How do hedge fund clones manage the real world?

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Abstract

Several hedge fund replication products have been launched over the past three to four years. Consequently a substantial number of products have build up a sufficient track record for performance analysis. This survey investigates the performance of 21 replication funds or indexes over the period April-08–May-09. All three well-known replication techniques are represented by different products. Besides classic performance analysis we investigate replication model risk, enabled by disclosed of backtested return data.

Key words: hedge fund replication, replication products,

1. Introduction

Some years ago hedge fund replication was a much discussed topic on the hedge fund horizon. A credit crunch and some hedge fund Ponzi schemes later, the attention have turned elsewhere. 2008 performance of broad hedge fund indices where dismal at best. This did not bode well for selling pitches to persuade investors to turn to funds which replicate this performance. However, with a more carefully look and what this survey have found, replication

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products have several unique and interesting features, many which where attractive during the crises of 2008.

Replication products claim to replicate, or clone, the returns of hedge funds through a statistical model or algorithmic trading strategy. These models and trading strategies are often backed by academic papers with very promising results. There is an often voiced four-folded advantage of these replication products compared to hedge funds, the clones are more transparent, more liquid, contain no manager specific risk, and charges lower fees than their hedged fund cousins. We argue that the last feature, lower fees, is unilaterally to the benefit of investors as well as true. However when it comes to the other three "advantages" the picture is somewhat more diffuse. Bearing liquidity risk may at times be very beneficial, and it is thus not necessarily a good thing to get rid of it. As will be apparent in the subsequent chapter many approaches to hedge fund replication are very sophisticated and complex and it is not obvious how all of them will give investors transparency or better understanding of what they are investing in. We further argue that replication products also have manager specific risk. Complex models necessarily demands skilled people to manage them.

In this article we will analyze the performance of 21 replication products which are offered by 17 asset management companies. There are three well-known replication techniques and these are all covered by different products. Reality can at times be a though judge on even the most novel financial model. Replication products are unlikely to be an exception, and this survey in particular investigates the model risk of some of these products. This is enabled by the large amount of disclosed backtested data.

We begin by giving a brief critical account of the three approaches used by asset management companies to replicate hedge fund returns. The third section presents and performance analyses and test for model risk of 21 replication funds. The forth section concludes.

2. Approaches to hedge fund replication

There are mainly three approaches to hedge fund replication. The first approach is based on linear regression analysis of hedge fund returns, proposed among others by Jaeger and Wagner (2005) and Hasanhodzic and Lo (2007). The second approach, proposed by Kat and Palaro (2005), is based on dynamic trading techniques to replicate a pay-off, with similar dependence structures as between a hedge fund and an appropriate choice of an investor's

portfolio. The third is a bottom-up approach, which we will refer to as reverse engineering. It aims to isolate broad and fundamental concept of hedge fund strategies and implement these with automated trading algorithms.

2.1. Factor analysis

Hedge fund replication using factor analysis is based on the assumption that the lion's part of hedge fund returns can be explained by a linear relationship to a set of common assets. The first question is of course which these common assets are. While anyone would agree that most hedge funds trade in equity, commodities, and bonds, just including an index derived of these asset classes may be too simplistic. Many strategies are implemented through derivatives which will give non-linear returns relative to the underlying asset. Thus the factor model should include derivative based factors to overcome nonlinearities. This, however, adds enormous amount of new factors to choose form and the selection process is not necessarily straight forward.

The second step in linear replication is to estimate the hedge fund exposure of these which will serve as the portfolio weights of the linear clone. The major problem for this task is scarce availability of data. The model also falls short to account for hedge funds time varying exposure towards asset classes. There are several techniques to increase the degree of flexibility of the model to overcome this. Most notable are Bayesian techniques which have been developed in optimal control theory, like the Kalman or particle filter. Implementing these filters requires significant theoretical knowledge to overcome model caveats and calibration issues. For instance, the filters can easily be over-specified and consequently come up with nice (and heavily data-mined) results.

Linear replication is prone to suffer from spurious correlation. I.e. despite statistical significance of any factor this does not imply causality between the factor exposures and, in this case, hedge fund returns. Liquidity risk and spurious correlation is of particular concern for hedge fund replication. The downside risk of liquidity often goes in tandem with the downside risk of other more liquid asset classes. This was particularly obvious during the second half of 2008. Given the illusive feature of liquidity risk it is quite likely that a replication model cannot properly include a liquidity factor and hence distinguish between hedge fund allocation to illiquid assets and liquid market assets.

Linear replication is best suited to capture aggregate returns (i.e. hedge fund indices) since more idiosyncratic, exotic risk exposures will diminish significantly and simplify the process of choosing appropriate set of factors and factor exposures.

2.2. Dynamic trading

This approach has been proposed by Kat and Palaro in a series of papers (see Kat and Palaro, 2005, 2006ab, among others) and further extended in a paper by Papageorgiou, Rémillard, and Hocquard (2008). Instead of trying to replicate the time-series properties, i.e. the beta exposure, of hedge fund returns as in factor replication they aim at replicating the distributional properties of hedge fund returns relative to a portfolio of common assets. The method is based on Merton's (1973) interpretation of Black and Scholes' (1973) option pricing formula, as a dynamic trading strategy of the option's underlying asset and a risk-free asset to replicate the future option payoff. In Kat and Palaro's setting the option payoff-function which they aim to replicate is the bivariate distribution function of the hedge fund returns relative to an investor's portfolio returns. A natural extension of the model is to, rather than estimating the bivariate distribution using hedge fund data, mathematically define a desirable dependence structure. This, as we shall see in the next section, is also the rout replication product managers have taken.

It is then to some degree questionable to include dynamic trading as a hedge fund replication model. The two replication products in the survey, based on this approach, are neither specifically benchmarked against hedge fund indices nor extract information from hedge fund data. They do however claim to offer distributional properties which are similar hedge fund returns. Since the technique has often been discussed in association with hedge fund replication we have included it in this survey.

The dynamic trading technique creates in essence a derivative which offers specific dependence structures towards the investor's portfolio. As with every derivative its return, or pay-off, is related to the reserve asset, or the underlying security as it can also be referred as. Papageorgiou, Rémillard, and Hocquard (2008) test specifically on the impact of the reserve asset and concludes that it "only" impact the return and not correlation or volatility performance. This highlights the need of adequate securities selection skill to construct a reserve asset. A successfully dynamic trading fund must have

a reserve asset which will yield attractive returns under the required dependence structure.

There are two final remarks worth mentioning regarding this method. First, the theory of dynamic trading presupposes highly liquid markets in order to change the hedging portfolio weights at sufficiently small time intervals. Secondly, the method is in complexity close to an actual hedge fund strategy[1]. The difficulty of selecting a reserve asset as well as these two final remarks will require substantial due diligence process for investors seeking investments in this approach and question if this form of hedge fund replication offers a particular high level of transparency.

2.3. Reverse engineering

This third approach of hedge fund replication is as the name implies an attempt to implement well-known and well-understood hedge fund strategies with relatively simple (and low-cost) trading algorithms. Reverse engineering is distinctly different from the other two replication methods in that it does not try to distill statistical patterns of hedge fund return series but actually implement hedge fund strategies.

Reverse engineering hedge fund strategies is in many cases backed by academic research. One example is Mitchell and Pulvino (2001) who investigate merger arbitrage strategies. This strategy bets on the outcome of merger negotiations between two companies where there is a spread on the target firm's current stock price and the bid price from the acquire and if the merger is successfully consummated this spread will disappear. To hedge market risk and only earn returns from the contraction of the spread, the strategy hold a long position in the target firm and short the acquiring firm. Since most merger deals are successfully consummated, the informational advantage gained by analyzing merger deals and evaluating probabilities of a successful deal may be too small compared to a rule based approached where the strategy is executed on all merger deals. Mitchell and Pulvino (2001) constructed a data set of all merger deals over the period 1963-1998 and found that a merger arbitrage strategy, as described above, employed on all deals in the data set, do explain a significant part of merger arbitrage hedge fund returns.

[1]Kat writes on AllAboutAlpha.com that in total, there is ten years of work behind their implementation of the replication scheme. Implementing a sophisticated version of factor analysis should be possible with six month of work.

Durate, Longstaff, and Yu (2007) investigate risk and return characteristics from five fixed-income arbitrage strategies which they are able to define by rules in a similar approach as in Mitchell and Pulvino (2001). They find three of these strategies to generate significant alpha, after adjusting for equity and bond risk as well as explaining substantial parts of fixed income arbitrage hedge fund returns.

Since these two articles conclude that they capture meaningful parts of hedge funds returns a naturally consequence is to combine reverse engineered trading strategies with factor analysis to estimate the degree any hedge fund employ these. While this has not been investigated at any great length in academic articles many companies have combined the two approaches of replication.

3. The replication products

Most companies involved with hedge fund replication have launched a flagship replication index and offers investable funds to track these as well as related structured products. This section will take a closer look at 21 funds and indices, listed in table 1, which are based on any of the replication models outlined above.

Fees for many replication investment vehicles vary depending on investment horizon and client group. Most products charge a flat fee of 1-2% on asset under management. Some companies, like Fulcrum Asset Management differs on this point by charging fund of funds like fees of 1% on AUM and 10% on performance, abbreviated 1/10. The overall trend is still to charge significantly lower than the 2/20 charged by hedge funds combined with the 1/10 charged by fund of funds.

From the providers of hedge fund replication products there seem to be a general consensus that replication products will bring better liquidity and lower fee's to asset managers seeking hedge fund like returns. However companies do differ on the issue if replication products will only complement hedge fund portfolios or even replace hedge fund investments. Some as SGI, Innocap and Credit Suisse seek to complement hedge fund portfolios and offers shortable versions of their products as a mean to hedge hedge fund exposure. This is indeed a contestable proposition, but given the liquidity problem of hedge fund investments it offers asset managers the possibility to hedge for example duration mismatches, from the point they desire to redeem fund shares up until this is realized. Other companies such as Blue White

Alternative Investments and Fulcrum Asset Management do not offer shortable versions of their products, instead they target to be a replacement for hedge fund investments and emphasize this position by benchmarking their products to outperform hedge fund composite indices on a risk-adjusted basis.

The AUM of the industry is hard to estimate for several reasons. The redemption waves which hit hedge funds last autumn was especially targeted towards replication funds, with replication products recieving redemptions on as much as 80% of their AUM. Not necessarily due to bad performance but because they offered the best liquidity. On the other hand this same period caused large inflows to shortable replication products which subsequently were dis-invested when markets stabilized in 2009. Anecdotal evidence suggests that a conservative lower bound on the aggregate AUM of the replication space is around 2 billion USD. To be compared with the hedge fund industry that managed an estimated $1.4 trillion at the end of 2008 according to Hedge Fund Research.

Of the replication products we investigate 13 are based on factor analysis, 4 on rule based, 2 on a combination of factor analysis and rule based, and 2 on dynamic trading. 4 products state a specific benchmark and of these 3 are based on factor replication and 1 on reverse engineering. In line with the notion that factor analysis is best suited to capture the aggregate performance of the industry, two companies, Société Générale and Innocap, are confirmed to use optimal control theory in the form of Kalman filter or variations thereof to enhance the ability to capture time-changing properties of hedge fund risk and return characterizes. In our interviews with replication products team the current trend for new launches is towards highly sophisticated mathematical models, often where reverse engineering approaches complement factor analysis.

Many companies have close collaboration with academics. Two companies (Credit Suisse and JP Morgan) in this survey collaborate with Professors Fung, Hsieh, and Naik. Of our knowledge this trio also collaborates with two other companies (State Street Global Advisors and Blue White Alternative Investments) which are not included in this survey.

The distribution approach, as mentioned in the previous section, does not necessarily have to be directly targeted to replicate hedge fund performance. This is also the case for the two funds included in this survey. Aquila Capital's fund for example states that they target zero correlation towards equities, 7% volatility, and 11% annual returns.

3.1. Performance

Table 2 present some performance statistics for all replication products. Data has been collected from Bloomberg, except for Barclays Capital and Société Générale which have been collected from their company webpage. We have chosen a fixed sample period, Mar–2008 to May–2009, to facilitate comparisons between replication products. While being unsatisfactory short, this was the longest achievable sample period where all replication products where operating live.

The return distributions are indeed heterogeneous among the set of replication products. Annualized mean varies from -27.0% to 3.6% (disregarding shortable products) and annualized standard deviation, or risk, varies from 5.0% to 22.9%. Tail-risk seems to be significant in many products as proxied by kurtosis. This measure is as high as 34 for one product (Morgan Stanley's), and for most other products far from 3 which holds for the normal distribution.

Performance of some equity and hedge fund indices are presented in the lower panel of table 2. In the light of these, most replication products have performed relatively well. All products outperform the US and international equity indices, S&P 500 and MSCI EAFE respectively. As many as 13 replication products outperform all the aggregate hedge fund indices. Many times however with more volatility.

The shortable version of products, when these exist[2], have performed well in that they seem to mirror the negative returns of their long product version. The sole exception is Société Générale's product pair, these two seems instead to have equal performance. Société Générale was not available for a comment on this.

Correlation towards various asset class indices is presented in table 3. There is high correlation towards small and large cap equity and international equity across most replication products. Correlation towards hedge fund indices is relatively high for many products. This is an indication that replications do indeed achieve its aim as a substitute for hedge fund investments. However, correlation towards hedge fund indices is not a necessary proxy for the success of replication products. As already mentioned some products do not benchmark against any specific index but rather aim for

[2]Barclays Capital have launched a short version of their replication index in early 2009, due to short live track record it is omitted.

absolute returns, which the hedge fund indices listed here have not deliver. Three products—from Aquila Capital, Ice Capital, and Fulcrum—stand out with never more than 20 % correlation against any equity or hedge fund index.

Gupta, Szado, and Spurgin (2008) investigate some replication products, many similar to these investigate here, over the period August 2007 to July 2008. They find that these products exhibit low correlation towards the investable HFRX global index. They fail however to further investigate the correlation towards non-investable indices which in many cases are the indices that products are benchmarked against. Table 1 show that correlation towards non-investable HFRI composite and fund of funds indices are relatively high. These differences in correlation are somewhat surprising but given the relatively poor performance of investable hedge fund indices this result is not of much concern for hedge fund replication products.

Figure 1 and 2 present the cumulative returns of all replication products as well as the S&P 500 and HFRI Fund Weighted Composite in six different plots over the period April 2008—May 2009. As can be deduced from these figures all replication products performed better then US equity over the sample period. At the same time, some products where suspiciously close to this index rather than the HFRI index. On the whole the plots still indicate that replication products have performed well in comparison to the HFRI composite index.

Given the small sample of products it is not possible to come to any conclusive judgment of whether any replication technique is preferable. It is as well difficult to discern any performance pattern with respect to the factor and reverse engineering replication technique. However, the two based on distribution approach are singled out as to have the highest returns and belonging to the group of four products with the lowest volatility.

Having a big well-known firm (and all their resources) behind a replication product does not seem to push the performance in any certain direction. Deutsche Bank's product has the second worst annualized return. Of the top five products, ranked by return and disregarding shortable products, four where developed by smaller asset management firms.

3.2. Model risk

With any statistical trading method there is a risk that backtested data may present results which are a bit too polished and will not be reproduced when the trading method is operating live on world markets. There is an

opportunity to investigate model risk in the case of replication products since eleven of the products in this survey disclose backtested data. The objective is to investigate whether there is any statistical difference between the backtested return series of the product and the live return series. Recent years dislocation in financial markets must however be taken into account since this coincide with the inception of many funds. Comparing backtested and live return series would not give much creditable results. Hence, it is appropriate to adjust return series for common market fluctuations. We make the adjustment by simply subtracting the return of a benchmark index from the replication fund return. In the case of shortable products, the negative monthly returns are subtracted.

The mean and volatility (in brackets) of the return series for the eleven replication products with backtested data is presented in table 4. For sake of clarity—the volatility figures in this table are more well-known as the tracking error. The table also present results of a two-sides Kolmogorov-Smirnov goodness-of-fit test (see Massey, 1951) on the backtested data sample relative to the live data sample on each replication product and benchmark. The null hypothesis is that two independent random samples are drawn from the same continues distribution. Rejection of the hypothesis is marked with a star.

The two first columns in table 4 state the backtested and live sample periods of each fund, note that the periods varies significantly between funds. The two following columns present fund return series benchmarked against the HFRI fund of fund index and Credit Suisse/Tremont Composite index, and if available the provider-reported benchmark of the replication product.

The raw numbers from table 4 speak in general in favor of replication funds. Most replication funds outperform hedge fund indices over the live sample period. However, the volatility, or monthly tracking error, is often comparatively high with above 1.5% on a monthly basis. Based on the Kolmogorov-Smirnov test, only J.P. Morgan's and Deutsche Bank's replication products exhibit significantly different distributional properties between backtested and live sample data on both of these indices.

All in all, this section finds little evidence of model risk with these eleven replication products.

4. Conclusion

This survey has found that hedge fund replication products seem to deliver competitive performance relative to hedge funds. Most importantly

they are able to deliver this at a far lower fee level than hedge funds. Many products seem to meet up with their promise of low correlation towards market indices. All of them fall short of delivering absolute returns, but neither did hedge funds over the sample period. Benchmarked against hedge fund indices many replication products do indeed perform very well.

There is however some worrying examples of failures among the products we investigate. These exhibit very high correlation to market indices and seem not to be able to capture attractive risk-return structures of hedge funds. This calls for caution from investors to thoroughly evaluate the models of replication products.

The tumultuous second half of 2008 in finical markets highlighted the benefits of good liquidity in replication products. The ability to hedge hedge fund exposure through shortable replication products when redemption is not possible proved valuable during this period as well. Going forward, however, the lack of liquidity risk may prove be costly on returns.

Investors should also question the promise of better transparency in replication products. The trend seems to be that replication models are becoming increasingly complex and it is necessarily a need to also understand why models allocate to certain assets. The distribution approach is a case in point. While the products in this survey indeed have generated the best performance it is not in our view straight forward to understand under which market conditions this method will deliver high returns.

While we conclude with results over all in favor of hedge fund replication products, the sample period has to be taken into consideration. It is first of all relatively short and more importantly it only covers a very though economic cycle. If replication product is a conservative asset in general it is little surprise that they have outperformed hedge funds.

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Company	Index/Fund name	Replication method	Inception	*Annulazied since incp.* Mean	S.D	AUM (mio)	AUM reported
Barclays Capital	BC-Long Barclays Alternatives Replicator Index	Factor analysis	1-Oct-07	−0.016	0.046		
Credit Suisse	CS-Long/Short Equity Replication Index	Factor analysis	3-Mar-08	−0.042	0.221		
Credit Suisse	CS-Inverse Long/Short Equity Replication Index	Factor analysis	3-Mar-08	0.002	0.218		
Concept Fund Solutions	CON-DB Alternative Return Fund	Factor analysis	11-Jul-07	−0.243	0.208		
Goldman Sachs	GS-Aboslute Return Tracker Index	Factor analysis	1-Mar-07	0.006	0.113		
IceCapital Fund Management	ICE-Alternative Beta Fund	Factor analysis	19-Mar-07	−0.055	0.122	EUR 20	Jul-09
Innocap Investment Management	IC-Salto Index	Factor analysis	3-Jul-07	−0.071	0.094		
Innocap Investment Management	IC-Verso Index	Factor analysis	2-Mar-07	0.055	0.086		
JP Morgan	JP-Alternative Beta Index	Factor analysis	12-Feb-07	0.003	0.078	USD 1000	Jul-09
Merrill Lynch	ML-Factor index	Factor analysis	3-Apr-06	0.021	0.083		
Société Générale	SGI-Alternative Beta Index	Factor analysis	1-Mar-07	−0.033	0.120		
Société Générale	SGI-Alternative Beta Shortable Index	Factor analysis	1-Mar-07	−0.046	0.122		
Deutsche Bank	DB-Absolute Return beta Index	Rule based	1-May-07	−0.176	0.201		
Fulcrum Asset Management	FLC-Alternative Beta Fund	Rule based	17-Oct-07	−0.001	0.066		
Index IQ	IQ-Hedge Composite Beta Index	Rule based	31-Oct-07	−0.042	0.140		
Rydex SGI	RYD-Multi-Hedge Strategies Fund	Rule based	19-Sep-05	−0.054	0.114		
Morgan Stanley	MS-altera Index	Factor analysis/ Rule based	1-Aug-07	0.017	0.092		
Partners Group	PG-Alternative beta strategies Index	Factor analysis/ Rule based	6-Oct-04	0.022	0.116		
Aquila Capital	AC-Statistical Value Market Neutral 7 Vol Fund	Distribution approach	5-Feb-08	0.032	0.088	130 EUR	Jul-09
Desjardins Global Asset Management	DGAM-Synthetic Alternative Investment Fund	Distribution approach	29-Jun-07	0.003	0.054		

Table 1 − *List of replication products with some general information.*

	Annual			*Monthly*					
	Mean	S.D.	Sharpe	Min	Max	Kurt.	Skew.	ρ_1	ρ_2
BC-Long Barclays Alternatives Replicator Index	−0.024	0.050	−0.49	−8.3	3.5	6.8	−0.4	−5.1	−3.6
CS-Long/Short Equity Replication Index	−0.052	0.221	−0.24	−7.4	3.9	9.4	0.9	−20.6	−17.1
CS-Inverse Long/Short Equity Replication Index	0.013	0.218	0.06	−4.2	6.7	8.4	−0.8	−20.5	−16.0
CON-DB Alternative Return Fund	−0.273	0.227	−1.20	−15.0	5.4	7.9	−0.5	−14.8	−10.1
GS-Aboslute Return Tracker Index	−0.070	0.120	−0.58	−6.7	4.2	8.3	−0.1	−5.5	−14.9
ICE-Alternative Beta Fund	−0.026	0.147	−0.17	−8.5	7.2	8.4	0.2	−0.9	−13.4
IC-Salto Index	−0.127	0.110	−1.15	−8.4	2.6	7.3	−0.5	5.9	−12.3
IC-Verso Index	0.124	0.108	1.14	−2.4	8.5	6.3	0.3	12.5	−12.7
JP-Alternative Beta Index	−0.015	0.090	−0.17	−6.3	4.8	5.1	−0.3	0.3	7.6
ML-Factor index	−0.035	0.109	−0.32	−6.4	4.8	5.7	−0.1	6.3	1.2
SGI-Alternative Beta Index	−0.107	0.143	−0.75	−8.0	2.7	12.1	0.3	−42.5	17.8
SGI-Alternative Beta Shortable Index	−0.107	0.153	−0.70	−9.1	3.8	9.2	−0.1	−31.4	13.5
DB-Absolute Return beta Index	−0.222	0.229	−0.97	−11.9	4.4	8.8	−0.3	−23.2	−10.0
FLC-Alternative Beta Fund	0.020	0.067	0.30	−2.2	5.4	2.6	0.4	15.7	15.4
IQ-Hedge Composite Beta Index	−0.039	0.151	−0.25	−9.6	6.2	8.9	0.3	−3.7	−16.0
RYD-Multi-Hedge Strategies Fund	−0.166	0.170	−0.97	−11.2	3.2	8.6	0.2	−12.4	−11.8
MS-altera Index	−0.051	0.105	−0.48	−8.2	3.5	34.4	0.9	0.9	−23.5
PG-Alternative beta strategies Index	−0.113	0.144	−0.79	−8.0	6.1	7.3	−0.1	−11.9	−3.9
AC-Statistical Value Market Neutral 7 Vol Fund	0.036	0.089	0.41	−3.5	3.6	6.1	0.3	−7.5	−10.0
DGAM-Synthetic Alternative Investment Fund	0.025	0.050	0.50	−1.6	3.7	3.1	0.8	30.1	−0.7

	Mean	S.D.	Sharpe	Min	Max	Kurt.	Skew.	ρ_1	ρ_2
S&P 500	−0.303	0.421	−0.72	−16.9	9.4	5.6	−0.0	−15.6	−14.9
MSCI EAFE	−0.349	0.359	−0.97	−20.2	12.3	6.0	−0.1	8.0	−11.7
C.S/Tremont Composite	−0.108	0.109	−0.99	−6.8	4.0	2.5	−0.6	59.4	21.7
HFRI Fund Weighted Composite	−0.091	0.145	−0.63	−11.3	5.1	3.9	−1.0	56.6	15.8
HFRI Fund of Funds Composite	−0.122	0.228	−0.53	−17.4	6.4	4.3	−1.4	59.4	10.8
HFRX Equal Weighted Strategies	−0.164	0.048	−3.39	−9.9	2.3	13.3	−1.2	28.6	16.6

Table 2 – *Performance statistics. (March-2008–May-2009)*

	SP500	RSL2000	EAFE	CMDTY	BOND	CS/T	HFRI	HFRI FoF	HFRX
BC-Long Barclays Alternatives Replicator Index	**73**	**64**	**77**	**70**	−19	**88**	**89**	**81**	**53**
CS-Long/Short Equity Replication Index	**76**	**66**	42	38	−23	**81**	**75**	**83**	40
CS-Inverse Long/Short Equity Replication Index	**−76**	**−66**	−41	−38	23	**−81**	**−74**	**−83**	−39
CON-DB Alternative Return Fund	**74**	**61**	**57**	46	−23	**84**	**93**	**81**	44
GS-Aboslute Return Tracker Index	50	39	**84**	**66**	−9	**73**	**78**	**72**	44
ICE-Alternative Beta Fund	7	9	6	13	−9	24	22	21	3
IC-Salto Index	**80**	**72**	**79**	**67**	−14	**82**	**90**	**81**	**55**
IC-Verso Index	**−78**	**−71**	**−80**	**−66**	10	**−83**	**−88**	**−82**	**−56**
JP-Alternative Beta Index	−1	−6	**59**	38	3	**88**	**84**	**83**	43
ML-Factor index	35	29	**90**	49	6	**80**	**81**	**80**	**50**
SGI-Alternative Beta Index	**60**	**54**	43	35	−22	**78**	**90**	**76**	29
SGI-Alternative Beta Shortable Index	**63**	**57**	44	37	−19	**82**	**92**	**81**	30
DB-Absolute Return beta Index	**78**	**65**	**56**	43	−24	**82**	**90**	**79**	45
FLC-Alternative Beta Fund	1	0	4	34	31	13	−3	14	18
IQ-Hedge Composite Beta Index	**80**	**68**	**69**	**58**	−0	**75**	**70**	**76**	**55**
RYD-Multi-Hedge Strategies Fund	**93**	**85**	**53**	45	−18	**70**	**71**	**69**	48
MS-altera Index	**53**	49	**58**	37	−11	**82**	**71**	**74**	49
PG-Alternative beta strategies Index	**83**	**77**	**50**	36	−14	**74**	**63**	**75**	**51**
AC-Statistical Value Market Neutral 7 Vol Fund	−2	−4	−9	−12	7	−22	−25	−40	−5
DGAM-Synthetic Alternative Investment Fund	**70**	**56**	**81**	**77**	**51**	**66**	**64**	49	**58**

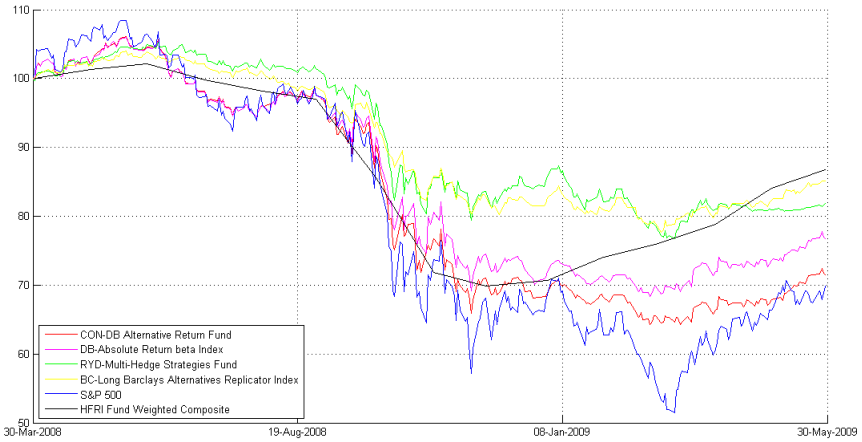
	SP500	RSL2000	EAFE	CMDTY	BOND	CS/T	HFRI	HFRI FoF	HFRX
S&P 500	**100**	**93**	47	35	−24	**67**	**74**	**67**	33
MSCI EAFE	47	38	**100**	**56**	8	**76**	**76**	**74**	**53**
C.S/Tremont Composite	**67**	**60**	**76**	**85**	**52**	**100**	**90**	**87**	**91**
HFRI Fund Weighted Composite	**74**	**69**	**76**	**82**	41	**90**	**100**	**88**	**94**
HFRI Fund of Funds Composite	**67**	**62**	**74**	**68**	**61**	**87**	**88**	**100**	**94**
HFRX Equal Weighted Strategies	33	25	**53**	40	12	**91**	**94**	**94**	**100**

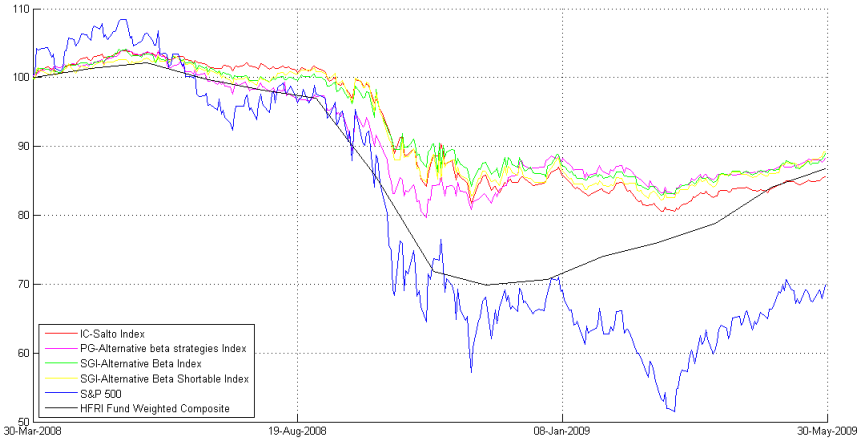
Table 3 – *Correlation towards various indices (March-2008–May-2009). Any correlations below -50% or above 50% are set in bold. The last four columns are more precicly the C.S/Tremont Composite, HFRI Fund Weighted Composite, HFRI Fund of Funds Composite, and HFRX Equal Weighted Strategies.*

Monthly excess returns of replication products

			HFRI Fund of Funds		CS/T. Composite		Benchmark	
	Backtested	*Live*	*BT*	*Live*	*BT*	*Live*	*BT*	*Live*
BCL-ALT REP (Std.)	Dec96–Sep07	Oct07–May09	0.05 (1.92)	0.17 (3.58)	−0.09 (1.43)	−0.06 (1.41)		
CS-L/S	Jan98–Feb08	Mar08–May09	0.33 (3.07)	0.42 (3.34)	0.22 (2.24)	0.46 (2.13)	0.00 (1.66)	0.24 (1.72)
CS-L/S INV	Jan00–Feb08	Mar08–May09	0.27 (2.78)	−0.67 (3.89)	0.40 (1.88)	−0.71 (1.97)	0.30* (1.52)	−0.50* (1.78)
GS-ART	Jan97–Feb07	Mar07–May09	−0.10 (1.77)	0.60 (3.54)	−0.16 (1.58)	0.21 (1.68)		
IC-SAL	Jan00–Jun07	Jul07–May09	−0.14 (1.38)	0.23 (3.68)	−0.21 (0.96)	−0.07 (1.69)		
IC-VERS	Jan00–Feb07	Mar07–May09	0.43 (1.44)	−0.05 (3.27)	0.46 (1.02)	0.36 (1.53)		
JP-ALB	Feb98–Jan07	Feb07–May09	−0.27* (1.60)	0.60* (2.92)	−0.29* (1.58)	0.20* (1.53)		
ML-FCTR	Jan03–Mar06	Apr06–May09	0.54 (1.19)	0.34 (2.68)	−0.09 (0.65)	0.08 (1.43)	−0.12 (1.09)	0.46 (1.74)
SGI-ALT	Jan97–Feb07	Mar07–May09	−0.06 (1.89)	0.32 (3.37)	−0.12 (1.88)	−0.07 (1.60)		
SGI-ALT SHT	Jan04–Feb07	Mar07–May09	0.89 (1.58)	−1.02 (7.30)	1.34* (1.96)	−0.62* (5.27)		
DB-ARB	Dec01–Apr07	May07–May09	0.47* (1.27)	−0.79* (3.31)	0.16* (0.74)	−1.09* (2.56)		
MS-ALT	Jan00–Jul07	Aug07–May09	0.05* (1.39)	0.90* (3.74)	−0.02 (1.10)	0.58 (1.70)		

Table 4 – *The top panel present monthly excess returns (and standarddeviations in brackets) of clones realtive to a hedge fund index benchmark on backtest (BT) and Live (Live) data. The standardeviation in brackets are perhapse more familiar as the tracking error relative to the index. Any pair of excess returns with a star indicates rejection of a two-sample Kolmogorov-Smirnov test on a 95 % level for the the backtested and live return distributions. The rejection implies that they are not derived from the same continuous distribution. The lower panel presents the linear correaltion of clones realtive to HFR indices on backtested and live data.*





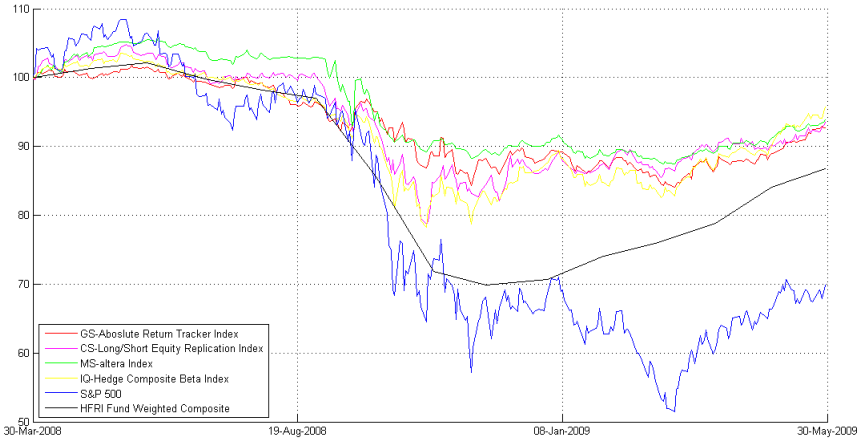


Figure 1 – *Cumulative returns of replication products*

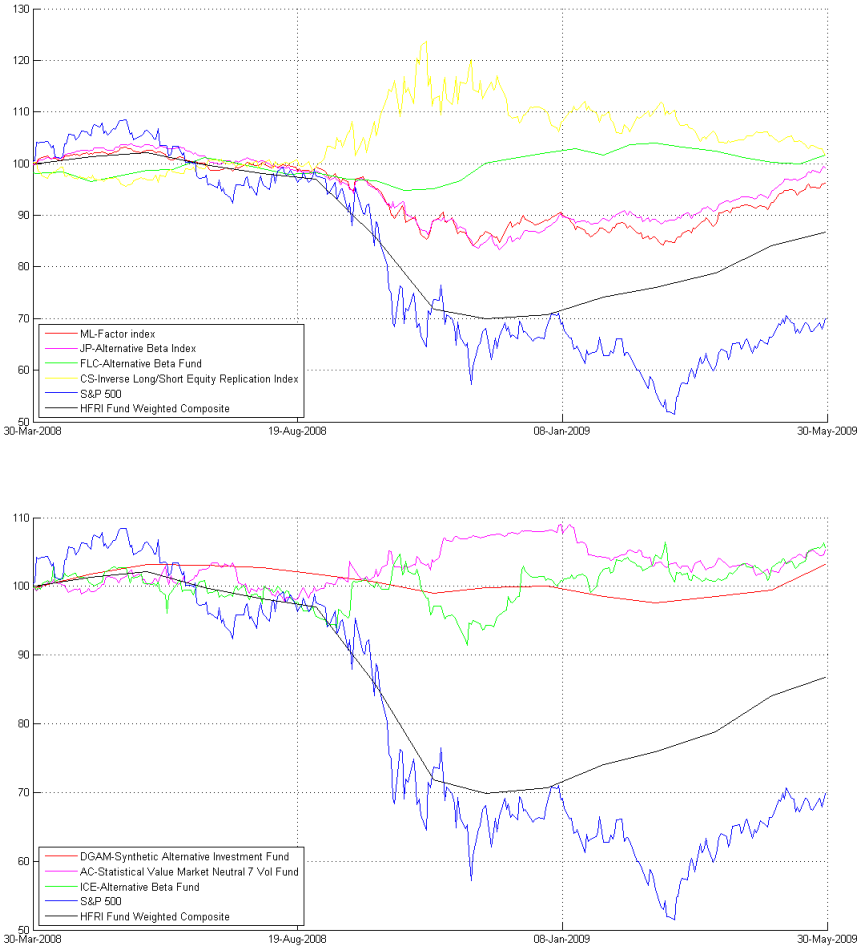


Figure 2 – *Cumulative returns of replication products*