benefit of being sensitive to rare events, which might otherwise go undetected when using standard measures.
Paucity of Historical Data

Historical hedge fund data only dates back to the 1990’s. This is probably not sufficient to give a good understanding of the risks of hedge fund strategies. Also, hedge fund returns from historical databases are likely upwardly biased since unsuccessful funds either do not report liquidation values or the funds are deleted all together from historical databases.

The following section will briefly discuss two approaches that researchers have recently proposed for addressing the historical data problems associated with hedge funds.

- **Asset-Based Explanation of Risks**

  The current academic thinking on how to evaluate the brief track records of alternative investment strategies is to use “asset-based style factors,” which explain a strategy’s returns.

  Sharpe [1992] originally advocated this approach to model mutual fund risk. A current effort by academics is to extend this approach to hedge funds.

  The idea is that if an investor can link a hedge fund’s returns to the fund’s underlying “style factors,” then one can use the longer history of the factors’ returns to evaluate the specific hedge fund. Presumably the longer history of the style factor(s) would be sufficient so that the magnitude of losses that have occurred (and therefore could occur again) would be apparent from the long-term data.

**Equity Example**

Agarwal and Naik [2002] take into consideration the option-like features inherent in a number of hedge fund strategies. Specifically, they apply stepwise regressions on a number of equity hedge fund strategies. They regress the strategies against a number of style factors and include options on market indices, too.

For example, the authors find that the following risk factors are significant in explaining the returns of the Hedge Fund Research Event Arbitrage index: a short out-of-the-money put on the S&P 500 along with an equity market capitalization factor and a equity value-vs.-growth factor.

The authors recommend using replicating portfolios for each fund strategy based on their respective significant risk factors. In this way, one can use the longer history of the strategy’s risk factors to evaluate whether a particular hedge fund strategy is a good fit for one’s overall portfolio.

**Fixed-Income Example**

Fung and Hsieh [2002] advocate extracting common risk factors in groups of fixed-income funds using principal component analysis. Their procedure then links the extracted factors to market observable prices, which have longer price histories.

The authors find that fixed-income hedge funds primarily have exposure to fixed-income related spreads, including the convertible/Treasury spread, the high yield/Treasury spread, the mortgage/Treasury spread, and the emerging market bond/Treasury spread.

The authors also construct a one-factor model with a specific corporate credit spread as the factor. Their goal is to examine how sensitive a particular fixed-income hedge fund strategy is to changes in credit spreads. They find a strong correlation using recent data. They show that if one extrapolates this relationship using a longer price history, one would find losses that are double the worst loss experienced in the brief history for this category of hedge fund.

Fung and Hsieh [2002] conclude that the returns for bearing the added sources of risk identified in their study need to be balanced against the additional tools needed to manage the attendant tail risk of the strategies.
• Disaster Function

One simple method of correcting for the survivorship bias that likely exists in databases of hedge funds returns is to apply a “haircut” to returns. Commonly used downward adjustments of return data are in the range of 2% to 3% per year.

The problem with this adjustment is that it does not adequately capture the risk reflected by attrition, as noted by Feldman et al [2002].

Feldman et al [2002] propose using default-like models of attrition risk. They consider using a simple Poisson process for their “disaster model.” Specifically:

“in every period, with fixed probability, a fund loses half of its assets (computed after its normal periodic return). We set the probability of failure at 0.25% per month.”

The researchers find that when they include the disaster model in their time series structure, the negative skewness and excess kurtosis of modeled hedge fund returns increased considerably. Both of these adverse statistical properties negatively impact recommended allocations to hedge funds under optimizations that take into consideration commonly expected risk and loss aversion levels of investors.

The specific parameters to use in models of hedge fund attrition will be a matter of considerable research. But the basic idea of a disaster model is very appealing to experienced hedge fund practitioners who have witnessed the dynamics of the business through financial crises during the past decade.

Conclusion

As the hedge fund business expands relative to traditional asset management, researchers are developing risk measures to take into consideration the nonstandard performance characteristics of hedge funds. This article gives three examples of proposals that have been published since this summer. Each proposal notes that conventional risk measures might understate the risk of hedge fund strategies.

Researchers are also grappling with how to extract useful risk information from brief and flawed historical data. This article discusses two proposals to address this difficulty. Although the proposals noted in the article are highly statistical in nature, they each require considerable professional judgment in application.
References


