

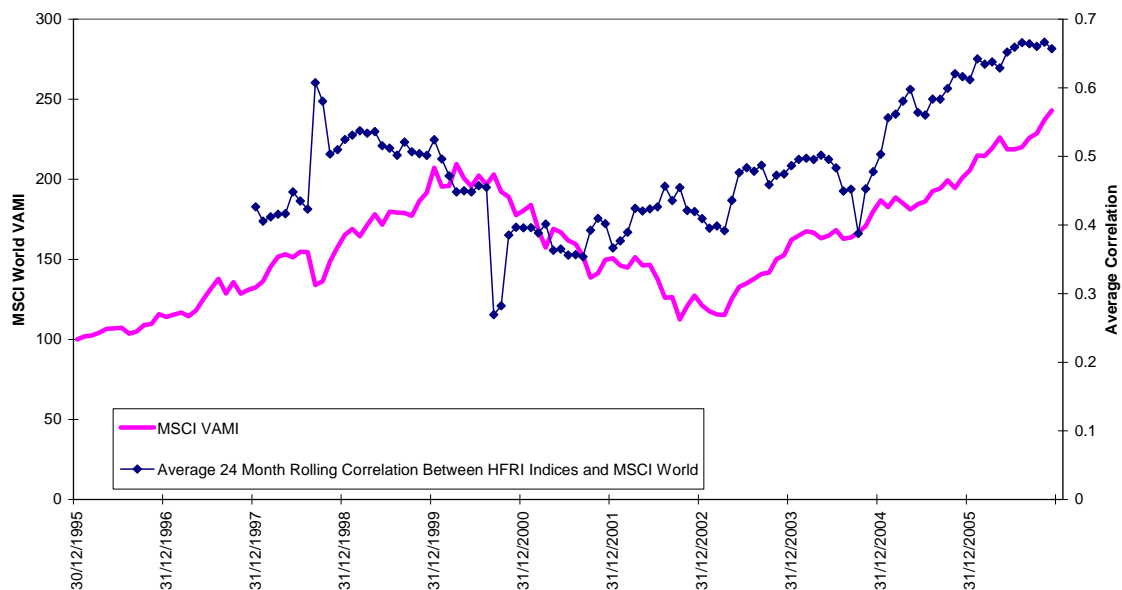


## Hedge Funds, Equities and Downside Protection

Nearly all research performed on hedge funds underlines the low correlation of hedge fund returns to traditional asset classes (see amongst others Kat (2005), Fung and Hsieh (1999), Liang (1999)). In recent years however, a significant increase in the co-movement between Hedge Fund returns and the returns of traditional asset classes has been observed. This has significant implications in terms of the use of hedge funds as diversifiers to traditional asset classes and also the portfolio diversification effects within a fund of hedge funds.

Figure 1 shows that the average correlation between Hedge Fund Style Indices<sup>1</sup> and the MSCI World Index<sup>2</sup> has increased significantly in the last two and a half years. More importantly, the average correlation is higher than it has ever been in this sample (January 1996 – November 2006)<sup>3</sup>.

**Figure 1: Average 24 Month Rolling Correlation Between HFRI Style Indices and World Equities**



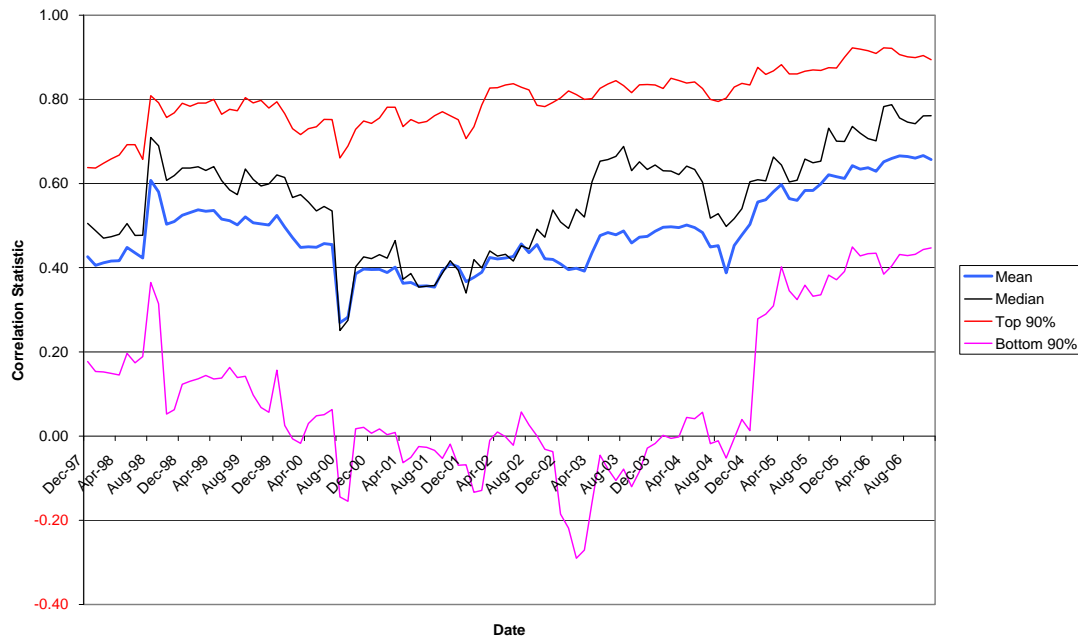
<sup>1</sup>HFRI Convertible Arbitrage Index, HFRI Distressed Securities Index, HFRI Emerging Markets: Asia Index, HFRI Emerging Markets: Eastern Europe/CIS Index, HFRI Emerging Markets: Global Index, HFRI Emerging Markets: Latin America Index, HFRI Equity Hedge Index, HFRI Equity Market Neutral Index, HFRI Equity Non-Hedge Index, HFRI Event-Driven Index, HFRI Fixed Income: Arbitrage Index, HFRI Fixed Income: Convertible Bonds Index, HFRI Fixed Income: Diversified Index, HFRI Fixed Income: High Yield Index, HFRI Fixed Income: Mortgage-Backed Index, HFRI Macro Index, HFRI Market Timing Index, HFRI Merger Arbitrage Index, HFRI Regulation D Index, HFRI Relative Value Arbitrage Index, HFRI Sector: Energy Index, HFRI Sector: Financial Index, HFRI Sector: Health Care/Biotechnology Index, HFRI Sector: Miscellaneous Index, HFRI Sector: Real Estate Index, HFRI Sector: Technology Index, HFRI Short Selling Index.

<sup>2</sup>This is the MSCI The World Index – Gross taken from PerTrac.

<sup>3</sup>Because of the known problems of the mean statistic we present the median minimum 90% and maximum 90% of the HFRI Indices correlations in Figure 2. The result of increased correlation in recent years is confirmed even when we examine these measures.

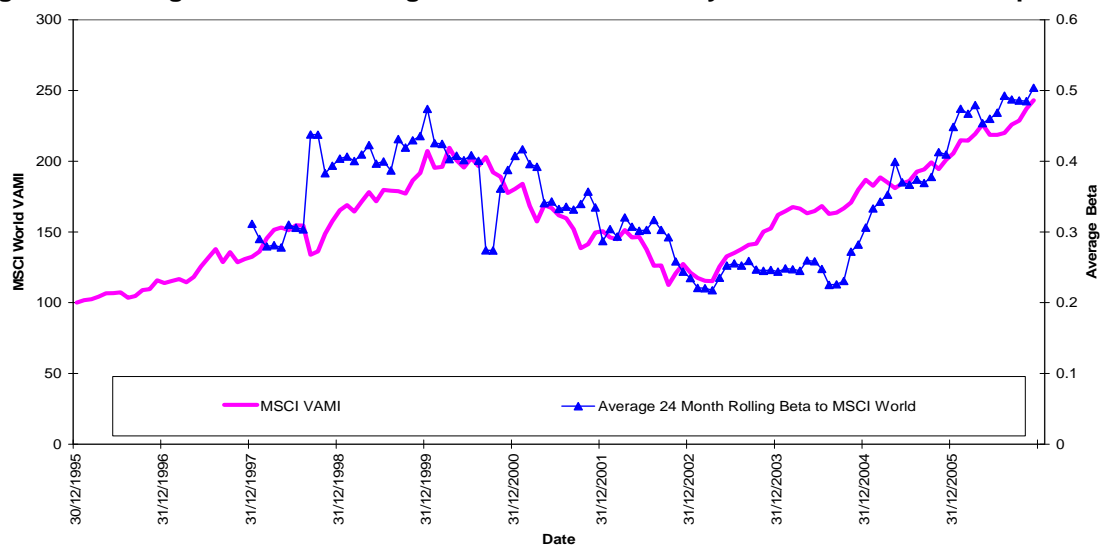
However, there are issues with correlation: It does not take into account the magnitude of the co-movement and it does not imply causality. For this reason we re-examine the HFRI Indices by running a uni-variate regression of each Hedge Fund Style Index against the MSCI World.

**Figure 2: Average, Median, Minimum 90% and Maximum 90% of 24 Month Rolling Correlation Between HFRI Style Indices and World Equities**

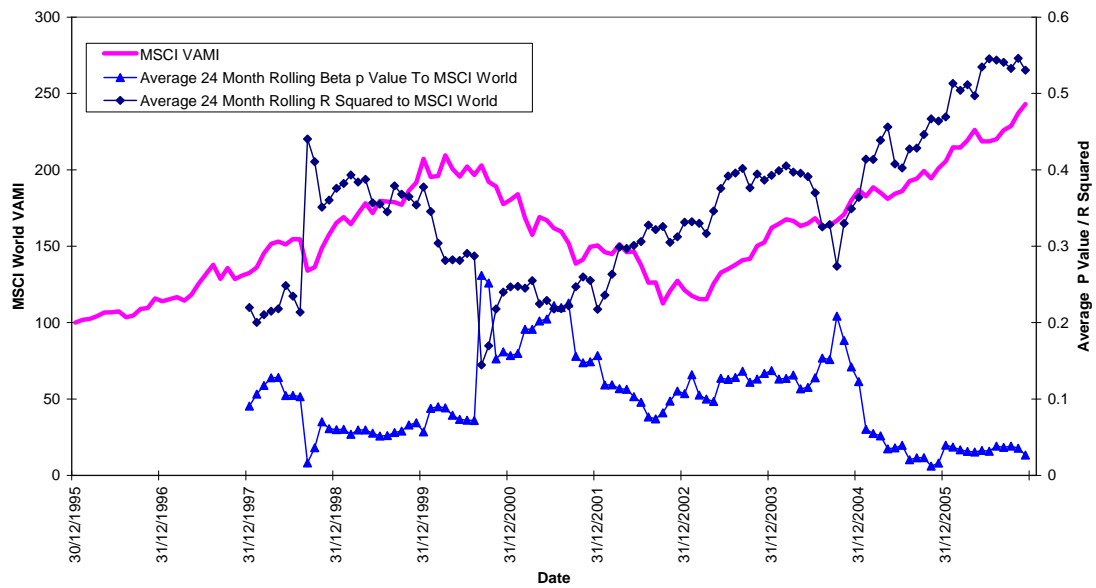


The average beta of the Style Indices is presented in Figure 3. The average beta to the MSCI World historically has increased with a lag when equity markets have been doing particularly well and decreased when markets have been in a bear run. This shows that, on average, hedge fund managers provide some market timing benefit to the investor since they increase or decrease the amount of market risk to which they are exposed depending on market conditions. Moreover, the average beta of the Style Indices to the MSCI World is not at the highest historical level, since such a high beta was observed in the period 1998-2000. At first glance this would be reassuring.

**Figure 3: Average 24 Month Rolling Beta Between HFRI Style Indices and World Equities**



**Figure 4: Average 24 Month Rolling Beta p Value and R Squared-Bar Between HFRI Style Indices and World Equities**



Nevertheless, as shown on Figure 4, the average beta is now more statistically significant than during any time in the history of the time series (inception 1995), and has been for the past 2 years, as indicated by the average value decline. The average percentage of variability of returns that can be explained by global equity market risk (R-Squared) is also significantly higher than at any point in the history of the series<sup>4</sup>. This implies that on average, hedge funds are more directional and carry significantly more equity market risk than ever before. This observation has two main implications.

1. The diversification benefit of including hedge funds in a traditional portfolio has decreased.
2. The average diversification within a fund of hedge funds portfolio has decreased.

<sup>4</sup>Again, because of the well known problems of using a mean to analyse data we present summary statistics on the regression results in the Appendix which confirms the increased beta sensitivity and statistical significance of the result in recent years.

### Diversification Benefits of Adding Hedge Funds to Traditional Portfolios:

If statement 1 is correct, then we should observe that on average, the correlation of fund of hedge funds to the MSCI World index has increased and the benefits of adding a portfolio of hedge funds to a traditional portfolio should have decreased.

Figure 5: 24 Month Rolling Correlation Between HFRI FoF Index and World Equities

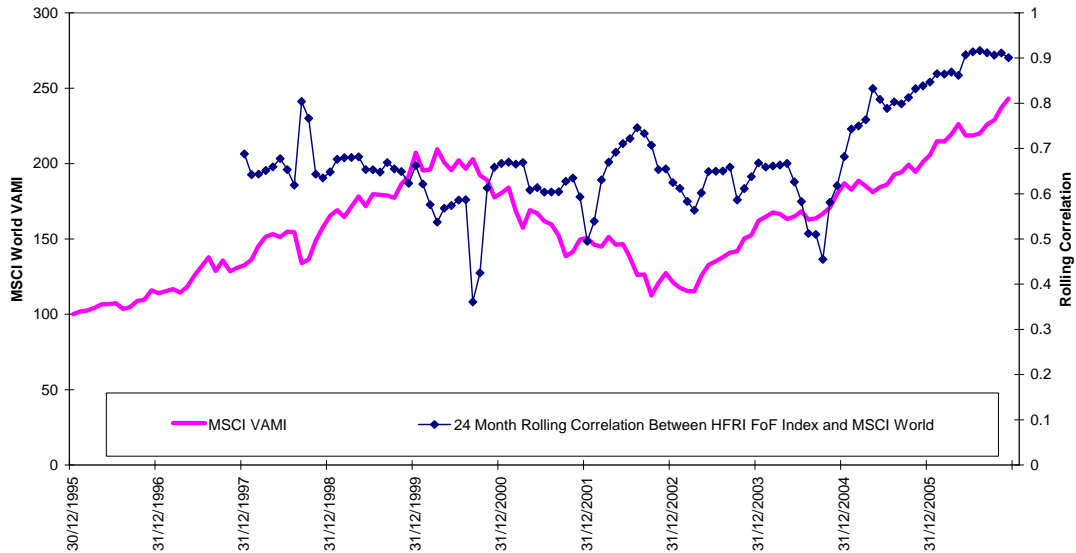


Figure 6: 24 Month Rolling Betas of HFRI FoF Index to World Equities and Related Statistics

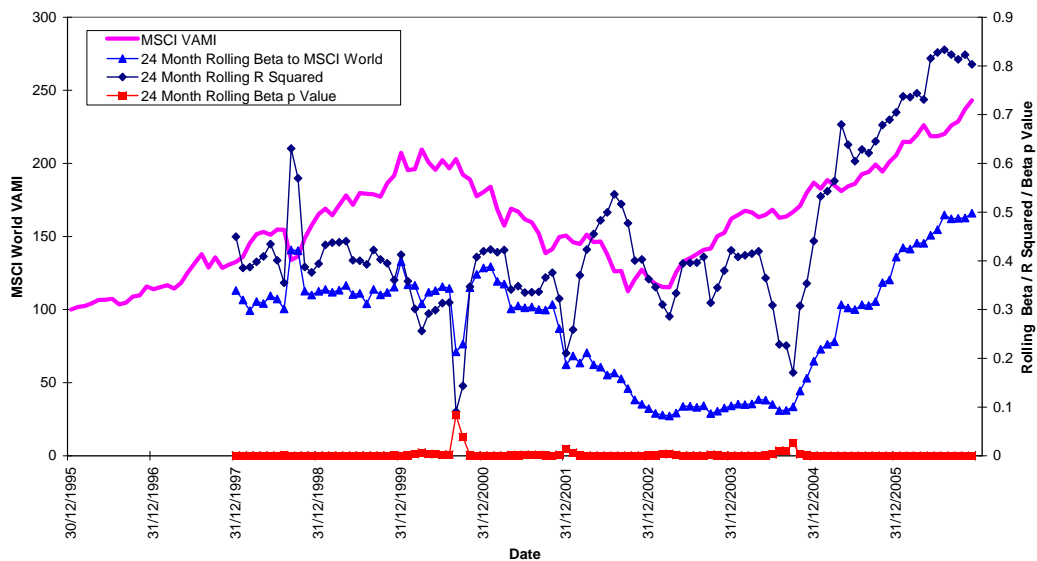
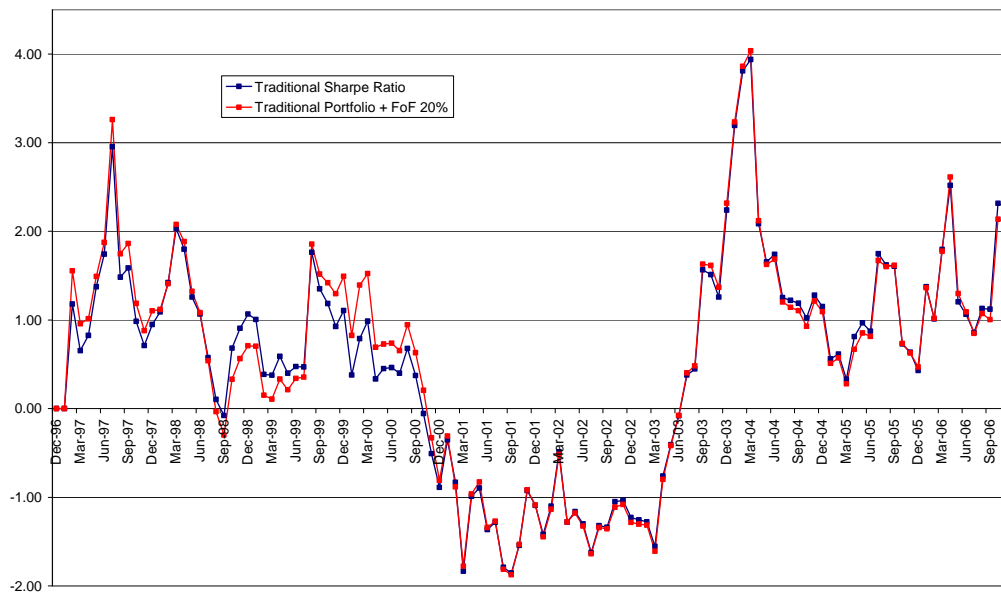


Figure 5 shows that in the last two and a half years the rolling 24 month correlation between HFRI FoF Index and the MSCI World has increased significantly, and Figure 6 confirms that on average, funds of hedge funds are now significantly more directional and carry a larger percentage of market risk than ever before.

This implies that the benefits of adding an average portfolio of hedge funds (as proxied by the HFRI FoF Index) to a portfolio of traditional asset classes have decreased significantly. In order to examine this hypothesis we consider a traditional portfolio made up of constant weightings of 60% World Equities, 30% Government and Corporate Bonds, 5% Money Market Instruments and 5% Real Estate<sup>5</sup>.

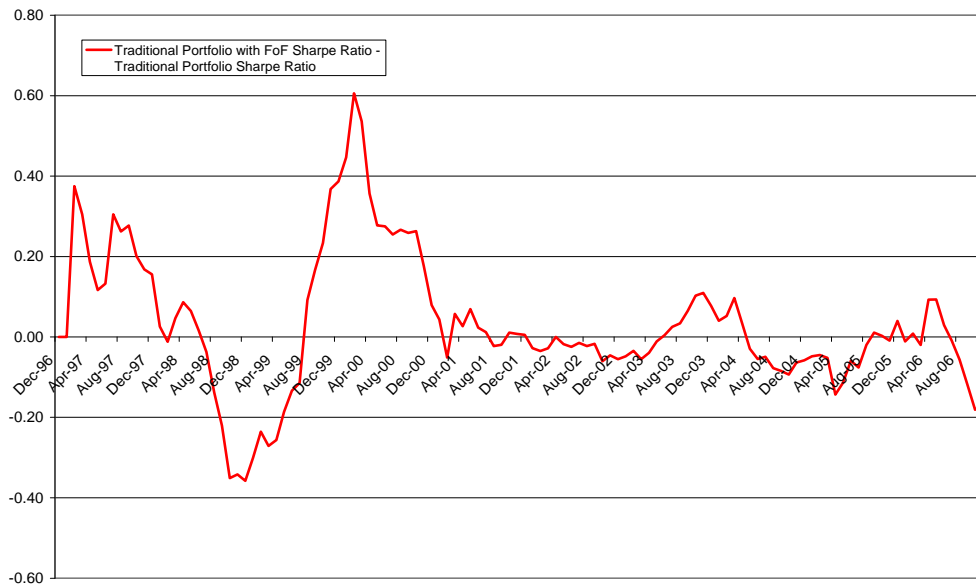
As shown in Figure 7 and Figure 8, the Sharpe Ratio (at 5% risk free rate) of this portfolio and the Sharpe Ratio of the Traditional Portfolio including a constant 20% allocation to the HFRI Fund of Funds Composite Index are virtually the same in the last 5 years. This indicates that the benefit in risk adjusted terms of adding the average portfolio of hedge funds to a traditional portfolio has decreased in recent years.

**Figure 7: 12 Month Rolling Annualised Sharpe Ratio of Traditional Portfolio and Traditional Portfolio + 20% FoF Allocation.**



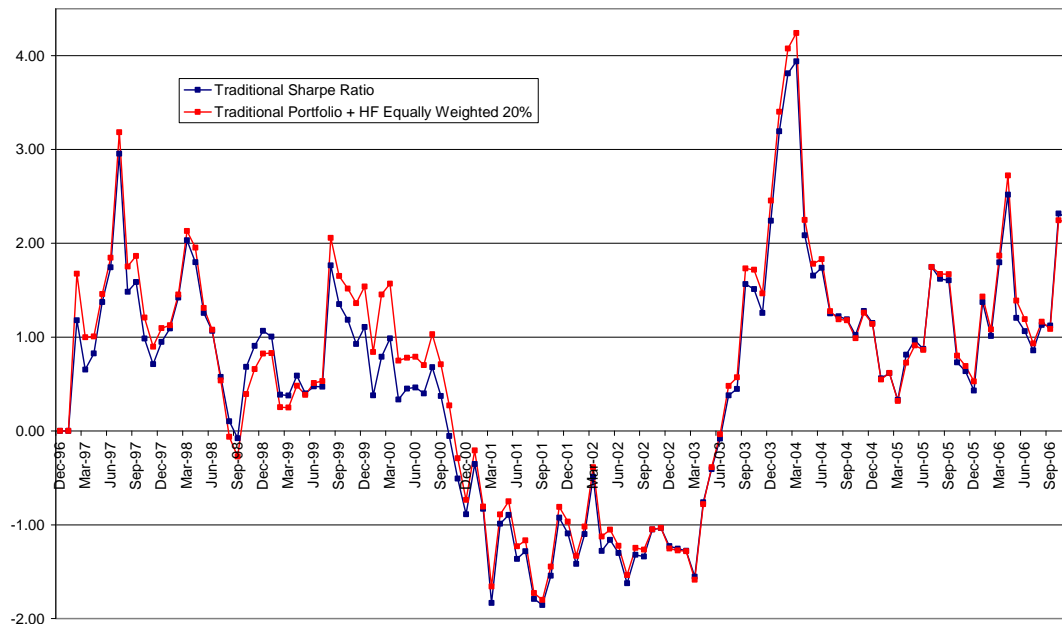
<sup>5</sup>As proxied by the MSCI World Index Gross, ML Corporate-Government Master, ML 3-month T-Bills (taken from PerTrac) and the NAREIT Index taken from Bloomberg (ticker: FNCO Index).

**Figure 8: Difference of 12 Month Rolling Annualised Sharpe Ratio of Traditional Portfolio and Traditional Portfolio + 20% FoF Allocation.**

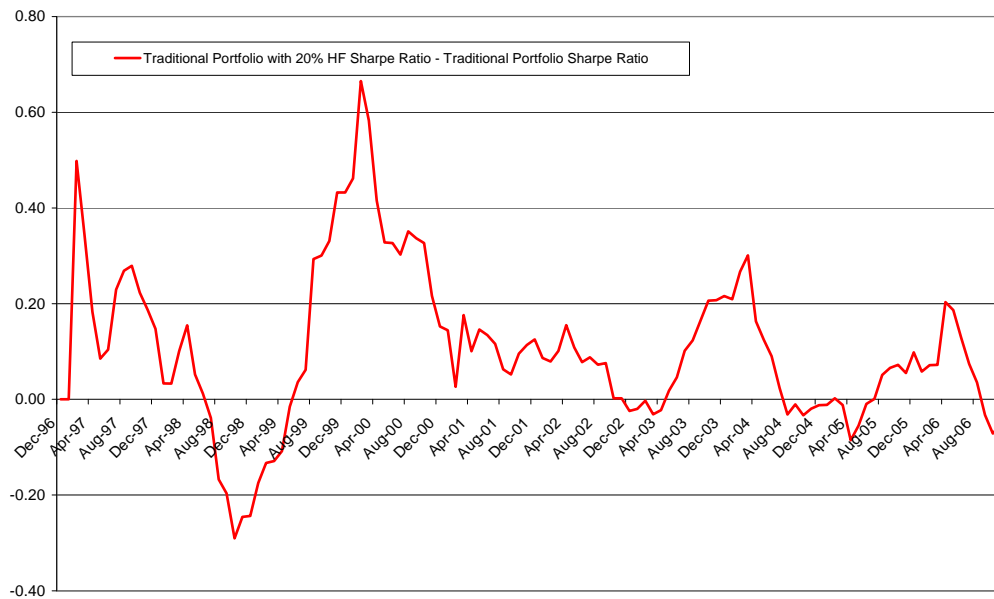


Nevertheless, one may argue that due to the double fee structure of funds of hedge funds, the benefits to the Traditional Portfolio may be lost. For this reason, we repeat the above exercise using the HFRI Fund Weighted Index, which only contains hedge funds and not fund of funds. Figure 9 and Figure 10 confirm that the benefits of including hedge funds in a traditional portfolio again appear diminished in recent years.

**Figure 9: 12 Month Rolling Annualised Sharpe Ratio of Traditional Portfolio and Traditional Portfolio + 20% HF Allocation.**

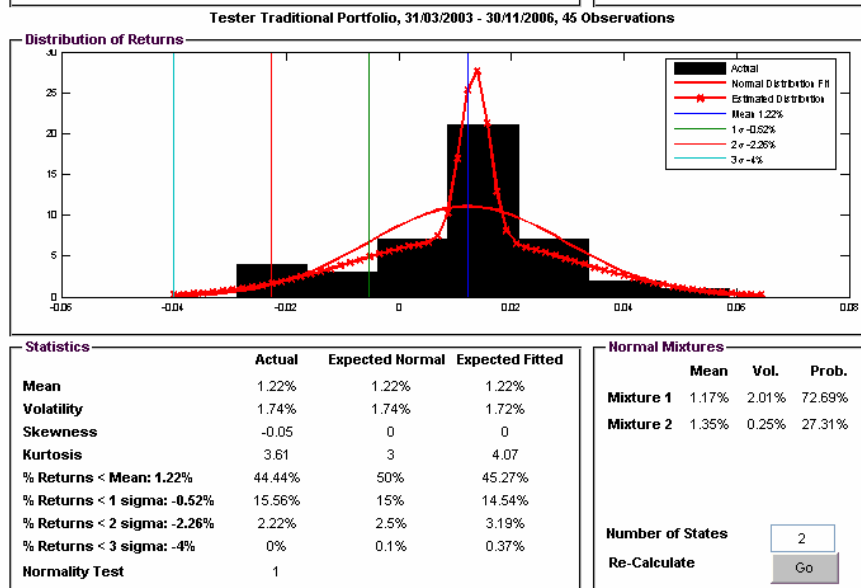
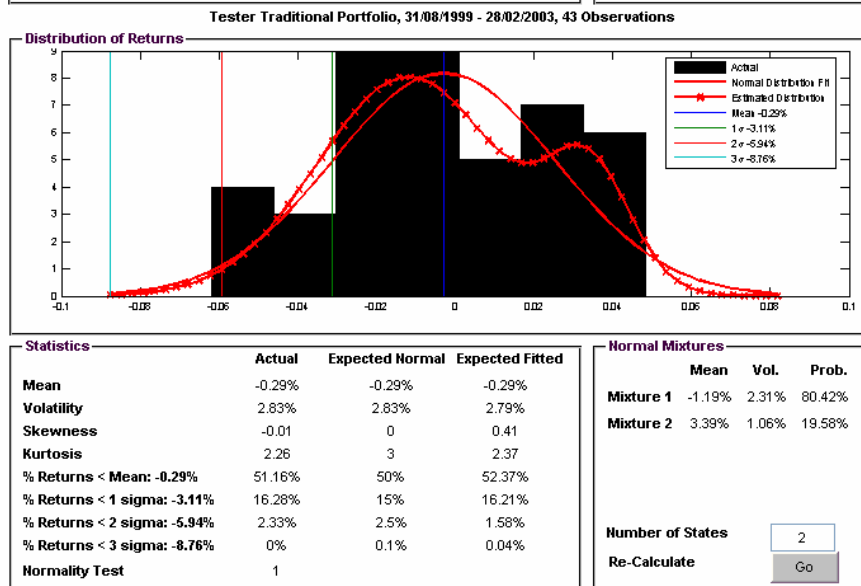
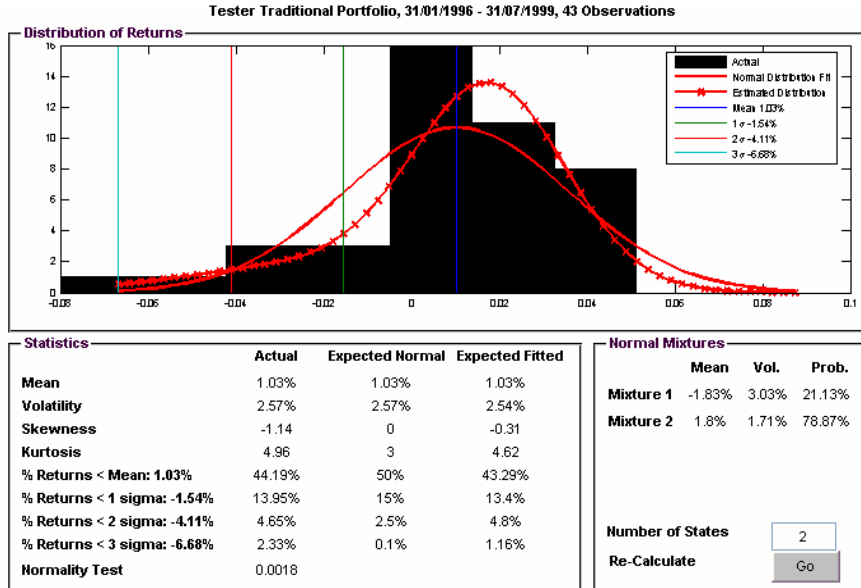


**Figure 10: Difference of 12 Month Rolling Annualised Sharpe Ratio of Traditional Portfolio and Traditional Portfolio + 20% HF Allocation.**

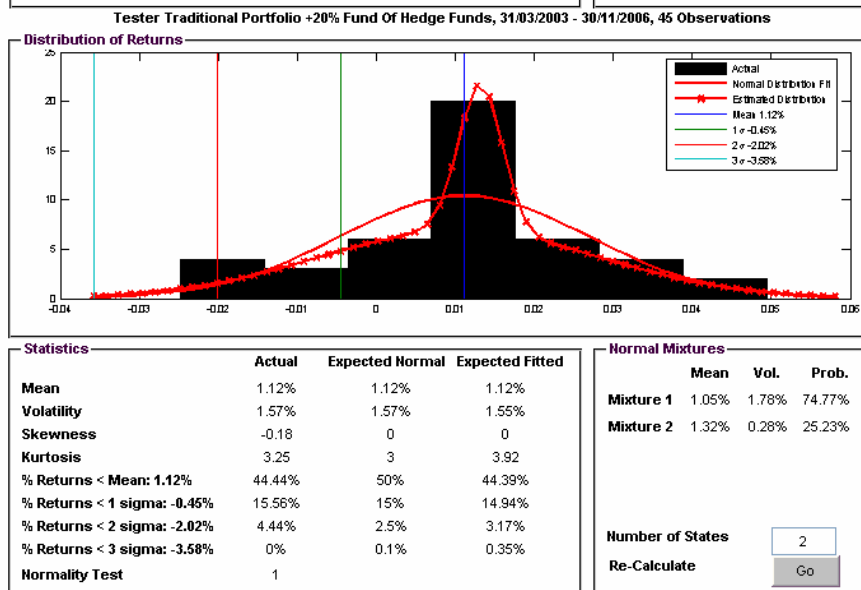
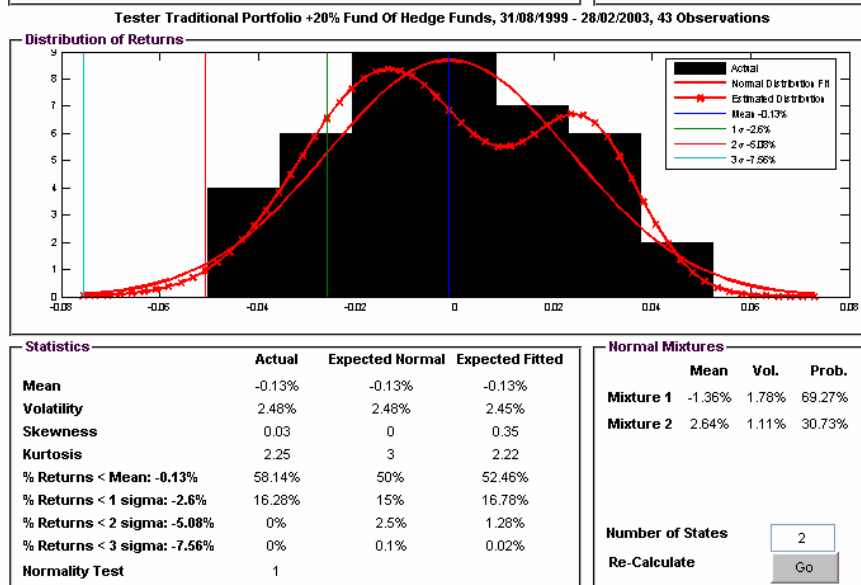
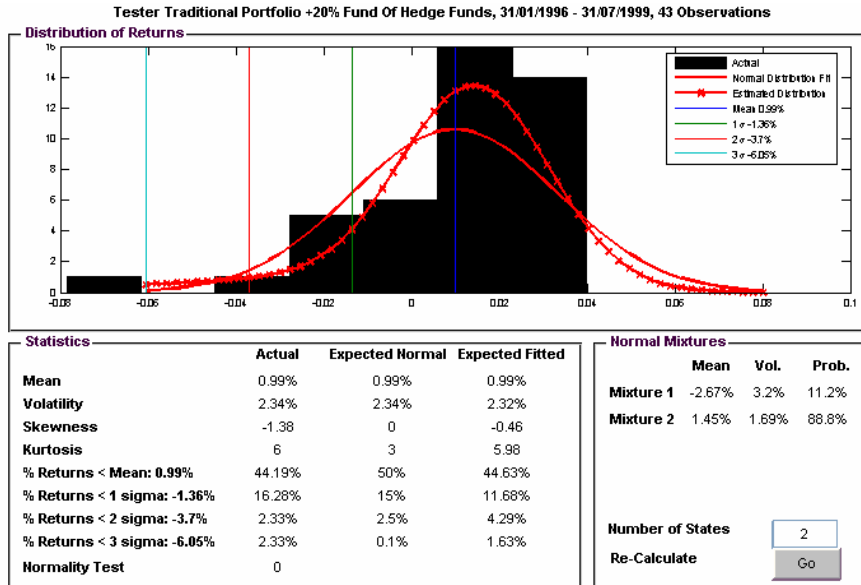


Although the above analysis indicates that the diversification benefit in terms of average returns and standard deviation has decreased, one can argue that because of the non-normality of the distribution of hedge fund returns, the diversification benefits would be found in the higher moments of the portfolio returns distribution. In order to verify this, we examine the distribution of returns of the Traditional Portfolio and the Traditional Portfolio with 20% HFRI FoF constant allocation in three distinct periods: January 1996 – July 1999, August 1999 – February 2003 and March 2003 – November 2006. This period selection gives us approximately 43 observations per period.

**Figure 11: Traditional Portfolio Distribution of Returns**



**Figure 12: Traditional Portfolio + 20% HFRI FoF Distribution of Returns**



As seen in Figure 11 and Figure 12 in period 1 (January 1996 – July 1999), adding a 20% allocation to the FoF Index would reduce monthly volatility from 2.57% to 2.34% (a reduction of 9%) while not significantly affecting average monthly returns (1.03% to 0.99%). However, the investor would have to pay for this diversification in terms of decreased skewness and increased kurtosis (implying reduced asymmetry of the portfolio to the upside and increased tail risk). This in effect indicates that the addition of the FoF returns has significantly impacted the distribution of returns the investor would receive.

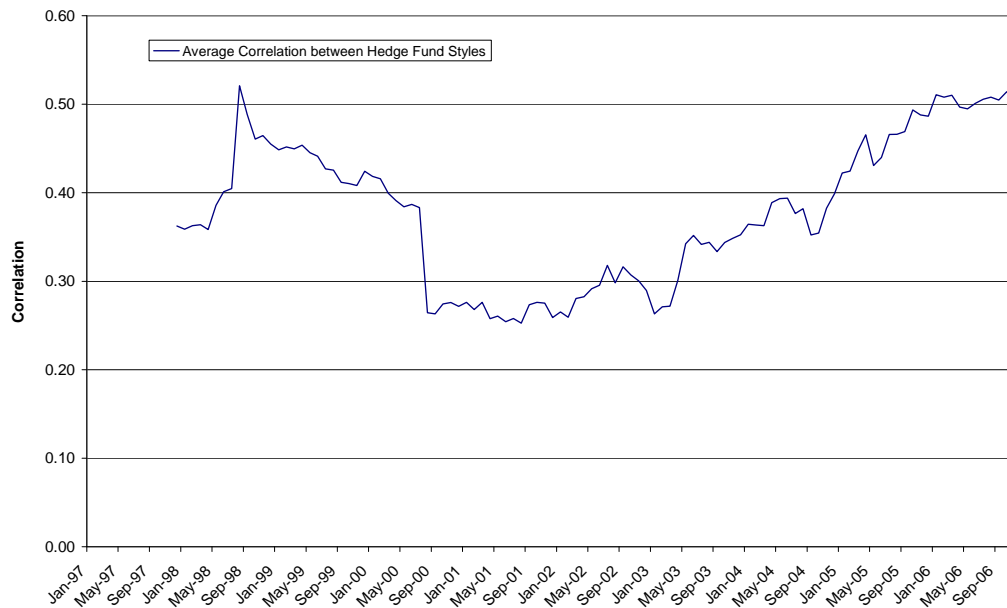
In the second period (August 1999 – February 2003), including the FoF index in a traditional portfolio would imply an increase in average returns (from -0.29% to -0.13%) and a reduction in monthly volatility (from 2.83% to 2.48%, a reduction of 12.37%). In this period, the diversification benefit came with minimal cost in terms of higher moments.

In the third period (March 2003 – November 2006), the allocation to the HFRI FoF would have again reduced volatility (1.57% vs. 1.74%) but would have yielded a lower return (1.12% vs. 1.22%), a similar, but lower skewness and a similar (although slightly lower) kurtosis. This implies that any distribution benefit in the third period came at the cost of lower returns.

### ***Diversification Within Funds of Hedge Funds:***

Since, as shown above, the average hedge fund is now more directional, this has significant implications in terms of the diversification within a portfolio of hedge funds. If the average directionality of a hedge fund has increased and hedge funds are taking on average more market risk, then more funds within the portfolio are expected to behave in a similar way. In Figure 13, we can see that the average correlation between hedge fund styles has increased significantly in the last 2 years. The only other point in history when it was as high as the current period was during the 1998 crisis<sup>6</sup>.

**Figure 13: Average 24 Month Rolling Correlation Between Hedge Fund Styles.**



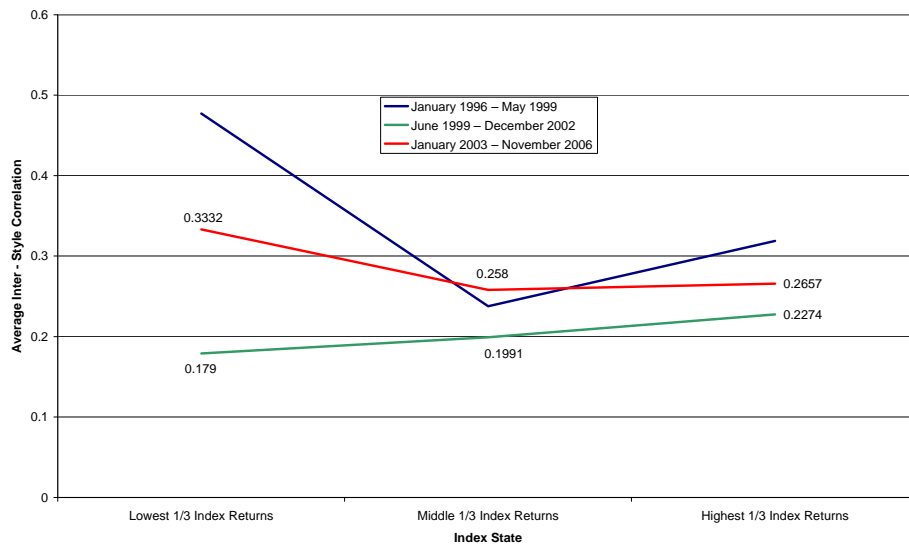
Moreover, as seen from Figure 14 in the period January 2003 to November 2006, the average inter-style correlation when the MSCI World yielded a return that was less than -0.16% (lowest 1/3 index return) was 0.33 compared to 0.18 for the period June 1999 - December 2002<sup>7</sup>. This implies that the downside inter-style correlation has almost doubled in recent years which implies that there is less downside protection when it is most needed.

Furthermore, the average correlation amongst strategies when the MSCI World yielded a return more than 2.39% (highest 1/3 index returns), increased to 0.27 from 0.23. Although this is a positive result, since there is more co-movement on the upside than before, the correlation in this state is lower than in the low index returns state, which implies that the upside is being diluted through diversification.

<sup>6</sup>In the appendix we present the mean, median, minimum 90% and maximum 90% in order to ensure that the average does not mislead us to an erroneous conclusion. We find that the concentration of correlations and the average size of correlations has increased in recent years.

<sup>7</sup>Note that the first period examined includes the crisis of August 1998, which affects our correlation results significantly.

**Figure 14: Average Inter – Style Correlation in Different States of MSCI World**



## ***How to Diversify a Fund of Hedge Funds in the Current Environment:***

As shown above, the increased directional exposure of the average hedge fund to world equities and the increased correlation between hedge funds in recent years has led to a decrease in the downside protection ability of portfolios of hedge funds in bad equity markets.

**Table 1: Linear and State Betas for HFRI Fund of Hedge Fund Composite Index vs the MSCI World Index**

	Jan 1995 Dec 1996	Jan 1997 Dec 1998	Jan 1999 Dec 2000	Jan 2001 Dec 2002	Jan 2003 Dec 2004	Jan 2005 Dec 2006
Alpha	0.83%	0.75%	1.12%	0.73%	0.31%	0.01%
Negative Beta	0.49	0.49	0.43	0.18	0.14	0.43
Positive Beta	0.23	0.11	0.36	-0.02	0.21	0.50
R Squared	0.34	0.44	0.43	0.50	0.44	0.82
Alpha	0.60%	-0.07%	1.00%	0.30%	0.37%	0.08%
Linear Beta	0.32	0.33	0.39	0.10	0.20	0.48
R Squared	0.35	0.41	0.45	0.39	0.46	0.83

**Table 2: Linear and State Betas for HFRI Fund Weighted Index vs the MSCI World Index**

	Jan 1995 Dec 1996	Jan 1997 Dec 1998	Jan 1999 Dec 2000	Jan 2001 Dec 2002	Jan 2003 Dec 2004	Jan 2005 Dec 2006
Alpha	1.79%	0.19%	1.50%	0.97%	0.53%	0.09%
Negative Beta	0.81	0.49	0.66	0.35	0.37	0.46
Positive Beta	0.12	0.44	0.45	0.15	0.32	0.57
R Squared	0.45	0.67	0.57	0.73	0.69	0.87
Alpha	1.19%	0.07%	1.14%	0.53%	0.49%	0.20%
Linear Beta	0.34	0.47	0.54	0.27	0.33	0.53
R Squared	0.36	0.68	0.58	0.71	0.70	0.87

For example, Table 1 and Table 2 above show that the linear beta to MSCI World<sup>8</sup> has increased along with the R Squared in the last two years. Moreover, the beta to negative MSCI World returns is, in the last 2 years, 0.47 for the HFRI FoF Index compared with 0.13 and 0.18 for the previous two year periods. The same increased directionality and loss of downside protection can be observed for the HFRI Fund Weighted Index.

This is an obvious point: the increased directionality in recent years has led to increased up-capture (and therefore returns, since the MSCI World has yielded 30% since January 2005) but also increased downside market risk.

In an ideal scenario, an investor would have received an option-like payoff on the MSCI World, showing maximum up-capture in positive market environments and minimal down-capture in bad market environments.

This philosophy of seeking an option-like payoff is integral to Calburn Capital Partners' portfolio construction methodology and is reflected in the results shown in Table 3. Over the period January 2005 – November 2006<sup>9</sup>, the Calburn Strategic

<sup>8</sup> We use the MSCI World Total Return Index - Gross (Bloomberg ticker: GDUEACWF Index)

<sup>9</sup> Pro forma results from January 2005 to May 2006, live inception date is June 2006.

Fund (CSF) has shown a beta to negative MSCI World returns of 0.32 and a beta to positive MSCI World returns of 0.74. The linear beta to MSCI World is 0.58. This implies that this portfolio has shown greater up-capture and lower down-capture than the average fund of hedge funds.

**Table 3: Linear and State Betas for Caliburn Strategic Fund vs the MSCI World Index**

	Jan 2005 Nov 2006
Alpha	0.06%
Negative Beta	0.32
Positive Beta	0.74
R Squared	0.64
Alpha	0.51%
Linear Beta	0.58
R Squared	0.63

**Table 4: Linear and State Betas for Caliburn Strategic Fund**

	Jan 2005 Nov 2006
Alpha	0
Negative Beta	0.73
Positive Beta	1.53
R Squared	0.84
Alpha	0.39%
Linear Beta	1.25
R Squared	0.82

If we examine the CSF portfolio vs the HFRI Fund of Funds Composite index we will see (Table 4) that the CSF portfolio has a beta of 0.73 to negative HFRI FoF returns and a beta of 1.53 to positive HFRI FoF returns, showing that the CSF only participated in approximately 75% of the downside of the industry on average but delivered approximately 150% of the upside.

### **References:**

Fung, W. and Hsieh D. A. (1999): "A Primer on Hedge Funds", Journal of Empirical Finance, Vol. 6, No. 3.

Kat, H. M. (2005): "Integrating Hedge Funds into the Traditional Portfolio", Alternative Investment Research Centre, Working Paper Series, Working Paper #0022,

Liang, B. (1999): "On the Performance of Hedge Funds", Financial Analysts Journal.

## Appendix:

### Summary Statistics on HFRI Indices vs. MSCI World Rolling Regression:

Figure 15: Average, Median, Minimum 90% and Maximum 90% of 24 Month Rolling Beta of HFRI Style Indices on World Equities

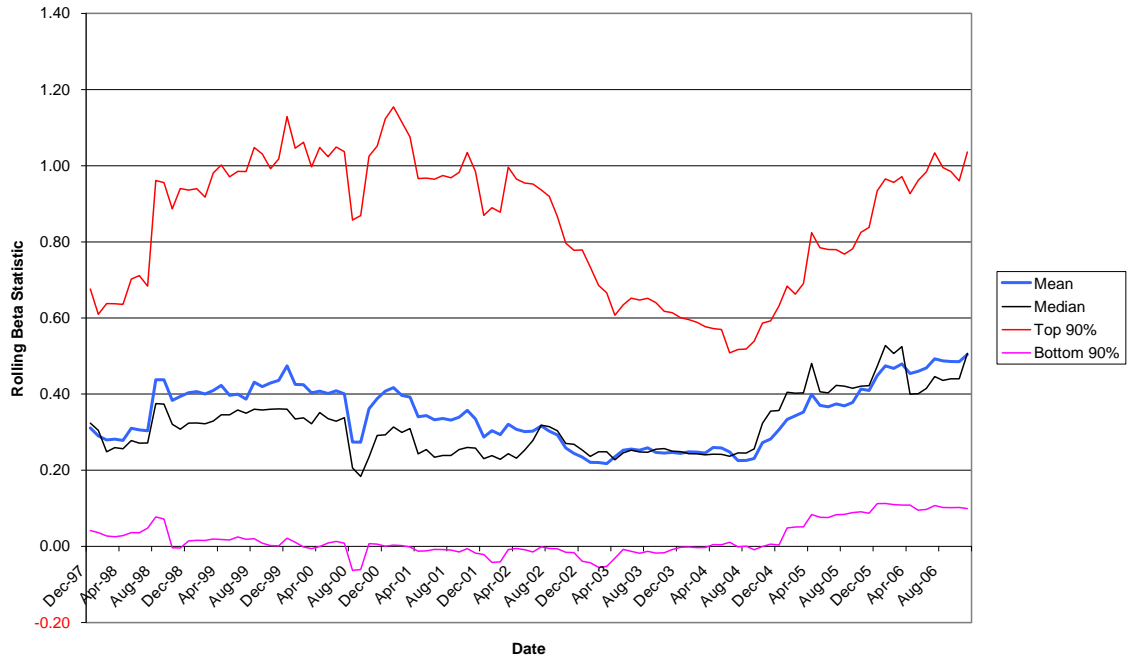
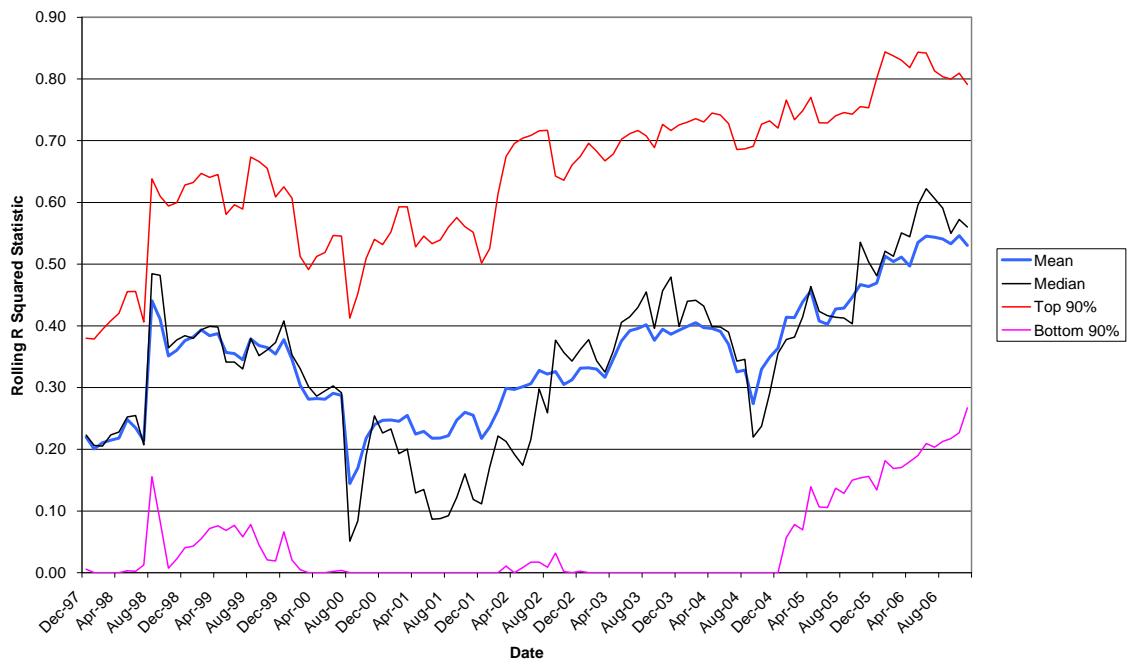
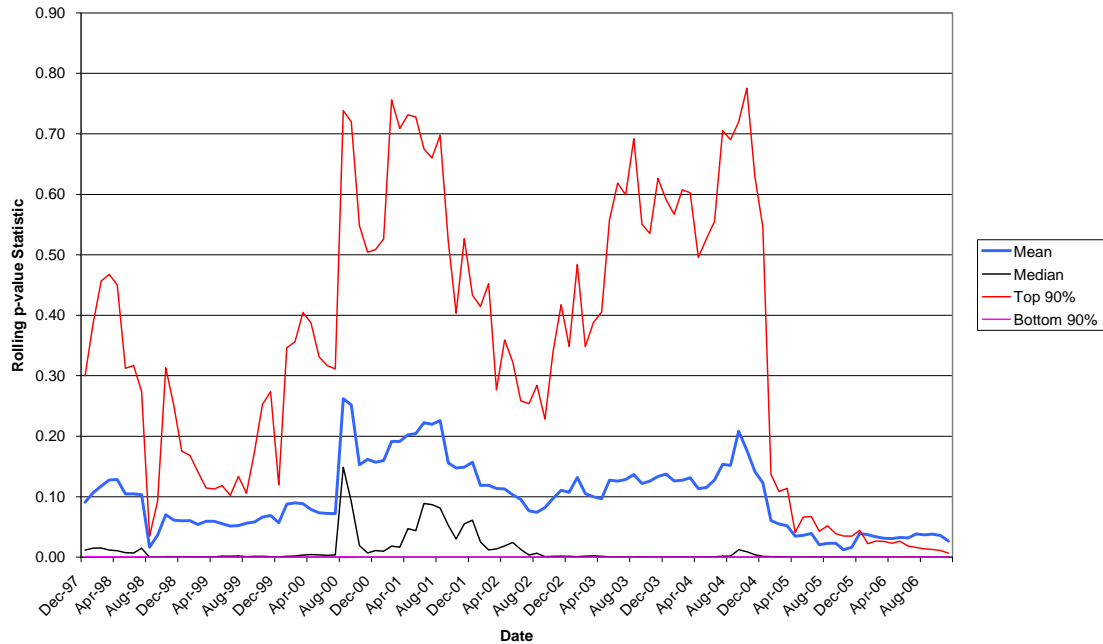


Figure 16: Average, Median, Minimum 90% and Maximum 90% of 24 Month Rolling R Squared of HFRI Style Indices on World Equities

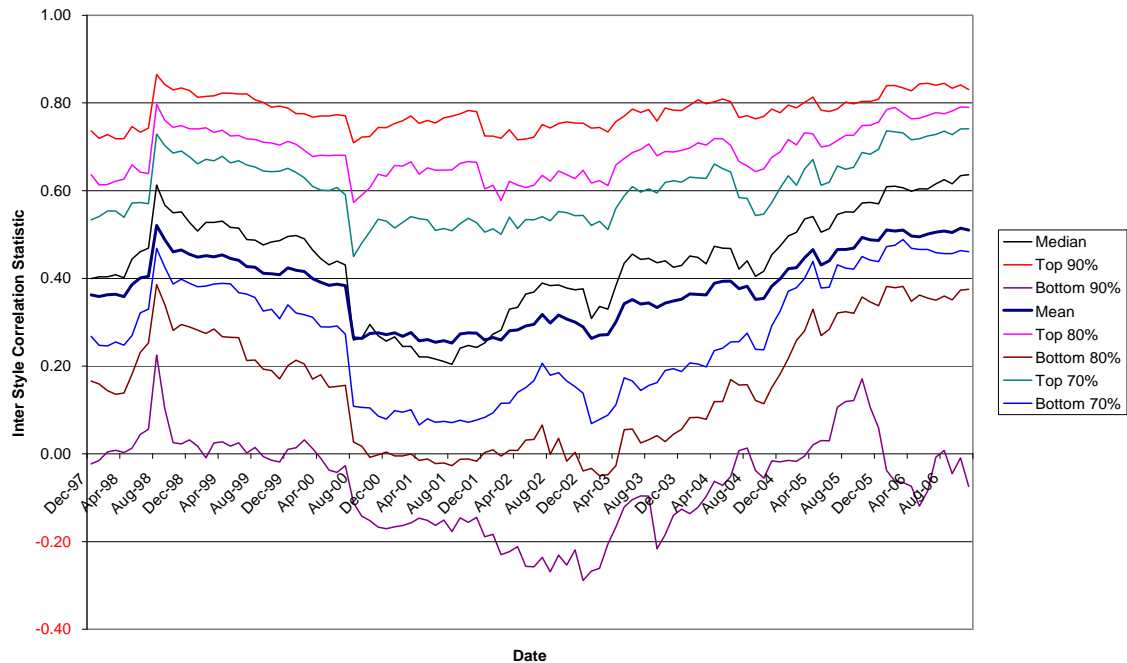


**Figure 17: Average, Median, Minimum 90% and Maximum 90% of 24 Month Rolling p value of beta of HFRI Style Indices on World Equities**



**Summary Statistics on Cross Correlations of HFRI Indices:**

**Figure 18: Average, Median, Minimum and Maximum 90%, 80% and 70% of 24 Month Rolling Cross Correlations Between HFRI Indices**



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