Tournaments in the UK Mutual Fund Industry

Rob Jans

Maastricht University

Rogér Otten

Maastricht University

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Correspondence address:

Rogér Otten
Limburg Institute of Financial Economics
Maastricht University
P.O. Box 616
6200 MD Maastricht
The Netherlands
Phone: (+31) 43 3883687
Fax: (+31) 43 3884875
E-mail: R.Otten@Berfin.Unimaas.nl
Homepage: http://www.fdewb.unimaas.nl/finance

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Abstract

In this paper we use a UK mutual fund database to test for the tournament hypothesis as first put forward in a US study by Brown, Harlow and Starks (1996). Studying the UK enables us to test whether the US results or sample specific or can be carried over to other countries as well. From our analysis of 422 UK mutual funds during 1989-2003 we extract three main conclusions. First, using the entire 1989-2003 sample period no consistent evidence for tournament behaviour is found. This is robust to the effects of survivorship bias, and window dressing. Second, splitting the sample period into 2 sub-periods reveals an interesting pattern. During the first part of our sample, 1989-1996, significant evidence for tournament behaviour is found. During the second part of our sample period, 1997-2003, significant support for strategic behaviour, as described theoretically by Taylor (2003), has been documented. These results suggest that after the Brown, Harlow and Starks (1996) study was published, managers entered into a strategic game that takes the actions of competing managers into account instead of seeing them as exogenous benchmarks. Third, we find that the actions taken by managers do have an impact on risk-adjusted performance. During periods that tournament behaviour is observed (1990-1996) loser funds close in on winner funds. During periods when strategic behaviour is observed (1997-2003) winner funds maintain the lead by increasing risk.

1 Introduction

Recently the risk-taking behaviour of mutual fund managers in response to their relative performance has been scrutinized by a growing number of academic studies. Most notably Brown, Harlow and Starks (1996) documented a hitherto undiscovered game performed by US mutual fund managers. Using a sample of monthly returns for 334 growth-oriented US mutual funds during 1980 to 1991 they find that relative mid-year losers increase portfolio risk more than relative mid-year winners. That is, managers who trail the market in the first half of the year increase risk to catch up with the market, while managers who are ahead of the market lock in their winner status. This is commonly referred to as the tournament hypothesis. The rationale for this can be found in Chevalier and Ellison (1997), Goetzmann and Peles (1997) and Sirri and Tufano (1998). These papers indicate that funds earning the highest returns during an assessment period (usually a calendar year) subsequently receive the largest new inflows of money in the fund. Funds with the lowest returns however do not significantly shrink in size. Due to this asymmetric flow of new money loser funds clearly have an incentive to increase risk as a subsequent failure does not lead to significant outflows. As fund managers typically are compensated based on a percentage of the assets under management, all ingredients for managerial manipulation of fund risk are therefore present.

Contradicting evidence is presented in Busse (2001). Using daily data for 230 US funds from 1985 to 1995 he finds that funds that are ranked *above* the median fund increase risk more than below median funds. This is interpreted as evidence against the tournament hypothesis described in Brown, Harlow and Starks (1996). Similar results are documented by Chevalier and Ellison (1997) who find that winner funds have a larger incentive to increase risk.

Taylor (2003) attempts to reconcile these seemingly contradicting results by introducing a formal two-period tournament model. All previous studies assume managers treat competing managers as exogenous benchmarks. Taylor (2003) extends this reasoning and allows for the fact that managers also take the actions of other managers into account. The model is therefore based on strategic interaction between active fund managers. In this game the winner expects the loser to increase risk (based on tournament hypothesis) and therefore the winner also increases risk to maintain the lead. Taylor (2003) shows that in equilibrium the winner is more likely to increase risk than the loser. Therefore previous results that were first interpreted as evidence against tournament hypothesis might well be explained as strategic behaviour instead.

Recently Goriaev, Nijman and Werker (2001, 2003) note two potential biases that could influence all previous work, being first order auto-correlation and the assumption that mutual fund returns are cross-sectionally independent. The authors find that tests of tournament hypothesis using monthly data is more robust to autocorrelation than tests using daily data. Furthermore they show that cross-correlated fund returns do not necessarily invalidate the tournaments tests used before. The idiosyncratic fund returns in a factor model should however be uncorrelated.

All previously cited work in this area has exclusively focused on the US mutual fund market. It might be that these results however are sample specific and pertain to the structure of the very competitive US market. To investigate this possibility we investigate the UK mutual fund market, which also has a long history of fund research.[1] However, to our best knowledge no work on tournaments for the UK mutual fund industry has been produced.

Our first contribution therefore is that we examine the fund tournament for a hitherto un-examined highly developed fund market. This is done using a survivorship bias controlled database of 422 UK mutual funds for the 1989-2003 period. This period is particularly interesting as it allows us to examine the period after the Brown, Harlow and Starks (1996) study was published. Next to that we address the recent criticism on previous studies put forward by for instance Goriaev, Nijman and Werker (2001, 2003). Specifically we use monthly returns to diminish autocorrelation and we use funds with different types of investment strategy to control for cross-correlated fund returns.

The second contribution relates to the influence of fund tournament games on the risk-adjusted performance of funds. After we establish the extent to which managers manipulate rankings by changing the risk of their fund, we are interested in the effect of this on shareholder wealth. In other words, do the actions of fund managers actually create or destroy value for their shareholders.

The rest of the paper is organized as follows. In the next section we present the methodology used in fund tournament studies. Section 3 describes our dataset. In section 4 we present the empirical results. Section 5 covers the influence of tournaments on fund performance. Section 6 concludes the paper.

[1] For an idea of general studies on UK mutual fund performance see for instance Blake and Timmerman (1998), Fletcher and Forbes (2002), Otten and Bams (2002), and Ward and Saunders (1976)

2 Methodology

The methodology we employ in this paper is largely taken from Brown, Harlow and Starks (1996). The only important difference is the fact that we include funds with many different types of investment styles, while Brown, Harlow and Starks (1996) only consider growth-oriented funds. As funds within the same investment style exhibit higher cross-correlation of fund returns, we mitigate the critique of Goriaev, Nijman and Werker (2001, 2003) by including funds with different types of investment strategies.

The general idea of tournament hypothesis in the mutual fund market deals with the fact that fund managers will change the risk of a fund depending on its relative performance compared to their peers. The mutual fund market could be seen as an annual tournament in which the rival funds compete for the best performance by year-end. If a fund manager lags behind in performance, tournament hypothesis predicts an increase in risk relative to the group of winners, in an attempt to improve the performance by year-end.

If managers perceive the mutual fund market as a series of annual tournaments, their behaviour should exhibit evidence of this. Especially in tandem with the battle for new invested capital inflow, a manager can feel the urge to alter the risk profile of a fund under management in an attempt to increase the relative performance. Sirri and Tufano (1998) show that winning managers will receive larger portions of capital inflow while losing managers do not have to fear a substantial capital outflow. This situation creates the effect of a free call option. Winning managers on the other hand might be more tempted to even lower the risk profile of the fund, to lock in the relative high returns that are already established.

The above breakdown leads to the following testable relationship between winning and losing mutual funds. This risk adjustment ratio (RAR) measures the standard deviation of the second period of the year, relative to the standard deviation of the first period of the same year. The cut-off point can be taken at several point during the year, but should at least include several months to be able to calculate a reliable standard deviation. The RAR now determines whether the risk has increased from one period to the other.

$$(\sigma_{2L}/\sigma_{1L}) > (\sigma_{2W}/\sigma_{1W}) \quad (1)$$

Where 1 and 2 are the time periods, L denotes the interim “Loser” and W denotes the interim “Winner”. Tournament hypothesis predicts the RAR for the interim loser to be larger than the

RAR for the interim winner. The equation represents not an exact prediction, which will hold in all cases, but more a general tendency for the mutual fund market as a whole. Nor does it say that risk always increases in the second period for losing managers. If overall risk profiles are decreasing, they will decrease in a lesser extent for these losing managers. The adjustment to a different risk level depends on a multitude of factors like the difference in performance relative to the peers and the likely and anticipated reaction by other managers. However, in tournament hypothesis, interim losers should in general have a larger risk adjustment ratio than the interim winners, no matter whether this is increased, or decreased less.

Equation (1) states that the loser funds will increase portfolio risk to a larger degree than that winner funds do after a certain mid-year point. To test for this, two variables from the monthly mutual fund data are constructed. First, subgroups of interim winners and losers were constructed according to a fund's relative return performance between January and month M. The M-month cumulative return (RTN) is calculated as follows:

$$RTN_{jMy} = [(1 + r_{j1y}) (1 + r_{j2y}) \ldots (1 + r_{jMy})] - 1 \qquad (2)$$

Where: $_j$ is a specific fund
$_y$ is a given year
r_j is the monthly change in net asset value
M is a given month

In the analysis, M is allowed to vary between April and August. This to detect months in which the tournament might be more prominent. Once the RTN's are calculated for each yearly tournament, the funds are ranked from high to low. After that, funds that performed above the median are labelled the winner funds, and funds performing below the median are the loser funds. These classifications were made for every different month M. In total five months were under investigation so five RTN rankings were developed for every year in the sample. Using the mean as the cut-off point for winners and losers could increase the influence of possible outliers. The use of the median ensures that exactly half of the sample will be labelled a loser or a winner, giving two equal-sized samples to compare.

Second, a ratio of each funds' volatility before and after the interim assessment period is developed. The (RAR) is calculated as follows:

$$\mathrm{RAR}_{jy} = \sqrt{\frac{\sum_{m=M+1}^{12} (r_{jmy} - \bar{r}_{j(12-M)y})^2}{(12-M)-1}} \Big/ \sqrt{\frac{\sum_{m=1}^{M} (r_{jmy} - \bar{r}_{jMy})^2}{M-1}} \qquad (3)$$

In each yearly tournament, this RAR measures the standard deviation of a fund in the latter part of a year, relative to the standard deviation of that fund before the interim assessment date. This interim assessment date M can vary between April and August. Following tournament hypothesis, the RAR is expected to be larger for loser funds than for winner funds.

Following equations (2) and (3) pairs for every fund and every month M in each yearly tournament are created. Each pair consists of the RTN measure for a certain fund, linked to the RAR measure of that fund in the same month. A fund can belong to one of the following 4 categories: [High-RTN, High-RAR], [High-RTN, Low-RAR], [Low-RTN, High-RAR] and [Low-RTN, Low-RAR]. The null hypothesis is that each of these four categories would contain 25%. The alternative hypothesis is that the [Low-RTN, High-RAR] and [High-RTN, Low-RAR] groups would have significantly larger frequencies than the other two cell outcomes. These four categories are placed in a matrix to be able to investigate them empirically. 2 x 2 contingency tables were used for the statistical part, with the statistical significance established with a chi-square test with one degree of freedom. For every year of the 15-year sample, a matrix was created for every month between April and August. The chi-square tests were performed on each of the five matrixes.

The months in which the hypothesis is not tested are not suitable for utilizable conclusions. For instance, a test in which November would be the mid-year point would include a RAR calculation that is based on a standard deviation of a period with only two data points.

3 Data

We use Datastream to create a comprehensive sample of UK open-end mutual funds (unit trusts). Several restrictions on the total amount of available funds were put in place to create a relevant dataset. We only include equity funds investing domestically, therefore excluding mixed or internationally investing mutual funds.

The result is a monthly database starting January 1989 until December 2003 consisting of 422 UK mutual funds. We assume that the tournaments are held on an annual basis, and

that the funds are evaluated during the same cycle. Therefore, a fund was only included if at least a full year of data was available, starting the first of January. Funds that became active during a given year were included in the next year's portfolio. A fund that ceased operations during a year was also removed from that year's portfolio under examination. Each year, the portfolios were reweighed to reflect the most actual situation.

Particular attention was addressed to minimise the effects of survivorship bias. As mentioned by Brown, Harlow and Starks (1996), the disappearance is more likely to affect under-performing funds and therefore the results of the study would possibly underestimate the tournament hypothesis. To account for survivorship bias, information on dead funds was collected using the Financial Times UK Unit Trust Yearbook 2003. The historical monthly data could then be retrieved from Datastream. Again the constraint applied that the dead funds also had to have a full year of data available to be included in the portfolio. In this way, usable information on a total of 115 dead funds was obtained.

The entire sample consists of 3191 living fund years, and 487 dead fund years, totaling 3678 mutual fund years. The sample set also reflects the increase in mutual funds on the UK market. In 1989, the first year of the sample, 142 funds are included. This number has grown to 422 funds in 2003, an increase of more than 200%. Table 1 provides the relevant descriptive statistics on our sample.

[Insert Table 1 about here]

4 Empirical Results

4.1 Full sample

To detect tournament behaviour for UK fund managers we first perform a general test on our full sample. After that we establish a series of additional robustness checks to test the sensitivity of our results to for instance survivorship bias, window dressing, use of sub-samples, fund characteristics and the use of april as the ending point. All tests have been conducted using a chi-square test. Given the format of 2x2 matrixes the rejection region is based on one degree of freedom. The following values must therefore be preserved to test for significance: a χ^2 value of 3.84146 with $\alpha = .05$ and the accompanying p-value of .05. Furthermore it should be stressed that significant outcomes do not necessarily imply tournament behaviour. On the contrary, when the [High-RTN, High-RAR] or [Low-RTN, Low-RAR] cells contain considerably more than 25% of the data, evidence against

tournament hypothesis is present. This would be the strategic behaviour first discussed by Taylor (2003).

[Insert Table 2 about here]

Table 2 presents the most rudimentary test of the sample. All funds, including the dead ones, are used during the full sample period to provide a first test of the tournament hypothesis for UK mutual funds. At first sight the results are rather disappointing. Only 1 out of 5 cut-off months M provides cell frequencies that are significantly different from our expectations under the null hypothesis. Funds with returns above the median (interim winners) during January-May (M=5) increase risk more during the remaining part of the year than loser funds during the same period. The difference is highly significant with a p-value of 0.006. This is evidence against the tournament hypothesis and could indicate strategic behaviour by winner funds who anticipate loser funds to increase risk as well. The most significant interim assessment month in Brown, Harlow and Starks (1996), July (M=7), surprisingly does not deliver a significant value in our investigation.[2]

Overall these first UK results do not corroborate the findings of Brown, Harlow and Starks (1996) for US mutual funds. In the next paragraphs we test the robustness of this preliminary result.

4.2 Survivorship bias

Previous studies, like Brown, Harlow and Starks (1996) and Chevalier and Ellison (1997) were subject to survivorship bias. To make our results more comparable to the earlier work we delete all dead funds from our full sample to create a surviving funds only sample. As dead funds are usually clustered in the loser portfolio, Brown, Harlow and Starks (1996) would suggest they are more susceptible to tournament behaviour. Leaving them out would therefore under-estimate tournament behaviour. Another view however is put forward in Qiu (2003). There it is shown that survivorship bias might result in over-estimating the risk adjustment of losers. The results of applying the same methodology to our survivorship biased sample can be found in Table 3.

[2] According to Brown, Harlow and Starks (1996) July would be obvious cut-off month as managers revise their investment strategy within the month following the release of the second-quarter performance rankings.

[Insert Table 3 about here]

Adjusting our sample to surviving funds only does not change our results for any given month M, even χ^2 values hardly change. May remains the only significant month, with evidence for strategic behaviour. Therefore we conclude that survivorship bias does not seem to influence our results for UK mutual fund tournaments. All subsequent tests are therefore performed using the full sample, including dead funds.

4.3 Window dressing

There is convincing evidence that money managers exhibit window dressing behaviour at the end of a calendar year. The typical situation is when a fund manager sells stocks with poor previous performance and buying stocks that have performed well. When seeing the year-end portfolio, loaded with well performing stocks, an investor might stick with the fund even when performance has been poor. This is documented by for instance, Haugen and Lakonishok (1988) Lakonishok, Schleifer, Thaler, and Vishny (1991) and Musto (1997).

This kind of behaviour might increase fund volatility that has nothing to do with our investigation. To be conservative, we therefore alternatively perform our analysis on a dataset that excludes all December returns, in line with Brown, Harlow and Starks (1996). The results of this are presented in Table 4.

[Insert Table 4 about here]

Our previous conclusions remain valid. May gives significant evidence for strategic behaviour. The only difference is that also August reports a significant value in favor of strategic behaviour. Overall however we still cannot confirm the convincing tournament results reported by Brown, Harlow and Starks (1996) for US funds.

4.4 Sub sample analysis

All results up to this point have been based on data from 1989-2003, a 15-year period in which we witnessed an enormous growth in the mutual fund sector, as outlined in section 3. It might be that temporal dynamics influence the findings for the entire 1989-2003 period. An indication of this can be found in Brown, Harlow and Starks (1996). When they split their

1980-1991 period into sub-periods it is found that tournament behaviour is only present during 1986-1991. For the first half of their sample period, 1980-1985, no significant results are observed. As the main part of our database is post the Brown, Harlow and Starks (1996) sample period it allows us to examine whether their findings persist after 1991.

To investigate the temporal dynamics of the tournament we split our sample into 2 sub-periods, 1989-1996 and 1997-2003. 1996 is not only the middle of our sample period, but also the year in which the Brown, Harlow and Starks (1996) study was published.

[Insert Table 5 about here]

The results using sub-periods are presented in Table 5, panel A (1989-1996) and B (1997-2003). Splitting the sample reveals an interesting pattern. During the first sub-period, 1989-1996, 4 out of 5 months produce significant support for tournament behaviour. In contrast to that, the second sub-period, 1997-2003, 4 out of 5 months show significant support for strategic behaviour. A possible explanation for the strategic behaviour may relate to the impact the Brown, Harlow and Starks (1996) study had on how managers perceive the fund tournament. After it has been documented that losers gamble by increasing risk, winner managers anticipate on this and increase risk as well. This leads to the strategic behaviour as described in Taylor (2003). Therefore using a UK dataset we can confirm the tournament behaviour described by Brown, Harlow and Starks (1996) up till 1996 and we provide empirical support for the Taylor (2003) theoretical model which predicts strategic behaviour after 1996.[3]

4.5 Small versus large funds

Based on results put forward in Brown, Harlow and Starks (1996) and Goriaev, Palomino and Prat (2002) we expect smaller funds to have more incentives and flexibility to change portfolio risk compared to larger funds. In order to test this hypothesis on our UK funds we rank all mutual funds by size. We then create two separate samples of funds by using the median size as cut-off point. Repeating our analysis for the full 1989-2003 sample period on small and large funds separately leads to Table 6, Panel A and B.

[3] These results are robust to survivorship bias and window dressing effects described before. Tables are available upon request with the authors.

[Insert Table 6 about here]

Based on these results we cannot confirm previous findings. Small funds exhibit no evidence of tournament or strategic behaviour. Large funds provide support for strategic behaviour in May and August. These mixed results however could be driven by using the full sample period. Therefore we also split the analysis on small versus large funds into 2 sub-samples, 1989-1996 and 1997-2003.

[Insert Table 7 about here]

[Insert Table 8 about here]

In Tables 7 and 8 we present our results for small and large funds separately. In line with our previous analysis using the total sample we find strong evidence for tournament behaviour during 1989-1996 and strategic behaviour during 1997-2003. Although this holds for both small and large funds the results are much stronger for small funds. For instance, during 1989-1997 all five assessment months provide highly significant proof of tournament behaviour.

4.6 Final month April

The final robustness check we perform relates to the choice of December as the final month. For US studies this seems an obvious choice, as the US tax year ends December 31. In the UK however the tax year for individuals ends April 5. Therefore it might be the case that UK investors use April as the final evaluation month. Subsequently fund managers anticipate on this and perceive April as the end of the tournament. We re-arrange our sample and use April as the final month. The tournament therefore is considered to run from May to April (instead of January to December).

[Insert Table 9 about here]

[Insert Table 10 about here]

The results of this are presented in table 9 (1989-2003) and Table 10 (sub-periods). Using April as the final month does not proof to be important. Although we finds some months

which support strategic behaviour the pattern is not very convincing. Therefore we believe UK investors as well as fund managers perceive December to be the last month of the tournament. In addition to that, all popular UK fund resources, including the authoritative Financial Times UK Unit Trust Yearbook, report returns and rankings as per end of December.

5 Influence on performance

Our empirical results until now clearly indicate that the UK mutual fund industry is indeed susceptible to risk adjustments after a certain assessment date. A question that logically follows now is whether this behaviour is beneficial for the investors in terms of performance. The main concern is whether the free call option that fund managers have creates or destroys value for the investors. The key interest here is to find out whether the tournament and/or strategic behaviour indeed paid off or whether the strategy is vain.

To test the performance of our funds, we use the Carhart (1997) 4-factor model, which is by now the standard model used in mutual fund performance studies. Our main database to construct the factors used in the 4-factor model is Worldscope.[4] For the excess market return we take the return on all stocks in the Worldscope UK universe that are larger than £ 25 million, minus the LIBOR rate. We then rank all stocks based on size and assign the bottom 20% of total market capitalization to the small portfolio. The remaining part goes into the large portfolio. SMB is the return difference between small and large. For the HML factor all stocks are ranked on their book-to-market ratio. The top 30% of market capitalization is assigned to the high book to market portfolio and the bottom 30% to the low book-to-market portfolio. HML is obtained by subtracting the low from the high book-to-market return. The momentum factor portfolio is formed by ranking all stocks on their prior 12-month return. The return difference between the top 30% and bottom 30% by market capitalization then provides us with the Pr12m factor returns.

The Carhart 4-factor model:

$$Rit - Rft = \alpha 1 + \beta 1i(Rmt - Rft) + \beta 2iSMBt + \beta 3iHMLt + \beta 4iPR12mt + \varepsilon it \qquad (4)$$

[4] This database is now commonly used in studies on UK fund performance, see for instance and Bauer, Koedijk and Otten (2005) and Otten & Bams (2002).

where

Rit : the fund return

Rft : the risk free rate

α : Jensen alpha

SMB : the difference in performance between a small cap portfolio and a large cap portfolio

HML : the difference in return between a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks

PR12m: the difference in return between a portfolio of past winners and a portfolio of past losers

ε : the error term

The idea is to examine whether the risk-adjusted performance of funds changes during the second part of the year, conditional upon the change in risk. In order to test for that we first calculate 4-factor alphas for both the Low RTN and High RTN groups (first part of the year). After that we estimate 4-factor alphas for the corresponding Low RAR and High RAR groups of funds (second part of the year). These results are presented in Table 11.

[Insert Table 11 about here]

Table 11 presents the results for the full 1989-2003 sample period. While Low RTN funds have a significantly negative 4-factor alpha (Panel A), High RTN funds (Panel B) have a significantly positive alpha.[5] Of course this is due to the way we construct our winner and loser groups. More interestingly however is to examine how the performance during the second part of the year looks like, conditional upon the change in RAR. This provides us with two interesting conclusions. First, Low RTN funds during period 1 continue to deliver significantly negative 4-factor alphas during period 2, irrespective of the change in RAR. Second, High RTN funds during period 1 show 4-factor alphas insignificantly different from zero during the second period, irrespective of the change in RAR.

These results suggest that interim changes in risk by fund managers do not have a significant influence on year-end risk-adjusted performance. However, based on our previous results we believe using the total sample period hides interesting sub-period results.

[5] The difference in alpha between low and high RTN funds is significantly negative. These results are available upon request.

Therefore, we again split our sample into 2 sub-periods for both Low RTN and High RTN groups.

[Insert Table 12 about here]

Table 12 presents the results for the first sub-period, 1989-1996. Recall that during that period we found significant evidence for tournament behaviour. Looking at the 4-factor alphas during the second part of the year (period 2) we find alphas for the Low RTN still to be significantly negative (Panel A). This holds for both RAR groups. Surprisingly however, the High RTN funds now also deliver significantly negative alphas, irrespective of the realized RAR. This provides some support to the idea that loser funds closed in on the winner funds by displaying tournament behaviour. A formal test of this would be to compare the risk-adjusted return of the Low RTN with a High RAR to the High RTN with Low RAR group. In Table 13 we present the results of this. As only 1 out of 4 months presents a significant difference in risk-adjusted performance we conclude that interim loser funds that increased risk did not significantly under-perform winner funds that decreased risk. As the loser funds did under-perform significantly during the period before the interim date we conclude that tournament behaviour did pay off for loser funds during 1989-1997.

[Insert Table 13 about here]

The second sub-period (1997-2003), in which we previously documented significant evidence in favor of strategic behaviour, is examined in Table 14. Again for Low RTN and High RTN funds separately.

[Insert Table 14 about here]

From this we derive that Low RTN funds remain significant under-performers during the rest of the year, although the significance level of this dropped somewhat. Again this holds for both RAR groups. High RTN with a High RAR seem to maintain their out-performance during the rest of the year. Low RAR fund alphas do not differ from 0 significantly. This suggests that winner funds maintained their lead by displaying strategic behaviour. As before, a formal test of this would be to compare the risk-adjusted return of the High RTN with a High RAR to the Low RTN with Low RAR group. In Table 15 we present the results of this.

As all months present a significantly positive difference in risk-adjusted performance we conclude that interim winner funds that increased risk did out-perform loser funds that decreased risk. From this we conclude that strategic behaviour did pay off for winner funds during 1998-2003.

[Insert Table 15 about here]

[Insert Table 16 about here]

Overall we think this provides evidence that both tournament behaviour and strategic behaviour did indeed lead to an improved relative performance for funds that engage in this game, which ultimately increases shareholder value.

6 Conclusion

In this paper we provide evidence on the risk-taking behaviour of fund managers in response to their relative performance. US evidence, presented in Brown, Harlow and Starks (1996), documents that funds with poor interim performance increase risk to close the gap on well performing funds. This so-called tournament behaviour is caused by the asymmetric flow of new money into funds as presented in Chevalier and Ellison (1997), Goetzmann and Peles (1997) and Sirri and Tufano (1998).

Our paper is the first to consider a UK mutual fund database, which enables us to examine whether the US results are sample specific. Next to that we consider a more recent time-period and take into account recent criticism on previous studies on tournament behaviour.

From our analysis of 422 UK mutual funds during 1989-2003 we extract three main conclusions. First, using the entire 1989-2003 sample period no consistent evidence for tournament behaviour has been found. This is robust to the effects of survivorship bias, and window dressing. Second, splitting the sample period into 2 sub-periods reveals an important pattern. During the first part of our sample, 1989-1996, significant evidence for tournament behaviour is found. During the second part of our sample period, 1997-2003, significant support for strategic behaviour, as described theoretically by Taylor (2003), has been documented. These results suggest that after the Brown, Harlow and Starks (1996) study was published, managers entered into a strategic game that takes the actions of competing

managers into account instead of seeing them as exogenous benchmarks. Third, we find that the actions taken by managers do have an impact on risk-adjusted performance. During periods that tournament behaviour is observed (1990-1996) loser managers close in on winner funds. During periods when strategic behaviour is observed (1997-2003) winner funds maintain the lead by increasing risk.

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Table 1: Descriptive Statistics

Year	Number of Funds	Median Return	Median Standard Deviation
1989	142	19.94%	7.42%
1990	154	-17.09	7.91
1991	157	10.55	6.54
1992	180	13.75	6.01
1993	182	24.41	8.87
1994	209	-7.05	5.42
1995	221	17.02	7.46
1996	231	13.09	5.82
1997	239	17.65	8.29
1998	249	8.17	11.92
1999	257	20.45	11.74
2000	293	-3.76	8.32
2001	326	-14.91	12.96
2002	355	-26.69	15.09
2003	422	18.22	10.69

Table 1 presents descriptive statistics on our sample. Per year we report the number of funds, median return and standard deviation.

Table 2: Full Sample Frequency Distributions, 1989 - 2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	3617	24.25	25.55	25.55	24.66	1.728	0.189
(5,7) **S**		25.79	23.86	23.86	26.49	7.512	0.006
(6,6)		23.89	25.77	25.77	24.58	3.417	0.065
(7,5)		24.74	24.91	24.91	25.44	0.045	0.831
(8,4)		25.46	24.19	24.19	26.15	3.774	0.052

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-2003 sample period. Funds are divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 3: Surviving Funds only Sample Frequency Distributions, 1989 - 2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	3191	24.44	25.44	25.44	24.69	0.983	0.321
(5,7) **S**		25.79	23.85	23.85	26.51	6.757	0.009
(6,6)		23.79	25.85	25.85	24.51	3.735	0.053
(7,5)		24.73	24.91	24.91	25.45	0.037	0.848
(8,4)		25.35	24.29	24.29	26.07	2.586	0.108

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using surviving funds only for the 1989-2003 sample period. Funds are divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 4: Controlling for Window Dressing (Ex-December), 1989 - 2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	3615	24.18	25.64	25.64	24.54	2.395	0.122
(5,7) **S**		26.14	23.71	23.71	26.45	9.670	0.002
(6,6)		24.20	25.64	25.64	24.51	2.394	0.122
(7,5)		25.15	24.70	24.70	25.45	0.511	0.475
(8,4) **S**		25.75	24.09	24.09	26.06	4.745	0.029

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-2003 sample period. Funds are divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 5: Sub-samples

Panel A: 1989-1996

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8) **T**	1476	21.75	27.98	27.98	22.29	20.998	0.000
(5,7) **T**		22.97	26.90	26.90	23.24	8.500	0.004
(6,6) **T**		22.70	27.17	27.17	22.97	11.102	0.001
(7,5) **T**		23.17	26.69	26.69	23.44	6.777	0.009
(8,4)		23.98	25.88	25.88	24.25	1.833	0.176

Panel B: 1997-2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8) **S**	2141	25.97	23.87	23.87	26.30	4.393	0.036
(5,7) **S**		27.74	21.77	21.77	28.72	35.792	0.000
(6,6)		24.71	24.80	24.80	25.69	0.132	0.717
(7,5) **S**		25.83	23.68	23.68	26.81	5.943	0.015
(8,4) **S**		26.48	23.03	23.03	27.46	13.310	0.000

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-1996 (Panel A) and 1997-2003 (Panel B) sample period. Funds are divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 6: Small versus Large funds, 1989-2003

Panel A: Small funds

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	1598	24.41	25.28	25.28	25.03	0.204	0.651
(5,7)		25.78	23.90	23.90	26.41	3.061	0.080
(6,6)		23.84	25.84	25.84	24.47	1.829	0.176
(7,5)		24.91	24.78	24.78	25.53	0.122	0.727
(8,4)		25.34	24.34	24.34	25.97	1.101	0.294

Panel B: Large Funds

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	1599	24.70	25.02	25.02	25.27	0.001	0.979
(5,7) **S**		26.45	23.14	23.14	27.27	8.842	0.003
(6,6)		24.02	25.58	25.58	24.83	0.861	0.353
(7,5)		25.52	24.08	24.08	26.33	2.169	0.141
(8,4) **S**		26.14	23.45	23.45	26.95	6.117	0.013

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-2003 sample period. We first divide funds into a small (Panel A) and large (Panel B) based on the median size. Funds are then divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 7: Small funds using sub-periods

Panel A: 1989-1996

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8) **T**	579	20.38	29.19	29.19	21.24	16.267	0.000
(5,7) **T**		22.28	27.29	27.29	23.14	4.860	0.027
(6,6) **T**		21.93	27.63	27.63	22.80	6.437	0.011
(7,5) **T**		21.42	28.15	28.15	22.28	9.216	0.002
(8,4) **T**		22.11	27.46	27.46	22.97	5.621	0.018

Panel B: 1997-2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8) **S**	1019	26.69	23.06	23.06	27.18	6.121	0.013
(5,7) **S**		27.77	21.98	21.98	28.26	14.842	0.000
(6,6)		24.93	24.83	24.83	25.42	0.048	0.827
(7,5) **S**		26.89	22.87	22.87	27.38	7.424	0.006
(8,4) **S**		27.18	22.57	22.57	27.67	9.614	0.002

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-2003 sample period. We first divide funds into a small (Table 7) and large (Table 8) based on the median size. For both small and large we then create to sub-samples, 1989-1996 (Panel A) and 1997-2003 (Panel B). Funds are then divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 8: Large funds using sub-periods

Panel A: 1989-1996

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	"High" RAR	High RTN ("Winners") "Low" RAR	"High" RAR	χ^2	p-value
(4,8)	580	22.59	26.90	26.90	23.62	3.348	0.067
(5,7)		22.76	26.72	26.72	23.79	2.768	0.096
(6,6) **T**		22.07	27.41	27.41	23.10	5.420	0.020
(7,5)		23.28	26.21	26.21	24.31	1.358	0.244
(8,4)		24.66	24.83	24.83	25.69	0.027	0.870

Panel B: 1997-2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	"High" RAR	High RTN ("Winners") "Low" RAR	"High" RAR	χ^2	p-value
(4,8)	1019	25.91	23.95	23.95	26.20	1.814	0.178
(5,7) **S**		27.77	21.98	21.98	28.26	14.842	0.000
(6,6)		24.93	24.83	24.83	25.42	0.048	0.827
(7,5) **S**		26.89	22.87	22.87	27.38	7.424	0.006
(8,4) **S**		27.18	22.57	22.57	27.67	9.614	0.002

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-2003 sample period. We first divide funds into a small (Table 7) and large (Table 8) based on the median size. For both small and large we then create to sub-samples, 1989-1996 (Panel A) and 1997-2003 (Panel B). Funds are then divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 9: April as final month, 1989 - 2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	3246	25.39	24.52	24.52	25.57	1.184	0.277
(5,7) **S**		27.51	22.34	22.34	27.82	36.875	0.000
(6,6)		24.40	25.45	25.45	24.71	1.037	0.308
(7,5)		25.32	24.53	24.52	25.63	1.183	0.277
(8,4)		24.95	24.89	24.89	25.26	0.060	0.806

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-2003 sample period. Funds are divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 10: April as final month, sub-periods

Panel A: 1989-1996

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8)	1500	24.47	25.40	25.40	24.73	0.384	0.535
(5,7) **S**		26.33	23.53	23.53	26.60	5.161	0.023
(6,6)		24.00	25.87	25.87	24.27	1.803	0.179
(7,5)		23.60	26.27	26.27	23.87	3.852	0.050
(8,4)		25.87	24.00	25.87	26.13	2.399	0.121

Panel B: 1997-2003

Assessment Period	# observations	Sample Frequency (% of Observations) Low RTN ("Losers") "Low" RAR	Low RTN ("Losers") "High" RAR	High RTN ("Winners") "Low" RAR	High RTN ("Winners") "High" RAR	χ^2	p-value
(4,8) **S**	1746	26.17	23.77	23.77	27.29	4.236	0.040
(5,7) **S**		28.52	21.31	21.31	28.87	38.119	0.000
(6,6)		24.74	25.09	25.09	25.09	0.021	0.885
(7,5) **S**		26.80	23.02	23.02	27.15	10.904	0.001
(8,4)		24.17	25.66	25.66	24.51	1.213	0.271

In this Table we report cell frequencies for a 2x2 classification scheme involving the risk adjustment ratio (RAR) and compounded return through the first M months of the year. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year. All data is constructed using 422 funds for the 1989-1997 (Panel A) and 1997-2003 (Panel B) sample period. Funds are divided into four groups on a yearly basis according to i) whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. The χ^2 statistic is based on a null hypothesis that each cell should receive an equal distribution (25%) of the sample. Based on the results in the last 2 columns we report a "**T**" if significant tournament behaviour occurs for that period, and an "**S**" for significant strategic behaviour for that given period. These are reported in column 1.

Table 11: Risk-adjusted performance, 1989-2003

Panel A: Low RTN

	Low RTN Period 1		Low RAR Period 2		High RAR Period 2	
Assessment Period	alpha	(t-stat)	alpha	(t-stat)	alpha	(t-stat)
(4,8)	-0.857	(-7.992)	-0.461	(-4.624)	-0.493	(-4.773)
(5,7)	-0.739	(-7.278)	-0.592	(-5.890)	-0.546	(-5.580)
(6,6)	-0.758	(-8.768)	-0.564	(-4.504)	-0.556	(-4.545)
(7,5)	-0.812	(-9.156)	-0.513	(-3.567)	-0.521	(-4.246)
(8,4)	-0.824	(-9.367)	-0.571	(-3.373)	-0.528	(-3.807)

Table 11 continued

Panel B: High RTN

	High RTN Period 1		Low RAR Period 2		High RAR Period 2	
Assessment Period	alpha	(t-stat)	alpha	(t-stat)	alpha	(t-stat)
(4,8)	0.463	(4.232)	-0.078	(0.094)	0.072	(0.734)
(5,7)	0.412	(4.136)	-0.070	(-0.733)	0.031	(0.277)
(6,6)	0.410	(4.201)	-0.147	(-1.326)	0.052	(0.418)
(7,5)	0.328	(3.426)	0.006	(0.048)	0.059	(0.428)
(8,4)	0.308	(3.432)	-0.079	(-0.537)	0.146	(0.826)

This table reports 4-factor alphas and corresponding t-stats for portfolios of funds based on whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year.

Table 12: Risk-adjusted performance , 1989-1996

Panel A: Low RTN

	Low RTN Period 1		Low RAR Period 2		High RAR Period 2	
Assessment Period	alpha	(t-stat)	alpha	(t-stat)	alpha	(t-stat)
(4,8)	-1.028	(-8.472)	-0.518	(-4.332)	-0.561	(-4.534)
(5,7)	-0.933	(-8.121)	-0.584	(-4.463)	-0.519	(-3.983)
(6,6)	-0.814	(-7.227)	-0.600	(-3.784)	-0.467	(-3.106)
(7,5)	-0.786	(-7.410)	-0.596	(-3.142)	-0.598	(-3.510)
(8,4)	-0.802	(-8.509)	-0.709	(-3.346)	-0.572	(-2.968)

Table 12 continued

Panel B: High RTN

	High RTN Period 1		Low RAR Period 2		High RAR Period 2	
Assessment Period	alpha	(t-stat)	alpha	(t-stat)	alpha	(t-stat)
(4.8)	0.322	(2.278)	-0.126	(-1.048)	-0.170	(-1.418)
(5.7)	0.411	(3.847)	-0.266	(-2.473)	-0.282	(-2.345)
(6.6)	0.312	(3.356)	-0.356	(-2.743)	-0.273	(-2.335)
(7.5)	0.277	(2.909)	-0.260	(-1.933)	-0.235	(-1.851)
(8.4)	0.273	(3.079)	-0.284	(-1.949)	-0.181	(-1.060)

This table reports 4-factor alphas and corresponding t-stats for portfolios of funds based on whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year.

Table 13: Effectiveness of Tournament behaviour, 1989-1996

[Low RTN High RAR] – [High RTN-Low RAR]		
Assessment Period	alpha	(t-stat)
(4,8)	-0.435	(-2.579)
(5,7)	-0.253	(-1.632)
(6,6)	-0.11	(-0.644)
(7,5)	-0.338	(-1.785)
(8,4)	-0.288	(-1.387)

This table reports 4-factor alphas and corresponding t-stats for the *difference* in return between the low RTN high RAR portfolio and the High RTN low RAR portfolio. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year.

Table 14: Risk-adjusted performance , 1997-2003

Panel A: Low RTN

	Low RTN Period 1		Low RAR Period 2		High RAR Period 2	
Assessment Period	alpha	(t-stat)	alpha	(t-stat)	alpha	(t-stat)
(4,8)	-0.764	(-4.059)	-0.399	(-2.328)	-0.402	(-2.235)
(5,7)	-0.550	(-3.219)	-0.555	(-3.536)	-0.499	(-3.238)
(6,6)	-0.697	(-5.234)	-0.530	(-2.521)	-0.615	(-2.984)
(7,5)	-0.820	(-5.584)	-0.416	(-1.764)	-0.437	(-2.256)
(8,4)	-0.804	(-5.094)	-0.482	(-1.665)	-0.515	(-2.322)

Table 14 continued

Panel B: High RTN

	High RTN Period 1		Low RAR Period 2		High RAR Period 2	
Assessment Period	alpha	(t-stat)	alpha	(t-stat)	alpha	(t-stat)
(4,8)	0.487	(2.914)	0.061	(0.398)	0.340	(2.144)
(5,7)	0.391	(2.195)	0.151	(0.907)	0.311	(1.623)
(6,6)	0.522	(2.907)	0.066	(0.358)	0.370	(1.683)
(7,5)	0.415	(2.377)	0.264	(1.274)	0.338	(1.363)
(8,4)	0.402	(2.462)	0.076	(0.281)	0.467	(1.415)

This table reports 4-factor alphas and corresponding t-stats for portfolios of funds based on whether RTN is below ("loser") or above ("winner") the median, and ii) whether RAR is above ("high") or below ("low") the median. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year.

Table 15: Effectiveness of Strategic behaviour, 1997-2003

[High RTN High RAR] – [Low RTN-Low RAR]		
Assessment Period	alpha	(t-stat)
(5,7)	1.25	(7.671)
(6,6)	0.941	(5.639)
(7,5)	1.218	(7.107)
(8,4)	1.234	(6.121)
(9,3)	1.206	(6.163)

This table reports 4-factor alphas and corresponding t-stats for the *difference* in return between the high RTN high RAR portfolio and the low RTN low RAR portfolio. In column 1 the assessment period is stated as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the rest of the year.