

On the Role of Hedge Funds in Institutional Portfolios: Comprehensive Version

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Hilary Till

Research Associate, EDHEC-Risk Institute and
Principal, Premia Risk Consultancy, Inc.

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I. The Hedge Fund Industry and Institutional Fund Management Arise from Different Intellectual Traditions

This article builds off the summary of research provided by Edwards and Gaon [2003]. The authors describe:

... the structure and operation of the hedge fund industry, the various investment strategies pursued by hedge funds, [and] what we know about the returns and overall performance of hedge funds ..."

The authors conclude that while there is some evidence that hedge funds may be able to generate excess returns, this conclusion needs to be confirmed with more refined techniques for evaluating hedge fund performance and with better data.

It would appear then that any conclusions on hedge funds are still uncomfortably tentative. With that caveat in mind, we will review both academic and practitioner research from the standpoint of a hypothetical institutional investor who is looking into whether hedge funds make sense for their portfolio.

Discomfort with MPT

After the dramatic losses in the equity markets during the past three years, there has been a struggle to understand how hedge funds, with their promise of absolute returns, might fit into institutional portfolios. The idea with "absolute return strategies" is that an investment manager will explicitly manage downside risk rather than solely manage risk relative to a benchmark. In "relative return strategies," for example, it is acceptable for a manager to lose say -20% as long as this return is broadly consistent with the manager's benchmark returns. Figure 1 emphasises one motivation for the recent institutional interest in investigating hedge fund investment vehicles. The performance shown in this figure has led to a bit of a reconsideration of "relative return strategies."

(One should emphasise, though, that the institutional interest is currently in *investigating* hedge fund vehicles rather than *actually investing* in them. Currently only 1.2% of global high net worth and institutional assets are invested in hedge funds, according to Putnam Lovell NBF and NewRiver [2002].)

Figure 1 : S&P 500 Returns from March 2000 to March 2003



Data Source: Bloomberg

As in late 1987 when there was doubt about the Efficient Market Hypothesis, the scale of the recent equity bubble and the magnitude of the subsequent losses have created "a sort-of crisis" in belief in the Modern Portfolio Theory (MPT), according to Siegel [2003]. In one paragraph, Siegel reviews the history of portfolio theory:

We regard the original or pre-MPT investment paradigm as one that requires the investor to *justify each investment on its own merits*. This view was largely replaced, between about 1964 and 1980, by the body of knowledge loosely known as Modern Portfolio Theory, which relies on capitalisation-weighted benchmarks as both the starting point for building actively managed portfolios and as the reference asset for measuring the performance and risk of portfolios.

Siegel notes that one current concern is that the widespread belief in MPT and capitalisation-weighted benchmarks might have actually led to the creation of the equity bubble.

A Brief Review of Institutional Decision-Making

The current framework for institutional decision-making is one where:

... plan sponsors are in charge of the asset and style allocations of their portfolios [while] the [investment] manager's job is to beat the benchmark, not to serve as a surrogate plan sponsor.

This prevailing institutional framework clashes with a view of fund management whereby a manager should balance investment opportunities with *total* risk, as advocated by Ineichen [2003a]. With such a mandate, in Siegel's words, the fund manager would indeed become a "surrogate plan sponsor."

Studies such as Brinson et al [1986] have shown that U.S. pension plans have historically chosen to emphasise the asset allocation decision over other types of investment choices. The Brinson studies referred to the asset allocation decision as the choice of an "investment policy portfolio." The other activities that make up the investment management process are market-timing and security selection. Figure 2 summarises the results from their 1986 study on the determinants of institutional portfolio performance.

Figure 2: Percentage of Total Return Variation Explained by Investment Activity Average of 91 Plans, 1973-1985

	<u>Average</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Standard Deviation</u>
Policy	93.6%	75.5%	98.6%	4.4%
Policy and Timing	95.3%	78.7%	98.7%	2.9%
Policy and Selection	97.8%	80.6%	99.8%	3.1%

Excerpt from Brinson, Gary, L. Randolph Hood, and Gilbert Beebower, "Determinants of Portfolio Performance," Financial Analysts Journal, July/August 1986, Table VII.

Ibbotson and Kaplan [2000] summarise the Brinson results as follows:

... more than 90% of the variability in a typical plan sponsor's performance over time is the result of asset allocation policy.

The emphasis on the asset allocation decision has been backed by the lack of evidence that professional managers can beat passive indices. Bodie et al. [1993] write that:

the amounts by which professional managers as a group beat or are beaten by the market fall within the margin of statistical uncertainty.

Further, what persistence there is in mutual fund returns cannot be attributed to stock-picking skill. Carhart [1997] finds that the persistence in mutual fund performance is due primarily to:

common [underlying] factors in stock returns and persistent differences in mutual fund expenses and transaction costs

Given the empirical evidence thus far, it is no wonder that institutions have focused on creating long-run policy portfolios and then have allowed individual managers limited discretion around investment benchmarks.

Again quoting from Siegel:

... market exposures are inherently rewarded. No one would invest in risky markets if they did not offer a risk premium, in expectation, over riskless assets. In contrast, active exposures are not inherently rewarded. No one should expect active decisions to produce superior returns just because they're active. Active management is a zero-sum game: the returns (before costs) of all active managers in an asset class must sum to the asset-class return, whether the market for securities in that asset class is "efficient" or not.

A Brief Review of the Different Assumptions Underlying Hedge Fund Investments

One might argue that the conceptual framework for hedge funds and fund-of-funds is at least partly based on pre-MPT principles, including:

- Every investment on its own merits, and
- A casualness about diversification.

Confirming the first point, Ineichen [2003a] argues the case for long-short equity sector funds as follows:

Investors are not indifferent [to] whether an active manager simply captures the premium of the asset class or whether he or she tilts the return distribution of the portfolio to the right.

Confirming the second point, Lhabitant and Learned [2002] quote a survey of Swiss hedge fund investors and fund of hedge fund managers:

It appears that most participants do not use a quantitative approach for their asset-allocation strategy. Many respondents even admitted to having no asset-allocation strategy at all!

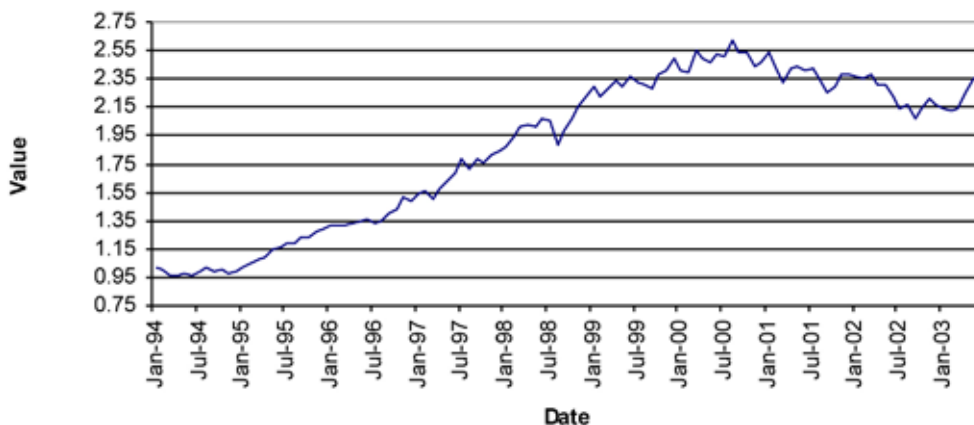
With each *individual hedge fund*, the core idea is that total risk is managed by neutralising systematic risk through shorting or hedging while in institutional management, total risk is managed at the *plan level* through the diversification provided by balanced portfolios of uncorrelated assets.

While Figure 1 focuses attention on the need for an absolute-return perspective, Figure 3 brings one's attention back to the usefulness of diversification. Figure 3 illustrates the overall growth and preservation of capital over the past decade from investing in a policy portfolio that is 60% in the S&P500 and 40% in the Lehman Government/Credit Bond Index.

Illustrating investment points with historical charts has its limits: in order to see what is coming ahead, one should not be looking in the rear-view mirror. But Figures 1 and 3 should put in perspective some of the debates on traditional versus alternative investment management. We will return to considering the balanced portfolio as a benchmark for investment performance at the end of the second section of this article.

Figure 3: Balanced Portfolio Returns from January 1994 to June 2003

Value of \$1 Invested 60% in the S&P Total Return Index and 40% in the Lehman Government/Credit Bond Index and Rebalanced Yearly



Data Source: Bloomberg

This brief introduction has been meant to illustrate that hedge funds do not easily fit into the current way institutions go about investing. We believe that much of the recent research on hedge funds has been driven by the following concerns:

1. Understanding hedge funds using the tools that are well-established in institutional investment management;
2. Noting how hedge funds themselves should change in order to be appealing to institutional investors; and
3. Creating more flexible ways of analysing portfolios that would incorporate the unique features of hedge funds along with traditional investments in a holistic fashion.

II. Competing Conceptual Frameworks for Incorporating Hedge Funds into Institutional Portfolios

Surveying the extensive hedge fund literature, it appears that there are six competing conceptual frameworks for considering how hedge funds should be incorporated into institutional portfolios. These frameworks are summarised in Figures 4 and 5. We will review each of these frameworks along with the research that supports their use.

Figure 4: Six Possible Conceptual Frameworks for Hedge Funds, Part I

<u>HOW HEDGE FUNDS SHOULD BE CHARACTERISED</u>	<u>POTENTIAL IMPLICATIONS FOR MANAGER SELECTION</u>	<u>IMPLICATIONS FOR INSTITUTIONAL ASSET ALLOCATION</u>
1. Equity Proxies	Want managers who capture the premium of asset class but also curtail downside risk	Replace traditional equity managers with hedge fund managers.
2. Unconventional Betas/Non-Standard Performance Characteristics	Could decide to only use style-pure managers once factor exposures are defined; Use investable style tracker funds instead of managers; and/or Be careful to not pay high "alpha" fees for what is actually a type of "beta."	Include unconventional betas in plan's long-term asset allocation modeling. Opens up possibility for tactical style selection. Decide which hedge fund styles are appropriate, given an institution's level of risk and loss aversion.
3. Alpha Generators/Exploiting Inefficiencies	Emphasis on managers whose performance cannot be linked to major risk factors Manager selection is a bottom-up exercise.	Expectation is that return patterns will be unrelated to asset classes in the core portfolio. Cannot use hedge fund style and index data in asset allocation modeling. For every investor that benefits from exploiting an inefficiency, there must be an investor supplying the inefficiency: Strategies are therefore inherently capacity constrained.
4. Traditional Factor Exposures with Additional Returns from Market Segmentation and Liquidity Premia	Manager selection would be part of a top-down approach.	A holistic framework in which all investments are represented in terms of a common set of factors
5. Total Return Provision Through a Fund-of-Funds	Emphasis on fund-of-funds or multi-strategy managers "Style Drift" is acceptable on the part of both managers and the fund-of-funds. Within a fund-of-funds portfolio, rebalancing is not a viable option.	Diversify idiosyncratic operational risk of individual hedge funds. Additional advantage in modeling is as follows: of the hedge fund data that is available, fund-of-fund data have the least biases. Optimal fund-of-fund construction is a responsibility of the fund-of-fund manager, not the plan sponsor.
6. Unstable Factor Exposures	Hedge Funds can't be integrated into an institutional framework.	Don't use hedge funds

Figure 5: Six Possible Conceptual Frameworks for Hedge Funds, Part II

<u>HOW HEDGE FUNDS SHOULD BE CHARACTERISED</u>	<u>BENCHMARK</u>
1. Equity Proxies	Want correlation with S&P but with truncated downside. Equity mutual funds
2. Unconventional Betas/Non-Standard Performance Characteristics	Benchmark is either a linear function of basic factor exposures, or asset-based style factors, or hedge fund styles.
3. Alpha Generators/Exploiting Inefficiencies	A total-return benchmark
4. Traditional Factor Exposures with Additional Returns from Market Segmentation and Liquidity Premia	Derived from the factors assumed to drive each hedge fund strategy's returns.
5. Total Return Provision Through a Fund-of-Funds	Balanced 60/40 Portfolio: But note that this bogey has been difficult to outperform.
6. Unstable Factor Exposures	Not applicable

A. Equity Proxies

One possible role for hedge funds is for them to become substitutes for an institution's equity allocation. The goal would be to benefit from the risk premium of the equity markets but with truncated downside risk.

Example: Equity Long/Short Hedge Funds

Ineichen [2003a] notes that long-short equity sector hedge funds have opportunity sets that are correlated to their respective sectors, resulting in the active sector funds having returns that are correlated to their sector indices. Even so, these hedge funds control their downside risk so that their returns compound at a higher rate than their sector indices.

Two illustrations of this point are shown in Figures 6 and 7. Each figure shows that the recovery-to-peak investment levels are considerably briefer with an active sector hedge fund compared to its corresponding sector index.

Figure 6: Comparison of Wealth Creation in Biotechnology

	AMEX Biotechnology – Pharmaceuticals	HFRI Healthcare/ Biotechnology
Initial Investment	100	100
Dec-97	113	101
Dec-98	122	108
Dec-99	274	159
Dec-00	442	240
Dec-01	420	246
Jul-02	252	194
Return 97-99	174%	59%
Return 00-02	-8%	22%
Under water	-43%	-21%
Loss recovery return*	75%	27%
Recovery at 8% pa	Nov-09	Sep-05

* Return required to recover losses

Author's Data Source: Hedge Fund Research, Datastream.

Source: Ineichen, Alexander, "Asymmetric Returns and Sector Specialists," *Journal of Alternative Investments*, Spring 2003, Table 5.

Figure 7: Comparison of Wealth Creation in Financials

	NYSE Financials	HFRI Financials
Initial Investment	100	100
Dec-97	141	149
Dec-98	148	131
Dec-99	147	129
Dec-00	184	176
Dec-01	169	207
Jul-02	151	209
Return 97-99	47%	29%
Return 00-02	3%	63%
Under water	-18%	0%
Loss recovery return*	22%	0%
Recovery at 8% pa	Feb-05	Index at Peak Level

* Return required to recover losses.

Author's Data Source: Hedge Fund Research, Datastream.

Source: Ineichen, Alexander, "Asymmetric Returns and Sector Specialists," *Journal of Alternative Investments*, Spring 2003, Table 7.

Example: Global Macro

Fung and Hsieh [1999] examine a global macro fund versus five equity-market environments. They find that this fund is positively correlated with stocks.

However, it underperforms equities in up markets and outperforms equities in down markets, behaving as if it owned collars (short calls and long puts) on U.S. equities.

After reviewing Figure 1 once again, one may consider such an investment strategy as attractive for loss-averse investors.

Benchmarks: Equity Mutual Funds and Equity Indices

Before an institution decides to allocate its equity risk to hedge funds, one might consider examining the relative performance of equity hedge funds compared to equity mutual funds. Ackermann et al. [1999] examine the performance of hedge funds and mutual funds in the eight-year period up to December 31, 1995. They find when comparing mean and median Sharpe ratios that:

The hedge fund advantage is fairly pervasive across categories

Figure 8 draws from Ackermann et al.'s research in comparing mean and median Sharpe ratios for comparably classified hedge funds and mutual funds.

Figure 8: U.S. Stock - Hedge Fund Versus Mutual Fund Sharpe Ratio Comparison

Four-Year Period Up to December 1995			
Hedge Fund Sharpe Ratios		Mutual Fund Sharpe Ratios	
<u>Mean</u>	<u>Median</u>	<u>Mean</u>	<u>Median</u>
0.323	0.322	0.244	0.250

Source: Excerpt from Ackermann, Carl, McEnally, Richard, and David Ravenscraft, "The Performance of Hedge Funds: Risk, Return, and Incentives, *Journal of Finance*, June 1999, Table VI.

Ineichen [2003b] compares the returns of hedge fund indices to equity indices and to average mutual fund performance. He emphasises the downside risk protection provided by hedge funds in Figure 9.

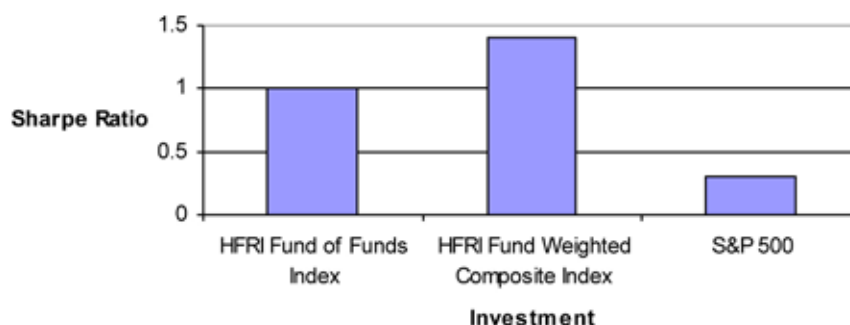
Figure 9: Hedge Fund Returns Compared with Mutual Fund and Index Returns (1988-2011)

	MSCI World Total Return Index	S&P 500 Total Return Index	Morningstar Average Equity Mutual Fund	Van Global Hedge Fund	HFRI Fund Weighted Composite Index	CSFB/ Tremont Hedge Fund Index
Average	10.0	15.5	12.1	17.5	16.4	12.2
Median	16.7	18.8	16.0	17.6	18.9	13.3
High	25.3	37.6	31.9	39.5	32.2	25.9
Low	-16.5	-11.9	-12.5	0.4	2.6	-4.4

Author's Data Source: Van Money Manager Research, Hedge Fund Research, CSFB/Tremont, Datastream.
Source: Excerpt from Ineichen, Alexander, *Absolute Returns*, Wiley Finance (New Jersey), 2003, Table 3.1.

And finally, Figure 10 illustrates the historical outperformance of hedge fund investments against the equity market on a risk-adjusted basis.

Figure 10: Hedge Fund Index ans S&P 500 Sharpe Ratios (1/90 to 11/02)



Authors' Data Source: HFR
Source: Excerpt from Edwards, Franklin and Stav Gaon, "Hedge Funds: What Do We Know?", Forthcoming *Journal of Applied Corporate Finance* (2003), Table 3.

B. Unconventional Betas/Non-Standard Performance Characteristics, or the Search for Beta

The appendix in Edwards and Gaon's article provides twenty-six hedge fund strategy classifications, which hedge fund managers can use to describe themselves. In the academic literature, there is discomfort with relying on manager self-descriptions to characterise their investment styles. One would prefer classification techniques that are derived from objective, statistical methods. There are four reasons for this preference:

1. Will a manager choose a style according to what makes their fund look the most attractive relative to peers? One would prefer to have an objective way of categorising a manager.
2. With the perceived heterogeneity in hedge fund strategies, there is a proliferation of indices. For example, the MSCI database now contains over 140 hedge fund indices. Does one really need that many indices to describe the hedge fund universe? In making quantitative asset allocation decisions, one would need to be able to forecast the returns and covariances of a large number of strategies to properly decide how to allocate amongst hedge funds. One would prefer to be able to describe each hedge fund strategy in terms of a handful of underlying factors, for which one could conceivably make forecasts.
3. The historical data on hedge funds are uncomfortably brief. If an investor could link a hedge fund's returns to underlying market-related factors, then one could consider using the factors' longer history of returns to evaluate the specific hedge fund, especially its risk.
4. Hedge fund database providers sometimes report divergent results for the same hedge fund category.

As a result of this discomfort with current practice, there have been a number of creative articles attempting to extend the Sharpe-style returns-based analysis to hedge funds. In Sharpe [1992], the author discusses how to model mutual fund portfolios as a mix of a limited set of investment styles, and this methodology is widely used by mutual funds and their investors. In a Sharpe style analysis, for example, an equity "growth fund" could be 70% large growth, 25% large value, and 5% small growth. Fung and Hsieh [1997] note that:

The elegance of Sharpe's intuition was demonstrated empirically by showing that only a limited number of major asset classes was required to successfully replicate the performance of an extensive universe of U.S. mutual funds.

There is not yet a consensus on how to apply the style factor approach to hedge funds. Four possible approaches to consider in coming up with a limited number of factors to explain hedge fund performance are as follows:

1. Create multi-factor models, which include such terms as changes in credit premia and changes in equity option implied volatility as well as asset-based style factors;
2. Use only asset-based style factors;
3. Extract a small set of statistical styles from manager data; and
4. Use the returns on existing hedge fund style indices themselves as the factors.

Multi-Factor Models

Schneeweis et al. [2001] describe using nine financial and macroeconomic factors to explain hedge fund performance. They write that:

... exposures to these factors can explain close to 60% of cross-sectional differences in average rates of return on different strategies.

The authors' nine explanatory factors are as follows:

- Slope of the yield curve;
- Long-term yield;
- T-Bill rate;
- Credit risk premium;
- Intra-month standard deviation of S&P 500 index;
- S&P 500 total return;
- Small capitalisation equity return;
- Equity implied volatility; and
- Intra-month volatility of bond returns.

The authors conclude that:

Forecasts of [these market] ... variables can be used to make allocations across hedge fund strategies.

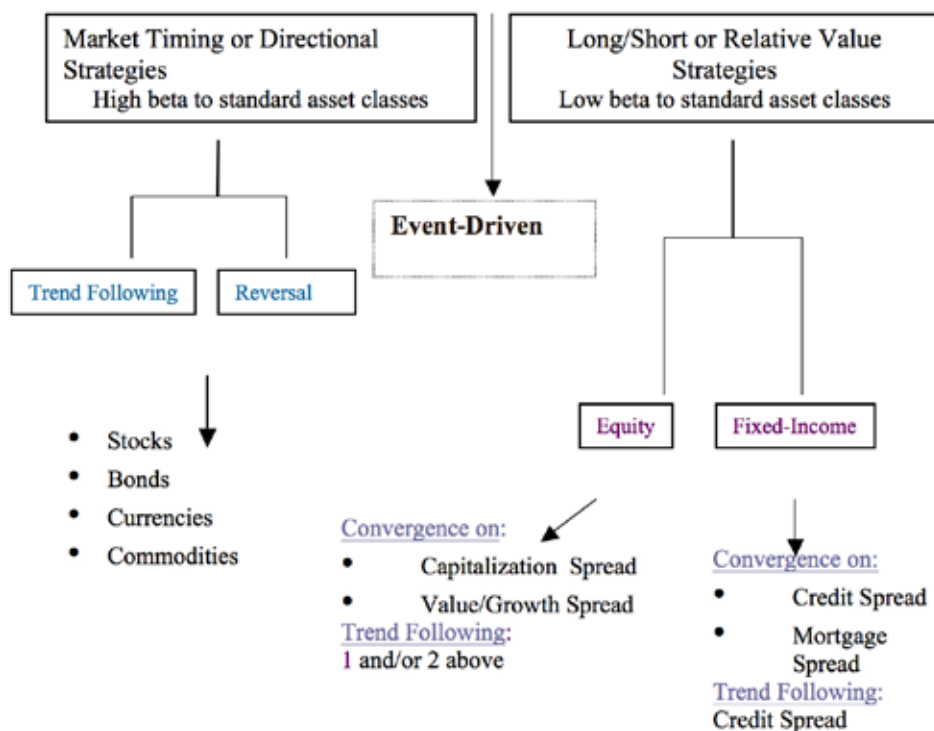
If an institution were confident in its forecasting ability of these variables, then these factors could be included in their asset allocation model. At that point one would aim to hire hedge fund managers whose strategies provided exposures to these factors. One might even insist upon "style purity," as advocated by Schneeweis [2003]. In other words, the goal would be to find managers whose performance was persistent, given the market conditions represented by the nine market variables. Interestingly under such conditions, hedge fund manager selection becomes a "search for beta" rather than a "search for alpha," as phrased by Fung [2003].

Asset-Based Style (ABS) Factors

One can also consider another approach, which is related to multi-factor modelling. In the asset-based style factor approach, one only uses tradable assets as factors. Specifically in this approach, researchers include various asset classes, rule-based investment styles, and options as explanatory factors of a hedge fund strategy's returns. This approach has been spearheaded by William Fung of the London Business School and David Hsieh of Duke University and by Vikas Agarwal of Georgia State University and Narayan Naik of the London Business School.

Figure 11 summarises the hedge fund styles for which the asset-based style factor approach has been successful so far in explaining returns.

Figure 11: Hedge Fund Styles That Can be Modeled with Asset-Based Style Factors



Source: Excerpt from Fung, William and David Hsieh, "The Risk in Hedge Fund Strategies: Alternative Alphas and Alternative Betas," The New Generation of Risk Management for Hedge Funds and Private Equity, forthcoming Euromoney book (2003), Exhibit 5.5.

The following provides two examples of the ABS approach, as described in Till [2002].

Equity Example

Agarwal and Naik [2003] 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 capitalisation 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 [2002b] 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 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.

Portfolio Construction

Similar to the multi-factor approach, Fung [2003] describes how the asset-based style factor approach could be used in portfolio construction:

- Determine the relevant ABS factors suitable to overall asset allocation; and
- Construct portfolios of hedge funds such that the aggregate ABS factor betas are consistent with overall asset allocation.

The ABS factor approach helps in understanding the role of hedge funds in a traditional asset allocation framework. Again quoting from Fung [2003]:

... hedge funds deliver "alternative risk premia" for bearing risk in factors different from traditional assets.

Specifically one gets paid for bearing certain types of equity and fixed-income spread risk as well as liquidity risk.

Small Set of Styles Extracted from Manager Data

Brown and Goetzmann [2003] advocate a procedure to take into consideration that hedge fund managers may vary their asset weights through time. They note that:

The way that fund managers change asset weights in response to economic circumstances can itself be legitimately characterised as part of their asset management style.

Over the period, 1989 through January 2000, the researchers:

... use past returns to determine a natural grouping of funds that has predictive power in explaining the future cross-sectional dispersion in fund returns. Such groupings are referred to as *styles*.

Brown and Goetzmann derive eight hedge fund styles from individual hedge manager data. These styles can be described as follows:

- A property investment style;
- A U.S. equity focus;
- A non-U.S. equity focus;
- An emerging markets style;
- An aggressive international style with a directional equity focus;
- An aggressive international style with a global macro focus; and
- Two styles that have concentrations in non-directional/relative-value strategies.

The authors note that their style analysis is useful for fund-of-funds investors in the following manner:

We find that diversification across [our] styles is an effective way to reduce exposure to holding a losing set of managers in any given year.

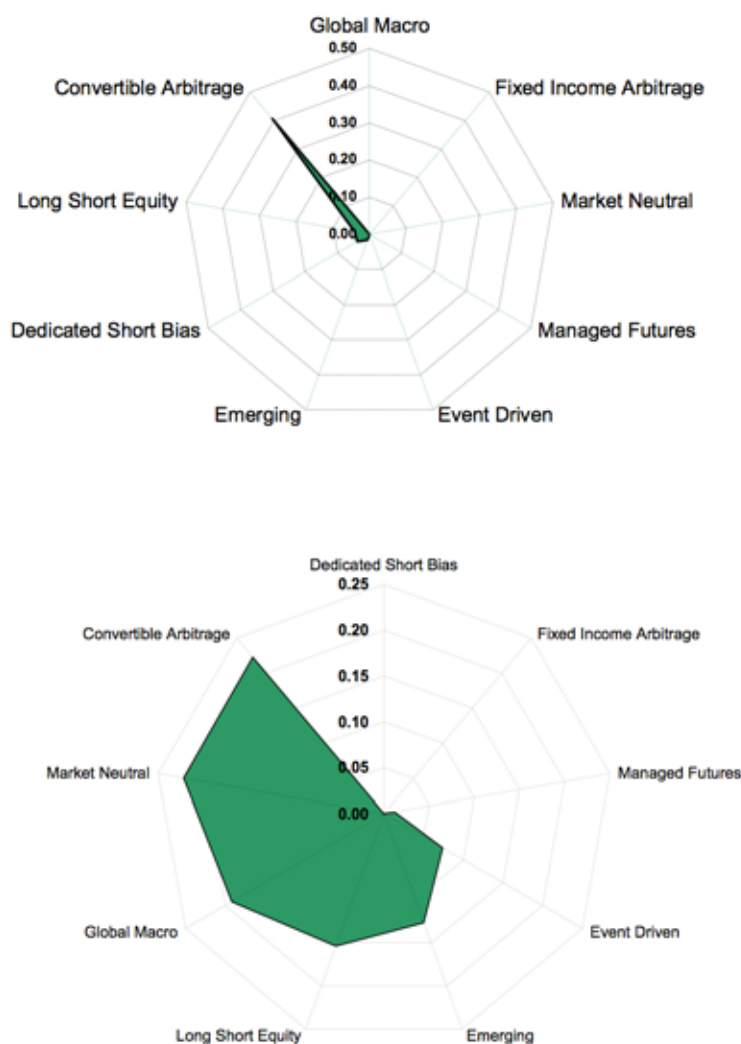
Anecdotally, the fund of hedge funds, which do use quantitative techniques in their asset allocation process, employ a variety of methodologies for isolating risk factors within their portfolios. The idea is to avoid having inadvertent concentration risk to any particular risk factor, however it is defined. The Brown and Goetzmann article provides an additional methodology for isolating eight types of common exposures across hedge funds.

Use Existing Hedge Fund Styles

Lhabitant [2001] suggests that one should use existing hedge fund style index returns as the appropriate underlying factors in a returns-based analysis of hedge funds. Lhabitant uses hedge fund style index returns from the database vendor, CSFB/Tremont, but he notes that his analysis could be repeated with other families of hedge fund indices.

Since a hedge fund manager or fund-of-funds will sometimes be diversified across hedge fund styles, he suggests creating "hedge fund style radars," which graphically illustrate a fund's beta to each hedge fund style. See Figure 12.

Figure 12: Hedge Fund Style Radars



"The figure shows the hedge fund radars obtained for a convertible arbitrage fund (top) and a fund of hedge funds (bottom). The sensitivities (i.e., style-beta coefficients) are estimated using three years of historical data."

Source: Lhabitant, Francois-Serge, "Hedge Fund Investing: A Quantitative Look Inside the Black Box," Union Bancaire Privee, Working Paper, 2001.

One might consider using Amenc and Martellini's [2002] research on creating pure style indices as a refinement to Lhabitant's approach. Figure 13 shows the maximum monthly return difference between competing indices for the same style.

Figure 13: Measures of Heterogeneity in Hedge Fund Indices

<u>Sub-Universe</u>	<u>Maximum Difference in percent (with dates and indices)</u>
Convertible Arbitrage	4.75% (Oct 98; CSFB (-4.67) / Hennessee (0.08))
Emerging Markets	19.45% (Aug 98; MAR (-26.65) / Altvest (-7.2))
Equity Market Neutral	5.00% (Dec 99; Hennessee (0.2) / Van Hedge (5.2))
Event Driven	5.06% (Aug 98; CSFB (-11.77) / Altvest (-6.71))
Fixed Income Arbitrage	10.98% (Oct 98; HF Net (-10.78) / Van Hedge (0.2))
Global Macro	17.80% (May 00; Van Hedge (-5.80) / HF Net (12))
Long/Short	22.04% (Feb 00; EACM (-1.56) / Zurich (20.48))
Merger Arbitrage	1.85% (Sep 98; Altvest (-0.11) / HFR (1.74))
Relative Value	10.47% (Sep 98; EACM (-6.07) / Van Hedge (4.40))
Short Selling	21.20% (Feb 00; Van Hedge (-24.3) / EACM (-3.09))
Distressed Securities	7.38% (Aug 98; HF Net (-12.08) / Van Hedge (-4.70))
Fund of Funds	8.01% (Dec 99; MAR-Zurich (2.41) / Altvest (10.42))

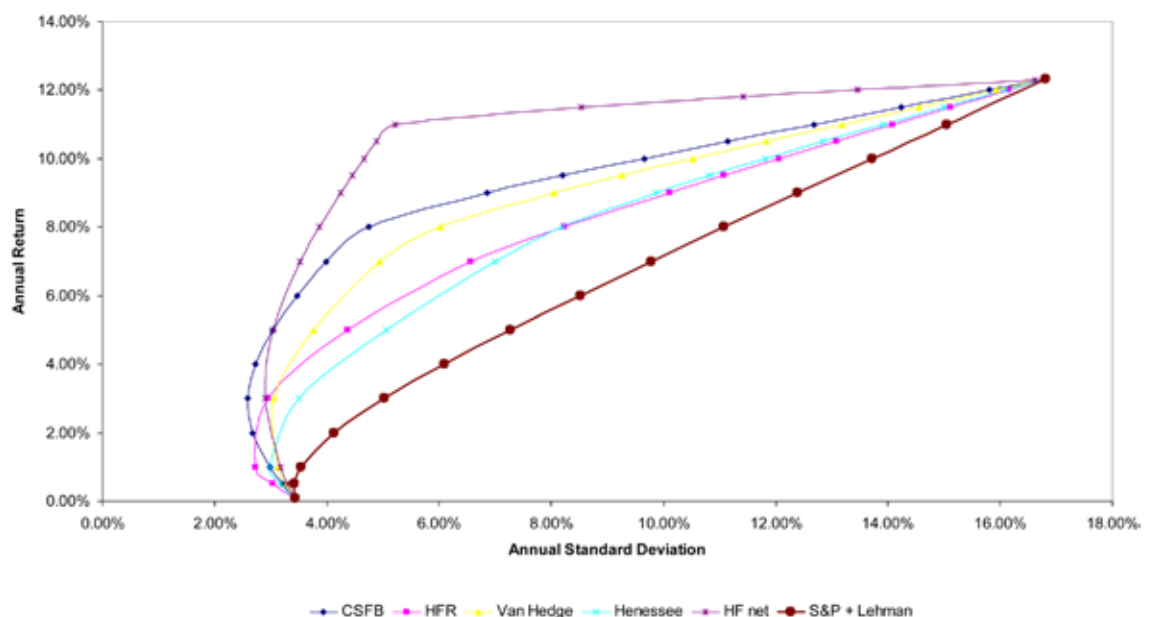
Source: Amenc, Noel and Lionel Martellini, "The Brave New World of Hedge Fund Indices," EDHEC Graduate School of Business and University of Southern California, Working Paper, 10/19/02, Table 4.

Depending on which database provider one uses, one would come up with different diversification benefits as one adds a particular hedge fund style to a traditional portfolio. This point is illustrated in Figure 14. In this figure, the authors:

... generate efficient frontiers obtained from adding various fixed income arbitrage indexes (CSFB, HFR, Van Hedge, Hennessee, HF Net) to an equity and fixed income portfolio, using the S&P 500 and the Lehman Brothers Aggregate as proxies for equity and fixed income markets, respectively. This figure is based on monthly data for the period extending from January 1996 to October 2001.

Therefore, Amenc and Martellini propose extracting a pure style index or "index of indexes" from the universe of index providers. Their paper provides a set of sophisticated mathematical techniques on how to do so.

Figure 14: Heterogeneity in Diversification Benefits



Source: Amenc, Noel and Lionel Martellini, "The Brave New World of Hedge Fund Indices," EDHEC Graduate School of Business and University of Southern California, Working Paper, 10/19/02, Figure 2.

Non-Standard Performance Characteristics

Another approach followed by researchers is to explicitly model the distributional characteristics of each hedge style, including their skewness and kurtosis properties. Chen et al of Ibbotson Associates [2002] advocate this approach.

For those readers who desire a brief statistical primer, skewness and kurtosis are the "higher moments" of a statistical distribution. The mean is the first moment of a distribution, standard deviation the second, and skewness and kurtosis the third and fourth respectively; a distribution with no skewness or kurtosis is a normal distribution.

Bacmann and Scholz [2003] write that skewness:

... mainly describes how asymmetric the distribution is. In other words, a positive skewness indicates that more observations are found to the right tail of the distribution.

Bacmann and Scholz write that kurtosis:

... is linked to the existence of extreme returns. The higher the kurtosis is, the more likely extreme observations are. In this context [for given levels of average returns and their variance], risk averse investors like positive skewness and dislike high kurtosis.

The issue for hedge fund investors, as noted by Feldman [2002], is that:

Most hedge fund "styles" achieve high Sharpe ratios at the expense of high levels of kurtosis and negative skew.

In Chen et al., the researchers take into consideration the non-normal return distributions of hedge fund styles. After modelling the performance characteristics of hedge fund styles, the Ibbotson Associates researchers determine the optimal combination of traditional and alternative investments, given different levels of investor risk and loss aversion. For certain levels of risk and loss aversion, the researchers find that the most attractive hedge fund styles to add to a traditional portfolio are the equity market-neutral and global macro styles.

The researchers also note that there is no reason to assume that the levels of risk aversion and loss aversion are common to all investors, which means that portfolios should be customised for each class of investor.

Tactical Style Selection

Liquidity Cycle

Once one is open to the idea of viewing hedge fund investments in terms of a handful of style bets, one might consider using a tactical allocation strategy. CrossBorder Capital [1999, 2003] proposes linking hedge fund style returns to the global liquidity cycle. One would then tactically switch among hedge fund styles according to one's predictions about future liquidity conditions.

One stumbling block with this approach is that lock-ups and illiquidity are a fundamental aspect of hedge fund investment, as noted by Edwards and Gaon. An additional practical problem is that some hedge fund managers restrict the amount of redemptions that can occur at any one time.

As a result, the CrossBorder researchers suggest using investable style tracker funds to implement the strategy. This idea pushes the idea of the "search for beta" to its logical conclusion.

Small Cap/Value Bias

Another way of thinking about style exposures of hedge funds has been proposed by researchers at Kenmar Global Investment Management. Goodman et al [2002] note that equity hedge funds have a structural value/small-capitalisation bias. They warn that:

The relative performances of both [equity] value and small-cap styles have historically been highly cyclical ...

Therefore in constructing "risk-efficient portfolios," an investor may want to attempt to neutralise this exposure if one does not want to have a small-cap value bias during a particular point in the investment cycle.

The idea that one might be able to successfully carry out equity style timing is provided by Asness et al. of AQR [2000]. The AQR researchers describe a methodology for deciding upon the relative prospects of value versus growth. In November 1999, for example, their model correctly forecasted:

... near-historic highs for the expected return of value versus growth.

Betas Versus Alphas

There is another logical conclusion, which emerges from the "search for beta." Bridgewater Associates [2003b] recommend that:

A savvy investor should be unwilling to pay significant fees to an asset manager who is essentially taking in risk premiums for them.

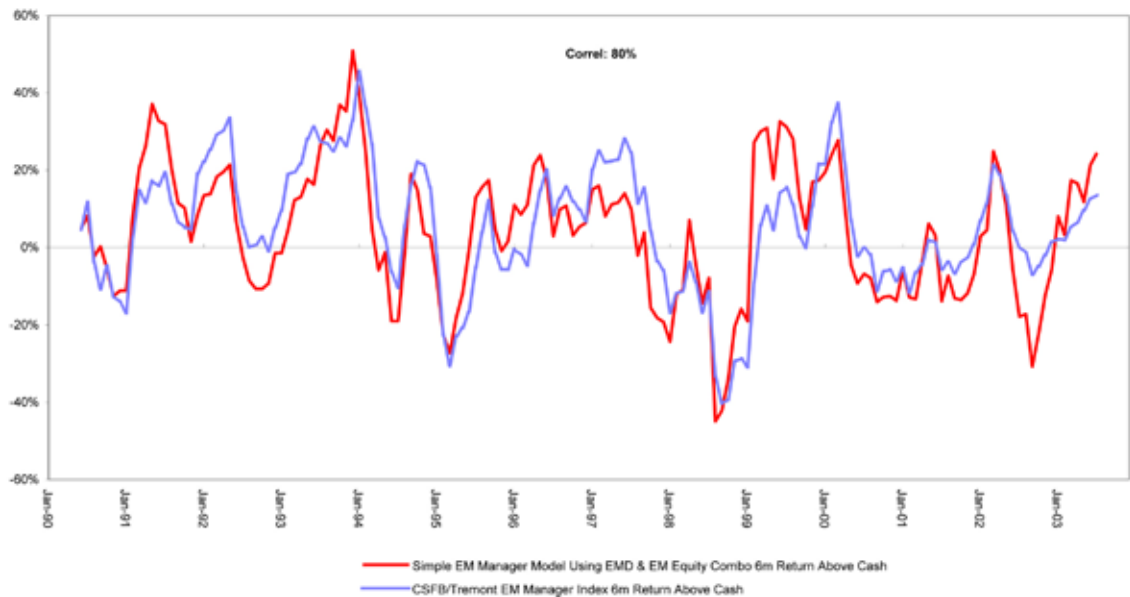
The Bridgewater researchers show four examples of hedge fund style returns that could be replicated by passive investment techniques. See Figures 15 and 16 for two of their examples.

Figure 15: Rolling Six-Month Returns of a Naïve Mix of Illiquid Fixed Income Instruments Versus the Rolling Returns of Fixed Income Arbitrage Hedge Funds



Source: Jensen, Greg and Jason Rotenberg, "Hedge Funds Selling Beta as Alpha," Bridgewater Daily Observations, 6/17/03, p. 2

Figure 16: Rolling Six-Month Returns of a 50/50 Mix of Emerging Market Equities Versus the Rolling Returns of Emerging Market Hedge Funds



Source: Jensen, Greg and Jason Rotenberg, "Hedge Funds Selling Beta as Alpha," Bridgewater Daily Observations, 6/17/03, p. 3

Based on this analysis of hedge fund style returns, the Bridgewater researchers advocate that one try to understand whether a hedge fund manager's returns are due to superior skill or are due to taking in risk premiums.

Another implication of the Bridgewater analysis is that if investors want to take on various kinds of beta risk, they can do so in a cost-efficient way using index funds, exchange-traded funds, futures, and options.

Before leaving the discussion on beta-versus-alpha, one should add the following cautionary note from Fung and Hsieh [2002a] about relying too much on hedge fund style index data for conclusions on individual managers:

... broad-based indexes of hedge funds are more likely to reflect the risk characteristics in the recent "popular bets" among hedge fund managers ... Because of this concentration, the hedge-fund indexes understate the diversity of trading styles in general and overstate the risk of style convergence.

Appropriate Benchmarks

The appropriate benchmarks for hedge fund investments will depend on which factor approach the investor embraces. This section provides four approaches to consider. In the first three approaches, the relevant factor returns would be the benchmarks. In the fourth approach, the return on the style-appropriate peer group would be the investment's benchmark.

As noted at the beginning of this section, there is not yet consensus on which factor approach to use. The larger point to make, though, is that there is not even consensus on whether the factor approach is appropriate for hedge fund investments. The next section of this article will adopt the point-of-view of emphasizing the pure alpha aspects of hedge fund investing.

C. Alpha Generators/Exploiting Inefficiencies, or The Search for Alpha

Morgan Stanley [2001] emphasises the "alpha advantage" of hedge fund managers. They write that:

Our research has shown that a significant proportion of the total return to hedge funds in the past has been alpha, in contrast with a small negative total alpha for mutual funds ...

They hypothesise that:

One possible explanation for an "alpha advantage" ... is that ... [the active managers] can forecast expected returns better than others. This means a significant ability to exploit market inefficiencies to outperform their benchmarks, presumably by virtue of skill, knowledge, and insight.

Capacity

This view of hedge fund management has a direct impact on the potential capacity of the hedge fund industry. To figure out the capacity of the hedge fund industry, we start by quoting from Cochrane [1999]:

... the average investor must hold the market so portfolio decisions must be driven by differences between an investor and the average investor.

If hedge funds are exploiting market inefficiencies, this means that other investors are supplying those inefficiencies. This means that, unfortunately, we cannot all profit from exploiting inefficiencies. Therefore, there is a natural cap on the potential size of the hedge fund industry (assuming that hedge funds are indeed exploiting inefficiencies rather than taking in risk premiums).

Under this framework we can estimate how large the hedge fund industry could become based on the following three factors:

1. The maximum tolerance of the average investor for supplying inefficiencies;
2. The required return targets of hedge fund investors; and
3. The size of the global capital markets.

According to Morgan Stanley [2001], the size of the global equity and bond markets is \$55 trillion. Using this size of the global capital markets, Figure 17 shows the potential size of the hedge fund industry based on a give-and-take analysis between the suppliers and exploiters of market inefficiencies.

Figure 17: Capacity of Hedge Fund Industry (With an "Alpha Advantage") in Billions of Dollars

		Allowable Inefficiency in Private, Mutual Fund and Institutional Fund Management		
		-0.5%	-0.75%	-1.0%
Required Excess	10.0%	2,750	4,125	5,500
Return for	7.5%	3,667	5,500	7,333
Hedge Funds	5.0%	5,500	8,250	11,000

Source: Premia Capital Management, LLC.

According to Putnam Lovell NBF and NewRiver [2002], the current size of the hedge fund industry is \$500 billion while the size of the global high net worth (HNW) and institutional marketplace is \$44 trillion. One might think then that one could calculate how large institutional investment in hedge funds could become using Figure 17's figures. As an example, say the average investor can tolerate up to -0.50% of inefficiencies in their traditional investments before competitive forces will step in to keep this number from getting larger. Simultaneously, let's say hedge fund investors demand at least 10% in excess returns before committing their money to hedge funds. One might

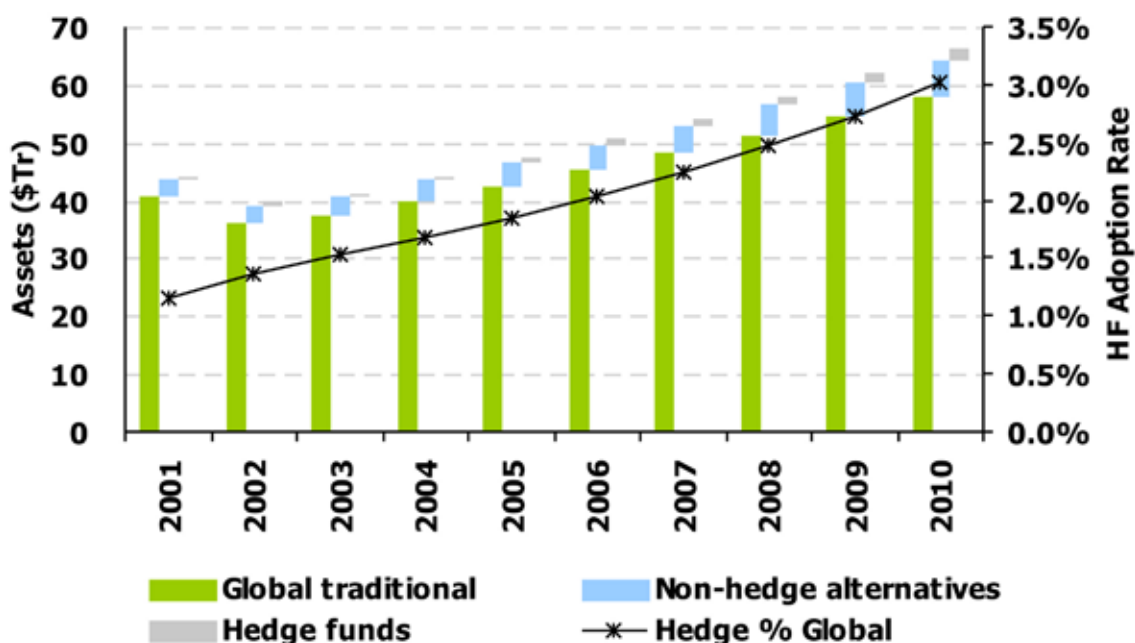
expect that hedge fund investors would require premium returns because these investment vehicles tend to be quite opaque and illiquid. Using these two assumptions, one could plausibly arrive at the size of the hedge fund industry becoming \$2.75 trillion (= \$55 trillion * 0.50% / 10%.) This would mean that institutional and HNW investments in hedge funds could become 6% (= \$2.75 trillion / \$44 trillion).

On the other end of the spectrum, if the average investor can tolerate -1.0% in inefficiencies in how their money is invested, and if hedge fund investors only require 5% in excess returns before giving their money to hedge funds, one could envision the hedge fund industry being able to grow to \$11 trillion. The trouble with this conclusion is that one would expect competitive forces to step in at some point: there should be an interaction effect between the size and success of the hedge fund industry and the willingness of the average investor to tolerate mediocre investment management.

Therefore in viewing the predictions of Figure 17, one must caution that at some point the size and success of alpha-generating strategies can only attract so much capital before this would jeopardise their continuing success.

Analysing the potential size of the hedge fund industry from a "demand point-of-view," Putnam Lovell NBF and NewRiver [2002] predict that by 2010, global HNW and institutional investment in hedge funds could become 3% of this sector's assets. See Figure 18.

Figure 18: Global Institutional and HNW Assets and Hedge Fund Adoption Curve



Authors' Data Source: Bernstein, OECD, Freeman & Company, Goldman/Russell, Nelsons, Greenwich Associates, NewRiver estimates.
 Source: "Institutional or Institutionalized - Are Hedge Funds Crazy," Putnam Lovell NBF and NewRiver, White Paper, December 2002, Exhibit 2.

Using Figure 17's framework, it is plausible that such a size could be achieved from a "supply point-of-view." Using Putnam Lovell NBF and NewRiver's assumed growth in the size of the capital markets, their estimate would be consistent with the average investor tolerating -0.25% in inefficiencies and the hedge fund investor requiring 10% excess returns on their investments.

There are a number of historical examples to point to in showing that superior investment strategies have historically been fleeting, which is why this section of the article is sounding a cautionary note on predicting the potential size of the (alpha-generating portion of the) hedge fund industry. To provide a broad historical perspective, one can again quote Siegel:

High-beta stocks beat low-beta stocks until William Sharpe discovered beta in 1964; small stocks beat large ones until Banz and Reinganum discovered the size effect in 1979 ...

Gatev et al. [1999] provide a more recent example. They simulate the performance of the equity pairs trading strategy. Over the period 1962 to 1997, they:

... find average annualized excess returns of up to 12 percent for a number of self-financing portfolios of top pairs.

But they also find that:

Pairs trading has declined in profitability dramatically from the 1970s and 1980s to a low point at the end of our sample when the returns were sometimes negative.

They hypothesise that after the strategy's discovery in the early 1980s, "competition has decreased opportunity."

This is very plausible given that the strategy's success was widely publicized in the 1980s, including a report that a Morgan Stanley group made \$50 million for the firm in 1987 as well as an article about the strategy in *Institutional Investor* magazine in 1989.

Further evidence of the capacity-constrained nature of the hedge fund industry is provided by Agarwal, Daniel, and Naik [2003]. Using data from January 1994 through December 2000, they note that:

... large funds with large inflows display poor future performance and a lower probability of exhibiting persistence. This finding is consistent with decreasing returns to scale in the hedge fund industry.

Herzberg and Mozes [2003] find similar results when examining hedge fund manager data from 1990 through 2001. They find that:

... large relative increases in assets under management are strongly predictive of decreases in future performance.

Selecting Alpha Generators rather than Beta Merchants

As noted before, Bridgewater Associates researchers warned against investing in hedge funds that were "selling beta as alpha." In Bridgewater Associates [2003b] they note that:

Over significant periods of time, betas have positive returns. However, they have low return to risk ratios (we estimate that, over long timeframes, betas have annual Sharpe ratios ranging from 0.2 to 0.3) ...

They explain the full import of an investment with a Sharpe ratio of 0.3 in Bridgewater Associates [2003a]:

... a 0.3 ratio ... means that you will have to wait 18.5 years to be 90% confident that you will make money (e.g. that ... [a risky investment like U.S. equities] will outperform cash.)

Siegel highlights the issue differently:

Beta has a low Sharpe ratio but a very high probability of being realised. Alpha can have a much

higher Sharpe ratio but few investors will get any – they have to take it away from other Alpha seekers. So Alpha is worth a high fee, not because it has a high Sharpe ratio when realised, but because it's hard to produce. Beta, in contrast, grows on trees and you shouldn't pay much for it.

Summarising the issue, Feldman [2002] asks:

Are hedge fund returns skill-based alpha-generators or efficiently-priced returns to bearing hidden risks?

Given that some hedge fund styles can potentially be passively replicated, have there been any studies so far on how to select hedge fund managers whose performance cannot be linked to known risk factors? The answer is yes; there have been two studies on this topic so far, and both have provided evidence that such screens may be able to select superior managers in out-of-sample tests. What these studies cannot answer, though, is at what point would the popularity of such tests lead to the selected managers quickly reaching or exceeding their capacity constraints? As with the pairs-trading study, one worries that the identification of superior investment strategies will lead to their profits disappearing. With that caveat in mind, the following section discusses the two alpha-selection studies.

Chen and Passow [2003] develop a quantitative model to select long-short equity managers who have low exposure to the following four factors: the broad equity market, the two Fama-French equity factors, and the Goldman Sachs Commodity Index (GSCI). The Fama-French factors are the return on small capitalisation versus large capitalization stocks and the return on high book-to-market (value) versus low book-to-market (growth) stocks, as described in Fama and French [1992].

Using data from January 1990 to September 2002, Chen and Passow find that "choosing those funds with high exposure to each risk factor gives unstable results". On the other hand in brief out-of-sample testing, the researchers find that choosing funds that have low exposure to their risk factors results in uncovering funds that perform well in both bullish and bearish market environments.

And again, Chen and Passow find evidence that:

... outperformance is highly correlated with ... [assets under management] growth, with negative impact on subsequent returns.

Herzberg and Mozes [2003] present the results of selecting equity funds that have good returns, lower risk, and lower correlations to the equity market compared to peer group funds. The authors believe these criteria might indicate that superior performance is due to underlying manager skill rather than being due to risk-taking and/or undue exposure to the equity market. They also take into consideration recent asset flows, noting the inverse relationship between increase in assets and later performance. Lastly, they screen out funds whose size and/or age demonstrates a lack of experience in handling large sums of money for long periods of time.

The authors find that:

For the period 1996 to 2001, portfolios of such funds generate significantly higher risk-adjusted returns (Sharpe ratios of 4.14) than portfolios containing all funds (1.38), portfolios constructed solely on the basis of past returns (0.75), and portfolios based on past Sharpe ratios (2.42).

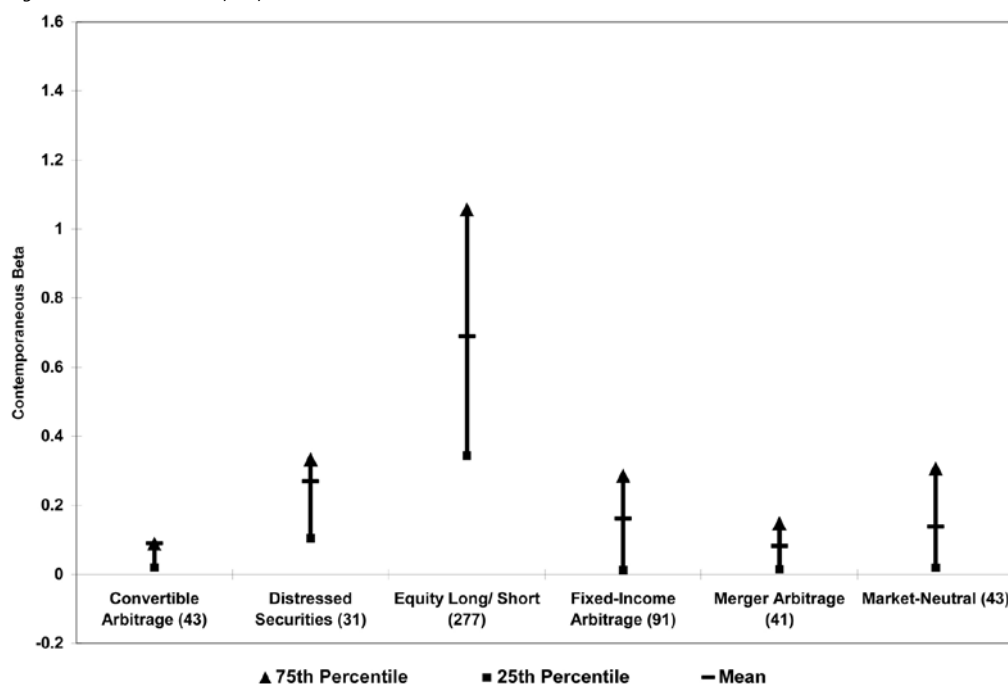
Manager Selection is a Bottom-Up Exercise

Confirming Fung and Hsieh's warning about using hedge fund style index data to represent the heterogeneous hedge fund industry, Ross and Oberhofer [2002] further state that:

The variability of individual fund characteristics suggests that investors' selection of hedge funds should be strictly a bottom-up exercise.

The Russell researchers illustrate the variability of results across individual managers within a given style in Figure 19.

Figure 19: Range of Beta Estimates by Style



This figure "demonstrates the range of betas [with respect to the Russell 3000 equity index] attributable to managers within the styles they follow."

Source: Ross, Leola and George Oberhofer, "What the 'Indexes' Don't Tell You about Hedge Funds," Russell Research Commentary, May 2002, Figure 1.

Appropriate Benchmark

For investment strategies that exploit inefficiencies, Ineichen and Johansen [2002] suggest one possible way of approaching the benchmark question:

One possible solution could be to combine objective quantitative assessment with qualitative judgment. The classical market benchmark could for example be replaced through a set of absolute investment objectives. The objectives are enforced through consent between manager and investor. The active manager will then be measured and held accountable against these objectives. A set of objectives could look as follows:

- 1 Generate positive return by exploiting inefficiencies in U.S. small- and mid-cap financial stocks;
- 2 Preserve capital over 12-month period;
- 3 Provide consistent monthly returns resulting in annual returns of around 10-15% and portfolio volatility of around 8-12%.

D. Traditional Factor Exposures with Additional Returns from Market Segmentation and Liquidity Premia

Another framework to consider in deciding how alternative investments should fit into an institutional portfolio has been suggested by Terhaar et al. of UBS [2003]. They emphasise the natural consequences of diversification as it applies to both traditional and alternative investments:

Any individual alternative investment may have low correlation with other assets in the portfolio. But when investors build well-diversified alternative investment programs, the systematic influences – underlying economic fundamental drivers – become more significant and the residual noise diminishes. Hence, the more diversified the private equity, real estate, natural resource or hedge fund portfolio, the more correlated it is likely to be with public markets.

The UBS researchers also discuss how alternative investment return data are problematic at best. The data “suffer from illiquidity and infrequent pricing biases, ... [and] also are fraught with membership and survivorship biases”.

The authors attempt to reconcile quantitative and qualitative techniques, given the problems with using historical data.

Their recommended solution is to use a factor approach to build a consistent set of forward-looking return and risk characteristics for conventional *and* alternative asset classes alike.

Their chosen factors attempt to reflect the underlying economic exposures of the assets and strategies. They choose 12 primary factors to capture the systematic risk characteristics of both alternative and conventional assets. Each investment, including hedge funds, is represented by some combination of these systematic risk factors plus a risk premium, reflecting the investment's level of market segmentation, and illiquidity.

To make the UBS researchers' point clearer, one can refer to Jaeger's [2002] discussion of several hedge funds strategies in which risk premia and liquidity premia are earned:

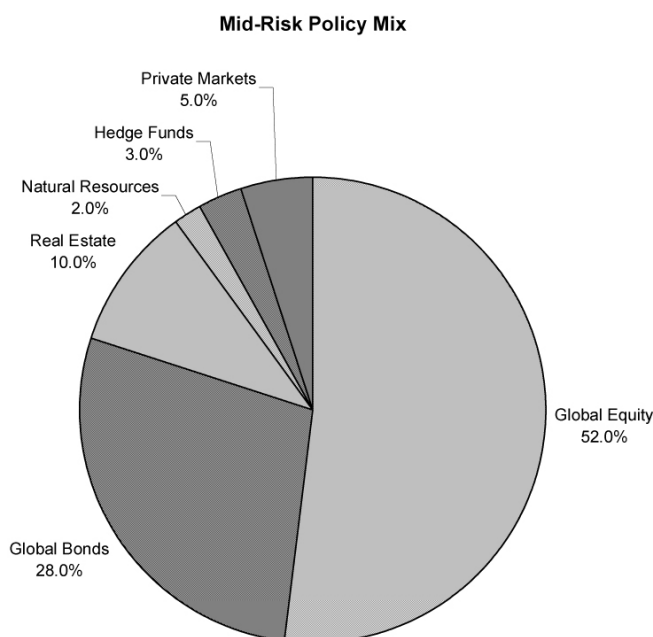
Often, the typical equity investor does not like to hold stocks that become involved in mergers and acquisitions. The equity investor already has a large gain and may achieve a slight, incremental gain if the transaction is consummated on schedule. However, the investor runs the risk of losses if the transaction is repriced, delayed, or cancelled. The risk arbitrageur assumes the risks that the equity investor prefers to avoid. Similarly, the distressed debt investor buys debt that traditional fixed income investors may be forced to sell in order to maintain portfolio yield or comply with investment guidelines. The convertible hedger provides liquidity to an “orphan” asset class that is neither pure equity nor pure debt.

Returning to the UBS researchers' article, one would expect that after coming up with their factor model, the researchers' next step would be to use some form of mean-variance optimisation to come up with a recommended asset allocation. This is not the case. The UBS researchers instead point out that in coming up with recommended policy mixes, it is not appropriate to use multi-period optimisation techniques. This is because an implicit assumption with such techniques is that one can rebalance the portfolio during each period. A distinguishing feature of alternative investments, including hedge funds, is their lock-up periods and illiquidity. Therefore, the UBS researchers use simulations to take into consideration the lack of rebalancing opportunities that occur when using alternative investments:

Simulations permit the inclusion of both the cost of illiquidity (allowing rebalancing only to the extent possible in practice) and the benefit of illiquidity (the liquidity premium).

Figure 20 illustrates an "appropriate" policy mix for an institutional investor, which results from the researchers' methodology. For our purposes what is of interest is that the recommended allocation to alternative investments is 20% with 3% allocated to hedge funds.

Figure 20: Policy Mix for a Mid-Risk Institutional Investor



Source: Terhaar, Kevin, Renato Staub, and Brian Singer, "Determining the Appropriate Allocation to Alternative Investments," *Journal of Portfolio Management*, Spring 2003, Exhibit 8.

As a final note on the capacity issue, one should note that the previous section discussed the size of the hedge fund market if it were assumed that the industry's returns were due to capitalising on inefficiencies or generating alpha, so to speak. In this section, we are assuming that the hedge fund strategies are earning risk premia. One would still note that even under this framework, the strategies would still be capacity constrained at some level since if everyone took advantage of a market segmentation effect, there would no longer be a market segmentation effect. Also, to earn a return from providing liquidity, "an investor must have a longer horizon than the average market participant," quoting Scholes [2000]. And again, unfortunately, we cannot all have a longer horizon than the average participant.

Appropriate Benchmark

In the "Unconventional Beta/Non-Standard Performance Characteristics" section, we noted that the appropriate benchmark for hedge fund investments would depend on which factor approach the investor embraces. Similarly under the framework described in this section, the collection of an institution's hedge fund managers should be benchmarked against the returns of the traditional factor exposures plus the assumed premia arising from market segmentation effects and illiquidity.

E. Total Return through a Fund-of-Funds

Diversifying Operational Risk

A defining feature of hedge funds is their boutique nature. A hedge fund may only have one or two key decision-makers, for example. This does not give a lot of comfort to institutional investors who require a deep team of investors carrying out a disciplined and repeatable investment process that does not rely on any one individual for its continued success.

Fund-of-funds provide the type of structure that gives comfort to institutional investors. One possible organisational model is for institutions to use fund-of-funds to diversify away idiosyncratic, operational risk of an individual hedge fund. In this framework, one should not compare individual hedge funds to mutual funds but instead should see fund-of-funds as the analog to mutual funds.

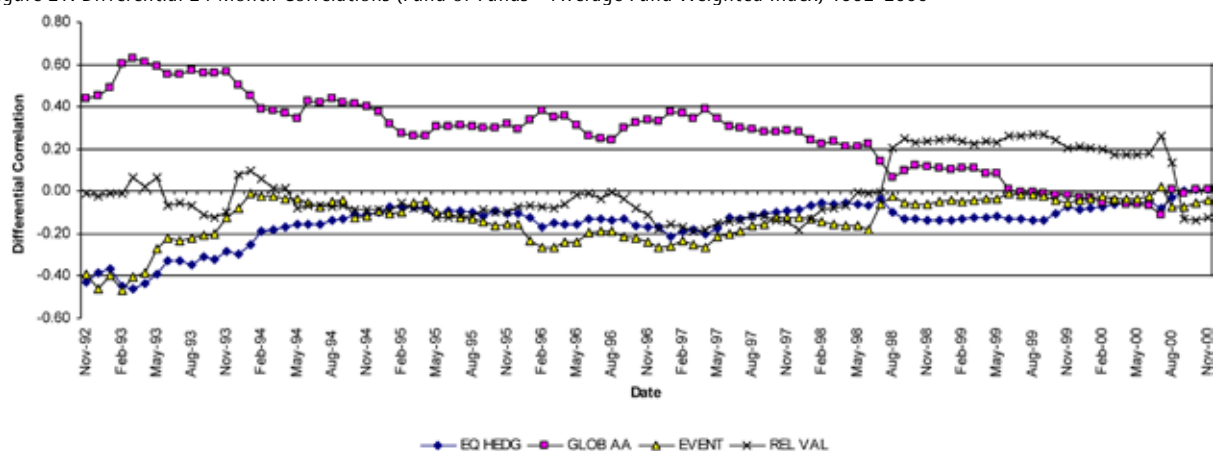
But Factor Exposures May Vary

However, Schneeweis et al. [2001] warn that fund of funds:

... may be market timing and are less useful in asset allocation strategies since ... [both their] factor sensitivity and [investment] composition change in contrast to more style-pure hedge fund indices or strategies.

Figure 21 illustrates the changing strategy emphasis in fund of funds.

Figure 21: Differential 24 Month Correlations (Fund of Funds – Average Fund Weighted Index) 1992-2000



EQ HEDG: Hedge Equity
 GLOB AA: Global Asset Allocation (or Global Macro)
 EVENT: Event Driven
 REL VAL: Relative Value

"Note that over time the correlations of Hedge Equity rise and Global Macro fall, indicating an increase in Fund of Funds' use of Hedge Equity and a decrease in the use of Global Macro."

Source: Schneeweis, Thomas, Kazemi, Hossein, and George Martin, "Understanding Hedge Fund Performance: Research Results and Rules of Thumb for the Institutional Investor," CISDM and Lehman Brothers, November 2001, Exhibit 10e.

Treat Hedge Funds as a Separate Asset Class

Drawing from Schneeweis et al.'s work, if one needs control over the factor exposures of their investments, then fund of funds may not be the appropriate vehicle for an institutional investor. But instead if one were treating their hedge fund investment as a separate asset class with a total-return "bogey" or benchmark, then a fund-of-funds investment would be appropriate.

Modelling Advantages

From a modelling standpoint, a quantitative researcher welcomes using fund-of-fund data rather than individual hedge fund manager data. Fung and Hsieh [2002a] reason that:

... the most direct way to measure hedge-fund performance is to observe the investment experience of hedge-fund investors themselves – the fund of funds.

The trouble with making inferences from individual hedge fund manager data is that there is inevitably a problem with survivorship bias; one is only able to analyse the performance characteristics of those funds that have chosen to remain in databases. With fund-of-funds data, presumably this data includes the experience of funds that no longer report to databases because either they have done poorly or have done exceptionally well. In the former case, a fund may have ceased to exist and in the latter case, a fund may be closed to new investors and so no longer needs to report their performance to databases.

Optimal Portfolio Construction with Hedge Funds

In an earlier section, we quoted a survey that most Swiss hedge fund investors do not use quantitative asset allocation techniques. Anecdotally, this article's author has heard two presentations from U.S. fund-of-funds investors who also do not use quantitative techniques in portfolio construction. One investor said it was impossible to do so since each hedge fund is unique "like a snowflake". A second investor said that with quantitative techniques, one has to make so many inappropriate assumptions that their results are "worthless." Therefore, during the investor's qualitative due diligence process, he makes sure that "each investment is orthogonal to existing investments".

A third investor was quoted in Savage [2003] as "minimizing the usefulness of allocation between strategies." The investor stated that 70% to 80% of the returns in his fund-of-funds were due to manager selection with the remainder coming from selection of strategies.

Despite these three anecdotes, this section will forge ahead and briefly discuss four proposals on optimal fund-of-funds construction using quantitative methods.

Minimum-Variance Portfolios

Amenc and Martellini [2002a] discuss how to create a portfolio of equity and hedge fund investments in which the goal is to minimise return variance. Their dataset covers the period, 1994 to 2000. They find that the following strategies are never included in the minimum variance portfolio: emerging markets, global macro, and equity long/short. On the other hand:

... the largest fraction of the portfolio is consistently invested in equity market neutral.

Number of Funds Needed for Diversification

Lhabitant and Learned [2002] examine how many hedge funds are needed to create a diversified portfolio. Using data from 1990 through 2001, their key findings are as follows:

- Per hedge fund style, between 5 and 10 hedge funds are usually sufficient to eliminate 75% of the specific risk in the portfolio;
- Diversification within some hedge fund strategies may appear highly attractive in mean-variance terms, but this is much less so when skewness and kurtosis are taken into account;
- There are limited benefits in diversifying amongst arbitrage hedge funds; and
- An investor can significantly reduce risk in his or her portfolio with fewer hedge funds if the funds are chosen across investment styles.

Advantages of Including Managed Futures

Kat [2002] discusses the diversification benefits of adding managed futures to a portfolio of hedge funds, stocks, and bonds. According to Kat:

Adding managed futures to a portfolio of stocks and bonds will reduce that portfolio's standard deviation more and quicker than hedge funds will, and without the undesirable side-effects on skewness and kurtosis. Overall portfolio standard deviation can be reduced further by combining both hedge funds and managed futures with stocks and bonds.

Optimisations That Include Higher Moments

Bacmann and Pache [2003] investigate the impact of creating optimal portfolios with metrics that take into consideration skewness and kurtosis. They find that:

... the portfolios optimized with [such] ... measures provide better out-of-sample returns than the ones constructed in the mean-variance framework.

For their study, the researchers examine an out-of-sample period from 1996 through 2002.

Appropriate Benchmark

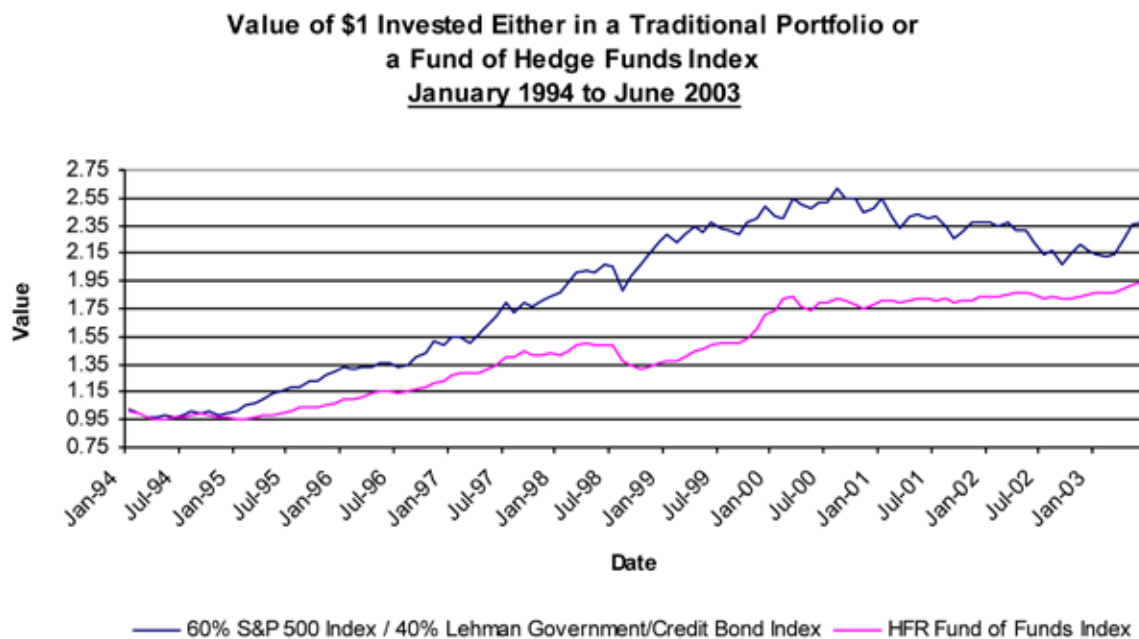
One could argue that a fund-of-funds effectively becomes a "surrogate plan sponsor" since they control the factor exposures of their slice of an institution's investment. In that case, the proper benchmark for a fund of funds might be a diversified portfolio of stocks and bonds as represented by a 60% equities/40% bonds balanced portfolio.

A Balanced Portfolio is a Difficult Benchmark to Outperform

Perhaps surprisingly this has been a tough benchmark to beat. Ackermann et al [1999] show that over several time frames, the average and median hedge fund has a Sharpe ratio that is less than a balanced portfolio of 60% in the S&P 500 index and 40% in the Lehman Aggregate Bond index. Those timeframes are as follows: January 1994 through December 1995, January 1992 through December 1995, and January 1988 through December 1995.

To provide a more up-to-date comparison, Figure 22 compares an index of fund-of-funds versus a balanced equity-and-bond benchmark. During the period, January 1994 to June 2003, the balanced benchmark has outperformed on a total-return basis.

Figure 22: Fund of Funds Performance versus a Balanced Benchmark



The 60/40 balanced portfolio is rebalanced yearly.

Data Sources: HFR and Bloomberg

The balanced benchmark has outperformed on a risk-adjusted return basis, too. See Figure 23.

Figure 23: Performance Results - January 1994 to June 2003

	<u>Annual Return</u>	<u>Annual Volatility</u>	<u>Sharpe Ratio</u>
HFR Fund of Funds Index	7.24%	6.29%	0.47
Traditional 60/40 Portfolio	9.50%	9.76%	0.53

The Traditional Portfolio of Equities and Bonds is represented by a blended index of 60% in the S&P 500 Total Return Index and 40% in the Lehman Government/Credit Bond Index. Allocations are rebalanced yearly.

Data Sources: HFR and Bloomberg

Does this invalidate the case for investing in fund of funds when a diversified portfolio of indexed stocks and bonds has historically beaten an index of actively managed funds of hedge funds?

First Objection

The short answer is no. There are four possible objections to the story portrayed by Figures 22 and 23. We are showing results starting in 1994 when the hedge fund industry did poorly. If one had started this comparison at other points in time, one would have come up with different conclusions. For example, Edwards and Gaon present fund of fund, equity, and bond data from January 1990 to November 2002. Figure 24 provides an excerpt from their table of performance results.

Given the large difference in results between the earlier figures and Figure 24, one might conclude that we do not have enough data to make robust conclusions in comparing diversified hedge fund investments to a balanced benchmark.

Figure 24: Performance Results - January 1990 to November 2002

	<u>Annual Return</u>	<u>Annual Volatility</u>	<u>Sharpe Ratio</u>
HFR Fund-of-Funds Index	10.56%	5.95%	1.0
S&P 500 Index	9.11%	15.14%	0.30
JP Morgan Global Bond Index	8.08%	4.27%	0.81

Authors' Data Source: HFR

Source: Excerpt from Edwards, Franklin and Stav Gaon, "Hedge Funds: What Do We Know?" Forthcoming *Journal of Applied Corporate Finance* (2003), Table 3.

There are a number of trade-offs to consider in analyzing hedge fund results. The reason we had started our comparison using 1994 as the beginning year is that is the year that hedge fund data gathering became the most reliable, according to Fung and Hsieh [2002a].

Second Objection

A second objection is that a belief in the merits of a 60/40 portfolio solution implies that going forward, one believes that U.S. stocks and U.S. bonds will be weakly correlated. If one can construct a plausible scenario where instead both U.S. stocks and U.S. bonds will both decline in value, then this "diversified" portfolio could plausibly do quite poorly in the future.

Third Objection

A third objection is that given where bond yields, equity dividend yields, and equity P/E ratios are as of June 2003, a plausible forecast for a 60/40 policy portfolio is 6.3% over the next ten years, according to Bogle [2003]. Bogle notes that this prediction is before costs:

When we add in portfolio transaction costs and opportunity cost (institutional accounts often maintain a modest cash position), the total cost for an average-sized institution are probably about 1.5% per year. After costs, the prediction for the return of a 60/40 policy portfolio becomes 4.8% per year over the next ten years (unless one indexed their investments.)

With this backdrop, an institution may be motivated to attempt to hire a fund-of-funds firm, which is capable of sourcing alpha-generating managers, "in an era of subdued returns."

Fourth Objection

In showing fund-of-funds returns, Figures 22 and 23 show an index of such funds. An institution may be capable of sourcing superior fund-of-funds managers for whom these results are not representative.

Conclusion

Even granting these objections, it is still nonetheless instructive to note that the 60/40 policy portfolio has frequently been a difficult bogey to outperform. This adds another element of caution in considering how to include hedge fund investments in an institutional portfolio.

F. Unstable Factor Exposures: "Style Drift" or "Real-Time Reaction to the World?"

Brealey and Kaplanis [2001] point out that hedge funds generally do not have stable exposures to market factors.

Real-Time Reaction to the World

This point gets to the heart of whether an institutional investor will embrace hedge funds or not. One successful hedge fund manager has been quoted in Clow [2003] as stating:

The willingness to do what we call real-time reaction to the world was called style-drift ... People would say, "If you're a swordfisherman, fish for swordfish."

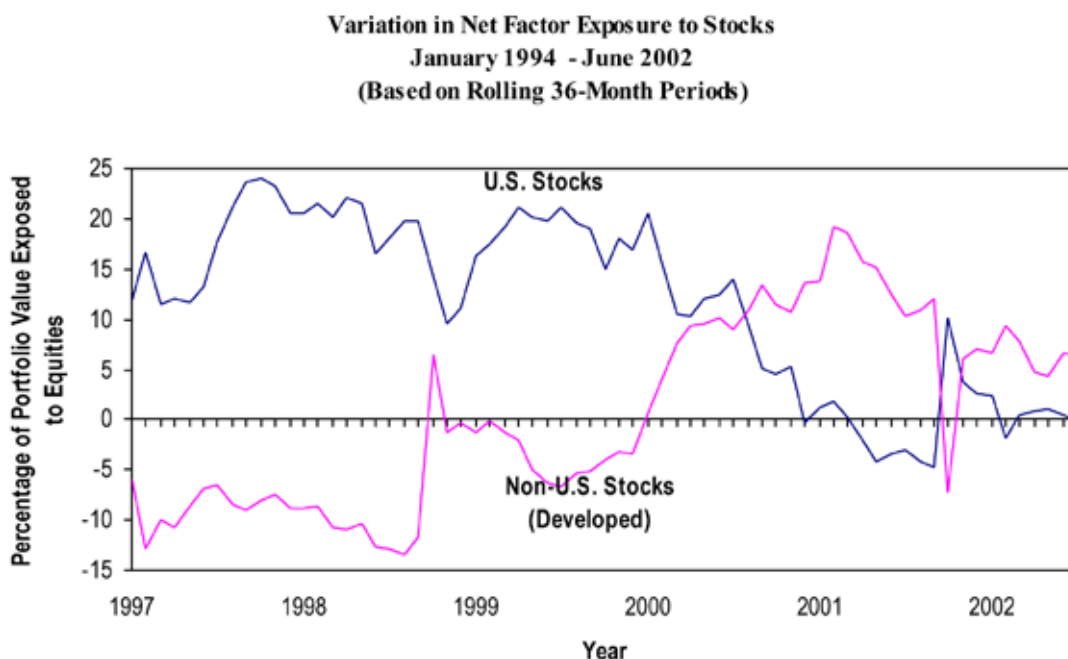
An investor with this particular hedge fund manager notes:

What the firm does very well is acquire competence in areas it doesn't know. It's a bottom-up process of figuring out where there is opportunity.

Style Drift

Correspondingly an investor may instead be uncomfortable with an investment having unstable factor exposures. Figure 25 provides an additional illustration of this issue from Bennett et al. of Ennis Knupp & Associates [2002].

Figure 25: Effective Equity Exposure of the HFR Fund-of-Fund Index Through Time



Source: Bennett, Phillip, Ennis, Richard, and Michael Sebastian, "Hedge Funds: Return Enhancer or False Hope," Ennis Knupp + Associates, Working Paper, October 2002, Exhibit 8.

Bennett et al. ask:

... is this the way investors expect to make money in hedge funds – through a series of timely factor bets?

If the answer is no, it means that one does not want their fund-of-fund manager to become, in effect, a surrogate plan sponsor. One may then conclude that hedge funds cannot be integrated into an institutional investment framework. As a matter of fact, Ennis Knupp & Associates write that:

... our standard advisory position is that we do not advocate hedge funds. We believe most clients with well-designed investment policies are better off without them.

Conclusion

This last sentence may be a controversial way to end an article on hedge fund research. But as the economic historian, Peter Bernstein, stated in a *Pensions & Investments* interview, one should be careful about expecting:

... a degree of neatness about the investment process [because] there is nothing to neat about it. It's very hard.

One can logically argue the merits of each of the six conceptual frameworks presented in this article as long as they are consistently applied.

Siegel notes that:

... some recent trends – notably the popularity of hedge funds and an emphasis on achieving absolute returns – demonstrate that MPT is not fully predictive of investor behaviour. Thus the future of investing can be expected to key off of non-MPT as well as MPT themes.

Our own belief on how hedge funds can fit into institutional portfolios is based on Cochrane [1999]. Under this view:

- Markets are largely efficient;
- The average investor must hold the market portfolio; and
- Some investors can achieve extra returns by in effect either selling insurance or providing liquidity to other investors.

The consequences of this viewpoint are summarized in Till and Eagleeye [2003]:

Those institutional investors who are *not* constrained by market segmentation issues and liquidity concerns can take advantage of niche opportunities. But their main source of returns [will] ... still derive from their asset allocation decision.

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For more information, please contact:
Carolyn Essid on +33 493 187 824
or by e-mail to: carolyn.essid@edhec-risk.com

EDHEC-Risk Institute
393 promenade des Anglais
BP 3116 - 06202 Nice Cedex 3
France
Tel: +33 (0)4 93 18 78 24

EDHEC Risk Institute—North America
1230 Avenue of the Americas
Rockefeller Center - 7th Floor
New York City - NY 10020 USA
Tel: +1 646 756 2638

EDHEC Risk Institute—Europe
10 Fleet Place, Ludgate
London EC4M 7RB
United Kingdom
Tel: +44 207 871 6740

EDHEC Risk Institute—France
16-18 rue du 4 septembre
75002 Paris
France
Tel: +33 (0)1 53 32 76 30

EDHEC Risk Institute—Asia
1 George Street
#07-02
Singapore 049145
Tel: +65 6438 0030