Institutional Investors and Mutual Fund Governance: Evidence from Retail – Institutional Fund Twins

Richard B. Evans and Rüdiger Fahlenbrach*

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Abstract

Some investment advisors offer multiple versions of a fund with the same manager and highly correlated returns. But these "twin" funds are separate portfolios for different investors with differing abilities to select and monitor managers. Using a matched sample of retail and institutional twin funds, we investigate whether retail investors benefit from investing alongside their institutional counterparts. We find that retail funds with an institutional twin outperform by 1.5% risk-adjusted annually. We demonstrate that institutional twin investors are more sensitive to high fees and poor risk-adjusted performance than retail investors. We analyze whether the difference in sensitivities can help explain the better performance by focusing on changes to fees and portfolio composition of retail funds after the creation of an institutional twin. We find that after the institutional twin is created, retail investors benefit from lower turnover, reduced expenses and greater managerial effort consistent with the reduction of agency problems from greater monitoring.

JEL Classification: G23, G34

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* Evans (evansr@darden.virginia.edu) is Assistant Professor of Finance at the Darden School of Business, University of Virginia. Fahlenbrach (ruediger.fahlenbrach@epfl.ch) is Assistant Professor at Ecole Polytechnique Fédérale de Lausanne, and affiliated with the Swiss Finance Institute. We gratefully acknowledge helpful comments and suggestions from Amit Goyal, Erwan Morellec, David Musto, Brian Reid, Russ Wermers, and seminar and conference participants at Darden School of Business, Escuela Superior de Administración y Dirección de Empresas, Ecole Polytechnique Fédérale de Lausanne, McIntire School of Commerce, Wharton's 2011 Rodney L. White Center Conference on Household Portfolio Choice and Investment Decisions, Universitat Pompeu Fabra, and William & Mary. Viktoras Vatinas provided excellent research assistance. Evans and Fahlenbrach gratefully acknowledge financial support from INQUIRE Europe and Fahlenbrach acknowledges financial support from the Swiss Finance Institute and the National Centre of Competence in Research "Financial Valuation and Risk Management" (NCCR FINRISK). Address correspondence to: Richard Evans, University of Virginia, Darden School of Business, 292A Faculty Office Building, Charlottesville, VA 22906.

Introduction

The ability of investors to vote with their feet is the principal investor safeguard in mutual funds. Because mutual fund investors can redeem their shares at net asset value, they can effectively remove the manager from the control of those assets. Fama and Jensen (1983) liken the feature of 'redeemable claims' to a 'partial takeover or liquidation', and argue that this market governance reduces the need for other forms of governance in mutual funds.

Whether or not 'redeemable claims' effectively safeguard investors, however, depends on whether investors use the correct criteria to evaluate funds, and the existing evidence suggests that retail investors fail to respond to many useful signals.[1] In stark contrast with the evidence for retail investors, sophisticated institutional investors respond to useful measures such as expenses and risk-adjusted performance. They exercise market governance and punish poorly performing managers by withdrawing assets under management (e.g., Del Guercio and Tkac (2002); and Goyal and Wahal (2008)).

In this paper, we use a matched sample of 474 retail and institutional funds to determine whether retail investors can benefit from the ability and willingness of institutional investors to exercise market governance. We examine a subset of retail mutual funds that offer a separate version of the fund for institutional investors either in mutual fund or separate account form, but where the same managers follow virtually the same strategy for both the retail and institutional assets. Cross-sectional differences in the creation date of the institutional and retail mutual funds enable us to examine whether performance for retail mutual fund investors improves after the addition of institutional assets. Specifically, we focus on the quarter of our twin matches (28% or

[1] For example, Sirri and Tufano (1998) and Del Guercio and Tkac (2002) find that mutual fund investors use raw return performance to evaluate funds and flock disproportionately to recent winners but do not withdraw assets from recent losers. This convexity leads to well-known problems such as mutual fund managers having incentives to alter the risk of their portfolios if they are close to being among the winners (e.g., Brown, Harlow, and Starks (1996); and Chevalier and Ellison (1997)).

134 out of 474) where the institutional twin is created after the retail fund. The risk-adjusted performance of the retail funds improves economically and statistically significantly after the addition of the institutional twin relative to a propensity-score matched control sample. The increase in performance is all the more surprising, because the institutional assets increase assets under management by over 200 percent, and the past literature typically finds that performance is a decreasing function of fund size (e.g., Chen, Hong, Huang, and Kubik (2004)).

We then examine different channels through which monitoring by investors in the institutional twin fund could help retail twin funds outperform their peers without twins. We compare differences in expense ratios, the return gap, brokerage commissions, trading volume, and portfolio characteristics for the matched sample of retail funds with and without twins. We find a decrease in the overall expense ratio and in each of the three components (i.e. advisory, administrative and distribution fees) for retail funds that add an institutional twin with administrative fees exhibiting the largest percentage decrease. We also examine the change in the return gap measure of Kacperczyk, Sialm and Zheng (2008) which broadly measures changes in unobserved managerial actions (i.e. trading costs and performance enhancement or degradation due to trading) separate from changes in the expense ratio. Using this measure, we find that the return gap for retail funds with institutional twins improves strongly relative to the control sample accounting for approximately 1/3 of the overall increase in risk-adjusted performance. Unlike the expense ratio, we cannot explicitly separate out the components of these unobserved managerial actions, but we examine proxies for a principal component: trading costs. In addition to decreased fund trading, we also find that the use of soft dollar payments for distribution decreases. We obtain qualitatively similar results when we analyze the brokerage commission rate. Separate from fees and the return gap, increased managerial effort resulting in

improved stock selection can also improve fund performance. With greater institutional monitoring, managers may expend greater effort in analyzing and selecting stocks. While measuring manager effort is difficult, when we look at fund trading and portfolio holdings characteristics, we find some evidence consistent with greater exertion of managerial effort, namely that the managers of retail funds with twins select stocks with lower analyst coverage relative to the control sample. Overall, we find strong evidence that retail investors benefit from the expertise and provision of market governance of institutional investors by investing alongside them.

Over the past few years, the role of fund governance has attracted considerable attention in both the finance and legal literature. The focus of the empirical finance literature has been on internal governance mechanisms such as the quality of the board of directors or director equity compensation.[2] Research on mutual fund board governance has identified an impact of boards on fees, stale pricing, fund merger activity, manager turnover and fund performance.[3] Our study contributes to this strand of the literature, because the existence of an institutional twin fund can be interpreted as an external governance mechanism. The institutional twin funds consist of significant investments by a small group of institutional investors, comparable to large shareholders in public corporations. To the best of our knowledge, the issue of the importance of large shareholders has not been addressed in the context of mutual funds.

[2] Chen, Goldstein, and Jiang (2008), Cremers, Driessen, Maenhout and Weinbaum (2009), and Meschke (2008) all document that funds whose directors hold a larger fraction of their shares exhibit superior performance.

[3] Tufano and Sevick (1997) find evidence that fees are lower for mutual funds whose boards are smaller and have a larger fraction of independent directors. Zitzewitz (2003) shows that the incidence of stale-pricing in fund complexes is higher for funds with fewer independent directors. Khorana, Tufano, and Wedge (2007) examine a sample of fund mergers and conclude that there is a higher probability of a merger if a fund has underperformed and if it has a higher fraction of independent directors. Ding and Wermers (2005) find that funds with a larger number of outside directors are more likely to replace a poorly performing manager. Adams, Mansi, and Nishikawa (2010) find that index funds with smaller boards, boards with inside directors who are also fund sponsor officers, and boards made up exclusively of independent directors are associated with improved performance.

Much of the discussion on market governance in the legal literature stems from a recent court case that challenged the so-called "Gartenberg standard" of mutual fund fees and involved twin funds. [4] The U.S. Court of Appeals, Seventh Circuit and the U.S. Supreme Court discussed the issue of twin funds in their consideration of a recent mutual fund fee case, Jones v. Harris Associates. The case addresses a twin-fund arrangement where Oakmark (the fund family advised by Harris Associates L.P.) charged different fees to retail clients as compared to institutional clients even though both were getting essentially the same investment product. At the core of the argument was how efficient market governance can be for retail mutual fund investors.[5] Our evidence contributes to this literature. It suggests that despite being charged higher fees than the institutional investors, retail twin fund investors can still benefit from a twin fund arrangement *relative* to non-twin retail fund investors.

Our paper is also related to two recent papers on the side-by-side management of hedge funds and mutual funds (Nohel, Wang, and Zheng (2010), and Cici, Gibson, and Moussawi (2010). The two papers also exploit the fact that some managers manage different funds at the same time, but their focus in on the quality and retention of the manager, and internal transfer payments.[6]

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[4]Excessive fee litigation cases have relied on the Second Circuit's Court of Appeals 1982 opinion in Gartenberg vs. Merrill Lynch Asset Management, Inc. In its opinion, the court established a heavy burden on mutual fund investors. Investors have to prove that the fee charged is "so disproportionately large that it bears no reasonable relationship to the services rendered and could not have been the product of arm's-length bargaining." For an overview of the legal literature on fund governance, see Morley and Quinn (2010).

[5] On appeal, chief justice Frank Easterbrook not only concurred with the district court's decision for summary judgment, but he challenged the whole premise behind the Gartenberg standard by suggesting that market governance was an effective mechanism to safeguard investors from excessive fees: "The trustees (and in the end investors, who vote with their feet and dollars), rather than a judge or jury, determine how much advisory services are worth." In the dissenting opinion on the petition for rehearing the case En Banc, Judge Richard Posner disagreed with this sentiment stating: "The panel bases its rejection…mainly on an economic analysis that is ripe for reexamination…. Competition in product and capital markets can't be counted on to solve the problem…."

[6] Nohel, Wang, and Zheng (2010) examine 112 cases where the same fund manager simultaneously manages mutual funds and hedge funds. The main finding is that the best mutual fund managers would potentially leave their mutual fund families and open their own hedge funds because of a more attractive compensation package, but that the permission to run an in-house hedge fund works well as a retention device. Cici, Gibson, and Moussawi (2010)

The remainder of our paper is structured as follows. Section 1 describes the data and offers summary statistics. Section 2 gives an example of a retail-institutional twin fund. Section 3 examines market governance by comparing the flow-performance and flow-fee sensitivities of institutional fund investors to those of their retail counterparts. Section 4 contains the empirical analysis of retail mutual fund performance and characteristics after the creation of a twin institutional fund. Section 5 examines the robustness of our main result by carrying out a placebo experiment, and Section 6 concludes.

1. Data

Our sample consists of domestic U.S. equity mutual funds in the Morningstar database from January of 1996 to December of 2009.[7] The principal sample used throughout the paper consists of retail funds and our analysis is performed at the fund level (e.g. share classes are aggregated and all variables are value-weighted by the total net assets of the individual share classes of the fund). We classify funds with all retail or both retail and institutional share classes as retail. Table 1 contains sample summary statistics. Panel A of Table 1 contains a breakdown of the number of funds and observations by year. Because our regressions control for lagged variables, the first year of data for our analysis is 1997. The number of funds is 794 in 1997 and increases in almost every year to a maximum of 2,089 in 2008. Overall, our sample contains 2,806 unique retail mutual funds.

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study mutual fund performance when parent firms (but not necessarily the same manager) simultaneously manage hedge funds and focus on the inherent conflicts of interest to transfer performance from mutual funds to hedge funds. They find that the mutual funds managed by these firms underperform a matched sample of other mutual funds.

[7] We use the Morningstar "U.S. Broad Asset Class" variable to identify the domestic equity sample. Specifically, we require all funds to have a U.S. Broad Asset Class designation of U.S. Stock. We then remove all funds with a Morningstar "Global Category" classification of Real Estate or any of the real estate industry sector classifications.

Panel B shows the breakdown of funds into those with and without an institutional twin. To construct the sample of possible institutional twins, we combine separate account and institutional mutual fund data from Morningstar. While the separate account data comes directly from Morningstar, to identify the institutional mutual funds we use an internal Morningstar share class identifier and classify a fund as institutional only if all of the fund's assets are institutional investments as designated by Morningstar. We then compare the retail fund sample to the institutional sample to identify twin matches. A twin match is identified if the retail and institutional fund have the same manager(s)[8], investment objectives, fund families and a gross return correlation of 0.95 or greater.[9] As Panel B shows, 474 out of 2,806 unique retail mutual funds or 16.9% of the sample observations have an institutional twin. Of these institutional twins, 350 are from the separate account sample and 124 are from the institutional mutual fund sample described above.

Panel C offers summary statistics for the retail funds in the sample, split by whether they ever have an institutional twin or not. The table lists the mean, median, 25th and 75th percentiles of the fund family size, fund size, expense ratio, turnover (the minimum of fund purchases and sales divided by fund total net assets or TNA), the quarterly net flow into the fund, the fund's 4-factor alpha and the percent of the observations coming from broker-sold funds. Unless otherwise noted, statistics are based on monthly observations. Fund family size[10], expense ratio, turnover and the percent of observations from broker-sold funds are comparable across the two samples. Funds with twins have larger median TNA, higher flows and better 4-factor alpha

[8] Because fund manager information is used in identifying fund twins, those funds that are missing manager information or only classify the manager as "Management Team" are removed from the sample.
[9] While setting a lower bound on the return correlation is a logical safeguard, when matching on the first three criteria alone, the mean and median return correlation is 0.98 and 0.99.
[10] While the differences in mean and median fund family size between funds with and without and institutional twin are in the billions of dollars, these differences are small relative to the dispersion of fund family size (~$20 or $30 billion).

performance. While the difference in performance is particularly interesting given the focus of our study, it is important to recognize that this result does not suggest causality. Indeed, we would expect that the funds that are most likely to be sold to multiple clienteles would be those with the best performance. The larger size of these funds and the higher inflows are also consistent with this interpretation. The summary statistics for the "Twins Sample" also includes information about the start date of the retail fund relative to its institutional twin. The second-to-last row of Panel C of Table 1 gives the mean, median, 25^{th} and 75^{th} percentiles of the relative start date, defined as the difference in years between the inception date of the institutional twin and the inception date of the retail fund. The mean relative start date value of 0.9, for example, indicates that the average institutional twin was started 0.9 years after its retail counterpart and the negative 25^{th} percentile shows that the sample also consists of twin pairs where the institutional fund was started before its retail twin.

Panel D further explores this heterogeneity in twin start dates; showing the number of twins where the retail fund was started first, the institutional fund was started first, and the retail and institutional funds were started on the same date (Same Incept. Date). In some cases the retail or institutional twin fund was started before the sample period began (1996) so the last three columns of Panel D repeat the breakdown for the sample of 321 twin funds where the inception date for the twin fund (i.e. the second fund created) occurs during the sample period. The 134 twin pairs where the retail fund was started first and the institutional twin was created during the sample period are important for our identification strategy. A pre-twin period for the retail fund allows us to identify the incremental effect of the institutional fund's market governance on retail mutual fund investors. In addition, such a sample enables us to provide estimates from propensity-score matched samples. With propensity-score matching, one first

analyzes which retail funds are the most likely to create an institutional twin, and then compares a treatment sample of twin funds with an appropriate control sample.

While the majority of our analysis focuses on retail funds, Table 2 characterizes the institutional twin fund sample. Panel A offers summary statistics for the sample of institutional twin fund-months. Because separate accounts do not have the same disclosure requirements as mutual funds, some variables, such as turnover, are not as well populated in the database and the flow and TNA data is only given at a quarterly frequency. As a result, in addition to the mean, median, 25^{th} and 75^{th} percentiles, we also list the number of fund-month observations. Comparing the institutional funds to their retail counterparts (twins sample in Table 1, Panel C), we see a number of differences. Consistent with an institutional clientele, expense ratios and mean turnover (less flow related trading) are lower and fund size is larger. Although performance is better for the institutional twins, the difference between the retail and institutional fund performance is roughly equivalent to the difference in expense ratios.

While comparing Panel C of Table 1 and Panel A of Table 2 gives an approximation of the differences between retail funds and their institutional twins, we formally test these differences in Panel B of Table 2. To construct this table, we merge monthly retail fund data with the corresponding monthly institutional twin data when it is available.[11] For each matched pair-month observation, we then calculate the difference in variables of interest. The differences are first averaged over time for each of the matched pairs. Panel B of Table 2 provides cross-sectional sample statistics from the time-series averages of the matched pairs and the number of matched pairs for which the variable of interest is available. The table shows that the average (median) institutional fund is $576.7 ($86.8) million larger than its retail twin and has an expense

[11] While return data for the separate accounts is available at a monthly frequency, the total net asset and flow data is only available at a quarterly frequency. For these variables, we calculate the institutional-retail differences at a quarterly frequency.

ratio that is 0.41% (0.44%) lower. The table provides p-values for difference in means (t-test) and medians (sign test) which indicate that these differences are statistically significantly different from zero.

As the table indicates, institutional twins are larger, they have lower expense ratios and turnover and a higher percentage of their portfolio invested in common stock. In each case, these differences are consistent with differences in the type of investors. Because investors in separate accounts typically have much larger investments, they also have much lower expenses. Similarly, because the flows from these investors are typically more predictable and less volatile, managers do not need to hold as much cash on hand to meet redemptions and do not need to trade as much to account for them.

The table also compares three different annualized performance measures: 4-factor alphas, net total return, and gross total return. The 4-factor alphas are calculated over the previous 36 months with the standard set of factors proposed by Fama and French (1993) and Carhart (1997): market (MKT), market capitalization (SMB = small minus big), book-to-market (HML = high minus low) and momentum. While the institutional funds outperform their retail twins in terms of both 4-factor alpha and net total return (both net of fund expenses), comparing the means and medians of these differences to the difference gross total return, we see that the outperformance is roughly equivalent to the difference in expense ratios (~40 bps). We do find, however, a small but marginally statistically significant difference in mean gross returns, but this is not surprising given the lower turnover and the higher percentage invested in common stock described above.

We also examine differences in the factor loadings between matched pairs to assess differences in risk. This comparison indicates that there are no significant differences with the

sole exception of the t-test for the market capitalization (SMB) factor. While this difference is marginally statistically significant, note that the coefficients are multiplied by 100 so the average difference in this factor loading for the institutional funds is an economically small -0.00498, and there is no difference in medians for this variable. Overall, the comparisons of Table 2, Panel B suggest that while there are important economic differences between retail funds and their institutional twins, there is little or no difference in the performance other than the fee differential and little or no difference in risk between the twin pairs.

2. Retail-Institutional Twins: An Example

The focus of our paper is the role of market governance provided by institutional investors and its impact on retail investors in twin funds. To illustrate the nature of these twin funds, we provide in this section an example of a matched pair from our sample: the GE U.S. Equity Fund and the GE Institutional U.S. Equity Fund.

Figure 1 contains the manager names and investment objective of the two funds as taken from the respective June 30th, 2009 prospectuses. As Figure 1 shows, the managers, the investment objective and the fund family for the two funds are the same. We use these three criteria, in addition to the return correlation between the twin pair, to identify the matched sample.

Figure 2 shows the holdings of the matched pair in this example. The percentages of each stock held by the retail and by the institutional fund differ, evidence that the two portfolios are not pooled. It is interesting to note that the percentage of the portfolio in each stock in the institutional fund is higher than the retail version of the fund. Consistent with lower flow

volatility and more predictable flow (one potential benefit of institutional assets), the institutional version of the fund holds less cash and consequently, holds more of the portfolio in equities.

Once a matched sample is identified, we can examine the differences in flow or market governance between retail funds and their institutional twins and the potential impact of the existence of an institutional twin on fund performance. A comparison of the monthly net percentage flows of the GE U.S. Equity Fund and its institutional twin, the GE Institutional U.S. Equity Fund from January 1998 to June of 2009 is given in Figure 3.

The gray columns represent the monthly net flow of the GE Institutional U.S. Equity Fund and the white columns represent the flow of the retail version of the fund, the GE U.S. Equity Fund. While percentage flows may not be a useful metric if the overall size of the two funds is dramatically different, on June 30th of 2009, the institutional fund had $387 million in assets and the retail fund had $278 million. Looking at Figure 3, the very different flow patterns suggest substantial differences between retail and institutional investors. Although the funds have the same manager and very similar total return performance, the flows are negatively correlated. Overall, the correlation between the two fund flows is -0.42. This correlation is obviously influenced by a number of months were there were large, opposite net flows for the two funds, but if we assign fractional ranks between 0 and 1 to the monthly flow observations (thereby mitigating the influence of the outliers) and repeat the calculation, the correlation is a statistically insignificant 0.15. The low correlation between retail and institutional flows is consistent with investor types being focused on different performance measures. For example, the correlation of lagged net flows with the fund's Morningstar Rating, a measure of past performance, is 0.64 for the retail fund and -0.14 for the institutional fund. The apparent focus on different performance measures may, in part, explain the difference in flows.

The example demonstrates how our identification strategy works. Using a matched pair with the same manager, the same investment objective and the same fund family, we are able to control for the innate ability of the manager and the influence or impact of the fund family on performance. This allows us to identify whether fund selection and oversight criteria of different types of investors affect fund performance and fund manager's behavior.

3. Fund-flow-sensitivity of retail mutual funds and institutional mutual funds

We now examine the determinants of net flows into retail and institutional funds to identify whether these two types of investors respond to different signals. Our working hypothesis is that institutional investors use more sophisticated criteria to evaluate fund managers and have a greater aptitude for market governance. While other papers (e.g., Tkac and Del Guercio (2002)) have provided some evidence of this with a broad sample of institutional and retail funds, we seek to establish the same fact for a matched set of retail and institutional funds with the same manager, investment objective and fund family and very similar gross performance. Using a matched sample reduces the possibility that the differences we observe are due to factors other than clientele.

Table 3 shows the results from regressions examining the determinants of fund flow in our sample. The dependent variable is percentage quarterly net fund flow for the next quarter (t=0 to t=3). The independent variables include the lagged (t= -1) natural log of fund family TNA and fund TNA, the lagged fund expense ratio, lagged turnover, the concurrent (t=0 to t=3) percentage quarterly flow to funds with the same investment objective, the lagged percentage quarterly fund flow, and two different measures of performance (36 month total return and 4-

factor alpha computed from the previous 36 months of data). The standard errors are clustered by fund and by date.[12]

Specifications 1 and 2 give the coefficients on the standard set of controls for the combined sample with total return and 4-factor alpha as the performance measures respectively. The coefficient on family size is positive and on fund size negative. This is consistent with larger fund family size proxying for higher visibility or lower search costs for investors. The negative sign on fund size is consistent with Berk and Green's (2004) and Chen, Hong, Huang and Kubik's (2004) diseconomies of scale arguments. The negative sign on fund expenses suggests that investors are avoiding high expense funds. The positive and significant coefficients on investment objective flows and lagged fund flows are consistent with previous evidence of herding behavior (i.e., Sirri and Tufano (1998)) within an investment objective and strong positive fund flow autocorrelation generated by automated investment programs such as 401(k), 403(b), 529 or other tax deferred investment programs. Last of all, both the total return and the 4-factor alpha performance measures are strongly positively related to performance, suggestive of performance chasing behavior. Similar to Sirri and Tufano (1998), we allow for non-linearity in the performance measures in all specifications. We use a piece-wise linear performance specification with a kink at the 50th percentile of returns.[13] Consistent with the results of Sirri and Tufano (1998), the total return specification exhibits non-linearity with flow responding more positively to high returns (greater than 50th percentile) than to low returns but the risk-adjusted performance does not.

[12] While we focus on the matched retail-institutional sample here, Section A of the appendix repeats the analysis for the entire sample of retail and institutional funds and thus allows for a comparison of our results with those reported previously.

[13] For the total return measure, the percentiles are calculated within date and investment objective similar to Sirri and Tufano (1998), while the 4-factor alpha percentiles are calculated within date only. With these percentiles, the formula for the low return is Minimum(0.5,ReturnPercentile) and the formula for the high return is Minimum(0.5, ReturnPercentile – LowReturn).

In order to assess whether institutional investor fund flow is driven by different criteria, we allow for separate coefficients for institutional and retail fund flows on each of the variables in specification 3. We also include both the risk-adjusted and total return measures to see whether retail and institutional flows respond more strongly to either measure. The coefficients for retail funds are under the *Retail Coef* header and the coefficients for institutional funds are under the *Inst. Coef* header. We test whether the coefficients on the expense ratio and performance measures for retail and institutional funds are statistically significantly different from each other. The p-values from these tests are listed at the bottom of the table.

The first coefficient of interest is that on the expense ratio. Carhart (1997) provides evidence that past expenses negatively relate to future returns. As a result, investors should avoid high fee funds. Comparing the expense ratio coefficients for institutional and retail funds, we see that institutional flows are five times more sensitive to expenses (-0.0559 vs. -0.0064) as retail funds and the difference is statistically significant with a p-value of 0.019.

The second coefficient of interest is that of performance. Carhart (1997) shows that poor risk-adjusted performance is persistent and that funds with high total returns exhibit mean reversion. As a result, investors should avoid funds with poor risk-adjusted performance and they should not chase past total returns. In specification 3 we compare the sensitivity of retail and institutional investors to both 4-factor alpha and total return allowing for non-linearity in both the total return and the 4-factor alpha coefficients. While retail flows are sensitive to both the high and low total return coefficients, institutional flows are not statistically related to total returns. Looking at the 4-factor alpha coefficients, we see that not only are the institutional flows more sensitive to poor risk-adjusted performance than retail flows, the piece-wise linear specification for institutional flows exhibits concavity in stark contrast to the observed retail flow

performance convexity. In other words, institutional investors respond with greater sensitivity to poor performance than they do to good past performance and the difference in the retail and institutional response to poor risk-adjusted performance is strongly significant.

Overall the evidence from flows is compelling. Institutional investors respond more sensitively to the variables that predict returns, namely, expenses and poor risk-adjusted performance. In addition, they avoid total return chasing behavior to a greater degree than their retail counterparts. Given this evidence, it is possible that institutional investors play an important role in disciplining fund managers through market governance.

4. Analysis of the performance and characteristics of retail mutual funds around the creation of institutional twins

The previous section demonstrates that institutional fund investors indeed exhibit stronger market governance. But do retail investors benefit from the presence of institutional investors? We make use of a particular subset of our sample of twin funds to address this question. In 134 out of 474 twin observations, the retail mutual fund was created before the institutional twin and the institutional twin was created during our sample period. For this sample we can examine various fund characteristics before and after the institutional twin is created. It is unlikely, of course, that institutional investors randomly choose a subset of retail funds. We would expect that characteristics such as past flows, size of the fund family, or other fund characteristics that potentially play a role for the future performance of the fund also play a significant role in the selection by institutions. We therefore use propensity-score matching techniques to compare the change in retail fund performance and characteristics for retail twin

funds before and after the creation of their institutional twin (treatment group) with a carefully matched sample of funds with no institutional twin (control group). [14]

Propensity score matching techniques were pioneered by Rosenbaum and Rubin (1983) and have been used recently in the finance literature by, for example, Drucker and Puri (2005) and Aggarwal, Erel, Stulz, and Williamson (2009). It is important to note that propensity score matching cannot take into account differences in unobservable firm characteristics. Yet Drucker and Puri (2005), using the insights of Heckman et al. (1997, 1998), come to the conclusion that the potential bias from ignoring differences in unobservable attributes is small. In the absence of an experiment or a clean instrument, we use propensity scores for econometric matching. The results we report are based on nearest neighbor matching using ten observations from the control-group.

In the first stage of the analysis, we calculate each retail fund's propensity score, which is equal to the probability that the fund family of a retail fund with given characteristics will create an institutional twin in the coming year. The coefficients for the probit regression are given in Panel A of Table 4. The control variables include an intercept, fund performance (4-factor alpha), fund flow, fund size and the size of the fund family's retail and institutional assets under management, an indicator variable of whether or not the family manages any other institutional assets, expense ratio, turnover, tracking error of the fund's returns relative to the 4-factor model determined benchmark and indicator variables for the distribution channel (Broker-Sold) and whether or not the fund is passive (Index Fund). The decision to create an institutional twin is

[14] We believe that the propensity-score matched sample comparison is the most suitable approach to examine the impact of an institutional twin creation on excess performance of retail funds. However, the drawback of the propensity-score matched sample is a relatively small sample size. To alleviate concerns that our results are an artifact of the small sample, we estimate performance attribution regressions with two alternative specifications that use all retail mutual funds of the sample in Sections B and C of the Appendix. The results of these additional tests are qualitatively and quantitatively similar to those reported in Table 5.[15] Young v. Nationwide Life Ins. Co. - 2 F.Supp.2d 914 (S.D. Tex. 1998).

principally related to three factors: fund flows, fund size and the distribution channel of the fund. While these three variables are economically intuitive, the overall fit of the model is low with a pseudo R-squared of 6.68%. Given the dearth of variables that predict future fund performance, however, the low R-squared is not surprising. For example, while it might seem logical that risk-adjusted past performance would be a focus for institutional investors, we don't find it to be a statistically significant predictor of the decision to create an institutional twin. This could be due to the fund size and/or flow variables subsuming the effect of performance. It could also be that institutional investors don't focus on good past performance in selecting funds and managers. Consistent with this interpretation, our flow results in Table 3 show that institutional investors respond strongly to poor risk-adjusted performance, but the impact of good risk-adjusted performance on flow is less pronounced. Additionally, neither Carhart (1997) nor Busse, Goyal and Wahal (2010) find performance persistence for high performing retail or institutional funds, respectively. Based on these results, it is not unreasonable that a sophisticated institutional investor might place less emphasis on past performance and consequently that this variable would be unrelated to the decision to create an institutional twin.

It is also surprising that the fund families' prior experience managing institutional assets is not significantly related to the probability of offering an institutional twin. It is important to note that the probit regression is *not* estimating the probability of the fund family opening any type of institutional product but rather it is estimating the probability of the fund family opening only a specific type of institutional product: the twin of an existing retail fund. The fund family's institutional TNA variables measure the aggregate assets of all institutional products offered by the family as captured by the separate account and institutional mutual fund databases

described earlier and not just twin funds. The majority of institutional assets in the Morningstar database are invested in funds that are not twins.

In spite of the low R-squared of the propensity score model, Panel B of Table 4 shows that the matching works well for all of the fund and family characteristics examined. The differences in past performance, fund flow, expenses, fund and family size and other characteristics between the treatment and control sample are economically small and statistically insignificant.

After identifying the control sample, we are able to examine the impact of creating an institutional twin on retail fund performance. Table 5 shows results for the 4-factor risk-adjusted performance of the treatment funds for the three years before compared to the three years after the institutional twin is created. The requirement of a 6-year window decreases the sample size from the original 134 to 98 retail-first funds. For the three years before the institutional twin is created, the average retail mutual fund in the treatment sample has a negative annualized 4-factor alpha of -0.373%. The control group has a risk adjusted performance of -0.17% over the same period and the two are not statistically different. For the three years after the institutional twin is created, the treatment sample averages risk-adjusted performance of a statistically insignificant -0.038%, and the change in performance across the event is a statistically insignificant 0.335%. The control sample, on the other hand, has a statistically significant negative alpha of -1.383%. These funds average a -1.213% deterioration in performance. Comparing the increase in performance for the treatment group of +0.335% with the decrease in performance for the control groups of -1.213%, the retail funds outperform the matched sample after the addition of their institutional twins by a statistically and economically significant risk-adjusted 1.548% per year.

In Table 5 we also examine the change in the retail fund's tracking error (Treynor and Black (1973)) relative to the 4-factor model. We analyze the tracking error for two reasons. First, institutional investors commonly use the information ratio (the ratio of a fund's alpha to its tracking error) as a metric to assess the value added by a fund manager relative to the manager's deviations from the benchmark by which he or she is judged and by which the institutional investors have established their asset allocation. While alpha relative to the benchmark is valued, deviating from the benchmark which characterizes the optimal asset allocation set by the institutional investors is not. Second, while the 4-factor model accounts for the fund's market, size, book-to-market and momentum factor exposures, it is possible that the outperformance observed in Table 5 is due to incremental risk-taking on the part of the fund in factors not captured in the 4-factor specification. Comparing the tracking error of the treatment and control groups we see that while both groups decrease their tracking error or the incremental risk relative to the benchmark, this decrease is larger for the treatment group. Overall, we see that when an institutional twin is added, the performance of the corresponding retail fund improves in conjunction with a decline in tracking error relative to the control sample.

While the evidence in Table 5 about performance increases and risk decreases in retail mutual funds with twins is compelling, it does not shed light on the mechanism through which increased monitoring of the institutional portfolio could benefit retail investors. Because the retail fund and the institutional twin are separate portfolios of different size and somewhat different portfolio composition there is no mechanical reason why changes made to the institutional fund's fee structure and portfolio composition would result in changes to the retail fund's fee structure and composition. Legal and regulatory guidelines, however, help us identify why retail investors could benefit from better oversight of the institutional investors.

First, the relevant legal precedent for performance differences between twin funds is Young vs. Nationwide Life Insurance.[15] In this case, the shareholders of a variable annuity life insurance fund successfully sued the life insurance fund sponsor on the basis of differences in performance between the mutual fund and its variable annuity fund twin. The case establishes fund liability for differences in performance.

Second, in negotiating fees with the advisor, mutual fund boards can use a comparison of fees charged by other funds or fees charged to other clients such as pension funds or other institutional investors. While the SEC has required boards since 1994 to disclose the material factors used and the rationale for approving an advisory contract (such as a fee comparison)[16], the SEC modified the disclosure requirements in 2004 to specifically require that boards discuss their use of fee and service comparisons, in addition to a small list of other factors. Hence, by allowing lower fees for the institutional fund and not discussing such lower fees when setting the fees of the retail twin fund, a board of directors may expose itself to legal liability and violate its fiduciary duties.

Third, in their analysis of the Jones v. Harris Associates case, the Supreme Court makes clear in their reinstatement of the Gartenberg standard that fee comparisons are relevant for excessive fee determinations:

> "First, since the Act requires consideration of all relevant factors, §80a–35(b)(2), courts must give comparisons between the fees an investment adviser charges a captive mutual fund and the fees it charges its independent clients the weight they

[15] Young v. Nationwide Life Ins. Co. - 2 F.Supp.2d 914 (S.D. Tex. 1998).
[16] 59 Federal Register 52689 (Oct. 19, 1994).

merit in light of the similarities and differences between the services the clients in question require."[17]

While the court does caution to be "wary of in-apt comparisons based on significant differences between those services", the nearly identical nature of twin funds suggests that boards would be particularly mindful of fee differences between twin financial products.

In addition to establishing the legal and regulatory ramifications of differences between twin funds, these three reasons identify possible channels through which institutional investor monitoring of one portfolio could affect a twin retail portfolio, namely, performance, fees and managerial effort. In Table 6 we explore these channels by analyzing changes in expense ratios, trading, portfolio characteristics, brokerage commissions, and soft dollars distributions before and after the addition of an institutional twin. Panel A explores the impact of an institutional twin on the fund's expense ratio and the components of the expense ratio: advisory fees, administrative fees and distribution fees. The data for this analysis is taken from a database of SEC N-SAR filings that is described in Edelen, Evans and Kadlec (2011a).

Panel A of Table 6 shows that the expense ratio of the treatment group decreases after the creation of the institutional twin, by 5.3 basis points on average. Because the expense ratio of the control group increases over the same time period by 0.3 basis points, we find a total control-group adjusted change in the net expense ratio of 5.6 basis points. Separating the expense ratio into three components, advisory, distribution (12b-1) and administrative[18], we see that the decrease in the expense ratio is due to decreases in all three, but the largest decrease is in

[17] Jones v. Harris Associates L.P. 559 U.S. ___ (2010)

[18] The total expense ratio is identified in N-SAR question 72.X. To calculate the net expense ratio, reimbursements (72.Y) are subtracted from the expense ratio and the total is divided by fund TNA. The advisory and distribution components of the expense ratio are identified in questions 72.F and 72.T. The administrative component is composed of all remaining expenses including administrator fees, custodial fees, postage, printing expenses, director fees, bookkeeping fees, auditing fees, legal fees, etc. The contents of the N-SAR form can be found on the SEC's website: http://www.sec.gov/about/forms/formn-sar.pdf.

administrative fees. While it might be difficult for a typical retail investor to assess whether the amount paid by the fund for administrative fees such as auditing, legal or custodial fees was too high or too low, institutional investors including endowments and pension funds would have a working knowledge of such costs, and as such, would be more aware of excessive administrative fees. The second largest decrease is in the advisory fee, consistent with the discussion above that boards of directors are potentially worried about advisory fees in twin-fund settings.[19]

Separate from the expense ratio, Kacperczyk, Sialm and Zheng (2008) argue that unobserved actions affect fund performance. For example, a manager's efforts to improve trade implementation or minimize price impact could positively affect fund performance while trading costs or increasing other portfolio expenses that are not included in the expense ratio and are relatively opaque to investors could negatively affect it. To broadly measure these unobserved actions, they propose a new performance measure called the return gap. The return gap is the difference between the actual fund return and the return of the fund based on the previously disclosed holdings minus the fund's expense ratio. By comparing the actual fund return to the return on a hypothetical portfolio return constructed from a buy and hold strategy of the fund's last disclosed holdings, the return gap measures the aggregate value added or destroyed by a manager's actions above and beyond the fund's expense ratio. Panel B of Table 6 examines the return gap and trading costs of the treatment and control fund samples. As Panel B shows, the annualized return gap is positive for the treatment sample, i.e. these funds on average provide greater hidden benefits than costs, but negative for the control sample. More importantly, we see substantial improvement in the return gap (i.e., greater outperformance relative to the return on

[19] While the availability of N-SAR data limits the twin sample to 82 matches, in an unreported analysis, we also examine the expense ratio for Morningstar which is available before and after the twin addition for 124 matches. In this analysis, we also find a statistically significant decrease in the expense ratio relative to the control group. However, because Morningstar does not have data for the components of the expense ratio over our sample period, we are only able to analyze the expense ratio and not he components from this Morningstar data.

previously disclosed holdings) which almost doubles after the institutional twin creation for the treatment sample, but corresponding deterioration in the return gap for the control sample. The diff-in-diff effect is an economically large improvement in the return gap measure of 0.552% annualized.

Unlike the expense ratio, we cannot explicitly separate out the components of these unobserved managerial actions. However, we examine proxies for a principal contributor, trading costs, in Panel B. As Yan (2008) and Edelen, Evans and Kadlec (2011b) document, as fund size grows, fund trading becomes more detrimental to performance. Ideally, as a fund grows larger, the fund manager will trade less and exert more effort in implementing those trades to minimize their impact on fund performance. To assess total trading activity, we analyze trading volume in Panel B. Trading volume is the sum of the dollar value of the fund's purchases (N-SAR question 71.A) and sales (71.B) divided by fund assets. Our diff-in-diff results suggest that prior to the creation of an institutional fund, treatment and control group have a trading volume that is indistinguishable from each other at approximately 190%. However, for treatment firms, the trading volume goes down by 26 percentage points, while it slightly increases for control firms. Consequently the diff-in-diff effect shows an economically and statistically large decrease in trading volume.

We also examine changes in brokerage commissions and soft dollar usage, two other unobserved actions, in Panel B. Both brokerage commissions (Q21) and the use of soft dollars to pay for distribution (Q26.A) variables come from the N-SAR filings. Edelen, Evans and Kadlec (2011a) show that both of these costs are strongly negatively related to future performance and that they are opaque to retail investors. Recognizing their impact on performance, an institutional investor with greater awareness of these costs might discourage their use by the

investment advisor. Looking at the results in Panel B, we do not find a statistically significant change in brokerage commission rates. However, after the creation of a twin, we observe a substantial decrease of 5.8% of retail mutual funds that use soft dollar distribution. Because the fraction of funds using soft dollar distributions decreases for the control group as well, we find and overall diff-in-diff effect of -3.6%. Relative to the fraction of funds using soft-dollar distribution prior to the creation of the twin fund, the decrease is 15.5% and appears economically significant.

In addition to decreasing fees and increasing the return gap, performance could also be improved through increased managerial effort resulting in superior stock selection. Because the return gap compares the actual fund return to the buy and hold return on the previously disclosed portfolio holdings (i.e. the benchmark for the manager is the manager's own previously disclosed portfolio), it abstracts from the value added through a manager's superior stock selection.[20] While it is difficult to directly measure managerial effort, we attempt to proxy for it by examining portfolio characteristics before and after the institutional twin is added as a proxy. In particular we examine the value-weighted average number of analyst estimates per holding, and Active Share, a measure of the overlap between the fund's holdings and the closest related index developed by Petajisto (2010) and Cremers and Petajisto (2009). The value-weighted average number of analyst estimates captures whether fund managers invest in stocks with greater analyst coverage, an indication of less effort, or less analyst coverage, consistent with greater effort. Active Share, on the other hand, measures how actively a fund manager deviates from a relevant benchmark.

[20] It does include the value added through the manager's intra-holding period trades. In contrast, the performance measurement methodology used in Daniel, Grinblatt, Titman and Wermers (1997) and Wermers (2000) uses the return on a portfolio of characteristic-based stocks as the benchmark and not the manager's portfolio itself.

Panel C of Table 6 shows that, prior to the event, treatment firms hold, on average, stocks with more analyst coverage. After the institutional twin is added, on average the treatment group holds stocks with lower analyst coverage and the control group holds stocks with greater analyst coverage, showing a significant decrease in the value-weighted number of analysts of the treatment sample relative to the control. While the changes in analyst coverage are relatively small, this evidence is consistent with managers making a greater effort to identify stocks.

An alternative measure of managerial effort is Active Share.[21] Cremers and Petajisto (2009) construct Active Share as the percentage of portfolio holdings that differ from the benchmark index holdings and show that funds with the highest Active Share significantly outperform their benchmarks, both before and after expenses. The change in active share for the treatment group has a larger negative point estimate (i.e. less overlap with the benchmark or more active stock selection on the part of the manager) than the control group, but neither change is statistically significant nor is the difference in the changes.

To summarize, while our matched sample analysis shows that adding an institutional twin is associated with decreased fees, the effect is small (0.056% annually) relative to the overall impact on annual performance (1.548%). While the fee analysis compares the first year before and after the addition of a twin and the performance results compare the three years before and after, fees might continue to decrease in years two and three, but it seems unlikely they would decrease enough in those additional years to account for the full 1.548%. In contrast, the return gap analysis shows a performance improvement of 0.552% after adding an institutional twin, just over a third of the performance improvement. Separate from fees and the unobserved managerial actions measured by the return gap, increased managerial effort in selecting equities in the portfolio as a result of the increased monitoring could also improve performance. While

[21] The small number of matches is due to the coverage of the active share data which ends in 2006.

we cannot measure increased effort directly, our results using proxies for managerial effort are consistent with this interpretation. Overall, our analysis suggests that institutional investor monitoring can improve performance through reduced fees, decreased trading and the associated trading costs, and greater managerial effort.

5. Robustness

We demonstrate in Section 4 that retail mutual fund investors benefit from the creation of an institutional fund twin. Relative to a carefully chosen control group, retail fund performance increases and fees decrease after the creation of the twin. We argue that this effect can potentially be explained by increased monitoring of fund management through the institutional investors. To provide further support for our hypothesis, we create in this section a placebo experiment. Our sample of 474 twin funds also contains 184 twins in which the retail fund was created *after* the institutional fund. Given our hypothesis of provision of more market governance by institutional investors relative to retail investors, we would not expect to observe market governance driven increases in performance in institutional funds after the creation of retail funds. If we were to observe similar diff-in-diff results for institutional funds to those reported in Tables 5 and 6, we would have to reject the monitoring hypothesis in favor of a hypothesis that other factors in the contractual environment (e.g., larger fund, economies of scale related to fees) are responsible for the reported changes.

To set up our placebo experiment, we first predict which institutional funds will create a twin retail fund, using similar characteristics to those used in Panel A of Table 4. Similar to Panel B of Table 4, we also compare the sample characteristics for the control and treatment samples, to ensure the propensity score match is reasonable. Table 7 shows the results of the

probit regressions and summary statistics of key variables for treatment and control group in Panels A and B respectively.[22] The main drivers of the decision to create a retail twin fund are high past performance, large family TNA, and a high expense ratio. Panel B of Table 7 shows that the matching works well. The means and medians of fund characteristics for treatment and control group are statistically indistinguishable from each other with the exception of 4-factor alpha. However, given the lack of performance persistence documented by Busse, Goyal and Wahal (2010) for institutional investment funds, this difference in the treatment and control sample should not bias our results.[23]

Using this matched sample, we examine the addition of a retail twin fund and its impact on the risk-adjusted performance and tracking error of the institutional fund relative to a control sample, similar to Table 5. The results of this analysis are included in Table 8. We see that the treatment sample, i.e., those institutional twin funds that add a retail twin, had risk-adjusted performance of 3.28% per year prior to the event. Given the focus of retail investors on past good performance that we examined in Table 3 and the ability of fund sponsors to use the performance of the institutional predecessor account in advertising the retail twin with certain required disclosures[24] it is perhaps not surprising that the treatment sample outperforms the control sample by a statistically significant 1.12% per year. Consistent with diseconomies of scale documented by Chen, Hong, Huang and Kubik (2004), both treatment and control funds exhibit significant declines in their risk-adjusted performance in the 36 months after. In the three

[22] While the probit model in Table 4 also included fund turnover and an indicator variable of whether or not the fund was sold by a broker, these variables are excluded in the model in Table 7. The institutional data does not provide information about broker distribution and including the turnover variable does not affect the results but it reduces the sample size significantly.

[23] We also repeat the analysis including only the 4-factor alpha in the propensity score probit model. By only including this variable in the propensity score model we eliminate the difference in the treatment and control sample 4-factor alphas, but the diff-in-diff performance results are largely unchanged. These results are available upon request.

[24] Pierce (1998) outlines the SEC's criteria for allowing mutual fund sponsors to adopt and advertise the performance record of an unregistered predecessor account.

years after adding a retail twin, the difference in performance between the treatment and control funds is a statistically insignificant 0.112% per year. Overall, the diff-in-diff results show that the change in performance of institutional funds with added retail twins compared to the change in performance of the control group is negative. We see a similar decline in tracking error for both the treatment and control samples with no statistically or economically significant difference either before or after the event period. Both of these results stand in sharp contrast to the improvement of retail funds that add an institutional twin on both performance and risk dimensions observed in Table 5 and further support the role of institutional investor monitoring as an explanation for our results.[25]

6. Conclusion

The Investment Company Act of 1940 gave investors in open-end mutual funds a unique and innovative governance mechanism – the ability to redeem. Because the decision to redeem shares and the associated loss of management's control over these assets can be undertaken independently by each investor no matter how small, they can effectively remove the fund manager from the control of those assets. Recognizing the significant role played by "market governance", Fama and Jensen (1983) suggest that it is primary to all other fund governance mechanisms. The effectiveness of this governance mechanism in protecting shareholders, however, depends on how investors exercise their right to redeem and whether or not they respond to useful investment signals such as fees and poor past risk-adjusted performance.

Using a sample of retail mutual funds with an institutional twin, a similar but separately managed institutional fund, we examine how retail and institutional investors in similar

[25] Because the separate account institutional twins are not subject to the Investment Company Act of 1940 and are therefore not required to report N-SARs, we don't have access to the variables necessary to repeat the analysis of Table 6 for our placebo sample.

investment products respond to these investment signals. We find that institutional investor flows are more sensitive to high fees and to poor risk-adjusted performance than retail flows. Additionally, retail investors respond more strongly to counterproductive signals like past total return than institutional investors.

We also examine what impact the creation of an institutional twin has on the performance of its retail fund counterpart. Consistent with greater monitoring on the part of the institutional twin investors, retail fund risk-adjusted performance increases by 1.5% per year if the fund manager also manages an institutional twin. Exploiting cross-sectional differences in the date the institutional and retail mutual funds were created, we are able to examine whether institutional investors are merely better at selecting managers, or whether their presence reduces agency problems between mutual fund managers and investors. We uncover evidence consistent with the latter explanation. Fees, trading costs, and other fund expenses decrease and managerial effort increases relative to a control sample after the institutional twin is created.

Our results have important implications for recent legal and legislative developments related to excessive mutual fund fees. In 2003, Eliot Spitzer, then the New York Attorney General, criticized investment advisers in the mutual fund industry for setting higher advisory fees for retail mutual fund investors than for clients in corresponding institutional separate accounts. Since that time, the premise behind much of the excessive fee litigation has been a breach of fiduciary duty on the part of advisors because they charge 'excessively' high fees to retail clients relative to what they charge their separate account clients for the same or a very similar investment product. This comparison between retail and institutional twins was at the heart of a recent Supreme Court case, Jones v. Harris Associates. While these cases have so far been rejected by courts, they have created some legal uncertainty for fund families that pursue

twin arrangements. Some commentators went so far as to speculate whether mutual fund families will shut down and avoid such twin fund arrangements in the future to avoid litigation. Our results, however, show that retail investors would be harmed by such a separation and that monitoring by investors in institutional twins serves as an important governance mechanism for investors in retail twins.

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Figure 1 – Stated Investment Objectives and Managers

Figure 1 shows excerpts from the June 30, 2009 prospectuses of the GE US Equity Fund and Institutional US Equity Fund. Included is both the summary statement of the fund's investment objective as well as a list of the managers of the fund.

GE Asset Management

GE U.S. Equity Fund

Objective: The Fund seeks long-term growth of capital by investing at least 80% of its net assets in equity securities of issuers that are tied economically to the U.S. under normal circumstances.

Fund Managers:
George Bicher/Paul Reinhardt/Stephen Gelhaus/Thomas Lincoln

GE Asset Management

GE Institutional U.S. Equity Fund

Objective: The Fund seeks long-term growth of capital by investing at least 80% of its net assets in equity securities of issuers that are tied economically to the U.S. under normal circumstances.

Fund Managers:
George Bicher/Paul Reinhardt/Stephen Gelhaus/Thomas Lincoln

Figure 2 – Fund Holdings

Figure 2 shows excerpts from the June 30, 2009 prospectuses of the GE US Equity Fund and Institutional US Equity Fund. Shown are the top 10 equity holdings for each fund as of June 30, 2009.

GE U.S. Equity Fund

Top 10 Equity Holdings (as of 06/30/09)	% of Fund
Microsoft Corp	3.74
Pepsico Inc	3.09
State Street Corp	2.99
Amgen Inc	2.85
Qualcomm Inc	2.55
Cisco Systems Inc	2.35
Goldman Sachs Group Inc	2.35
Exxon Mobil Corp	2.33
Transocean Ltd	2.30
Jpmorgan Chase & Co	2.04
Total Top 10	26.59

GE Institutional U.S. Equity Fund

Top 10 Equity Holdings (as of 06/30/09)	% of Fund
Microsoft Corp	3.77
Pepsico Inc	3.12
State Street Corp	3.01
Amgen Inc	2.87
Qualcomm Inc	2.57
Cisco Systems Inc	2.37
Goldman Sachs Group Inc	2.36
Exxon Mobil Corp	2.35
Transocean Ltd	2.32
Jpmorgan Chase & Co	2.05
Total Top 10	26.79

Figure 3 – Institutional and Retail Fund Flows to the GE US Equity Fund

Figure 3 shows the monthly net flows (as a percentage of the fund's TNA) for both the GE US Equity Fund (Retail – white bars) and the GE Institutional US Equity Fund (Institutional – grey bars) taken from the Morningstar database. The data covers the period from January 1998 to June of 2009.

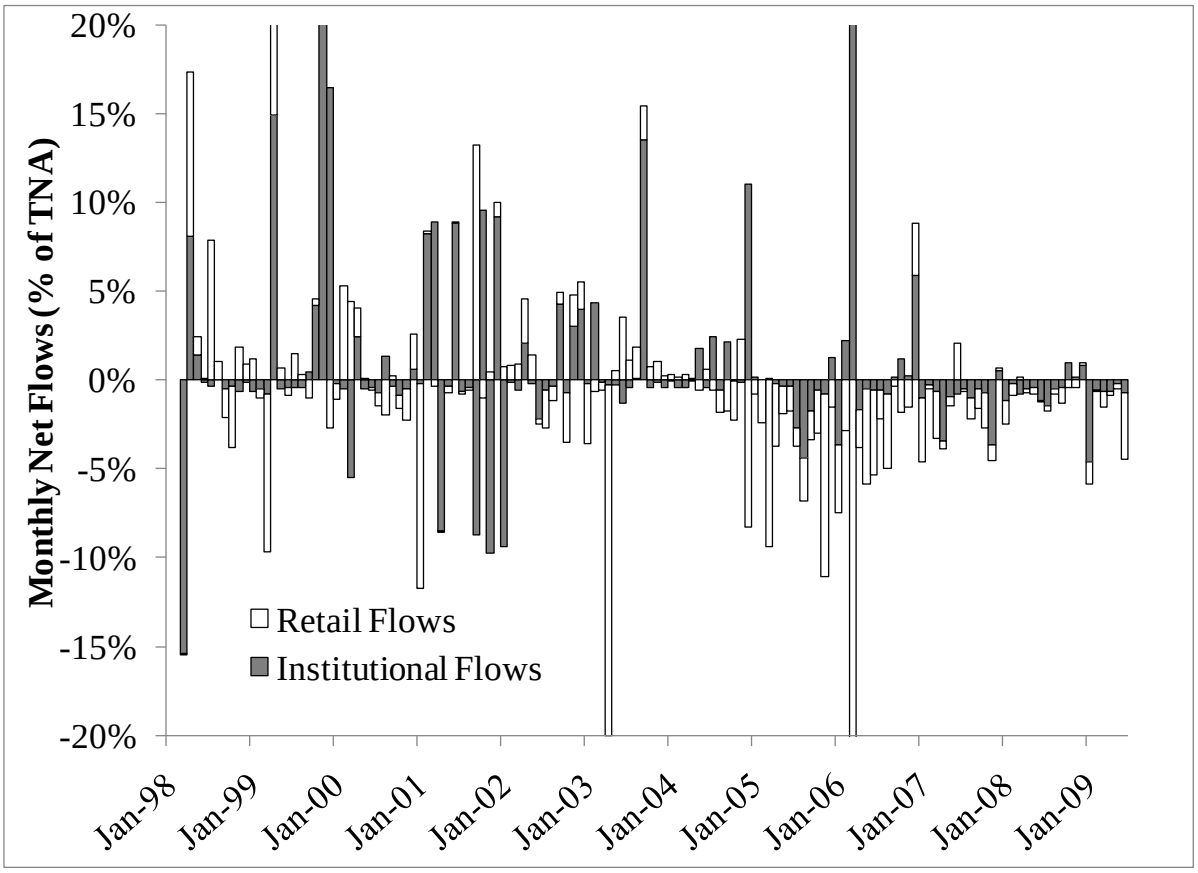

Table 1 – Retail Mutual Fund Sample Summary Statistics

Table 1 provides descriptive statistics for the sample of US domestic equity mutual funds from 1997 to 2009 used in the paper. Panel A lists the number of fund-month observations in the sample by year. Panel B lists the number of funds, and percent of the sample, with and without an institutional twin. The funds with twins are further divided into those with a separate account twin versus those with an institutional mutual fund twin. Panel C gives the mean, median, 25th and 75th percentiles for fund and fund family characteristics, separating the sample of fund-month observations into those with and without institutional twins. The descriptive statistics are given for fund and family total net assets (TNA) under management in millions ($MM) and billions ($BB) of dollars respectively. It also lists the annual expense ratio charged to investors in the fund, the fund's turnover (minimum of the fund's purchases and sales for the 12 month period divided by average fund TNA over the same period), quarterly net flow as a percent of TNA, and the fund's annualized four-factor alpha (the three Fama and French (1993) factors combined with the momentum factor of Carhart (1997)), calculated over the previous 36 months. It also lists the percentage of broker-sold fund-month observations, where broker-sold is defined as any fund that has a front load, a rear load or charges a 12b-1 fee greater than 0.25%. For the twins sample, the univariate statistics also provide the relative start date of the twin. This is calculated as the inception date of the institutional twin minus the inception date of the retail twin in years. Panel D breaks the sample of retail-institutional matched twins in three groups: those where the retail fund was started first followed by the institutional twin, those where the institutional twin was first and those where they started at the same time. Panel D lists the number of twins in each category for the full sample and for the subsample where the inception date of the relevant fund occurs after the start of our sample period, 1996 (institutional twin inception date if it is in the retail fund first category; retail twin inception date if it is in the institutional fund first category; and either if it is in the same inception date category).

Panel A. Observations By Year

Year	1997	1998	1999	2000	2001	2002	2003
Observations	8,944	9,961	10,896	13,183	14,917	16,499	17,625
Funds	794	880	1,004	1,205	1,337	1,454	1,626

Year	2004	2005	2006	2007	2008	2009
Observations	19,192	21,429	21,510	23,012	23,593	23,676
Funds	1,708	1,921	1,853	2,038	2,089	2,055

Panel B. Sample Composition

	No. of Funds	Percent
No Twin	2,332	83.1%
Twin	474	16.9%
Separate Account Twin	350	12.5%
Institutional MF Twin	124	4.4%

Table 1 – Retail Mutual Fund Sample Summary Statistics (Continued)

Panel C. Univariate Statistics

No Twins Sample (182,407 Obs.)			Percentiles	
Variable	Mean	Median	25th	75th
Family TNA ($BB)	32.8	5.3	0.7	23.9
Fund TNA ($MM)	1,438.9	231.7	63.9	840.6
Expense Ratio (Annual)	1.27%	1.25%	0.96%	1.55%
Turnover (%)	95%	62%	29%	111%
Quarterly Net Flow (%)	2.43%	-0.48%	-3.83%	4.28%
4-Factor Alpha (Annualized)	-0.65%	-0.90%	-3.17%	1.45%
Broker-Sold	64.1%			

Twins Sample (42,030 Obs.)			Percentiles	
Variable	Mean	Median	25th	75th
Family TNA ($BB)	25.0	8.9	2.3	33.9
Fund TNA ($MM)	1,416.3	410.6	125.2	1,291.3
Expense Ratio (Annual)	1.24%	1.23%	0.97%	1.53%
Turnover (%)	86%	65%	34%	111%
Quarterly Net Flow (%)	3.35%	-0.03%	-3.46%	5.43%
4-Factor Alpha (Annualized)	0.18%	-0.27%	-2.55%	2.38%
Relative Start Date (Inst. Incept. Date - Retail Incept. Date)	0.9	0.0	-3.5	6.1
Broker-Sold	67.3%			

Panel D. Twin Relative Start Dates

	Full Sample			Inception Date between 1996 and 2009		
	Retail Fund First	Institutional Fund First	Same Incept. Date	Retail Fund First	Institutional Fund First	Same Incept. Date
All Twins	242	229	3	134	184	3

Table 2 – Institutional Fund Sample Summary Statistics

Table 2 provides descriptive statistics for our sample of institutional fund twins from 1997 to 2009. Panel A gives the mean, median, 25th and 75th percentiles and number of observations for fund and family total net assets (TNA) under management in millions ($MM) and billions ($BB) of dollars respectively. It also lists the annual expense ratio charged to investors in the fund, the fund's turnover (minimum of the fund's purchases and sales for the 12 month period divided by average fund TNA over the same period), quarterly net flow as a percent of TNA, and the fund's annualized four-factor alpha (the three Fama and French (1993) factors combined with the momentum factor of Carhart (1997)), calculated over the previous 36 months. Panel B contains summary statistics for the differences in characteristics between the retail mutual funds and their institutional twins. Panel B provides the mean, median, 25th and 75th percentiles as well as a the p-values from a t-test of the difference in means and a sign test of the difference in medians. The last column shows the number of twin pairs with complete data. The monthly retail fund data is merged with the corresponding monthly institutional twin data. For each matched pair-month observation, the difference in the variables of interest is calculated. These differences are averaged for each of the 474 matched pairs and cross-sectional sample statistics from the 474 matched pairs are given in Panel B.

Panel A. Institutional Twin Sample

			Percentiles		
Variable	Mean	Median	25th	75th	Obs.
Family TNA ($BB)	33.6	11.2	3.2	53.9	6,239
Fund TNA ($MM)	1,780.5	689.7	173.0	1,797.6	6,239
Expense Ratio	0.80%	0.72%	0.50%	0.96%	18,035
Turnover (%)	80%	63%	34%	107%	10,810
Quarterly Net Flow (%)	3.49%	-0.32%	-3.66%	4.60%	4,350
4-Factor Alpha (Annualized)	0.53%	0.09%	-2.13%	2.69%	18,321

Panel B. Average Fund Differences

	Diff. (Inst - Retail)		Percentiles		Difference p-Values		Number of
Variable	Mean	Median	25th	75th	Mean	Median	Twin Pairs
Fund TNA ($MM)	576.7	86.8	-225.1	847.3	0.042	<.001	449
Expense Ratio (Annual)	-0.41%	-0.44%	-0.73%	-0.15%	<.001	<.001	452
Turnover (%)	-7.0%	-0.5%	-13.7%	7.1%	0.005	0.109	305
Quarterly Net Flow (%)	1.86%	0.06%	-5.08%	6.41%	0.103	0.736	317
4-Factor Alpha (Annualized)	0.52%	0.43%	-0.05%	1.09%	<.001	<.001	434
Net Total Return (Annualized)	0.60%	0.49%	-0.07%	1.14%	<.001	<.001	474
Gross Total Return (Annualized)	0.11%	-0.02%	-0.48%	0.44%	0.082	0.120	474
Pct in Common Stock (%)	3.6%	3.3%	0.0%	7.7%	<.001	<.001	377
MKT Factor (x100)	-0.206	0.007	-1.122	0.910	0.308	0.962	434
HML Factor (x100)	0.313	-0.005	-0.950	1.046	0.220	0.886	434
SMB Factor (x100)	-0.498	-0.036	-1.584	0.937	0.087	0.270	434
Momentum Factor (x100)	-0.059	-0.026	-0.733	0.589	0.685	0.313	434

Table 3 – Determinants of Institutional vs. Retail Flows

Table 3 presents coefficient estimates and t-statistics from pooled regressions of quarterly net fund flow on lagged fund characteristics. The sample includes both retail and institutional funds from the matched twin sample over the period 1997 through 2009. The dependent variable is the quarterly fund flow (t=0 to t=3) as a percent of TNA. The independent variables include an intercept, the natural log of lagged (t=-1) fund family and fund TNA, the lagged fund expense ratio, lagged turnover, the concurrent (t=0 to t=3) percentage quarterly flow to funds with the same investment objective, the lagged percentage quarterly fund flow, and two different measures of performance: 36 month total return and 4-factor alpha (Fama and French (1993); Carhart (1997)), calculated over the previous 36 months. For both performance measures, we allow for non-linearity through the use of a piece-wise linear performance specification with a kink at the 50th percentile of returns. For the total return measure, the percentiles are calculated within date and investment objective similar to Sirri and Tufano (1998), while the 4-factor alpha percentiles are calculated within date only. With these percentiles, the formula for the low return is Minimum(0.5,ReturnPercentile) and the formula for the high return is Minimum(0.5, ReturnPercentile – LowReturn). Specification 3 allows for separate coefficients for the retail and institutional funds. For these specifications, p-values from difference in coefficients tests across the retail and institutional coefficients are provided at the bottom of the table. Standard errors are clustered by fund and by date and the total number quarterly fund observations and the adjusted R-squared are provided.

Regression:	1		2		3			
					Retail Coef.		***Inst. Coef.***	
Intercept	0.2423	(5.1)	0.2307	(5.2)	0.1540	(5.9)	0.4325	(3.8)
Log(Family TNA)$_{t-1}$	0.0036	(2.3)	0.0032	(2.2)	0.0044	(3.5)	0.0006	(0.2)
Log(Fund TNA)$_{t-1}$	-0.0178	(-9.6)	-0.0177	(-9.4)	-0.0149	(-8.2)	-0.0251	(-6.1)
Expense Ratio$_{t-1}$	-0.0168	(-3.0)	-0.0123	(-2.4)	-0.0064	(-1.6)	-0.0559	(-2.8)
Turnover$_{t-1}$	0.0002	(0.2)	0.0012	(0.8)	0.0009	(0.7)	0.0013	(0.4)
InvObj Qtrly Pct Flow$_{t,t+3}$	0.5465	(5.3)	0.5685	(5.5)	0.3925	(5.3)	0.7687	(3.8)
Qtrly Pct Flow$_{t-4,t-1}$	0.1180	(2.9)	0.1128	(2.7)	0.3127	(10.3)	0.0122	(0.3)
Total Return$_{t-36,t-1}$ Low (≤ 50th Ptile)	0.0818	(7.0)			0.0608	(5.4)	-0.0569	(-1.2)
Total Return$_{t-36,t-1}$ High (> 50th Ptile)	0.1115	(7.0)			0.0528	(3.7)	0.0002	(0.0)
4-Fctr Alpha$_{t-36,t-1}$ Low (≤ 50th Ptile)			0.1154	(7.1)	0.0307	(2.6)	0.2088	(3.9)
4-Fctr Alpha$_{t-36,t-1}$ High (> 50th Ptile)			0.1090	(5.8)	0.0570	(3.7)	0.0953	(2.4)
Observations	20,393		20,393		20,393			
Adj. R-Squared	7.16%		7.71%		10.97%			
Coef. Difference Test p-Values (Retail vs. Institutional)								
Expense Ratio$_{t-1}$					0.019			
Total Return$_{t-36,t-1}$ Low (≤ 50th Ptile)					0.019			
Total Return$_{t-36,t-1}$ High (> 50th Ptile)					0.201			
4-Fctr Alpha$_{t-36,t-1}$ Low (≤ 50th Ptile)					0.001			
4-Fctr Alpha$_{t-36,t-1}$ High (> 50th Ptile)					0.334			

Table 4 – Propensity Score Matching

Panel A shows the results of a probit regression of whether or not an institutional twin is created for a given retail mutual fund in the following year, based on characteristics of the retail fund from the previous year. Using the propensity scores from this model, we construct a control sample of the 10 funds from the same time period with the closest propensity scores to the treatment group. In addition to variables previously described in the paper, the probit model also includes the natural log of the family's institutional TNA estimated by aggregating the TNA of all separate accounts and institutional mutual funds listed in the Morningstar database for that fund family, an indicator variable for whether or not the family has any institutional assets under management in the Morningstar database, and the annualized tracking error, defined as the root mean square of the monthly return difference between the fund and the 4-factor adjusted benchmark, calculated over the previous 36 months. Panel B compares the sample statistics for the treatment group and the control group. In addition to the mean and median, the table gives the p-values from a t-test of the difference in means and a sign test of the difference in medians.

Panel A. Propensity Score Probit Estimation

	Coef.	t-Stat
Intercept	-5.349	(-8.8)
4-Factor Alpha$_{t-36,t-1}$	-0.035	(-0.4)
Annual Pct Flow$_{t-12,t-1}$	0.070	(2.3)
Log(Fund TNA)$_{t-1}$	0.132	(5.1)
Log(Family TNA)$_{t-1}$	-0.003	(-0.1)
Log(Family Institutional TNA)$_{t-1}$	-0.002	(-0.1)
Family Institutional TNA ID$_{t-1}$ (=Yes)	0.194	(0.4)
Expense Ratio$_{t-1}$	0.113	(1.3)
Turnover$_{t-12,t-1}$ (%)	0.000	(0.1)
Tracking Error$_{t-36,t-1}$ (4-Factor Model)	-2.229	(-0.4)
Broker-Sold ID$_{t-1}$ (=Yes)	0.206	(2.3)
Index Fund ID$_{t-1}$ (=Yes)	-0.082	(-0.5)
Observations	13,603	
Pseudo R-Squared	6.68%	
Calendar Fixed Effects	Yes	
Inv. Obj. Fixed Effects	Yes	

Panel B. Matched Sample Comparison

	Treatment Sample		Control Sample		Difference p-value	
	Mean	Median	Mean	Median	Mean	Median
4-Factor Alpha (Annualized)	-0.37%	-0.86%	-0.17%	-0.77%	0.433	0.581
Quarterly Net Flow (%)	10.7%	1.0%	8.9%	0.2%	0.163	0.221
Fund TNA ($MM)	$751.7	$737.4	$786.0	$742.8	0.377	0.976
Family TNA ($BB)	$7.3	$9.7	$7.9	$13.5	0.340	0.269
Family Institutional TNA	$8.1 MM	$6.6 BB	$12.2 MM	$6.92 BB	0.313	0.922
Family Has Institutional Funds (=Yes)	67.0%	100.0%	69.3%	100.0%	0.178	0.195
Expense Ratio (Annual)	1.32%	1.26%	1.29%	1.26%	0.102	0.220
Turnover (%)	86.2%	70.5%	84.5%	62.0%	0.594	0.015
Tracking Error (4-Factor Model)	5.22%	4.60%	5.30%	4.66%	0.441	0.324
Broker-Sold (=Yes)	78.6%	100.0%	76.9%	100.0%	0.275	0.301
Index Fund (=Yes)	3.6%	0.0%	4.4%	0.0%	0.318	0.374

Table 5 – Performance and Risk

Table 5 contains results of a matched sample analysis of the change in performance and risk for retail funds before and after an institutional twin is added (treatment group). To identify the matched sample, we use propensity scores from the probit model described in Table 4. Using the propensity scores from this model, we construct a control sample of the 10 funds from the same time period with the closest propensity scores to each fund from the treatment group. For each variable the average for both the treatment and control group, before and after the addition of the institutional twin for the treatment group is given. The differences between treatment and control groups before and after the event are given in the bottom (Treatment-Control) row. The differences in the before and after estimates for the treatment and control group are given in the last column (After-Before). The intersection of the bottom row and the last column gives the "Diff-in-Diff" estimate for each variable. The asterisks denote statistical significance in the following manner: *** significant at 1%; ** significant at 5%; and * significant at 10%. The table includes results for 4-factor alphas over the 36 months before and after the event. It also includes results for the annualized tracking error, defined as the root mean square of the monthly return difference between the fund and the 4-factor adjusted benchmark, calculated over the previous 36 months before and after the event.

		Obs.	Before	After	(After-Before)
4-Factor Alpha (Annualized)	Treatment (Inst. Twin)	98	-0.373% **	-0.038%	0.335%
	Control (Matched Fund)	980	-0.170%	-1.383% ***	-1.213% ***
	(Treatment-Control)		-0.203%	1.345% ***	1.548% ***
Tracking Error (4-Factor Model)	Treatment (Inst. Twin)	98	5.510% ***	4.257% ***	-1.253% ***
	Control (Matched Fund)	980	5.538% ***	4.461% ***	-1.077% ***
	(Treatment-Control)		-0.028%	-0.204%	-0.176% *

Table 6 – Matched Sample Results

Table 6 contains results of a matched sample analysis of the change in fees and other fund characteristics for retail funds before and after an institutional twin is added (treatment group). To identify the matched sample, we use propensity scores from the probit model described in Table 4. Using the propensity scores from this model, we construct a control sample of the 10 funds from the same time period with the closest propensity scores to each fund from the treatment group. For each variable the average for both the treatment and control group, before and after the addition of the institutional twin for the treatment group is given. The differences between treatment and control groups before and after the event are given in the bottom (Treatment-Control) row. The differences in the before and after estimates for the treatment and control group are given in the last (After-Before) column. The intersection of the bottom row and the last column gives the "Diff-in-Diff" estimate for each variable. The asterisks denote statistical significance in the following manner: *** significant at 1%; ** significant at 5%; and * significant at 10%. Panel A includes results for the net expense ratio from NSAR and then several variables from the funds' annual SEC N-SAR filings. The N-SAR variables include the advisory fee portion of the expense ratio (Question 72.F, hereafter Q72.F), the distribution fee portion (Q72.T), and the administrative fee portion (all remaining expenses). Panel B analyzes the return gap of Kacperczyk, Sialm and Zheng (2008), a measure of the hidden costs incurred by a fund, calculated as the difference between the actual fund return and the return inferred from fund holdings (less expenses). It also includes trading volume of a fund calculated from N-SAR data as the sum of a fund's purchases and sales (Q71.A and B) divided by the TNA of the fund, the brokerage commission rate calculated as the total brokerage commissions paid (Q21 for the series) divided by the sum of the manager's total purchases and sales (the sum of Q71.A and Q71.B for all funds in the series), and the percent of funds using soft dollar or commission bundled payments to pay for fund distribution (Q26.A). Panel C gives the value-weighted average number of analyst earnings estimates, where the weight is the percent of the equity portfolio held in each stock and the analyst following data is from IBES. The last variable of Panel C is Active Share of Petajisto (2010) and Cremers and Petajisto (2009), a measure of the overlap between the fund's holdings and the closest related index.

Panel A. Expense Ratio and Components

		Obs.	Before	After	(After-Before)
Net Expense Ratio (NSAR)	Treatment (Inst. Twin)	82	1.215% ***	1.162% ***	-0.053% ***
	Control (Matched Fund)	820	1.268% ***	1.271% ***	0.003%
	(Treatment-Control)		-0.053% **	-0.109% ***	-0.056% ***
Advisory Fees (NSAR)	Treatment (Inst. Twin)	82	0.665% ***	0.649% ***	-0.016% ***
	Control (Matched Fund)	820	0.662% ***	0.667% ***	0.004%
	(Treatment-Control)		0.002%	-0.018%	-0.020% *
Administrative Fees (NSAR)	Treatment (Inst. Twin)	82	0.269% ***	0.258% ***	-0.011% ***
	Control (Matched Fund)	820	0.308% ***	0.319% ***	0.011% **
	(Treatment-Control)		-0.039% ***	-0.061% ***	-0.022% ***
Distribution Fees (NSAR)	Treatment (Inst. Twin)	82	0.281% ***	0.255% ***	-0.027% ***
	Control (Matched Fund)	820	0.275% ***	0.265% ***	-0.010% **
	(Treatment-Control)		0.007%	-0.010%	-0.017% ***

Table 6 – Matched Sample Results (Continued)

Panel B. Return Gap/Trading Costs

		Obs.	Before	After	(After-Before)
Return Gap (Annualized)	Treatment (Inst. Twin)	105	0.321% ***	0.579% ***	0.259%
	Control (Matched Fund)	1,050	-0.073%	-0.366% **	-0.293%
	(Treatment-Control)		0.394% **	0.946% ***	0.552% **
Trading Volume (% of TNA)	Treatment (Inst. Twin)	82	193.4% ***	167.4% ***	-26.0% ***
	Control (Matched Fund)	820	186.7% ***	193.9% ***	7.4%
	(Treatment-Control)		6.8%	-26.6% ***	-33.4% ***
Brokerage Commission Rate	Treatment (Inst. Twin)	82	0.096% ***	0.097% ***	0.000%
	Control (Matched Fund)	820	0.107% ***	0.151% ***	0.045%
	(Treatment-Control)		-0.011% **	-0.055%	-0.044%
Percent of Funds Using Soft Dollars for Distribution	Treatment (Inst. Twin)	82	23.26% ***	17.44% ***	-5.81% ***
	Control (Matched Fund)	820	21.40% ***	19.19% ***	-2.21% ***
	(Treatment-Control)		1.86%	-1.74%	-3.60% ***

Panel C. Portfolio Characteristics

		Obs.	Before	After	(After-Before)
Avg. # Analysts Estimates per Holding	Treatment (Inst. Twin)	112	13.71 ***	13.62 ***	-0.088 **
	Control (Matched Fund)	1,120	12.93 ***	13.04 ***	0.113 ***
	(Treatment-Control)		0.78 ***	0.57 ***	-0.201 ***
Active Share	Treatment (Inst. Twin)	84	0.751 ***	0.748 ***	-0.0028
	Control (Matched Fund)	840	0.739 ***	0.738 ***	-0.0015
	(Treatment-Control)		0.011	0.010	-0.0013

Table 7 – Propensity Score Matching – Placebo Experiment

Panel A of the table shows the results of a probit regression of whether or not a retail twin is created for a given institutional fund in the following year, based on characteristics of the institutional fund from the previous year. Using the propensity scores from this model, we construct a control sample of the 10 institutional funds from the same time period with the closest propensity scores to the treatment group. In addition to variables previously described in the paper, the probit model also includes the natural log of the families retail TNA estimated by aggregating the TNA of all retail mutual funds listed in the Morningstar database for that fund family, an indicator variable for whether or not the family has any retail assets under management in the Morningstar database, and the tracking error, defined as the root mean square of the monthly return difference between the fund and the 4-factor adjusted benchmark, calculated over the previous 36 months. Panel B compares the sample statistics for the treatment group and the control group. In addition to the mean and median, the table gives the p-values from a t-test of the difference in means and a sign test of the difference in medians.

Panel A. Propensity Score Probit Estimation

	Coef.	t-Stat
Intercept	-2.487	(-3.6)
4-Factor Alpha$_{t-36,t-1}$	0.284	(3.2)
Quarterly Pct Flow$_{t-3,t-1}$	0.075	(1.4)
Log(Fund TNA)$_{t-1}$	-0.002	(-0.1)
Log(Family Institutional TNA)$_{t-1}$	-0.013	(-0.6)
Log(Family Retail TNA)$_{t-1}$	0.021	(4.3)
Family Retail TNA ID$_{t-1}$ (=Yes)	0.108	(0.2)
Expense Ratio$_{t-1}$	0.328	(1.9)
Tracking Error$_{t-36,t-1}$ (4-Factor Model)	4.410	(0.8)
Index Fund ID$_{t-1}$ (=Yes)	-0.103	(-0.5)
Observations	8,868	
Pseudo R-Squared	10.42%	
Calendar Fixed Effects	Yes	
Inv. Obj. Fixed Effects	Yes	

Panel B. Matched Sample Comparison

	Treatment Sample		Control Sample		Difference p-value	
	Mean	Median	Mean	Median	Mean	Median
4-Factor Alpha (Annualized)	3.28%	1.51%	2.16%	0.72%	<0.001	0.003
Quarterly Net Flow (%)	19.6%	2.8%	17.2%	1.3%	0.511	0.430
Fund TNA ($MM)	$402.3	$473.7	$376.9	$477.0	0.508	0.918
Family Institutional TNA ($BB)	$0.21	$3.80	$0.16	$2.46	0.450	0.022
Family Retail TNA	$5.4 MM	$1.4 BB	$5.4 MM	$0.6 BB	0.952	0.510
Family Has Retail Funds (=Yes)	85.9%	100.0%	85.1%	100.0%	0.532	0.926
Expense Ratio	0.27%	0.08%	0.30%	0.07%	0.086	0.267
Tracking Error (4-Factor Model)	5.91%	4.83%	5.93%	4.85%	0.884	0.560
Index Fund (=Yes)	4.7%	0.0%	6.0%	0.0%	0.228	0.720

Table 8 – Performance and Risk – Placebo Experiment

Table 8 contains results of a matched sample analysis of the change in performance and risk for institutional funds before and after a retail twin is added (treatment group). To identify the matched samples, we use propensity scores from the probit model described in Table 7. Using the propensity scores from this model, we construct a control sample of the 10 institutional funds from the same time period with the closest propensity scores to each fund from the treatment group. For each variable the average for both the treatment and control group, before and after the addition of the retail twin for the treatment group is given. The differences between treatment and control groups before and after the event are given in the bottom (Treatment-Control) row. The differences in the before and after estimates for the treatment and control group are given in the last (After-Before) column. The intersection of this bottom row and the last column gives the "Diff-in-Diff" estimate for each variable. The asterisks denote statistical significance in the following manner: *** significant at 1%; ** significant at 5%; and * significant at 10%. The table includes results for 4-factor alphas over the 36 months before and after the event. It also includes results for the annualized tracking error, defined as the root mean square of the monthly return difference between the fund and the 4-factor adjusted benchmark, calculated over the previous 36 months before and after the event.

		Obs.	Before	After	(After-Before)
4-Factor Alpha (Annualized)	Treatment (Retail Twin)	85	3.28% ***	0.117%	-3.16% ***
	Control (Matched Fund)	850	2.16% ***	0.005%	-2.16% ***
	(Treatment-Control)		1.12% ***	0.112%	-1.01% ***
Tracking Error (4-Factor Model)	Treatment (Retail Twin)	85	5.91% ***	4.94% ***	-0.97% ***
	Control (Matched Fund)	850	5.93% ***	4.95% ***	-0.98% ***
	(Treatment-Control)		-0.02%	-0.01%	0.01%

Appendix

This appendix contains supplementary results and is divided into two sections. The first section repeats the flow-performance analysis of Section 3 of the paper, but with a complete sample of retail and institutional funds. The second section builds upon the matched sample performance analysis of Section 4 of the paper but uses panel and Fama-Macbeth regressions. It also examines whether or not the separate account data has any potential backfill bias and what, if any, impact that bias has on the performance results.

A. Flow Regressions

Table A1 contains an analysis of the determinants of institutional and retail quarterly flows. In contrast to Table 3 of the paper which only uses the sample of twin matched observations, this analysis includes all retail and institutional domestic equity funds. Specifications 1 and 2 give the coefficients on the standard set of controls for the combined sample with total return and 4-factor alpha as the performance measures respectively. Specification 3 has separate retail and institutional fund flow coefficients for each variable. For all three specifications, the control variable results, including fund and family size, lagged quarterly fund flow and concurrent investment objective flow, are similar both statistically and economically to the results in Table 3. The main focus of our analysis is the fee and performance results in Specification 3. We see that institutional investors are four times as sensitive to expenses (-0.0403 vs. -0.0078) as retail investors and the difference is statistically significant at a p-value of 0.015. As for the performance results, we see that while retail investor flow is convex in both total return and our measure of risk-adjusted performance, 4-factor alpha, institutional investor flow is unrelated to total return performance and is actually concave in risk-adjusted performance. As the p-values at

the bottom of the table indicate, the differences between the retail and institutional coefficients for high past total return performance and low risk-adjusted performance are statistically significant at a 5% level. These results are consistent with the results of Table 3 and suggest that institutional investor flows respond more strongly to useful signals of future fund performance, namely fees and poor past risk-adjusted performance and that they are less responsive to counterproductive signals such as high past total return performance.

B. Performance Regressions

In addition to the propensity matched sample performance analysis in Section 4, we also examine the impact of the addition of an institutional twin on retail fund performance using the full set of retail funds (i.e. with and without twins). To do this, we regress future fund performance on lagged fund characteristics and on an institutional – retail twin indicator using both panel and Fama-MacBeth regression frameworks. Table A2 gives these regression results.

The dependent variable is the fund's 1-month, forward-looking, 4-factor alpha. This is calculated using the factor loadings estimated over the prior 36 months of data (t-1 to t-36). Using these factor loadings and the factor realizations for time t, a monthly benchmark return is calculated:

$$r_t^{Benchmark} = \beta_{t-1,t-36}^{MKT} r_t^{MKT} + \beta_{t-1,t-36}^{SMB} r_t^{SMB} + \beta_{t-1,t-36}^{HML} r_t^{HML} + \beta_{t-1,t-36}^{Moment} r_t^{Moment}$$

Taking the difference between the monthly fund return at time t and the monthly benchmark return gives the 1-month forward-looking 4-factor alpha.

The independent variables include the natural log of fund TNA and fund family TNA, turnover calculated as the minimum of fund purchases and sales divided by TNA, the expense ratio, an indicator variable equal to one if the fund is broker sold (indicated by the presence of a

front or rear load or a 12b-1 fee), and an indicator variable equal to one if the fund is an index fund. The results in Panel A are from a panel regression approach with fixed effects for date and fund family as indicated at the bottom of the table and standard errors that are clustered by fund and date. The results in Panel B are from a Fama-MacBeth regression approach with Newey-West (1987) standard errors with 12 lags. The p-value of a difference in coefficients test comparing the before and after versions of the Retail 1st indicator variable coefficients is also included.

Our focus is on the three twin indicator variables. The "Inst. 1st" variable is equal to one if the retail fund has an institutional twin and that twin was created before the retail fund. The "Retail 1st - Before Inst. Fund Created" indicator variable is equal to 1 if the retail fund has an institutional twin, the twin was created after the retail fund and if the date of the observation is on or before that institutional fund was created (e.g.. the retail fund was created on 1/1/2000, the institutional fund was created on 1/1/2004 and the date of the return observation is 1/1/2002). The "Retail 1st - After Inst. Fund Created" indicator variable is equal to 1 if the retail fund has an institutional twin, the twin was created after the retail fund and if the date of the observation is after the institutional fund was created (e.g.. the retail fund was created on 1/1/2000, the institutional fund was created on 1/1/2004 and the date of the return observation is 1/1/2005).

Looking at the twin indicator results, the coefficient on "Inst. 1st" is positive and strongly significant in every regression. The interpretation of this result is that retail funds in the sample that were created as clones of an existing institutional fund outperform other retail funds. Because the dependent variable is 4-factor risk-adjusted monthly performance, the coefficients of 0.0842 and 0.1256 indicate that the retail funds outperformed by between 8.42 and 12.56 basis points per month or between 1.01% and 1.51% per year. This is consistent with a number of

different interpretations including the ability of institutional investors to select superior managers/strategies, the use of superior managers by fund families to manage institutional assets or the additional monitoring by investors in an institutional twin resulting in improved performance.

The analysis of the "Retail 1st" or "first-born" mutual fund of the twins helps shed light on whether it is merely clever selection by institutional investors, or whether they also provide some form of governance. While the "Retail 1st - Before Inst. Fund Created" indicator is positive it is never statistically different from 0. The comparison between the "Retail 1st- Before Inst. Fund Created" coefficient and the "Retail 1st- After Inst. Fund Created" coefficient is consistent with a monitoring role played by institutional investors. The coefficient on "Retail 1st - After Inst. Fund Created" is positive, significant and statistically larger than the "Before Inst. Fund Created" coefficient in every specification as indicated by the p-values comparing the difference in the "Before" and "After" indicator variable coefficients listed at the bottom of the table. This result suggests that once the institutional twin is created, risk-adjusted performance of the twin retail fund significantly improves, despite the negative impact of increased assets under management due to the scale diseconomies documented by Chen et al. (2004) and others. Although the approach is different, these supplementary results are consistent with the matched sample performance results reported in Table 5.

C. Survivorship and Backfill Bias

A potential concern with our performance analysis is the possibility of a survivorship or backfill bias affecting the results. Because separate accounts are outside the scope of the Investment Company Act of 1940, they are not subject to the same reporting requirements. As a

result, the separate account data in the Morningstar database is provided on a voluntary basis and as a result may be subject to both survivorship and backfill biases. While the data used for the majority of the paper, including the performance analysis in Table 5, comes from the corresponding mutual fund twins that do not suffer from these biases, if the identification of retail funds with twins is based on the separate account twin data are subject to such biases, it may affect our results.

To eliminate the possibility of survivorship bias, the data we use is culled from annual snapshots of the Morningstar data and we include both surviving and terminated separate accounts in our analysis. To address the issue of a backfill bias, we collect the year and month of addition for each separate account.[26] We then repeat the performance analysis of Table A2 including an indicator variable for whether the corresponding fund-month observation in the separate account data is backfilled. The results are included in Specifications 2 and 4 of Panels A and B of Table A2.

Comparing the results with and without the backfill indicator, the results for the standard set of controls are quite similar. While the backfill indicator is positive, it is only statistically significant in specification 2 of Panel B which excludes the twin indicators. Including the backfill bias indicator decreases the twin indicator coefficients and the Retail 1st – Before indicator in particular, but the Retail 1st – After coefficient remains significant in every specification and the difference between the before and after retail twin indicators remains statistically significant as well. Overall, this suggests that the results are not driven by a backfill bias.

[26] The Morningstar Principia database shows both the added and removed separate accounts for each month of the year in the "Editorial Features" tab of the database.

Table A1 – Determinants of Institutional vs. Retail Flows

Table A1 presents coefficient estimates and t-statistics from pooled regressions of quarterly net fund flow on lagged fund characteristics. The sample includes both retail and institutional domestic equity funds over the period 1997 through 2009. The dependent variable is the quarterly fund flow (t=0 to t=3) as a percent of TNA. The independent variables include an intercept, the natural log of lagged (t=-1) fund family and fund TNA, the lagged fund expense ratio, lagged turnover, the concurrent (t=0 to t=3) percentage quarterly flow to funds with the same investment objective, the lagged percentage quarterly fund flow, and two different measures of performance: 36 month total return and 4-factor alpha (Fama and French (1993); Carhart (1997)) computed from the previous 36 months of data. For both performance measures, we allow for non-linearity through the use of a piece-wise linear performance specification with a kink at the 50th percentile of returns. For the total return measure, the percentiles are calculated within date and investment objective similar to Sirri and Tufano (1998), while the 4-factor alpha percentiles are calculated within date only. With these percentiles, the formula for the low return is Minimum(0.5,ReturnPercentile) and the formula for the high return is Minimum(0.5, ReturnPercentile – LowReturn). In contrast with Table 3 of the paper which includes only the twin matched observations, this analysis is estimated on the entire sample of retail funds combined with the institutional fund twins. Specification 3 allows for separate coefficients for the retail and institutional funds. For this specification, p-values from difference in coefficients tests across the retail and institutional coefficients are provided at the bottom of the table. Standard errors are clustered by fund and by date and the total number quarterly fund observations and the adjusted R-squared are provided.

Regression:	1		2		3			
					Retail Coef.		***Inst. Coef.***	
Intercept	0.1769	(15.1)	0.1621	(13.9)	0.1250	(9.9)	0.3465	(6.5)
Log(Family TNA)$_{t-1}$	0.0056	(13.7)	0.0057	(14.0)	0.0052	(9.5)	0.0053	(3.0)
Log(Fund TNA)$_{t-1}$	-0.0179	(-25.2)	-0.0179	(-25.2)	-0.0145	(-15.7)	-0.0266	(-8.7)
Expense Ratio$_{t-1}$	-0.0193	(-13.4)	-0.0149	(-10.4)	-0.0078	(-4.3)	-0.0403	(-3.1)
Turnover$_{t-1}$	0.0011	(1.5)	0.0022	(2.9)	0.0022	(1.7)	-0.0029	(-0.7)
InvObj Qtrly Pct Flow$_{t,t+3}$	1.0614	(75.0)	1.0636	(75.2)	0.4723	(8.7)	0.7703	(6.8)
Qtrly Pct Flow$_{t-4,t-1}$	0.0607	(11.7)	0.0584	(11.3)	0.2339	(15.2)	0.0133	(1.1)
Total Return$_{t-36,t-1}$ Low (≤ 50th Ptile	0.0751	(14.8)			0.0375	(6.1)	0.0278	(1.6)
Total Return$_{t-36,t-1}$ High (> 50th Ptile	0.1290	(22.9)			0.0835	(8.7)	0.0159	(0.7)
4-Fctr Alpha$_{t-36,t-1}$ Low (≤ 50th Ptile)			0.0953	(19.6)	0.0345	(6.3)	0.1280	(7.3)
4-Fctr Alpha$_{t-36,t-1}$ High (> 50th Ptile)			0.1329	(21.8)	0.0727	(6.4)	0.1081	(4.7)
Observations	103,029		103,029		103,508			
Adj. R-Squared	10.52%		10.86%		8.70%			

Coef. Difference Test p-Values (Retail vs. Institutional)

Expense Ratio$_{t-1}$	0.015
Total Return$_{t-36,t-1}$ Low (≤ 50th Ptile)	0.630
Total Return$_{t-36,t-1}$ High (> 50th Ptile)	0.003
4-Fctr Alpha$_{t-36,t-1}$ Low (≤ 50th Ptile)	0.001
4-Fctr Alpha$_{t-36,t-1}$ High (> 50th Ptile)	0.110

Table A2 – Determinants of Fund Performance

Table A2 presents the results from regressions of fund performance on lagged fund characteristics. The sample includes U.S. domestic equity retail funds over the period 1997 to 2009. The dependent variable is the fund's 1 month, forward-looking, 4-factor alpha (Fama and French (1993); Carhart (1997)) using factor loadings estimated over the prior 36 months of data (t-1 to t-36). The independent variables include an intercept, the natural log of fund TNA and fund family TNA, the annual expense ratio, turnover calculated as the minimum of fund purchases and sales divided by TNA, an indicator variable of whether the fund is broker-sold (1=Yes) and whether it is an index fund (1=Yes). The independent variables also include indicator variables for whether or not the fund has an institutional twin (1=Yes). The indicator variables identify those funds where an institutional twin was created before the retail fund or the institutional fund was created before the sample start date of January 1996 (Inst. 1st/Inception before Jan 1996) those funds where the retail fund was created before the institutional fund both before (Retail 1st – Before Inst. Fund Created) and after (Retail 1st – After Inst. Fund Created) the institutional fund was created. Funds without an institutional twin have a 0 for all three indicator variables. Specifications 2 and 4 in both panels include an indicator variable for whether or not that month's performance from the corresponding institutional twin was backfilled (SA Backfill Period). Using information from the Morningstar Principia Separate Account CDs about the addition and removal of separate accounts, we identify the date that the separate account was added to the database. We then add a backfill indicator variable that equals one for any fund-month observation before the fund's institutional twin separate account was added to the database, corresponding to the backfilled return period for the corresponding institutional twin. The results in Panel A are from a panel regression approach with fixed effects for date and fund family as indicated at the bottom of the table and standard errors that are clustered by fund and date. The results in Panel B are from a Fama-MacBeth regression approach with Newey-West standard errors with 12 lags. The p-value of a difference in coefficients test comparing the before and after versions of the Retail 1st indicator variable coefficients is also included.

Panel A. Panel Regressions

Regression:	1		2		3		4	
$Log(Fund\ TNA)_{t-1}$	-0.0243	(-3.9)	-0.0243	(-3.9)	-0.0433	(-4.8)	-0.0433	(-4.8)
$Log(Family\ TNA)_{t-1}$	0.0094	(2.5)	0.0093	(2.5)	-0.0680	(-3.4)	-0.0679	(-3.4)
$Expense\ Ratio_{t-1}$	-0.0140	(-0.5)	-0.0136	(-0.4)	0.0065	(0.2)	0.0068	(0.2)
$Turnover_{t-1}$	-0.0001	(-0.9)	-0.0001	(-0.9)	0.0000	(0.7)	0.0000	(0.7)
Broker-Sold ID_{t-1} (=Yes)	-0.0471	(-2.8)	-0.0474	(-2.8)	-0.0430	(-2.3)	-0.0430	(-2.3)
Index Fund ID_{t-1} (=Yes)	0.0378	(1.0)	0.0389	(1.0)	0.0775	(2.2)	0.0781	(2.2)
$Twin_{t-1}$ (=Yes for Retail 1st - Before Inst. Fund Created)	0.0351	(1.4)	0.0079	(0.3)	0.0403	(1.6)	0.0299	(0.9)
$Twin_{t-1}$ (=Yes for Retail 1st - After Inst. Fund Created)	0.1074	(5.6)	0.0873	(4.2)	0.1228	(5.4)	0.1147	(4.1)
$Twin_{t-1}$ (=Yes for Inst. 1st/Inception Before Jan 1996)	0.1039	(4.6)	0.0842	(4.0)	0.1256	(5.8)	0.1174	(4.7)
SA Backfill Period (=Yes)			0.0405	(1.5)			0.0157	(0.6)
Observations	224,437		224,437		224,437		224,437	
R-Squared	7.03%		7.03%		7.55%		7.55%	
Calendar Fixed Effects	Yes		Yes		Yes		Yes	
Fund Family Fixed Effects	No		No		Yes		Yes	
Diff. Test p-Value	0.014		0.009		0.004		0.004	

Table A2 – Determinants of Fund Performance (Continued)

Panel B. Fama-Macbeth Regressions

Regression:	1		2		3		4	
Intercept	0.2540	(1.7)	0.2673	(1.8)	0.2718	(1.9)	0.2724	(1.9)
Log(Fund TNA)$_{t-1}$	-0.0297	(-4.5)	-0.0303	(-4.6)	-0.0310	(-4.7)	-0.0311	(-4.7)
Log(Family TNA)$_{t-1}$	0.0116	(3.1)	0.0111	(3.1)	0.0113	(3.1)	0.0114	(3.1)
Expense Ratio$_{t-1}$	-0.0181	(-0.6)	-0.0179	(-0.6)	-0.0183	(-0.6)	-0.0184	(-0.6)
Turnover$_{t-1}$	0.0002	(1.4)	0.0002	(1.4)	0.0002	(1.4)	0.0002	(1.4)
Broker-Sold ID$_{t-1}$ (=Yes)	-0.0437	(-2.7)	-0.0449	(-2.8)	-0.0442	(-2.8)	-0.0446	(-2.8)
Index Fund ID$_{t-1}$ (=Yes)	0.0492	(1.4)	0.0546	(1.5)	0.0529	(1.5)	0.0535	(1.5)
Twin$_{t-1}$ (=Yes for Retail 1st - Before Inst. Fund Created)					0.0227	(0.9)	0.0097	(0.3)
Twin$_{t-1}$ (=Yes for Retail 1st - After Inst. Fund Created)					0.1157	(2.8)	0.1007	(2.5)
Twin$_{t-1}$ (=Yes for Inst. 1st/Inception Before Jan 1996)					0.0883	(3.9)	0.0727	(3.1)
SA Backfill Period (=Yes)			0.0764	(3.8)			0.0210	(0.8)
Number of Cross-Sections	156		156		156		156	
Avg. # Obs.	1,439		1,439		1,439		1,439	
Avg. Adj. R-Squared	2.17%		2.24%		2.24%		2.24%	
Diff. Test p-Value					0.041		0.048	