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Persistence in Hedge Fund Performance: The True Value of a Track Record

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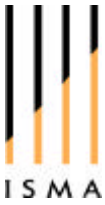

Abstract

In this paper we study the persistence and predictability of several statistical parameters of individual hedge fund returns. We find little evidence of persistence in mean returns but do find strong persistence in hedge funds' standard deviations and their correlation with the stock market. Persistence in skewness and kurtosis is low but this could be due to the small size of the sample used. Despite the observed persistence, our study also shows that in absolute terms hedge funds' risk profiles are not easily predicted from historical returns alone. The true value of a hedge fund's track record therefore appears not to lie in its use as a predictor of future performance and risk, but primarily in the insight that it provides in a fund's risk profile relative to that of other funds in the same strategy group. The availability of a track record is important, but for a different reason than many investors think.

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1. INTRODUCTION

Many investors, retail as well as institutional, allocate to different managers based on these managers' historical performance or track record. Good performance is rewarded with a higher allocation, while badly performing managers are replaced. Some institutional investors go as far as to require a new manager to have at least three or even five years of history before they are willing to allocate to that manager. Especially for hedge funds, most of which are unable to comply with such a requirement, this is quite problematic. The weight given to a track record by investors implies that many believe that good and bad performance persists, i.e. that winners will continue to win and losers will continue to lose. Various authors have tested this hypothesis for mutual funds[1] as well as for hedge funds.[2] Measuring performance either as the difference between the fund return and the average return on all funds following the same strategy or as the so-called appraisal ratio, Agarwal and Naik (2001) report evidence of persistence in quarterly hedge fund returns over the period 1982-1998. Using data over the period 1990-1998 and measuring performance as the alpha from a six-factor model, Edwards and Caglayan (2001) also find significant persistence on a one-year as well as a two-year basis. Studying the performance of portfolios formed on the basis of funds' previous year's return over the period 1990-2000, Peskin et al. (2000) on the other hand find little or no evidence of persistence. A similar conclusion can be found in Brown et al. (1999) and Schneeweis et al. (2001).

One possible explanation for these contradictory conclusions lies in the way in which performance is measured. When the returns generated by a fund are incorrectly adjusted for risk, this may show up as persistence where there is in fact none. Consider the following example. A fund manager holds the index and at the beginning of every month writes a 1-month at-the-money call option on that same index. The fund's return distribution will be negatively skewed as by writing the call the manager effectively sells off his upside potential. There is nothing special about this strategy. However, this is not the message we would get if we used the fund's monthly returns to calculate traditional performance measures such as the Sharpe ratio and Jensen's alpha for example. Purely due to the shape of the return distribution, the latter measures would indicate the presence of superior performance where there is none. If

subsequently we were to investigate whether this superior performance persisted over time, we would find that this was indeed the case as the manager's strategy and therefore the fund's return distribution is unchanged. Since there is no superior performance to start with, however, it is not the fund's superior performance that persists but simply the fund's risk profile. A similar argument explains why some authors, including Ackerman et al. (1999) and Edwards and Caglayan (2001), find a positive relationship between incentive fees and performance. A higher incentive fee will increase the skewness of a fund's return distribution. When performance is measured without this taking this into account, this may create the illusion of a positive relationship while the true relationship is flat or even negative.

The above example indicates that the issue of performance persistence can be approached from at least two different angles. We can investigate whether there is persistence in the (risk-adjusted) returns that a fund generates but we can also study whether there is persistence in the fund's overall risk profile. In this paper we will do the latter. For 260 hedge funds and 78 funds of funds we calculate the mean, standard deviation, skewness, kurtosis, correlation with stocks and correlation with bonds over the period June 1994 – November 1997 as well as the period December 1997 – May 2001. Subsequently, we use non-parametric (contingency tables) as well as parametric (linear regression) methods to investigate whether relatively high (low) parameter values in the first period are followed by relatively high (low) values in the second period. Since persistence does not necessarily imply predictability, we also study whether the parameter values estimated over the first period are any good as predictors for the values estimated over the second period. Overall, we find significant persistence in the risk profile of hedge funds but at the same time very low predictability. In other words, although hedge funds' relative risk profile, i.e. relative to each other, appears fairly stable, their absolute risk profile is much harder to predict.

2. THE DATA

The monthy net-of-fee hedge fund return data used in this study are taken from Tremont TASS, one of the largest and best-known hedge fund databases. From the database we selected a total of 338 funds with data available from June 1994 until May 2001. In line with the TASS classification, these funds are classified in the following subgroups (with the number of funds in parenthesis): long/short equity (113), event driven (59), convertible arbitrage (8), global macro (17), emerging markets (26), relative value (31), fixed income directional (6), and funds of funds (78). In what follows we use the S&P 500 index as a proxy for 'stocks' and the Salomon Brothers 7-year Government Bond index as a proxy for 'bonds'.

3. CONTINGENCY TABLES

For the above funds we calculated the mean, standard deviation, skewness, kurtosis, correlation with stocks and correlation with bonds over the period June 1994 – November 1997 as well as the period December 1997 – May 2001. To test whether funds with a relatively high (low) mean, standard deviation, etc. over one period also exhibit a relatively high (low) value over the second period we use straightforward contingency tables of winners (W) and losers (L). A fund is deemed to be a winner (loser) if the parameter value in question is greater (lower) than the median value for all funds in the same strategy group. We speak of persistence when a fund is a winner or loser in both periods. To formally test the hypothesis of persistence we use the cross-product ratio (CPR). Denoting two time winners and two time losers as WW and LL and mixed cases as WL and LW, the CPR is calculated as (WW*LL)/(WL*LW), i.e. as the product ratio of the number of funds that show persistence and the funds that do not. Under the null hypothesis of no persistence the CPR equals 1. The significance of the CPR is tested with a Z-statistic, which equals the ratio of the natural logarithm of the CPR and the standard error of the natural logarithm of the CPR. A Z-statistic of 1.96 corresponds with a 5% significance level, i.e. when the Z-statistic is greater than 1.96 the null hypothesis of no persistence is rejected at 5% significance. The 48 contingency tables for the 8 different strategy groups can be found in table 1-8.

<< Insert Table 1-8 >>

Starting with the CPRs for the mean, we see that, except for emerging markets, relative value and fixed income funds, they are all close to 1, with none of them being statistically significant (at 5%). We find much more persistence in the standard deviations. The CPRs are extremely high and, except for convertible arbitrage and fixed income, statistically significant as well. Apart from long/short equity, funds of funds and fixed income, the CPRs for skewness are all close to 1. Persistence in kurtosis is also low, with in this case convertible arbitrage and relative value providing the outliers. The low persistence in skewness and kurtosis does not come as a complete surprise. Since both these parameters are concerned with the tails of the distribution and extreme events only occur infrequently, they are hard to estimate accurately from a small sample like ours. Consider the following example. It is known that most of the outstanding catastrophe-linked bonds are held by hedge funds. These bonds pay an exceptionally high coupon in return for the bondholder putting (part of) his principal at risk. Since the world has not seen a major catastrophe for some time now, these bonds have performed quite well and the available return series show relatively little skewness. However, this does not give an accurate indication of the actual degree of skewness as when a catastrophe does eventually occur, these bonds will produce large losses. Looking at the CPRs of the correlation with stocks, we see strong persistence for most strategy groups. Most of the CPRs are statistically significant as well. Apart from long/short equity, we find little or no persistence in the correlation with bonds.

Overall, the contingency tables show that there is quite some persistence in the risk profile of hedge funds, with especially the standard deviation and the correlation with stocks standing out. In terms of strategies, the highest persistence is found in long/short equity and the lowest in event driven strategies. This is an interesting conclusion as the return distributions of long/short equity funds tend to be substantially more symmetrical than those of event driven funds. A priori, one would therefore expect to be able to estimate long/short equity funds' parameters more accurately.

4. REGRESSION ANALYSIS

An alternative technique to test for persistence is a cross-sectional regression of the period 2 parameter values on the period 1 parameter values. If the estimated slope coefficient is significantly greater than zero we take that as evidence of persistence. The results of the 48 regressions for the 8 strategy groups can be found in table 9.

<< Insert Table 9 >>

From table 9 we see that only funds of funds and emerging markets strategies exhibit significant persistence in the mean, although the R-squared of the regressions is very low. It is interesting to see some persistence in the mean returns of fund of funds. This could be interpreted as an indication that some fund of funds managers are able to consistently pick top performers. However, the observed persistence could equally be the result of investment in strategies that show persistence themselves, such as emerging markets for example. Distinguishing between these two explanations will require more insight in the portfolios held by funds of funds than currently available. As before, we see very pronounced persistence in the standard deviations. All strategy groups test highly significant with a very high R-squared. Apart from long/short equity and funds of funds, there is little evidence of persistence in skewness, while kurtosis only seems to persist in funds of funds and convertible arbitrage. Similar to the standard deviations, all strategy groups show highly significant persistence in their correlation with the stock market accompanied by a very high R-squared. Persistence in the correlation with bonds on the other hand seems low, with long/short equity and funds of funds being the only exceptions.

The regression results are not very different from what we saw before in the contingency tables and indicate significant persistence in hedge funds' risk profiles. Especially the standard deviation and correlation with the stock market show strong persistence. The highest persistence is found in funds of funds and the lowest in relative value strategies.

5. PREDICTABILITY

So far, we have sorted funds relative to the strategy group median and studied whether funds that score above (below) the median in one period also do so in the next. Doing so, we found clear signs of persistence in hedge funds' risk profiles. A fund that exhibits high (low) risk relative to the median fund can be expected to do so in the future as well. This, however, does not imply that the risk profile of hedge funds in more absolute terms can be easily predicted. To do so we have to be able to predict the median.

To find out more about the predictability of the hedge fund return parameters in question we tested the forecasting power of two simple rules. The first rule (method 1) simply predicts that the period 2 value will be equal to the period 1 value. The second rule (method 2) predicts that the period 2 value will be equal to the average of all period 1 values, where the average is taken over all funds in the same strategy group. To evaluate the quality of both predictors we calculate three different error measures: the mean error (ME), the mean absolute error (MAE) and the root mean squared error (RMSE). The first provides information on possible biases in the predictors in question, while the other two are concerned with its accuracy. The RMSE gives extra weight to relatively large errors. The results can be found in table 10.

<< Insert Table 10 >>

The second and third column (Average 1 and Average 2) show the average parameter values calculated over all funds in a specific strategy group for period 1 and 2. Comparing the entries in both columns we see substantial differences between the period June 1994 – November 1997 and the period December 1997 – May 2001. In the second period all strategy groups exhibit a significantly lower mean as well as a substantially higher standard deviation. Kurtosis is also higher in most cases. There are several possible explanations for this. First, the second period is characterized by a number of major crises: Asia, Russia and LTCM. The resulting volatility may have affected hedge fund volatility as well. If this is indeed the case then this shows that the hedge fund industry is not as market neutral as is often claimed. In addition, by

their very nature hedge fund are expected to do better in more volatile circumstances. Comparing the means between the two periods, however, we see that this has definitely not been the case. Second, over period 2 the hedge fund industry has shown spectacular growth, with assets under management rising from an estimated $280b in 1997 to $500b in 2001. The observed drop in performance can therefore also be interpreted as an indication of growing over-capacity, with more and more hedge funds chasing the same deals. To compensate for the resulting loss in profitability, hedge funds may have increased their risk level over time.

Comparing the size of the ME, MAE and RMSE statistics with the averages in column 2 and 3, it quickly becomes clear that the (average) historical values of the parameters in question are not particularly good predictors for their future values. Means are substantially over-estimated and standard deviations and kurtosis levels are very significantly under-estimated. In many cases the MAE and RMSE are higher than the average value of the parameter that is being forecast. From table 10 we also see that there is little difference between both predictors used. Method 2 slightly outperforms method 1 for the mean, skewness, kurtosis, and the correlation with bonds. Method 1 on the other hand does better for the standard deviation and the correlation with stocks. Since the latter tend to be easier to estimate than the mean, skewness and kurtosis, this is not completely unexpected.

6. CONCLUSION

In this paper we studied the persistence and predictability of several statistical parameters of individual hedge fund returns. We find little evidence of persistence in mean returns. This suggests that a strategy of allocating only to top performers may not yield a significantly higher return. We do find clear evidence of persistence in hedge fund returns' higher moments, especially in the standard deviation and the correlation with stocks. Persistence in skewness and kurtosis is low, but this may be due to the small size of the sample used. Despite the observed persistence, our study also shows that in absolute terms hedge funds' risk profiles are not easily predicted from historical returns alone. The true value of a hedge fund's track record therefore appears to lie not in its use as a predictor of future performance and risk, but primarily in the insight that it provides in a fund's relative risk profile, i.e. relative to other funds in the same strategy group. The availability of a track record is important, but for a different reason than many investors think.

FOOTNOTES

1. See for example Grinblatt and Titman (1992), Hendricks at al. (1993). Baumann and Miller (1994), Goetzmann and Ibbotson (1994), Brown and Goetzmann (1995), Malkiel (1995), Kahn and Rudd (1995), Elton at al. (1996), or Carhart (1997).

2. Apart from the references below, see also Agarwal and Naik (2000) or Park and Staum (undated).

REFERENCES

Ackerman, C., R. McEnally and D. Ravenscraft (1999), The Performance of Hedge Funds: Risk, Return and Incentives, *Journal of Finance*, Vol. 54, pp. 833-874.

Agarwal, V. and N. Naik (2000), On Taking the Alternative Route: Risks, Rewards, Style and Performance Persistence of Hedge Funds, *Journal of Alternative Investments*, Vol.2, pp. 6-23.

Agarwal, V. and N. Naik (2001), Multi-Period Performance Persistence Analysis of Hedge Funds, *Journal of Financial and Quantitative Analysis*, Vol. ??, pp. ??

Bauman, S. and R. Miller (1994), Can Managed Portfolio Performance Be Predicted?, *Journal of Portfolio Management*, Summer, pp. 31-39.

Brown, S. and W. Goetzmann (1995), Performance Persistence, *Journal of Finance*, Vol. 50, pp. 679-698.

Brown, S., W. Goetzmann and R. Ibbotson (1999), Offshore Hedge Funds: Survival and Performance 1989-1995, *Journal of Business*, Vol. 72, pp. 91-117.

Carhart, M. (1997), On Persistence in Mutual Fund Performance, *Journal of Finance*, Vol. 52, pp. 57-82.

Edwards, F. and M. Caglayan (2001), Hedge Fund Performance and Manager Skill, Working Paper Columbia University.

Elton, E., M. Gruber and C. Blake (1996), The Persistence of Risk-Adjusted Mutual Fund Performance, *Journal of Business*, Vol. 69, pp. 133-157.

Goetzmann, W. and R. Ibbotson (1994), Do Winners Repeat? Patterns in Mutual Fund Performance, *Journal of Portfolio Management*, Winter, pp. 9-18.

Grinblatt, M. and S. Titman (1992), The Persistence of Mutual Fund Performance, *Journal of Finance*, Vol. 47, pp. 1977-1984.

Hendricks, D., J. Patel and R. Zeckhauser (1993), Hot Hands in Mutual Funds: Short-Run Persistence of Relative Performance, *Journal of Finance*, Vol. 48, pp. 93-130.

Kahn, R. and A. Rudd (1995), Does Historical Performance Predict Future Performance?, *Financial Analysts Journal*, November-December, pp. 43-52.

Malkiel, B. (1995), Returns from Investing in Equity Mutual Funds 1971 to 1991, *Journal of Finance*, Vol. 50, pp. 549-572.

Park, J. and J. Staum (undated), Performance Persistence in the Alternative Investment Industry, Working Paper PARADIGM Capital Management.

Psekin, M., M. Urias, S. Anjilvel and B. Boudreau (2000), Why Hedge Funds Make Sense, Morgan Stanley Quantitative Strategies Paper.

Schneeweis, T, H. Kazemi and G. Martin (2001), Understanding Hedge Fund Performance: Research Results and Rules of Thumb for the Institutional Investors, Lehman Brothers Research Paper.

Table 1. Contingency tables long/short equity

MEAN

	W2	L2
W1	26	30
L1	30	27

CPR	0.78
z- score	-0.65

KURTOSIS

	W2	L2
W1	29	27
L1	27	30

CPR	1.19
z- score	0.46

STANDARD DEVIATION

	W2	L2
W1	44	12
L1	12	45

CPR	13.75
z- score	5.70

CORRELATION WITH STOCKS

	W2	L2
W1	38	18
L1	18	39

CPR	4.57
z- score	3.77

SKEWNESS

	W2	L2
W1	37	19
L1	19	38

CPR	3.89
z- score	3.41

CORRELATION WITH BONDS

	W2	L2
W1	33	23
L1	23	34

CPR	2.12
z- score	1.96

Table 2. Contingency tables event driven

MEAN

	W2	L2
W1	16	13
L1	13	17

CPR	1.61
z- score	0.91

KURTOSIS

	W2	L2
W1	14	15
L1	15	15

CPR	0.93
z- score	-0.13

STANDARD DEVIATION

	W2	L2
W1	25	4
L1	4	26

CPR	40.63
z- score	4.87

CORRELATION WITH STOCKS

	W2	L2
W1	12	17
L1	17	13

CPR	0.54
z- score	-1.17

SKEWNESS

	W2	L2
W1	14	15
L1	15	15

CPR	0.93
z- score	-0.13

CORRELATION WITH BONDS

	W2	L2
W1	12	17
L1	17	13

CPR	0.54
z- score	-1.17

Table 3. Contingency tables funds of funds

MEAN

	W2	L2
W1	21	18
L1	18	21

CPR	1.36
z- score	0.67

KURTOSIS

	W2	L2
W1	20	19
L1	19	20

CPR	1.11
z- score	0.22

STANDARD DEVIATION

	W2	L2
W1	30	9
L1	9	30

CPR	11.11
z- score	4.48

CORRELATION WITH STOCKS

	W2	L2
W1	29	10
L1	10	29

CPR	8.41
z- score	4.11

SKEWNESS

	W2	L2
W1	23	16
L1	16	23

CPR	2.07
z- score	1.58

CORRELATION WITH BONDS

	W2	L2
W1	22	17
L1	17	22

CPR	1.67
z- score	1.13

Table 4. Contingency tables convertible arbitrage

MEAN

	W2	L2
W1	2	2
L1	2	2

CPR	1.00
z- score	0

KURTOSIS

	W2	L2
W1	3	1
L1	1	3

CPR	9.00
z- score	1.34

STANDARD DEVIATION

	W2	L2
W1	3	1
L1	1	3

CPR	9.00
z- score	1.34

CORRELATION WITH STOCKS

	W2	L2
W1	4	0
L1	0	4

CPR	#DIV/0!
z- score	#DIV/0!

SKEWNESS

	W2	L2
W1	1	3
L1	3	1

CPR	0.11
z- score	-1.34

CORRELATION WITH BONDS

	W2	L2
W1	1	3
L1	3	1

CPR	0.11
z- score	-1.34

Table 5. Contingency tables global macro

MEAN

	W2	L2
W1	3	5
L1	5	4

CPR	0.48
z- score	-0.74

KURTOSIS

	W2	L2
W1	2	6
L1	6	3

CPR	0.17
z- score	-1.66

STANDARD DEVIATION

	W2	L2
W1	6	2
L1	2	7

CPR	10.50
z- score	2.05

CORRELATION WITH STOCKS

	W2	L2
W1	5	3
L1	3	6

CPR	3.33
z- score	1.18

SKEWNESS

	W2	L2
W1	4	4
L1	4	5

CPR	1.25
z- score	0.23

CORRELATION WITH BONDS

	W2	L2
W1	4	4
L1	4	5

CPR	1.25
z- score	0.22

Table 6. Contingency tables emerging markets

MEAN

	W2	L2
W1	9	4
L1	4	9

CPR	5.06
z- score	1.91

KURTOSIS

	W2	L2
W1	6	7
L1	7	6

CPR	0.73
z- score	-0.39

STANDARD DEVIATION

	W2	L2
W1	10	3
L1	3	10

CPR	11.11
z- score	2.59

CORRELATION WITH STOCKS

	W2	L2
W1	9	4
L1	4	9

CPR	5.06
z- score	1.91

SKEWNESS

	W2	L2
W1	5	8
L1	8	5

CPR	0.39
z- score	-1.16

CORRELATION WITH BONDS

	W2	L2
W1	6	7
L1	7	6

CPR	0.73
z- score	-0.39

Table 7. Contingency tables relative value

MEAN

	W2	L2
W1	9	6
L1	6	10

CPR	2.50
z- score	1.24

KURTOSIS

	W2	L2
W1	9	6
L1	6	10

CPR	2.50
z- score	1.24

STANDARD DEVIATION

	W2	L2
W1	11	4
L1	4	12

CPR	8.25
z- score	2.57

CORRELATION WITH STOCKS

	W2	L2
W1	11	4
L1	4	12

CPR	8.25
z- score	2.57

SKEWNESS

	W2	L2
W1	8	7
L1	7	9

CPR	1.47
z- score	0.53

CORRELATION WITH BONDS

	W2	L2
W1	8	7
L1	7	9

CPR	1.47
z- score	0.53

Table 8. Contingency tables fixed income

MEAN

	W2	L2
W1	2	1
L1	1	2

CPR	4.00
z- score	0.80

KURTOSIS

	W2	L2
W1	1	2
L1	2	1

CPR	0.25
z- score	-0.80

STANDARD DEVIATION

	W2	L2
W1	2	1
L1	1	2

CPR	4.00
z- score	0.80

CORRELATION WITH STOCKS

	W2	L2
W1	3	0
L1	0	3

CPR	#DIV/0!
z- score	#DIV/0!

SKEWNESS

	W2	L2
W1	2	1
L1	1	2

CPR	4.00
z- score	0.80

CORRELATION WITH BONDS

	W2	L2
W1	1	2
L1	2	1

CPR	0.25
z- score	-0.80

Table 9. Regression results

Long Short/Equity	**Coefficient**	**t- statistic**	**R-squared**
Mean	0.1815	1.5698	0.0217
Standard Deviation	1.2502	10.1694	0.4823
Skewness	0.2994	2.4927	0.0142
Kurtosis	-0.1277	-0.9722	0.3331
Correlation with stock market	0.8477	13.0398	0.6050
Correlation with bond market	0.3457	3.4785	0.0983

Event Driven	**Coefficient**	**t- statistic**	**R-squared**
Mean	0.2584	1.6175	0.0439
Standard Deviation	1.8515	11.5517	0.7007
Skewness	0.0185	0.0673	0.0001
Kurtosis	0.0396	0.0806	0.0001
Correlation with stock market	0.4458	4.1359	0.2308
Correlation with bond market	0.0016	0.0105	0.0000

Funds of Funds	**Coefficient**	**t- statistic**	**R-squared**
Mean	0.3135	2.5066	0.0764
Standard Deviation	1.1189	12.9204	0.6872
Skewness	0.5337	2.3332	0.0223
Kurtosis	0.8519	2.9777	0.1045
Correlation with stock market	0.8359	7.3088	0.4128
Correlation with bond market	0.4227	3.4040	0.1323

Emerging Markets	**Coefficient**	**t- statistic**	**R-squared**
Mean	0.3031	2.1496	0.1614
Standard Deviation	0.9380	7.1145	0.6784
Skewness	-0.2754	-1.1054	0.0484
Kurtosis	-0.0340	-0.0900	0.0003
Correlation with stock market	0.6951	7.7320	0.7135
Correlation with bond market	-0.2895	-1.2678	0.0628

Relative Value	**Coefficient**	**t- statistic**	**R-squared**
Mean	0.0898	0.4960	0.0084
Standard Deviation	0.5454	3.8605	0.3394
Skewness	0.0230	0.0986	0.0003
Kurtosis	-0.0171	-0.0990	0.0003
Correlation with stock market	0.7096	3.5396	0.3017
Correlation with bond market	0.3684	1.3549	0.0595

Convertible Arbitrage	**Coefficient**	**t- statistic**	**R-squared**
Mean	0.2597	1.3244	0.2262
Standard Deviation	2.7089	7.2453	0.8974
Skewness	0.0761	0.3005	0.0148
Kurtosis	0.3664	2.9168	0.5864
Correlation with stock market	0.9460	4.0158	0.7288
Correlation with bond market	-0.1791	-0.4743	0.0361

Global Macro	**Coefficient**	**t- statistic**	**R-squared**
Mean	-0.7999	-1.9220	0.1976
Standard Deviation	0.9484	3.7047	0.4778
Skewness	-0.2324	-0.5638	0.0208
Kurtosis	-0.4923	-1.4474	0.1225
Correlation with stock market	0.5548	3.2997	0.4206
Correlation with bond market	-0.3463	-1.5437	0.1371

Fixed Income	**Coefficient**	**t- statistic**	**R-squared**
Mean	-0.0130	-0.0255	0.0002
Standard Deviation	0.7598	5.0962	0.8665
Skewness	0.5205	0.5047	0.0599
Kurtosis	-0.9338	-1.2409	0.2780
Correlation with stock market	1.2057	6.3104	0.9087
Correlation with bond market	0.9394	1.7800	0.4420

Table 10. Forecast errors

Mean (%)			Method 1			Method 2		
	Average 1	Average 2	ME	MAE	RMSE	ME	MAE	RMSE
Long/Short Equity	1.64	1.39	0.25	0.78	1.08	0.25	0.72	0.91
Event Driven	1.27	0.91	0.36	0.49	0.68	0.36	0.47	0.62
Fund of Funds	0.95	0.68	0.27	0.53	0.72	0.27	0.48	0.65
Convertible Arb.	1.18	1.00	0.18	0.42	0.58	0.18	0.36	0.39
Global Macro	1.12	0.55	0.56	0.93	1.26	0.56	0.74	1.01
Emerging Market	0.77	0.03	0.74	1.20	1.56	0.74	0.98	1.29
Relative Value	1.22	0.69	0.54	0.70	1.02	0.54	0.72	0.83
Fixed Income	1.24	0.24	0.99	0.99	1.17	0.99	0.99	1.09

Std. Deviation (%)			Method 1			Method 2		
	Average 1	Average 2	ME	MAE	RMSE	ME	MAE	RMSE
Long/Short Equity	4.13	6.64	-2.51	2.72	3.43	-2.51	3.08	4.05
Event Driven	1.75	2.62	-0.87	0.99	1.97	-0.87	1.45	2.79
Fund of Funds	2.66	3.78	-1.12	1.34	1.71	-1.12	1.82	2.53
Convertible Arb.	1.87	3.57	-1.70	1.90	3.04	-1.70	2.81	4.09
Global Macro	4.30	4.06	0.24	1.69	2.06	0.24	2.49	2.84
Emerging Market	6.35	9.77	-3.42	3.45	4.00	-3.42	3.79	4.98
Relative Value	1.97	2.44	-0.46	1.05	1.71	-0.46	1.37	1.83
Fixed Income	2.25	2.75	-0.50	0.90	0.98	-0.50	1.17	1.86

Skewness			Method 1			Method 2		
	Average 1	Average 2	ME	MAE	RMSE	ME	MAE	RMSE
Long/Short Equity	0.06	0.21	-0.15	0.71	0.94	-0.15	0.67	0.85
Event Driven	0.02	-0.76	0.79	1.26	1.60	0.79	1.18	1.48
Fund of Funds	0.09	-0.35	0.35	0.90	1.20	0.35	0.96	1.21
Convertible Arb.	-0.82	3.57	-0.47	1.24	1.57	-0.47	0.79	0.96
Global Macro	1.01	0.87	0.14	1.56	1.86	0.14	1.30	1.49
Emerging Market	-0.27	-0.50	0.23	1.07	1.41	0.23	0.66	1.02
Relative Value	-0.02	-0.36	0.35	1.19	1.57	0.35	0.93	1.25
Fixed Income	0.25	-0.29	0.54	0.77	1.15	0.54	0.68	1.15

Kurtosis			**Method 1**			**Method 2**		
	Average 1	**Average 2**	**ME**	**MAE**	**RMSE**	**ME**	**MAE**	**RMSE**
Long/Short Equity	0.67	1.97	-1.30	2.28	3.48	-1.30	1.67	2.83
Event Driven	0.93	4.63	-3.71	4.21	5.99	-3.71	3.98	5.87
Fund of Funds	0.73	3.46	-2.73	3.01	4.24	-2.73	2.97	4.38
Convertible Arb.	3.46	2.67	0.79	2.77	3.87	0.79	2.46	2.70
Global Macro	3.28	4.88	-1.61	6.26	8.14	-1.61	4.63	5.86
Emerging Market	2.35	2.66	-0.31	3.20	4.99	-0.31	2.66	4.36
Relative Value	2.44	2.89	-0.45	3.50	5.52	-0.45	2.62	3.67
Fixed Income	0.84	3.18	-2.34	3.22	3.76	-2.34	2.60	3.16

Correlation stocks			**Method 1**			**Method 2**		
	Average 1	**Average 2**	**ME**	**MAE**	**RMSE**	**ME**	**MAE**	**RMSE**
Long/Short Equity	0.37	0.37	-0.01	0.16	0.20	-0.01	0.23	0.31
Event Driven	0.29	0.34	-0.05	0.17	0.20	-0.05	0.15	0.19
Fund of Funds	0.41	0.34	0.08	0.19	0.24	0.08	0.21	0.31
Convertible Arb.	0.22	0.25	-0.03	0.16	0.18	-0.03	0.30	0.34
Global Macro	0.23	0.05	0.18	0.22	0.27	0.18	0.24	0.28
Emerging Market	0.29	0.48	-0.19	0.20	0.22	-0.19	0.24	0.25
Relative Value	0.13	0.10	0.03	0.19	0.23	0.03	0.21	0.26
Fixed Income	0.43	0.26	0.17	0.17	0.19	0.17	0.17	0.28

Correlation bonds			**Method 1**			**Method 2**		
	Average 1	**Average 2**	**ME**	**MAE**	**RMSE**	**ME**	**MAE**	**RMSE**
Long/Short Equity	0.04	0.02	0.02	0.12	0.16	0.02	0.11	0.15
Event Driven	0.05	-0.22	0.27	0.29	0.34	0.27	0.28	0.31
Fund of Funds	-0.05	-0.13	0.09	0.16	0.21	0.09	0.16	0.20
Convertible Arb.	0.01	-0.24	0.25	0.29	0.35	0.25	0.26	0.29
Global Macro	0.00	-0.03	0.02	0.27	0.35	0.02	0.15	0.20
Emerging Market	-0.15	-0.09	-0.06	0.20	0.25	-0.06	0.15	0.17
Relative Value	0.08	-0.15	0.23	0.27	0.32	0.23	0.25	0.31
Fixed Income	0.07	-0.13	0.20	0.24	0.29	0.20	0.34	0.34