Faculty Research

University
of Michigan
Business
School

WORKING PAPER SERIES

Family Values and the Star Phenomenon

Vikram Nanda
University of Michigan Business School

Z. Jay Wang
University of Michigan Business School

Lu Zheng
University of Michigan Business School

Working Paper 01-007

701 Tappan Street • Ann Arbor, MI 48109-1234 • 734/764-5278

Family Values and the Star Phenomenon

Vikram Nanda
University of Michigan

Z. Jay Wang
University of Michigan

Lu Zheng
University of Michigan

(December 2000)

The research is funded by the Institute for Quantitative Research in Finance.

Contact information: Vikram Nanda, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI-48109-1234. Phone: 734-763-0105; e-mail: vnanda@umich.edu; Z. Jay Wang, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI-48109-1234. Phone: 734-763-4613; e-mail: zhiw@bus.umich.edu; Lu Zheng, University of Michigan Business School, 701 Tappan St., Ann Arbor, MI-48109-1234. Phone: 734-763-5392; e-mail: luzheng@umich.edu.

Abstract:

Family Values and the Star Phenomenon

Most mutual funds belong to fund families, yet little is known of the influence of family membership on fund strategy and performance. We examine the extent to which a fund's cash inflows are affected by the performance of other funds in the family – and the consequences of such spillover effects. The cash flow response to fund performance has been documented to be asymmetric, suggesting that even stand-alone funds may seek to create 'stars' to attract large cash inflows. We argue that for a family with positive spillover effects between funds, the impact of a star performer is amplified. This can increase the incentives to both pursue star-driven strategies and to increase the size of the family. Our empirical results indicate a strong positive spillover effect from star fund performers, resulting in higher cash inflow for other funds in the family as well. We show that the probability of obtaining a star performance is increasing in family size and in the negative correlation of fund returns. However, factors that increase the odds of producing a star fund and, potentially, attracting more cash inflow to a fund family – are also found to be factors associated with a *lower* average performance. Hence, a star-based marketing strategy, presumably aimed at less informed investors, does them no favor.

1 Introduction

Most mutual funds are members of fund families.[1] There are good reasons for this: a family structure brings economies of scale to the distribution, servicing, and promotion of funds. Compared to stand alone funds, a family has greater flexibility in reallocating its human and other resources in response to market opportunities. A family's reputation can help to reassure investors about the selection and monitoring of investment managers.

Despite the prevalence of the family organization, little research has been done on the consequences or importance of family membership. The literature has, for the most part, treated funds as though they were stand alone entities. This is inappropriate if there are significant spillover effects between funds in a family – *e.g.,* good performance by a fund benefits other funds in the family as well. This can happen if, for instance, good performance by a fund raises investor perception about the quality of the fund family overall. Hence, without an understanding of performance and strategy at the level of the fund family, we are potentially ignoring significant influences on the behavior and performance of individual funds as well.

It is well documented in the literature that investors appear to respond asymmetrically to the performance of a fund.[2] A strongly performing fund attracts a disproportionate inflow of funds, relative to the cash outflow when performance is poor (see Figure 1). While the reasons for such a pattern are not well understood,[3] the convex (call-option-like) response to fund performance suggests that individual funds may seek variance increasing strategies to increase expected cash inflow. When

[1]Over 80% of mutual funds are members of fund families. The average fund family has about 7 diversified equity funds (see Table I).

[2]The non-linearity in the flow-performance relation is discussed in several studies. We discuss the previous findings in the next section on related literature.

[3]One may need a less than fully rational explanation to account for such a cash flow response pattern. For instance, the pattern may reflect the difficulty of attracting the attention of small, possibly unsophisticated fund investors unless the fund is a star performer and is heavily promoted. On the other hand, if the fund does poorly, investors either do not pay attention or, possibly, exhibit an aversion to recognizing their losses, in line with behavioral evidence on the reluctance of investors to sell losing stocks. For behavioral evidence on fund investors, see Barber, Odean and Zheng (2000) and Goetzmann and Peles (1997).

funds are in a family structure, possible spillover effects between funds can further amplify the benefit of a star performer.

The implication, therefore, is that if there are positive spillover effects between funds in a family, this increases the incentive to pursue a star-driven strategy. The stronger the spillover effect, the greater the incentive to increase family size - both to increase the probability of creating a star and to have more funds benefit from star performance. Of course, enthusiasm for a star performer would be considerably diminished if, for instance, the bulk of the new funds the star attracted were cannibalized from other funds in its family.

We investigate the question whether there are intra-family spillover effects and, specifically, whether a star performer affects the flow of new money, to itself and to other funds in the family. For our empirical analysis, we use data from Morningstar over the period 1992 – 1998 that provides information on family identity. We define a star as a fund that has a risk-adjusted performance that puts it among the top 100 performers in the year.[4]

Our results confirm that there is a strong positive spillover effect from having a star performer in the family. Overall, the monthly new money growth for star families (families that have a star fund) is significantly higher than for families with no stars. The spillover effect is such that, compared to a stand alone fund, the fund inflows resulting from a star performance are about 40 to 120 percent larger for a typical family with seven member funds. The effect is present in the year of the star performance and for the year after.

Given the large positive spillover effect, the incentives are, presumably, in the direction of increasing family size, to capture the benefits from a star performance, even if it comes at the expense of having a family size that may be larger than optimal. The increase in family size can, in turn, make a star performance more likely. Other actions taken by a family to enhance the probability of obtaining a star, say the

[4]The results are not sensitive to the use of alternative procedures, for instance selecting stars on the basis of raw rather than risk adjusted returns.

investment strategies it follows, may come at the expense of performance as well.[5]

To determine the consequences of a star strategy, we identify factors that affect the likelihood of producing a star. Using logistic regressions, one for each sample year, it is shown that there are two primary factors that a family can reasonably control that raise the probability of having a star in the family – these involve increasing the number of funds and decreasing the correlation between fund returns in the family.

From an investor's perspective, should a fund be expending effort to generate more stars or does this come at the cost of a poorer performance. This is the issue we investigate next. Controlling for other factors that have been shown to affect performance – such as turnover and expense ratios – we find that families with star performers in a particular period do not have higher returns in the subsequent period. The implications for investors are worse than that, however. It appears that the very factors that increase the probability of producing star performers, are associated with a worse family performance.

The finding that families with star performers deliver lower returns to investors may reflect the costs of implementing a star-oriented strategy. The costs may be due to the cost of adding funds, beyond the number that can be effectively monitored or managed. It may also reflect that in trying to create stars, the family may deviate from value maximizing investment strategies, getting investment managers to take negatively correlated positions, to increase the odds of producing at least one star. The bottom line is that factors that are effective in generating stars and attracting new money – are also ones associated with a lower average performance. Hence, a star based marketing strategy presumably targeted to the less informed investors, does them no favor.

While the paper investigates the impetus for some families to engage in star-based strategies, there is clearly substantial heterogeneity in strategies followed by fund

[5] An interesting issue is the trade-off that the fund family faces since the size of the family and the standard deviation are substitutes in terms of the probability in creating a star. It may be informative to see the nature of the trade-off chosen by fund families.

families. In contrast to families following star-based strategies, it is plausible that other families use the family structure as a way of sharing and developing valuable investment information across funds, reflected in terms of a positive correlation in their risk-adjusted returns. Their investors may be the more sophisticated ones, not prone to chasing star performers.

There are policy implications of a general nature arising from the findings in the paper. To discourage fund families from following star-driven strategies, at the expense of less sophisticated investors, more disclosure can help. For instance, fund families could be required to disclose features of their overall performance, in addition to any other information that is publicized. Naturally, this would include information on merged and defunct funds.

The rest of the paper is as follows. In section 2, we discuss the extensive literature on mutual funds and its relation to our paper. We describe our data and empirical approach in section 3. We present our empirical findings in section 4, and conclude in section 5.

2 Literature Review

It is well documented in the literature that investors tend to chase past fund performance. Earlier studies report a positive *linear* relation between fund performance and new money flows. Recent studies have, however, documented a *nonlinear* relation between performance and new money flows. The nonlinear cash flow response to performance for our sample is indicated in Figure 1. As is apparent, the growth in cash inflows appears disproportionately greater for funds performing in the top deciles. As we will argue, the (convex) flow-performance relation can provide incentives to fund and family managers to adopt certain strategies in an effort to maximize expected cash inflows.

Numerous studies have demonstrated that mutual fund investors chase fund performance. Among these, Spritz (1970) reports a contemporaneous positive linear relation between performance and flow for twenty mutual funds over the period 1960 to 1967. Smith (1978) finds a positive linear relation between improvement in fund performance and new money flow using a sample of 74 funds over the period 1966 to 1975. Patel, Zeckhauser and Hendricks (1991) demonstrate the positive linear performance-flow relation by studying 96 open-end no-load funds for the period 1975 to 1987. Kane, Santini and Aber (1991) find a similar linear relation between risk-adjusted returns and flow on a quarterly basis using a sample of 131 open-end equity funds from 1973 to 1985. Lakonishok, Shleifer, and Vishny (1992) detect a positive association between the number of new accounts gained and the three-year industry adjusted returns by investigating 250 institutional money managers. Ippolito (1992) verifies the positive linear performance-flow relation by studying 143 open-end equity funds for the period 1965 to 1984. At the aggregate level, Warther (1995) and Zheng (1999b) both document a contemporaneous positive linear relation between aggregate flows into mutual funds and security market returns. In short, there is extensive evidence that investors buy funds with strong past performance. Thus, not surprisingly, fund managers need to deliver good performance in order to attract new funds.

Many recent papers have called attention to the *nonlinearity* in the performance-flow relation. Ippolito (1992) points out that the performance-flow relation is stronger for funds with positive rather than negative market-adjusted returns. Goetzmann and Peles (1997) performs tests that control for survivorship bias and confirm the presence of a nonlinear flow-performance response. Chevalier and Ellison (1995) document a similar non-linear performance-flow relation by estimating a semi-parametric model for a sample of 449 funds observed over the 1982-1992 period. Gruber (1996) reports a similar nonlinear relation between performance and flow for 227 open-end funds from January 1985 to December 1994. Sirri and Tufano (1998) indicate that mutual fund investors base their fund investment decisions asymmetrically on prior performance; they invest disproportionately more in funds that performed well in the prior period. Barber, Odean and Zheng (2000) provide further insights into these issues by analyzing the mutual fund purchase and sale decisions of over 30,000 households with accounts at a large U.S. discount broker: while verifying the positive nonlinear performance-net flow relation, the authors also show that most purchase and sale actions take place among the top-performing funds. The nonlinearity in the performance-flow relation suggests that stellar performance – not just good performance – is the key to attracting new money and that there is little penalty for performing poorly. As a consequence, individual funds may adopt strategies that increase their chances of becoming star funds – even at the expense of average performance. This paper documents such incentives for fund families empirically.

Researchers have studied how incentives affect fund managers investment decisions. Among these, Chevalier and Ellison (1995) reveal that fund managers alter the riskiness of their portfolios at the end of the year in order to exploit the nonlinear shape of the flow performance relation. Brown, Harlow and Starks (1996) investigate 334 mutual funds during 1976 to 1991 and show that managers of investment portfolios that are likely to end up as losers manipulate fund risk differently than those managing portfolios that are likely to be winners. This is attributed to the fact that managers' compensation is linked to relative performance.

There are only a few papers that study the decisions at the level of the mutual fund complex. Goetzmann and Ibbotson (1993) discuss the notion that fund complexes maximize the probability of having a fund at the top of the rankings by managing many funds, and by minimizing cross-fund correlations. Khorana and Servaes (1999) studies the decisions by fund families on starting new funds. Khorana and Servaes (2000) analyze the determinants that drive market share in the mutual fund industry. They find that families that charge lower fees, perform better, offer a wider range of products, and start more funds relative to the competition tend to have a larger market share. In our paper, we investigate how a star performer affects the cash inflows to itself as well as to other funds in the same family, what family strategies maximize the likelihood of producing stars, and how the star-based marketing strategy affects the welfare of mutual fund investors.

3 Data Sources and Variable Definitions

3.1 Mutual fund data

Our data sample is drawn from the mutual fund database compiled by Center for Research in Security Prices (CRSP). This data set provides open-end mutual fund data from December 1961 to December 1998 for all funds, including defunct funds. For our study we include all diversified equity funds over the period January 1992 to December 1998, for which fund complex information, monthly fund total net assets (TNA), monthly fund returns, and annual fund characteristics (turnover ratio, expense ratio, load, etc.) are available. To be consistent with earlier mutual fund papers, the sample excludes sector funds, international funds and balanced funds.[6]

3.2 Definition of variables

To measure the performance of a mutual fund family, we calculate the weighted average of three-factor adjusted returns of all member funds within the family. For robustness, we also compute one-factor adjusted returns and raw returns to measure fund and family performance. These alternative measures are defined later. For each member fund, the three-factor adjusted returns are estimated by using the Fama and French three-factor model (Fama and French (1993)). Specifically, we use the following OLS regressions to estimate fund factor loadings and α measures:

$$R_{it} - R_{ft} = \alpha_i + \beta_{iRMRF}\text{RMRF}_t + \beta_{iSMB}\text{SMB}_t + \beta_{iHML}\text{HML}_t + e_{it}, \qquad (1)$$

where R_{it} is the rate of return of fund i in month t, R_{ft} is the risk-free interest rate in month t, R_{mt} is the rate of return of the market in month t, $\text{RMRF}_t \equiv R_{mt} - R_{ft}$ is the excess market return in month t, SMB_t is the rate of return on the mimicking portfolio for the common size factor in stock returns in month t, HML_t is the rate

[6] Another concern about the use of other fund types is that the standard (Fama-French) three factor model may not be appropriate in some of these contexts and may require additional risk factors to span the space covered by their investments.

of return on the mimicking portfolio for the common book-to-market equity factor in stock returns in month t, α is the excess return of the corresponding factor model and βs are the factor loadings of the corresponding factors. Using the estimated factor loadings (βs) and excess return α, we define the three-factor adjusted return (α_{it}) for fund i in month t as

$$\alpha_{it} \equiv \alpha_i + e_{it}. \tag{2}$$

We then compute the three-factor adjusted return α_{ft} of fund family f in month t as the weighted average of three-factor adjusted returns of all member funds within family f:

$$\alpha_{ft} = \frac{\sum_{i=1}^{n} \alpha_{it} \text{TNA}_{it}}{\sum_{i=1}^{n} \text{TNA}_{it}}, \tag{3}$$

where TNA_{it} is the total net assets of fund i in month t, and n is the total number of member funds within family f.

The new money or cash flow of a mutual fund family is calculated as the sum of new money of all member funds. For each member fund, new money is defined to be the dollar change in TNA, net of price appreciation in the fund assets. Assuming that new money is invested at the end of each month, the cash flow for fund i in month t is given by

$$\text{Newmoney}_{it} = \text{TNA}_{it} - \text{TNA}_{i,t-1} * (1 + R_{it}). \tag{4}$$

Normalizing the new money by TNA in the previous month gives a measure for new money growth:

$$\text{Newmoneygrowth}_{it} = \frac{\text{Newmoney}_{it}}{\text{TNA}_{i,t-1}} \tag{5}$$

For any mutual fund family f, the family-level new money and new money growth are calculated as

$$\text{Newmoney}_{ft} = \sum_{i=1}^{n} \text{Newmoney}_{it}, \tag{6}$$

$$\text{Newmoneygrowth}_{ft} = \frac{\text{Newmoney}_{ft}}{\sum_{i=1}^{n} \text{TNA}_{i,t-1}}. \tag{7}$$

As discussed in the introduction, alternative strategies are available to managers of a mutual fund family. If a family adopts a star-based marketing strategy and tries to enhance the probability of creating star funds, we expect to observe relatively high cross-sectional variation in the performance of its member funds. On the other hand, a relatively low variation in fund-level returns may indicate sharing of information and coordination among member funds. Hence, a natural proxy for the strategy played by family management is the standard deviation of fund-level returns. For any fund family f in month t, we calculate the cross-fund standard deviation of three-factor adjusted returns Stdev_{ft} as

$$\text{Stdev}_{ft} = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(\alpha_{it} - \overline{\alpha_{ft}})^2}, \tag{8}$$

where $\overline{\alpha_{ft}}$ is the mean of three-factor adjusted returns of all member funds within family f in month t.

The family-level turnover ratio, expense ratio, and front-end load are calculated as the weighted average of the corresponding fund-level measures. The weights used here are fund-level TNAs.

Finally, we need a procedure to identify star funds. For each year in the sample period, we calculate the monthly average three-factor adjusted return for each fund. The 100 funds (about 5% of the sample) with the highest monthly average returns are then defined as the *star funds* for that year. For any given year, a fund family is called a *star family* if it has at least one star fund under management. Otherwise, it is called a *nonstar family*.

As mentioned, as a robustness check, we also use different measures of returns to evaluate fund performance. These alternative measures include one-factor adjusted returns and raw returns. The one-factor adjusted returns for each fund are estimated by using the single (market) factor model. Specifically, we use the following OLS regression to estimate fund factor loadings and α measures:

$$R_{it} - R_{ft} = \alpha_i + \beta_{iRMRF} RMRF_t + e_{it}. \tag{9}$$

With the estimated factor loading β and excess return α, we define the one-factor adjusted return for fund i in month t as in equation (2). Using the fund-level one-factor adjusted returns, we then calculate the family-level one-factor adjusted returns as in equation (3) and the cross-fund standard deviation of one-factor adjusted returns as in equation (8). In case of raw returns, the family-level raw return measure is simply the weighted average of raw returns (R_{it}) of all member funds within the family, and the cross-fund standard deviation of raw returns is defined similarly as in equation (8).

To examine whether the results are sensitive to alternative ranking mechanisms, we also identify the star performers by ranking the one-factor adjusted returns and raw returns. For any given year, the star funds are defined as the top 100 performers with the highest monthly average one-factor adjusted (or raw) returns.

3.3 Summary statistics

Table I provides the annual summary statistics for mutual fund families. The number of fund families in the sample increases from 354 in 1992 to 437 in 1998. The average size of fund families has become larger over time in terms of both the number of member funds and the total net assets under family management. The average number of funds managed by a family was 4.15 in 1992. In 1998, this number has increased to 7.30. On average, the TNA managed by a fund family has increased almost five times, from 865.43 million dollars in 1992 to 4014.89 million dollars in 1998. Moreover, the average TNA per member fund also exhibits a dramatic increase over the sample period. The family turnover ratios exhibit an increasing trend, indicating that fund families are, on average, trading more actively than in the past. The expense ratios appear quite stable over the sample period, while the average front-end loads have decreased from 1.86% to 1.12%. The last two columns of the table report the summary statistics for three-factor adjusted returns and cross-fund standard deviation of three-factor adjusted returns. For all years in the sample period (except 1993), the fund families on average earned negative three-factor adjusted returns. Overall, the average standard deviation of three-factor adjusted returns exhibits an increasing trend.

Table II reports the correlation coefficients between several key family characteristics. These characteristics measure the family size (TNA and Average TNA Per Fund), new money growth, family performance (Three-factor Adjusted Return), cross-fund standard deviation of three-factor adjusted returns, family turnover ratio, family expense ratio and family front-end load. For each family, the above characteristics are calculated by taking monthly averages over the entire sample period. As indicated, family size is inversely related to the expense ratio, suggesting that large fund families may benefit from economies of scale. New money growth is found to be positively correlated with both family performance and the standard deviation of three-factor adjusted returns. This suggests that fund families that perform better or adopt star-based marketing strategies tend to attract more cash inflows. However, the estimated correlation coefficients should be interpreted with caution since all the family characteristics are time-series averages and thus are highly aggregated. Clearly, a lot of information, especially time-series information, may have been lost in the aggregation process. For our empirical analysis we, therefore, adopt the more appropriate panel regression approach.

4 Methodology and Empirical Results

4.1 What Does A Star Bring to the Family?

4.1.1 The star-fund effect on family-level new money growth

To explore the effect of star funds on family cash flows, we compare the new money growth of star families with the new money growth of nonstar families, after controlling for other family characteristics. Specifically, we estimate the following fixed effect panel regression:

$$
\begin{aligned}
& (\text{Newmoneygrowth})_{f,t} \\
= \; & \alpha_f + \beta_1 * (\text{Newmoneygrowth})_{f,t-1} + \\
& \beta_2 * (\text{Three-factor Adjusted Return})_{f,t-1} + \beta_3 * (\text{Standard Deviation})_{f,t-1} + \\
& \beta_4 * (\text{Number of Funds})_{f,t-1} + \beta_5 * (\text{Turnover Ratio})_{f,t-1} + \\
& \beta_6 * (\text{Expense Ratio})_{f,t-1} + \beta_7 * (\text{Front-end Load})_{f,t-1} + \\
& \beta_8 * (\text{Star Family Dummy})_{f,t} + \beta_9 * (\text{Star Family Dummy})_{f,t-12} + \varepsilon_{f,t}. \qquad (10)
\end{aligned}
$$

Here, f is the index for fund family, t is the index for month, α_f captures the family fixed effect. Other than the variables indicating star performance, the other variables are similar to those found in other studies of the performance-flow relation. On the RHS, the variable (Newmoneygrowth) is given by equation (7), (Three-factor Adjusted Return) by equation (3) and (Standard Deviation) is measured by equation (8). (Number of Funds) is the logarithm of the total number of member funds managed by the family, and (Turnover Ratio), (Expense Ratio), and (Front-end Load) are defined as in the previous section. To analyze the impact of a star performer in the fund family, we rely on indicator variables (Star Family Dummy)$_{f,t}$ and (Star Family Dummy) $_{f,t-12}$. (Star Family Dummy)$_{f,t}$ equals one if fund family f has at least one star fund in the current year, and (Star Family Dummy)$_{f,t-12}$ equals one if fund family f has at least one star fund in the previous year. For each year in the sample period, the star funds and star families are identified by ranking the three-factor adjusted returns. Alternative measures of performance are considered and are discussed below. To control for autocorrelation and heteroscedasticity in the panel regressions, we allow for disturbances to follow an AR(1) process and for each family (panel) to have its own variance.

The coefficients of the two dummy variables capture the mean difference of new money growth between star families and nonstar families. The coefficient estimate of β_8 captures whether the presence of one or more star funds helps the family to attract more money in the concurrent year, while the coefficient estimate of β_9 sheds light on whether star funds have a significant new money effect for the family in the subsequent year.

In Table III, columns one and four present the estimation results for panel regression (10). The coefficients on the star family dummies are positive and significant at the 5 percent level, indicating that having a star fund increases the total level of new money flows for the entire family in both the current and the subsequent year. Specifically, the new money growth for star families is, on average, 0.80 percent (per month) higher than that for nonstar families in both years. Given the average family TNA (4015 million dollars) at the end of 1998, this implies that a star family, on average, attracts 32 million dollars more than a nonstar family on a monthly basis. The results indicate that families with star funds receive additional cash inflows in both the current and the subsequent years. The persistence of the cash flow response may reflect the continued publicity and promotion of the star performance by the fund family in an effort to attract investor funds.

To control for the effect of performance and other family characteristics on family new money flows, we include the lagged family cash flow, the lagged three-factor adjusted return of the family, the lagged cross-fund standard deviation of three-factor adjusted returns, the lagged total number of member funds in the family, the lagged turnover ratio, expense ratio and front-end load. Consistent with earlier fund-level studies, family cash flows are positively related to past performance and past cash flows, and are negatively related to front-end load. The results indicate that, when evaluating a fund family, investors care about its past performance and are sensitive to its load structure.

To check for robustness, we reestimate panel regression (10) by replacing three-factor adjusted returns with one-factor adjusted returns and raw returns. The cross-fund standard deviation of returns are also adjusted accordingly. When one-factor adjusted returns are used in the regression, the star funds and star families are identified by ranking the one-factor adjusted returns. Similar treatment is applied when raw returns are used in the regression. Columns two and five contain coefficient estimates when one-factor adjusted returns are adopted in the regression, while columns three and six document the results when raw returns are used. Clearly, the coefficient estimates from all regressions are similar both qualitatively and quantitatively, indicating that the results are not particularly sensitive to different performance measures and star ranking procedures.

4.1.2 The star-fund effect on fund-level new money growth

Panel regression (10) affirms the star-fund effect on the new money growth at the family level. We now turn to the issue of whether a star fund helps attract greater cash inflows to *nonstar* funds in its family. If the brand (or reputation) effect of having a star fund spills over to the nonstar members in the same family, we should expect to see higher new money growth for the nonstar funds in star families than for similarly situated funds in nonstar families. On the other hand, if the cash inflows to star funds are largely the consequence of cannibalizing cash flow from other funds in the same family, the new money growth for nonstar funds in star families may well be lower.

To investigate such spillover effects, we estimate the following fixed effect panel regression by utilizing fund-level information and by explicitly taking into account whether a particular fund belongs to a star family or not:

$$\begin{aligned}
&(\text{Newmoneygrowth})_{i,t} \\
= \; & \alpha_i + \beta_1 * (\text{Newmoneygrowth})_{i,t-1} + \\
& \beta_2 * (\text{Three-factor Adjusted Return})_{i,t-1} + \beta_3 * (\text{Turnover Ratio})_{i,t-1} + \\
& \beta_4 * (\text{Expense Ratio})_{i,t-1} + \beta_5 * (\text{Front-end Load})_{i,t-1} + \\
& \beta_6 * (\text{Star Family Dummy})_{i,t} + \beta_7 * (\text{Star Family Dummy})_{i,t-12} + \\
& \beta_8 * (\text{Star Fund Dummy})_{i,t} + \beta_9 * (\text{Star Fund Dummy})_{i,t-12} + \varepsilon_{i,t}. \qquad (11)
\end{aligned}$$

In the above regression, i is the index for individual fund, t is the index for month, α_i captures the fixed fund effect, (Three-factor Adjusted Return) is given by equation (2), (Turnover Ratio), (Expense Ratio), and (Front-end Load) are all fund-level statistics, and the remaining four independent variables are all dummies. (Star Family Dummy)$_{i,t}$ equals one if the fund belongs to a star family in the current year, (Star Family Dummy)$_{i,t-12}$ equals one if the fund belongs to a star family in the previous year, (Star Fund Dummy)$_{i,t}$ equals one if the fund itself is a star fund in the current year, and (Star Fund Dummy)$_{i,t-12}$ equals one if the fund is a star fund in the previous year. For each year in the sample period, the star funds and star families are identified by ranking the three-factor adjusted returns. As before, the regressions are estimated allowing for autocorrelation (AR1) in the residuals and heteroscedasticity in the variance of funds (panel). In the presence of significant spillover, the coefficient estimates of β_6 and β_7 are predicted expected to capture the spillover effects of star funds on the cash flow of nonstar funds in the same family. A significant spillover effect will be indicated by the coefficients being positive and significant.

In Table IV, columns one and four report estimation results from panel regression (11). The coefficient estimates for both the star fund dummies and the star family dummies are positive and significant at the 5 percent level. The new money growth for a star fund is, on average, 2.57 percent (per month) higher than that for a nonstar fund in the year the fund is a star performer. In the subsequent year, the star fund continues to attract more cash inflows (1.51 percent higher per month) when compared to nonstar funds. More interestingly, the star identity of a family also brings more cash inflows to its nonstar member funds. In the year when the family becomes a star, the new money growth for its nonstar member funds is, on average, 0.22 percent (per month) higher than that for other nonstar funds. In the subsequent year, the nonstar funds in star families continue to experience higher (0.27 percent per month) new money growth than other nonstar funds. Hence, both the star and nonstar funds in a star family attract more cash inflows in the current and subsequent years. As one might expect, the magnitudes of the coefficients indicate that a star fund attracts more new money than a nonstar fund that belongs to a star family.

The above results confirm the notion that creating a star fund has positive spillover effects on other funds in the family. For perspective, note that the average fund family has about seven members in 1998. Assuming that the TNAs of all member funds are the same, the spillover effect is such that, compared to a stand alone fund, the overall fund inflows from a star performance in the context of an average family are about 40 percent larger in the current year and 120 percent larger in the subsequent year. Hence, the magnitude of the spillover effect appears substantial and could well affect decisions regarding the number of funds in a family and the introduction of new funds.

As in the earlier regressions, fund-level characteristics are included to control for their effect on new money growth. The results indicate that fund-level cash inflows are positively related to past cash inflows, past performance, and expense ratio. Moreover, turnover ratio and front-end load are found to have negative impact on fund-level cash inflows. The results are in line with the evidence documented in the earlier literature, and are also consistent with our findings in the family-level regressions. One thing to point out is the finding that fund-level cash inflows are positively related to expense ratio. A possible reason for the positive correlation is that investors are less desirous of load funds and that load funds tend to have lower expense ratios than no-load funds. Hence, in saving load charges, investors inevitably expose themselves to funds with higher expense ratios. The result is consistent with the findings in Barber, Odean and Zheng (2000).

To examine whether the regression results are sensitive to different performance measures and star ranking mechanisms, we reestimate panel regression (11) by using one-factor adjusted returns and raw returns instead of three-factor adjusted returns. When one-factor adjusted returns are used in the regression, the star funds and star families are identified by ranking the one-factor adjusted returns. Similar treatment is applied when raw returns are used in the regression. The coefficient estimates are reported in columns two and five and columns three and six of Table IV. Clearly, the results are very similar to what we have found in case of three-factor adjusted returns. In addition to the panel regression approach, we also conduct month by month cross-sectional regression analyses and use the t-statistics proposed by Fama and MacBeth (1973). The results (not reported in this paper) confirm our conclusion that there is a strong positive spillover effect from a star performer at the family level.

To summarize the above results, we find evidence indicating that: 1) having a star fund significantly increases the family-level new money flows in both the current and subsequent years; 2) funds that belong to star families attract significantly greater amount of new money than funds that belong to nonstar families in both the current and subsequent years; 3) star funds attract significantly greater amount of new money than nonstar funds in both the current and subsequent years.

4.2 What Makes A Star?

The cash flow patterns discussed in the previous section indicate that a family is well rewarded in terms of new cash inflows for producing a star fund. Surely this may encourage families to seek ways to 'create' one or more star funds – even if it does little to improve average fund performance. What types of choices are, in practice, available to fund families to enhance the odds of producing stars? We approach this by investigating family characteristics tend to be related to the creation of star funds.[7]

[7]Goetzmann and Ibbotson (1993) point out that the collection of mutual funds under management by a fund family resembles a portfolio of options due to the high payoffs of a star fund. As such, the value of the portfolio is maximized by increasing the variance of individual fund performance

For each year in the sample period, we apply a logit model to explore the relationship between the probability of creating star funds and the following family-level factors: standard deviation of three-factor adjusted returns, relative size of the family, total number of funds within the family, family turnover ratio, family expense ratio, and family front-end load. The relative size of family f in month t is measured by

$$\text{Family Size}_{ft} = \frac{(\text{average TNA per member fund})_{ft}}{\text{Median}(\text{average TNA per member fund})_t}. \tag{12}$$

Hence, we measure the size of a family by its average TNA per member fund relative to the industry median.

For the purpose of our empirical study, we estimate the following logistic regression model:

$$\begin{aligned} S_f \;=\; & \beta_0 + \beta_1 * (\text{Standard Deviation})_f + \beta_2 * (\text{Family Size})_f + \\ & \beta_3 * (\text{Number of Funds})_f + \beta_4 * (\text{Turnover Ratio})_f + \\ & \beta_5 * (\text{Expense Ratio})_f + \beta_6 * (\text{Front-end Load})_f. \end{aligned} \tag{13}$$

Here, f is the index for fund family, S_f is an indicator variable that equals one if the family has at least one star fund and zero otherwise. (Standard Deviation) is the monthly average of the cross-fund standard deviations of three-factor adjusted returns for the family, (Family Size) is the logarithm of monthly average of the relative family size measured by (12), (Number of Funds) is the logarithm of monthly average of the total number of member funds managed by the family, and (Turnover ratio), (Expense Ratio), and (Front-end Load) are the monthly averages of the corresponding statistics for the family.

If adopting the star-based marketing strategy and having more member funds under management help a family to increase its odds of creating stars, then the coefficient estimates for β_1 and β_3 are expected to be positive and significant. Given all

and decreasing the correlations across funds. They also hypothesize that the more funds a family manages, the higher the probability that one of them will be a winner, if only due to pure luck. Other factors may also affect the likelihood of creating a star fund. For example, higher research effort or expenses may increase the likelihood of creating a star fund.

the coefficient estimates from the logistic model, we can also estimate the probability of creating a star fund for family f by using the following formula (see Maddala (1983)):

$$\text{Prob}(S_f = 1) = \frac{\exp(X_f)}{1 + \exp(X_f)}, \tag{14}$$

where X_f is simply the right hand side of equation (13) with βs replaced by their maximum likelihood estimates.

In Table V, we present the results of logistic regression (13). Among the six characteristics examined, the standard deviation of three-factor adjusted returns and the number of funds under family control have consistent and positive impact on the probability of creating star funds over the sample period. The average coefficient estimates for these two factors are 122.94 and 0.83, respectively. The t-statistics indicate that they are significant at the 5 percent level for almost all years in the sample period.

For perspective on how the changes in standard deviation and the number of member funds affect the probability of creating star funds, let us construct a hypothesized family and use the average coefficient estimates reported in column eight of Table V to calculate the probability. All the six characteristics for the hypothesized family are evaluated at the mean statistics for fund families used in the logistic regression for 1998. Specifically, the cross-fund standard deviation of returns and the number of member funds for this hypothesized family are 1.51% and 7.35, respectively. Using formula (14), we find that the probability of creating a star fund is 0.32. If the family management decides to increase the cross-fund standard deviation of returns by 100 percent while keeping everything else unchanged, then the probability of creating a star fund will increase to 0.75. The impact of the number of member funds is smaller but still economically significant. If the family doubles the number of funds under control, the probability of creating a star will increase from 0.32 to 0.46.

For robustness check purposes, we also estimate the logistic regression (13) using alternative measures of the cross-fund standard deviation of returns: standard deviation of one-factor adjusted returns and standard deviation of raw returns. The coefficient estimates are reported in Tables VI and VII, and are qualitatively similar to those in Table V. Hence, the logistic results are not sensitive to how we measure the standard deviation of returns.

Another approach to exploring the relationship between family characteristics and the creation of star funds is to perform a Poisson regression. Instead of relating family characteristics to the probability of creating a star fund, the Poisson regression examines which family characteristics are critical to determining the expected number of star funds in the fund family.

We assume that the numbers of star funds S_1, S_2, ..., S_N for fund family 1, 2, ..., N have independent Poisson distributions with parameters λ_1, λ_2, ..., λ_N, respectively. Hence,

$$\text{Prob}(S_f = r) = \exp(-\lambda_f)\frac{(\lambda_f)^r}{r!}, \quad f = 1, 2, \ldots, N, \tag{15}$$

where r is the observed number of star funds managed by family f. Further, we assume that λ_f is log-linear in family characteristics such that

$$\begin{aligned}\log(\lambda_f) &= \beta_0 + \beta_1 * (\text{Standard Deviation})_f + \beta_2 * (\text{Family Size})_f + \\ &\quad \beta_3 * (\text{Number of Funds})_f + \beta_4 * (\text{Turnover Ratio})_f + \\ &\quad \beta_5 * (\text{Expense Ratio})_f + \beta_6 * (\text{Front-end Load})_f.\end{aligned} \tag{16}$$

Table VIII presents the maximum likelihood estimation results for the above model. Again, the standard deviation of three-factor adjusted returns and the number of member funds are the most important factors determining the expected number of star funds in the fund family. The coefficient estimates for the two factors are positive and significant at the 5 percent level for all years in the sample period. These further confirm the result that a family can increase the odds of producing stars by increasing the cross-fund standard deviation of returns and by adding more funds under control.

In summary, the results from logistic and Poisson regressions indicate that (a) a diversified strategy (high cross-fund standard deviation of returns) helps to produce star funds, and (b) the more member funds a family has, the more likely it is to produce a star fund. Other characteristics, such as family size, turnover ratio, expense ratio, and front-end load, are not significantly related to the likelihood of having a star fund.

4.3 Do stars live up to investor expectations?

The cash flow patterns we find suggest that investors are bullish on the investment skills of the star fund manager and of the fund family in general. As we have discussed fund families can affect the odds of producing stars and, potentially, benefit from engaging in what is, in effect, a star-centered marketing strategy. There is suggestive time series evidence about the increasing popularity of such strategies. From 1992 to 1998, the average number of funds managed by families and the average cross-fund standard deviation of returns have both increased (see Figures 2 and 3). While the evidence is only suggestive, it is consistent with the greater recognition by mutual fund families that investors highly reward star funds and families that produce star funds. We now turn to the welfare consequences of a star-based marketing strategy for mutual fund investors. Specifically, we focus on whether effort of generating star funds by families comes at the cost of poorer overall family performance.

To examine the star-fund effect on family performance, we estimate the following fixed effect panel regression:

$$
\begin{aligned}
& (\text{Three-factor Adjusted Return})_{f,t} \\
= \; & \alpha_f + \beta_1 * (\text{Three-factor Adjusted Return})_{f,t-1} + \beta_2 * (\text{Standard Deviation})_{f,t-1} + \\
& \beta_3 * (\text{Number of Funds})_{f,t-1} + \beta_4 * (\text{Turnover Ratio})_{f,t-1} + \\
& \beta_5 * (\text{Expense Ratio})_{f,t-1} + \beta_6 * (\text{Front-end Load})_{f,t-1} + \\
& \beta_7 * (\text{Star Family Dummy})_{f,t-12} + \varepsilon_{f,t}. \qquad (17)
\end{aligned}
$$

All variables in the above regression have been defined earlier in connection with regression (10). The coefficient estimates of β_2 and β_3 indicate the effect of adopting a star-based marketing strategy based on increasing cross-fund standard deviation of returns and the number of member funds on the overall family performance. The coefficient estimate of β_7 sheds light on how the existence of star funds in the current year is related to family performance in the subsequent year. If investors adopt the strategy of following the stars and invest in last year's star families, then β_7 can help us to understand whether such a strategy pays off for investors. To examine whether the regression results are sensitive to alternative return measures and ranking mechanisms, we conduct robustness check similar to that applied to panel regression (10).

In Table IX, columns one and four report the coefficient estimates for panel regression (17). Columns two and five and columns three and six present results when one-factor adjusted returns and raw returns are used instead of three-factor adjusted returns to compute the cross-fund standard deviation of returns and to identify star families. As can be seen from the table, the coefficient estimates are very similar across all three regressions. In the following analysis, we will focus on discussing the results presented in column four.

We find that the coefficient estimate on the lagged star dummy is *negative* and not statistically significant. Thus, there is no evidence that having a star fund implies better future family performance! Recall that a significant portion of new money flows into star families in the subsequent year. Hence, these money flows do not seem to catch the "hot hands". Moreover, we find that the estimated coefficients for the cross-fund standard deviation of three-factor adjusted returns and the number of funds are negative and significant (-0.055 and -0.001, respectively). Therefore, factors that contribute the most in generating star funds appear to be associated with poorer overall family performance. This could imply that there are costs in connection with implementing a star-oriented strategy. For instance, the negative impact of number of member funds on the family performance may reflect a family management's decision to expand the fund family, beyond a number that can be effectively monitored or managed. This will induce higher agency costs and thus reduce the overall family performance. Recall from section 4.2, another effective way to increase the odds of producing stars is to increase the cross-fund standard deviation of returns. Family management can achieve this by getting investment managers to take negatively correlated positions. However, such investment strategies are unlikely to be consistent with fund value maximization.

In addition to the panel regression approach, we estimate Fama and MacBeth (1973) regression coefficients. The results (not reported in this paper) confirm our conclusion that the strategy of following the star does not pay off to investors.

In summary, star families do not deliver better performance in the subsequent year. Strategies associated with producing stars tend to put a drag on average fund performance. Therefore, a strategy of "following stars" is not one that favors mutual fund investors.

5 Conclusion

In this paper, we study the impact of family structure on fund strategy to attract investor funds. First, we examine whether a star performer affects the flow of funds, not only to itself, but also to other funds in the family. Second, we identify the factors that affect the probability of producing star funds. Third, we investigate the costs, if any, associated with a star-driven strategy.

Our results indicate that there is a strong positive spillover effect from a star performer at the family level. The existence of a star helps itself as well as other funds in the star family to attract more money inflows. Investors respond to a star performance by investing more money into the star fund and star family in both the current and subsequent year. Given that the average family has seven funds, the overall fund inflows to the family from a star performance are about 40 percent larger in the current year and 120 percent larger in the subsequent year when compared to a stand alone fund.

We apply logistic regressions and Poisson regressions to determine the factors that may be effective in producing a star. Evidence shows that there are two primary factors that a family can reasonably control that would raise the probability of creating a star – increases in the number of member funds and decreases in the correlation between fund returns.

Finally, we document that families with star performers in a particular year do not have higher returns in the subsequent year. Hence, the strategy of following the stars does not pay off to investors. The implications for these investors are worse than that, however. It appears that factors (increasing the cross-fund standard deviation of returns and number of member funds) that enhance the odds of producing stars are associated with a significantly poorer overall performance for the fund family. These results are confirmed by several robustness checks, employing alternative definitions of fund and family performance.

REFERENCES

Brad, Barber, Terry Odean and Lu Zheng, 2000, Are mutual fund investors rational?, working paper.

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

Chevalier, Judith and Glenn Ellison, 1997, Risk taking by mutual funds as a response to incentives, *Journal of Political Economy* 105, 1167-1200.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the return on bonds and stocks, *Journal of Financial Economics* 33, 3-53.

Goetzmann William N., and Roger G. Ibbotson, 1993, Games mutual fund companies play: strategic response to investor beliefs in the mutual fund industry, working paper, Yale School of Management.

Goetzmann, William N. and Nadev Peles, 1997, Cognitive dissonance and mutual fund investors, *The Journal of Financial Research* 20, 145-158.

Gruber, Martin J., 1996, Another puzzle: The growth in actively managed mutual funds, *Journal of Finance* 51, 783-810.

Ippolito, Richard A., 1989, Efficiency with costly information: A study of mutual fund performance, 1965-1984, *Quarterly Journal of Economics* 104, 1-23.

Ippolito, Richard A., 1992, Consumer reaction to measures of poor quality: Evidence from the mutual fund industry, *Journal of Law and Economics* 35, 45-70.

Kane, Alex, don L. Santini, and Jack W. Aber, 1991, Lessons from the growth history of mutual funds, Unpublished working paper.

Khorana, Ajay and Henri Servaes, 1999, The determinants of mutual fund starts, *Review of Financial Studies*, forthcoming.

Lakonishok, Joseph, Andrei Shleifer, and Robert Vishny, 1992, The structure and performance of the money management industry, *Brookings Papers*: Microeonomics, 339 – 379.

Maddala, G. S., 1983, *Limited-Dependent And Qualitative Variables In Econometrics,* Cambridge University Press.

Patel, Jayendu, Richard J. Zeckhauser, and Darryll Hendricks, 1990, Investment flows and performance: Evidence from mutual funds, cross-border investments, and new issues, in Richard Satl, Robert Levitch,and Rama Ramachandran, Eds.: *Japan, Europe and the International Financial Markets: Analytical and Empirical Perspectives* (Cambridge University Press, New York.)

Sirri, Erik and Peter Tufano, 1998, Costly Search and Mutual Fund Flows, *Journal of Finance* 53, 1589-1622.

Smith, Keith V., 1978, Is fund growth related to fund performance?, *Journal of Portfolio Management*, Spring, 49-54.

Spritz, A. E., 1970, Mutual fund performance and cash inflow, *Applied Economics* 2, 141-145.

Warther, Vince, 1995, Aggregate mutual fund flows and security returns, *Journal of Financial Economics* 39, 209-236.

Zheng, Lu, 1999(a), Is money smart? A study of mutual fund investors' fund selection ability, *Journal of Finance* 54, 901-933.

Zheng, Lu, 1999(b), Who moves the market?: A study of investment cashflows and stock prices, University of Michigan working paper.

Table I. Mutual Fund Family Annual Summary Statistics, 1992-1998

The table reports annual summary statistics for mutual fund families in the period of 1992-1998. For each year in the sample period, the table shows the mean and standard deviation of the following family characteristics: the number of mutual fund families, the average number of funds within a family, the monthly average family new money growth (%), the monthly average family TNA (in million dollars), the monthly average TNA (in million dollars) per fund within a family, the monthly average family turnover ratio, the monthly average family expense ratio (%), the monthly average family front-end load (%), the monthly average family risk-adjusted return (%), and the monthly average family standard deviation of risk-adjusted returns (%).

Year	Number of Families	Number of Funds	New Money Growth (%)	Family TNA	Family TNA Per Fund	Turnover Ratio	Expense Ratio (%)	Front-end Load (%)	Risk-adjusted Return (%)	Standard Deviation of Returns (%)
	Mean									
1992	354	4.15	3.25	865.43	275.43	0.66	1.45	1.86	-0.16	1.12
1993	362	4.54	3.00	1158.06	310.88	0.70	1.42	1.75	0.02	1.24
1994	374	4.78	2.35	1383.11	317.06	0.78	1.43	1.56	-0.13	1.07
1995	380	5.26	1.87	1804.90	379.99	0.78	1.42	1.44	-0.19	1.24
1996	393	5.41	1.79	2487.69	472.47	0.78	1.41	1.27	-0.09	1.18
1997	424	6.14	3.13	3223.81	541.50	0.81	1.42	1.14	-0.36	1.33
1998	437	7.30	1.56	4014.89	559.50	0.88	1.43	1.12	-0.27	1.49
	Standard Deviation									
1992	--	3.52	8.33	3586.03	496.40	1.06	1.07	2.35	0.55	0.49
1993	--	4.46	9.73	5095.05	592.47	0.69	0.94	2.27	0.60	0.65
1994	--	5.02	9.01	6510.87	627.77	1.00	0.75	2.19	0.52	0.49
1995	--	5.71	5.62	8789.98	762.30	1.03	0.75	2.11	0.58	0.59
1996	--	6.23	7.36	12153.51	960.67	1.03	0.70	1.99	0.53	0.48
1997	--	7.24	8.96	15915.37	1190.64	1.06	1.13	1.89	0.70	0.55
1998	--	8.57	5.36	20302.81	1407.20	1.34	1.20	1.83	0.70	0.69

Table II. Correlation between Mutual Fund Family Characteristics

The table reports correlation coefficients between the following mutual fund family characteristics: TNA, average TNA per member fund, new money growth, risk-adjusted return, standard deviation of risk-adjusted returns, turnover ratio, expense ratio, and front-end load. For each fund family, the above characteristics are calculated by taking the monthly averages over the sample period. P-values are reported in the parenthesis.

	TNA	Average TNA Per Fund	New Money Growth	Risk-adjusted Return	Standard Deviation of Returns	Turnover Ratio	Expense Ratio	Front-end Load
TNA	1	**0.75** **(0.00)**	-0.05 (0.31)	0.05 (0.29)	-0.02 (0.79)	-0.02 (0.68)	**-0.11** **(0.01)**	0.07 (0.12)
Average TNA Per Fund		1	-0.09 (0.10)	0.08 (0.14)	-0.06 (0.29)	-0.04 (0.42)	**-0.21** **(0.00)**	0.11 (0.05)
New Money Growth			1	**0.21** **(0.00)**	**0.14** **(0.02)**	**0.16** **(0.00)**	0.02 (0.59)	-0.04 (0.40)
Risk-adjusted Return				1	-0.10 (0.09)	**0.14** **(0.00)**	**-0.34** **(0.00)**	-0.04 (0.34)
Standard Deviation of Returns					1	**0.42** **(0.00)**	**0.35** **(0.00)**	-0.08 (0.17)
Turnover Ratio						1	**0.17** **(0.00)**	0.00 (0.99)
Expense Ratio							1	**0.14** **(0.00)**
Front-end Load								1

Table III. The Star-Fund Effect on Family-Level New Money Growth

The table examines the star-fund effect on family-level new money growth. All coefficient estimates are from fixed effect panel regressions adjusted for autocorrelation and heteroscedasticity. T-statistics are reported in the parentheses. The dependent variable is family-level new money growth. The independent variables include: family-level new money growth, family-level return, family-level standard deviation of returns across member funds, logarithm of number of funds within the family, family-level turnover ratio, expense ratio, and front-end load, and dummies indicating whether the family has at least one star fund in the current and previous years. Except dummies for star family, all independent variables are lagged one period. The coefficient estimates from three panel regressions are reported in the table. The first regression uses the Fama-French three factor model to measure the risk-adjusted returns and the corresponding standard deviation of returns. In any given year, a family is identified as a star family if it contains at least one star performer ranked by the risk-adjusted returns. The second regression uses the CAPM to measure the market-adjusted returns and the corresponding standard deviation of returns. In any given year, a family is identified as a star family if it contains at least one star performer ranked by the market-adjusted returns. The third regression simply uses the raw returns and the corresponding standard deviation of returns. In any given year, a family is identified as a star family if it contains at least one star performer ranked by the raw returns.

Independent Variables	Dependent Variable					
	Family New Money Growth (t)			Family New Money Growth (t)		
	3-Factor	CAPM	Raw	3-Factor	CAPM	Raw
New Money Growth (t-1)	0.053* (2.21)	0.053* (2.21)	0.070* (2.97)	0.047** (1.94)	0.043** (1.77)	0.061* (2.57)
Return (t-1)	0.230* (5.85)	0.256* (7.82)	0.027* (2.13)	0.212* (5.38)	0.245* (7.46)	0.026* (2.04)
Std. Deviation (t-1)	0.051 (0.74)	0.075 (1.39)	0.021 (0.31)	0.040 (0.58)	0.071 (1.31)	0.009 (0.14)
Number of Funds (t-1)	-0.012* (-8.18)	-0.012* (-7.85)	-0.013* (-8.16)	-0.012* (-8.00)	-0.012* (-7.71)	-0.012* (-7.59)
Turnover Ratio (t-1)	-0.002 (-0.67)	-0.002 (-0.65)	-0.002 (-0.73)	-0.002 (-0.62)	-0.002 (-0.64)	-0.002 (-0.68)
Expense Ratio (t-1)	0.089 (1.17)	0.090 (1.17)	0.090 (1.22)	0.035 (0.461)	0.063 (0.82)	0.040 (0.55)
Front-end Load (t-1)	-0.239* (-3.41)	-0.232* (-3.33)	-0.218* (-3.10)	-0.252* (-3.61)	-0.261* (-3.74)	-0.265* (-3.77)
Dummy for Star Family (t)				0.008* (5.21)	0.006* (4.38)	0.009* (6.85)
Dummy for Star Family (t-12)				0.008* (5.69)	0.010* (7.81)	0.008* (6.39)
Number of observations	15834	15834	15996	15834	15834	15996

* significant at the 5% level

** significant at the 10% level

Table IV. The Star-Fund Effect on Fund-Level New Money Growth

The table examines the star-fund effect on fund-level new money growth. All coefficient estimates are from fixed effect panel regressions adjusted for autocorrelation and heteroscedasticity. T-statistics are reported in the parentheses. The dependent variable is fund-level new money growth. The independent variables include: fund-level new money growth, fund-level return, fund-level turnover ratio, expense ratio, and front-end load, and dummies indicating whether the fund is a star fund in the current and previous years. Except dummies for star fund, all independent variables are lagged one period. The coefficient estimates from three panel regressions are reported in the table. The first regression uses the Fama-French three factor model to measure the risk-adjusted returns. In any given year, the top 100 performers ranked by the risk-adjusted returns are identified as the star funds. The second regression uses the CAPM to measure the market-adjusted returns. In any given year, the top 100 performers ranked by the market-adjusted returns are identified as the star funds. The third regression simply uses the raw returns to measure fund performance. In any given year, the top 100 performers ranked by the raw returns are identified as the star funds.

Independent Variables	Dependent Variable					
	Fund New Money Growth (t)			Fund New Money Growth (t)		
	3-Factor	CAPM	Raw	3-Factor	CAPM	Raw
New Money Growth (t-1)	0.243* (51.15)	0.245* (51.54)	0.241* (50.54)	0.234* (49.01)	0.234* (48.84)	0.228* (47.52)
Return (t-1)	0.359* (18.18)	0.374* (25.02)	0.048* (6.49)	0.315* (15.78)	0.342* (22.65)	0.041* (5.55)
Turnover Ratio (t-1)	-0.010* (-9.24)	-0.010* (-9.20)	-0.010* (-9.30)	-0.010* (-9.37)	-0.010* (-9.32)	-0.011* (-9.42)
Expense Ratio (t-1)	0.350* (4.14)	0.340* (4.05)	0.360* (4.24)	0.275* (3.25)	0.260* (3.09)	0.277* (3.26)
Front-end Load (t-1)	-0.001 (-1.59)	-0.001 (-1.55)	-0.001 (-1.53)	0.001** (-1.87)	-0.001* (-1.97)	-0.001* (-2.05)
Dummy for Star Family (t)				0.002* (2.23)	0.006* (6.55)	0.005* (5.24)
Dummy for Star Family (t-12)				0.003* (2.90)	0.005* (5.99)	0.007* (7.25)
Dummy for Star Fund (t)				0.026* (13.66)	0.021* (11.93)	0.031* (15.89)
Dummy for Star Fund (t-12)				0.015* (9.58)	0.012* (7.66)	0.016* (9.39)
Number of observations	144717	144717	144717	144717	144717	144717

* significant at the 5% level

** significant at the 10% level

Table V. Factors Affecting the Creation of Star Funds: Logistic Regressions (I)

The table examines what family characteristics are more likely to create star funds. All parameter estimates are from logistic regressions. T-statistics are in the parentheses. For each year from 1992 to 1998, we apply a logit model to examine how family characteristics are related to the probability of creating star funds. The family characteristics included in the analysis are standard deviation of risk-adjusted returns from Fama-French three-factor model, relative size of the family, logarithm of number of member funds under family management, family-level turnover ratio, expense ratio, and front-end load. The last column of the table reports the time-series averages of the parameter estimates.

	1992	1993	1994	1995	1996	1997	1998	Average
Constant	-4.31* (-5.01)	-5.11* (-5.39)	-3.18* (-4.07)	-4.15* (-5.37)	-4.71* (-5.55)	-4.88* (-6.00)	-4.08* (-5.11)	-4.35
Standard Deviation	106.79* (2.62)	84.11* (2.98)	112.14* (2.79)	130.63* (3.45)	228.50* (4.67)	156.31* (3.27)	42.07 (1.20)	122.94
Family Size	0.52* (2.97)	0.61* (3.51)	0.27** (1.69)	0.15 (0.94)	0.18 (1.27)	-0.30* (-1.97)	0.13 (0.93)	0.22
Number of Funds	0.87* (2.22)	1.30* (3.69)	0.61* (2.00)	0.91* (3.14)	0.62* (2.18)	0.97* (3.22)	0.51* (2.00)	0.83
Turnover Ratio	0.01 (0.07)	0.73* (2.25)	0.15 (0.50)	-0.57 (-1.45)	0.01 (0.04)	-0.74** (-1.65)	0.16 (1.11)	-0.03
Expense Ratio	68.48* (2.21)	58.23 (1.25)	-43.22 (-0.89)	10.33 (0.28)	-38.54 (-0.91)	-7.80 (-0.48)	57.40 (1.25)	14.98
Front-end Load	-0.56 (-0.07)	-15.26** (-1.66)	3.59 (0.42)	-7.79 (-0.82)	-19.99** (-1.80)	2.08 (0.20)	-2.17 (-0.20)	-5.73

* significant at the 5% level
** significant at the 10% level

Table VI. Factors Affecting the Creation of Star Funds: Logistic Regressions (II)

The table examines what family characteristics are more likely to create star funds. All parameter estimates are from logistic regressions. T-statistics are in the parentheses. For each year from 1992 to 1998, we apply a logit model to examine how family characteristics are related to the probability of creating star funds. The family characteristics included in the analysis are standard deviation of market-adjusted returns from CAPM, relative size of the family, logarithm of the number of member funds under family management, family-level turnover ratio, expense ratio, and front-end load. The last column of the table reports the time-series averages of the parameter estimates.

	1992	1993	1994	1995	1996	1997	1998	Average
Constant	-4.21*	-5.31*	-3.63*	-3.26*	-3.35*	-4.06*	-4.55*	-4.05
	(-5.00)	(-5.56)	(-4.51)	(-4.03)	(-4.38)	(-5.20)	(-5.58)	
Standard Deviation	91.22*	81.26*	87.97*	-11.98	38.77	69.51*	14.01	52.97
	(2.87)	(2.97)	(2.45)	(-0.27)	(1.38)	(2.20)	(0.42)	
Size	0.19	0.31*	0.09	-0.03	0.17	-0.06	0.13	0.12
	(1.22)	(1.97)	(0.59)	(-0.22)	(1.25)	(-0.40)	(0.85)	
Number of Funds	1.42*	1.50*	0.91*	1.54*	0.92*	0.66*	0.88*	1.12
	(3.44)	(4.17)	(2.87)	(4.71)	(3.41)	(2.34)	(3.25)	
Turnover Ratio	-0.20	0.53**	0.47**	-0.97*	-0.01	-0.37	0.21	-0.05
	(-0.73)	(1.67)	(1.72)	(-2.06)	(-0.02)	(-0.97)	(1.38)	
Expense Ratio	41.43	45.83	-52.52	34.30	8.23	7.64	58.54	20.49
	(1.38)	(1.01)	(-1.14)	(0.84)	(0.20)	(0.52)	(1.44)	
Front-end Load	-5.45	-3.84	5.30	-6.46	-20.31**	-3.52	-7.32	-5.94
	(-0.71)	(-0.44)	(0.62)	(-0.66)	(-1.91)	(-0.32)	(-0.61)	

* significant at the 5% level
** significant at the 10% level

Table VII. Factors Affecting the Creation of Star Funds: Logistic Regressions (III)

The table examines what family characteristics are more likely to create star funds. All parameter estimates are from logistic regressions. T-statistics are in the parentheses. For each year from 1992 to 1998, we apply a logit model to examine how family characteristics are related to the probability of creating star funds. The family characteristics included in the analysis are standard deviation of raw returns, relative size of the family, logarithm of the number of member funds under family management, family-level turnover ratio, expense ratio, and front-end load. The last column of the table reports the time-series averages of the parameter estimates.

	1992	1993	1994	1995	1996	1997	1998	Average
Constant	-4.18*	-5.12*	-2.78*	-4.14*	-4.26*	-3.81*	-4.77*	-4.15
	(-4.99)	(-5.28)	(-3.55)	(-5.02)	(-5.13)	(-5.51)	(-5.87)	
Standard Deviation	85.94*	91.46*	80.80*	119.40*	93.33*	73.90*	56.26*	85.87
	(2.89)	(3.16)	(2.30)	(3.23)	(3.47)	(2.87)	(2.06)	
Size	0.19	0.44*	0.27	0.21	0.11	-0.12	0.25	0.19
	(1.21)	(2.70)	(1.64)	(1.34)	(0.76)	(-0.88)	(1.61)	
Number of Funds	1.50*	1.45*	0.59**	0.77*	0.61*	0.63*	0.56*	0.87
	(3.60)	(4.02)	(1.94)	(2.62)	(2.26)	(2.33)	(2.05)	
Turnover Ratio	-0.22	0.55**	0.41	-0.18	-0.05	-0.36	-0.01	0.02
	(-0.77)	(1.71)	(1.41)	(-0.73)	(-0.25)	(-0.97)	(-0.05)	
Expense Ratio	39.39	24.74	-68.63	-5.66	17.94	2.37	53.43	9.08
	(1.31)	(0.50)	(-1.37)	(-0.14)	(0.47)	(0.16)	(1.53)	
Front-end Load	-5.27	-4.75	0.57	-13.19	-16.97	-9.26	-10.19	-8.44
	(-0.69)	(-0.55)	(0.07)	(-1.32)	(-1.63)	(-0.87)	(-0.83)	

* significant at the 5% level
** significant at the 10% level

Table VIII. Factors Affecting the Creation of Star Funds: Poisson Regressions

The table examines what family characteristics are more likely to create star funds. All parameter estimates are from Poisson regressions. T-statistics are in the parentheses. For each year from 1992 to 1998, we apply a Poisson model to examine how family characteristics are related to the probability of creating star funds. The family characteristics included in the analysis are standard deviation of risk-adjusted returns, relative size of the family, logarithm of the number of member funds under family management, family-level turnover ratio, expense ratio, and front-end load. The last column of the table reports the time-series averages of the parameter estimates.

	1992	1993	1994	1995	1996	1997	1998	Average
Constant	-3.82*	-5.05*	-3.66*	-4.21*	-3.80*	-3.68*	-3.28*	-3.93
	(-6.98)	(-8.34)	(-6.26)	(-8.55)	(-7.37)	(-9.06)	(-8.24)	
Standard Deviation	60.00*	71.23*	88.44*	85.93*	164.40*	115.11*	32.92*	88.29
	(2.47)	(5.63)	(3.94)	(3.74)	(6.73)	(4.59)	(2.14)	
Size	0.38*	0.60*	0.17	0.12	0.02	-0.16**	-0.05	0.15
	(3.53)	(6.15)	(1.60)	(1.32)	(0.21)	(-1.93)	(-0.64)	
Number of Funds	0.91*	0.93*	1.03*	1.08*	0.76*	0.76*	0.61*	0.87
	(4.70)	(5.74)	(6.63)	(7.73)	(5.99)	(5.46)	(4.18)	
Turnover Ratio	0.06	0.37**	0.33	-0.37	0.05	-0.60*	0.02	-0.02
	(0.83)	(1.83)	(1.60)	(-1.57)	(0.31)	(-2.25)	(0.29)	
Expense Ratio	52.68*	97.93*	-50.08	40.00**	-56.56**	-10.47	17.91*	13.06
	(3.11)	(3.44)	(-1.31)	(1.90)	(-1.91)	(-0.63)	(2.42)	
Front-end Load	3.67	-5.55	6.89	-4.36	-6.45	13.84*	18.81*	3.84
	(0.73)	(-1.01)	(1.13)	(-0.69)	(-0.95)	(2.38)	(3.39)	

* significant at the 5% level
** significant at the 10% level

Table IX. The Star-Fund Effect on Family-Level Performance

The table examines the star-fund effect on family-level performance. All coefficient estimates are from fixed effect panel regressions adjusted for autocorrelation and heteroscedasticity. T-statistics are reported in the parentheses. The dependent variable is family-level risk-adjusted return. The independent variables include: family-level risk-adjusted return, standard deviation of returns across member funds, logarithm of number of funds within the family, family-level turnover ratio, expense ratio, and front-end load, and dummies indicating whether the family has at least one star fund in the current and previous years. Except dummies for star family, all independent variables are lagged one period. The coefficient estimates from three panel regressions are reported in the table. In the first regression (3-factor), risk-adjusted returns from the Fama-French three-factor model are used to compute the family-level standard deviation of returns across member funds. In any given year, a family is identified as a star family if it contains at least one star performer ranked by the risk-adjusted returns. In the second regression (CAPM), market-adjusted returns from the CAPM are used to compute the family-level standard deviation of returns across member funds. In any given year, a family is identified as a star family if it contains at least one star performer ranked by the market-adjusted returns. In the third regression (Raw), raw returns are used to compute the family-level standard deviation of returns across member funds. In any given year, a family is identified as a star family if it contains at least one star performer ranked by the raw returns.

Independent Variables	Dependent Variable					
	Family Risk-adjusted Return (t)			Family Risk-adjusted Return (t)		
	3-Factor	CAPM	Raw	3-Factor	CAPM	Raw
Risk-adjusted Return (t-1)	0.018 (0.87)	0.019 (0.90)	0.015 (0.73)	0.001 (0.07)	0.005 (0.22)	0.003 (0.17)
Std. Deviation (t-1)	-0.055** (-1.82)	-0.041* (-2.12)	-0.033* (-1.96)	-0.063* (-2.11)	-0.045* (-2.34)	-0.038* (-2.32)
Number of Funds (t-1)	-0.001* (-4.05)	-0.001* (-4.08)	-0.001* (-3.98)	-0.001* (-3.52)	-0.001* (-3.67)	-0.001* (-3.03)
Turnover Ratio (t-1)	-0.000 (-0.28)	-0.000 (-0.27)	-0.000 (-0.38)	-0.000 (-0.30)	-0.000 (-0.35)	-0.000 (-0.36)
Expense Ratio (t-1)	-0.020 (-0.28)	-0.021 (-0.28)	-0.018 (-0.25)	-0.045 (-0.62)	-0.037 (-0.51)	-0.034 (-0.48)
Front-end Load (t-1)	-0.013 (-0.75)	-0.014 (-0.83)	-0.014 (-0.82)	-0.017 (-1.00)	-0.021 (-1.24)	-0.020 (-1.21)
Dummy for Star Family (t)				0.005* (12.97)	0.004* (11.95)	0.004* (11.70)
Dummy for Star Family (t-12)				0.000 (1.31)	-0.000 (-0.25)	0.000 (0.40)
Number of observations	16062	16062	16204	16062	16062	16204

* significant at the 5% level
** significant at the 10% level

Figure 1: New Money Flows of Past Performance Deciles

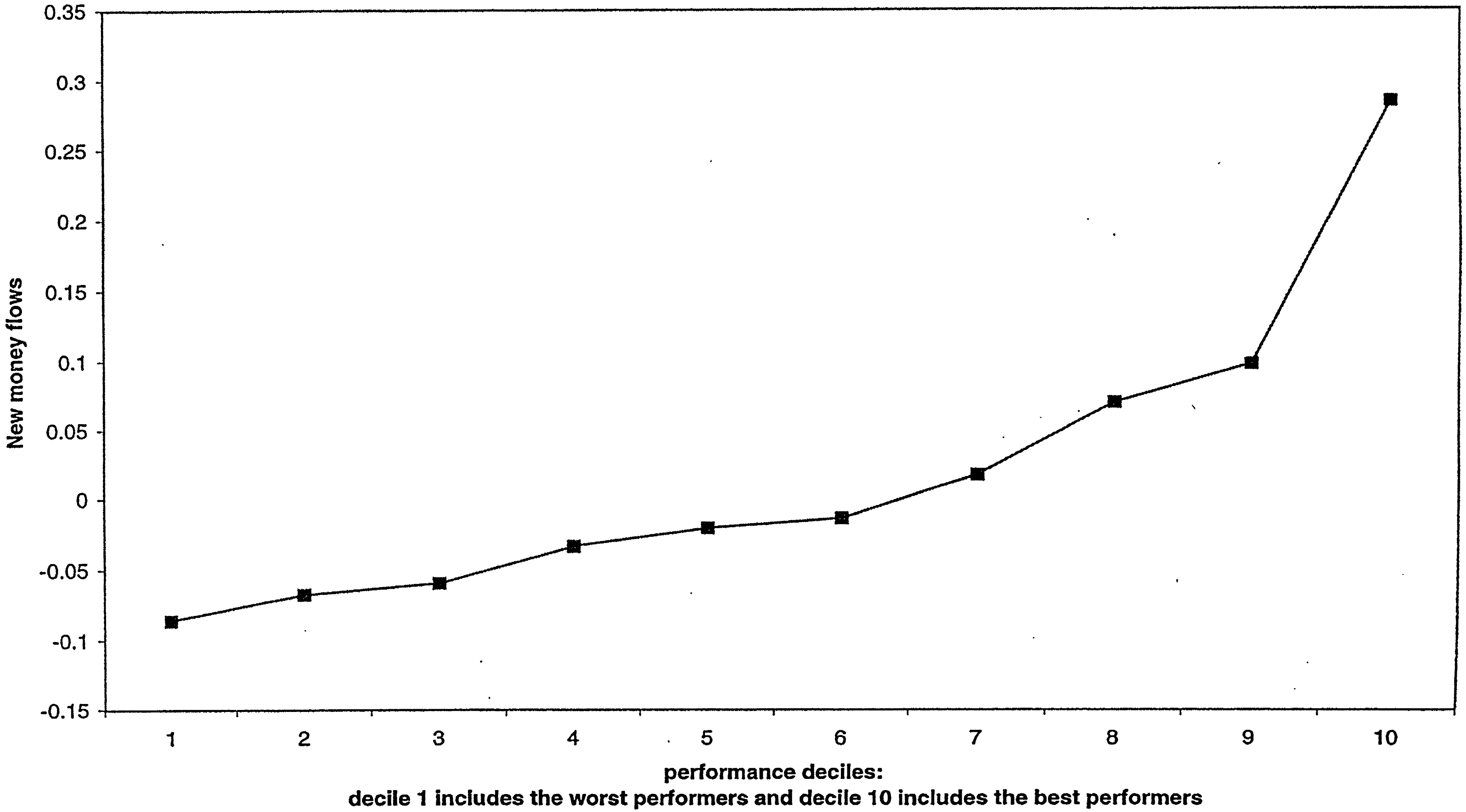

Figure 2: Average Number of Funds Managed by Fund Families

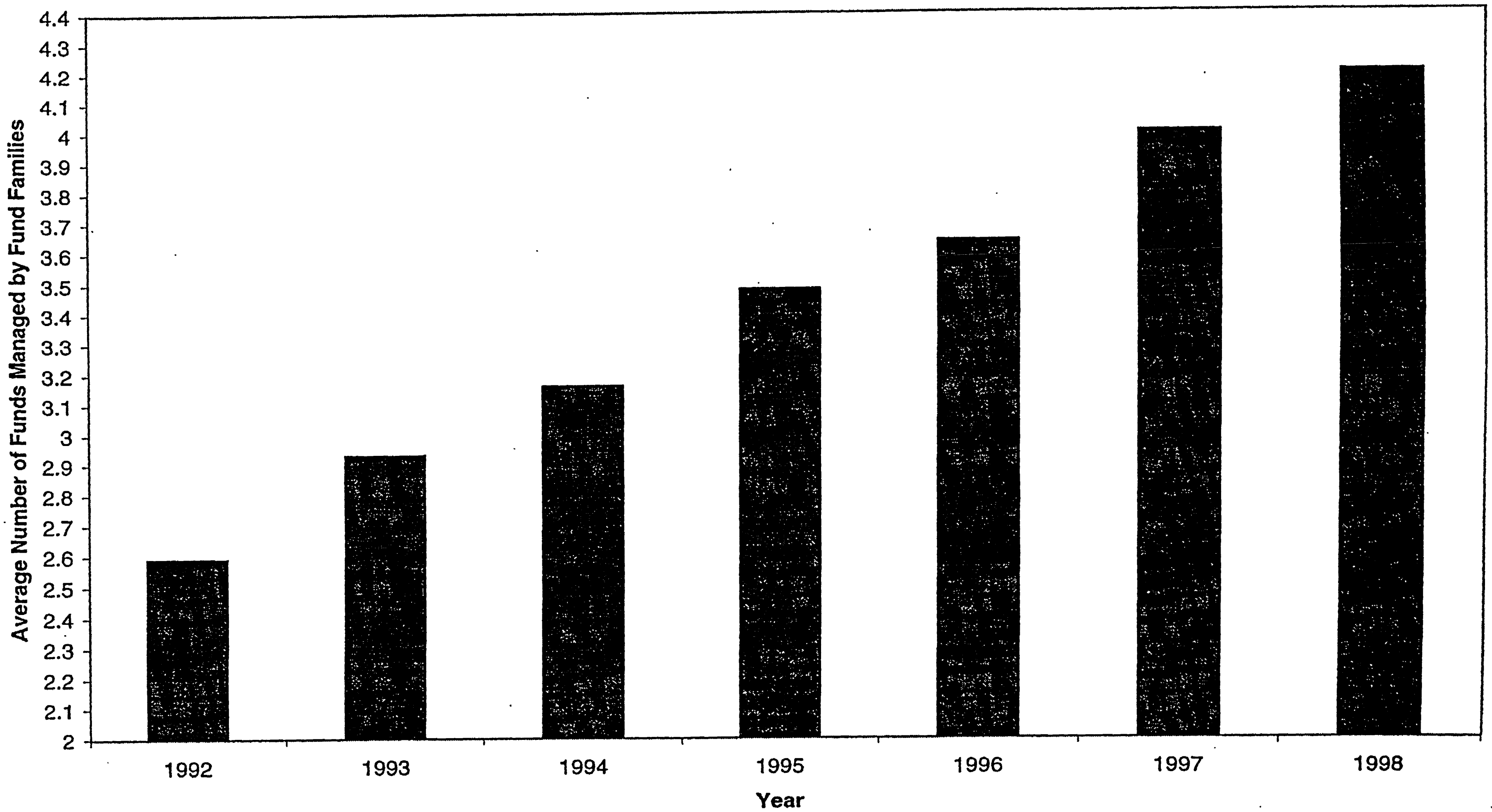

Figure 3: Cross-fund Return Standard Deviation of Fund Families