Family Status and Mutual Fund Performance

Andrew Clare[a,*],

Niall O'Sullivan[b]

and

Meadhbh Sherman[c]

[a] The Centre for Asset Management Research,
The Sir John Cass Business School, City University, London, UK.
[b] School of Economics and Centre for Investment Research,
University College Cork, Ireland.
[c]School of Economics, University College Cork, Ireland.

Published in *Journal of Asset Management*, 2014, Vol. 15, Issue 3, 163-175.

Abstract

Using a large and long sample of US and European mutual funds we examine the impact that membership of a fund family has on performance. We test for strategic and competitive behaviours among family funds and whether this affects performance persistence and risk taking. While we do not find evidence of stronger performance persistence among family funds versus non-family funds, we do find some significant differences in the future performance of portfolios of family and non-family funds formed on the basis of past performance. We find strong evidence that a fund's mid-year ranking within its family and within its sector affects its risk taking over the remainder of the year. However, most interestingly, we find evidence to suggest differences in the ways in which the US and European fund management industries operate, although future microstructure research would be required to identify the industry practices and cultures that may be the source of these differences.

JEL classification: G02, G11, G15.
Keywords: fund family, performance persistence and risk.

---

[*]Corresponding author. Tel.: +44 207 040 5169. *E-mail addresses:* a.clare@city.ac.uk

1. Introduction

A mutual fund family is a group of funds that are managed by the same fund management company. It has been argued that being part of a fund family conveys certain benefits on the individual funds (for example, see Nanda, Wang and Zheng (2004)). In particular, the 'family members' may benefit from economies of scale in terms of promotion, advertising and distribution that the fund management company can provide for all of its funds. In addition, Nanda *et al* (2004) argue that fund family members may benefit from the greater flexibility afforded by a larger parent organization in terms of the reallocation of human capital and other resources in response to changes in financial market conditions. Since being part of a fund family is such a prevalent organizational structure, in this paper we examine the impact of family status on fund manager behavior. In particular, we focus on behavior that may affect fund performance persistence and risk-taking. The limited extant literature on fund families has focused on the US. We examine these behaviors and explore possible differences in two major mutual fund markets by using a large data set consisting of over 5,000 European and US mutual funds.

We begin by looking at the impact of family status on the persistence of fund returns. Guedj and Papastaikoudi (2005) suggest that funds within a family are more likely to have persistent performance than those not in a family. This hypothesis is based on evidence of a convex relationship between performance and fund flows, that is, good performance attracts capital inflows while poor performance tends not to lead to commensurate fund outflows (see for example, Nanda, Wang and Zheng (2004)). This convex performance/fund flow relationship may provide fund management companies with an incentive to engage in strategic behaviour by supporting and resourcing their better performing funds at the expense of their poorer performing funds. This convexity may lead to a situation where, given a choice between operating two funds with median performance, or two funds, one a top performing fund and the other a poorly performing fund, the company would choose the latter. We test the hypothesis that such strategic resource allocations may increase the chances of this good and bad relative performance persisting, that is, a finding of positive persistence among funds in a family.

The second related strategic behaviour of fund management companies that we explore relates to the impact of family status on risk taking behaviour. We examine whether risk taking behaviour among funds within families changes according to the funds' relative performance. Specifically, we test whether, within a fund family, the risk taking of top performing funds (over say the first half of the year) is reduced in the second half of the year while the risk taking of bottom performing funds rises. This negative relationship between performance and subsequent risk taking behaviour over the course of the year may arise for two reasons. First, a fund management company acting strategically may decide to protect or 'bank' good performance achieved in the early part of the investment period by reducing top funds' risk in the latter part of the period. Similarly, the convex performance/fund flow relationship gives the company an incentive to transfer risk to the lower performing funds. If the risks pay off, great; if not, the fund outflows are smaller than the inflows enjoyed by the better performing funds. Second, risk profiles across funds within a family may change over the year due to intra-firm competitive behaviour by funds rather than because of the strategic behaviour of the fund management company. Funds within a fund family may compete for resources including salaries, marketing budgets and, of course, performance bonuses. As resources are likely to be skewed towards the top-performing funds, such internal competition may alter risk taking behaviour by funds over the year in an effort to improve their ranking. We test for a negative relation between fund rank and risk taking behaviour and examine whether it is due to competitive or strategic behaviour.

The rest of this paper is organised as follows: in Section 2 we review the limited set of papers in this area; in Section 3 we present a discussion of our methodology and data; in Section 4 we present our results; and finally Section 5 concludes.

2. Related Literature

The mutual fund performance evaluation literature is vast; for a comprehensive review of it see Cuthbertson, Nitzsche and O'Sullivan (2008). In this section of the paper we present a more focused discussion of the most relevant literature relating to mutual fund families.

Guedj and Papastaikoudi (2005) examine fund performance within US mutual fund families. They hypothesise that families may promote their funds selectively and that this may cause unequal performance within these families. They base this hypothesis on the well-established empirical finding that fund inflows are attracted to good past performance while bad performance does not lead to commensurate outflows (see for example Nanda, Wang and Zheng (2004)). This convex relationship gives fund families the incentive to prioritize some funds over others. As the majority of mutual funds generate fees for their fund management parent as a percentage of assets under management (AUM) rather than on performance, there is a further incentive to use this strategy while the percentage of AUM fee structure also allows larger families to charge lower percentage fees. Kempf and Ruenzi (2004) find that top performing funds in a family grow faster compared to lower ranked funds while Khorana and Servaes (1999) find that new fund openings by families are positively related to the ability of families to generate additional fee income and family size. In addition, Guedj and Papastaikoudi (2005) also hypothesis that larger families should be more capable of affecting the performance of their funds since they would be more able to exploit marketing economies of scale. In order to test their hypothesis, Guedj and Papastaikoudi use Carhart's (1997) recursive portfolio formation methodology to test fund performance persistence. They find evidence of short term persistence among family funds and cite this as evidence that fund management companies actively intervene in their funds' performance. They also find that persistence in fund performance is positively related to the number of funds in a family.

In a similar study, Gaspar, Massa and Matos (2006) examine the issue of favouritism within the top 50 US mutual fund families. Favouritism is the adoption of a strategy that involves transferring performance (e.g., assigning cheap IPO offerings or similar strategies) across member funds to favour particular funds – usually the high performance/high fee funds. They call this strategy '*cross-fund subsidisation*'. They also argue that the existence of a convex relationship between fund flows and performance is the key motivation for this type of strategic behavior even if it is at the expense of some investors. They investigate cross-subsidisation behaviour by examining whether families enhance the performance of '*high-value*' funds (high fee, high performance and young funds) at the expense of '*low-value*' funds (low fee, low performance and old funds). They find that families enhance the performance of high-value funds by between 0.7% and 3.3% per year (depending on the classifications used).

Kempf and Ruenzi (2004) argue that funds not only compete for cash flows within their market segment, but also within their family. The position of a fund within a family will influence its growth because families advertise their star performers. Examining the US mutual fund industry, the authors find there is a positive and convex relationship between a fund's family rank and its subsequent growth. The top 20% of funds in a family grow on average by an additional 6.78% per year as compared to the other funds in the family after controlling for their position within their market sector.

Kempf and Ruenzi (2008) examine the issue of intra-family competition in the US mutual fund industry. They show that fund managers within families compete against other managers in the same family for scarce resources – salaries, bonuses or the best advertising budget, etc. The authors show that fund managers adjust their risk in the second half of the year based on their performance in the first half of the year in an attempt to catch up with their peers. They also analyse competition within families of different sizes and show that strategic interaction takes place in small families but not in large ones. Thus family size is a key determinant of whether a fund competes against other managers in the same family or behaves strategically within its family.

The link between industry structure and US mutual fund family performance is also analyzed by Massa (2003). Massa suggests that family-specific characteristics influence the way investors evaluate funds. The most important of these characteristics being the ability of the investor to move in and out of funds within a family at low cost. The larger the number of funds in a family, the greater the value of this option. The results show that this low cost ability to switch between funds affects the degree of competition between them. The greater the value an investor puts on the low-cost switching option, the less the competition between funds and the greater the segmentation of the industry, in terms of family affiliation. Massa also finds that investors are influenced by a number of other factors - namely their investment horizons, family size and fees and the fact that investors perceive funds as differentiated products. If families are able to differentiate themselves in terms of non-performance-related characteristics (e.g., a higher degree of fee differentiation), they have less need to compete in terms of performance.

Our paper contributes to the literature by broadening the scope of the analysis on mutual fund families by including European as well as US fund families in our study and by exploring differences between the two. We also examine whether: family status affects performance persistence; whether a fund’s rank within its family and within its sector affects subsequent fund risk taking; whether such a relationship is concave; and whether risk changes are due to intra-family competition or strategic management by the parent company.

3. Methodology and Data

3.1. Persistence Tests

We begin by examining performance persistence using the recursive portfolio formation technique (Hendricks, Patel, and Zeckhauser (1993), Carhart (1997)). This technique involves forming portfolios of funds based upon the funds' performance over some past ranking period and evaluating how these portfolios go on to perform over some holding period. Specifically here, based on fund alphas from a single factor model over the past 12 months, we form (equally weighted) decile portfolios of funds, where decile 1 is comprised of those funds which produced the top ten percent of alphas, decile 2 consists of the next ten percent of funds and so on while decile 10 contains the funds that produced the bottom ten percent of alphas. These decile portfolios are held for one year. This process is repeated recursively annually and hence generates ten time series of 'forward looking' portfolio returns. If persistence exists, the ten alphas of these forward looking portfolios should be decreasing. If the persistence is to be of economic significance at least some of the upper decile portfolio alphas should be statistically significantly greater than zero. We perform this analysis for our set of family and non-family funds separately[1].

We also test whether the alphas of the forward-looking decile portfolios for family funds and non-family funds are significantly different. For example, whether the alpha produced by decile 1 of funds in a family is different than the alpha produced by decile 1 of non-family funds. To do this we run the following regression:

$$R_{F,it} - R_{NF,it} = \alpha_i + \beta_i\left(R_{M,t}\right) + \varepsilon_{it} \quad (1)$$

[1] We also estimated the alphas using Fama and French's three factor model but the results were qualitatively similar. To test the robustness of our results to alternative portfolio formation techniques we also formed portfolios based upon their alpha quartile rankings. We also ranked funds based upon the t-statistic of alpha rather than the level of alpha. Our results were unaffected by these variations in the portfolio construction process.

where $R_{F,it}$ is the excess return (over the risk free rate) at time *t* on the i^{th} decile portfolio of family funds, $R_{NF,it}$ is the excess return at time *t* on the i^{th} decile portfolio of non-family funds. $R_{M,t}$ is the excess return at time *t* on a proxy for the market portfolio and $\varepsilon_{,it}$ is a white noise error term. A statistically significant value of α_i in (1) indicates that the decile portfolio alphas of family funds and non-family funds are significantly different from each other.

3.2. Risk Adjustment Strategy

To our knowledge, the relative performance and risk-taking behaviour of funds within a family has received little attention in the past. There are a couple of reasons, *a priori*, to believe that these may be related. First, because fund managers within a family must share scarce resources (salaries, marketing budgets, bonuses etc) it seems plausible that they would compete with one another. Here, a manager may feel compelled to increase the risk in their fund in the second half of the year if s/he finds that his/her mid-year intra-firm ranking is low. Second, on the other hand, fund families may behave strategically where high (low) performing funds over the first half of the year may reduce (increase) risk in the second half of the year. In this case, the fund management company, or family, may wish to secure rather than risk the strong mid-year performance of top funds and transfer risk to low performing funds. As noted previously, the convex nature of the performance/fund-flow relationship gives firms an incentive to engage in this strategy. Both these hypotheses indicate a negative relationship between mid-year performance and subsequent risk in the second half of the year. However, in the second instance in the case of top funds we would also expect the difference in risk between the second and first halves of the year to be negative. In addition, the degree of both intra-firm competition and firm level strategic behaviour may be a positive function of the number of funds in the family. We also examine this possibility.

To test whether a change in the risk profile of a fund from the first to the second half of the year is due to its mid-year rank within the family we estimate various forms of the following model which are loosely based on Kempf and Ruenzi (2008).

$$\Delta\sigma_{i,t} = b_0 + b_1 R^F_{i,t} + b_2 R^S_{i,t} + b_3 \sigma^{(1)}_{i,t} + b_4 S_{i,t} + b_5 \Delta\sigma_{m,t} + b_6 \left(D_{i,t} \times R^F_{i,t}\right) + \varepsilon_{i,t} \qquad (2)$$

where $\Delta\sigma_{i,t} = \sigma^{(2)}_{i,t} - \sigma^{(1)}_{i,t}$ represents the change in the standard deviation of fund *i*'s monthly returns over the first half (January – June inclusive) to the second half (July – December inclusive) of year *t*. $R^F_{i,t}$ is fund *i*'s mid-year rank based on all funds' (within its family) average return over January - June inclusive, in year *t*.[2] A rank of 1 is assigned to the worst fund within the family, a rank of 2 to the second worst fund and so on. The ranks are normalised to make families of different sizes comparable. We test the hypothesis that $b_1 < 0$. $R^S_{i,t}$ is fund *i*'s mid-year rank relative to all funds in the same sector rather than family. The normalised ranks assigned to each fund are constructed using a process similar to the one we used to construct $R^F_{i,t}$. It is hypothesised that $b_2 < 0$. In order to control for possible mean reversion in volatility, $\sigma^{(1)}_{i,t}$ is specified as a regressor where it is expected that $b_3 < 0$. $S_{i,t}$ is the number of funds in fund *i*'s family in year *t*. This allows us to test the hypothesis that either competitive or strategic behaviour may be a function of the number of funds in the family. We hypothesise that $b_4 > 0$. As all funds in this study are equity funds, in order to control for changes in equity market risk between the second and first half of the year, $\Delta\sigma_{m,t}$ represents the change in the standard deviation of returns in either the US or European equity market (as appropriate to fund *i*) between the first half and the second half of year *t*. It is hypothesised that $b_5 > 0$. We specify an interactive dummy variable, $\left(D_{i,t} \times R^F_{i,t}\right)$, in order

[2] Patel, Zeckhauser and Hendricks (1994) show that investors care more about rankings than about absolute performance.

to examine whether the sensitivity of a fund's reaction to its mid-year rank differs depending on whether it is a high ranked or low ranked fund. Here, D=1 if fund *i* ranks below the family median and D=0 otherwise. Equation 2 is estimated as a pooled regression. For statistical robustness a minimum observation restriction of 60 months for each fund was applied.

To summarise, we put forward two hypotheses in the paper to explain why the risk of funds within families may change from the first to the second half of the year. First, intra-family competition between fund managers for resources including individual bonuses, marketing budgets, salaries etc, may be one source of this change. Poorly performing funds (funds that rank below the mid-year median performance) may feel under pressure to increase risk in the second half of the year in order to 'catch up' with better performing family members. Second, the fund management company may engage in strategic behaviour by transferring risk from high performers to low performers because of the well-documented phenomenon that top-performing funds generally experience greater inflows than funds that underperform experience outflows. The model set up allows us to distinguish between the two hypotheses. Under the second hypothesis mid-year winners should exhibit $\Delta\sigma_{i,t} = \sigma_{i,t}^{(2)} - \sigma_{i,t}^{(1)} < 0$ on average. If $\Delta\sigma$ is positive on average for both winner and loser funds this would indicate that the explanation for the negative relation between fund rank and a subsequent change in risk lies in competitive intra-firm behaviour rather than being due to strategic behaviour on the part of the fund management company.

3.3. Data

The dataset is comprised of European and US equity mutual fund monthly returns between January 1993 and June 2009 from Morningstar. Non-surviving funds are included to account for survivorship bias. In total there are 5,714 funds of which 3,703 are US funds while 2,011 are European funds. Returns are gross of buying and selling expenses but are net of annual management fees and are gross of income-tax so that the they are comparable between the two regions. Finally, all returns are inclusive of reinvested income.

Morningstar provides the management company name of each fund, making it possible to identify a fund's family. There are 666 families in the dataset with the number of funds per family ranging from 2 to 141. The majority of families are small; 80% of families comprise 9 or fewer funds. Only 9% of families have 20 or more funds. There are 498 funds that we are able to classify as being non-family funds. This information is summarised in Figure 1. The US and European equity market indices that we used to calculate $\Delta\sigma_{m,t}$ in (2) were collected from Datastream. Finally, Morningstar also provides information about each fund's sector which we also collected.

4. Results

4.1 Persistence

In Table 1 we present the results of persistence tests based upon the recursive portfolio formation technique outlined in Section 3. We present the results for US equity family funds (Panel A) and non- family funds (Panel B) and for European family funds (Panel C) and non-family funds (Panel D). Decile 1 is formed by holding the ten percent of funds with the highest pre-ranking alphas while decile 10 ten is comprised of the ten percent of funds with the lowest pre-ranking alphas. Each panel presents the average monthly return for each decile along with each decile portfolio monthly alpha and its t-statistic. We also present the box plots of the average monthly returns of each family and non-family decile in Figures 2 (US) and 3 (European), to show how the return distributions differ[3].

There is evidence of persistence in all four panels because both the average returns and alphas decline from decile 1 to decile 10, though not monotonically. Spearman rank

[3] We are grateful to an anonymous referee for suggesting their inclusion.

correlations between fund alphas and the series 1 to10 are statistically significant at the 5% significance level in all four cases. Across all four panels there is very little evidence of economically significant persistence because top decile alphas are not positive and statistically significant; the only exception here is decile 1 for European non-family funds. There is stronger evidence of persistence among low ranked deciles many of which show significantly negative alphas at the 5% level of statistical confidence.

We test whether the decile alphas of family funds are significantly different from the corresponding decile alphas of non-family funds. We find that among lower deciles (between decile 7 to decile 10) the poorer performing family funds go on to perform significantly better, or rather less badly, than their non-family counterparts. We posit that this is likely to be because family funds have greater scope to address poor performing individual funds – perhaps by reducing fees, changing strategies, knowledge spillovers from better funds, economies of scale, substituting the manager or merging them into other funds.

Overall, the finding of persistence among family funds does not rule out the hypothesis that family funds are behaving strategically (taking advantage of the convex performance-flow relationship) but we do not find that this behavior is greater among family funds than among the control group of non-family funds.

4.2 Risk Adjustment Strategy

We report the results of our tests designed to investigate the hypothesis that, arising from either strategic or competitive behaviour, fund managers in a fund family adjust the risk profile of their fund in the second half of the year based upon their relative performance in the first half of the year. We estimate a number of forms of Equation (2). Table 2, Panel A presents results for the US family funds, Panel B reports results for European family funds while Panel C reports results for the combined sample of US and European funds. For each estimated model the tables show OLS coefficients with p values in parentheses. All regressions include a constant.

For US family funds in Panel A we find that the coefficient on $R_{i,t}^{F}$ is negative in all model estimations and is highly statistically significant with p values equal to zero in all models (except one where it is significant at the 10% significance level). Even after controlling for other factors, these results provide strong evidence that mid-year 'loser' (below median) funds increase risk more than mid-year 'winner' (above median) funds and/or that mid-year winners reduce risk in the second half of the year. However, if the latter were the case, mid-year winners should exhibit $\Delta\sigma_{i,t} = \sigma_{i,t}^{(2)} - \sigma_{i,t}^{(1)} < 0$ on average. Our data show that although there is a negative relationship between $\Delta\sigma$ and R^{F}, $\Delta\sigma$ is positive on average for both winner and loser funds. This indicates that the explanation for the negative relation between fund rank and a subsequent change in risk lies in competitive intra-firm behavior rather than being due to strategic behavior by the fund management company in transferring risk from high performers to low performers. However, interestingly, when we look at European fund families in Panel B we find the opposite result: mid-year winners increase risk more than mid-year losers. This finding does not support the hypothesis of the existence of intra-family competition among family funds in Europe. In our combined sample, Panel C, the negative fund rank/subsequent risk taking relation found for US family funds dominates the sample, unsurprisingly since US funds represent almost two-thirds of the combined sample.

While for US family funds the above establishes a negative relation between mid-year rank and subsequent risk, we also examined whether a fund's reaction to its mid-year rank differs depending on whether it is a high or a low ranked fund. We do this by introducing an interactive dummy variable $\left(D_{i,t} \times R_{i,t}^{F}\right)$ where D=1 if fund *i* ranks below the family median and D=0 otherwise. From Table 2, Panel A we find that the coefficient on this dummy variable is positive and significant at the 10% level of significance. This lends support to the earlier finding that mid-year losers tend to increase the risk in their fund by more than mid-year winners, but at a diminishing rate.

Moving to the effect of a fund's sector rank, $R_{i,t}^{S}$, on its subsequent risk we find similar results to those found around the impact of family rank. In the case of US family funds (Panel A) mid-year sector losers increase risk more than mid-year sector winners, while the opposite is the case for European family funds (Pane B). These results are significant at the 1% level of significance in both markets. Again, these results point to stronger intra-sector competition in the US compared to Europe. In Panel C in the combined sample the positive but generally insignificant coefficients on $R_{i,t}^{S}$ are likely to be the result of the opposing negative and positive effects of this variable among US and European family funds respectively.

In examining the role played by a fund's mid-year family rank and sector rank on its subsequent risk, we controlled for the possible role played by other factors. We see from Table 2 that funds in larger families increase risk in the second half of the year by more than funds from small families, though this effect is only found to be statistically significant for European funds. Finally, the coefficients on our control variables for (i) mean reversion in volatility and (ii) changes in equity market risk between the second and first halves of the year are both signed in accordance with expectations across all models and are also highly statistically significant.

Finally, the last two rows of Panels A, B and C of Table 2 present estimates of model 5 over the first half of our sample (5-1) and the second half (5-2). These sub-sample results show that the full sample results are robust. The coefficient estimates are generally similar in both cases.

5. Conclusions

In this paper we examine the impact that a mutual fund's family status has on its performance. First, we test whether family status gives rise to strategic behaviour on the part of fund management companies which generates stronger performance persistence among family funds compared to non-family funds. Second, we test whether family membership creates intra-family competition which affects the risk taking behaviour of funds. While we do not find evidence of stronger persistence among family funds compared to non-family funds, we do show that holding portfolios of funds based on their past performance leads in some instances to significant differences in performance between family versus non-family funds. We also provide evidence to suggest that a fund's mid-year ranking within its family and within its sector affects its risk taking over the remainder of the year but interestingly that this effect differs between US and European family funds. Among US funds, intra-family and intra-sector competition dominates where mid-year losers increase risk by more than mid-year winners (albeit at a diminishing rate) in an attempt to catch up. The opposite is found to be the case for European family funds. Overall then, these results highlight significant differences in the ways in which the US and European fund management industries operate. Future microstructure research is required to identify the industry practices and cultures that may be the source of these differences.

References

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

Cuthbertson, K. and Nitzsche, D. (2010) Mutual Fund Performance: Measurement and Evidence. *Journal of Financial Markets, Instruments and Institutions* 19(2): 95-187.

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

Gaspar, J., Massa, M. and Matos, P. (2006) Favouritism in Mutual Fund Families? Evidence on Strategic Cross-Fund Subsidization. *Journal of Finance* 61: 73-104.

Guedj, I. and Papastaikoudi, J. (2005) Can mutual fund families affect the performance of their funds?. http://ssrn.com/abstract=467282

Hendricks, D., Patel, J. and Zeckhauser, R. (1993) Hot hands in mutual funds: Short-run persistence of performance. *Journal of Finance* 48: 93-130.

Kempf, A. and Ruenzi, S. (2004) Family Matters: the performance flow relationship in the mutual fund industry. http://ssrn.com/abstract=549121.

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

Khorana, A. and Servaes, H. (1999) The determinants of mutual fund starts. *Review of Financial Studies* 12: 1043-1074.

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

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

Patel, J., Zeckhauser, RJ. and Hendricks, D. (1994) Investor Flows and Performance: Evidence from Mutual Fund, Cross Border Investments and New Issues. In: R.M Lavich, R.V Ramachandran and R. Sato (eds.) Japan, European and International Financial Markets: Analytical and Empirical Perspectives. Cambridge University Press, pp 51-72.

Figure 1: Family size

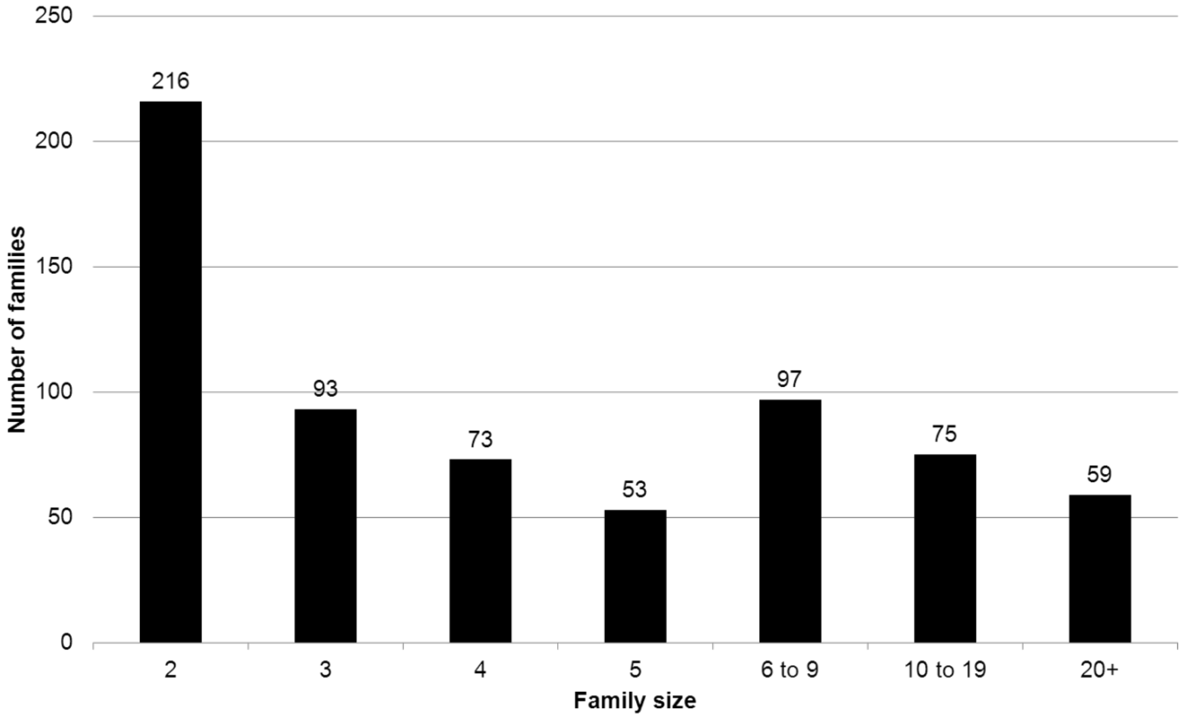

Figure 2: US Family and non-family funds

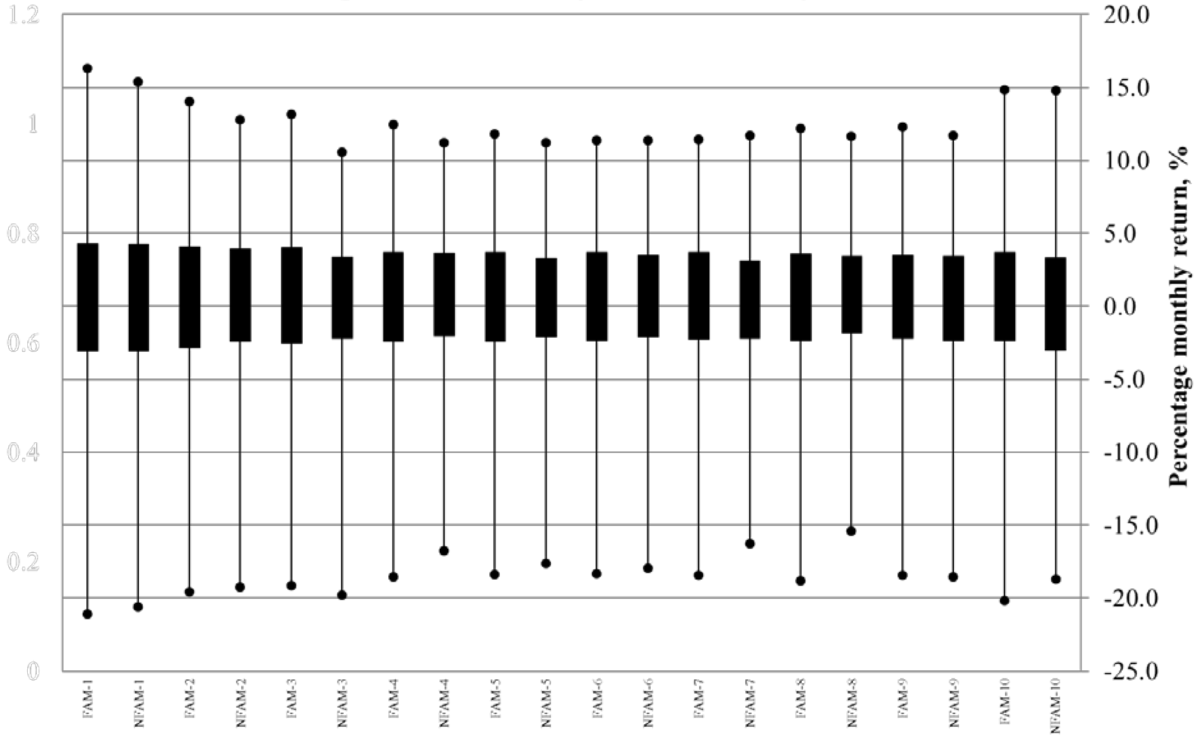

Figure 3: European Family and non-family funds

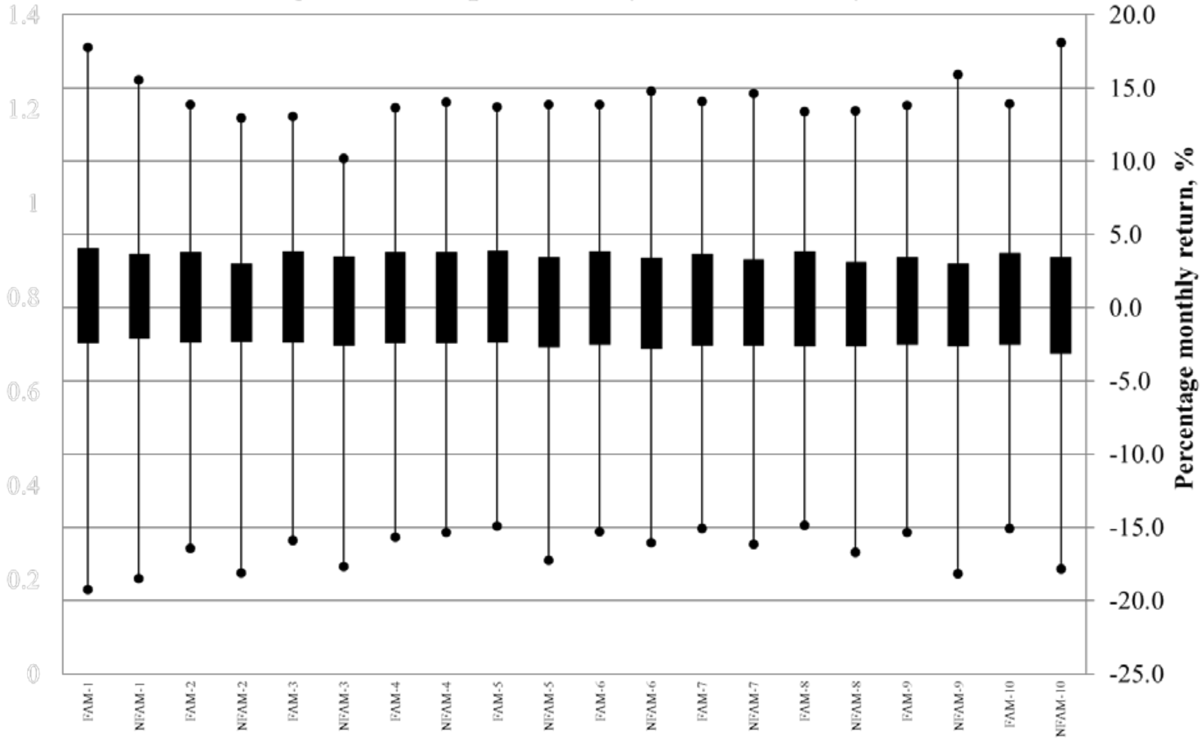

Table 1: Recursive Portfolio Formation Tests of Persistence

Table 1 presents the results of the recursive portfolio methodology for testing for performance persistence. At time t we sort the funds in our sample on a single factor model alpha over t to t-12 into equally weighted deciles, where decile 1 contains the top 10% of funds while decile 10 contains the lowest 10% of funds. We hold these decile portfolios over t to t+1. This process is repeated recursively over the sample period to generate a time series of holding period or 'forward looking' returns. The Table reports the average return, alpha and absolute t-statistic of alpha of these forward looking decile portfolios.

Panel A: Family US mutual funds										
Decile Portfolio	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Average return	0.41%	0.44%	0.45%	0.39%	0.34%	0.32%	0.31%	0.28%	0.36%	0.34%
Alpha	-0.03%	0.02%	0.05%	0.00%	-0.05%	-0.06%	-0.07%	-0.11%	-0.03%	-0.07%
T-stat	0.16	0.14	0.49	-0.03	-0.70	-0.80	-0.94	-1.25	-0.31	-0.53
Panel B: Non-family US mutual funds										
Decile Portfolio	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Average return	0.38%	0.34%	0.37%	0.38%	0.27%	0.24%	0.14%	0.37%	0.20%	0.04%
Alpha	-0.06%	-0.07%	0.00%	0.03%	-0.09%	-0.13%	-0.21%	0.01%	-0.18%	-0.37%
T-stat	-0.35	-0.56	-0.01	0.23	-0.92	-1.43	-1.95	0.10	-1.72	-3.01
T-stat for diff	0.25	0.94	0.54	-0.32	0.49	1.01	1.84	-1.90	1.75	2.58
Panel C: Family European mutual funds										
Decile Portfolio	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Average return	0.40%	0.38%	0.28%	0.25%	0.24%	0.21%	0.21%	0.19%	0.16%	0.21%
Alpha	0.02%	0.00%	-0.10%	-0.13%	-0.14%	-0.16%	-0.16%	-0.17%	-0.21%	-0.17%
T-stat	0.12	-0.01	-1.17	-1.72	-1.72	-2.13	-2.00	-2.09	-2.20	-1.71
Panel D: Non-family European mutual funds										
Decile Portfolio	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Average return	0.68%	0.07%	0.13%	0.37%	0.22%	0.05%	0.11%	-0.03%	-0.05%	-0.03%
Alpha	0.36%	-0.03%	-0.19%	0.01%	-0.14%	-0.30%	-0.25%	-0.39%	-0.41%	-0.41%
T-stat	2.28	-1.70	-1.33	0.10	-0.98	-2.44	-1.99	-3.27	-2.96	-2.47
T-stat for diff	-2.26	2.13	0.76	-1.47	0.05	1.44	0.98	2.42	1.99	1.91

Table 2, Panel A: Risk Adjustment Strategy – US Family Funds

$$\Delta\sigma_{i,t} = b_0 + b_1 R^F_{i,t} + b_2 R^S_{i,t} + b_3 \sigma^{(1)}_{i,t} + b_4 S_{i,t} + b_5 \Delta\sigma_{m,t} + b_6 \left(D_{i,t} \times R^F_{i,t}\right) + \varepsilon_{i,t}$$

Table 2 shows the results of pooled regressions of the change in a fund's risk between the first and second half of the year on a number of fund characteristics and control variables using the first half of the full sample. Results relate to the combined sample of US and European family funds. $\Delta\sigma_{i,t} = \sigma^{(2)}_{i,t} - \sigma^{(1)}_{i,t}$ represents the change in the standard deviation of fund i's monthly returns over the first half (January – June inclusive) to the second half (July – December inclusive) of year t. $R^F_{i,t}$ is fund i's mid-year rank based on all funds' (within its family) average return over January - June inclusive, in year t. A rank of 1 is assigned to the worst fund within the family, a rank of 2 to the second worst fund and so on. The ranks are normalised to make families of different sizes comparable. $R^S_{i,t}$ is fund i's mid-year (similarly normalised) rank relative to all funds in the same sector. $\sigma^{(1)}_{i,t}$ is specified to control for mean reversion in volatility. $S_{i,t}$ is the number of funds in fund i's family in year t. $\Delta\sigma_{m,t}$ represents the change in the standard deviation of returns in either the US or European equity market (as appropriate to fund i) over the first half (January – June inclusive) to the second half (July – December inclusive) of year t. This is specified to control for changing risk in equity markets generally. $\left(D_{i,t} \times R^F_{i,t}\right)$ is an interactive dummy variable to examine whether a fund's reaction to its mid-year rank differs depending on whether it is a high ranked or low ranked fund. Here, D=1if fund i ranks below the family median and D=0 otherwise. Finally, the last two rows present estimates of model 5 over the first half of our sample (5-1) and the second half (5-2).

			Coefficient			
Model	b_1	b_2	b_3	b_4	b_5	b_6
(1)	-0.340		-0.400			
	(0.000)		(0.000)			
(2)	-0.273		-0.219		0.527	
	(0.000)		(0.000)		(0.000)	
(3)	-0.214	-0.103	-0.219		0.528	
	(0.000)	(0.010)	(0.000)		(0.000)	
(4)	-0.212	-0.104	-0.219	0.0001	0.528	
	(0.093)	(0.010)	(0.000)	(0.382)	(0.000)	
(5)	-0.174	-0.104	-0.219	0.0002	0.528	0.104
	(0.000)	(0.010)	(0.000)	(0.341)	(0.000)	(0.092)
(5-1)	-0.028	-0.216	-0.315	0.0002	0.660	0.032
	(0.876)	(0.121)	(0.000)	(0.780)	(0.000)	(0.896)
(5-2)	-0.270	-0.060	-0.213	-0.001	0.516	0.066
	(0.000)	(0.121)	(0.000)	(0.710)	(0.000)	(0.278)

Table 2, Panel B: Risk Adjustment Strategy – European Family Funds

$$\Delta\sigma_{i,t} = b_0 + b_1 R^F_{i,t} + b_2 R^S_{i,t} + b_3 \sigma^{(1)}_{i,t} + b_4 S_{i,t} + b_5 \Delta\sigma_{m,t} + b_6 \left(D_{i,t} \times R^F_{i,t}\right) + \varepsilon_{i,t}$$

Table 2 shows the results of pooled regressions of the change in a fund's risk between the first and second half of the year on a number of fund characteristics and control variables using the first half of the full sample. Results relate to the combined sample of US and European family funds. $\Delta\sigma_{i,t} = \sigma^{(2)}_{i,t} - \sigma^{(1)}_{i,t}$ represents the change in the standard deviation of fund i's monthly returns over the first half (January – June inclusive) to the second half (July – December inclusive) of year t. $R^F_{i,t}$ is fund i's mid-year rank based on all funds' (within its family) average return over January - June inclusive, in year t. A rank of 1 is assigned to the worst fund within the family, a rank of 2 to the second worst fund and so on. The ranks are normalised to make families of different sizes comparable. $R^S_{i,t}$ is fund i's mid-year (similarly normalised) rank relative to all funds in the same sector. $\sigma^{(1)}_{i,t}$ is specified to control for mean reversion in volatility. $S_{i,t}$ is the number of funds in fund i's family in year t. $\Delta\sigma_{m,t}$ represents the change in the standard deviation of returns in either the US or European equity market (as appropriate to fund i) over the first half (January – June inclusive) to the second half (July – December inclusive) of year t. This is specified to control for changing risk in equity markets generally. $\left(D_{i,t} \times R^F_{i,t}\right)$ is an interactive dummy variable to examine whether a fund's reaction to its mid-year rank differs depending on whether it is a high ranked or low ranked fund. Here, D=1if fund i ranks below the family median and D=0 otherwise. Finally, the last two rows present estimates of model 5 over the first half of our sample (5-1) and the second half (5-2).

			Coefficient			
Model	b_1	b_2	b_3	b_4	b_5	b_6
(1)	0.557 (0.000)		-0.495 (0.000)			
(2)	0.474 (0.000)		-0.270 (0.000)		0.795 (0.000)	
(3)	0.155 (0.009)	0.579 (0.000)	-0.275 (0.000)		0.797 (0.000)	
(4)	0.202 (0.001)	0.560 (0.000)	-0.275 (0.000)	0.002 (0.000)	0.796 (0.000)	
(5)	0.221 (0.001)	0.561 (0.000)	-0.276 (0.000)	0.002 (0.000)	0.7978 (0.000)	0.055 (0.329)
(5-1)	0.656 (0.207)	1.787 (0.000)	-0.649 (0.000)	0.002 (0.298)	0.459 (0.000)	-0.221 (0.732)
(5-2)	0.318 (0.000)	0.497 (0.000)	-0.292 (0.000)	0.001 (0.000)	0.825 (0.000)	0.075 (0.389)

Table 2, Panel C: Risk Adjustment Strategy – All Family Funds

$$\Delta\sigma_{i,t} = b_0 + b_1 R_{i,t}^F + b_2 R_{i,t}^S + b_3 \sigma_{i,t}^{(1)} + b_4 S_{i,t} + b_5 \Delta\sigma_{m,t} + b_6 \left(D_{i,t} \times R_{i,t}^F\right) + \varepsilon_{i,t}$$

Table 2 shows the results of pooled regressions of the change in a fund's risk between the first and second half of the year on a number of fund characteristics and control variables using the first half of the full sample. Results relate to the combined sample of US and European family funds. $\Delta\sigma_{i,t} = \sigma_{i,t}^{(2)} - \sigma_{i,t}^{(1)}$ represents the change in the standard deviation of fund i's monthly returns over the first half (January – June inclusive) to the second half (July – December inclusive) of year t. $R_{i,t}^F$ is fund i's mid-year rank based on all funds' (within its family) average return over January - June inclusive, in year t. A rank of 1 is assigned to the worst fund within the family, a rank of 2 to the second worst fund and so on. The ranks are normalised to make families of different sizes comparable. $R_{i,t}^S$ is fund i's mid-year (similarly normalised) rank relative to all funds in the same sector. $\sigma_{i,t}^{(1)}$ is specified to control for mean reversion in volatility. $S_{i,t}$ is the number of funds in fund i's family in year t. $\Delta\sigma_{m,t}$ represents the change in the standard deviation of returns in either the US or European equity market (as appropriate to fund i) over the first half (January – June inclusive) to the second half (July – December inclusive) of year t. This is specified to control for changing risk in equity markets generally. $\left(D_{i,t} \times R_{i,t}^F\right)$ is an interactive dummy variable to examine whether a fund's reaction to its mid-year rank differs depending on whether it is a high ranked or low ranked fund. Here, D=1if fund i ranks below the family median and D=0 otherwise. Finally, the last two rows present estimates of model 5 over the first half of our sample (5-1) and the second half (5-2).

	Coefficient					
Model	b_1	b_2	b_3	b_4	b_5	b_6
(1)	-0.069		-0.430			
	(0.062)		(0.000)			
(2)	-0.044		-0.239		0.578	
	(0.087)		(0.000)		(0.000)	
(3)	-0.078	0.059	-0.240		0.579	
	(0.018)	(0.078)	(0.000)		(0.000)	
(4)	-0.055	0.049	-0.240	0.001	0.578	
	(0.093)	(0.132)	(0.000)	(0.001)	(0.000)	
(5)	-0.013	0.049	-0.239	0.001	0.578	0.116
	(0.375)	(0.129)	(0.000)	(0.001)	(0.000)	(0.031)
(5-1)	-0.211	0.031	-0.362	0.001	0.620	0.058
	(0.233)	(0.808)	(0.000)	(0.535)	(0.000)	(0.807)
(5-2)	-0.039	0.054	-0.232	0.001	0.574	0.099
	(0.303)	(0.108)	(0.000)	(0.000)	(0.000)	(0.056)