Implicit Options in Hedge Fund Products

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This article continues in the spirit of the July 2002 *Learning Curve* column, "Returns-Based Analyses of Hedge Funds." The July column noted that there is a tremendous amount of interest in characterizing the unique exposures of hedge funds.

This column will discuss the option-like exposures of a number of hedge fund strategies based on a review of the current literature on the topic. Specifically, recent academic articles have argued that implicit options arise in hedge fund products due to the following factors:

- The tailoring of return-to-risk profiles to certain classes of investors, resulting in investments that have option-like payoff profiles;
- The provision of real options by hedge fund investors who take on illiquid investments, allowing other investors the flexibility to readily liquidate their investments.
- The incentives given to hedge fund managers in their management contracts, which provide managers with option-like payoff profiles in terms of how they are paid for their services.

This column will briefly cover the investor preferences, risk-transfer function, and manager incentives that lead to the optionality embedded in hedge fund products.

Investor Preferences

Arjen Siegmann and Andre Lucas of the Tinbergen Institute, Netherlands, argue that varying investor preferences result in different types of hedge fund products. They argue that the optimal behavior of a loss-averse investor depends on whether an investor is in a situation of surplus. For those in surplus, the optimal strategies have long option profiles (with particular strike prices.) For those who don't have a surplus, the optimal strategies are income-producing, short option-like payoffs (again with particular strike prices.)

Siegmann further notes that the optimal strategy also depends on the available options (or achievable dynamic strategies). This will determine whether the long call or the straddle pay-off is optimal in the case of a positive surplus. And similarly for negative surplus and the short put and short straddle pay-off.

Long Option Strategies

Anecdotally, the very wealthy clients of European fund-of-funds prefer strategies that have a lot of optionality, including the global macro strategy and Commodity Trading Advisors (CTA's). These European funds have at times gravitated to managers who are in the midst of large drawdowns, figuring that with such a large dispersion of results, there is an increased chance of a large upside.

It was the researchers, William Fung of the Center for Hedge Research and Education, London Business School, and David Hsieh of Duke University, who first linked the returns of both the CTA and Global Macro hedge fund styles to long option-like profiles.

As noted in the July column, Fung and Hsieh found high explanatory power in modeling the return profile of CTA's as equivalent to look-back straddles on currencies, commodities, and fixed income. In addition, by focusing on extreme events to detect non-linear correlations between hedge fund strategies and risk factors, the researchers found that the global macro style behaves like a straddle on the U.S. dollar. (A straddle is the combination of being long a call option and long a put option.)

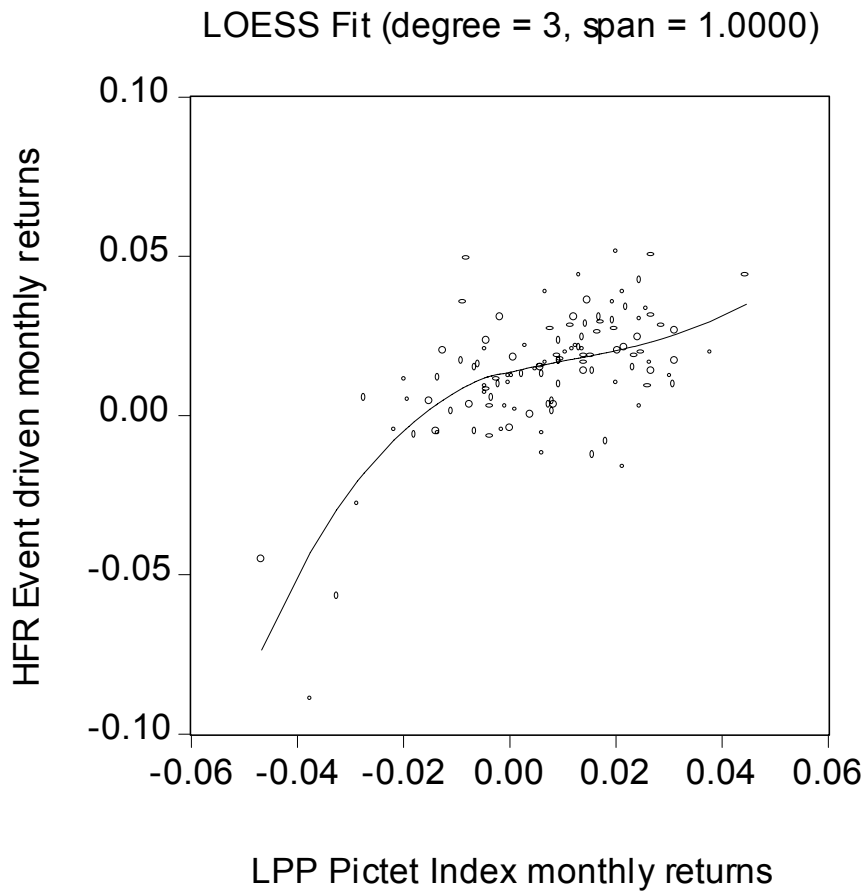
Short Option Strategies

If Siegmann and Lucas' model is correct, though, for everyone else, the appropriate hedge fund strategies are income-producing strategies, which are implicitly short options.

It appears that a number of fixed income and equity arbitrage strategies have payoffs that resemble those that can be obtained by writing put options on traditional assets.

For example as noted in the July column, Laurent Favre of UBS Switzerland and Jose-Antonio Galeano of Banque Cantonale Vandoise illustrate the non-linear relationship of a number of hedge fund styles to an equity-and-bond benchmark of interest to Swiss institutions, the LPP Pictet index. They use non-linear regression techniques to estimate the relationship between a hedge fund style and a portfolio of traditional assets. Figure 1 on the next page illustrates a best-fit relationship between the returns of the Event Driven hedge fund style and an equity-and-bond benchmark. This equity arbitrage strategy is equivalent to a long position in a traditional portfolio combined with short out-of-the-money puts.

Figure 1

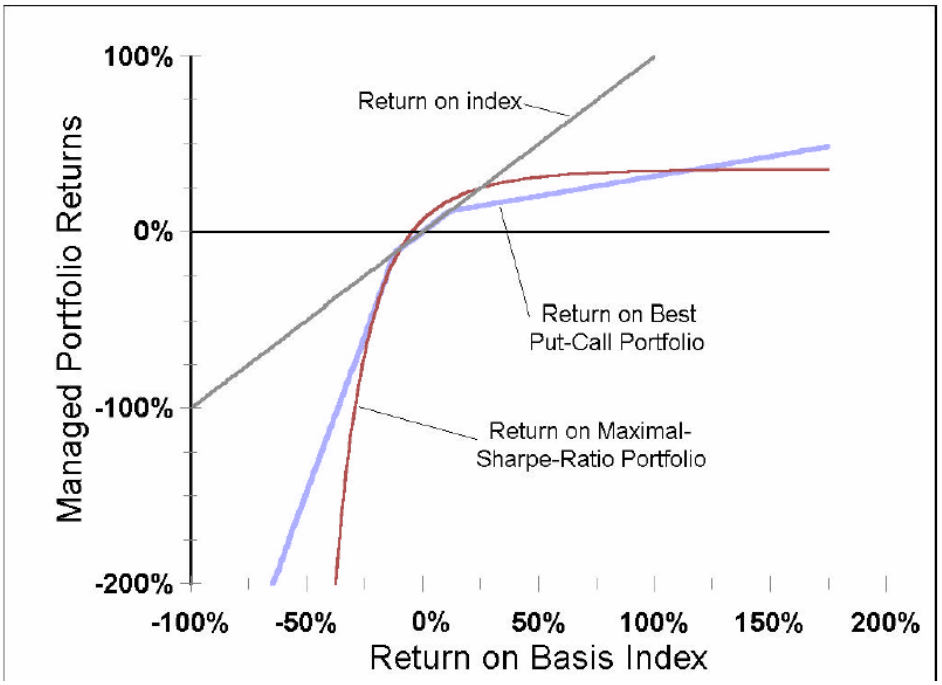


Source: Favre, Laurent and Jose-Antonio Galeano, "An Analysis of Hedge Fund Performance Using Loess Fit Regression, " Journal of Alternative Investments, Spring 2002.

Now when investors choose strategies that are implicitly short options, due care must be exercised in choosing appropriate performance metrics to evaluate these strategies.

Four Yale University professors have derived an optimal strategy for maximizing the Sharpe ratio, a common performance metric. The optimal strategy is one that can be very nearly achieved by selling certain ratios of fairly valued calls and puts against a core equity market holding, as illustrated in Figure 2 on the next page. One would instead prefer a performance metric that would not be so easily gamed.

Figure 2



Source: Goetzmann, William, Jonathan Ingersoll, Matthew Spiegel, and Ivo Welch, "Sharpening Sharpe Ratios," Yale School of Management, Working Paper, February 2002.

Risk-Transfer Function

The latest stream of thought by financial economists is that there are actually multiple sources of risk besides the market risk factor, which can produce high average returns. If an investor passively bears any of these risks, that investor will earn a return, which is not conditioned upon superior information. Frequently, there may be large losses from bearing one of these risk factors, resulting in a short-option-like return distribution, but the returns over time are sufficient to make the activity profitable. These returns are called "risk premia."

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.

For example, one could argue that a relative-value bond fund earns its returns by taking on the illiquid assets that international banks desire to lay off when in need of reducing risk. The fund hedges this risk by shorting liquid assets. A relative-value bond fund thereby provides a reinsurance function for financial institutions, but it also exposures the

fund to liquidity crises. As a result, an examination of empirical data shows that relative-value bond funds have short-option-like returns. An investor in such funds assumes the risk of systemic financial distress and provides other investors with the flexibility of being able to readily liquidate their investments. A relative-value bond fund is in essence providing real options to other investors.

Manager Incentives

Some researchers have noted that the incentive clause in hedge fund contracts gives managers a call-option-type structure. A manager collects a performance fee if their fund is profitable (or above a high-water mark) and is not monetarily penalized if the fund loses money.

In a recent working paper, Hari Krishnan of Morgan Stanley and Izzy Nelken of Super Computer Consulting extend previous work by noting that a manager's incentive clause is more like a convertible bond. As long as a hedge fund firm stays in business, the firm collects a management fee or a "coupon." If the firm does well, it collects an incentive fee, which is an ever increasing payment linearly related to the performance of the fund. If the fund does poorly, investors will liquidate the fund, resulting in a "default," in which manager loses all future "coupon" payments.

The researchers create this framework in order to solve for what the illiquidity premium an investor should receive from a hedge fund investment. Their hypothesis is that a hedge fund will alter its leverage level according to what would optimize the value of the manager's incentive contract, which, as discussed, can be modeled as a kind of convertible bond.

On the other hand, investors would prefer to rebalance their hedge fund investments according to the likelihood of a fund doing very poorly. Since investors cannot rebalance, they need to be paid a premium for lacking this flexibility. In their specific numerical example, an investor should apply a haircut of 10% to an illiquid investment's return in order to equate the investment with a liquid investment.

Conclusion

This article used an option framework to characterize the unique exposures of hedge fund strategies. Arguably, some hedge fund strategies create option-like return profiles that are a better match for the preferences of certain classes of investors than is the case with traditional assets.

Also, a number of hedge fund strategies may be providing superior returns because of their illiquidity or because the investor is being compensated for taking on the risk of rare, but large losses, each of which have short-option-like return profiles.