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Volatility Arbitrage Using Diversified Fund of Hedge Funds Portfolios

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Arbitrage: *the simultaneous buying and selling of the same negotiables or commodities in different markets in order to make an immediate riskless profit.*

Modern Portfolio Theory (MPT) suggests that increased investment returns are a function of increased risk, where risk is defined as volatility or, the annualized standard deviation of periodic (e.g., monthly) returns. Alpha is a measure of the excess return generated by an actively managed portfolio (the amount of value added or subtracted) after considering portfolio volatility and correlations. Generally, a large positive Alpha is a function of either great manager skill, poor benchmark selection or a combination of both.

The quest of most investors and their advisors is the capture of alpha – more return with less risk! Investors seek managers who consistently exhibit non-market correlated skill when executing their strategies. It is generally accepted that the performance of most traditional “long only” strategies are best explained by the “directional” movements, either up or down, of the broad market indices. This thesis is supported by the relatively high correlations exhibited between most long-only equity portfolios and traditional industry benchmarks such as the S&P 500 stock index. Most hedge fund strategies are “non-directional” because their performance is generally not explained exclusively by directional market movement. Instead, hedge fund managers attempt to exploit various market pricing or trading inefficiencies in an effort to produce consistent, non-market-correlated returns. As a result, most hedge fund strategies are considered “skill based,” and many have “absolute return” objectives, e.g., a consistent, positive return, irrespective of the performance of the major equity and/or fixed income markets.

Sophisticated investment managers, such as those found in the world of hedge funds, have developed

many strategies targeted towards achieving greater risk-adjusted returns than found in the traditional equity and fixed income markets. Many of these strategies, if successfully executed, will result in Alpha Transfer. In most cases, these strategies employ paired-trading techniques which involve the simultaneous purchase and sale (buy and sell) of two related, but different, securities. When viewed as one transaction, these offsetting positions should minimize directional market risk (systemic risk), while benefiting from the actual net performance spread or movements between the respective long and short positions. To be sure, Alpha Transfer is both an attractive and elusive

concept. If it was easy to achieve this objective all investors would experience greater returns with lower risk, which has clearly not been the experience of the majority of traditional investors.

Most arbitrage strategies which, by definition, are non-directional, are designed as Alpha Transfer (or alpha capture) vehicles. Because these simultaneous buy-long and sell-short transactions are designed to profit from either a perceived market inefficiency or market volatility, they should produce very high risk-adjusted returns (alpha) when compared against traditional market benchmarks. In contrast to most traditional,

long-only investment strategies, arbitrage strategies frequently boast high Sharpe Ratios – a popular measure of risk-adjusted returns.

“Market neutral” and “relative value” strategies, which are also forms of arbitrage, are also referred to as “absolute return” because there is a positive investment return objective, irrespective of market direction and performance. Absolute return arbitrage strategies include Convertible Bond Arbitrage, Merger Arbitrage, Capital Structure Arbitrage, Statistical Arbitrage, Equity Market Neutral fundamental and systematic trading, and, to some extent, long/short equity with low

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directional bias. Irrespective of the specific investments vehicles employed, the net objective is to create a return that is as close to “riskless” as possible, that is, to create “market neutral,” “non-directional” transactions that do not rely exclusively upon directional markets to generate positive returns. This is in direct contrast to traditional investment strategies that require consistent, long-term directional trends such as a rising stock market or, in the case of fixed income strategies, falling interest rates, to generate capital gains.

Volatility Arbitrage

One arbitrage strategy that has the net result of transferring alpha but that may not fit traditional, security-specific arbitrage definitions, is *Volatility Arbitrage*. We define Volatility Arbitrage as “the exchange of one asset for another of similar volatility wherein the investor captures a greater return for the same statistical risk”. For the exchange to be credible, the two assets must have (1) similar volatility (statistical risk) characteristics and, (2) different forecasted returns. Thus, from a practical perspective, the notion of Volatility Arbitrage exists when two assets with similar volatility characteristics offer different return potentials.

As an example of Volatility Arbitrage, we will consider Asset A, a short-term fixed income portfolio with an expected annual return (coupon) of 2.0% and a historic annualized standard deviation of 3.0%. Next, we identify an asset with similar volatility but with a higher forecasted annual return, 12.5% for example, which we call Asset B. Both assets are statistically expected to have similar volatility, yet they have very different expected returns. In its simplest iteration, the exchange of Asset A for Asset B reveals the concept of Volatility Arbitrage because the two assets have similar volatility characteristics but very different forecasted returns. The successful execution of this Arbitrage strategy also represents an excellent example of Alpha Transfer since we anticipate receiving the increased (excess) return of Asset B without any net increase in risk, where risk is measured as standard deviation and defined as volatility.

For purposes of this paper, Asset B is a well-diversified, multi-strategy, multi-manager hedge fund portfolio, generally referred to as a Fund of Hedge Funds (FoHF). Our hypothetical FoHF portfolio is designed to be non-directional. In this respect, the portfolio invests primarily in arbitrage strategies and/or a combination of strategies that historically have demonstrated very low or negative correlations. The result of this approach to portfolio construction should be an “absolute return” objective that exhibits very low and/or statistically insignificant correlations to traditional equity and fixed income market indices. The net-of-fees return objective of our model FoHF, which we consider realistic, is 1.05% per

expected return of the bond portfolio since shorter-term fixed income securities typically have lower coupon yields. The second option for increasing return would be to go down the credit curve and enter the High Yield bond market, which is what many investors have recently been doing. This decision might serve to increase current yield, but it will also introduce additional risks that are probably not fully revealed through MPT statistical analyses. Either way, this investor will either (1) reduce expected return with lower yielding, shorter maturity investments or, (2) introduce default and credit spread risk (which may result in greater volatility) with his increased commitment to the High Yield sector.

IRRESPECTIVE OF THE SPECIFIC INVESTMENTS VEHICLES EMPLOYED, THE NET OBJECTIVE IS TO CREATE A RETURN THAT IS AS CLOSE TO “RISKLESS” AS POSSIBLE, THAT IS, TO CREATE “MARKET NEUTRAL,” “NON-DIRECTIONAL” TRANSACTIONS THAT DO NOT RELY EXCLUSIVELY UPON DIRECTIONAL MARKETS TO GENERATE POSITIVE RETURNS

Asset B, the FoHF portfolio, offers a third alternative, introduces the concept of Volatility Arbitrage and should result in a successful Alpha Transfer. Asset B has the same annualized standard deviation (3.0%) as the short-term fixed income portfolio although it has the much greater forecasted annual return of 12.5%. Thus, by exchanging Asset A for Asset B, the investor is able to exchange the volatility of the bond portfolio for another asset with similar volatility and a higher, although uncertain, expected return. This exchange, what we refer to as the *arbitrage*, is an excellent example of Alpha Transfer. This exchange also supports portfolio construction

concepts of “Risk Budgeting” which we support but do not address in this article.

Further analysis of this Volatility Arbitrage transaction, assuming that the FoHF portfolio actually delivers the 12.5% per annum forecasted return, suggests that our investor will experience an Alpha Transfer (excess, risk-adjusted return) of 10.5% per annum; the 12.5% return of Asset B minus the 2.0% return of Asset A. Because Assets A and B have similar expected volatility, the 10.5% annual excess return of the FoHF portfolio is “pure alpha.”

For purposes of calculating the Alpha of the Volatility Arbitrage, we believe the returns of the FoHF portfolio should be regressed against the asset being replaced, in this case, the short-term fixed income portfolio. Although such a

month, with a very low annualized standard deviation, resulting in a Sharpe Ratio in excess of 2.0.

To understand the motive for Volatility Arbitrage, using a present-day economic scenario, we’ll consider an investor with a traditional fixed income portfolio, who is concerned with (1) the relatively low current yield on his bonds, and (2) the potential impact of rising interest rates on the value of the portfolio. What can this investor do to mitigate these concerns, especially if the issues are potentially long-term?

First, the investor can further shorten the duration of the bonds, thereby reducing the portfolio’s sensitivity to interest rate volatility. This will also have the effect, due to the slope of the yield curve, of further decreasing the



technique will not reveal the actual alpha of the FoHF, compared with other FoHFs with similar objectives, it will reveal the potential benefits of the arbitrage transaction being considered.

An additional benefit of the Volatility Arbitrage, when using FoHF portfolios, is the favorable shift of the efficient frontier with respect to a traditional, balanced portfolio (Figure 1), or a "risk/return" scattergram (Figure 2). The efficient frontier shown in Figure 1 shifts in a favorable manner because (1) the forecasted composite returns have increased, (2) the overall portfolio volatility has been reduced, and (3) the FoHF portfolio had little or no correlation with the other "traditional" assets in Frontier A.

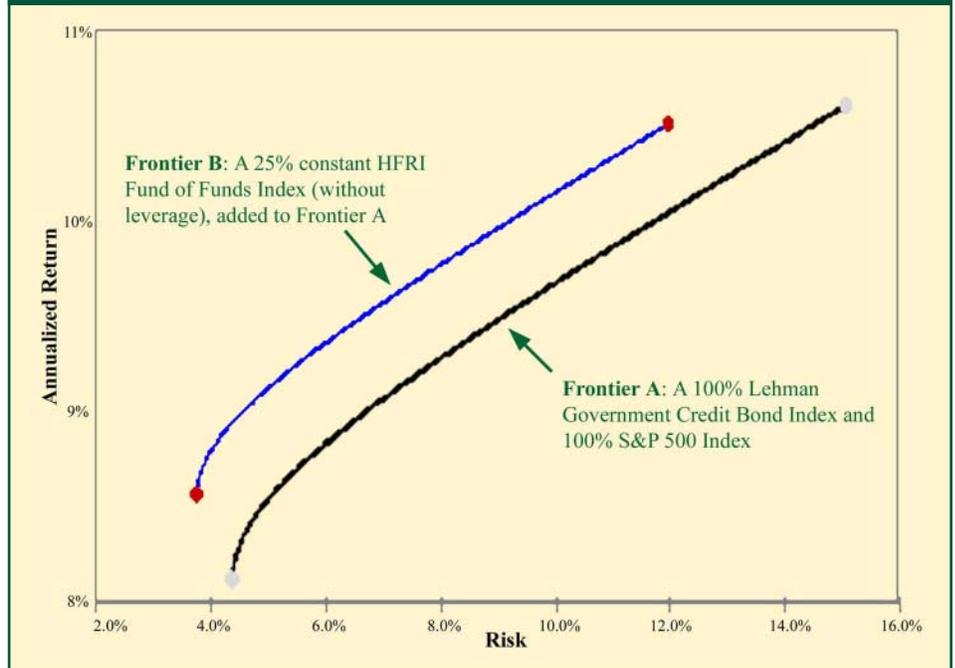
Figure 2, the risk/return scattergram, reveals the favorable risk/return characteristics of the diversified FoHF portfolio when compared against various traditional equity and fixed income indices.

Of course, the FoHF portfolio has a number of risks that are not reflected in MPT statistical analyses such as (1) a lack of daily pricing, (2) a lack of daily liquidity and (3) a potential lack of full position transparency. These factors, however, simply support the notion that a hedge fund investor should expect some amount of risk premium as further compensation for making this type of investment. These factors do not, however, reduce either the statistical or notional Alpha of the arbitrage. Unfortunately, however, the appropriate risk premium for these risk factors are not fully (mathematically) revealed through MPT because the additional risks of hedge fund investing are often more qualitative than quantitative. Thus, the appropriate risk premium is notional and, perhaps a bit arbitrary. Of course, many investment strategies such as high yield fixed income, private equity and real estate, also have risks that are not fully revealed through the statistical measures of MPT; which tends to support the notion that diversification is useful with many asset classes.

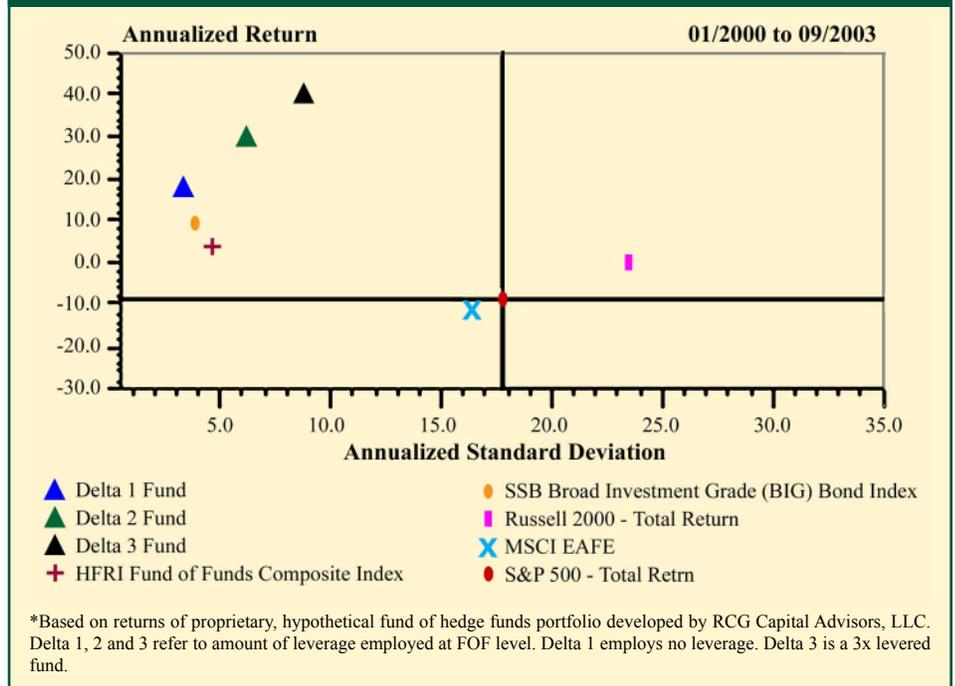
FoHF Portfolio Leverage

Taking the concept of Volatility Arbitrage to another level, let's consider an investor willing to assume more volatility than Asset A, the short-term fixed income portfolio described above. This investor, for example, is comfortable with the higher volatility of an

**Figure 1.
Efficient Frontier
14 Years Ending November 2003**



**Figure 2.
Risk-Return Scattergram***





intermediate-term fixed income portfolio (Asset C) but is also concerned with historically low current yields and the risk of rising interest rates. Assuming an annual return of 4.0% with standard deviation of 6.0%* for Asset C, Volatility Arbitrage occurs when Asset B, the diversified FoHF portfolio, is leveraged at a ratio of 2:1 (one unit of investor equity matched by one unit of borrowed capital – or a 50% margin). The 2x levered FoHF portfolio (Delta 2 in Figure 2) will have annual forecasted volatility of 6.0%, which is the same as Asset C.

Yet, after adjusting the expected return of the FoHF portfolio to net out the current 2.5% per annum cost of borrowing (margin), we have increased the forecasted annual return of the Delta 2 portfolio to 22.0% (12.5% for Asset B, the unleveraged portion, plus 10.0% net for the borrowed portion). The Alpha Transfer of this transaction would be 18.0% per annum – the 22% forecasted return minus the existing 4.0% of the intermediate-term fixed income portfolio.

To be sure, and as revealed in Figure 2, leveraging the FoHF portfolio amplifies both up and downside volatility. But the 6.0% standard deviation of the newly levered FoHF portfolio is no different than the existing volatility of Asset C, the intermediate-term fixed income portfolio, and we have greatly increased the forecasted return. In fact, as shown in Table 1, the expected volatility of the Delta 2 portfolio is almost identical to the standard deviation of the Lehman Government-Credit Bond Index.

Because we have accomplished this exchange without increasing the volatility of the existing intermediate-term bond portfolio, we have another example of Volatility Arbitrage and Alpha Transfer.

Further leveraging the FoHF portfolio to a ratio of 3:1 (Delta 3 – one unit of equity and two borrowed units) increases forecasted volatility to approximately 9.0% per annum, but the forecasted annual return is now in the range of 32.5%. This hypothetical portfolio, the Delta 3 portfolio in Figure 2, should have approximately one-half the volatility of the S&P 500 Stock Index with nearly three times the historical average return.

Even if the FoHF portfolio falls short of its return forecast, the Delta 3 FoHF portfolio is still a very attractive Volatility Arbitrage candi-

date because an investor benefits from (1) lower forecasted volatility than the equity asset being replaced, (2) significantly greater expected returns and (3) non-market correlated, absolute returns.

Returning to our earliest example, one obvious difference between the fixed income and FoHF portfolios is the “promise” of future principal repayment embedded in each fixed income investment. For investors valuing this type of promise, a well-diversified FoHF portfolio can be structured to provide a similar feature. Specifically, the FoHF can be structured to include a 100% Principal Protection contract – a guarantee issued by a major bank or insurance company that promises 100% repayment of initial investment principal, at some specific future time, if the FoHF portfolio fails to perform and actually loses money. The concept of Volatility Arbitrage is still intact when the Principal Protection option is employed, although the expected excess return (Alpha) will be reduced by the annual cost of the Principal Guarantee, typically between 1.0% and 1.5% per annum.

The notion of Volatility Arbitrage explored in this article assumes that the FoHF portfolio is actually able to deliver on its annual forecasted returns. To the extent that it fails to deliver the expected returns, the Alpha Transfer benefits clearly decline. Another risk of this type of arbitrage transaction is that the FoHF portfolio fails to produce even the modest 2.0% return of the short-term fixed income portfolio. Clearly, an investor must consider this risk (opportunity cost) when evaluating the potential benefits of the transaction since our hypothetical FoHF portfolio does not contemplate an annual return (coupon) guarantee. Nonetheless, a fixed income investor faced with today’s macro-economic uncertainty and the strong possibility of rising interest rates,

faces the potential of periodic principal and/or purchasing power erosion, even with a short or intermediate fixed income portfolio, making the FoHF Volatility Arbitrage an attractive strategy.

This article explores how an investor with concerns over the future performance of a fixed income or equity portfolio can mitigate those concerns while potentially increasing returns without adding (and possibly decreasing) volatility risk in his current portfolio. A well-diversified and unlevered Fund of Hedge Funds becomes an excellent Volatility Arbitrage tool for some portion of the current short-term fixed income portfolio, while the Delta 2 and Delta 3 levered FoHF portfolios (Figure 2 and Table 1), can be excellent arbitrage candidates for intermediate-term fixed income and equity portfolios. We believe diversified hedge fund portfolios, emphasizing absolute return strategies, offer very attractive portfolio modeling opportunities and that features such as Principal Protection and Portfolio Leverage, which at times can be combined, only serve to broaden the range of possibilities. ■

Note

*The standard deviation of a leveraged portfolio does not actually increase in a linear manner and is actually less than a direct multiple of the non-levered portfolio.

About the Author

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**Table 1.
Hypothetical FoHF Performance History***

| | <u>3-Year Net Returns Annualized</u> | <u>3-Year Volatility Annualized</u> |
|---------------------------------------|--------------------------------------|-------------------------------------|
| Absolute Return Fund | 14.20% | 2.96% |
| 2x Intermediate Volatility | 23.05% | 5.50% |
| 3x Capital Growth | 31.94% | 7.85% |
| HFR Fund of Funds Index | 4.87% | 2.87% |
| S&P 500 | 5.52% | 18.05% |
| Lehman Government - Credit Bond Index | 8.39% | 5.32% |

*Based on returns of a proprietary, hypothetical fund of hedge funds portfolio developed by RCG Capital Advisors, LLC.