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As the alternative asset space has matured some investors and consultants have been questioning the portion of hedge fund returns attributable to alpha. Do managers actually add value or are they simply providing exposure that is inherent to the investment style? Over the past few years, the academic research has begun to shed light on the debate, and now the press regularly provides commentary highlighting to investors the need to understand this topic.

Hedge Fund Replication is *De Rigeur*

A necessary consequence of this debate is that the argument that hedge funds mostly provide exotic beta implies that they should be replicable. Indeed, hedge fund "replication" has become one of the most fiercely-debated topics in both the hedge fund world and academic finance. Whereas the academic literature on the subject has centered on the appropriate methodology, the motivation for this research is clear: hedge fund replication strategies aim to provide investors a relatively transparent alternative to actively-managed hedge funds, ideally with a more cost-effective fee structure.

Conquest introduced a fund in June of 2004 with exactly this premise: to provide investors access to the beta component of managed futures returns. This fund, being a beta replication strategy, has a fee schedule that is more appropriate for a beta product. The appetite for such a strategy has been demonstrated through the growth in Conquest CTA replication strategy assets, which now exceed $250MM.

Furthermore, over the past year a number of other institutions have begun to market their own strategies in response to marketplace demand. Investment banks such as Goldman Sachs, JP Morgan and Merrill Lynch have introduced their own replication programs, and it is unlikely that interest in this area will abate anytime soon.

Given this market trend and our relatively long practical experience, we feel that it is a good time for a short review of each methodology. Currently the three main types of replication investors are likely to encounter are the following:

1. Factor modeling
2. Distributional replication (“FundCreator”)
3. Mechanical trading rules

Although Conquest believes the latter to be the best investment approach, each methodology will be discussed below.

Factor Modeling

Factor modeling, used by Goldman Sachs, JP Morgan, and Merrill, is the most popular form of replication. Factor model-based funds seek to replicate an index by duplicating its various risk exposures. Commonly-used risk factors include equity and bond index returns, currency returns, implied volatility and credit spreads. The weights of the component factors are typically determined by a regression or optimization procedure wherein the returns of the index are set as a goal.

The following is an example of how a replication strategy could be created:

1. Create a basket of 17 factors that appear to be related to the strategy.
2. Regress an index's returns over the most recent 24 months and select all factors with an absolute weight greater than 20% with the constraint that the total weight must equal 100%.

After the analysis, the resulting strategy might have the following positions:

Position	Weight	Factor
Long	1.5X	European Equities
Long	1X	2s-30s US Treasury Spread
Short	.75X	US Dollar Index
Short	.75X	EUR/USD Implied Volatility

In order to replicate this index, investment positions would then be established corresponding to these weights and would typically be rebalanced on a monthly basis. This example is merely meant to outline the process in very rough terms. In particular, positions may be changed more frequently, with individual factors weights changed at different intervals.

Most forms of factor-based modeling rely on three basic assumptions:

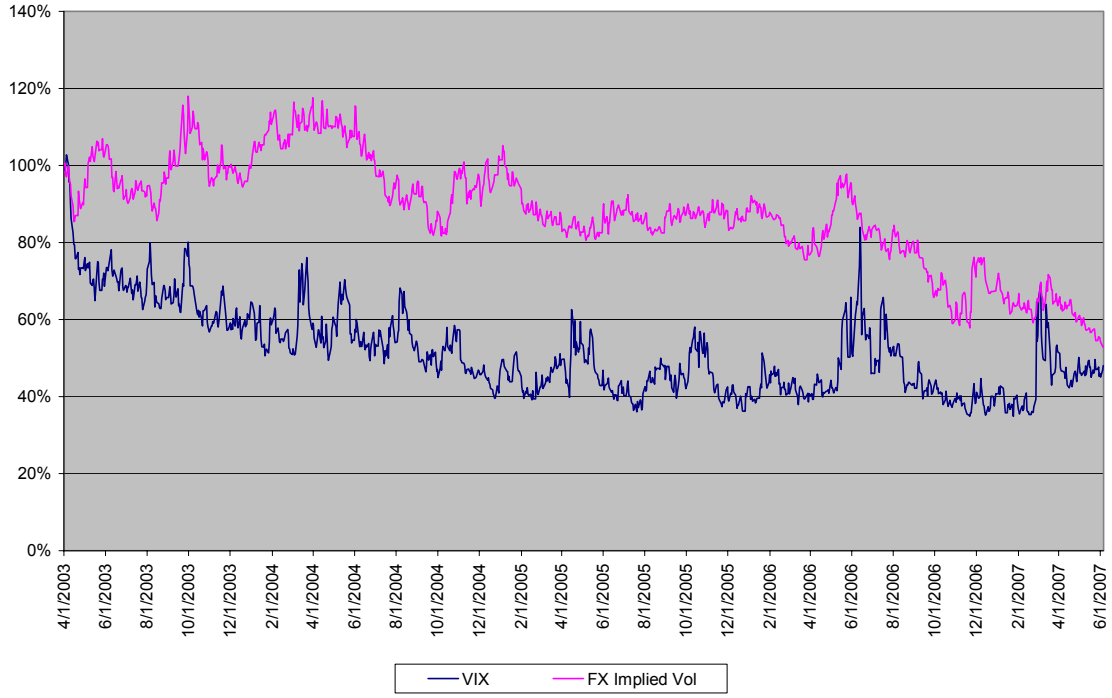
1. That spurious correlations in selecting factors can be minimized or eliminated.
2. That returns may be modeled linearly.
3. That factors are constant within the chosen look-back period -- that is, they are not conditional, switching on and off over time.

The March 2007 Edhec study on replication highlighted precisely these issues and a recent ***FT*** article describes, "Edhec found that backtesting of these models produced results that were 'bad to acceptable' in replicating hedge fund returns, and 'not acceptable' when applied to out-of-sample data. […] Edhec attributed this alleged failure to the difficulty of identifying the right factors, as well as the non-linear nature of hedge fund returns; while having 100 per cent exposure to the equity risk premium half the time

and zero the remainder of the time may yield strong returns, having 50 per cent exposure all of the time may be far less profitable." [2]

We consider the first assumption to be the most problematic, especially when applied to individual hedge fund strategies. One of our first reactions to Goldman's methodology was simply that it is too slow and static, leaving it especially vulnerable when volatility rises. In particular, the hypothetical periods cited throughout much of the presentation are characterized by descending volatility. Figure 1 (below) illustrates this assertion by comparing recent levels of the VIX and FX Volatility since April, 2003:

Figure 1: VIX and FX Implied Vols vs 4/2003 levels



When volatility rises, however, traders change positions more rapidly and risk factors inferred from past periods may quickly be rendered useless. This is especially true when risk factors are recalculated on a monthly basis. Intuitively, it is hard to see how such a methodology could capture the dynamic high-frequency trading that is common in the industry.

It does turn out, however, that the existence of dynamic strategies becomes less important when replicating a broad-based hedge fund index or a fund-of-funds is being replicated,

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[2] FT 2007: Johnson, Steve. May 28, 2007. "FT REPORT – FT FUND MANAGEMENT: Hedge clones 'jumped the gun'":
http://search.ft.com/ftArticle?queryText=edhec&javascriptEnabled=true&id=070528000478
(Accessed June 5, 2007).

as trades may cancel each other out. The more diversified an index is, the easier it is to replicate with factor analysis.

The bottom line is that factor-based modeling is at best a blunt tool for replicating specific hedge fund strategy types -- which are the most interesting since they can provide the most diversification to systemic risk, presumably the reason why investors are interested in hedge funds in the first place.

Distributional Replication ("FundCreator")

While this strategy currently has very little assets employed, the FundCreator approach has been made quite conspicuous by its creator, Professor Harry Kat of City University, London. Unlike factor models, the FundCreator method does not seek to generate the same month-to-month returns as the target index. Instead, FundCreator tries to generate returns with the same statistical properties, namely, standard deviation, correlation to a certain portfolio, kurtosis and skew. The sequence in which the returns arrive is of no concern, nor is the mean return even explicitly targeted.

Professor Kat describes the full process as follows: "the first step is to decide on the return characteristics of the fund to be created, including its relationship with the 'reference portfolio'. When the synthetic fund is meant to further diversify some portfolio, as will typically be the case, then the reference portfolio equals that portfolio, or a good proxy. The next step is the selection of the 'reserve asset'. The latter is the main source of uncertainty in the fund. Although allocations to the reserve asset will change over time, the strategy will never sell the reserve asset short. As such, it can be interpreted as the core portfolio of the fund. Next, we design an exotic option, which, given the bivariate distribution of the return on the reference portfolio and the reserve asset, has the exact same return characteristics as the fund we want to create. Finally, we derive a hedging strategy for the above option. Mechanical execution of this strategy will produce the desired returns." [3]

FundCreator can actually be described as a systematic trading strategy, and, in this sense, does not even deserve its own category. It just happens to optimize for the statistical properties of returns other than the mean. From whence does the mean return come, then? Professor Kat somewhat cryptically answers, "in an efficient market, in the longer run investors will receive a return in line with that risk they have taken."[4] A May 2007 study by Northwater Capital Management sheds considerably more light on the question

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[3] **K&P 2006:** Kat, Harry & Helder Palaro. 2006. "Tell Me What You Want, What You Really, Really Want! An Exercise in Tailor-Made Synthetic Fund Creation". Alternative Investment Research Centre Working Paper No. 36, Cass Business School, City University, London.

[4] **K&P 2006b:** Kat, Harry & Helder Palaro. 2006. "Who Needs Hedge Funds? A Copula-Based Approach to Hedge Fund Return Replication". Alternative Investment Research Centre Working Paper No. 0027, Cass Business School, City University, London.

and concludes that, "Parameters such as volatility and correlation to a target portfolio are robust with respect to the selection of the reserve portfolio; however the mean return is

dependent upon the contents of reserve portfolio. A reserve portfolio with a high Sharpe ratio will tend to produce a replica with a high Sharpe ratio, and a reserve portfolio with a low Sharpe ratio will tend to produce a replica with a low Sharpe ratio."[5] In other words, the mean return comes from the underlying "reserve asset", while the other explicitly targeted moments of the distribution are a result of Professor Kat's dynamic hedging process.

Since investors presumably care about their mean returns, the selection criteria for the reserve asset are rather crucial*, but not public.* In this respect, FundCreator does not satisfy one of the main desiderata of replication: that of transparency. Professor Kat does claim transparency in the sense that "all we do is trade futures and anyone who wants to see what the portfolio looks like can do so at any point in time,"(K&P 2005) but what people normally mean by transparency is the knowing the *rules* of the strategy.

It is also not clear that sufficient precautions were taken to avoid overfitting, and the crucial "payoff function" that maps benchmark to fund returns is no doubt transient. That is, why should the relationship between the reserve assets and the fund or index being replicated remain constant? It is no surprise that Professor Kat found the payoff function kept working in his "out of sample" periods.

Somewhat amusingly, in his response to the March Edhec study on replication, he states that "the FundCreator C++ code currently spans over 17,000 lines."[6] While over-optimization of an undisclosed strategy is impossible to prove with complete certainty, one sign of it is long "quiet times" interspersed with sharp position increases. Whereas a non-optimized strategy works by benefiting from regular market action, an optimized strategy feeds on highly unusual moments. One can fit parameters to make the strategy reap enormous profits from one historic event, but since such an event is unlikely to repeat itself, the results may be misleading. Consider this chart of FundCreator positions in a certain reserve asset:

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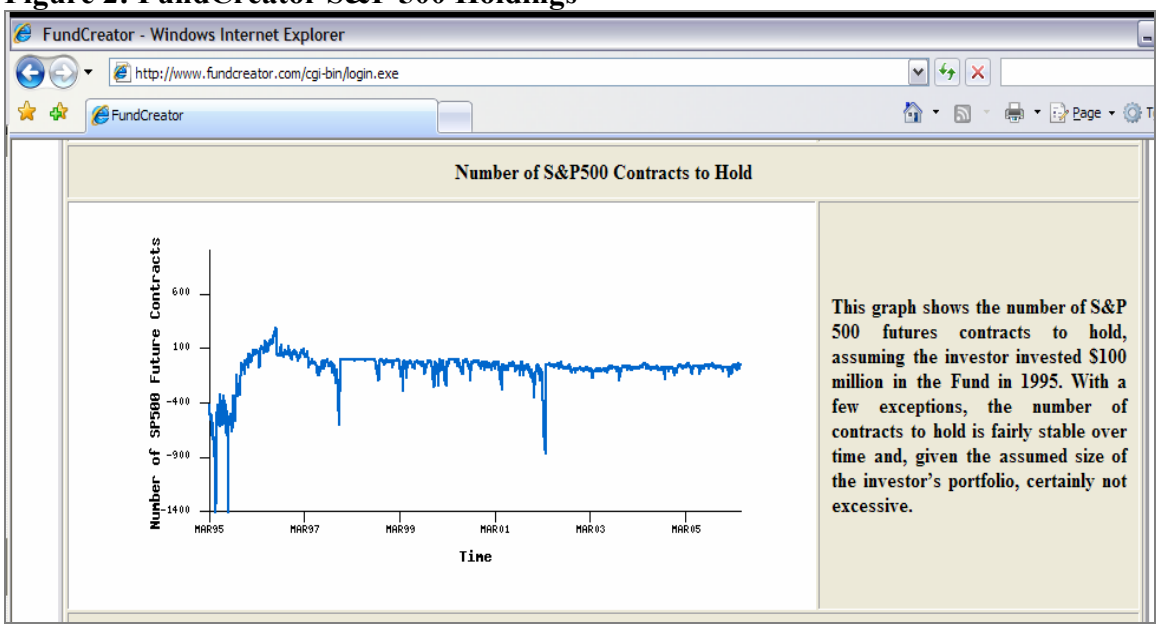
[5] **NCM 2007:** Northwater Capital Management Inc. May 2007. "Northwater Capital Management's Thoughts on Hedge Fund Replication".

[6] **AAA 2007:** AllAboutAlpha.Com. March 15, 2007. "Professor Harry Kat Responds to EDHEC Study on Hedge Fund Replication".

Figure 2: FundCreator S&P 500 Holdings[7]

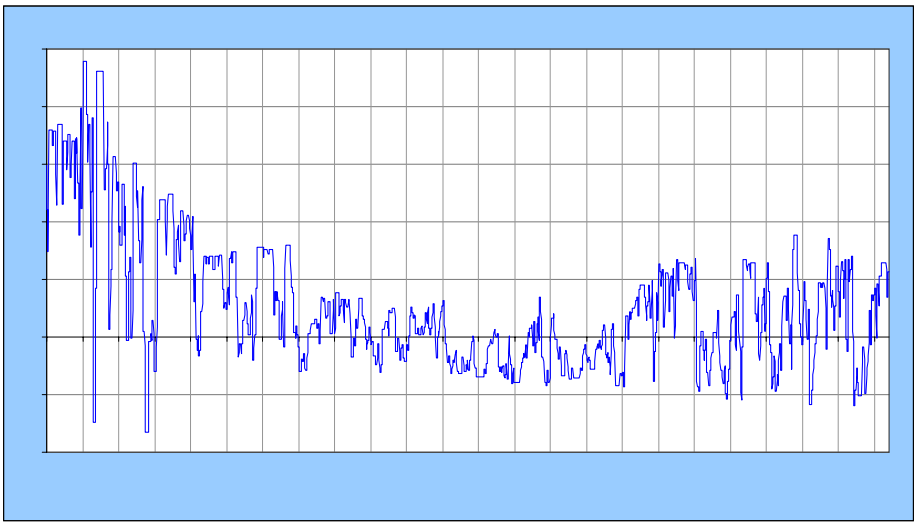


An unusually large position size variance is actually a serious problem for any strategy. A large account becomes excessive for the largest trades and a small account is not large enough to take the smallest trades. In particular, the smaller account sizes creates a troublesome case because the wide range of absolute position sizes makes it difficult to give the strategy the desired exposure level under more common scenarios while keeping the exposure level reasonable when position sizes reach extrema.

For comparison, below is the chart of the S&P 500 position sizes if one were to apply our own Conquest managed futures fund replication strategy to this market. The positions are also based on a $100 mm portfolio and on the actual managed futures fund's equity market weights. As we can see in Figure 3, while positions do swing, the position levels tend to stay within a range, with the absolute sizes in the last several years not going beyond 40 lots.

[7]**Screenshot from FundCreator website:** http://www.fundcreator.com/login.exe; set drop-down menu to "Zero Correlation" and click the Show button; chart is eighth chart from the top (Acessed June 13, 2007)

Figure 3: Conquest's managed futures fund Hypothetical S&P 500 Positions Since 1995



One result that strikes us as especially surprising in this area is Professor Kat's "out of sample" replication of the HFRI Short Selling index from March 1999 through October 2006[8]. Professor Kat achieves a comparable correlation to a 50/50 S&P500/T-bonds portfolio of 53%, but with a mean return of 23.67% vs. 4.15%. We are skeptical how one might consistently, without the benefit of hindsight, select a reserve portfolio that is capable of such a high mean return but is capable of generating a negative correlation to a 50/50 stock/bond portfolio, given that the reserve portfolio, which is composed only of futures, cannot be shorted.

In this vein, we were also confused by the short S&P positions given that the original description suggests that the reserve asset can never be sold short. However, we can reconcile these apparent contradictions by assuming that, although the reserve assets cannot be sold short in a "core" portfolio, they can be sold short by the actively-traded component of the strategy, therein creating a net short position. However, this assumption is conjecture in our attempts to explain what appears to be inconsistent.

With these considerations, FundCreator resembles more of a typical "black-box" system, albeit one disguised with a confusing facade of academic sophistication.

We do not mean to belabor the academic/practical distinction here, but it is our experience that no investor will buy an alternative investment product – a hedge against systemic risk – in which the sequence of returns is "of no real importance". Noel Amenc

[8] **K 2007**: Kat, Harry. 2007. "Alternative Routes to Hedge Fund Return Replication: A Note". Alternative Investment Research Centre Working Paper No. 0037, Cass Business School, City University, London.

of Edhec makes the similar observation: "you cannot say before eight years whether the pay-off replication is satisfactory. That's quite difficult for an investor to be told that each month you will not have the return of hedge funds but, at the end, you will". (***FT*** 2007)

Furthermore, while the correlation to the target index or portfolio may converge over time, correlations to other assets an investor might value will be unpredictable. For example, Northwater Capital Management, in simulating Professor Kat's methodology, has shown that a replicated Edhec short-selling index does accomplish a similar correlation to a 50/50 S&P 500/Bond portfolio, but the actual Edhec index is -78% and -85% correlated to the S&P 500 and Russell 2000 respectively, while the replica is -50% correlated to the S&P *and -3% correlated to the Russell.*[9] This does not sound like the successful replication of a short-selling index.

Professor Kat is a very talented statistician, but even if we cast aside all suspicion of overfitting and ignore the transparency issue, the FundCreator methodology strikes us as not commercially viable. Even if the statistical properties do converge to their targets over the longer term, that the sequence of returns is unimportant increases the likelihood that the replication strategy will fail to cushion the returns under adverse conditions.

Mechanical Trading Rules (The Conquest Approach)

Mechanical trading rules have been our preferred method of replicating benchmarks. Our beta product is completely transparent with extremely simple trading rules. To be fair, trading rules are especially suited to replicate managed futures funds and CTAs.

It is common for a CTA to trade 50 or so relatively uncorrelated markets at any given time. Surely, trying to replicate such a broad-based strategy based with only a handful of factors will be less successful than one that actually trades the characteristic underlying markets. Adding too many factors would introduce the risk of spurious correlations via over-optimization of tangential relationships.

In addition, factor models are much less nimble than our trading rules. A significant portion of these strategies also employ very short term trading horizons. Consequently, a factor model will tend to be too unwieldy and too slow.

Conquest's managed futures fund's track record further confirms that CTAs are replicable and that we have successfully replicated CTA beta. Specifically, Conquest's fund has exhibited correlations ranging from 75% and 85% to the major managed futures indices since its inception in June 2004. While this observation period is admittedly brief, it is still quite long in the context of index replication. Furthermore, that the actual observed correlation is consistent with the hypothetical correlations presents strong evidence that

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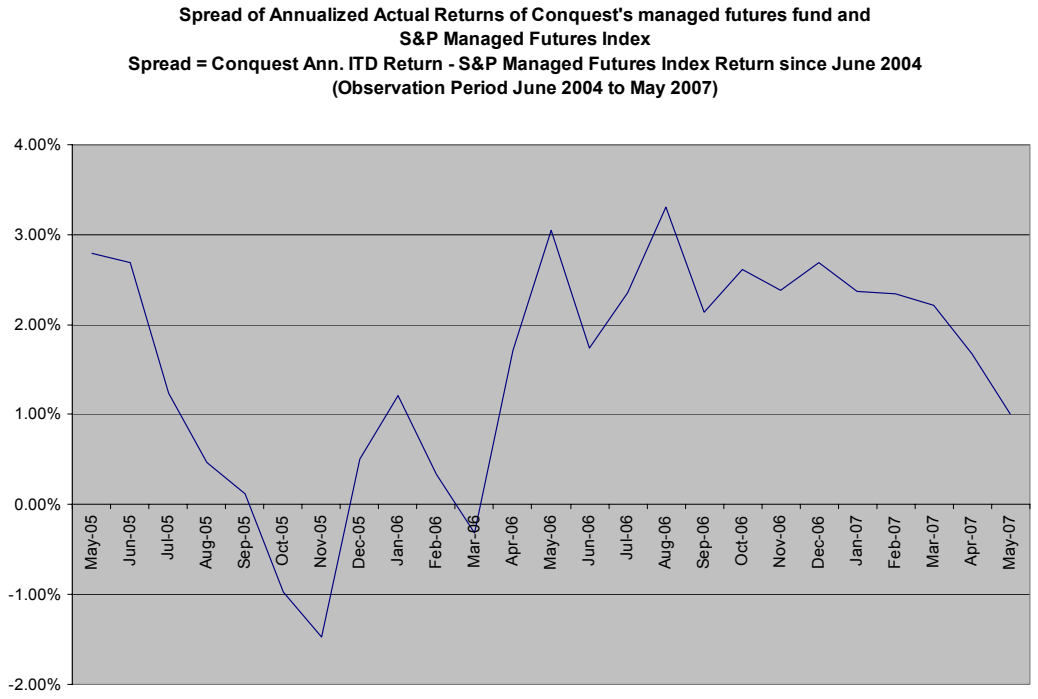
[9] **NCM 2007:** Northwater Capital Management Inc. May 2007. "Northwater Capital Management's Thoughts on Hedge Fund Replication".

Conquest's managed futures fund's strategy is a robust replica of these indices rather than an optimization.

Furthermore, when we compare Conquest's managed futures fund returns to those of the S&P Managed Futures Index (S&P MFI), we see that the gross returns track nicely as well. We selected the S&P MFI as a basis for comparison because it contains a diversified range of best-in-breed managers and because its correlation can be verified over a daily time horizon. Unlike a number of the other indices, S&P publishes daily returns for its Managed Futures Index. Using these returns, we see a daily correlation of 82%, which is comparable to the monthly correlation of 85%. The S&P MFI also makes a good index for comparison because its volatility is similar to that of Conquest's managed futures fund, both historically, and over the past three years.

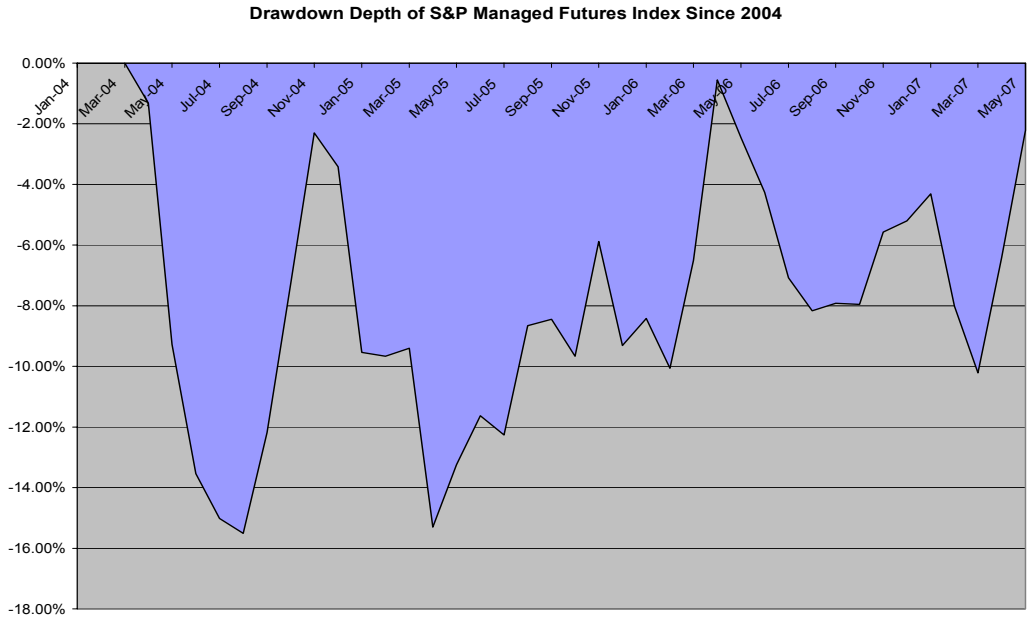
Consider Figure 4 below. We see that the annualized spread between Conquest's managed futures fund and the S&P MFI oscillates around 1%. This result is striking because the spread in annualized returns is the management fee spread between Conquest's managed futures fund and most managers; whereas its managed futures fund charges a 1% management fee and no incentive fee, most managers use a 2/20 fee structure.

Figure 4: Return Spread of Conquest's managed futures fund and S&P Managed Futures Index



The variation in individual manager (and index) returns is expected; CTA managers differentiate themselves from each other by selecting across markets and timeframes. These particular weights account for the relative performance of individual managers over any timeframe. For example, the strong, consistent upward move in base metal prices over the past couple of years has proved very lucrative for managers with large metal allocations. Although the idiosyncrasies of manager returns can make certain managers and strategies appear more attractive in the short run, in many cases these managers do not perform as Conquest's managed futures fund does over longer time horizons.[10] Please refer to **Conquest's Managed Futures Excess Return Study** for more concrete examples of this spread.

Figure 5: S&P Managed Futures Index Has Been in a Drawdown since April 2004



Although the spread is precisely the difference in management fees, one could argue that the S&P MFI returns are dragged down by incentive fees. However, this explanation does not apply because the S&P MFI entered a drawdown from which it has not emerged in April of 2004. As we see in Figure 5, the index as a whole has not crossed its high watermark. While we are aware that incentive fees are applied on a fund-by-fund basis, that the index itself has been in such a drawdown suggests that a significant portion of those returns has been earned without incurring incentive fees.

[10] **Conquest Capital Group's managed futures fund Excess Return Study**, first created in 2006 and now updated quarterly. This study compares manager and index returns to Conquest's managed futures fund returns by setting Conquest's managed futures fund leverage such that its volatility is equal to that of the manager. With nearly all of the managers and indices included in the study, the levered Conquest's managed futures fund strategy outperforms the managers since the manager's inception.

The incentive fee effect on these returns has also not been skewed by index composition turnover. Since its inception in September, 2002, there have been five changes in the S&P MFI. These changes have encompassed the removal of four managers and the addition of two. Four of these changes have occurred since Conquest's managed futures fund's inception. These changes do nothing to contradict the conclusion that drawdowns have shielded the index from incentive fees: the one manager added was in a much deeper drawdown when it joined the index than the three managers that were removed. This new manager is still in a drawdown at the time of publication.

With incentive fees mostly removed from the equation, the return spread implies that the S&P Managed Futures Index and Conquest's managed futures fund have very similar gross returns. Consequently, we consider this 1% return spread to be a lower bound on the spread in net performance. If managed futures returns improve and managers exit their drawdowns, we expect Conquest's managed futures fund's returns to outperform by even larger margins. This expectation is supported by our analysis of the hypothetical returns of the S&P Managed Futures Index.

If we consider both Conquest's managed futures fund and the S&P MFI's hypothetical returns, we are able to draw much more concrete conclusions regarding the effect of incentive fees on the actual returns by backing out an estimate of the gross manager returns. In this case, we looked back to 1998, the earliest published hypothetical returns for the S&P Managed Futures Index and present our analysis in Figures 6 and 7.

Figure 6: Conquest's managed futures fund Sharpe Ratio is nearly double that of S&P Managed Futures Index

Conquest's Managed Futures Fund Returns vs. Net Returns of the S&P Managed Futures Index

	S&P Managed Futures Index	Conquest's Managed Futures Fund Net Returns
Annualized Return	8.64%	12.80%
Annualized Volatility	15.20%	14.49%
Sharpe Ratio (3.5%)	**0.34**	**0.64**

*Pre-Incentive Fee returns of the S&P Managed Futures Index assume a 2% management fee and monthly application of incentive fees.

It is clear from Figure 6 that Conquest's managed futures fund's hypothetical net returns trump those of the index when the index returns are taken net of incentive fees, with Conquest's managed futures fund exhibiting a Sharpe Ratio nearly double that of the S&P MFI. This gap in returns is not surprising and is consistent with our prior statements.

Analyzing these returns over a longer horizon also creates the opportunity to determine whether the excess performance is solely due to the differing fee structure. Using an estimate of the incentive fees and management fees, we can back out gross returns for both Conquest's managed futures fund and the S&P MFI assuming a number of fee scenarios. We depict the results of this exercise in Figure 7.

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Figure 7: Estimated Gross Returns most likely favor Conquest's managed futures fund

Conquest's Managed Futures Fund Returns vs. Estimated Pre-Incentive Fee Returns of the S&P Managed Futures Index*

	Conquest's Managed Futures Fund Gross Returns	Implied S&P MFI Gross Returns (Incentive Fee = 20%)	Implied S&P MFI Gross Returns (Incentive Fee = 25%)	Implied S&P MFI Gross Returns (Incentive Fee = 33.33%)	Implied S&P MFI Gross Returns (Incentive Fee = 37.5%)
Implied Incentive Fee		20%	25%	33.33%	**37.50%**
Annualized Return	13.92%	13.16%	13.94%	15.52%	16.47%
Annualized Volatility	14.49%	16.29%	16.68%	17.50%	18.01%
Sharpe Ratio (3.5%)	**0.72**	0.59	0.63	0.69	**0.72**

*Pre-Incentive Fee returns of the S&P Managed Futures Index assume a 2% management fee and monthly application of incentive fees.

Given the fee structures of the constituents of the S&P Managed Futures Index and the likelihood that some managers would be reaching new highs even as others are in a drawdown, we thought a 20% or even a 25% incentive fee estimate too conservative.

Even with such allowances, however, the 37.5% incentive fee rate required for the S&P MFI and Conquest's fund to have equivalent gross performance suggests that Conquest's fund's returns are superior to those of the index regardless of whether fees are applied.

We also see that the gross Sharpe Ratios are much closer, reinforcing the effect of the fee structure on the returns. When taken in the context of the index's inferior gross and net returns, this performance degradation implies that, although some constituent managers of the index may provide alpha on a gross basis, *the superior gross returns are often insufficient to justify the managers' fee structures in most cases*. This result is consistent with our findings in our managed futures fund Excess Return Study, which covers the majority of the managers included in the S&P Managed Futures Index.

Mechanical Trading Rules Are Not Just Applicable to CTAs

Leaving aside managed futures and CTAs, other beta models we have developed offer total transparency, and furthermore, have a logical basis that may be lacking from other methods. We have done our own research in this vein and have found effective proxies for other strategies.

Furthermore, Conquest is not alone in this endeavor. Bridgewater Associates outlined several hedge fund strategy beta strategies in a well-known 2004 daily note.[11] These simple strategies have logical assumptions and capture much of their benchmarks' beta.

From 1994 through 2003, Bridgewater found that:

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[11] **BW 2004:** Jensen, Greg & Jason Rotenberg. February 13, 2004. "Hedge Funds Selling Beta as Alpha". Bridgewater Daily Observations.

- Emerging market hedge funds, "are over 79% correlated to a simple 50/50 mix of emerging market equities and bonds and are failing to outperform this basic combo"
- "Distressed securities hedge funds match up well to a basic mix of junk bonds and high-yielding emerging market debt." (79% correlation)
- Merger arbitrage funds, "do no better than simply buying the top 10 announced acquirees and selling the top 10 acquirers." (56% correlation)
- Managed-futures hedge funds, "a different type of animal", were replicated with 71% correlation, "with a basic 1-month by 3-month moving average strategy applied to the major futures markets." (During this time period our own managed futures fund achieved an 84% correlation to the Calyon CTA index.)

In a follow-up study[12] from 1994 through April 2005, Bridgewater found that:

- Fixed-income arbitrage strategies, "are 78% correlated to the naïve strategy of being long a simple combo of mortgages, emerging market debt, Eurodollars relative to treasuries, long- vs. short-term treasuries, long high yielding currencies, and short volatility." (This correlation fell to 66% in the January 2007 follow-up study[13], at which time the other strategy proxies cited here had small gains in correlation.)
- Convertible arbitrage fund returns had a correlation of 50% to a naïve strategy of being long a basket of newly-issued convertibles (<6 months old), and a 0.3 delta hedge with the respective equities.

These strategies show that much hedge fund beta is available without relying on complicated strategies prone to overfitting and bad correlations.

To summarize, we find a number of limitations in two of the recently proposed techniques for replicating hedge fund returns. Factor models are not strong in replicating specific idiosyncratic hedge fund styles. FundCreator is suspiciously opaque and impractical. In contrast, mechanical trading strategies such as Conquest's and those described by Bridgewater do not suffer from these difficulties. Finally, Conquest's managed futures fund's three-year track record of actual trading gives investors the added benefit of both transparency and live returns to analyze.

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[12] **BW 2005:** Jensen, Greg; Noah Yechiely & Jason Rotenberg. May 24, 2005. "Hedge Funds Selling Beta as Alpha (An Update)". Bridgewater Daily Observations.

[13] **BW 2007:** Jensen, Greg; Noah Yechiely & Amit Srivastava. January 10, 2007. "Hedge Funds Levering Betas". Bridgewater Daily Observations.

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Other Sources

E 2007: Géhin, Walter. March 18, 2007. "Hedge fund replication and industry initiatives: clones or hybrid products?". http://www.edhec-risk.com/latest_news/Alternative%20Investments/RISKArticle.2007-03-18.4344?newsletter=yes (accessed June 5, 2007)

GS 2007: Goldman Sachs Presentation. 2007. "The Goldman Sachs Absolute Return Tracker Index, Approximating Hedge Fund 'Beta' with Enhanced Liquidity, Transparency and Cost Efficiency".

ML 2006: Merrill Lynch Presentation. October 2006. "Merrill Lynch Factor Index, An Alternative to Investable Hedge Fund Indices".

K&P 2005: Kat, Harry & Helder Palaro. 2005. "Hedge Fund Returns: You Can Make Them Yourself!". Alternative Investment Research Centre Working Paper No. 0023, Cass Business School, City University, London.