

## HEDGE FUND PORTFOLIO STRATEGY

# WHY A DYNAMICALLY STRUCTURED STRATEGY METHODOLOGY IS NEEDED

Because hedge funds do not fit easily into traditional asset allocations, extra attention must be paid to creating a strategy that can make the best use of their valuable characteristics

Asset allocation approaches in the alternatives sphere frequently lack systematic investment methodology. In general, a rigorous method of allocating capital among the various hedge fund strategies has yet to become commonplace. The result is that while there is a general understanding of the value of hedge funds as diversifiers of traditional portfolios and as absolute return generators, very little has been done to extract greater value at the portfolio level.

This lack of development, while seemingly at odds with the sophisticated nature of the underlying strategies, is not surprising. It can be attributed to a variety of structural and secular factors.

### »» NON-TRADITIONAL

Hedge fund strategy data and returns display a variety of characteristics that are different from traditional markets. This means they do not lend themselves to easy incorporation into traditional asset allocation frameworks. Of particular note:

- Hedge fund performance data may exhibit valuation biases, which result in an overly smooth return series. This leads to an underestimation of the volatility both of individual strategies and managers, with obvious and severe consequences for asset allocation. In particular, hedge fund strategy indices that appear highly attractive

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when only reported returns and unadjusted volatility are considered become much less so when they are accounted for correctly.

- The correlations between hedge fund strategies change over time and typically exhibit more instability than those of traditional asset classes. A portfolio construction methodology that relies on the stability of inter-strategy correlation to provide diversification may therefore become less robust over long time periods.

- The distribution of returns for most hedge fund strategies displays significant abnormality and, in particular, demonstrates larger negative returns (skew) than those associated with traditional asset classes. Asset allocation approaches focus on optimising returns with respect to volatility and ignore this “skew” risk, which has consequences for the risk profile of the portfolio.

### »» CAPITAL INFLOWS

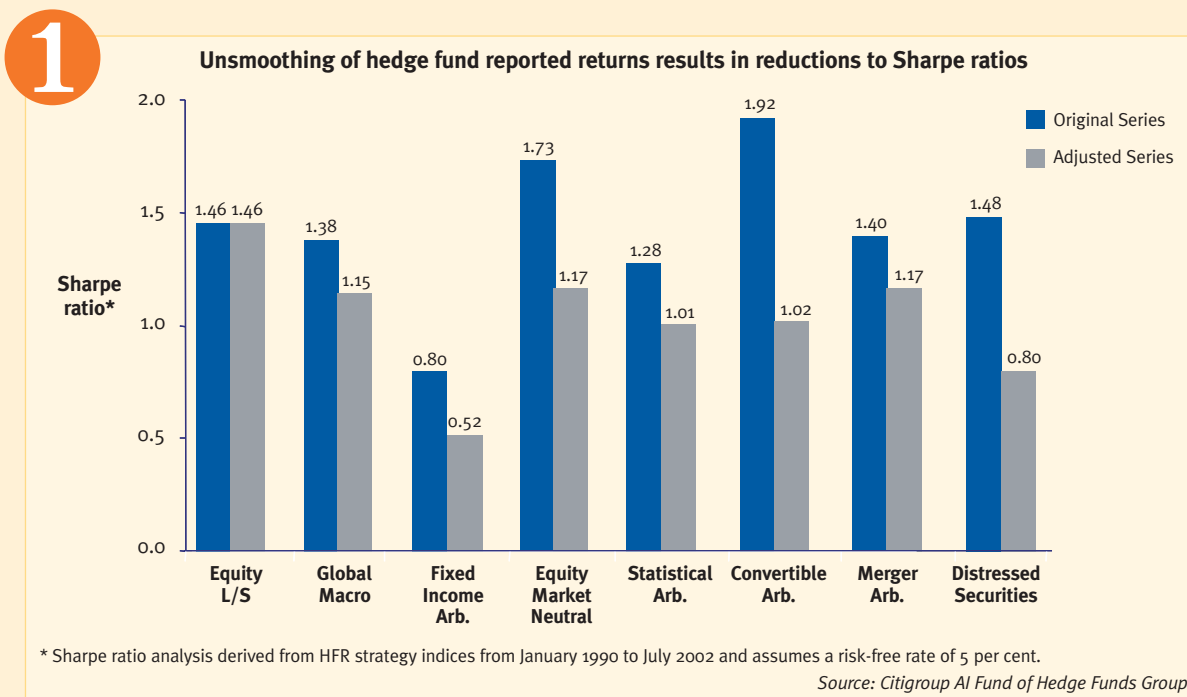
The hedge fund marketplace has recently experienced significant capital inflows that have done little to enforce a large degree of product differentiation or discipline. This, combined with the conventional wisdom that manager selection is the primary driver of returns at the portfolio level, has caused scarce attention to be paid to strategy return characteristics – to the detriment of the portfolio construction process.

A further effect of capital acceleration has been a proliferation of the manager base, with subsequent quality and seasoning concerns. There is now more potential for an ongoing series of capacity crises as capital flow into individual strategies dilutes returns. Not all investors appreciate the magnitude of this shift, but failing to account for its effects within the strategy allocation process is, at best, detrimental to returns and, at worst, can lead to exposure to systemic market failure.

It is worth considering these structural factors systematically, to develop a sophisticated quantitative approach to determine initial allocations. This enables a forward-looking dynamic tactical allocation, taking into account both individual strategy capacity biases as well as changing global macroeconomic and market conditions.

An ideal approach is a three-step process that accounts for each of the structural issues:

- **Data Unsmoothing:** An objective manifestation of the valuation biases mentioned above is in a phenomenon



called “serial correlation”, or the artificially induced correlation of month over month returns as volatility is damped. Serial correlation in this context is associated with illiquidity and the often esoteric nature of many securities in which hedge funds trade, ie, they cannot be “marked to market” on a regular basis. By comparison, hedge fund strategies that trade highly liquid securities, listed on well-regulated exchanges, demonstrate the least serial correlation. The results of serial correlation are reported performance that, for certain strategies, may be artificially consistent over time. This suggests a less volatile return stream than was actually the case.

Citigroup Alternative Investments (Citigroup AI) recommends allowing for serial correlation with a process we call “unsmoothing”. Unsmoothing identifies the degree of serial correlation and then removes it from the return data. This often results in upward adjustments to hedge fund return volatility, thus reducing the Sharpe ratios of hedge fund managers. (See Graph 1.)

● **Strategy Clustering:** Portfolio diversification assumes a certain set of reasonably stable correlation characteristics among the portfolio’s strategy allocations. Instability among these characteristics may ultimately undermine the diversification benefits of allocating to a portfolio of hedge funds.

To correct this phenomenon, a statistical technique called cluster analysis can be used to define logical groups of strategies with comparatively well defined but

differentiated risk, return and correlation characteristics. Intuitively, cluster analysis attempts to group data to minimise variations between strategies in a group, while maximising variations between groups. There are four well-defined clusters of strategies, which Citigroup AI terms rational strategy groups (RSGs).

The RSGs demonstrate generally low correlations to each other, with the added benefit that these correlations are more “robust” – that is, they demonstrate more stable risk and return characteristics over time – than are the correlations among the individual strategies. (See Table 2.)

The stability of the relationship among these RSGs – in contrast to the instability of the correlations among the strategies themselves – allows the RSGs to be treated as “asset classes” in an allocation scheme. This will facilitate the structuring of well-diversified portfolios of hedge funds, in the same manner as traditional portfolio managers do with stocks and bonds.

● **Return Drawdown Optimisation:** As previously discussed, the traditional optimisation processes typically use a measure of volatility as the operative risk variable. Many managers of hedge fund portfolios do so as well, arguing that as the control of volatility is of primary concern for portfolios of stocks, bonds and cash equivalents, so it should be for hedge fund portfolios.

However, employing volatility as the primary risk variable in hedge fund portfolio optimisation is

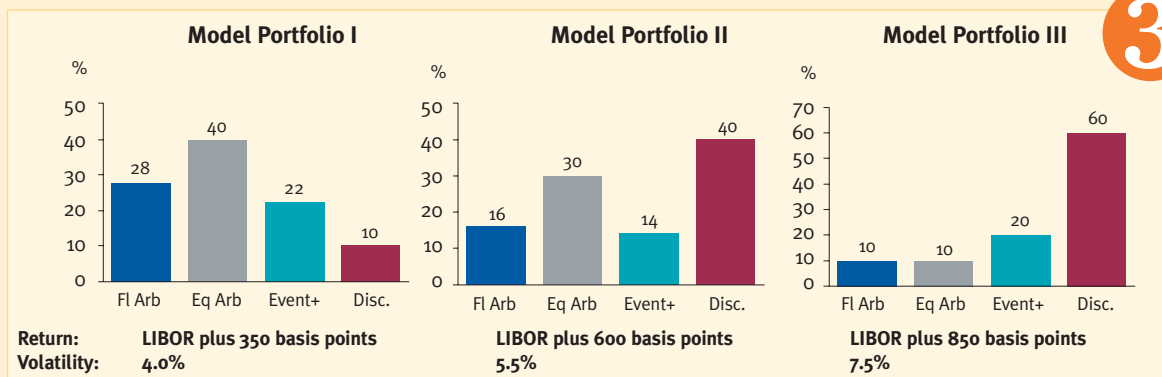
**Correlations of RSGs (January 1990 to July 2002)**

	Event Driven +	Fixed Income Arb.	Equity Arb.	Discretionary
Event Driven Plus	1.00	0.13	0.24	0.63
Fixed Income Arb.		1.00	0.10	0.07
Equity Arb.			1.00	0.36
Discretionary				1.00

Correlation matrix was derived from HFR indices using unsmoothed data

Source: Citigroup AI Fund of Hedge Funds Group

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problematic, because hedge funds possess their own unique set of investment criteria. Volatility is therefore only one of several variables for risk measurement that need to be accounted for in hedge fund portfolios.

portfolio of RSGs with respect to acute drawdowns. The result is a theoretically efficient frontier from which a variety of model portfolios can be extracted. (See Chart 3.)

## MANAGING LOSSES

The primary risk that needs to be minimised in hedge fund portfolios is that of an acute drawdown. In addition to drawdowns having critical effects on the ability to conserve capital, managing this type of loss is critical due to the use of leverage within the asset class. In addition to amplifying returns, leverage introduces the element of counterparty risk into the equation. In times of market crises, or following a significant manager loss in a short period of time, providers of leverage may decide to withdraw it. Doing so may force the hedge fund manager to liquidate assets in order to meet both his counterparty obligations as well as any ensuing redemption requests by clients.

The mark to market effects of such liquidations typically are negative and lead to further redemptions and credit withdrawals. The “critical liquidation cycle” that may result is generally detrimental to fund survival and greatly to be avoided.

To account for this in the strategy allocation process, hedge fund portfolios can be optimised using a variable that measures the probability of an acute drawdown in lieu of standard deviation as a measure of volatility. The results of this process lead to strategy allocations that are different from more traditional allocation schemes and make it clear that conventional optimisation may underestimate the true risk in a portfolio of hedge fund strategies.

To construct portfolios, an efficient frontier can be created by optimising long-term forecast returns of the

## REBALANCING

As with traditional asset management, hedge fund portfolio optimisation that relies only on return data and that is therefore backward looking is inherently flawed. In particular, strategy allocation would not only fail to account for prevailing market and macroeconomic conditions, but would also ignore the increasingly critical issue of strategy capacity limits.

This issue can be addressed by first developing model portfolios around the RSGs, each with its own distinct performance characteristics. A tactical view of global markets and the current opportunity sets for individual strategies can then be overlaid in order to assess actual strategy weightings for client portfolios. As markets, capacity and opportunity sets change, these allocations are reexamined and rebalanced. The result, in theory, is a portfolio that better takes into account true risk and return rather than one based purely on a forward-looking approach.

A dynamically structured strategy methodology is essential to constructing portfolios of hedge funds. Furthermore, the ability to identify manager alpha consistent with the overall portfolio philosophy is essential. Complementary to this is the ability to conduct sophisticated proactive risk management and thorough ongoing due diligence. This combination, together with the appropriate resources and technology, aids in our efforts to generate consistent quality returns over time.

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## CORPORATE STATEMENT

Citigroup Alternative Investments has been managing hedge fund portfolios since 1991 with \$2.7bn in assets under management, as of May 2003. The firm offers a full range of multi-manager fund of hedge fund portfolios that span the risk/return spectrum, offering tailored strategies to fit the investment objectives of institutions and high net worth individuals around the world.



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