Fund Family Tournament and Performance Consequences:

Evidence from the UK fund industry

Zhichao Zhang[a] Li Ding[a] Si Zhou[b*] Yaoyao Fu[a]

[a]*Durham University Business School, Durham University, United Kingdom*
[b]*University of Aberdeen Business School, United Kingdom*

Abstract

By applying tournament analysis to the UK Unit Trusts data, we find evidence to support significant risk shifting in the family tournament; i.e. interim winning managers tend to increase their level of risk exposure more than losing managers. Our results also show that the risk-adjusted returns of the winners outperform those of the losers following the risk taking, which implies that risk altering can be regarded as an indication of managers' superior ability. However, the tournament behaviour can still be a costly strategy for investors, since winners can be seen to beat losers in the observed returns due to the deterioration in the performance of their major portfolio holdings.

JEL Classification: G20; G23

Keywords: Mutual fund family; Performance; Tournament; Risk Taking

[*] Corresponding author. Postal address: Durham University Business School, Green Lane Site, Durham, UK, DH1 3LA. E-mail: si.zhou@abdn.ac.uk

1 Introduction

Most mutual funds belong to a fund family. Several previous studies examine the characteristics of these fund families. Guedj and Papastaikoudi 2003), and Massa 2003) analyse how performance of the individual fund can be affected by its affiliated family. Nanda, Wang and Zheng 2004) discuss the close relation between the growth of cash inflows of a certain fund and the superior performance of other peer funds within the same family. Gaspar, Massa and Matos 2006) study how a fund family allocates resources to promote the funds which have the potential to improve the profits of the entire fund family. However, previous research devotes little attention to the relation between the behaviour of individual funds and other peer funds within the same family. Kempf and Ruenzi 2008) KR hereafter) are the first to examine such a connection. They consider the fund tournament phenomenon in the fund family, first reported in Brown, Harlow and Starks 1996). Despite their findings of differential levels of risk exposure for winners and losers, it remains debatable whether the risk taking behaviour stimulated by the fund tournament benefits the fund performance and the overall profits of the fund family. One also wonders whether the risk taking behaviour is a consequence of the agency problem, or just an indication of managers' inferior ability.

Mutual funds alter their risk exposure frequently for various reasons. Chevalier and Ellison 1997) and Sirri and Tufano 1998) find a convex relation between the funds' previous performance and changes of their cash inflows. Underperforming funds may therefore take more risks to bet on better performance given the

disproportionate response from cash flows to previous fund performance. Underperforming funds may also alter the level of portfolio risk before the reporting date to manipulate their performance record Goetzmann, Ingersoll, Spiegel and Welch, 2007; Lakonishok, Shleifer, Thaler and Vishny, 1991).

On the other hand, the convex relation between cash flows and performance may not be applicable everywhere. Funds may use risk shifting to indicate active trading or superior stock selection ability, which may not necessarily indent investors' benefits Kacperczyk, Sialm and Zheng, 2005). Managers are also compelled to work for the interest of the whole family. In the context of a fund family, funds gain resources and information advantages from the family by winning the competition. Also, it is the fund family that decides which managers are to be promoted or demoted based on the tournament outcome. As a result, managers should change their risk exposure only to improve the fund performance, rather than increase the overall uncertainty of the family. However, to date there has been little research on the relation between risk altering and performance shifting.

Tournament is defined as the competition among a group for a fixed prize, and to be rewarded on their relative performance Conyon, Simon and Sadler, 2001). The tournament phenomenon in fund family has both differences from and similarities to the corporate tournament. The major difference lies in the main concern of these two types of tournament. For most of the corporate tournament literature, it is the reward structure and various efforts made by participants to win the

tournament that are of greatest concern Leonard, 1990; Gibbs, 1993). Given the sound evidence on the compensation scheme, as well as the family strategies to promote top performing funds, the fund tournament literature concentrates more on the efforts made by the managers to win the competition, in which risk altering serves as the major channel.

Another difference between the two types of tournament is the time frame. Corporate tournament can occur at any time with the appearance of the prizes), or it can be long journey continuing over decades Rees, 1992), whereas fund tournament literature suggests that fund managers mainly engage in tournament on an annual basis, since the end of year report summarizes the managers' averaged performance. Studies also find that risk altering is more popular on a mid-year basis from the managers' perspective Brown, Harlow and Starks, 1996).

Moreover, traditional corporate tournament concerns competition for employment concerns, for example promotion from vice-president to CEO. The motivation behind such competition is often a rise in pay structure Rosen, 1986; Bognanno, 2001), since most wage changes are found between jobs rather than within jobs Lazear, 1992). Fund managers also take employment issues into consideration during portfolio management. But since performance evaluation on managers might be based on a number of criteria, previous research finds that top management replacement is often accompanied by poor observed returns Khorana, 2001), whereas the fund alphas are more closely related to managers' promotion and demotion Evans, 2009). Thus, there remains the possibility that top and

bottom ranked managers could value the risk taking strategies differently; specifically, underperforming managers will be more concerned with the observed returns as a precaution against being replaced, while top performing ones aim to show their superior ability to pursue rewards.

The common factor behind both types of tournament is the reduced cost of monitoring. Corporate tournament theory suggests that such self-enforcing reward systems are more desirable, compared with monitoring and supervision Becker and Huselid, 1992). Fund family tournament also carries the characteristic of reducing monitoring cost, as the fund family can benefit from individual managers' stellar performance; in addition, the competition reduces the agency cost, since winning the contest only comes because of performance improvement, which is in line with investors' benefits. However, the existing studies lack empirical evidence to connect the performance consequences of risk taking to family tournament, from both the families' and the investors' perspective.

This research is the first to discuss performance shifting in relation to the risk taking in the family tournament. Using data from the UK unit trust industry, we first examine both the segment and family tournament phenomena in 3 IMA sectors of UK domicile equity funds in the sample period from 2001 to 2010. Our results show that funds with better previous performance actively participate in the family tournaments by increasing their risk exposure in the second half of the calendar year, while the opposite is true in the segment tournament. The results persist when funds are ranked by risk-adjusted performance. But no significant

evidence is found to support the existence of the tournament phenomenon when the overall family level of risk is used; i.e., the overall risk exposure of the winning family does not increase in the second half of the year.

We further examine managers' risk taking behaviour under different market condition and our results document a positive relation between family ranks and future risk taking in bear market condition. Namely, mid-year winners increase their risk level higher than the losers since the losing managers are concerned more about their jobs.

Our empirical analysis of the performance consequences show that the interim winners can outperform the losing ones in risk adjusted returns by taking more risk, whereas the opposite is true when turning to the observed returns. The magnitude of performance differential is the largest when the risk shifting level is low. The decreasing observed returns in the winning group is probably due to the return deteriorations from increased holdings of index-linked stocks. The increasing exposure to the systematic risk of the winning funds from our results supports this finding. Although it seems to be optimal for the mid-year winners to maintain a low level of risk shifting, we argue that winners might value the importance of employment concerns and family favouritism more seriously than the losers. Thus, they aim to signal the fund family of their superior ability by beating the other members with high fund alphas in order to gain more resource from the family. The results from our test of families' cross-fund subsidization support this view.

We also conduct the performance consequence analysis from the fund family's perspective. We compute the probability of funds being promoted in the segment ranks, which is regarded as the relative performance consequence given the level of risk taking. In general our analysis documents a positive relation between performance ranks of individual funds and their risk taking. The result also suggests that, for a fund family that consists of funds whose performance is extremely poor dog family), its cross-sectional volatility is positively correlated with the probability of underlying funds being promoted. In other words, dog families are more likely to undertake family strategies by shifting performance or promoting risk taking behaviour across underlying members.

While our findings about the family tournament differ than those in KR, they are consistent with those of Mas-Colell, Whinston and Green 1995). Specifically, the winning funds in a small fund group are more likely to engage in a tournament with strategic interactions. The cut-off points by KR to identify large and small families in the US fund industry are 16, 21, 31 and 36 funds, whereas in the UK the average family size is 4, and the largest family consists of only 11 funds. Thus, our entire sample of fund families can be classified as small families in the KR sense. Second, our results confirm the effects of employment concerns in relation to fund risk taking. Extant research suggests that, despite the compensation schemes that are based on asset values, fund managers are also exposed to employment risk, as they need to keep their jobs. Taking more risk provides a means for the losing managers to bet on better performance, though it may also

raise the probability of performing even worse. Relative to the losing managers, the interim winners are under less employment pressure. Therefore, the underperforming managers tend to take less risk than good performers Chevalier and Ellison, 1997; Kempf, Ruenzi and Thiele, 2009). Third, and most important, our analysis of performance consequences shows that risk taking can serve as an indication of managers' superior stock selection ability. It also acts as a crucial criterion for the fund family to decide which fund should be advertised or favoured with extra resources. Thus, it stands to reason that winner funds would actively consider shifting risk exposure to retain their leading positions. The current research unearths significant empirical evidence of changes in the risk taking behaviour in the family tournaments. Our results also support the conclusion that risk taking helps top performing managers win the competition.

This paper is organized as follows. The next section summarizes the related literature. Section 3 describes the empirical methods to be implemented in this research, while section 4 discusses the data and presents the descriptive statistics of the datasets. Section 5 reports the empirical findings from the tournament analysis, and the performance consequences due to tournament related risk taking. The results are then summarized in the final section.

2 Related literature

Our research relates to three strands of literature. First, we revisit the risk shifting phenomenon presented by many fund tournament studies. Brown, Harlow and

Starks 1996) BHS hereafter) are among the first to document the evidence that managers from half-year-losing funds have incentives to alter their risk exposure more significantly than those from the half-year-winning funds. In this seminal research, they report that half-year losers are more likely to increase their exposure to portfolio risk for the second half of the calendar year in an attempt to improve their future position against peer funds, while half-year winners tend to decrease risk exposure to retain their leading position. The motivation behind such tournament behaviour can be explained by the disproportionate amount of capital injected into top performing funds relative to the underperforming funds Chevalier and Ellison, 1997; Sirri and Tufano, 1998). However, bottom ranked funds might not be equally punished by capital outflows, which encourages the underperforming funds to bet on the market by increasing their risk exposure. Although there is a large body of research related to the tournament behaviour see for example Koski and Pontiff, 1999; Elton et al., 2003; Huang et al., 2011; Schwarz, 2012), the empirical results are mixed.

Using monthly data and contingent tables, Jans and Otten 2008) find significant evidence that mid-year losers increase risk exposure more than mid-year winners in the first sub period, 1989-1996, of their sample using the UK unit trust data. But the risk shifting behaviour reverses in the rest of their sample period, 1997-2003, as they argue that a strategic game is conducted by both the winners and the losers; i.e., both parties might alter their risk shifting based on the decision made by the opposite parties. Busse 2001) also finds evidence to support the tournament hypothesis; he discovers that fund managers may engage in half-year risk shifting

to compete with others from the same investment style, also known as the segment tournament. However, contradictory evidence is found when daily data is applied. Specifically, top performing managers tend to increase their risk exposure more than the bottom performing ones. Similar results are found in Chevalier and Ellison 1997).

In recent research, Kempf et al. 2009) and Schwarz 2011) apply the portfolio holding data in the tournament analysis. They argue that, compared with estimating the realized risk, deploying the portfolio holding data to estimate volatility better represents the managers' intention to alter the exposure to portfolio risk. However, holding data might not be sufficient to address managers' frequent risk shifting, since funds might only publish their holding data on a quarterly basis or even on a half-year basis).

The second strand of literature relevant to our research is the fund family tournament literature. Fund families play an important role in funds operation. Since individual funds are usually affiliated to different fund complexes, it is the fund family that decides managers' promotion or demotion, and which funds to market Jain and Wu, 2000). Fund companies also conduct various types of strategies to enhance the performance of certain funds, such as undertaking cross-fund subsidization to promote funds with high past performance through allocating new IPO shares Gaspar et al., 2006). On the other hand, fund companies also have the motivation to support family tournament. Nanda et al. 2004) suggest that families with star funds, i.e. funds with top ranking

performance against peer funds within the same investment style, attract significantly more new cash inflows than other families. The growing cash inflows can bring new capital not only to the star funds, but also to other funds within the same family, i.e. the spillover effect. They also find evidence that star families tend to increase the volatility of cross-sectional returns in order to increase the odds of creating star funds. In other words, risk taking in family tournament is a reasonable strategy, from which a fund company can benefit greatly.

KR is the first to discuss the tournament behaviour in the context of fund families. They find that the bottom ranked managers in large families tend to increase risk more than top ranked ones, while the opposite occurs in small families. Following the theoretical work by Taylor 2003), KR suggests that there are no strategic interactions in large fund families. Fund managers cannot optimize their decision when too many competitors are present. Therefore, mid-year winners simply choose to reduce risk exposure to retain their positions, without consideration of the strategies played by other mid-year losers. Meanwhile, given the convex reward scheme, bad performance cannot hurt the mid-year losers substantially if they increase their risk exposure.

When the family is small, managers will be concerned about how other competitors behave. Taylor 2003) suggests that in a game with strategic interactions, the mid-year winner will increase their risk exposure to lock their positions, as they are aware of the risk-increasing strategy taken by the losers.

With the help of large cash inflows and favouritism from the fund companies, the losers cannot beat the winners when they both undertake the risk-increasing strategy. As a consequence, losers will tend to increase their future risk exposure less than the winners, or maintain it at a more stable level. However, KR also shows a strategic tournament in the group of funds within the same segment, which contradicts the results from prior research, although they argue that the strategic tournament could be time sensitive.

The third strand of literature to which our research is related is the growing field of funds' risk taking. There are a large number of studies discussing the purposes of funds' risk shifting. Most of the studies identify that risk shifting is a major channel for the managers to promote cash inflows. Goetzmann, Ingersoll, Spiegel and Welch 2007) maintain that fund managers can alter the funds' risk exposure with a view to manipulating the performance record. They tend to purchase well-performing stocks and ditch the poor ones immediately before the performance reporting date to attract new cash inflows, a practice known as end-year window dressing Lakonishok et al., 1991; Musto, 1997). Chevalier and Ellison 1997), and Sirri and Tufano 1998) document a convex shaped relation between fund performance and the change of cash inflows, implying that fund managers can take extra risk for compensation concerns, since underperforming managers are not punished heavily by cash outflows.

In addition to the agency problem, Kacperczyk et al. 2005) suggest that active trading can also be regarded as a sign of managers' superior ability. Thus risk

shifting might lead to performance improvement. While much of the research in this field concentrates on searching for the real purposes of funds' risk shifting, some studies focus on whether risk shifting actually benefits the investors. Huang, Sialm and Zhang 2011) HSZ hereafter) initiate the discussion on the performance consequences of risk shifting. Using portfolio holding data of the US mutual fund industry, they find that funds with stable risk levels provide better performance than funds significantly altering their risk levels. As it is costly for the fund investors to bear the loss of funds during risk shifting, they argue that such behaviour is merely an indication of inferior ability or due to compensation concerns. However, despite a large number of studies examining the tournament behaviour and the risk shifting in the fund industry, few studies have followed the HSZ model to conduct a complete analysis of the performance consequences of family tournament. Our research is therefore set to fill the gap from an empirical perspective.

3 Methodology

To identify the risk taking behaviour in the family tournament, we adapt the empirical model suggested by KR, as follows:

$$\begin{aligned}\Delta\sigma_{i,t} =& \alpha_i + \beta_i^{(1)} R_{i,t}^{Fam} D_l + \beta_i^{(2)} R_{i,t}^{Fam} D_s + \beta_i^{(3)} R_{i,t}^{Seg} D_l + \beta_i^{(4)} R_{i,t}^{Seg} D_s \\ &+ \beta_i^{(5)} \sigma_{i,t-1} + \beta_i^{(6)} \Delta\sigma_{med} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where $\Delta\sigma_{i,t}$ is the difference of funds' volatility between the ranking period and the post-ranking period. We use different measures in examining the volatility shifting, including the total risk, the systematic risk and idiosyncratic risk.

Volatility difference of the entire family is also calculated, to analyse whether tournament behaviour might occur at the family level. A fund family's overall risk level is based on the value weighted returns of all funds within the same family. Previous studies consider the tournament behaviour on an annual basis, in which the ranking period lasts from 6 to 8 months e.g. BHS; Jans and Otten, 2008). KR consider only the 7-month ranking period. To fully address the time frame issue of the tournament behaviour, our investigation includes the cases with both the June 6-month ranking period) and July 7-month ranking period) cut-off points, while also considering the quarter-ranking period to further the analysis of managers' risk shifting strategy. In equation 1), $R_{i,t}^{Fam}$ and $R_{i,t}^{Seg}$ are the family rank and segment rank, respectively. The segment rank is generated by arranging funds of the same segment in ascending order according to their performance in the ranking period. We classify all funds into three segments according to the IMA category of investment styles, i.e. UK All Companies, UK Equity Income and UK Smaller Companies.

For measuring the performance, BHS and KR use funds' raw returns only, due to the fact that the raw returns are the major concern of investors. Given the recent concern that the close connection between risk and returns might bias the tournament analysis Schwarz, 2012), we also include the Jensen alphas as a measure of the risk-adjusted performance. In order to make ranks from different investment styles comparable, we normalize the rank by using the function $(R_i - 1)/(N_i - 1)$, where R_i is the segment rank of fund i and N_i is the size of the corresponding segment. We calculate the family rank by further ranking the

normalized segment rank from funds within the same family in ascending order. Thus, the family rank measures the relative performance of each member in the family. We also normalize the family rank using the same method, with N_i being the size of the corresponding family. D_l D_s) is the dummy variable that represents a large small) fund family. We consider two criteria to classify fund family into large and small, namely, the aggregate value of the family and the family size. This is because some of the families may have only a limited number of members, but each member has a large size of underlying assets. The model also includes the funds' volatility in the ranking period, $\sigma_{i,t-1}$, and the median difference of funds' risk in each of the segments, $\Delta\sigma_{med}$, to capture the exogenous factors that lead to risk shifting.

For the performance consequences of family tournament, we apply several analytical tools, including the transition matrix and performance differences, to examine the performance shifting of individual funds. An empirical model is then constructed to analyse how performance changes from the family perspective can be explained by changes in the risk taking behaviour. Given that funds participate in the tournament to win the competition, it is the relative performance rather than the absolute performance that matters to the managers. Thus, we can further link the risk taking behaviour to the rank changes of a certain fund. With the spillover effect and disproportionate relation between historical performance and cash inflows, fund families also have incentives to take on higher risk exposure in family tournament. We thus formulate the empirical model as follows:

$$
\begin{aligned}
R_{i,t}^{Family} =& \alpha_i + b_i^{(1)} R_{i,t}^{\Delta\sigma} + b_i^{(2)} \Delta\Lambda_{i,t}^{\sigma} D_{Star} + b_i^{(3)} \Delta\Lambda_{i,t}^{\sigma} D_{Dog} + b_i^{(4)} \Delta\Lambda_{i,t}^{\sigma} D_{Star,Dog} \\
&+ b_i^{(5)} \Delta\Lambda_{i,t}^{\beta} D_{Star} + b_i^{(6)} \Delta\Lambda_{i,t}^{\beta} D_{Dog} + b_i^{(7)} \Delta\Lambda_{i,t}^{\beta} D_{Star,Dog} \\
&+ b_i^{(8)} \Delta\Lambda_{i,t}^{\varepsilon} D_{Star} + b_i^{(9)} \Delta\Lambda_{i,t}^{\varepsilon} D_{Dog} \\
&+ b_i^{(10)} \Delta\Lambda_{i,t}^{\varepsilon} D_{Star,Dog} + \varepsilon_{i,t}
\end{aligned}
\qquad 2)
$$

where $R_{i,t}^{Family}$ is now the overall family rank of family i in the post-ranking period. The family rank is worked out by first taking the difference in the segment rank of each sampled fund between the ranking and post-ranking period. Then we further rank each of the fund families using the aggregate ranking ratio. For example, if family i has three funds, A, B and C, the differences in normalized segment rank for each fund are $A = 0.1$, $B = 0$ and $C = -0.3$. Here, $A = 0.1$ means that fund A improves its ranking ratio by 0.1; fund C has been demoted by 0.3 in the segment rank and fund B has no change in its rank. The aggregate ranking ratio for family i thus equals $-0.3 + 0 + 0.1 = -0.2$. All the families in our sample are then ranked according to this ratio. A high $R_{i,t}^{Family}$ indicates that the funds within the family experience a positive performance shift with a smaller cost of funds being demoted. $R_{i,t}^{\Delta\sigma}$ measures the level of risk shifting in a certain family. A similar aggregate ranking ratio is generated for each family according to the changes in the level of risk exposure of the underlying funds. $\Delta\Lambda_i^T$, $\Delta\Lambda_i^S$ and $\Delta\Lambda_i^{\varepsilon}$ measure the cross-sectional differences in the total risk, systematic risk and idiosyncratic risk, respectively. D_{Star} is equal to 10), if the family that fund i is affiliated to is a star dog) family. A star family contains at least one fund ranked in the top quartile of the segment star fund) in the ranking period, while a dog family includes any bottom performing funds dog fund). $D_{Star,Dog}$ denotes a family that has both star and dog funds in the ranking period. Both star and dog

families may have motivation to promote family tournament; i.e. the dog family will seek to improve the performance of its dog fund by betting on the market, while the star family tends to retain the position of the star funds in its group. Further, fund families also have the ability to promote the tournament behaviour by resource reallocation, i.e. family favouritism and the spillover effect. Thus, by sorting families into star and dog types, we are able to explore which types of families are more likely to be involved in the tournament. Additionally, we may discover how performance of the peer funds in a star/dog family responds to the tournament behaviour.

4 Data

The funds' raw data are obtained from Morningstar. We collect daily total returns data for the UK unit trust industry during the period between 2001 and 2010. The funds selected into the sample are all UK domiciled, equity based unit trusts and OEICs. [1] We exclude funds targeting fixed income securities and mixed investments; the index linked funds are also taken out of the sample. The sampled funds belong to 3 IMA sectors: UK All Companies, UK Equity Income and UK Small Companies. We treat these 3 IMA sectors as the 3 largest segments in our tournament analysis. With regard to fund families, this research regards a fund family as being formed by the funds that are managed by the same fund company. For each of the families, we only keep the oldest fund in the same share class,

[1] Unit trusts and OEIC s are both open-ended investments with different bid/ask pricing, legal structures and up-front loads. However in practice, they can both be regarded as mutual fund equivalents.

since funds within the same share class deliver similar rates of returns.[2]

Table 1 reports the summary statistics for the sample funds in this research. It shows a rapid growth of the UK fund industry, although the population of UK funds is still moderate in numbers compared to the US fund industry. Both the number of funds and the number of fund families increased dramatically in the sample period. There were only 159 UK domiciled equity funds in 2001, and this number had doubled to 324 by 2010. Columns 2 and 3 report the mean cross-sectional returns and standard deviations of the sample funds. In general, we see a weak association between higher levels of risk and higher observed returns among the fund population, but exceptions occur in 2001/2002 and 2007/2008, when the market suffered from the dot-com bubble and the global financial crisis.

<Please insert Table 1 here>

Apart from the raw returns, we also estimate the Jensen alphas as a measure of the funds' risk-adjusted performance. We employ three sets of benchmark returns to proxy the excessive market returns MKT), the size effect SMB), the book to market effect HML) and the momentum effect UMD). We choose the FTSE All Shares index as the basis for calculating market returns, and hence the MKT. Use of the MKT factor is motivated by the conventional CAPM model. The HML and SMB factors are adopted following the Fama-French 3-factor model, and

[2] The oldest fund is normally the first fund established by the fund company in the share class. Other peer funds within the same share class can be created individually or by splitting from the oldest one, but they all share a management team and a similar portfolio composition. Morningstar provides additional information indicating the oldest fund from the same share class.

computed by two pairs of market portfolios. SMB is generated by taking the difference between the FTSE 100 index and the FTSE small capital index; HML is calculated by taking the difference between the MSCI UK Growth index and MSCI UK Value index suggested by Cuthbertson et al. 2008). Following the method presented in French's website, the UMD factor in the Carhart 4-factor model is generated by extracting the returns of the 1-year low return portfolio from the returns of the 1-year high return portfolio.[3]

5 Empirical results

5.1 Risk taking in the segment and family tournaments

Table 2 reports the regression results fitting by model 1). In general, it shows significant evidence of funds engaging in both family and segment tournaments. In column 2 of Panel A, when the half-year ranking period is considered, the main indicator of family tournament, $R_{i,t}^{Fam}$, has a significant and positive coefficient on the large-value-family dummy, although no significant tournament behaviour is found in small families. The segment tournament indicator, $R_{i,t}^{Seg}$, has a significantly negative factor loading on either the large or the small family dummy variable. The positive coefficient on $R_{i,t}^{Fam} \cdot D_l^V$ indicates that top ranking funds in the large families take more risk than bottom ranked ones, which is consistent with the theoretical prediction of strategic tournament by Taylor 2003).

[3] The detailed method of calculating the moment factor can be found in French's website, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html, accessed September 2012.

This result is also consistent when the cut-off point of the ranking period turns to be 7 months in the second column of Panel A.

The negative coefficient on $R_{i,t}^{Seg}$ suggests a non-strategic segment tournament in which half-year underperforming funds are more likely to increase their risk exposure in the second half of the year than are the top performing ones. The risk shifting behaviour in segment tournament is more sensitive in small families than in large ones by more than 50 basis points.

Our findings regarding the family tournament are contrary to those reported in KR, which suggests that underperforming funds within a small family increase risk more than over-performing ones. Our results however do indicate that managers of the mid-year winners choose to increase their risk exposure than the mid-year losers. This is particularly true for those from the large sized families, since large sized funds have more capital to fund strategy shifting or are the market makers that enjoy some competitive edge over the small funds.

Chevalier and Ellison 1997) argue that top performing managers may increase their risk level to retain their leading positions. In the segment tournament, mid-year winners are less motivated to compete with peer funds within the same segments, as the only reward for the winner is the new cash inflows. Existing research however shows no supportive evidence of performance improvement over the peer losers after the risk shifting, implying that it actually becomes even

harder to attract new cash inflows by increasing risk exposure see for example HSZ).

Mid-year winners are highly motivated in the family tournament since the winner of the tournament may be rewarded by the fund company through various forms of family favouritism. Even those mid-year winners who have already been rewarded by the family may seek for continuation of such favouritism Guedj and Papstaikoudi, 2003; Nanda et al., 2004 and Gaspar et al., 2006). Large sized families may also encourage their member funds, particularly the winning ones, to participate in the tournament, since the winner funds could spare their new capital to benefit the other peer funds in the family. Compared with large sized families, smaller ones have no competitive edge in shifting investment strategies. Columns 4-6 of Panel A in Table 2 report the outcome of the research that is extended to include the tournament analysis on a quarterly basis. The family tournament behaviour is consistently significant throughout the quarterly analysis, while segment tournament behaviour disappears between the first and second quarter.

In Panel B of Table 2, the fund families are classified into large or small according to the number of their underlying family members. We find that the results in general agree with those given in Panel A. Funds in small sized families are not actively involved in family tournament. An additional reason for this could be that funds in the families with fewer members are normally managed by the same manager or have a similar portfolio composition, which leads them to be even less motivated to engage in a family tournament.

To further analyse family tournaments we re-rank the funds according to their risk-adjusted returns in the ranking period, since the previous literature suggests that a close relation between risk and returns could jeopardize the tournament analysis. The risk-adjusted returns can be estimated by using the Carhart 4 factor model,

$$R_{i,t} = \alpha_i + \beta_i MKT_{i,t} + \beta_i^{HML} HML_{i,t} + \beta_i^{SMB} SMB_{i,t} + \beta_i^{UMD} UMD_{i,t} + \varepsilon_{i,t}$$

where α_i is the Jensen alpha measuring the risk-adjusted returns of fund i and $MKT_{i,t}$, $HML_{i,t}$, $SMB_{i,t}$ and $UMD_{i,t}$ are all pricing factors.

<Please insert Table 2 here>

Table 3 reports the results from model 1) based on using the Jensen alpha from the Carhart 4 factor model as the ranking criterion. We find similar tournament behaviour in the large sized families, where $R_{i,t}^{Fam} \cdot D_l^V$ is found to have a significant and positive loading. Its parameter value as shown in Table 3 is very close to that of the coefficients on $R_{i,t}^{Fam} \cdot D_l^V$ in Panel A of Table 2, with only an 8-basis-point difference. Funds within small sized families are not found to increase their risk exposure significantly. Therefore, our analysis indicates a pervasive phenomenon of family tournament among large sized fund families. However, evidence reported in Table 3 does not support the segment tournament in both large and small families, as none of the coefficients on $R_{i,t}^{Seg}$ are significantly different from 0.

<Please insert Table 3 here>

Employment concern is another incentive that can trigger managers' risk altering. Kempf et al. 2009) find that mangers change their risk level differently during distinct market condition. They argue that mid-year winners increase their risk exposure more than the mid-year losers in bear market since the losing managers are more concerned about their jobs employment incentive dominant). Opposite situation occurs in bull market when compensation is the major concern among the managers compensation incentive dominant). To further test the distinguishing risk shifting during these two types of market condition, we apply the empirical model suggested by Kempf et al. 2009). The model is described as following:

$$\Delta\sigma_{i,t} = \alpha_i + \beta_i^{(1)} R_{i,t}^{Fam} D^{Com} + \beta_i^{(2)} R_{i,t}^{Fam} D^{Emp} + \varepsilon_{i,t} \quad 3)$$

where $R_{i,t}^{Fam}$, the fund's family rank, is interacted with the dummy variable which classify the market condition into bear and bull.[4] Table 4 reports the results.

Our results show significantly distinct risk shifting between the bear and bull market. Mid-year winners are more likely to increase their risk exposure than the mid-year losers when the employment incentive is dominant in that year, whereas the opposite is true when the compensation incentive is dominant in the sampled year. For example, the coefficient is 6.79% for $R_{i,t}^{Fam} \cdot D^{Emp}$ and -4.92% for

[4] We adopt the method suggested by Kempf et al. (2009) to classify the sampled years into bear and bull ones. Thus, 2003, 2005, 2006, 2009 and 2010 is considered as bull years (compensation incentive dominant) while the rest of the sampled years are in bear condition (employment incentive dominant).

$R_{i,t}^{Fam} \cdot D^{Emp}$ when 6-month ranking period is considered. Also, it seemed that the employment incentive is more sensitive with the risk shifting than the compensation incentive given the coefficient of $R_{i,t}^{Fam} \cdot D^{Emp}$ is larger in absolute value. Column 3 of Table 4 reports similar results as those shown in the previous column.

The findings in Table 4 further confirm our concerns regarding to the risk taking driven by employment incentive. Increasing risk exposure also adds more uncertainties to the holding portfolio, which may lead to even worse performance in the future. Since underperforming mangers are under more employment pressures, they are more cautions with risk taking than the over performing ones. Meanwhile, the higher sensitivity between the risk shifting and employment concerns is also consistent with our overall finding on the relation between risk taking and fund previous performance in Table 2, where interim winners tend to increase their level of risk more than the loser for all sampled years.

<Please insert Table 4 here>

We extend our analysis to look at the tournament behaviour on the family basis. Fund families are ranked according to their mean value weighted returns in the ranking period and we create dummy variables indicating a star dog) family when it has at least one top performing bottom performing) fund. The empirical model is formulated as follows:

$$\Delta\sigma_{i,t}^{Family} = \beta_i^{(1)} R_{i,t}^{Family} D_l^V + \beta_i^{(2)} R_{i,t}^{Family} D_s^V + \beta_i^{(3)} D_{Star} + \beta_i^{(4)} D_{Dog} + \beta_i^{(5)} D_{Star,Dog} + \beta_i^{(7)} \sigma_{i,t} \quad 4)$$

where the risk shifting of the whole family is computed by taking the difference of volatility of families' value weighted returns between the ranking and post-ranking periods.

Table 5 reports the regression results from model 4). The coefficients on $R_{i,t}^{Family} \cdot D_l^V$ and $R_{i,t}^{Family} \cdot D_s^V$ are not significant, indicating that fund families do not participate in the tournament by altering their overall risk level. Both Tables 2 and 3 show a distinct difference in risk taking behaviour between winners and losers within the same family, which can offset the risk level taken by their affiliated family. For the small families, those with fewer members are normally under the management of the same team, and with similar investment strategies would be less active in participating in tournament. Furthermore, both D_{Star} and $D_{Star,Dog}$ have significant coefficients in the 6, 6) interval of Panel A, with 13 and 19 basis points, suggesting that funds within the star families tend to take more risks. This is consistent with our previous findings, in which top performing funds increase their risks more than bottom performing ones. Particularly, since star families contain funds ranked in the top 10% of the corresponding segment, the results given in Table 5 imply that the increase of the families' overall risk is mainly attributable to the risk shifting undertaken by the star funds, while the other peer funds, especially the dog funds, maintain stable risk levels. This finding can also be explained as the direct consequence of family subsidization, since

fund companies can keep star funds informed with more valuable information in order to utilize the spillover effect.

<Please insert Table 5 here>

5.2 Risk characteristics in segment and family tournaments

We now extend our investigation to deploy alternative risk measures in analysing the tournament behaviour. Tables 6 and 7 report results when the market beta and the idiosyncratic risk are used to compute the level of risk shifting.

In Tables 6 and 7, the statistical significance of coefficients on $R_{i,t}^{Fam} \cdot D_t^V$ in both the 6, 6) and 7, 5) intervals of Panel A suggests that leading managers of the family increase more of their systematic risk in the tournament than do the losing ones. This result is further enhanced in Panel B when families are sorted according to the number of their underlying funds, i.e. with a parameter value of 6.23% and 7.88% respectively for the 6, 6) and 7, 5) intervals. The outcome implies that top performing managers increase their market beta by holding more equities in the benchmark index to time the market. While cross subsidization can bring more resources to finance major strategy changes by the winning funds, it seems reasonable for the winning funds to decrease uncertainty resulting from holding small value equities, since previous evidence suggests that in general the index-linked funds outperform the actively managed funds. The results in Panels A and B of Table 7 also confirm this finding by showing no statistically

significant evidence of family tournament when the idiosyncratic risk is considered.

Compared with family tournaments, in Table 6 no evidence is found to support the shifts in risk taking behaviour in terms of systematic risk in the segment tournament. However, the losing funds are found to increase their idiosyncratic risk exposure more than the winning funds in the second half of the calendar year, as shown in Table 6 where $R_{i,t}^{Seg} \cdot D_l$ has a coefficient of -6.1% in Panel A and -8.4% in Panel B. This result remains significant in the small family case. HSZ find similar results in their research. They hold that underperforming funds tend to take more idiosyncratic risks by increasing portfolio concentration or changing stock selection. But such an effort brings no positive feedback to performance consequences. Similar arguments can be found in Ang, Hodrick, Xing and Zhang 2006), for example. Given disproportionate responses of the growing cash inflows, it comes as no surprise to see that losing funds choose to increase their exposure to uncertainty surrounding their portfolio with a view to improving performance in the segment tournament.

Tables 8 and 9 present the regression results from model 3) when families' overall systematic risk and idiosyncratic risk are used to compute the risk level. For most of the sample intervals, no significant evidence on risk taking is found regarding the family and segment tournaments. However, the last columns of Tables 8 and 9 suggest that low-ranked fund families take more overall systematic and idiosyncratic risks in the tournament during the final quarter of the calendar year.

It is plausible that the results from the end-year window dressing behaviour when underperforming funds devote every effort to promoting their performance before the reporting date.

<Please insert Table 6 here>

<Please insert Table 7 here>

<Please insert Table 8 here>

<Please insert Table 9 here>

5.3 Rank transition analysis

We now move to examine performance consequences of both the segment and family tournaments. As a first step, in this section we analyse funds' rank transitions. Table 10 reports the transition probability of funds' segment ranks. In the first column, we sort all the funds into 10 deciles in ascending order according to their segment ranks. As such, the 1st decile includes bottom ranked funds while the 10th decile contains top ranked funds. The remaining columns present the probability of funds ranked in each of the deciles moving to the other deciles.

We find that the performance of top ranked funds persists for the ranking period and the post-ranking period. The transition probability of staying in the 10th decile is the highest, with a probability of 28.69% of the funds remaining in the same decile in the second half of the year. The transition probability of remaining in the

1st decile is the second highest value. Thus, the very best and worst-performing funds seem to show performance persistency throughout the sample period. It is also the case that the probability for top ranked funds to have extremely bad performance in the second half of the year increases, particularly when their ranks are higher in the first half of the year. That is, funds located in the 10th, 9th, 8th and 7th deciles have a cumulative probability of being demoted to a decile lower than or equal to the 3rd decile of 21.54%, 26.34%, 23%, and 27.73%, respectively. Top performing managers, therefore, are capable of retaining their positions. On the other hand, bottom ranked funds seem to have more difficulty in being promoted to higher ranking groups.

<Please insert Table 10 here>

We then switch our attention to the transition probability of the family ranks. A transition matrix similar to that in Table 10 is developed in Table 11. However, instead of using the segment ranks, in the first column of Table 11 we group all the sample funds into 5 percentiles according to their family ranks. For example, the 1st percentile group contains all funds that are ranked in the bottom 20% within their affiliated families, while funds within the 5th percentile group are ranked in the top 20% by their average returns. The results are found to be similar to those in the transition matrix of the segment ranks. Performance of the top and bottom ranked funds persists over time. Funds in the 1st percentile group have a 32.04% probability of staying in the same group and 32.44% of the funds in the

5th percentile group will keep performing at the high level. Panel B of Table 11 confirms a similar outcome.

<Please insert Table 11 here>

As shown in Tables 10 and 11, we use the transition probability to provide a general picture of funds' performance persistence over the sample interval. Evidence shows that both the leading funds and the losing funds have higher probability to retain their positions. However, the analytics in Tables 10 and 11 take no consideration of managers' possible risk shifting. HSZ argue that if risk taking brings no improvement to funds' performance, the motivation left could be driven by either inferior ability or the agency problem. But, compared with the segment tournament, funds in family tournament can win the opportunity to gain benefits from family favouritism. Therefore, the motivation behind risk taking in family tournament is in line with investors' interests. This prompts us to further examine how funds' performance responds to managers' risk taking in family tournaments.

Table 12 presents examination results of the transition probability of family ranks under various levels of risk shifting. In the first column we create 5 groups by ranking funds in ascending order according to their levels of risk shifting between the ranking and post-ranking periods. In the second column we further sort all funds by their performance into 3 percentile groups; i.e., funds in the 1st group have performance ranked within the bottom 33% percentile, and so on. For each

risk shifting group Table 12 reports the transition probability of moving from one percentile to another. We use both the mean returns and the 4-factor model alphas to evaluate funds' performance. It comes as no surprise that, once again, relative performance of the top and bottom ranked funds in the same family persists over time.

Moreover, Table 12 suggests that the transition probability of top ranked funds reduces with the increase in risk altering. Of the sample funds, 58.5% of the top funds stay in the same percentile group when the magnitude of changes in the risk taking level is low. This percentage value decreases to 50% when risk changes are more substantial. However, the opposite result is found when performance is estimated with the 4-factor model alpha. In the last column of Table 12 the transition probability in the 1st RS group increases from 48% to 58.7%, an increase of 10%. This gives some supportive evidence that risk shifting can lead to the promotion/demotion of family ranks.

Taking Jenson alphas as indication of managers' stock selection ability, the raw returns contain information about the performance that certain funds may deliver. Unlike the risk taking in segment tournaments, in family tournaments none of the performance measures show any improvement after altering the risk exposure. We believe that risk shifting could be an indication of managers' superior ability. Since top managers may already be rewarded by the fund company after mid-year ranking, funds may therefore profitably utilize the information advantage to purchase more under-priced stocks or increase portfolio concentration.

Equities that may have helped funds gain a top ranking are normally funds' major holdings, although they could experience mean reversion in their returns during the second half of the year. It is then expensive for the funds to ditch these holdings, and this is especially so for large funds, as they are more likely to engage in family tournaments. In addition, the agency problem could be another reason for funds to close those long positions. On the other hand, no clear trend is detected in our empirical investigation of bottom ranked funds improving their ranking by increasing the risk taking, consistent with our earlier analysis showing that mid-year losers are not actively involved in family tournaments.

<Please insert Table 12 here>

5.4 Performance comparison in family tournaments

Despite the evidence of top funds' performance persistence after risk shifting, it remains to be seen whether such funds can outperform their peers in the same family. To answer this question, in this section we compare the performance between the mid-year winners and losers under different levels of risk shifting. The results are reported in Tables 13 to 15.

In the first column of Table 13, we sort funds into 5 groups RS group) according to their levels of risk shifting. The funds are then classified into the winner and

loser groups according to their mid-year performance. Performance of the funds is measured by the mean returns, the CAPM alphas, the 3-factor alphas and the 4-factor alphas. In Panel A where the funds' segment ranks are used to sort winner/loser groups, we find that the losing funds cannot outperform the winning ones for all evaluation measures when their risk taking is at a low level. The mean returns from the winning group exceed those of the losing group by 3.74%, statistically significant at the 1% level. Similar results can be drawn when the Jensen alpha measure is used. However, the winning funds cannot beat the losing ones when they take more risk, since the performance differences between the two groups are not statistically significant for the 5th RS group. Recalling the results in Table 2, where the mid-year losers tend to increase their risk exposure more than the winners in segment tournaments, the performance consequences of funds' risk shifting, however, suggest that it does not make sense for the losing funds to take extra risks. Therefore, winner's risk increasing cannot but be an indication of inferior ability or a sign of the agency problem see similar argument in HSZ).

In Panel B of Table 13, family ranks are used to sort funds into winning and losing groups. We find similar results, that mid-year winners outperform the losers in the 1st RS group. However, at a higher level of risk shifting, Table 13 shows a mixed result between performance measures based on raw returns and Jensen alphas. Specifically, mid-year losers can beat the winners in terms of observed returns, but underperform them in Jensen alpha. The difference is -5.34% in returns and 3.59% in CAPM alpha; both are significant at the 1% level. Such differences become smaller when the 3-factor and 4-factor alphas are considered, but remain statistically significant. Certainly, winners' underperformance could be

due to mean revision in their main holdings' returns. In Table 6, our results have already shown that increasing portfolios' market beta can be a channel of risk shifting. Fund managers may deliberately select large-cap equities with good past performance, or keep the position of their original holdings to maintain their leading positions. But those equities might not perform persistently, which can lower the overall returns of the winners.

On the other hand, the higher value of Jensen alphas delivered by the mid-year winners implies that those managers possess superior stock selection abilities so that they are able to re-construct their portfolios by picking up more underpriced stocks. Meanwhile, judging by the increasing magnitude of alphas obtained from the 3-factor model and the 4-factor model, it is plausible that managers' superior ability is not attributable to increased holdings of the size and book to market portfolio, or the momentum portfolio.

In addition, Panel B shows that the mid-year losers tend to keep their risk at a stable level to mimic the performance of the winners, which may explain why the performance differences between the winner and loser groups are the smallest. HSZ find the similar result that funds with more stable risk levels exhibit the best performance. In a strategic tournament, mid-year winners show risk taking behaviour similar to that of the mid-year losers, since the winning funds now have more access to new capital to manipulate their portfolios. The performance improvement in terms of the Jensen alphas following changes in the risk taking indicates the superior stock selection ability of the winning managers. But when

the magnitude of the risk shifting decreases, the winners lose their competitive edge; hence both winners and losers reduce to adopt a similar investment strategy, and so no performance consequence is shown here. However, in the 1st RS group, where the risk shifting is limited in magnitude or even changes to take on less rather than more risk exposure, mid-year losers still cannot outperform the winners, for the reason that the winners can liquidate some of their holdings to lock on the cash profits see for example HSZ).

Table 14 reports the results when the 7-5 interval is used for the tournament analysis. The results are similar to those of Table 13. In Panel A, the winning funds manage to outperform the losing ones in a segment tournament when changes in the level of risk exposure are extremely low. In Panel B, when funds' performance is measured by the raw returns or estimates of the CAPM alphas, we find the same supportive results of performance improvements for the winner funds when extra risks are taken. But the performance differences become statistically insignificant when using the Jensen alphas estimated from the 3-factor and 4-factor models. It follows that the winning funds may engage in portfolio reconstruction only immediately after the mid-year ranking is made as a response to the family tournament. In other words, the risk taking behaviour in a family tournament is more likely to take place on a mid-year basis.

Table 15 further extends the investigation to examine the risk taking behaviour at the level of a fund family. We create one portfolio for each of the families by using value weighted returns of the funds within the same family. Then we

estimate the portfolios' alphas and the mean returns as measures of the families' overall performance. Unlike the results found for individual funds, no significant improvement in the family performance can be identified. In the previous analysis of the whole family tournament, we find that families' total risk taking is not closely related to their overall performance ranks. Results in Table 15 further confirm that the risk taking by a certain member of a family is not necessarily beneficial to the performance of the whole family, since the fund company might re-allocate resources from the losing fund to the leading funds that it favours.

Our performance consequences analysis documents a mixed relation between the performance differences and risk taking. Mid-year winners outperform the losing ones by keeping their risk exposure in a low level. But the performance gap in fund alphas decreases and even reversed in observed returns if they take more risk in the second half of the year.

<Please insert Table 13 here>

<Please insert Table 14 here>

<Please insert Table 15 here>

We find strong negative correlation between performance consequences and the risk shifting in relation to the systematic risk. Table 16 reports the results. Rather than the mixed relation found in the previous table, Panels A and B of Table 16

indicate that the average fund performance decreases monotonically when taking more systematic risk. For example, the return difference between the winner and loser group is 3.88 basis points in the 1st RS group but decreases to -2.47 basis points in the 5th RS group. The performance difference in terms of the Carhart alphas also decreases from 2 to -0.93 basis points. Similar results can be found in Panel B. We therefore argue that the performance improvement found in the family tournament in the previous analysis cannot be attributed to the increased exposure to systematic risk, since a positive relation is documented in previous analysis, suggesting that winning funds tend to increase their market beta in the second half of the year. As mentioned before, an increase in the systematic risk is an indication of the enlargement of the holdings of stocks that have heavy weight in the market index. Despite the efforts of winning managers to shift portfolio composition to absorb more highly valued equities, mean revision of the returns of these stocks can demote winners' leading positions.

Results in Panels C and D do not show a clear pattern in the relation between performance consequences and the level of change in the idiosyncratic risks. This finding also confirms the previous results, whereby no significant changes in idiosyncratic risk take place in response to funds' family ranks.

<Please insert Table 16 here>

Previous literature suggests that fund families may increase cross-sectional volatility of funds returns to increase the probability of creating star funds. Given

the spillover effects of fund flows and the disproportionate response of cash inflows to funds' historical performance, fund families have incentives to encourage risk taking in family tournaments. This requires us to further examine the performance consequences with respect to the efforts by the fund family to promote risk taking.

Table 17 documents a strong relation between the performance improvement and the increase in cross-sectional risks within the fund family. Specifically, dog families are found to significantly increase their cross-sectional total risks to improve performance ranking of their underlying funds. For example, the coefficients on $\Delta\Lambda_{i,t}^{\sigma} D_{Dog}$ are 4.174, 2.391, 4.005 and 3.225 when fund performance is estimated by the mean returns, CAPM alphas, FF alphas and Carhart alphas, respectively. All of them are significant and the performance consequences respond positively. These results suggest that families with extremely underperforming funds are strongly motivated to promote risk taking of their underlying funds. Moreover, we also find some evidence to support a close relation between the increase of cross-sectional idiosyncratic risks and the probability of funds in the dog families being promoted, i.e. $\Delta\Lambda_{i,t}^{\varepsilon} \cdot D_{Dog}$ has a coefficient equal to 1.189 when mean returns are considered for ranking, and this increases to 1.264 and 1.260 when FF alphas or Carhart alphas are used. Dog families contain funds that are ranked in the bottom 10% of the segment and none of their members have top performance. Therefore, they are motivated to undertake various strategies to create stars. Despite this, our results in Table 17 imply that dog families improve performance of a certain member by sacrificing

the profits of others. In addition to funds' total risk, changes in cross-sectional idiosyncratic risk can also be a channel to improve performance. Thus, fund families may increase industrial concentration in the holdings of a certain fund and diversify the holdings of others to bet on the market.

However, we find only weak evidence to suggest such a strategy in the star families. For example, the coefficients on $\Delta\Lambda^{\sigma}_{i,t} \cdot D_{Star}$ are in lower values, equalling to 1.351 when raw returns are used and 1.321 when Carhart alphas are used for measurement of the performance, and only significant at the 10% significance level. It is plausible that the star funds are already rewarded with increased cash inflows, which can also benefit other peer funds for their performance enhancement.

Table 17 also documents a significant relation between performance improvement and the shifting funds' idiosyncratic risk, which is consistent with previous results. But it seems to have lesser power in explaining the aggregated rank promotion compared with the contribution made by the changes in cross-sectional risk. Moreover, no conclusive evidence can be found that shifting of the systematic risk exposure is related to the increases in the aggregate performance ranks.

<Please insert Table 17 here>

5.5 Cross-fund subsidization in family tournament

In this section, we examine the fund family's strategy of cross-fund subsidization. The above research documents that mid-year winners outperform the losers in the risk-adjusted returns by increasing their risk exposure, but the situation reverses when it turns to observed returns. We argue that it might be due to managers' intention to signal the fund family about their superior skills in order to gain additional resource from the fund family. Gaspar et al. 2006) suggests an empirical method to test the strategy of family's cross-fund subsidization which can be considered as the major channel for the family to promote their favourite funds. To address our concerns regarding to the family favouritism as the reward of higher risk-adjusted returns, we modify their method to rank funds according to their Carhart alphas for each month. Funds ranked above the 25^{th} and 75^{th} percentile are formed as the Low and High value group, respectively. We then construct two sets of High/Low value pairs. In the actual pair, each of the funds in the High value group is matched with a fund within the same family but in the Low value group. In the second set of the High/Low value pairs, the matching pairs, each of the low value funds in the actual pairs is replaced by a random selected fund within the same ranking percentile as the original low value fund but from a different fund family. The return differences between the High and Low value funds for each pair then act as the dependant variable. The empirical model can be shown as following:

$$R_{i,t}^{H} - R_{i,t}^{L} = \alpha_i + \beta_i^{(1)} D_{i,t}^{Family} + \beta_i^{(2)} D_{i,t}^{Style} + \varepsilon_{i,t} \quad 5)$$

where D^{Family} and D^{Style} are the dummy variables that takes the value of 1 when funds within the pair belong to the same family or the same investment style, respectively. If the family does subsidise the mangers with superior skill, we

expect that the same-family dummy is positively related with the return differences.

The results from Eq5) are reported in Table 18. It is suggested that fund family conduct significant cross-fund subsidization by shifting performance from high alpha funds to low alpha funds after the mid-year. For example, in Panel A the coefficient of the family dummy suggests that the return difference between the High/Low value funds of the same family is on average 0.82% higher than funds in matching pairs. However, we find opposite results when turning to the first half of the year in Panel A. In Panel C we further examine the cross-fund subsidization on a monthly basis. We find that the family subsidization is more pronounced in the second half of the year when most of the coefficients of the same-family dummy is positive and significant from 0.

The above findings support our view regarding the motivation of mangers' risk taking in the family tournament. Specifically, funds with high risk-adjusted returns gain benefits through the cross-fund subsidization which can drive managers' intention of active trading. The results also indicate that the fund family consider mangers' skill as the major criteria in judging which fund to be promoted.

<Please insert Table 18 here>

6 Conclusions

In this research, we analyse the risk taking behaviour in fund family tournaments, and the performance consequences. Using the data from UK unit trusts, our research documents a significant risk taking behaviour in the family tournaments. The half-year winning funds in the family are likely to take more risks than their peers in the same family. On the other hand, winning managers would consider adopting similar risk taking strategies as the losers, since they have competitive advantages over the losers, such as more capital injection and family favouritism. We further examine the relation between the half-year performance and changes in funds' taking of other types of risk. The results show that the winning funds tend to increase their systematic risk in the second half of the year. We argue that this is because those winners want to retain their positions by maintaining or increasing their holdings of high value and index linked equities to mimic the market.

We also analyse that how risk shifting is related to different incentive. By classifying the sampled years into bear and bull market condition, we find a positive relation better risk taking and previous performance in the bear market when mid-year losers are more concerned about their jobs rather than compensation. And such a correlation is more pronounced than the situation in bull market when compensation incentive is dominant.

We then conduct further analysis on the performance consequences of risk shifting. Results show a strong relation between risk taking and performance

changes. Our results regarding to the observed returns are consistent with the previous research in which increasing risk is accompanied with performance drop. But when turning to the risk-adjusted performance, risk shifting is positively correlated to funds' performance. Given that the half-year winners will increase their taking of systematic risk, the deterioration in funds' observed returns seems due to the mean revision of high value equities in portfolio holdings. When risk-adjusted performance is considered, the winning funds outperform the losing ones in the post-ranking period. We argue this is due to managers' intention to show off their skills in order to gain further subsidization from the fund family. Our empirical results from the test of families' cross-fund subsidization support this view. In addition, no evidence is found that the increasing of the systematic risk or the idiosyncratic risk can lead to a strong performance improvement.

Our analysis shows that the families that have extremely poor performing funds in their groups would manage to promote segment ranks of most of their underlying funds by increasing the cross-sectional volatility in both total and idiosyncratic risks. This implies that the fund family may sacrifice the profits of certain members to benefit the others, given the disproportionate responses in cash inflows and the spillover effect. Our research thus provides empirical evidence on effects of family tournaments and performance shifting. In general, we find significant results to support the notion that risk taking in family tournaments can be viewed as an indication of managers' superior ability.

References

Ang, A., Hodrick, R. J., Xing, Y. and Zhang, X. 2006) The cross-section of volatility and expected returns. *The Journal of Finance*, **61**, 259-299.

Becker, B. E. and Huselid, M. A. 1992) The incentive effects of tournament compensation systems. *Administrative Science Quarterly*, **37**, 336-350.

Bibbs, M. 1996) *Promotions and incentives*. Harvard Business School: Boston.

Bognanno, M. L. 2001) Corporate tournaments. *Journal of Labor Economics*, **19**, 290-315.

Brown, K. C., Harlow, W. V. and Starks, L. T. 1996) Of tournaments and temptations: An analysis of managerial incentives in the mutual fund industry. *The Journal of Finance*, **51**, 85-110.

Busse, J. A. 2001) Another look at mutual fund tournaments. *Journal of Financial & Quantitative Analysis*, **36**, 53-73.

Carhart, M. M. 1997) On persistence in mutual fund performance. *The Journal of Finance*, **52**, 57-82.

Chevalier, J. and Ellison, G. 1997) Risk taking by mutual funds as a response to incentives. *Journal of Political Economy*, **105**, 1167.

Conyon, M. J., Simon, I. P. and Sadler, G. V. 2001) Corporate tournaments and executive compensation: Evidence from the UK. *Strategic Management Journal*, **22**, 805-815.

Cuthbertson, K., Nitzsche, D. and O'Sullivan, N. 2008) UK mutual fund performance: Skill or luck? *Journal of Empirical Finance*, **15**, 613-634.

Elton, E. J., Gruber, M. J. and Blake, C. R. 2003) Incentive fees and mutual funds. *The Journal of Finance*, **58**, 779-804.

Evan, R. 2009) Does Alpha Really Matter? Evidence from Mutual Fund Incubation, Termination and Manager Change. *Working paper, University of Virginia*.

Fama, E. F. and French, K. R. 1993) Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, **33**, 3-56.

Gaspar, J.-M., Massa, M. and Matos, P. 2006) Favoritism in mutual fund families? Evidence on strategic cross-fund subsidization. *The Journal of Finance*, **61**, 73-104.

Gibbs, M. 1993) Promotions and Incentives: A Theoretical Analysis, *Working paper, Harvard Business School.*

Goetzmann, W., Ingersoll, J., Spiegel, M. and Welch, I. 2007) Portfolio performance manipulation and manipulation-proof performance measures. *Review of Financial Studies*, **20**, 1503-1546.

Guedj, I. and Papastaikoudi, J. 2003) Can mutual fund families affect the performance of their funds? *Working paper, Analysis Research Planning Corporation.*

Huang, J., Sialm, C. and Zhang, H. 2011) Risk shifting and mutual fund performance. *Review of Financial Studies*, **24**, 2575-2616.

Jain, P. C. and Wu, J. S. 2000) Truth in mutual fund advertising: Evidence on future performance and fund flows. *The Journal of Finance*, **55**, 937-958.

Jans, R. and Otten, R. 2008) Tournaments in the UK mutual fund industry. *Managerial Finance*, **34**, 786-798.

Jensen, M. C. 1968) The performance of mutual funds in the period 1945–1964. *The Journal of Finance*, **23**, 389-416.

Kacperczyk, M., Sialm, C. and Zheng, L. U. 2005) On the industry concentration of actively managed equity mutual funds. *The Journal of Finance*, **60**, 1983-2011.

Kempf, A. and Ruenzi, S. 2008) Tournaments in mutual-fund families. *Review of Financial Studies*, **21**, 1013-1036.

Kempf, A., Ruenzi, S. and Thiele, T. 2009) Employment risk, compensation incentives, and managerial risk taking: Evidence from the mutual fund industry. *Journal of Financial Economics*, **92**, 92-108.

Khorana, A. 2001) Performance changes following top management turnover: Evidence from open-end mutual funds. *The Journal of Financial and Quantitative Analysis*, **36**, 371-393.

Koski, J. L. and Pontiff, J. 1999) How are derivatives used? Evidence from the mutual fund industry. *The Journal of Finance*, **54**, 791-816.
Lakonishok, J., Shleifer, A., Thaler, R. and Vishny, R. 1991) Window dressing by pension fund managers. *NBER Working paper No. 3617*.

Lazear, E. 1992) The job as a concept. In: Bruns, W., Jr., ed.) *In performance measurement, evaluation, and incentives*. Harvard Business School Press: Boston.

Leonard, J. S. 1990) Executive pay and firm performance. *Industrial & Labor Relations Review*, **43**, 13-S-29-S.

Mas-Colell, A., Whinston, M. D. and Green, J. R. 1995) *Microeconomic theory*. Oxford University Press, New York.

Massa, M. 2003) How do family strategies affect fund performance? When performance-maximization is not the only game in town. *Journal of Financial Economics*, **67**, 249-304.

Musto, D. K. 1997) Portfolio disclosures and year-end price shifts. *The Journal of Finance*, **52**, 1563-1588.

Nanda, V., Wang, Z. J. and Zheng, L. 2004) Family values and the star phenomenon: Strategies of mutual fund families. *Review of Financial Studies*, **17**, 667-698.

Rees, A. 1992) The tournament as a model for executive compensation. *Journal of Post Keynesian Economics*, **14**, 567-571.

Rosen, S. 1986) Prizes and incentives in elimination tournaments. *The American Economic Review*, **76**, 701-715.

Schwarz, C. G. 2012) Mutual fund tournaments: The sorting bias and new evidence. *Review of Financial Studies*, **25**, 913-936.

Sirri, E. R. and Tufano, P. 1998) Costly search and mutual fund flows. *The Journal of Finance*, **53**, 1589-1622.

Taylor, J. 2003) Risk-taking behavior in mutual fund tournaments. *Journal of Economic Behavior & Organization*, **50**, 373-383.

Table 1 Summary statistics

Year	Mean return (%)	Mean S.D. (%)	No. of funds	No. of fund families
2001	-0.047	1.171	159	41
2002	-0.112	1.176	172	41
2003	0.092	0.909	189	44
2004	0.050	0.574	210	50
2005	0.078	0.586	225	52
2006	0.068	0.706	250	56
2007	-0.003	0.941	277	60
2008	-0.173	1.843	294	62
2009	0.119	1.244	302	63
2010	0.071	0.938	324	65

This table shows the summary statistics for the sample UK equity funds considered by this study. Columns 2 and 3 present the mean sum of total daily returns and mean sum of standard deviations of all sample funds, respectively. Column 4 presents the total number of funds in the sample. In Column 5, the number of fund families for each year in the sample is shown.

Table 2 Family and segment tournaments (Raw Returns)

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^V$	0.0050**	0.0049**	0.0040**	0.0045**	0.0065**
$R_{i,t}^{Fam} \cdot D_s^V$	0.0033	0.0018***	0.0020	-0.0019	0.0040
$R_{i,t}^{Seg} \cdot D_l^V$	-0.0076***	-0.0068***	0.0037	-0.0104***	-0.0076**
$R_{i,t}^{Seg} \cdot D_s^V$	-0.0127***	-0.0074***	0.00002	-0.0091***	-0.0111***
$\sigma_{i,t-1}$	-3.5697***	-2.9213***	-4.8218***	-4.0134***	-3.6620***
$\Delta\sigma_{med}$	13.6588***	12.9068***	7.0209***	14.3347***	11.8634***
R^2	88.35%	89.12%	74.18%	86.61%	83.15%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)

$R_{i,t}^{Fam} \cdot D_l^S$	0.0054**	0.0034	0.0076***	0.0031	0.0067**
$R_{i,t}^{Fam} \cdot D_s^S$	0.0028	0.0033	0.0023	0.0003	0.0041
$R_{i,t}^{Seg} \cdot D_l^S$	-0.0105***	-0.0061**	-0.0007	-0.0091***	-0.0097***
$R_{i,t}^{Seg} \cdot D_s^S$	-0.0115***	-0.0098***	0.0036	-0.0111***	-0.0095***
$\sigma_{i,t-1}$	-3.5662****	-2.9171***	-4.8229***	-4.0229***	-3.6757***
$\Delta\sigma_{med}$	13.6754***	12.9184***	7.0462***	14.3398***	11.8655***
R^2	88.34%	89.13%	74.23%	86.58%	83.12%

This table presents the regression results from the family tournament model (1). $R_{i,t}^{Fam}$ and $R_{i,t}^{Seg}$ are the family and segment ranks based on the funds' daily total returns, respectively. D_l (D_s) is the dummy variable which equals to 1(0) when fund i belongs to a large (small) fund family. $\sigma_{i,t-1}$ indicates the risk level that fund i is exposed to in the ranking period and $\Delta\sigma_{med}$ is the median difference of the segment volatility. Funds' daily returns from 3 UK IMA segments, i.e. UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. Panel A reports the results when fund families are sorted by funds' aggregate market size, while in Panel B results are sorted by the number of funds in a family. Column 1 presents the results when 6 months is taken as the ranking period and column 2 shows the results when the ranking period is 7 months and post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is considered. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 3 Family and segment tournaments (4 Factor Model Alpha)

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^V$	0.0058**	0.0049**	0.0029	0.004*	0.0037
$R_{i,t}^{Fam} \cdot D_s^V$	0.0022	0.002	0.0053***	-0.0013	0.0048**
$R_{i,t}^{Seg} \cdot D_l^V$	0.0005	0.0028	-0.0017	0.0016	-0.0059**
$R_{i,t}^{Seg} \cdot D_s^V$	-0.002	0.0026	-0.0069***	-0.0011	-0.0091***
$\sigma_{i,t-1}$	-3.5048***	-2.9170***	-4.8114***	-3.8839***	-3.6208***
$\Delta\sigma_{med}$	13.6334***	12.8792***	7.05774***	14.2787***	11.8891***
R^2	88.32%	89.11%	74.22%	86.61%	83.28%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^S$	0.0047**	0.0048**	0.0056**	0.0028	0.0056**
$R_{i,t}^{Fam} \cdot D_s^S$	0.0034	0.0025	0.0028	-0.0001	0.0031
$R_{i,t}^{Seg} \cdot D_l^S$	-0.0007	0.0026	-0.0053**	0.0002	-0.0073**
$R_{i,t}^{Seg} \cdot D_s^S$	-0.0027	0.0017	-0.0038	-0.0014	-0.0084***
$\sigma_{i,t-1}$	-3.5000***	-2.9157***	-4.8138***	-3.8892***	-3.6295***
$\Delta\sigma_{med}$	13.6676***	12.8787***	6.9834***	14.3356***	11.8775***
R^2	88.32%	83.71%	74.06%	86.55%	83.24%

This table presents the regression results from the family tournament model (1). $R_{i,t}^{Fam}$ and $R_{i,t}^{Seg}$ are the family and segment ranks respectively based on funds' alphas estimated by the Carhart 4 factors model. D_l (D_s) is the dummy variable which equals to 1(0) when fund i belongs to a large (small) fund family. $\sigma_{i,t-1}$ is the risk level that fund i is exposed to in the ranking period and $\Delta\sigma_{med}$ is the median difference of the segment volatility. Funds' daily returns from 3 UK IMA segments, UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. Panel A reports the results when the fund families are sorted by funds' aggregate market size, while in Panel B results are sorted by the number of funds in the family. Column 1 presents the results for the 6-month ranking period and column 2 shows the results when the ranking period is 7 months and the post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is considered. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 4 Employment and compensation driven risk taking

Risk taking	(6, 6)	(7, 5)
$R_{i,t}^{Fam} \cdot D^{Emp}$	0.0679***	0.0668***
	(4.24)	(4.45)
$R_{i,t}^{Fam} \cdot D^{Com}$	-0.0492***	-0.0577***
	(-3.27)	(-4.09)
R^2	61.11%	55.29%

This table presents the regression results from the family tournament model (3). $R_{i,t}^{Fam}$ is the family ranks based on funds' observed mean returns. D^{Com} (D^{Emp}) is the dummy variable which equals to 1 when the sampled year is compensation (employment) incentive dominant. We classify the market into bull (bear) when the mid-year return of the FTSE All Share Index is positive (negative). Funds' daily returns from 3 UK IMA segments, UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. Column 2 presents the results for the 6-month ranking period and column 3 shows the results when the ranking period is 7 months and the post-ranking period is 5 months. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 5 Whole family tournaments

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^V$	0.0004	-0.0005	-0.0005	0.0010	-0.0015*
$R_{i,t}^{Fam} \cdot D_s^V$	0.0006	-0.0002	-0.0005	0.0009	-0.0012
D_{Star}	0.0013***	0.0007	0.0011	0.0014**	-0.0001
D_{Dog}	0.0008	-0.0003	-0.0001	0.0014**	-0.0003
$D_{Star,Dog}$	0.0019***	0.0014***	0.0004	0.0015**	-0.0002
$\sigma_{i,t-1}$	-15.497***	-15.0568***	-7.8053***	-13.5333***	-10.3831***
R^2	77.44%	65.35%	49.01%	53.19%	26.75%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^S$	0.0006	-0.0003	-0.0004	0.0013	-0.0011
$R_{i,t}^{Fam} \cdot D_s^S$	0.0004	-0.0003	-0.0006	0.0007	-0.0016*
D_{Star}	0.0013***	0.0007	0.0011	0.0013*	-0.0001
D_{Dog}	0.0007	-0.0003	-0.0001	0.0013**	-0.0004
$D_{Star,Dog}$	0.0018***	0.0013**	0.0003	0.0013**	-0.0003
$\sigma_{i,t-1}$	-15.468***	-15.0265***	-7.7978***	-13.4907***	-10.3292***
R^2	77.48%	65.34%	49.00%	53.30%	26.96%

This table presents the regression results on risk shifting in the family tournament. $R_{i,t}^{Fam}$ is the rank of the family return, which is calculated by using the value weighted return of funds within the same family. D_l (D_s) is the dummy variable, which equals to 1(0) when family i is a large (small) fund family. D_{Star} (D_{Dog}) equals to 1(0) when family i is a star (dog) family. $\sigma_{i,t-1}$ is the risk of family i in the ranking period. Funds' daily returns from 3 UK IMA segments, i.e. UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. Panel A reports the results when fund families are sorted by the funds' aggregate market size, while in Panel B results are sorted by the number of funds in the family. Column 1 presents the results where 6 months is the cut-off point for a ranking period and column 2 shows the results when the ranking period is 7 months and the post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is considered. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 6 Family and segment tournaments (Market Beta)

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^V$	0.0363*	0.0497***	0.0484***	0.0180	0.0408***
$R_{i,t}^{Fam} \cdot D_s^V$	0.0209	0.0448**	0.0156	-0.0049	0.0572***
$R_{i,t}^{Seg} \cdot D_l^V$	-0.0137	0.0035	-0.0524***	0.0470**	-0.0193
$R_{i,t}^{Seg} \cdot D_s^V$	-0.0471**	-0.0303	-0.0455**	0.0113	-0.0578***
$\beta_{i,t-1}$	-2.3525***	-3.4309***	-0.2903***	-0.1070***	-0.3457***
$\Delta\beta_{med}$	12.3390***	11.8658***	0.5272***	0.8219***	0.4662***
R^2	44.12%	38.27%	65.64%	41.17%	59.19%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^S$	0.0623***	0.0788***	0.0781***	0.0338**	0.0782***
$R_{i,t}^{Fam} \cdot D_s^S$	-0.00236	0.0202	-0.0051	-0.0183	0.0243*
$R_{i,t}^{Seg} \cdot D_l^S$	-0.0569**	-0.0396*	-0.0909***	0.0127	-0.0704***
$R_{i,t}^{Seg} \cdot D_s^S$	-0.0136	0.0051	-0.0159	0.0381**	-0.0053
$\beta_{i,t-1}$	-2.3124***	-3.4064***	-0.2902***	-0.1031***	-0.3456***
$\Delta\beta_{med}$	12.3586***	11.8913***	0.5345***	0.8244***	0.4699***
R^2	44.25%	38.31%	65.88%	41.01%	59.08%

This table presents the regression results from model (1) where $\Delta\sigma_{i,t}$ is given by the difference of the market beta between the ranking and post-ranking periods. The market beta is estimated by the Carhart 4 factors model. $R_{i,t}^{Fam}$ and $R_{i,t}^{Seg}$ are the family and segment ranks based on funds' daily returns. D_l (D_s) is the dummy variable which equals to 1(0) when fund i belongs to a large (small) fund family. $\beta_{i,t-1}$ is the market beta of fund i in the ranking period and $\Delta\beta_{med}$ is the median difference of the segment beta. Funds' daily returns in the sample period of 2001 to 2010 from 3 UK IMA segments, i.e. UK All Companies, UK Equity Income and UK Small Companies, are used to estimate the market beta. Panel A reports the results when fund families are sorted by funds' aggregate market size, while in Panel B results are sorted by the number of funds in the family. Column 1 presents the results where 6 months is taken as the cut-off point for the ranking period and column 2 shows the results when the ranking period is 7 months and the post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is considered. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 7 Family and segment tournaments (Idiosyncratic Risk)

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^V$	0.0035	0.0026	-0.0004	0.0036	0.0035
$R_{i,t}^{Fam} \cdot D_s^V$	0.0024	0.0012	0.0004	0.0007	0.0050**
$R_{i,t}^{Seg} \cdot D_l^V$	-0.0061***	-0.0036	0.0031	-0.0054**	-0.0064**
$R_{i,t}^{Seg} \cdot D_s^V$	-0.0089***	-0.0051**	0.0004	-0.0050**	-0.0075***
$\sigma_{\varepsilon i,t-1}$	-3.5591***	-3.1808	-4.5610***	-3.9013***	-3.6651***
$\Delta\sigma_{\varepsilon med}$	12.5259***	11.5825	5.1820***	13.7519***	10.4571***
R^2	78.89%	79.10%	40.31%	72.76%	73.44%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_l^S$	0.0036	0.0003	0.0008	0.0019	0.0035
$R_{i,t}^{Fam} \cdot D_s^S$	0.0022	0.0031	-0.006	0.0022	0.0049**
$R_{i,t}^{Seg} \cdot D_l^S$	-0.0084***	-0.0028	0.0015	-0.0051**	-0.0049*
$R_{i,t}^{Seg} \cdot D_s^S$	-0.0072***	-0.0067**	0.0012	-0.0053**	-0.0095***
$\sigma_{\varepsilon i,t-1}$	-3.5715***	-3.1907***	-4.5775***	-3.9056***	-3.6625***
$\Delta\sigma_{\varepsilon med}$	12.5394***	11.6465***	5.1838***	13.7525***	10.4791***
R^2	78.86%	79.12%	40.24%	72.74%	73.48%

This table presents the regression results from model (1) where $\Delta\sigma_{i,t}$ is given by the difference of the idiosyncratic risk between the ranking and post-ranking periods. The idiosyncratic risk is proxied by the standard deviation of the error term from the Carhart 4 factors model. $R_{i,t}^{Fam}$ and $R_{i,t}^{Seg}$ are the family and segment ranks based on funds' daily returns. D_{large} (D_{small}) is the dummy variable which equals to 1(0) when fund i belongs to a large (small) fund family. $\sigma_{\varepsilon i,t-1}^2$ is the market beta of fund i in the ranking period and $\Delta\sigma_{\varepsilon med}^2$ is the median difference of the segment beta. Funds' daily returns in the sample period of 2001 to 2010 from 3 UK IMA segments, i.e. UK All Companies, UK Equity Income and UK Small Companies, are used to estimate the market beta. Panel A reports the results when fund families are sorted by funds' aggregate market size, while in Panel B results are sorted by the number of funds in the family. Column 1 presents the results when the cut-off point for the ranking period is 6 months, and column 2 shows the results when the ranking period is 7 months and the post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is present. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 8 Family and segment tournaments (Family Overall Beta)

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_{large}^{V}$	-0.0005	-0.0110	-0.0095	-0.0234	-0.0418***
$R_{i,t}^{Fam} \cdot D_{small}^{V}$	-0.0012	-0.0119	-0.0059	-0.0183	-0.0420***
D_{Star}	-0.0129	-0.0084	0.0234	0.0065	0.0065
D_{Dog}	-0.0111	-0.0102	0.0132	0.0004	-0.0155
$D_{Star,Dog}$	-0.0036	0.0079	0.0266*	0.0177	0.0182
$\beta_{i,t-1}$	-0.2860***	-0.3764***	-0.4786***	-0.3069***	-0.5037***
R^2	11.86%	26.42%	38.84%	11.13%	48.89%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_{large}^{S}$	-0.0078	-0.0111	-0.0173	-0.0435*	-0.0363**
$R_{i,t}^{Fam} \cdot D_{small}^{S}$	0.0060	-0.0119	0.0042	-0.0067	-0.0462**
D_{Star}	-0.0118	-0.0084	0.0242	0.0109	0.0060
D_{Dog}	-0.0090	-0.0102	0.0167	0.0045	-0.0171
$D_{Star,Dog}$	0.0002	0.0078	0.0322**	0.0273	0.0158
$\beta_{i,t-1}$	-0.2885***	-0.3764***	-0.4786***	-0.3091***	-0.5030***
R^2	11.93%	26.42%	39.05%	14.01%	48.88%

This table presents the regression results from model (4) where $\Delta\sigma_{i,t}$ is given by the difference of the family's market beta between the ranking and post-ranking periods. The market beta is estimated by the Carhart 4 factors model. $R_{i,t}^{Fam}$ is the returns rank of the entire fund family. The family returns are calculated by using the value weighted returns of the funds within the same family. D_{large} (D_{small}) is the dummy variable which equals to 1(0) when family i is a large (small) fund family. D_{Star} (D_{Dog}) equals to 1(0) when family i is a star (dog) family. $\beta_{i,t-1}$ is the market beta of family i in the ranking period. Funds' daily returns from 3 UK IMA segments, i.e. UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. Panel A reports the results when fund families are sorted by funds' aggregate market size, while in Panel B results are sorted by the number of funds in the family. Column 1 presents the results when the cut-off point for the ranking period is 6 months, and column 2 shows the results when the ranking period is 7 months and post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is considered. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 9 Family and segment tournaments
(Family Overall Idiosyncratic Risk)

Panel A	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_{large}^{V}$	0.0022	-0.0017	0.0002	0.0048*	-0.0125***
$R_{i,t}^{Fam} \cdot D_{small}^{V}$	0.0024	0.0005	-0.0009	0.0019	-0.0092***
D_{Star}	-0.0006	0.0023	0.0002	-0.0020	-0.0004
D_{Dog}	-0.0001	0.0015	-0.0015	0.0005	-0.0018
$D_{Star,Dog}$	0.0012	0.0043**	0.0019	0.0001	0.0011
$\sigma_{\varepsilon i,t-1}$	-6.0783***	-5.3604***	-5.8952***	-6.0422***	-5.4827***
R^2	13.78%	9.79%	24.82%	14.18%	9.29%
Panel B	(6, 6)	(7, 5)	(Q1,Q2)	(Q2,Q3)	(Q3,Q4)
$R_{i,t}^{Fam} \cdot D_{large}^{S}$	0.0028	-0.0005	-0.0002	0.0055*	-0.0103***
$R_{i,t}^{Fam} \cdot D_{small}^{S}$	0.0018	-0.0003	-0.0007	0.0017	-0.0118***
D_{Star}	-0.0007	0.0022	0.0002	-0.0022	-0.0004
D_{Dog}	-0.0003	0.0014	-0.0015	0.0003	-0.0024
$D_{Star,Dog}$	0.0009	0.0039**	0.0019	-0.0004	0.0004
$\sigma_{\varepsilon i,t-1}$	-6.0983***	-5.3162***	-5.9292***	-6.1744***	-5.5457***
R^2	13.90%	9.77%	24.82%	14.28%	9.38%

This table presents the regression results from the family tournament analysis model (4), where $\Delta\sigma_{i,t}$ is given by the difference of the family's idiosyncratic risk estimated by the standard deviation of the error term from the Carhart 4 factors model between the ranking and post-ranking periods. $R_{i,t}^{Fam}$ is the return rank of the entire fund family. The family returns are calculated by using the value weighted return of funds within the same family. D_{large} (D_{small}) is a dummy variable which equals to 1(0) when family i is a large (small) fund family. D_{Star} (D_{Dog}) equals to 1(0) when family i is a star (dog) family. $\sigma_{\varepsilon i,t-1}^{2}$ is the idiosyncratic risk of family i in the ranking period. Funds' daily returns from 3 UK IMA segments, i.e. UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. Panel A reports the results when fund families are sorted by the funds' aggregate market size, while in Panel B results are sorted by the number of funds in the family. Column 1 presents the results when 6 months is considered as the ranking period and column 2 shows the results when the ranking period is 7 months and the post-ranking period is 5 months. Columns 4-6 report the results when a quarterly tournament is considered. All the results are based on a time fixed panel regression. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 10 Segment rank transition matrix

Panel A (%) Current Decile	1	2	3	4	5	6	7	8	9	10
1	19.30	10.04	14.71	7.86	10.85	6.39	12.39	6.43	4.97	7.10
2	10.12	15.13	10.59	13.29	9.11	8.56	8.26	10.78	7.44	6.78
3	13.42	10.83	7.64	13.33	11.52	13.94	9.82	7.21	7.12	5.10
4	8.07	8.63	11.52	12.75	13.78	11.37	10.51	9.57	8.32	5.47
5	8.34	13.65	12.19	11.13	7.27	11.70	12.00	9.27	6.60	7.87
6	9.40	11.15	9.40	7.82	11.69	9.71	11.73	12.57	8.38	8.14
7	6.73	9.49	11.51	7.99	13.39	8.47	10.99	11.08	11.51	8.87
8	9.90	5.28	7.82	9.61	9.65	8.64	8.14	11.58	16.23	13.13
9	9.99	9.84	6.51	7.33	9.48	11.87	7.36	10.34	13.70	13.62
10	10.21	5.66	5.67	7.46	4.86	6.70	6.35	10.27	14.17	28.69
Panel B (%) Current Decile	1	2	3	4	5	6	7	8	9	10
1	18.06	10.55	14.15	9.92	8.31	10.71	8.74	6.01	6.46	7.11
2	10.02	15.12	7.4	9.41	14.77	9.91	8.79	10.5	8.59	5.48
3	10.71	11.5	15.71	7.96	11.38	8.09	10.96	8.52	6.86	8.29
4	8.14	9.52	9.08	16.84	8.37	15.43	11.37	7.29	7.78	6.18
5	10.3	11.52	13.39	13.23	10.83	8.54	7.86	10.55	8.45	5.31
6	11.1	12.62	10.18	7.45	11.71	7.24	10.57	10.47	10.23	8.44
7	7.53	6.41	7.18	10.73	12.59	9.59	12.31	11.77	12.16	9.71
8	12.16	9.7	6.1	11.09	7.55	11.11	8.43	12.04	9.86	11.96
9	8.43	6.67	5.92	6.33	8.14	10.21	11.15	10.72	12.61	19.89
10	9.27	6.17	8.22	5.44	7.82	6.38	7.44	11.12	15.28	22.89

This table reports the transition probability of the return ranks between the ranking and post-ranking periods. Funds are ranked in ascending order into 10 deciles compared with the mean returns from other funds in the same segment during the ranking period. Columns 2 to 11 report the transition probability of rank shifting for funds in each decile from the ranking period to the post-ranking period. Panel A reports the transition probability on a mid-year basis while Panel B considers a 7-month ranking period. All the figures reported here are in percentage value.

Table 11 Family rank transition matrix

Panel A (%) Current Percentile	1	2	3	4	5
1	32.04	22.62	17.92	15.21	12.23
2	21.17	26.22	26.15	13.71	12.77
3	20.78	14.99	17.93	18.13	28.20
4	16.02	21.89	23.49	22.57	16.02
5	13.27	12.72	12.71	28.91	32.44
Panel B (%) Current Percentile	1	2	3	4	5
1	33.19	22.84	12.77	13.60	17.63
2	20.55	23.52	27.33	17.78	10.82
3	18.54	18.73	22.82	23.42	16.53
4	19.93	18.89	15.84	21.84	23.52
5	11.50	14.31	19.47	22.20	32.55

This table reports the probability of return rank transition between the ranking and post-ranking periods. Fund families are ranked in ascending order into 5 deciles according to their value weighted family returns during the ranking period. Columns 2 to 6 report the transition probability of rank shifting in each decile from the ranking period to the post-ranking period. Panel A reports the transition probability on a middle year basis while in Panel B a 7 month period is considered for the ranking period. All values reported in the table are in percentage.

Table 12 Risk shifting and post-ranking performance transition

RS ranking	Current percentile	Raw returns			4-factor alphas		
		1	2	3	1	2	3
1	1	48.3	39.8	11.9	57.8	32.0	10.2
	2	24.4	62.8	12.8	26.7	63.4	9.9
	3	13.8	27.6	58.5	16.3	35.8	48.0
2	1	40.2	45.4	14.4	45.8	37.5	16.7
	2	18.6	66.9	14.4	15.0	69.6	15.4
	3	15.0	34.2	50.8	18.3	34.6	47.1
3	1	46.4	41.1	12.5	44.5	43.7	11.8
	2	14.1	72.1	13.8	12.6	71.8	15.6
	3	17.9	27.4	54.7	14.7	29.5	55.8
4	1	38.2	44.1	17.6	38.1	44.3	17.5
	2	13.4	69.5	17.1	13.1	71.2	15.7
	3	18.3	37.6	44.0	12.9	40.5	46.6
5	1	46.0	44.4	9.7	50.9	36.2	12.9
	2	19.2	66.3	14.6	15.5	68.2	16.3
	3	17.3	32.7	50.0	13.8	27.5	58.7

This table shows mean performance of the funds subsequent to risk shifting. In Column 1, all sample funds are ranked in ascending order in terms of the magnitude of risk shifting, leading to the formation of 5 groups. In Column 2, funds in each of the risk shifting groups are further ranked into 3 groups in ascending order based on their mean returns in the first half of the year. The subsequent family performance is then calculated for each of the risk shifting groups and for the corresponding return ranking groups. Columns 3 to 8 report the transition probability of each percentile's rank shifting between the ranking period and the post-ranking period. The post-ranking performance is measured by funds' mean returns and funds' alphas estimated from the Carhart 4 factors model.

Table 13 Post fund ranking performance (6-6)

Panel A	Raw returns			CAPM alphas			FF alphas			Carhart alphas		
RS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0355	-0.0019	0.0374***	-0.0003	-0.0271	0.0267**	0.0183	-0.0002	0.0185***	0.0279	0.0025	0.0254***
			(0.0097)			(2.091)			(2.7140)			(3.4388)
2	0.0231	0.0364	-0.0132	0.0005	0.0104	-0.0099	0.0383	0.0370	0.0013	0.0452	0.0419	0.0033
			(-0.9775)			(-1.0527)			(0.2403)			(0.5689)
3	0.0166	0.0351	-0.0185*	0.0001	0.0101	-0.0010*	0.0424	0.0405	0.0018	0.0486	0.0480	0.0006
			(-1.4556)			(-1.2248)			(0.3282)			(0.1027)
4	0.0370	0.0166	0.0203**	0.0080	0.0006	0.0074	0.0465	0.0459	0.0005	0.0526	0.0526	0.0000
			(1.6038)			(0.4418)			(0.0924)			(0.0005)
5	0.0230	0.0153	0.0076	0.0067	0.0006	0.0062	0.0478	0.0476	0.0002	0.0554	0.0547	0.0008
			(0.5262)			(0.6118)			(0.0363)			(0.1092)

Table 13 Post fund ranking performance (6-6) (Continued)

Panel B	Raw returns			CAPM alphas			FF alphas			Carhart alphas		
RS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0601	-0.0108	0.0710***	0.0176	-0.0337	0.0513***	0.0202	0.0031	0.0171***	0.0305	0.0069	0.0236***
			(4.5187)			(4.0839)			(0.0062)			(3.1898)
2	0.0378	0.0217	0.0161	0.0083	0.0024	0.0060	0.0366	0.0387	-0.0021	0.0424	0.0447	-0.0023
			(1.1902)			(0.6350)			(-0.3899)			(-0.4055)
3	0.0243	0.0277	-0.0034	0.0040	0.0065	-0.0025	0.0424	0.0406	0.0019	0.0486	0.0480	0.0006
			(-0.2638)			(-0.3043)			(0.3348)			(0.1034)
4	0.0278	0.0236	0.0042	0.0076	0.0088	-0.0012	0.0410	0.0508	-0.0098**	0.0457	0.0588	-0.0132**
			(0.3287)			(-0.1716)			(-1.7245)			(-2.1958)
5	-0.0120	0.0414	-0.0534***	0.0186	-0.0173	0.0359***	0.0527	0.0440	0.0086**	0.0601	0.0513	0.0088**
			(-3.6902)			(3.5781)			(1.7025)			(1.6651)

This table presents funds' mean performance subsequent to risk shifting on a half year basis. In Column 1, funds are ranked in ascending order to form 5 groups based on the magnitude of risk shifting. Funds are further sorted into the winner (loser) group if their half year performance is higher (lower) than the median performance. Panel A reports the results when a segment rank is considered, while family rank is considered in Panel B. The subsequent fund performance is calculated for each of the risk shifting groups and the corresponding winner and loser groups. The differences between the winner and loser groups are presented for each type of performance evaluation, with t statistics in brackets. All results reported are in percentage values. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 14 Post fund ranking performance (7-5)

Panel A	Raw returns			CAPM alphas			FF alphas			Carhart alphas		
RS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0384	-0.0101	0.0485***	0.0056	-0.0334	0.0390***	0.0202	0.0024	0.0178***	0.0258	0.0071	0.0187***
			(3.1484)			(3.0688)			(2.6831)			(2.5370)
2	0.0343	0.0298	0.0045	0.0074	0.0072	0.0002	0.0420	0.0389	0.0031	0.0460	0.0454	0.0006
			(0.3498)			(0.0187)			(0.5206)			(0.0897)
3	0.0251	0.0347	-0.0096	0.0014	0.0123	-0.0109*	0.0460	0.0411	0.0049	0.0524	0.0459	0.0065
			(-0.8053)			(-1.2877)			(0.8053)			(1.0068)
4	0.0316	0.0307	0.0008	0.0138	0.0110	0.0028	0.0519	0.0525	-0.0006	0.0587	0.0577	0.0010
			(0.0690)			(0.3625)			(-0.1036)			(0.1546)
5	0.0240	0.0251	-0.0011	0.0106	0.0080	0.0026	0.0574	0.0493	0.0081*	0.0659	0.0556	0.0103*
			(-0.0782)			(0.2466)			(1.2154)			(1.4723)

Table 14 Post fund ranking performance (7-5) (Continued)

Panel B	Raw returns			CAPM alphas			FF alphas			Carhart alphas		
RS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0642	-0.0208	0.0850***	0.0257	-0.0414	0.0672***	0.0233	0.0039	0.0193***	0.0297	0.0082	0.0215***
			(5.7264)			(5.4797)			(2.9594)			(2.9591)
2	0.0401	0.0256	0.0145*	0.0111	0.0044	0.0067	0.0399	0.0408	-0.0008	0.0437	0.0473	-0.0036
			(1.1271)			(0.7252)			(-0.1414)			(-0.5535)
3	0.0292	0.0311	-0.0019	0.0035	0.0103	-0.0068	0.0422	0.0444	-0.0022	0.0481	0.0497	-0.0016
			(-0.1574)			(-0.8003)			(-0.3573)			(-0.2448)
4	0.0025	0.0371	-0.0121	0.0060	0.0184	-0.0124**	0.0506	0.0538	-0.0032	0.0551	0.0611	-0.0059
			(-1.0123)			(-1.6070)			(-0.5457)			(-0.9408)
5	-0.0075	0.0489	-0.0563***	0.0260	-0.0013	0.0390***	0.0558	0.0510	0.0047	0.0635	0.0581	0.0055
			(-4.0016)			(3.7230)			(0.7045)			(0.7700)

This table presents the funds' mean performance subsequent to risk shifting on a 7-5 month basis. In Column 1, funds are ranked in ascending order to form 5 groups on the basis of the magnitude of risk shifting. Funds are further sorted into the winner (loser) group if their 7-month mean performance is higher (lower) than the median performance. Panel A reports the results when a segment rank is considered, while family rank is considered in Panel B. The subsequent fund performance is calculated for each of the risk shifting groups and the corresponding winner and loser groups. The differences between the winner and loser groups are presented for each type of performance evaluation, with t statistics in brackets. All results reported are in percentage values. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table Performance attribution

Panel A (All Cap)	Market Beta			SMB Beta			HML Beta			MOM Beta		
segRS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	-0.057***	-0.092***	0.084**	-0.080***	-0.059***	0.029	-0.025**	-0.007	-0.045***	-0.003	-0.001	0.000
2	0.006	-0.010	-0.033	0.001	-0.011	-0.028	-0.029*	-0.014	-0.034*	-0.005**	0.004*	-0.003
3	0.038***	0.029**	-0.022	0.026*	0.031**	-0.035	-0.026*	-0.050***	-0.005	-0.006***	-0.002	0.007**
4	0.046***	0.071***	-0.055	0.064***	0.048***	0.009	0.009	-0.049***	0.045**	-0.005**	-0.005**	0.004
5	0.133***	0.153***	-0.022	0.144***	0.116***	0.044	0.017	-0.043**	0.019	-0.002	-0.006**	0.005
Panel B												
famRS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	-0.040***	-0.039**	-0.037	-0.043***	-0.009	-0.040*	-0.023**	0.010	-0.052***	0.000	-0.001	0.000
2	0.025*	0.029*	-0.054	0.031**	0.008	0.007	-0.052***	-0.047*	-0.010	-0.007***	-0.001	-0.002
3	0.024*	0.049**	-0.036	0.014	0.044**	-0.033	-0.018	0.015	-0.050**	-0.007***	-0.005*	-0.002
4	0.070***	0.069***	-0.033	0.048***	0.033*	0.681	-0.035**	-0.045*	0.002	-0.004**	-0.002	0.005
5	0.091***	0.104***	-0.009	0.087***	0.083***	0.014	0.005	-0.053**	0.041**	-0.002	-0.005**	0.002

Table Performance attribution (continued)

Panel C (Income)	Market Beta			SMB Beta			HML Beta			MOM Beta		
segRS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	-0.027*	-0.057**	0.086**	-0.026	-1.5987*	0.064**	-0.077***	0.011	-0.113***	-0.012***	0.012***	-0.016***
2	0.020	-0.014	-0.073*	0.045	-0.038*	0.015	-0.0024	-0.031*	-0.029	-0.001	0.001	0.003
3	0.047**	0.030	0.039	0.062**	0.036	0.019	-0.005	-0.032	0.028	-0.005*	-0.002	0.012**
4	0.099***	0.084***	-0.088**	0.059**	0.088***	-0.062	-0.003	-0.012	-0.009	0.001	-0.006*	0.004
5	0.063	0.123***	-0.056	0.042*	0.140***	-0.043	0.065**	-0.066***	0.124***	0.003	-0.012**	0.007
Panel D												
famRS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	0.045**	-0.008	-0.036	-0.004	-0.004	-0.017	-0.065**	-0.054***	-0.048*	-0.008*	-0.003	-0.003
2	0.048	0.010	-0.162**	0.045	-0.017	0.022	0.110*	-0.012	0.033	0.013	-0.001	0.010
3	0.111***	0.055**	-0.048	0.085*	0.050**	-0.014	-0.043	-0.025	-0.036	-0.013*	-0.001	-0.007
4	0.110**	0.023	0.015	0.187***	0.056**	0.024	0.031	-0.025	0.016	0.003	-0.002	0.003
5	0.038	0.072***	0.005	0.001	0.089***	-0.049	0.056	0.008	0.089**	-0.003	-0.004	0.007

Table Performance attribution (continued)

Panel E (Small Cap)	Market Beta			SMB Beta			HML Beta			MOM Beta		
segRS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	-0.062**	-0.080***	0.050	-0.121***	-0.116***	-0.019	0.000	0.017	0.009	-0.016*	-0.010	0.003
2	-0.018	-0.095***	0.013	-0.034	-0.112***	0.020	0.007	-0.016	0.005	-0.005*	-0.004	-0.002
3	0.015	-0.055***	0.053	-0.001	-0.047***	0.031	0.005	-0.036*	0.017	-0.005**	0.001	0.006
4	0.018	0.014	-0.021	0.016	0.013	-0.002	0.020	-0.044*	0.026	0.000	-0.006*	0.019***
5	0.063*	0.054**	0.081	0.081*	0.051**	0.096	-0.036	-0.009	-0.031	0.005	-0.011**	0.003
Panel F												
famRS	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L	Winner	Loser	W-L
1	-0.060	-0.030**	0.075	0.054	-0.078***	0.125**	0.019	0.003	-0.001	0.007	-0.011***	0.005
2	0.073	-0.034*	0.162**	0.030	-0.029	0.058	0.061*	-0.031*	0.041	-0.010**	0.003	0.003
3	-0.009	-0.018	0.126	0.024	-0.027	0.162	0.013	0.000	0.031	0.004***	0.001	0.005
4	-0.008	0.015	-0.026	-0.067	0.000	-0.029	0.055	0.011	0.087**	0.010**	-0.011**	0.020*
5	0.028	-0.008	-0.055	-0.014	0.001	0.003	-0.088*	-0.027*	-0.043	-0.008	-0.005**	0.002

This table presents the changes of the factor loadings of the 4-fator model for both the winner and loser group on a 6-6 month tournament basis. Funds are classified into 3 IMA sectors, namely, all company, equity income and small company. Panel A, C and E report the results when a segment rank is considered, while family rank is considered in Panel B, D and F. The differences on factor loadings between the winner and loser groups are also presented for both types of tournament. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 15 Post fund ranking size adjusted performance

Panel A		Raw returns	CAPM alphas	FF alphas	Carhart alphas
RS	Size	W-L	W-L	W-L	W-L
1	1	-0.0132	0.0573***	0.0637***	0.0692***
		-0.4271	2.3868	4.7763	4.9903
	2	0.0096	0.0106	0.0556***	0.0450***
		0.2948	0.4275	2.7049	3.2731
	3	0.0088	0.0325*	0.0157	0.0227*
		0.3102	1.4985	0.0593	1.5492
	4	-0.0050	0.0343*	0.0150*	0.0100
		-0.1510	1.4138	1.3551	0.9740
	5	0.0662***	-0.0072	0.0213*	0.0150
		2.2345	-0.3745	1.6283	1.0105
2	1	-0.0067	0.0057	0.0260**	0.0127
		-0.2132	0.2566	2.0487	0.9225
	2	0.0016	-0.0028	0.0291*	0.0293***
		0.0544	-0.1342	.5417	2.3735
	3	0.0458*	0.0407**	0.0251**	0.0250**
		1.4533	1.8392	2.0005	1.9002
	4	-0.0076	0.0249*	0.0188*	0.0091
		-0.2616	1.3923	1.5506	0.6975
	5	-0.0045	0.0432***	0.0300***	0.0270**
		-0.1524	2.2318	2.6127	2.2572
3	1	0.0004	-0.0136	0.0174*	0.0046
		0.0136	-0.6501	1.4437	0.3560
	2	0.0126	0.0568***	0.0447***	0.0525***
		0.3839	2.3583	3.3152	3.6861
	3	0.0256	0.0393**	0.0548***	0.0565***
		0.7627	1.8500	3.9115	3.9147
	4	-0.0092	0.0300*	0.0192*	0.0248**
		-0.2983	1.3864	1.4138	1.7583
	5	-0.0232	0.0123	0.0152*	0.0075
		-0.8721	0.8601	1.3185	0.6037
4	1	0.0499	0.0701**	0.0729***	0.0500**
		1.2234	2.2560	3.1676	2.0128
	2	0.0344	0.0238	0.0129	-0.0003
		1.0861	1.1475	0.8276	-0.0180
	3	-0.0082	0.0477	0.0366*	0.0013
		-0.2714	1.1096	1.8553	0.1409
	4	-0.0279	-0.0052	0.0140	0.0157
		-0.9844	-0.2851	1.0648	1.1327
	5	-0.0029	0.0030	0.0213**	0.0182*
		-0.1043	0.1945	2.0651	1.6209
5	1	0.0432*	0.0011	0.0141	0.0077
		1.3722	0.6687	1.1040	1.0036
	2	0.0558**	0.0096	0.0048	0.0121*
		1.6247	0.4033	0.1553	0.6243
	3	0.0091	0.0018	0.0029	-0.0027
		0.2628	0.0764	0.2465	-0.1823
	4	-0.0347	0.0130	0.0157	0.0053
		-1.1268	0.6924	0.3518	0.7010
	5	-0.0484**	0.0060	0.0102	0.0101
		-1.7257	0.7598	0.0429	0.5052

Table 15 Post fund ranking size adjusted performance (continued)

Panel B		Raw returns	CAPM alphas	FF alphas	Carhart alphas
RS	Size	W-L	W-L	W-L	W-L
1	1	-0.0320	0.0506***	0.0489**	0.0304***
		-1.1617	2.5267	2.1905	2.2983
	2	-0.0040	0.0319*	0.0263***	0.0308***
		-0.1595	1.6255	2.5005	2.6531
	3	0.0723***	0.0025	0.0126	0.0267***
		2.8866	0.7422	0.1663	2.1362
	4	0.0165	0.0169	0.0184	0.0101
		0.6575	0.1203	1.1819	1.0164
	5	0.0122	0.0191*	0.0149*	0.0139
		0.4798	1.2722	1.4134	1.1768
2	1	0.0282	0.0555***	0.0294**	0.0181
		0.8318	2.3378	1.8764	1.1034
	2	-0.0123	0.0072	0.0049	0.0024
		-0.3695	0.2973	0.3745	0.1658
	3	0.0083	0.0197	0.0212	0.0060
		0.1872	0.6009	1.2290	0.3351
	4	-0.0680***	0.0131	-0.0177*	-0.0329***
		-2.1172	0.6407	-1.3069	-2.3011
	5	0.0241	0.0127	0.0115	0.0103
		0.7680	0.6322	0.8437	0.7223
3	1	0.0136	0.0512*	0.0351**	0.0192
		0.2769	1.5143	1.7678	0.8787
	2	-0.0201	0.0109	0.0169	0.0303**
		-0.4634	0.3674	1.0496	1.7497
	3	0.0506*	0.0361*	0.0388***	0.0372***
		1.5531	1.5632	2.8245	2.5596
	4	0.0658**	-0.0051	0.0385***	0.0339**
		1.9112	-0.2508	2.6038	2.1902
	5	0.0034	0.0228	0.0368***	0.0312***
		0.1066	1.2212	2.9498	2.3264
4	1	0.0218	0.0256	0.0278*	0.0046
		0.5972	0.9243	1.4964	0.2395
	2	0.0345	-0.0205	0.0234*	0.0223
		0.8660	-0.7657	1.3003	1.2135
	3	0.0010	0.0413**	0.0131	0.0148
		0.0258	1.6998	0.7678	0.8075
	4	-0.0078	0.0173	0.0017	0.0007
		-0.1852	0.5938	0.0949	0.0354
	5	0.0347*	0.0059	0.0086	0.0086
		1.3347	0.4214	0.7514	0.6890
5	1	0.0306	0.0404**	0.0189	0.0073
		1.0682	1.8285	0.3628	0.0913
	2	-0.0169	-0.0316*	0.0150*	0.0173*
		-0.5589	-1.5346	1.2982	1.4169
	3	-0.0151	0.0043	0.0220**	0.0105
		-0.5444	0.2438	1.8907	0.8372
	4	-0.0585***	0.0226*	0.0206***	0.0283***
		-2.4337	1.6227	3.0154	2.6056
	5	-0.0236	0.0282***	0.0143***	0.0164**
		-0.8157	2.4632	2.2558	1.7734

This table presents the mean performance of fund families subsequent to risk shifting. In Column 1, families are ranked in ascending order to form 5 groups on the basis of the magnitude of risk shifting. Funds are further sorted into groups by their end of year size, in which winners losers are classified according to their half-year performance. Panel A B reports the results based on segment family ranks. The differences between the winner and loser groups

are presented for each type of performance evaluation, with t statistics in brackets. All results reported are in percentage values. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 16 Post-ranking risk characteristics

Panel A	Raw returns			Carhart alphas		
Beta RS	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0531	0.0143	0.0388***	0.0587	0.0386	0.0200***
			3.1879			3.1080
2	0.0328	0.0221	0.0107	0.0430	0.0433	-0.0003
			0.6057			-0.0326
3	0.0496	0.0096	0.0400***	0.0514	0.0412	0.0102*
			2.4643			1.4653
4	0.0177	0.0314	-0.0231	0.0442	0.0409	0.0033
			-0.8518			0.4735
5	0.0100	0.0348	-0.0247**	0.0373	0.0466	-0.0093*
			-1.9387			-1.6248

Panel B	Raw returns			Carhart alphas		
Beta RS	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0589	0.0183	0.0407***	0.0499	0.0490	0.0009
			3.3941			0.1275
2	0.0406	0.0124	0.0281***	0.0498	0.0384	0.0114*
			1.7062			1.4163
3	0.0265	0.0287	-0.0022	0.0463	0.0413	0.0050
			-0.1388			0.6551
4	0.0363	0.0249	0.0114	0.0052	0.0510	0.0006
			0.7625			0.0746
5	0.0112	0.0474	-0.0362***	0.0449	0.0414	0.0035
			-2.9690			0.5826

Table 16 Post-ranking risk characteristics (continued)

Panel C	Raw returns			Carhart alphas		
Idio RS	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0210	0.0257	-0.0047	0.0428	0.0394	0.0035
			-0.3663			0.5746
2	0.0480	0.0130	0.0350**	0.0373	0.0472	-0.0010
			2.0467			-1.1615
3	0.0250	0.0267	-0.0017	0.0454	0.0412	0.0042
			-0.1045			0.6510
4	0.0251	0.0169	0.0082	0.0462	0.0363	0.0099*
			0.5124			1.4110
5	0.0287	0.0149	0.0138	0.0486	0.0437	0.0049
			1.1038			0.7829

Panel D	Raw returns			Carhart alphas		
Idio RS	Winner	Loser	W-L	Winner	Loser	W-L
1	0.0269	0.0271	-0.0003	0.0398	0.0451	-0.0052
			-0.0200			-0.8219
2	0.0338	0.0243	0.0094	0.0386	0.0532	-0.0146**
			0.5925			-1.6336
3	0.0273	0.0278	-0.0005	0.0416	0.0451	-0.0036
			-0.0341			-0.5169
4	0.0267	0.0269	-0.0002	0.0579	0.0299	0.0280***
			-0.0122			3.8324
5	0.0347	0.0144	0.0203***	0.0516	0.0451	0.0066
			1.6979			0.9977

This table presents the fund performance subsequent to risk shifting in terms of the systematic and the idiosyncratic risks. In Column 1, funds are ranked in ascending order to form 5 groups according to the magnitude of risk shifting. Panels A and B C and D report the results based on sorting by systematic risk idiosyncratic risk on a 6-6 and 7-5 basis, respectively. Funds are further sorted into the winner loser group if their performance is higher lower than the median performance of the family. The subsequent fund performance is calculated for each of the risk shifting groups and the corresponding winner and loser groups. The differences between the winner and loser groups are presented for each type of performance evaluation, with t statistics in brackets. All results reported are in percentage values. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 17 Aggregated family ranks analysis

Odds ratio	Raw returns	CAPM alphas	FF alphas	Carhart alphas
$R_{i,t}^{\Delta\sigma}$	0.582**	0.843**	0.788**	0.633*
	-2.01	-2.14	-2.33	-1.72
$\Delta\Lambda_{i,t}^{\sigma} \cdot D_{Star}$	1.351*	1.300*	1.406*	1.321*
	1.64	1.61	1.72	1.61
$\Delta\Lambda_{i,t}^{\sigma} \cdot D_{Dog}$	4.174***	2.391**	4.005***	3.225**
	3.08	2.01	2.94	2.52
$\Delta\Lambda_{i,t}^{\sigma} \cdot D_{Star,Dog}$	0.854	0.947	0.827	0.846
	-0.91	-0.32	-1.04	-0.92
$\Delta\Lambda_{i,t}^{\beta} \cdot D_{Star}$	1.000	0.999	0.999	0.999
	-0.06	-0.54	-0.70	-0.82
$\Delta\Lambda_{i,t}^{\beta} \cdot D_{Dog}$	0.999	0.999	1.000	0.999
	-1.18	-0.72	-0.40	-0.53
$\Delta\Lambda_{i,t}^{\beta} \cdot D_{Star,Dog}$	1.000	1.001	1.000	1.000
	0.87	0.67	0.17	0.43
$\Delta\Lambda_{i,t}^{\varepsilon} \cdot D_{Star}$	1.003	0.985	0.998	1.021
	0.04	-0.21	-0.02	0.28
$\Delta\Lambda_{i,t}^{\varepsilon} \cdot D_{Dog}$	1.189*	1.185*	1.264***	1.210**
	1.89	1.86	2.64	2.20
$\Delta\Lambda_{i,t}^{\varepsilon} \cdot D_{Star,Dog}$	0.914	0.943	0.984	0.991
	-1.21	-0.85	-0.24	-0.13
χ^2	26.90	14.61	25.29	21.22
Obs.	534	534	534	534

This table presents the odds ratios from the post-ranking performance analysis of model 2. Fund families are ranked according to performance changes of the underlying members. Fund performance is estimated by four evaluation measures: the raw total returns, the CAPM alphas, the Fama French alphas and the Carhart alphas. $\Delta\Lambda_{i,t}^{\sigma}$, $\Delta\Lambda_{i,t}^{\beta}$ and $\Delta\sigma_{i,t}^{\varepsilon}$ are the cross sectional risk difference on funds' total risk, the systematic risk and the idiosyncratic risk between the ranking and post-ranking period, respectively. $R_{i,t}^{\Delta\sigma}$ is the family rank that measures the level of risk shifting for individual funds within the family. D_{Star} D_{Dog} is equal to 10 when the family is a star dog family. $D_{Star,Dog}$ is equal to 1 if the family has both star and dog funds and 0 otherwise. The model is fitted by the ordinal logistic model. The z statistics are shown in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% level.

Table 18 Cross-fund subsidization

Panel A 1st half year	Intercept	D^{Family}	D^{Style}
Coeff.	0.1027***	-0.0325***	0.0438***
t-Stat.	22.62	-6.01	7.85
Adjusted R^2	0.16		
Panel B 2nd half year	Intercept	D^{Family}	D^{Style}
Coeff.	0.0082***	0.0082**	-0.0090**
t-Stat.	2.20	1.99	-2.00
Adjusted R^2	0.09		
Panel C Monthly	Intercept	D^{Family}	D^{Style}
Feb.	0.1137***	-0.0170*	0.0515***
	14.85	-1.87	5.58
Mar.	0.1721***	-0.1437***	0.0279*
	15.67	-10.57	1.93
Apr.	0.0405***	-0.0184	0.0520***
	3.41	-1.29	3.52
May	0.0621***	0.0341***	0.0450***
	9.94	4.69	6.05
Jun.	0.0068	0.0557***	-0.0270***
	0.97	6.84	-3.27
Jul.	-0.1491***	0.1536***	-0.0462***
	-16.30	13.78	-4.04
Aug.	-0.0749***	-0.0161	0.0215**
	-9.94	-1.74	2.26
Sep.	0.2225***	-0.2045***	0.0224*
	19.29	-15.23	1.64
Oct.	-0.0140*	0.0315***	0.0230**
	-1.78	3.29	2.31
Nov.	-0.0184**	0.0268***	-0.0359***
	-2.52	3.29	-4.40
Dec.	0.0137*	0.0368***	0.0107
	1.64	3.61	0.98

This table presents the regression results from the test of cross-fund subsidization. For each month, we rank all the funds in ascending orders according to their Carhart alphas, and funds within the 25th percentile 75th percentile are formed to be the Low High value fund groups. The comparison peer group is all the funds in the same style. We then construct two sets of High/Low value pairs, namely, the actual pair and the matching pair. In the actual pair, each of the funds in the High value group is matched with a fund of the same family but in the Low value group. In the matching pair, each of the Low value funds in the actual pair is substituted with a fund taken from the same ranking percentile but within a different fund family. The return difference is then computed in the month following the ranking month. D^{Family} is the dummy variable which equals to 1 when the paired funds are in the same fund family. D^{Style} is the same style dummy that takes a value of 1 when the paired funds are within the same investment style. Panel A reports the results when we only consider the subsidization in the first half of the year while Panel B reports the results from the second half of the year. In Panel C we report the results from the monthly regression. Funds' daily returns from 3 UK IMA segments, UK All Companies, UK Equity Income and UK Small Companies, are examined for the sample years between 2001 and 2010. ***, ** and * indicate significance at the 1%, 5% and 10% level.