The Determinants of U.S. Equity Index Funds Flows

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ABSTRACT

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Existing studies on fund flows focus on actively managed funds and S&P 500 index funds. This thesis examines the determinants of funds flow for a sample of 211 U.S. index funds representing eight different underlying indexes over a period of approximately 16 years. We find that performance in general has a positive effect on fund flows. Fund fees (including expense ratios and front-end loads) are negatively related with fund flows. The association between fund flows and tracking error depends upon time period with a positive relation over the most recent subperiod and a negative relation over the earlier subperiod. We find that institutional and retail investors have different funds-flow responses to performance, tracking errors and fund fees. While some determinants affect the sensitivity of flows to performance ranges, these influences are not robust since they do not persist for all types of performance measures.

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1. INTRODUCTION

Funds flows are an indicator of how fast mutual funds grow and can be driven by many factors, such as performance, expense ratios, fund size, and so forth. Many studies examine funds flows for active funds while similar research on the flows of index funds is scarce. This is the case even though it is more than 35 years since the first index fund was established by John Bogle.

In the past decade, index fund growth has been dramatic. Index funds are currently a significant investment channel in most countries. Investors choose to invest in index funds because index funds have many advantages over actively managed funds. Low cost is one of the most important advantages of index funds. Unlike actively managed mutual fund managers, index fund managers do not have to buy and sell to actively adjust portfolios since they only need to do so when the composition of the known index changes. Thus, index funds charge investors lower fees due to lower transaction costs. Index funds also incur lower operating expenses and advisory fees than their counterparts due to the greater clarity of their target or benchmark portfolio. Furthermore, actively managed mutual funds do not outperform index funds after adjusting for fees and risk. Given these differences, we believe that index funds may have different funds flow determinants than their actively managed counterparts.

Elton *et al.* (2004) examines the relationship between performance and fund flows for 52 S&P 500 index funds. In this thesis, we investigate the determinants of fund flows for 211 U.S. equity index funds in eight categories; namely, MSCI EAFE index funds; Russell 1000, 2000 and 3000 index funds; Russell MidCap index fund; and S&P 400, 500 and 600 index funds. The time period spans from January 1995 to September 2010.

We find that performance is positively related with fund flows across all time periods and that sophisticated (institutional) investors do not choose index funds based on risk-adjusted performance measures. Contrary to our intuition, we do not find that index fund investors prefer lower tracking error and volatility. For the early subperiod, we find no relation between fund flows and expense ratios, or even a positive relation for S&P 500 index funds. Fund size and fund age have a constantly negative effect on fund flows. We find mixed evidence that the sensitivity of flows to performance could be influenced by certain factors, such as the expense ratio and family-size proxies.

The major contribution of this study is to extend the study of the determinants of fund flows for index funds to indexes other than the S&P500 and to more recent time periods that include two official economic recessions in the U.S. and a global credit crisis.

The remainder of the thesis is organized as follows. Section 2 reviews some of the related literature on fund flows. Section 3 develops our hypotheses. Section 4 describes our data sample and summarizes the sample characteristics. Section 5 presents our test methodology. Section 6 presents and discusses our empirical results. Section 7 concludes the thesis.

2. LITERATURE REVIEW

2.1 Relation between Performance and Fund Flows

A sizable literature exists on the flow-performance relationship for non-index mutual funds. Most of the previous studies conclude that mutual fund performance is positively related to fund flows. Gruber (1996) provides an explanation for why actively managed mutual funds grow when investors can obtain higher risk-adjusted returns from index funds. He finds that sophisticated investors chase positive risk-adjusted returns and new money can lead subsequently to positive risk-adjusted returns over at least a three-year period. Studies by Goetzmann and Peles (1997), Sirri and Tufano (1998), Bergstresser and Poterba (2002), Nanda *et al.* (2004), Barber, Odean, and Zheng (2005) also find that money flows for mutual funds are positively related with fund performance. However, the relationship is not symmetric for all mutual funds. Goetzmann and Peles (1997) and Sirri and Tufano (1998) find evidence of an asymmetric flow-performance relationship where investors chase winners but fail to leave losers.

In this literature, institutional investors are considered to be sophisticated or informed investors, while retail investors are deemed to be uninformed investors. James and Karceski (2002) find that the selection choice criteria used by institutional and retail investors differ. For example, institutional investors are more sensitive to risk-adjusted returns, such as the 4-factor alpha. Furthermore, the flow-performance relation only exists for the top and bottom quintile performance funds for retail investors, and is absent for institutional investors. Based on an examination of mutual funds and pension funds, Del Guercio and Tkac (2002) find institutional (unlike retail) investors punish poor performers by withdrawing their money under management, and they do not flock to last

year's winners. While both types of investors chase higher Jensen's alphas, only institutional investors pay attention to lower tracking error.

Elton *et al.* (2004) find that, since the returns of S&P 500 index funds are highly predictable, investors would be better off if they were to choose index funds with higher past returns.

2.2 Relation between Fees and Flows

The cost of investing in a mutual fund, such as the management expense ratio (MER) and front-end load, is another important determinant of fund flows. MERs include compensations for administrators, fund managers, and marketing expenses, while loads are used to compensate salespersons.[1] Index funds fees are lower than those for actively managed mutual funds since index funds have significantly lower turnover ratios as they are not trying to add value through active management.

The literature provides mixed conclusions on the relation between fees and fund flows. For retail investors, Sirri and Tufano (1998) find some evidence that fund flows are inversely related to total fees, measured as the expense ratio plus one seventh of the front-end loads, and the change of total fees. James and Karceski (2006) find that fees have no effect on flows over a longer time period (1990-2001), but flows are negatively affected by fees over a shorter time period (1995-2001). Bergstresser and Poterba (2002) find that the effect of the expense ratio on flows is smaller for institutional investors, while a load dummy has a positive effect on fund flows for retail investors and a negative effect for institutional investors. Nanda *et al.* (2009) find that the expense ratio is negatively but not significantly related to flows. In their experiment, Choi, Laibson,

[1] MERs can also contain deferred compensation for sellers of mutual funds.

Madrian (2010) demonstrate that even Harvard staff and MBA students are unwilling to minimize fund fees. Based on their critical review of the empirical findings, Cuthbertson, Nitzche and O'Sullivan (2010) conclude that most investors would be better off if they held low cost index funds.

Elton *et al.* (2004) find that loads as a marketing variable have a significant and positive effect on fund flows. However, Barber, Odean, and Zheng (2005) report that investors over time have learned to avoid funds with higher loads but not higher expense ratios.

2.3 Relation between Fees and Performance

If fees are negatively related with flows and performance has a positive effect on flows, what is the relation between fees and performance? Carhart (1997) reports that investment costs (such as expense ratios, transaction costs, and load fees) have a negative impact on performance, as does Bogle (2002).

Elton *et al.* (2004) find that the expense ratio has a one-on-one negative effect on fund performance, as measured by differential returns or Jensen's alphas. Gil-Bazo and Ruiz-Verdu (2006) examine the puzzling observation that actively managed mutual funds with worse before-fee performance charge relatively higher fees. Haslem *et al.* (2006) find not only a large range of expense ratios for retail S&P 500 index funds but also that funds with higher fees generally perform worse. Haslem *et al.* (2008) report the later finding for institutional S&P 500 index funds. Boldin and Cici (2010) use the phrase, Index Fund Rationality Paradox, to describe the phenomenon where investors choose index funds with higher fees but lower returns.

2.4 Relation between Search Costs and Flows

Search costs are defined as the costs incurred by investors when they need to identify and decide which mutual funds to invest in. Search costs are expected to have the same negative impact on fund flows as fees. Since it is not easy to directly measure investors' search costs, researchers use various proxies, such as 12b-1 fees, front-end loads and size of the fund complex of which the fund is a member.

Based on an examination of 294 mutual funds with ads in Barron's or Money Magazine, Jain and Wu (2000) find direct support for the notion that advertising helps to attract money flows. Elton *et al.* (2004) find that 12b-1 fees have an insignificantly negative effect on flows, but that loads attract more inflows. Cronqvist (2005) reports that advertising affects portfolio choices in Sweden even if the advertisements contain no information about the fund. Huang, Wei, and Yan (2007) find that higher marketing expenses are associated with new money for funds with medium performance, and have a negative effect on funds with high-quintile performance. Boldin and Cici (2010) find that both retail and institutional investors tend to avoid funds with high loads and 12b-1 fees.

3. HYPOTHESES

While many studies demonstrate that institutional and retail investors behave differently for non index funds, such tests are rarely conducted on index funds.

3.1 Relation between Flows and Fees

The literature reviewed earlier reports that fees (including the expense ratio and front-end loads) are negatively related with money flows into funds. Thus, the first two

hypotheses examine the relation between money flows for index funds and fees that index funds charge investors (not) differentiated by whether they are institutional or retail. The hypotheses in their alternative form are:

H_A^1: Index fund flows are negatively related to fund fees.

H_A^2: The sensitivity of index fund flows to fund fees is lower for institutional versus retail investors.

3.2 Relation between Fund Flows and Fund Performance

Based on the literature reviewed earlier, the relation between fund flows and fund performance is ambiguous. Thus, the third hypothesis is:

H_0^3: Fund performance is not related with fund flows.

Past research such as that by James and Karceski (2006) clearly demonstrates that institutional investors are more likely to use risk-adjusted returns to evaluate mutual fund performance while retail investors are more likely to use raw or differential returns as the measure of fund performance. Using tracking error to measure risk, the fourth hypothesis in its alternate form is:

H_A^4: Institutional investors select index funds based on risk-adjusted returns, while retail investors select index funds based on raw or differential returns.

Based on the findings that retail investors respond asymmetrically to high and low performance (Sirri and Tufano, 1998) while institutional pension funds punish poor performers without flocking to past winners (Del Guercio and Tkac, 2002), our fifth hypothesis in its alternate form is:

H_A^5: Institutional investors leave poorly managed index funds more quickly than retail investors.

3.3 Relation between Fund Flows and Search Costs

Based on studies by Sirri and Tufano (1998) and Huang *et al.* (2007) that lower investor search costs are related with positive fund flows, our sixth hypothesis in its alternate from is:

H_A^6: Flows for index funds are negatively related to investor search costs.

In our tests, we use three proxies for investor search costs: 12b-1 fees, family size and number of family funds. We expect these proxies for investor search cost to have a lower impact on the decisions of institutional investors. Thus, our seventh hypothesis in its alternate from is:

H_A^7: Institutional investors are less likely to be influenced by search costs than retail investors when choosing index funds.

4. DATA

4.1 Sample

Our sample of pure index funds is downloaded from the CRSP survivor-bias-free U.S. mutual fund database for the period from January 1995 through September 2010. We rely on the CRSP definition of a pure index fund, which is:

"Objective is to match the total investment performance of a publicly recognized securities market index. The fund will hold virtually all securities in the noted index with weightings equal to those in the index."

We then restrict our sample to the eight most popular index funds: MSCI EAFE, Russell 1000, Russell 2000, Russell 3000, Russell MidCap, S&P 400, S&P 500, and S&P 600 index funds. We remove all growth and value categories of these funds to eliminate the impact of any style bias on our findings, and only keep funds that are open to investors. We clean our data by dropping funds with missing or negative monthly total net assets, with negative expense ratios, and with less than 72-months (six years) of observations.

Since some of the names of the index funds and the titles of their management companies do not reveal their benchmarks, we manually search for benchmark information from Yahoo Finance, Google Finance, and the fund family's website using the fund name and the NASDAQ ticker symbol if the funds are listed on NASDAQ. We obtain monthly net asset values, monthly fund raw returns, first offer dates, expense ratios, 12b-1 fee ratios, institutional fund dummy, and other fund characteristics from the CRSP mutual fund database. The returns on the benchmarks and risk-free rates are downloaded from the Morningstar database. To measure performance, we obtain the three Fama and French (1993) factors and the momentum factor from Ken French's website. Our final sample consists of 25,448 fund-month observations.

4.2 Sample Characteristics

Table 1 presents descriptive statistics for our sample. Panel A provides detailed information on the number of index funds and the dependent variable (fund flows) from

1995 to 2010. Not only has the number of funds included in our sample grown over time but the representation of S&P 500 index funds has decreased from more than 90% to about 60% more recently. The sample is divided almost equally between institutional and retail funds which facilitates tests of the difference in effects on fund flows between these two classes of index funds.

[Please insert Table 1 about here.]

Huang *et al.* (2007) note that due to mutual fund mergers and splits, some extreme flows (errors) exist in the CRSP database. As a result, they eliminate the top and bottom 2.5% of the net flows. Extreme net flows are also identified in our sample. For example, the minimum monthly fund flow in Panel A of Table 1 is -101.52%, the maximum monthly fund flow is 45399.06%, and the maximum standard deviation of fund flows is 987.16%. Though we do not find the reason for the largest fund flow, we obtain some information about the other extreme values. For example, the LargeCap S&P 500 Index Fund (institutional class shares) which belongs to Principal Funds, Inc. has a fund flow growth of 212.11% in July 2010. From its SEC filing, we find that this extreme growth was due to the acquisition of LargeCap Blend Fund I. From Panel C, we find that the minimum and maximum flows are for S&P 500 index funds. We control for outliers by filtering out the top and bottom 2% of observations in terms of monthly fund flows. Based on Panel B of Table 1, the filtered values of the percentage changes in monthly fund flows range from -12.36% to 24.27%. In the following sections, the reported results are for the filtered samples unless specifically indicated otherwise.

Panels C and D of table 1 report the numbers of funds (all institutional and retail), and the information on fund flows for the unfiltered and filtered samples of the eight types of index funds, respectively. From Panel D, we observe that only one Russell-linked index fund (i.e., the Russell 2000) has a retail class. The S&P 500 index funds exhibit the lowest average fund flows of 0.499% during the 16-year sample period. The only international index fund, the MSCI EAFE index fund, has the highest expense ratio. Except for Russell 2000 funds, all other types of Russell funds charge only 1/4 to 1/3 of the fees that are charged by the S&P index funds.[2]

Panels E and F of Table 1 report annual average fund flows, raw returns, differential returns, CAPM alphas, three and four factor alphas, tracking errors, expense ratios, and fund size for institutional and retail index funds, respectively. While no average fund outflows occur for institutional funds over the period, negative average fund flows occur for retail funds over the most recent five years. For most of the years, institutional index funds outperform retail index funds. This differs from the findings of James and Karceski (2006). Tracking error is lower for institutional versus retail funds before 2003, but higher afterwards. The expense ratio is significantly lower for institutional versus retail funds, and is almost one-half during the most recent year. Institutional fund size is always larger than its retail counterparts.

[2] This is expected for the Russell 2000, which is described as follows on the Russell Website on August 7, 2011 (http://www.russell.com/indexes/data/fact_sheets/us/russell_2000_index.asp):

> "The Russell 2000 Index measures the performance of the small-cap segment of the U.S. equity universe. The Russell 2000 is a subset of the Russell 3000® Index representing approximately 10% of the total market capitalization of that index. It includes approximately 2000 of the smallest securities based on a combination of their market cap and current index membership."

5. METHODOLOGY

5.1 Regression Models

Pooled ordinary least squares regressions can be applied when observations in the sample are independent. However, observations in our sample are in the form of fund-months. If pooled OLS is used on the panel data, the standard errors would be underestimated while the t-statistics would be overstated, as noted by Sirri and Tufano (1998). Therefore, we choose to use the two-step regression procedure of Fama and MacBeth (1973) for our tests. The procedure is defined by STATA as follows: In the first step, for each single time period a cross-sectional regression is performed. Then, in the second step, the final coefficient estimates are obtained as the average of the first step coefficient estimates. This regression method provides more conservative results in terms of the estimates of the significance levels.

$$\begin{aligned} Flow_{i,t} = a &+ b_1 \times Flows_{i,t-1} + b_2 \times Performance_{i,t-1} \\ &+ b_3 \times Tracking\ Error_{i,t-1} + b_4 \times Volatility_{i,t-1} \\ &+ b_5 \times Expense\ Ratio_{i,t-1} + b_6 \times 12b_1 Fee\ Ratio_{i,t-1} \\ &+ b_7 \times Front\ Load\ Dummy_{i,t-1} + b_8 \times Fund\ Size_{i,t-1} \\ &+ b_9 \times Number\ of\ Funds\ Under\ Management_{i,t-1} \\ &+ b_{10} \times Number\ of\ Index\ Funds\ Under\ Management_{i,t-1} \\ &+ b_{11} \times Total\ AUM_{i,t-1} + b_{12} \times Total\ Index\ Funds\ AUM_{i,t-1} \\ &+ b_{13} \times Fund\ Age_{i,t-1} + b_{14} \times Institutional\ Fund\ Dummy_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

In the following sections, we report Fama-MacBeth regression coefficients and their significance levels for the following model and variants thereof. In the first model, we employ all factors (variables) in the above regression. The dependent variables include lag fund flows, lag performance (measured by raw returns, differential returns, CAPM alphas, and three and four-factor alphas), lag tracking error, lag volatility, lag expense

ratio, lag 12b-1 ratio, front load dummy, lag fund size, lag number of funds under management, lag number of index funds under management, lag total AUM, lag total index funds AUM, lag fund age, and institutional fund dummy.

We perform regressions based on four different samples: all eight types of index funds together; S&P 500 index funds only; institutional index funds only; and retail index funds only. Our sample period spans from January 1995 to September 2010. We conduct robustness tests that differentiate between the most distant (1995-1999) and most recent (2000-2010) segments of this total time period.

Following Huang *et al.* (2007), we test the effects of six factors on the flow-performance relationship. The factors are the expense ratio, marketing expense (12b-1 fee), number of funds under management, number of index funds under management, total assets under management (AUM) for all fund types, and total assets under management for index funds. Except for the expense ratio, the other five factors are proxies for search costs. Since Sirri and Tufano (1998) identified an asymmetrical relationship between flows and performance, we conduct piecewise linear regressions which allows us to discover the relationship at different performance levels.

For each month, all index funds are ranked according to their past performances as measured by raw returns, differential returns, CAPM alphas, three-factor alphas, or four-factor alphas. Then, each fund is assigned a fractional rank ranging from zero to one. The fractional ranks for funds in the bottom quintile performance level are in the low performance group. Funds in the medium three performance quintiles are in the medium (mid) group. The funds are ranked in the highest quintile based on their performance are in the high group.

We interact each performance rank with one of the factors in the following regression model to examine the impact of the factor on the flow-performance sensitivity, and we keep the factor itself of the prior period as an independent variable in our second model:

$$\begin{aligned} Flow_{i,t} = a &+ b_1 \times Low_{i,t-1} + \beta_1 \times Low_{i,t-1} \times Factor_{i,t-1} \\ &+ b_2 \times Mid_{i,t-1} + \beta_2 \times Mid_{i,t-1} \times Factor_{i,t-1} \\ &+ b_3 \times High_{i,t-1} + \beta_3 \times High_{i,t-1} \times Factor_{i,t-1} \\ &+ Factor_{i,t-1} + Controls + \varepsilon_{i,t} \end{aligned} \quad (2)$$

5.2 Variables

The dependent variable used in this paper is fund flows. Unlike other papers, Del Guercio and Tkac (2002) use the annual net dollar flow, which is defined as annual net asset changes minus appreciation. However, due to the large differences in fund sizes across the different index funds, the dollar amount of flows can lead to misleading results. Thus, we use the net flows definition of Sirri and Tufano (1998), which is also the most referenced and tested version of this variable. Specifically, our dependent variable is given by:

$$FLOW_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} * (1 + R_{i,t})}{TNA_{i,t-1}}$$

Where $TNA_{i,t}$ is the monthly total net assets for fund i in month t, and $R_{i,t}$ is fund i's monthly return in month t. This fund flow definition assumes that money flows in and out of the funds at the end of each month since there is no way to account for the exact time of flows within each month.

Since institutional investors and retail investors are believed to have possibly different choice criteria for picking funds, we use five measures of performance. We use raw returns ($R_{i,t}$) and differential returns as simple performance measurements as the primary choice criteria for (uninformed) retail investors, and use the CAPM alphas, and the three and four-factor alphas as more sophisticated performance measurements as the primary choice criteria for (informed) institutional investors. The differential return is the difference between the index fund's raw return and the benchmark's return. The alphas from the CAPM, Fama and French (1993) three-factor model and the Carhart (1997) four-factor model are given by the respective alphas in the following equations:

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \varepsilon_i$$

$$R_i - R_f = \alpha_i + \beta_i^{MKT} MKT + \beta_i^{SMB} SMB + \beta_i^{HML} HML + \varepsilon_i$$

$$R_i - R_f = \alpha_i + \beta_i^{MKT} MKT + \beta_i^{SMB} SMB + \beta_i^{HML} HML + \beta_i^{MOM} MOM + \varepsilon_i$$

In the above equations, R_f is the Ibbotson 30-day T-bill rate, and MKT, SMB, HML and MOM are the Fama and French (1993) three factors and the Carhart (1997) momentum factor, respectively. In order to maintain more index fund years in our dataset and to maintain consistency with similar research on non-index funds, we use a one-year horizon to compute the various alphas. This is also consistent with the finding that fund performance tends to continue over the short-term (Zheng, 1999).

We use the standard error from the above CAPM model as the measure of tracking error. Volatility is the standard deviation of the fund's prior year's raw returns.

Three fund fees variables are used herein. The expense ratio represents the ratio of total investment that investors pay for the fund's operating expenses, which includes 12b-1 fees. Following Fama and French (2010), we derive the monthly expense ratio by

dividing the yearly ratio by 12. We do a similar adjustment to get the monthly 12b-1 fee ratio. We also use a front load dummy variable, which equals one if a fund charges front-load fees and zero otherwise.

Fund size is calculated by taking the natural log of a fund's monthly total net assets. We use two different measures of the size of a fund family. The first is the family size for all funds, which is defined as the logarithm of total net AUM for the fund family at the end of each month. The second measure is the number of funds offered by the fund family. We also derive the above two measures by only counting the index funds of the affiliated family to investigate the effect of the index funds sector of the family.

Fund age and the institutional fund dummy are added as control variables. Fund age is the logarithm of the time difference between the end date of month *t* and the first offer date. The institutional fund dummy is equal to one if the index fund is institutional and zero if retail. To deal with problems of endogeneity, we include the lagged values of the dependent variable in our models.

6. EMPIRICAL RESULTS

6.1 Univariate Analysis

To obtain some intuition about the variables used in the subsequent regressions, we conduct a series of univariate tests in which we examine whether the fund flows differ across various subsamples based on each independent variable. We distinguish between high and low performance index funds based on the median raw return, differential return, CAPM alpha, three and four-factor alphas of the index funds; between index funds

with high and low tracking errors and volatilities; between index funds with high and low expense ratios and 12b-1 fee ratios; between young and old funds; between large and small index funds based on their logged total net assets; between funds with and without front-end loads; and between funds that are part of large and small fund families based on the number of all funds under management, number of index funds under management, total AUM, and total AUM for each family's index funds.

Panel A of Table 2 presents the univariate results for the index funds in our sample not differentiated by the underlying index. In Panels B, C and D, we provide results for S&P 500, institutional, and retail index funds, respectively.

[Please place Table 2 about here.]

Based on Panel A of Table 2, we observe that the fund flows do not differ between funds with and without 12b-1 fees. In terms of performance, higher differential returns and CAPM alphas are associated with smaller fund flows; while higher raw returns and three and four-factor alphas are positively associated with higher fund flows. In terms of riskiness, the results do not support previous findings reported in the literature that investors prefer lower volatilities and lower tracking errors. Index funds with higher (lower) than median tracking errors have average fund flows of 1.27% (0.386%). Consistent with expectations, index funds with lower expense ratios have significantly higher new money flows. Investors prefer index funds without front-end loads as such funds grew twice as fast as their counterparts with front-end loads. Younger and older funds have significantly different fund flows. Specifically, younger funds have an average monthly rate of money *in*flows of 1.744% while older funds have an average monthly

rate of money *out*flows of 0.067%. Investors exhibit a preference for smaller versus larger funds in terms of total net assets. For the five proxies of search costs, only the number of index funds under management is consistent with our hypothesis that an index fund associated with a larger fund family has a higher money flow.

Based on Panel B of Table 2, we observe the same relationships except for the expense ratios and the number of index funds under management. No significant differences are identified in average funds flows between funds with higher and lower expense ratios. All four proxies of family size based on AUM and the number of funds under management have a negative relationship with the fund flows.

Comparing the results for institutional and retail funds reported in Panels C and D of Table 2, respectively, we observe that retail investors chase outperformers based on both simple and more sophisticated measures of performance, while no clear relationship is identified for institutional investors. For example, institutional investors prefer higher three and four-factor alphas and lower differential returns and CAPM alphas. The two investor groups react differently towards the magnitudes of the expense ratios. While institutional investors appear to be indifferent to this factor, retail investors invest more money in index funds with lower expense ratios. This suggests that, in line with our hypothesis, the relatively lower expense ratios charged institutional investors reduces the sensitivity of their flow-fees relation. Unlike retail investors, institutional investors tend to invest more money into index funds without load fees. In terms of 12b-1 fee funds, institutional investors are more likely to pay such fees while retail investors tend to avoid such fees. We observe that the distribution of 12b-1 fee funds number may affect the above findings. For instance, 17% of the observations of institutional funds are associated

with charges for 12b-1 fees while 60% of retail index funds observations are associated with such charges. For the size of fund family proxies, institutional investors pick large fund families based on the number of index funds under management whereas retail investors use the AUM of the index funds sector as their criterion.

6.2 Regression Results

Since a univariate analysis can only examine the impact on fund flows of one factor at a time, we perform Fama and MacBeth (1973) regressions for the monthly fund flows against a variety of variables that characterize the index funds. These regression results for our first model are reported in Table 3. Panel A of Table 3 reports the findings using all index funds not differentiated as being retail or institutional. Some of the results are consistent with our hypotheses.

[Please place Table 3 about here.]

We find that lagged fund flows have significant explanatory power, which implies that fund flows have a one-period momentum effect. Of the five performance measures, raw returns, and the 3 and 4-factor alphas have a significant positive effect on flows. While a one percent increase in the raw return raises flows by 0.344 percent, a one percent increase in either the 3 or 4-factor alphas increases flows by about two percent. Consistent with previously reported results in the literature, tracking error has a negative (greater than one) relation with money flows. Both the lagged expense ratio and the front load dummy are negatively related with fund flows so that a one percent increase in the expense ratio is associated with about a 10 percent decrease in fund flows. Although marketing expense as represented by the 12b-1 fee ratio has a positive relationship with

fund flows, this relationship is only significant when four-factor alphas are used to measure performance. Of the four proxies of the size of the index fund complex, only the number of funds under management has a significant (and positive) relation with fund flows. In addition, we observe that investors prefer smaller to larger index funds, and that there is a one to one negative relationship between a fund's lagged age measured as a natural log and its flows.

Panel B of Table 3 reports the results using only S&P 500 index funds. It shows that investors tend to leave index funds with front-end loads but do not avoid funds with high expense ratios. Similar to Panel A, investors in S&P 500 index funds prefer younger and smaller funds, and this finding holds for all five types of performance measurement. We also find that the number of funds under management is significantly and positively related to fund flows for this category of index funds. We find that performance, tracking error, volatility and the 12b-1 fee ratio have no significant effects on fund flows for this category of index funds.

Panels C and D of Table 3 examine data for only institutional and only retail index funds, respectively. While the fund flows of retail investors are significantly related to CAPM and four-factor alphas, the only relation between fund flows and performance for institutional investors is the marginally significant negative relation with CAPM alphas. When the measure of performance is risk adjusted, funds flow is significantly (and negatively) related to the expense ratios and to the existence of front-end loads for institutional but not retail investors. This finding is not consistent with our hypothesis that the sensitivity of flows to fees is lower for institutional versus retail investors. However, it does indicate that institutional investors appear to be more rational than retail investors

in that they tend to avoid index funds with high fees and front-end loads.

We now use our second model to test the Sirri and Tufano (1998) and Huang *et al.* (2007) finding of an asymmetric relationship between performance and flows for nonindex funds. The results for the effect of the expense ratio on the flow-performance relationship for our sample of index funds over the full time period are summarized in Table 4. Based on Panel A of Table 4, the lagged expense ratio is not significantly related to index fund flows. We observe that when the three-factor alpha ranking is used to measure performance, the coefficient for the interaction term between the performance range and the expense ratio is significantly negative in the high performance quintile range. This finding indicates that a one percent increase in the expense ratio decreases the sensitivity of flows to the high-range performing fund by 2.538%. It suggests that even index funds with high three-factor alphas would suffer lower money *in*flows if their expense ratios are high. The effect of other factors on fund flows displayed in Panel A are consistent with findings in the previous table. For example, we observe a negative relation between fund flows and lagged fund age and the lagged fund size.

[Please insert Table 4 about here.]

The results for S&P 500 index funds as reported in Panel B of Table 4 are somewhat similar to the results for all index funds reported in Panel A of Table 4. However, we observe that all significant coefficients for the performance rankings are negative. For example, when the three-factor alpha ranking is used to measure performance, it has a 1.033% negative effect on flows for the low quintile performance range and a 0.018% negative effect on flows for the middle three quintiles performance range. When the

CAPM alphas are used to calculate the performance ranking, the ranking has a 0.129% negative effect on fund flows. Another difference between Panels A and B is that investors in S&P 500 index funds are more likely to invest in funds with lower lagged tracking error. However, this finding is significant only when the rankings of raw returns and differential returns are used as performance measures. Based on a comparison of Panels C and D of Table 4, we find no significant differences between institutional and retail investors except that institutional investors are more sensitive to front-end loads than their retail counterparts.

Table 5 reports the effect of marketing expenses as proxied by 12b-1 fee ratios on the flow-performance relationship. Based on Panel A, we find no significant effect of 12b-1 fee ratios on fund flows. However, based on the last column where the ranking of performance is based on four-factor alphas, we find that the coefficient for the interaction term between the high ranking performance and the 12b-1 fee ratios is significantly negative. This finding suggests that spending more money on marketing does not attract more investors for an index fund that has already achieved superior alphas. Similar results are found in Panel B where S&P 500 index funds are examined. For example, when the ranking of CAPM alphas is used as the performance measure, the significant coefficients suggest that the marketing expense will help a fund attract more money if the fund performs poorly, but will not help a superior performing fund. Moreover, we observe that when the CAPM alpha is used to measure performance, the 12b-1 fee ratios have a marginally negative effect on fund flows. We find no noteworthy results from Panels C and D.

[Please insert Table 5 about here.]

Next we test how the family size to which the index fund belongs is related to the flows to that fund and how the relation changes with different measures of fund performance. As noted earlier, we use the number of (all) funds under management, number of index funds under management, total AUM, and total index funds AUM as proxies of the size of the fund's family. We only report the results in Table 6 which use the number of funds under management since significant results are obtained only for this proxy. Tables using other Family size-related proxies are available in the appendix as Tables A1, A2 and A3.

[Please insert Table 6 about here.]

Based on Panel A of Table 6, we observe that the number of funds under management is positively related with fund flows when performance is measured by the ranking of raw returns. In particular, if an index fund's family offers one more fund to investors, the money flows to the index fund increase by 0.032%. The interaction term between lowest-quintile performance and the number of funds under management is significantly negative, indicating that being in a large family does not help an index fund attract more investors if the fund ranks in the lowest quintile in terms of raw returns. In contrast, the coefficient for the interaction term between performance and the family size proxy is significantly positive for the highest-quintile performance, showing that increasing the family funds number will increase the index fund's money inflows. Such a finding also appears in Panel B when the ranking of performance is based on three-factor alphas. These findings are not consistent with the conclusion of Huang *et al.* (2007) for nonindex funds that larger family size does not help a fund attract more potential

investors when the fund has already been a superior performer. However, from Panel D, we find that the estimated coefficient between the high-range performing fund and the number of funds under management is negative only when performance is measured by differential returns.

6.3 Robustness Tests

6.3.1 Examination of a recent subperiod

Table 7 provides the regression results for the relation between an index fund's past performance, fees, search costs and other control variables on its fund flows for the recent subperiod of 2000 to 2010 (unlike Table 3 that provided them for the full time period). Based on Panel A of Table 7, we observe that for the recent time period investors appear to exhibit a preference to invest in index funds with higher lagged tracking error and higher lagged volatility, and that this relation holds for the multivariate regressions with both risk-adjusted and not risk-adjusted performance measures. We observe that the relation of the lagged expense ratios with fund flows is still significantly negative so that a one percent increase in the former is associated with more than a 12% decrease in the latter. While the front load dummy has a significant (negative) effect on fund flows across the five performance measures for the full time period, its influence is only significant when performance is measured by the ranking of raw returns for the more recent time period. As found by previous researchers, the relation between 12b-1 fees and fund flows is insignificant for this more recent subperiod.

[Please insert Table 7 about here.]

Based on Panel B of Table 7, we find that most of the estimated coefficients for the performance measures are negative (with only two being significant). Compared with the results in Table 3 for the full time period, the relationship between the lagged expense ratio and fund flows becomes significant (negative) for all the performance measures for the most recent time period and the lagged fund size effect becomes not significant. While the institutional fund dummy is negative and significant over the full time period, it is insignificant for the most recent time period.

Panels C and D of Table 7 report the results for institutional and retail funds, respectively. In terms of the performance-flow relationship and riskiness, we find that fund flows for institutional investors are not related significantly to either of the five performance measures. Instead, the fund flows of institutional investors are positively related to lagged tracking error and volatility. In contrast, the fund flows of retail investors are significantly related to the three and four-factor alphas, and not with tracking error or volatility. In terms of fund fees, we observe that fund flow sensitivity to the expense ratio is higher for institutional investors although their fees are much lower than those for retail investors.

Compared with the full time period, we observe that in the recent period retail investors learned to avoid funds with high expense ratios, but not to avoid funds with front-end loads. While the 12b-1 fee ratios have no significant effect on fund flows for both types of investors over the full time period (except when performance is measured using the four-factor alpha for institutional investors), the relationship is significantly positive for institutional investors and significantly negative for retail investors for the most recent subperiod. In addition, all four types of family size proxies become

significant for retail investors, and three out of four become significant for institutional investors, although the estimated coefficients for AUM and the index fund AUM are almost 0.

Similar to Table 4 for the full time period, Table 8 examines the relation between fund flows and fund expense ratios for various measures of past performance for the recent subperiod. The estimated coefficient for the expense ratio moves from being consistently not significant in Table 4 to being consistently significant (and negative) in Table 8. For the recent subperiod, a one percent increase in the expense ratio is associated with decreases of 16.377% and 19.178% in fund flows if performance is measured by raw returns and the four-factor alpha, respectively. This finding is consistent with the findings of James and Karceski (2006) for active mutual funds. While the estimated coefficient for the front load Dummy remains negative, it is not significant for the recent subperiod.

[Please place Table 8 about here.]

Panel B of Table 8 reports the results for the same regressions but for a sample confined to S&P 500 index funds. We observe that the estimated coefficients for the interaction term between performance ranking (measured by differential returns and three-factor alphas) and the expense ratio is significantly positive in the bottom-quintile performance range, indicating that high expense ratios help index funds with low rankings of differential returns and three-factor alphas lose less money flows. For example, concentrating on the fourth column of Panel B of Table 8 where performance is measured by the ranking of three-factor alphas, we find that a one-percent increase in the

expense ratio reduces the sensitivity of flows to the low-range performance from -0.8354 to -0.77169 (nearly a 9% decrease). Similar results were reported earlier in Panel B of Table 4 where the ranking of raw returns is used as a measure of performance. The above finding confirms the index fund rationality paradox of Boldin and Cici (2010) that some S&P 500 index funds with excessive fees and low returns can survive. The coefficient of the institutional fund dummy remains negative but becomes insignificant in Table 8 compared to Table 4 for both their panels A and B.

From Panel C of Table 8, we find a marginally significant coefficient indicates that institutional investors punish poor performers by withdrawing their money from funds with low raw returns in the more recent subperiod versus the full time period. In contrast, results from Panel D show no evidence of such withdrawals by retail investors. The estimated coefficients for the expense ratio become significant for retail investors over the recent subperiod when performance is risk adjusted. The estimated coefficient for fund age and family size (except for age when performance is measured using raw returns) become significant (negative) for retail investors for the recent subperiod. The estimated coefficient for fund age (except when performance is measured using the three-factor alpha) become significant (negative) for institutional investors for the recent subperiod.

Table 9 presents the regression results for the relation between fund marketing expenses and fund flows for various measures of past performance for the most recent subperiod of 2000-2010. Unlike the results for the full time period reported earlier in Table 5, we find that two of the five coefficients for 12b-1 fee ratios in Panel A of Table 9 are significant (negative). The negative coefficient when performance is measured using

the CAPM alpha remains significant in Panel B of Table 9 for the S&P 500 index funds. The negative estimated coefficients for Low Ranking and Medium Ranking, when based on CAPM alphas, are significant, indicating that those funds lose fund flows. However, the coefficients for the interaction terms between the performance rankings and the 12b-1 fee ratios are significantly positive, indicating that spending on marketing is able to reduce the negative relationship between fund flows and performance. This finding remains in Panel B of Table 9 but not over the full time period as reported earlier. From Panel A of Table 9, we also find that the effect of the lag fund size turns positive and significant, and the institutional fund dummy is not significant for the recent subperiod.

[Please insert Table 9 about here.]

As we found in Table 8, we observe from Panels C and D of Table 9 that the estimated coefficients for the low performance ranking, as measured by raw returns and CAPM alphas, are significantly negative for institutional index funds and not significant for retail index funds for the recent subperiod.

Earlier we found that only the number of funds under management has a significant effect on the flow-performance relationship over the full time period. In contrast, we find that the only factor with a significant effect is the number of index funds under management over the recent subperiod. Thus, we report the significant results in Table 10 and place tables using other family-size proxies in the appendix as Tables A4, A5 and A6.

[Please insert Table 10 about here.]

We find that in Panel A of Table 10 that the number of index funds under management has a significant (positive) effect on fund flows for all five performance measures. According to the coefficients capturing the relationship between the interaction terms and fund flows, we observe that the number of index funds under management diminishes the sensitivity of flows to the lowest-range performance grouping when performance is measured by the ranking of raw returns and three-factor alphas, and on the mid-range performance grouping when performance is measured by the ranking of differential returns, CAPM and four-factor alphas. It has a positive effect on the sensitivity of flows to the highest-range performance grouping when performance is measured by the ranking of raw returns, differential returns, and four-factor alphas.

From Panel B of Table 10, we find that this family-size factor (the number of funds under management) does not have a significant influence on fund flows for the S&P 500 index funds. However, this family-size factor lowers flow sensitivity to the mid-range performance funds for all performance measures. The estimated coefficients for this family-size factor in Panels C and D of Table 10 indicate that this factor has a significantly positive effect on retail funds and negative effect (only when performance is measured by the ranking of CAPM alphas) on institutional funds.

6.3.2 Examination of an earlier subperiod

In this section, we investigate the determinants on fund flows over an earlier subperiod of January 1995 to December 1999 using our first model. Table 11 reports the same information as in Table 7 but for the distant and not the recent subperiod.

[Please insert Table 11 about here.]

Compared with the results in Panel A of Table 7 for the recent subperiod, we find that fund flows over the earlier subperiod are significantly and positively related with performance (measured by three and four-factor alphas), and the magnitude of the coefficients are much higher than those for the recent subperiod. For example, the Panel A coefficients for the three and four-factor alphas are 0.677 and 0.477 in Table 7 for the recent subperiod and 4.927 and 4.645 in Table 11 for the earlier subperiod. We observe that the estimated coefficients for lag tracking error (for all five performance measures) and lag volatility (for only two of the performance measures) are negative and significant over the earlier subperiod. While the lag expense ratio has a significant (negative) effect on fund flow during the recent subperiod, it has no significance at traditional levels during the earlier subperiod. We also find that the coefficient for the 12b-1 fee ratios turn positive and significant for performance measured by the CAPM and four-factor alphas during the earlier subperiod. None of the proxies of family size have a significant effect on fund flows over the earlier subperiod. This may be partially due to the lower number of index funds in this earlier subperiod.

Based on Panel B of Table 11, we find some significant results for the earlier subperiod that differ from those for the recent subperiod when only S&P 500 index funds are examined. For example, while performance has a significant and negative effect on fund flows in the recent subperiod, CAPM and three-factor alphas have significant and positive effects on fund flows during the earlier subperiod. In addition, the estimated coefficients for the lagged tracking error become significant (negative) for the earlier subperiod. The estimated coefficients for the lagged expense ratio and fund size become respectively positive and negative (and significant) for the earlier versus recent

subperiod. Panels C and D do not provide any noteworthy differences for the earlier subperiod compared to the recent subperiod.

6.3.3 Use of the information ratio as an alternative performance measure

In this section, we conduct robustness tests on the three time periods (full, early, and recent) using the lagged information ratio instead of the five types of performance measures and tracking error. The results are presented in Table 12. Panel A reports the results for the full time period. We find that the lagged information ratio shows a marginally significant (positive) effect on fund flows for S&P 500 index funds. From Panel B, we find no significant relationship between the lagged information ratio and fund flows for the earlier subperiod. Based on Panel C, the estimated coefficients for the lagged information ratio are significant and positive, but not for retail funds. The coefficient estimates for the two subperiods also differ for lagged volatility and the lagged expense ratios. Investors more recently not only tend to prefer funds with higher volatilities but they appear to have learned to avoid index funds with high expense ratios.

[Please insert Table 12 about here.]

6.3.4 Panel regressions

In addition to the Fama and MacBeth (1973) regression analysis, we conduct a panel data analysis. The Hausman test suggests that the appropriate regression should be fixed-effects. The untabulated estimates of the significance levels from the fixed-effects linear regressions seem to be less conservative compared with the earlier findings from the Fama and MacBeth (1973) two-step regressions. For example, based on untabulated findings, we find that the relationship between performance and fund flows are

significant at the 1% level across four performance measures, whereas in Panel A of Table 3 estimated coefficients for only two performance measures are significant at traditional levels. Take the expense ratio as another example. The results from the Fama and MacBeth regressions show that two out of five estimated coefficients for expense ratio are significant at the 1% level and the other three at the 5% level. In contrast, all five coefficient estimates from the fixed-effects regressions are significant at the 1% level. Such differences between the two regression analyses are even stronger when the sample only includes S&P 500 index funds. Thus, we follow previous authors, such as Sirri and Tufano (1998) and Huang *et al*. (2007), who draw inferences based on Fama and MacBeth (1973) regression results in their papers.

6.3.5 Examination of high MERs influence on previous results

As a final test of robustness, we investigate the possible influence on our previous results from index fund categories that have higher MERs. From Panel D of Tables 1, we observe that the highest monthly average expense ratio, 0.062%, is associated with the MSCI EAFE index funds which invest in foreign securities, and that the second highest average monthly expense ratio of 0.059% is associated with the Russell 2000 index funds that invest in small-cap companies. We run the Fama and MacBeth regressions with the full sample minus these two categories of index funds for Model 1 over the three time periods (full, early and recent). We find that the results are almost the same as the ones derived from using the full sample. Thus, we conclude that our full sample regression results are not driven by the inclusion of these two types of index funds with relatively higher average MERs.

7. CONCLUSION

In this paper, we investigate the determinants of fund flows using a sample of 211 U.S. index funds representing eight different fund categories over the period from January 1995 to September 2010. We test our hypotheses by examining all index funds as well as S&P 500 index funds by themselves since they represent the largest category in our sample. We also divide index funds into institutional and retail, and find that these two groupings behave differently. We test all samples for the full time period and also for the two subperiods of 1995-1999 and 2000-2010.

We draw our conclusions using Table 13, which summarizes the regression results based on Model 1 though all time periods and subsamples. Our first hypothesis is supported that fund fees, including expense ratios and front-end loads, are negatively related to fund flows. However, our second hypothesis is not fully supported since we find that the sensitivity of index fund flows to expense ratios is lower for retail versus institutional investors and vice versa for their sensitivity to front-end loads. The results show that performance, proxied by five different measurements, has a positive effect on fund flows but not for S&P 500 index funds in the most recent subperiod. Over the early subperiod, only the risk-adjusted performance measures have a significant relationship with fund flows. Unlike previous findings, such as James and Karceski (2006) who study nonindex mutual funds, our fourth hypothesis is rejected based on our findings. We find no significant relationship between fund flows and performance in any time period for institutional investors, and that retail investors significantly rely on all three kinds of risk-adjusted performance measures. We only find little support for the finding of Del Guercio and Tkac (2002) that institutional fund investors punish poor performers. The

response by investors to tracking error is asymmetric in that they respond differently during the earlier (negative) and recent (positive) subperiods.

[Please place Table 13 about here.]

We find that the evidence supports our hypothesis that search costs are negatively related with fund flows. The 12b-1 fee ratio helps index funds in aggregate attract more potential investors but not for S&P 500 index funds as a separate category. For the four proxies of family size, the number of funds under management effectively lowers investor search costs, while the number of index funds under management has significant explanatory power for the recent subperiod. We find no evidence to support the hypothesis that institutional investors are less likely to be influenced by search costs than retail investors. In fact, we find exactly the opposite relation when marketing expenses are taken as a method of reducing investors' search costs.

Some of the factors, such as the expense ratio, 12b-1 fee ratio, and family-size proxies, are tested separately in Model 2 to see their effect on the sensitivity of fund flows to performance ranges as well as their own influence on fund flows. We find that the expense ratio has more of an effect on the flow-performance sensitivity over the full time period. In particular, the expense ratio has a negative and positive effect on the sensitivity of flows to respectively high-range and low-range performance (except for retail index funds). The effect of the expense ratio is more pronounced on fund flows instead of on flow-performance sensitivity over the recent subperiod.

We find that marketing effort as measured by the 12b-1 fee ratio does not help index funds attract more money if the funds are already superior performers over the full time

period but not the recent subperiod. Nevertheless, marketing expenditures do increase fund flows when the index funds rank lower in terms of CAPM alphas over both the full and recent time periods, and especially for S&P 500 index funds. Fund family-size is broadly considered to have a positive effect on fund flows. We find that our family-size proxies have positive influence on fund flows as well as positive (negative) effects on the sensitivity of flows to high (low) range performances when not differentiated by institutional and retail investors. However, this finding is fragile since it is only found for one or two out of the five performance measures.

REFERENCES

Barber, B. M., & Odean, T. (2008). All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *The Review of Financial Studies, 21*(2), 785-818.

Barber, B. M., Odean, T., & Zheng, L. (2005). Out of sight, out of mind: The effects of expenses on mutual fund flows. *The Journal of Business, 78*(6), 2095-2119.

Bergstresser, D., & Poterba, J. (2002). Do after-tax returns affect mutual fund inflows? *Journal of Financial Economics, 63*(3), 381-414.

Blume, M. E., & Edelen, R. M. (2004). S&P 500 indexers, tracking error, and liquidity. *Journal of Portfolio Management, 30*(3), 37-46.

Bogle, J. C. (2002). An index fund fundamentalist. *Journal of Portfolio Management, 28*(3), 31-38.

Boldin, M. D., & Cici, G. (2010). The index fund rationality paradox. *Journal of Banking & Finance, 34*(1), 33-43

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance, 52*(1), 57-82.

Chen, H., Noronha, G., & Singal, V. (2006). Index changes and losses to index fund investors. *Financial Analysts Journal, 62*(4), 31-47.

Chen, J., Harrison, H., Huang, M., & Kubik, J. D. (2004). Does fund size erode mutual fund performance? The role of liquidity and organization. *The American Economic Review, 94*(5), 1276-1302.

Chevalier, J., & Ellison, G. (1997). Risk taking by mutual funds as a response to incentives. *The Journal of Political Economy, 105*(6), 1167-1200.

Choi, J. J., Laibson, D., & Madrian, B. C. (2010). Why does the law of one price fail? An experiment on index mutual funds. *The Review of Financial Studies, 23*(4), 1405-1432.

Cronqvist, H. (2005). *Advertising and portfolio choice.* Unpublished manuscript.

Cuthbertson, K., Nitzsche, D., & O'Sullivan, N. (2010). Mutual fund performance: Measurement and evidence. *Financial Markets, Institutions & Instruments, 19*(2), 95-187.

Dellva, W. L., & Olson, G. T. (1998). The relationship between mutual fund fees and expenses and their effects on performance. *The Financial Review, 33*(1), 85-104.

Del Guercio, D., &Tkac, P. A. (2002). The determinants of the flow of funds of managed portfolios: Mutual funds vs. pension funds. *Journal of Financial and Quantitative Analysis, 37*(4), 523-557.

Edelen, R. M., & Warner, J. B. (2001). Aggregate price effects of institutional trading: A study of mutual fund flow and market returns. *Journal of Financial Economics, 59*(2), 195-220.

Elton, E. J., Gruber, M. J., & Blake, C. R. (1996). The persistence of risk-adjusted mutual fund performance. *The Journal of Business, 69*(2), 133-157.

Elton, E. J., Gruber, M. J., & Busse, J. A. (2004). Are investors rational? Choices among index funds. *The Journal of Finance, 59*(1), 261-288.

Fama, E. F., & French, K. R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *The Journal of Financial Economics, 33*(1), 3-56.

Fama, E. F., & French, K. R. (2010). Luck versus skill in the cross-section of mutual fund returns. *The Journal of Finance, 65*(5), 1915-1947.

Fama, E. F., & Macbeth, J. D. (1973). Risk, return and equilibrium: empirical tests. *The Journal of Political Economy, 81*(3), 607-636.

Gil-Bazo, J., & Ruiz-Verdu, P. (2006). *Yet another puzzle? The relation between price and performance in the mutual fund industry.* Unpublished manuscript.

Goetzmann, W. N., & Peles, N. (1997). Cognitive dissonance and mutual fund investors. *The Journal of Financial Research, 20*(2), 145-158.

Grinblatt, M., & Titman, S. (1992). The persistence of mutual fund performance. *The Journal of Finance, 47*(5), 1977-1984.

Gruber, M. J. (1996). Another puzzle: The growth in actively managed mutual funds. *The Journal of Finance, 51*(3), 783-810.

Haslem, J. A., Baker, H. K., & Smith, D. M. (2006). Are retail S&P 500 index funds a financial commodity? Insights for investors. *Financial Services Review, 15*(2), 99-116.

Haslem, J. A., Baker, H. K., & Smith, D. M. (2008). Institutional S&P 500 index mutual funds as financial commodities: fact or fiction? *Journal of Investing, 17*(2), 24-34.

Huang, J., Wei, K. D., & Hong, Y. (2007). Participation costs and the sensitivity of fund flows to past performance. *The Journal of Finance, 62*(3), 1273-1311.

Jain, P. C., & Wu, J. S. (2000). Truth in mutual fund advertising: Evidence on future performance and fund flows. *The Journal of Finance, 55*(2), 937-958.

James, C., & Karceski, J. (2006). Investor monitoring and differences in mutual fund performance . *Journal of Banking & Finance, 30*(10), 2787-2808.

Keswani, A., & Stolin, D. (2008). Which money is smart? mutual fund buys and sells of individual and institutional investors. *The Journal of Finance, 63*(1), 85-118.

Malkiel, B. G. (1995). Returns from investing in equity mutual funds 1971 to 1991. *The Journal of Finance, 50*(2), 549-572.

Nanda, V. K., Wang, Z. J., & Zheng, L. (2009). The ABCs of mutual funds: On the introduction of multiple share classes. *Journal of Financial Intermediation, 18*(3), 324-345.

Nanda, V., Narayanan, M. P., & Warther, V. A. (2000). Liquidity, investment ability, and mutual fund structure. *Journal of Financial Economics, 57*(3), 417-443.

Sapp, T., & Tiwari, A. (2004). Does stock return momentum explain the "smart money" effect? *The Journal of Finance, 59*(6), 2605-2622.

Sirri, E. R., & Tufano, P. (1998). Costly search and mutual fund flows. *The Journal of Finance, 53*(5), 1589-1622.

Wermers, R. (2003). *Is money really \smart"? New evidence on the relation between mutual fund flows, manager behavior, and performance persistence.* Unpublished manuscript.

Wilcox, R. T. (2003). Bargain hunting or star gazing? investors' preferences for stock mutual funds. *The Journal of Business, 76*(4), 645-663.

Zheng. (1999). Is money smart? A study of mutual fund investors' fund selection ability. *The Journal of Finance, 54*(3), 901-933.

Table 1
Sample Description

This table provides descriptive statistics for our sample for the period 1995-2010. Panel A reports the number of index funds, number of S&P 500 index funds, number of institutional funds, and number of retail funds by year. It also reports the details of the dependent variable, monthly fund flows. Panel B provides a filtered version of the same information after sorting out the top and bottom 2% of the monthly fund flows. Panel C reports the detailed index category breakdown with all observations. Panel D provides the same information as Panel C using the filtered sample. Panel E and F report the yearly fund flows, fund performance, tracking error, expense ratio, and fund size for institutional and retail funds, respectively.
The values of fund flows and performance are reported in percentages.

Panel A: Detailed sample breakdown by year using all observations

Year	Number of Index Funds	Number of S&P 500 Funds	Institutional Funds	Retail Funds	Average Fund Flows	Minimum Fund Flows	Maximum Fund Flows	Standard Deviation of Fund Flows
1995	33	29	18	15	3.514	-25.770	126.140	10.231
1996	38	32	21	17	3.945	-59.405	64.654	8.070
1997	47	37	24	23	3.632	-58.218	101.034	11.027
1998	63	44	32	31	4.207	-76.220	794.458	37.767
1999	70	50	36	34	2.032	-44.781	132.118	8.988
2000	97	72	50	40	7.411	-91.786	4296.288	147.975
2001	133	94	65	68	3.515	-98.174	986.931	39.121
2002	176	112	93	83	2.207	-76.561	249.578	11.538
2003	189	116	98	91	26.849	-84.190	45399.06	987.159
2004	201	121	109	92	1.410	-101.517	199.692	10.216
2005	211	127	112	99	1.592	-73.049	401.903	14.962
2006	211	127	112	99	1.151	-69.251	562.634	14.790
2007	211	127	112	99	0.293	-71.209	203.473	8.356
2008	211	127	112	99	-0.063	-92.386	223.967	8.137
2009	208	124	109	99	0.151	-76.443	225.448	8.195
2010	194	117	103	91	1.214	-73.999	1944.919	48.005

Panel B: Detailed sample breakdown by year using filtered observations[1]

Year	Number of Index Funds	Number of S&P 500 Funds	Institutional Funds	Retail Funds	Average Fund Flows	Minimum Fund Flows	Maximum Fund Flows	Standard Deviation of Fund Flows
1995	33	29	18	15	2.415	-9.441	22.304	4.649
1996	38	32	21	17	3.355	-11.066	23.684	4.588
1997	47	37	24	23	2.660	-11.371	23.016	4.308
1998	63	44	32	31	2.143	-11.835	23.520	4.284
1999	70	50	36	34	1.768	-11.760	23.146	4.486
2000	97	72	50	40	1.050	-12.352	24.096	4.112
2001	133	94	65	68	1.085	-12.361	21.768	3.920
2002	176	112	93	83	1.765	-11.589	24.274	4.726
2003	189	116	98	91	1.734	-12.152	23.735	4.314
2004	201	121	109	92	1.206	-11.859	24.066	3.881
2005	211	127	112	99	0.469	-12.279	22.868	3.639
2006	211	127	112	99	0.363	-12.323	24.087	3.813
2007	211	127	112	99	0.078	-11.913	23.299	3.200
2008	211	127	112	99	0.150	-12.310	24.219	3.473
2009	208	124	109	99	0.102	-12.353	23.991	3.370
2010	194	117	103	91	-0.098	-12.306	23.907	3.232

[1] Sample is filtered out by top and bottom 2% in terms of fund flows

Panel C: Breakdown by index category using all observations

Index	Number of Funds	Number of Institutional Funds	Number of Retail Funds	Average Fund Flows	Minimum Fund Flows	Maximum Fund Flows	Standard Deviation of Fund Flows	Expense Ratio
MSCI EAFE Funds	18	9	9	5.112	-90.462	4296.288	98.741	0.062
Russell 1000 Funds	4	4	0	5.205	-64.803	354.6234	23.429	0.014
Russell 2000 Funds	20	10	10	1.910	-101.229	436.588	16.791	0.058
Russell 3000 Funds	2	2	0	1.411	-60.819	138.713	13.562	0.012
Russell Mid Funds	1	1	0	3.087	-8.722	24.066	5.302	0.017
S&P 400 Funds	23	12	11	2.343	-98.278	562.634	17.231	0.052
S&P 500 Funds	127	61	66	3.835	-101.517	45399.06	356.161	0.043
S&P 600 Funds	16	7	9	5.979	-92.386	6899.338	165.207	0.051

Panel D: Breakdown by index category using filtered observations

Index	Number of Funds	Number of Institutional Funds	Number of Retail Funds	Average Fund Flows	Minimum Fund Flows	Maximum Fund Flows	Standard Deviation of Fund Flows	Expense Ratio
MSCI EAFE Funds	18	9	9	1.754	-12.310	24.096	4.794	0.062
Russell 1000 Funds	4	4	0	2.170	-9.830	23.264	4.612	0.013
Russell 2000 Funds	20	10	10	0.998	-12.323	23.520	4.920	0.059
Russell 3000 Funds	2	2	0	1.133	-12.279	22.981	4.163	0.012
Russell Mid Funds	1	1	0	3.087	-8.722	24.066	5.302	0.017
S&P 400 Funds	23	12	11	1.487	-12.003	23.747	4.370	0.052
S&P 500 Funds	127	61	66	0.499	-12.361	24.274	3.440	0.043
S&P 600 Funds	16	7	9	1.305	-12.125	23.864	4.372	0.051

Panel E: Institutional funds breakdown by year

Year	Fund Flows	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Tracking Error	Expense Ratio	Fund Size
1995	1.971	2.632	-0.029	-0.006	-0.011	-0.073	0.053	0.025	5.464
1996	2.874	1.737	-0.030	-0.022	-0.015	-0.064	0.055	0.029	5.866
1997	1.986	2.264	-0.032	-0.020	0.038	0.038	0.057	0.031	5.813
1998	1.424	2.229	-0.020	-0.018	0.001	0.028	0.068	0.028	6.084
1999	1.157	1.762	-0.013	-0.008	-0.137	-0.138	0.086	0.029	5.947
2000	0.649	-0.782	0.005	-0.008	0.084	0.138	0.104	0.030	5.879
2001	0.579	-0.630	-0.017	0.001	-0.042	0.028	0.137	0.033	5.144
2002	2.070	-1.699	-0.042	-0.042	-0.192	-0.228	0.094	0.032	4.777
2003	1.795	2.417	-0.043	-0.040	-0.181	-0.208	0.072	0.034	4.533
2004	1.485	1.153	-0.039	-0.037	0.107	-0.023	0.068	0.035	4.746
2005	0.810	0.561	-0.031	-0.032	0.001	-0.093	0.089	0.034	4.828
2006	0.720	1.253	-0.036	-0.036	-0.001	-0.003	0.080	0.035	5.100
2007	0.262	0.420	-0.032	-0.031	-0.028	-0.011	0.088	0.034	5.252
2008	0.538	-3.547	-0.018	-0.038	0.063	0.042	0.157	0.034	5.069
2009	0.316	2.213	-0.033	-0.024	-0.090	0.086	0.206	0.034	5.007
2010	0.043	0.747	-0.030	-0.038	-0.131	-0.120	0.138	0.034	5.244

Panel F: Retail funds breakdown by year

Year	Fund Flows	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Tracking Error	Expense Ratio	Fund Size
1995	2.925	2.552	-0.083	-0.039	-0.093	-0.128	0.110	0.036	4.244
1996	3.927	1.726	-0.035	-0.068	-0.129	-0.083	0.192	0.038	4.917
1997	3.462	2.330	-0.025	-0.019	-0.017	-0.032	0.112	0.047	5.231
1998	2.886	2.135	-0.020	0.018	-0.046	-0.047	0.411	0.044	5.638
1999	2.408	1.564	-0.030	-0.018	-0.286	-0.295	0.193	0.046	5.733
2000	1.455	-0.476	-0.044	-0.046	0.121	0.192	0.154	0.051	5.611
2001	1.578	-0.657	-0.053	-0.042	0.077	0.076	0.117	0.056	5.083
2002	1.449	-1.715	-0.072	-0.074	-0.228	-0.266	0.094	0.061	4.514
2003	1.668	2.369	-0.073	-0.072	-0.201	-0.227	0.081	0.064	4.408
2004	0.898	1.050	-0.065	-0.071	-0.017	-0.045	0.063	0.066	4.614
2005	0.083	0.544	-0.061	-0.061	-0.039	-0.132	0.071	0.064	4.621
2006	-0.033	1.231	-0.064	-0.063	-0.018	-0.024	0.070	0.064	4.587
2007	-0.125	0.407	-0.062	-0.060	-0.044	-0.025	0.073	0.064	4.651
2008	-0.277	-3.598	-0.040	-0.064	0.047	0.025	0.121	0.063	4.435
2009	-0.132	2.156	-0.063	-0.046	-0.114	0.067	0.167	0.063	4.148
2010	-0.257	0.733	-0.059	-0.064	-0.146	-0.136	0.114	0.065	4.272

Table 2
Preliminary Examination of Fund Flows

We form several subsets of our index funds sample to conduct univariate tests with monthly data over the full time period from 1995 to 2010. The subsamples are distinguished based on the median of a certain character of the index funds, such as Performance, Expense Ratio, Fund Age, and etc. For each subsample, we report the number of observations N, as well as the mean and median of the Fund Flows. We apply t-tests and Kruskal-Wallis tests to test for the equality of mean and median Fund Flows. The symbols *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
High Performance (Raw Return > 1.118)	12372 0.890 0.268	Low Performance (Raw Return <= 1.118)	12373 0.766 0.194	0.013** 0.053*
High Performance (Differential Return > -0.037)	12373 0.770 0.235	Low Performance (Differential Return <= -0.037)	12372 0.886 0.229	0.020** 0.649
High Performance (CAPM Alpha > -0.037)	12373 0.777 0.253	Low Performance (CAPM Alpha <= -0.037)	12372 0.879 0.205	0.042** 0.314
High Performance (3-factor Alpha > -0.071)	12373 1.125 0.497	Low Performance (3-factor Alpha <= -0.071)	12372 0.531 -0.029	0.000*** 0.000***
High Performance (4-factor Alpha > -0.053)	12372 1.053 0.458	Low Performance (4-factor Alpha <= -0.053)	12373 0.603 -0.002	0.000*** 0.000***
High Tracking Error (>0.044)	12372 1.270 0.533	Low Tracking Error (<=0.044)	12373 0.386 0.002	0.000*** 0.000***
High Volatility (>4.134)	12373 0.998 0.379	Low Volatility (<=4.134)	12372 0.658 0.092	0.000*** 0.000***
High Expense Ratio (>0.041)	12522 0.760 0.092	Low Expense Ratio (<=0.0419)	12223 0.898 0.353	0.006*** 0.000***
12b-1 fee Funds	9610 0.777 0.042	No 12b-1 fee Funds	15135 0.860 0.342	0.105 0.000***

Panel A. (Continued)

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
Old Fund (>1.97)	12518 -0.067 -0.210	Young Fund (<=1.97)	12227 1.744 0.934	0.000*** 0.000***
Large Fund Size (>5.006)	12378 0.613 0.217	Small Fund Size (<=5.006)	12367 1.044 0.254	0.000*** 0.012**
Front Load Funds	13290 0.599 0.102	No Front Load Funds	11455 1.094 0.411	0.000*** 0.000***
Large Fund Family (Number of Funds Under Management >124)	12281 0.669 0.118	Small Fund Family (Number of All Funds Under Management <=124)	12464 0.985 0.360	0.000*** 0.000***
Large Fund Family (Number of Index Funds Under Management >8)	11953 1.170 0.434	Small Fund Family (Number of Index Funds Under Management <=8)	12792 0.509 0.056	0.000*** 0.000***
Large Fund Family (Total AUM >39380.2)	12371 0.590 0.111	Small Fund Family (Total AUM <=39380.2)	12374 1.066 0.375	0.000*** 0.000***
Large Fund Family (Total Index Funds AUM >1812.1)	12370 0.785 0.253	Small Fund Family (Total Index Funds AUM <=1812.1)	12375 0.871 0.211	0.083* 0.214
Institutional Funds	12898 0.931 0.325	Retail Funds	11847 0.716 0.134	0.000*** 0.000***

Panel B: S&P 500 Index Funds

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
High Performance (Raw Return > 1.067)	7980 0.573 0.107	Low Performance (Raw Return <= 1.067)	7983 0.424 0.013	0.006*** 0.010***
High Performance (Differential Return > -0.033)	7981 0.471 0.109	Low Performance (Differential Return <= -0.033)	7982 0.526 0.000	0.313 0.010***
High Performance (CAPM Alpha > -0.032)	7982 0.448 0.151	Low Performance (CAPM Alpha <= -0.032)	7981 0.549 -0.053	0.063* 0.000***
High Performance (3-factor Alpha > -0.079)	7982 0.958 0.399	Low Performance (3-factor Alpha <= -0.079)	7981 0.039 -0.264	0.000*** 0.000***
High Performance (4-factor Alpha > -0.058)	7981 0.931 0.413	Low Performance (4-factor Alpha <= -0.058)	7982 0.066 -0.267	0.000*** 0.000***
High Tracking Error (>0.036)	7982 0.904 0.284	Low Tracking Error (<=0.036)	7981 0.093 -0.135	0.000*** 0.000***
High Volatility (>3.942)	7982 0.664 0.228	Low Volatility (<=3.942)	7981 0.333 -0.102	0.000*** 0.000***
High Expense Ratio (>0.035)	8172 0.481 -0.082	Low Expense Ratio (<=0.035)	7791 0.517 0.196	0.508 0.000***
12b-1 fee Funds	5427 0.464 -0.136	No 12b-1 fee Funds	9536 0.522 0.185	0.290 0.000***

Panel B. (Continued)

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
Old Fund (>2.04)	7962 -0.349 -0.351	Young Fund (<=2.04)	8001 1.342 0.649	0.000*** 0.000***
Large Fund Size (>5.476)	7981 0.385 0.132	Small Fund Size (<=5.476)	7982 0.612 -0.046	0.000*** 0.000***
Front Load Funds	9397 0.419 -0.002	No Front Load Funds	6566 0.613 0.151	0.001*** 0.000***
Large Fund Family (Number of Funds Under Management >111)	7971 0.243 -0.122	Small Fund Family (Number of All Funds Under Management <=111)	7992 0.754 0.283	0.000*** 0.000***
Large Fund Family (Number of Index Funds Under Management >6)	7867 0.422 -0.000	Small Fund Family (Number of Index Funds Under Management <=6)	8096 0.574 0.126	0.005*** 0.003***
Large Fund Family (Total AUM >36189.2)	7981 0.250 -0.085	Small Fund Family (Total AUM <=36189.2)	7982 0.747 0.232	0.000*** 0.000***
Large Fund Family (Total Index Funds AUM >1621.3)	7983 0.330 0.043	Small Fund Family (Total Index Funds AUM <=1621.3)	7980 0.668 0.085	0.000*** 0.010***
Institutional Funds	8335 0.535 0.130	Retail Funds	7628 0.459 -0.019	0.164 0.000***

Panel C: All Institutional Index Funds

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
High Performance (Raw Return > 1.147)	6449 0.947 0.352	Low Performance (Raw Return <= 1.147)	6449 0.915 0.300	0.665 0.640
High Performance (Differential Return > -0.026)	6449 0.835 0.291	Low Performance (Differential Return <= -0.026)	6449 1.027 0.361	0.009*** 0.025**
High Performance (CAPM Alpha > -0.027)	6449 0.750 0.275	Low Performance (CAPM Alpha <= -0.027)	6449 1.113 0.398	0.000*** 0.001***
High Performance (3-factor Alpha > -0.059)	6449 1.161 0.546	Low Performance (3-factor Alpha <= -0.059)	6449 0.702 0.127	0.000*** 0.000***
High Performance (4-factor Alpha > -0.043)	6449 1.038 0.464	Low Performance (4-factor Alpha <= -0.043)	6449 0.824 0.185	0.004*** 0.000***
High Tracking Error (>0.042)	6449 1.388 0.642	Low Tracking Error (<=0.042)	6449 0.474 0.068	0.000*** 0.000***
High Volatility (>4.086)	6449 1.003 0.389	Low Volatility (<=4.086)	6449 0.859 0.262	0.051* 0.008***
High Expense Ratio (>0.029)	6875 0.921 0.235	Low Expense Ratio (<=0.029)	6023 0.942 0.420	0.776 0.000***
12b-1 fee Funds	2222 1.518 0.557	No 12b-1 fee Funds	10676 0.809 0.284	0.000*** 0.000***

Panel C. (Continued)

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
Old Fund (>1.97)	6539 0.021 -0.109	Young Fund (<=1.97)	6359 1.867 1.012	0.000*** 0.000***
Large Fund Size (>5.383)	6449 0.627 0.254	Small Fund Size (<=5.383)	6449 1.236 0.424	0.000*** 0.000***
Front Load Funds	5643 0.326 0.010	No Front Load Funds	7255 1.402 0.619	0.000*** 0.000***
Large Fund Family (Number of Funds Under Management >112)	6384 0.864 0.264	Small Fund Family (Number of All Funds Under Management <=112)	6514 0.998 0.405	0.069* 0.006***
Large Fund Family (Number of Index Funds Under Management >11)	6044 1.482 0.700	Small Fund Family (Number of Index Funds Under Management <=11)	6854 0.445 0.076	0.000*** 0.000***
Large Fund Family (Total AUM >36644.6)	6451 0.672 0.172	Small Fund Family (Total AUM <=36644.6)	6447 1.191 0.499	0.000*** 0.000***
Large Fund Family (Total Index Funds AUM >1822.5)	6436 0.758 0.274	Small Fund Family (Total Index Funds AUM <=1822.5)	6462 1.103 0.387	0.000*** 0.002***

Panel D: All Retail Index Funds

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
High Performance (Raw Return > 1.098)	5923 0.826 0.173	Low Performance (Raw Return <= 1.098)	5924 0.606 0.094	0.001*** 0.030**
High Performance (Differential Return > -0.051)	5923 0.699 0.169	Low Performance (Differential Return <= -0.051)	5924 0.733 0.085	0.608 0.006***
High Performance (CAPM Alpha > -0.050)	5923 0.824 0.218	Low Performance (CAPM Alpha <= -0.050)	5924 0.608 0.022	0.001*** 0.000***
High Performance (3-factor Alpha > -0.086)	5923 1.085 0.440	Low Performance (3-factor Alpha <= -0.086)	5924 0.347 -0.169	0.000*** 0.000***
High Performance (4-factor Alpha > -0.066)	5923 1.048 0.428	Low Performance (4-factor Alpha <= -0.066)	5924 0.384 -0.151	0.000*** 0.000***
High Tracking Error (>0.045)	5923 1.134 0.410	Low Tracking Error (<=0.045)	5924 0.298 -0.059	0.000*** 0.000***
High Volatility (>4.171)	5923 0.973 0.340	Low Volatility (<=4.171)	5924 0.459 -0.072	0.000*** 0.000***
High Expense Ratio (>0.052)	5740 0.497 -0.095	Low Expense Ratio (<=0.052)	6107 0.922 0.307	0.000*** 0.000***
12b-1 fee Funds	7388 0.555 -0.082	No 12b-1 fee Funds	4459 0.983 0.472	0.000*** 0.000***

Panel D. (Continued)

Subsample 1	N Mean Median	Subsample 2	N Mean Median	Tests of differences Means (p-value) Medians (p-value)
Old Fund (>1.97)	5979 -0.163 -0.322	Young Fund (<=1.97)	5868 1.611 0.855	0.000*** 0.000***
Large Fund Size (>4.687)	5922 0.589 0.140	Small Fund Size (<=4.687)	5925 0.897 0.126	0.000*** 0.528
Front Load Funds	7647 0.801 0.170	No Front Load Funds	4200 0.561 0.042	0.001*** 0.000***
Large Fund Family (Number of Funds Under Management >154)	5912 0.497 0.008	Small Fund Family (Number of All Funds Under Management <=154)	5935 0.934 0.267	0.000*** 0.000***
Large Fund Family (Number of Index Funds Under Management >7)	5786 0.683 0.090	Small Fund Family (Number of Index Funds Under Management <=7)	6061 0.748 0.184	0.331 0.363
Large Fund Family (Total AUM >44384.4)	5923 0.546 0.097	Small Fund Family (Total AUM <=44384.4)	5924 0.886 0.179	0.000*** 0.000***
Large Fund Family (Total Index Funds AUM >1787.8)	5924 0.809 0.228	Small Fund Family (Total Index Funds AUM <=1787.8)	5923 0.623 0.014	0.005*** 0.000***

Table 3
Regression Results for Determinants of Monthly Fund Flows for 1995 - 2010

This table examines the effect of fund past performance, fees and search costs on the index funds flows. The sample includes open-end U.S. index funds from January 1995 to September 2010. The dependent variable is the monthly fund flows. The independent variables include the fund flows in the prior period (Lag Fund Flows); raw returns in the prior period; differential returns in the prior period; CAPM alphas in the prior period; 3-factor alphas in the prior period; 4-factor alphas in the prior period; tracking error in the prior period; volatility in the prior period; expense ratio in the prior month; 12b-1 ratio in the prior month; the front-end load dummy, which equals 1 when fund charges frond-end load and 0 otherwise; the natural log of fund's TNA in the prior period as fund size; lagged number of all mutual funds under management; lagged number of all index funds under management; lagged total assets under management; lagged total index funds assets under management; lagged fund age, which is the natural log of the years from the fund's first offer day to period *t*; and the Institutional Fund Dummy, which equals 1 if the funds are institutional funds, and equals 0 if the funds are retail funds.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	2.929* (0.094)	5.004*** (0.000)	5.079*** (0.000)	2.392* (0.073)	2.253* (0.062)
Lag Fund Flows	0.202*** (0.000)	0.212*** (0.000)	0.207*** (0.000)	0.201*** (0.000)	0.202*** (0.000)
Performance	0.344* (0.063)	0.677 (0.267)	-0.355 (0.800)	2.026*** (0.000)	1.800*** (0.005)
Lag Tracking Error	-1.795** (0.020)	-1.209 (0.113)	-1.417* (0.088)	-1.335* (0.077)	-1.384* (0.074)
Lag Volatility	0.210 (0.712)	-0.463* (0.064)	-0.490** (0.033)	0.418 (0.337)	0.349 (0.355)
Lag Expense Ratio	-9.407*** (0.006)	-8.129** (0.028)	-10.315*** (0.005)	-8.965** (0.013)	-8.931** (0.013)
Lag 12b-1 Ratio	5.074 (0.358)	8.807 (0.136)	9.294 (0.124)	8.307 (0.131)	10.288* (0.052)
Front Load Dummy	-0.196** (0.018)	-0.173** (0.035)	-0.174** (0.034)	-0.164** (0.048)	-0.166** (0.045)
Lag Fund Size	-0.198*** (0.000)	-0.168*** (0.000)	-0.164*** (0.000)	-0.188*** (0.000)	-0.180*** (0.000)
Number of Funds Under Management	0.002** (0.025)	0.002* (0.063)	0.002** (0.039)	0.003** (0.018)	0.002** (0.031)
Number of Index Funds Under Management	-0.007 (0.773)	-0.010 (0.711)	-0.004 (0.860)	-0.013 (0.597)	-0.008 (0.758)
Total AUM	0.000 (0.202)	0.000 (0.238)	0.000 (0.148)	0.000 (0.299)	0.000 (0.185)
Total Index Funds AUM	0.000 (0.430)	0.000 (0.506)	0.000 (0.544)	0.000 (0.373)	0.000 (0.484)
Lag Fund Age	-0.923*** (0.000)	-0.944*** (0.000)	-0.914*** (0.000)	-0.937*** (0.000)	-0.961*** (0.000)
Institutional Fund Dummy	-0.281*** (0.001)	-0.241*** (0.005)	-0.252*** (0.003)	-0.256*** (0.002)	-0.253*** (0.002)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3142	0.3161	0.3148	0.3175	0.3160
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	21.494**	22.437**	3.860	16.207	24.411**
	(0.041)	(0.036)	(0.752)	(0.150)	(0.018)
Lag Fund Flows	0.223***	0.223***	0.221***	0.223***	0.225***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Performance	0.678	0.678	6.826	1.843	-1.855
	(0.544)	(0.544)	(0.141)	(0.613)	(0.499)
Lag Tracking Error	-2.637	-2.637	-0.771	-2.872	-2.675
	(0.190)	(0.190)	(0.712)	(0.158)	(0.190)
Lag Volatility	-0.658	-0.658	5.449	3.017	-1.529
	(0.838)	(0.838)	(0.151)	(0.447)	(0.603)
Lag Expense Ratio	-3.359	-3.359	6.496	0.403	-5.009
	(0.379)	(0.379)	(0.298)	(0.941)	(0.241)
Lag 12b-1 Ratio	6.908	6.908	7.304	11.297	6.375
	(0.253)	(0.253)	(0.252)	(0.101)	(0.276)
Front Load Dummy	-0.251***	-0.251***	-0.254***	-0.253***	-0.247***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Lag Fund Size	-0.125***	-0.125***	-0.113**	-0.103**	-0.121***
	(0.007)	(0.007)	(0.014)	(0.022)	(0.010)
Number of Funds Under Management	0.003**	0.003**	0.004***	0.004***	0.003**
	(0.016)	(0.016)	(0.009)	(0.005)	(0.031)
Number of Index Funds Under Management	-0.027	-0.027	-0.034	-0.030	-0.018
	(0.386)	(0.386)	(0.287)	(0.335)	(0.571)
Total AUM	0.000	0.000	0.000	0.000	0.000
	(0.482)	(0.482)	(0.394)	(0.295)	(0.746)
Total Index Funds AUM	0.000	0.000	0.000	0.000	0.000
	(0.237)	(0.237)	(0.156)	(0.190)	(0.323)
Lag Fund Age	-0.791***	-0.791***	-0.864***	-0.880***	-0.839***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Institutional Fund Dummy	-0.244**	-0.244**	-0.211**	-0.209**	-0.229**
	(0.012)	(0.012)	(0.036)	(0.037)	(0.023)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3507	0.3507	0.3538	0.3540	0.3531
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	27.071 (0.134)	-23.247 (0.580)	-7.574 (0.466)	27.814 (0.222)	20.837 (0.341)
Lag Fund Flows	-0.030 (0.884)	0.122 (0.413)	0.277*** (0.001)	0.228*** (0.003)	0.245*** (0.002)
Performance	3.460 (0.286)	4.564 (0.151)	-10.230* (0.069)	-3.376 (0.563)	-1.178 (0.724)
Lag Tracking Error	-5.824 (0.521)	-15.756 (0.143)	4.089 (0.500)	11.459* (0.098)	3.880 (0.618)
Lag Volatility	-11.966 (0.129)	9.750 (0.513)	3.832 (0.284)	-9.226 (0.246)	-6.157 (0.419)
Lag Expense Ratio	9.293 (0.649)	9.977 (0.500)	-24.381* (0.070)	-24.192** (0.015)	-19.886** (0.046)
Lag 12b-1 Ratio	-224.650 (0.602)	-288.646 (0.370)	129.555 (0.293)	315.345 (0.103)	334.833** (0.041)
Front Load Dummy	-0.588*** (0.000)	-0.504*** (0.000)	-0.533*** (0.000)	-0.551*** (0.000)	-0.564*** (0.000)
Lag Fund Size	-0.082 (0.665)	-0.068 (0.666)	-0.376*** (0.004)	-0.312*** (0.004)	-0.267*** (0.002)
Number of Funds Under Management	0.018 (0.368)	0.023 (0.153)	0.000 (0.977)	-0.005 (0.602)	-0.007 (0.448)
Number of Index Funds Under Management	-0.578 (0.323)	-0.440 (0.273)	0.136 (0.570)	0.166 (0.472)	0.174 (0.453)
Total AUM	0.000 (0.492)	0.000 (0.210)	0.000 (0.534)	0.000 (0.880)	0.000 (0.487)
Total Index Funds AUM	0.000 (0.412)	0.000 (0.397)	0.001 (0.268)	0.001 (0.229)	0.000 (0.749)
Lag Fund Age	-1.209** (0.027)	-0.325 (0.617)	0.004 (0.993)	-0.686 (0.128)	-0.728 (0.121)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.4419	0.4399	0.4407	0.4441	0.4427
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-34.591 (0.382)	19.724 (0.168)	-22.832 (0.377)	-13.625 (0.588)	-42.007 (0.043)
Lag Fund Flows	0.301** (0.014)	0.366*** (0.001)	0.126 (0.198)	0.276*** (0.000)	0.205*** (0.001)
Performance	3.472 (0.410)	-17.697 (0.204)	57.453* (0.074)	3.890 (0.616)	20.271*** (0.008)
Lag Tracking Error	-2.701 (0.585)	-58.027 (0.386)	13.299 (0.699)	0.350 (0.932)	-0.408 (0.941)
Lag Volatility	7.040 (0.675)	-3.439 (0.241)	5.196 (0.256)	4.503 (0.633)	15.846** (0.030)
Lag Expense Ratio	57.256 (0.294)	-103.841 (0.242)	104.474 (0.255)	12.390 (0.332)	1.281 (0.942)
Lag 12b-1 Ratio	4.254 (0.971)	-84.935 (0.154)	419.227 (0.318)	34.803 (0.503)	40.630 (0.344)
Front Load Dummy	0.005 (0.945)	0.003 (0.970)	-0.007 (0.928)	0.018 (0.802)	0.032 (0.650)
Lag Fund Size	-0.044 (0.919)	-0.603** (0.037)	1.333 (0.438)	0.058 (0.788)	-0.257 (0.307)
Number of Funds Under Management	0.014 (0.490)	0.007 (0.712)	0.077 (0.249)	0.018 (0.115)	0.018* (0.073)
Number of Index Funds Under Management	-0.199 (0.492)	-0.096 (0.704)	-0.907 (0.330)	-0.258 (0.151)	-0.154 (0.393)
Total AUM	0.000 (0.413)	0.000 (0.518)	0.000 (0.231)	0.000 (0.128)	0.000 (0.190)
Total Index Funds AUM	0.000 (0.189)	0.000 (0.265)	0.001 (0.273)	0.000* (0.100)	0.000 (0.288)
Lag Fund Age	-1.954*** (0.002)	0.682 (0.545)	-2.768 (0.111)	-1.724*** (0.000)	-1.077* (0.095)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.4770	0.4777	0.4770	0.4777	0.4763
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 4
Regression Results for the Effect of Expense Ratio on the Flow-Performance relationship using Monthly Data for 1995 - 2010

This table examines the effect of fund expense ratios on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	0.765 (0.898)	6.953*** (0.008)	6.403*** (0.000)	8.904* (0.055)	2.030 (0.671)
Lag Fund Flows	0.229*** (0.000)	0.238*** (0.000)	0.234*** (0.000)	0.236*** (0.000)	0.240*** (0.000)
Low	7.809 (0.619)	-11.475 (0.328)	-10.178 (0.188)	-28.887* (0.086)	17.964 (0.398)
Low * Expense Ratio	-402.756 (0.407)	347.682 (0.177)	111.897 (0.422)	373.447 (0.209)	-346.983 (0.343)
Mid	0.056 (0.916)	0.276 (0.704)	-0.642 (0.436)	0.466 (0.601)	0.370 (0.580)
Mid * Expense Ratio	9.690 (0.478)	-12.936 (0.525)	-25.533 (0.158)	-4.723 (0.822)	-8.120 (0.609)
High	-3.620 (0.417)	-5.158* (0.060)	-14.753 (0.352)	4.366 (0.145)	-2.651 (0.551)
High * Expense Ratio	135.303 (0.222)	13.218 (0.876)	-103.787 (0.427)	-253.735** (0.018)	-1.338 (0.990)
Lag Tracking Error	-1.835 (0.150)	-0.879 (0.448)	-1.426 (0.189)	-0.382 (0.729)	0.124 (0.903)
Lag Volatility	1.007 (0.422)	-0.384 (0.230)	-0.141 (0.545)	-0.297 (0.730)	-0.894 (0.447)
Age	-2.014 (0.320)	-0.775*** (0.000)	-0.676*** (0.000)	-0.924*** (0.000)	-0.584** (0.019)
Age * Performance	0.334 (0.510)	2.802* (0.099)	5.296 (0.296)	2.479* (0.075)	-2.163 (0.319)
Lag Fund Size	-0.111*** (0.002)	-0.080** (0.027)	-0.095*** (0.010)	-0.085** (0.021)	-0.077** (0.025)
Expense Ratio	68.983 (0.480)	-71.644 (0.145)	-22.859 (0.374)	-70.915 (0.217)	70.518 (0.328)
Front Load Dummy	-0.189** (0.021)	-0.159** (0.050)	-0.187** (0.021)	-0.189** (0.021)	-0.182** (0.028)
Institutional Fund Dummy	-0.421*** (0.000)	-0.359*** (0.000)	-0.340*** (0.000)	-0.391*** (0.000)	-0.294*** (0.002)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3651	0.3626	0.3597	0.3677	0.3676
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	23.710* (0.054)	13.928 (0.299)	24.346 (0.402)	41.177*** (0.007)	-31.427 (0.525)
Lag Fund Flows	0.237*** (0.000)	0.243*** (0.000)	0.239*** (0.000)	0.243*** (0.000)	0.251*** (0.000)
Low	-28.720 (0.303)	9.279 (0.755)	-92.268 (0.495)	-103.325* (0.100)	234.295 (0.344)
Low * Expense Ratio	509.152* (0.096)	-53.562 (0.938)	1699.786 (0.541)	1646.096 (0.187)	-4490.02 (0.296)
Mid	-0.434 (0.629)	-0.433 (0.693)	-2.125** (0.029)	-1.839* (0.073)	-1.763** (0.047)
Mid * Expense Ratio	2.450 (0.875)	6.181 (0.747)	-13.029 (0.541)	-24.286 (0.284)	-26.639 (0.204)
High	-11.407 (0.692)	-4.144 (0.695)	-12.867* (0.093)	38.485 (0.209)	-31.549 (0.278)
High * Expense Ratio	1437.174 (0.350)	202.234 (0.689)	371.300 (0.659)	-3081.074* (0.098)	893.439 (0.571)
Lag Tracking Error	-5.514** (0.029)	-5.574** (0.024)	-0.369 (0.870)	-3.450* (0.097)	-1.810 (0.436)
Lag Volatility	0.265 (0.936)	1.343 (0.702)	1.716 (0.659)	-1.699 (0.620)	0.086 (0.978)
Age	-10.560 (0.240)	-0.633*** (0.000)	-0.334* (0.064)	0.392 (0.397)	0.089 (0.883)
Age * Performance	1.349 (0.596)	4.354 (0.158)	11.897* (0.092)	13.306*** (0.002)	9.948* (0.096)
Lag Fund Size	-0.086** (0.039)	-0.065 (0.121)	-0.049 (0.218)	-0.063* (0.090)	-0.040 (0.283)
Expense Ratio	-104.448* (0.089)	8.894 (0.949)	-329.875 (0.553)	-316.537 (0.205)	909.568 (0.291)
Front Load Dummy	-0.317*** (0.000)	-0.299*** (0.000)	-0.336*** (0.000)	-0.366*** (0.000)	-0.329*** (0.000)
Institutional Fund Dummy	-0.380*** (0.000)	-0.428*** (0.000)	-0.345*** (0.000)	-0.417*** (0.000)	-0.345*** (0.000)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3796	0.4077	0.3993	0.3705	0.3730
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	24.480 (0.494)	4.038 (0.658)	17.295 (0.482)	-0.698 (0.986)	-9.344 (0.753)
Lag Fund Flows	0.219*** (0.000)	0.242*** (0.001)	0.166*** (0.000)	0.247*** (0.000)	0.139** (0.027)
Low	25.380 (0.838)	19.868 (0.555)	-2.353 (0.973)	63.569 (0.715)	31.064 (0.711)
Low * Expense Ratio	459.561 (0.276)	226.532 (0.696)	4019.338 (0.342)	738.127 (0.229)	1582.896** (0.038)
Mid	0.722 (0.728)	-1.536 (0.603)	1.470 (0.763)	0.099 (0.972)	4.782* (0.061)
Mid * Expense Ratio	-55.950 (0.367)	76.831 (0.184)	-39.625 (0.732)	-27.000 (0.534)	-119.956** (0.013)
High	-51.891 (0.528)	8.348 (0.521)	3.099 (0.761)	11.591 (0.231)	3.746 (0.808)
High * Expense Ratio	2885.405 (0.259)	-4507.193 (0.291)	-578.769 (0.255)	-463.90*** (0.008)	-28.896 (0.957)
Lag Tracking Error	-19.168** (0.039)	-12.275 (0.107)	3.758 (0.754)	-11.094 (0.188)	14.033* (0.063)
Lag Volatility	4.187 (0.389)	0.037 (0.989)	-1.733 (0.823)	3.292 (0.562)	4.124 (0.587)
Age	-10.610 (0.660)	-0.674 (0.213)	0.041 (0.949)	-1.673 (0.446)	-3.526* (0.082)
Age * Performance	0.332 (0.963)	3.184 (0.751)	32.952 (0.320)	24.792 (0.324)	2.259 (0.884)
Lag Fund Size	-0.306** (0.043)	-0.1931 (0.112)	-0.145 (0.506)	-0.136 (0.323)	0.316 (0.149)
Expense Ratio	-92.108 (0.283)	-85.820 (0.459)	-782.397 (0.354)	-118.738 (0.336)	-257.994* (0.090)
Front Load Dummy	-0.534*** (0.000)	-0.398*** (0.003)	-0.496*** (0.001)	-0.492*** (0.001)	-0.465*** (0.001)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.5047	0.5135	0.5098	0.5151	0.5162
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-120.329 (0.177)	7.684 (0.441)	59.764 (0.277)	60.936 (0.377)	211.059 (0.310)
Lag Fund Flows	0.158 (0.133)	0.205*** (0.005)	0.272*** (0.000)	0.133 (0.406)	0.282*** (0.000)
Low	224.920 (0.225)	32.979** (0.048)	-204.640 (0.393)	-219.024 (0.231)	-832.800 (0.333)
Low * Expense Ratio	-437.293 (0.769)	-608.059** (0.033)	5778.273 (0.439)	2141.911 (0.368)	5095.730 (0.405)
Mid	-12.888* (0.066)	-5.852** (0.014)	-1.449 (0.742)	-12.947 (0.388)	-12.286* (0.084)
Mid * Expense Ratio	258.659* (0.079)	157.292*** (0.010)	94.275 (0.382)	328.657 (0.336)	144.445 (0.252)
High	-33.878 (0.569)	-86.266 (0.149)	23.837 (0.392)	75.622 (0.358)	-68.806 (0.345)
High * Expense Ratio	-1842.40 (0.342)	461.552 (0.143)	-658.803** (0.026)	-1947.83 (0.483)	6581.455 (0.276)
Lag Tracking Error	2.776 (0.876)	-1.799 (0.786)	-2.155 (0.548)	1.203 (0.879)	-2.155 (0.784)
Lag Volatility	24.909 (0.164)	-1.712 (0.518)	-3.557 (0.136)	-8.949 (0.679)	-9.565 (0.473)
Age	24.669 (0.450)	-0.055 (0.899)	-1.957 (0.103)	-1.470 (0.453)	-6.068 (0.317)
Age * Performance	-7.716 (0.175)	8.201 (0.369)	-45.558 (0.389)	4.946 (0.788)	61.231 (0.375)
Lag Fund Size	-0.202 (0.270)	-0.275 (0.107)	-0.156 (0.228)	-0.246 (0.494)	-0.069 (0.590)
Expense Ratio	-34.499 (0.904)	101.506* (0.088)	-1188.866 (0.428)	-510.268 (0.286)	-1086.20 (0.372)
Front Load Dummy	0.010 (0.908)	0.020 (0.778)	-0.009 (0.900)	-0.002 (0.981)	-0.038 (0.665)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.5345	0.5358	0.5356	0.5378	0.5407
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 5
Regression Results for the Effect of Marketing Expense on the Flow-Performance relationship using Monthly Data for 1995 - 2010

This table examines the effect of fund marketing expense, measured as the 12b-1 ratio, on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.038 (0.686)	3.789*** (0.002)	6.132*** (0.000)	2.943 (0.283)	3.079 (0.147)
Lag Fund Flows	0.218*** (0.000)	0.239*** (0.000)	0.233*** (0.000)	0.218*** (0.000)	0.224*** (0.000)
Low	3.436 (0.388)	2.450 (0.590)	-5.462* (0.068)	-5.142 (0.345)	-5.158 (0.231)
Low * 12b-1 Ratio	74.599 (0.940)	-1112.038 (0.272)	475.090 (0.119)	256.890 (0.695)	183.075 (0.665)
Mid	0.268 (0.374)	-0.137 (0.738)	-0.460 (0.353)	0.502 (0.184)	-0.212 (0.555)
Mid * 12b-1 Ratio	56.705 (0.478)	8.849 (0.906)	45.422 (0.496)	32.490 (0.659)	104.752 (0.183)
High	0.850 (0.659)	-7.273*** (0.000)	4.521 (0.432)	3.497* (0.100)	-3.311 (0.513)
High * 12b-1 Ratio	-2986.627 (0.319)	3387.422 (0.217)	-1461.585 (0.248)	-2210.667 (0.486)	-3410.8** (0.029)
Lag Tracking Error	-0.542 (0.508)	-0.454 (0.548)	0.159 (0.885)	-0.343 (0.755)	-0.837 (0.384)
Lag Volatility	0.775 (0.297)	-0.346 (0.243)	-0.709** (0.012)	0.266 (0.756)	0.359 (0.602)
Age	-2.019 (0.361)	-0.804*** (0.000)	-0.912*** (0.000)	-1.005*** (0.000)	-1.031*** (0.000)
Age * Performance	0.229 (0.653)	3.673*** (0.007)	2.390 (0.524)	1.081 (0.294)	1.360 (0.240)
Lag Fund Size	-0.033 (0.301)	-0.039 (0.282)	-0.032 (0.433)	-0.020 (0.579)	-0.018 (0.605)
12b-1 Ratio	-16.882 (0.930)	230.805 (0.250)	-75.809 (0.155)	-34.036 (0.791)	-39.859 (0.623)
Institutional Fund Dummy	-0.201** (0.025)	-0.106 (0.267)	-0.156* (0.087)	-0.237*** (0.007)	-0.132 (0.149)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3584	0.3593	0.3472	0.3565	0.3558
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	27.537**	20.339*	12.066	18.552*	13.212
	(0.046)	(0.082)	(0.266)	(0.056)	(0.204)
Lag Fund Flows	0.229***	0.237***	0.240***	0.230***	0.234***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Low	-26.804	-26.162	-37.605***	-7.187	-10.554
	(0.599)	(0.207)	(0.005)	(0.677)	(0.596)
Low * 12b-1 Ratio	3251.390	-1967.924	1141.348**	-12.351	65.688
	(0.140)	(0.566)	(0.048)	(0.882)	(0.947)
Mid	-0.732	-0.830	-1.849***	-2.120***	-2.421***
	(0.259)	(0.186)	(0.003)	(0.000)	(0.000)
Mid * 12b-1 Ratio	-75.108	-111.592	21.865	32.108	69.373
	(0.541)	(0.419)	(0.835)	(0.686)	(0.401)
High	0.177	-6.827	-7.884*	-5.422	-0.634
	(0.987)	(0.241)	(0.069)	(0.611)	(0.939)
High * 12b-1 Ratio	51.399	5.928	-3942.357*	-3970.106	-1341.994
	(0.987)	(0.998)	(0.098)	(0.239)	(0.732)
Lag Tracking Error	-3.708**	-4.596**	-3.197	-4.220**	-3.791*
	(0.049)	(0.023)	(0.126)	(0.025)	(0.097)
Lag Volatility	-0.746	1.345	4.583	0.833	1.707
	(0.807)	(0.667)	(0.145)	(0.759)	(0.581)
Age	-22.312**	-0.655***	-0.615***	0.469	0.308
	(0.047)	(0.000)	(0.000)	(0.206)	(0.528)
Age * Performance	2.860	7.227**	11.370**	12.130***	10.162**
	(0.254)	(0.022)	(0.020)	(0.001)	(0.024)
Lag Fund Size	-0.046	-0.039	-0.049	-0.038	0.000
	(0.225)	(0.341)	(0.322)	(0.346)	(0.990)
12b-1 Ratio	-597.100	455.760	-191.879*	22.240	-4.082
	(0.132)	(0.487)	(0.083)	(0.437)	(0.984)
Institutional Fund Dummy	-0.206*	-0.141	-0.284***	-0.299***	-0.199**
	(0.051)	(0.156)	(0.003)	(0.001)	(0.034)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3625	0.3917	0.3784	0.3513	0.3550
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	720.548 (0.323)	-4.565 (0.586)	5.129 (0.655)	5.811 (0.742)	14.560 (0.425)
Lag Fund Flows	1.892 (0.265)	0.225*** (0.000)	0.216*** (0.000)	0.228*** (0.000)	0.236*** (0.000)
Low	-21117.590 (0.320)	39.945 (0.172)	24.405 (0.508)	-12.009 (0.864)	-59.434 (0.340)
Low * 12b-1 Ratio	-5203.207 (0.111)	-472.696 (0.822)	4387.079 (0.151)	-3658.825 (0.532)	1552.223 (0.731)
Mid	-221.450 (0.318)	0.422 (0.753)	0.033 (0.985)	1.085 (0.354)	-0.184 (0.834)
Mid * 12b-1 Ratio	-47866.820 (0.316)	1593.897 (0.309)	879.662 (0.216)	369.972 (0.495)	-372.545 (0.397)
High	-1602.288 (0.260)	7.550 (0.343)	-0.764 (0.907)	3.391 (0.677)	-2.993 (0.843)
High * 12b-1 Ratio	-2773.036 (0.510)	-19538.260 (0.176)	2576.487* (0.081)	-757.074 (0.322)	11510.290 (0.134)
Lag Tracking Error	-666.053 (0.319)	-3.394 (0.416)	-1.197 (0.807)	-4.665 (0.227)	-2.609 (0.559)
Lag Volatility	1115.617 (0.316)	1.124 (0.664)	-2.101 (0.547)	0.293 (0.935)	0.702 (0.884)
Age	-6545.532 (0.317)	-0.727** (0.047)	-0.894*** (0.001)	0.115 (0.926)	-1.979* (0.074)
Age * Performance	1668.107 (0.318)	0.391 (0.957)	8.095 (0.610)	5.973 (0.697)	7.791 (0.436)
Lag Fund Size	1.995 (0.336)	0.022 (0.759)	-0.025 (0.780)	0.021 (0.727)	0.034 (0.605)
12b-1 Ratio	20124.340 (0.288)	-293.551 (0.660)	-1212.686* (0.084)	625.815 (0.593)	81.210 (0.916)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.4781	0.4749	0.4672	0.4819	0.4849
P-value (F-Test)	0.484	0.001	0.000	0.007	0.034

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	25.271 (0.448)	6.560 (0.681)	-31.904 (0.391)	-54.527 (0.747)	20.075 (0.821)
Lag Fund Flows	0.142*** (0.004)	0.249*** (0.000)	0.337*** (0.000)	0.317*** (0.000)	0.278*** (0.000)
Low	90.781 (0.105)	-31.666 (0.662)	113.631 (0.336)	27.451 (0.910)	-163.296 (0.178)
Low * 12b-1 Ratio	-2738.797 (0.141)	-408.360 (0.490)	601.098 (0.742)	-2530.855 (0.528)	-3049.304 (0.236)
Mid	0.801 (0.554)	-2.582 (0.222)	12.877 (0.132)	-1.955 (0.680)	-5.367 (0.352)
Mid * 12b-1 Ratio	825.028 (0.306)	-17.222 (0.925)	-1071.617** (0.047)	349.292 (0.353)	467.032 (0.313)
High	-33.115 (0.262)	-34.319** (0.018)	248.610 (0.218)	-40.262 (0.438)	39.867* (0.064)
High * 12b-1 Ratio	-11308.760 (0.108)	4691.213 (0.340)	-2127.190 (0.298)	8530.868 (0.643)	10602.280 (0.238)
Lag Tracking Error	-6.698 (0.406)	-10.586 (0.193)	-11.958 (0.430)	-15.498 (0.385)	-7.016 (0.712)
Lag Volatility	-11.151 (0.247)	0.856 (0.853)	10.619 (0.387)	28.595 (0.686)	-6.523 (0.823)
Age	5.548 (0.585)	-1.302*** (0.004)	-3.270** (0.022)	3.808 (0.265)	0.468 (0.937)
Age * Performance	-0.068 (0.985)	20.988 (0.166)	-124.071* (0.089)	1.976 (0.947)	18.117 (0.523)
Lag Fund Size	-0.149 (0.280)	0.120 (0.405)	0.194 (0.208)	0.273 (0.115)	-0.256 (0.513)
12b-1 Ratio	249.624 (0.149)	170.014 (0.229)	108.866 (0.758)	574.882 (0.509)	493.923 (0.322)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.5350	0.5297	0.5290	0.5419	0.5352
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 6
Regression Results for the Effect of Number of Funds Under Management on the Flow-Performance relationship using Monthly Data for 1995 - 2010

This table examines the effect of number of funds provided by a fund family on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.176 (0.796)	3.933** (0.043)	4.426*** (0.001)	1.520 (0.622)	0.087 (0.981)
Lag Fund Flows	0.232*** (0.000)	0.251*** (0.000)	0.236*** (0.000)	0.219*** (0.000)	0.228*** (0.000)
Low	-2.111 (0.810)	0.454 (0.894)	-0.385 (0.926)	-0.944 (0.876)	-5.556 (0.579)
Low * Number of Funds Under Management	-0.151** (0.045)	0.005 (0.867)	0.020 (0.473)	0.018 (0.388)	0.041 (0.139)
Mid	0.557 (0.178)	0.430 (0.367)	0.350 (0.548)	0.535 (0.229)	0.298 (0.459)
Mid * Number of Funds Under Management	0.000 (0.939)	-0.003 (0.424)	-0.007* (0.087)	0.000 (0.913)	-0.005 (0.196)
High	-3.358 (0.303)	-3.938 (0.133)	-1.477 (0.683)	-2.512 (0.331)	-0.567 (0.827)
High * Number of Funds Under Management	0.046** (0.041)	-0.018 (0.523)	0.468 (0.348)	0.035 (0.139)	-0.003 (0.926)
Lag Tracking Error	0.996 (0.291)	0.190 (0.759)	0.370 (0.644)	0.699 (0.357)	2.025** (0.037)
Lag Volatility	1.918 (0.242)	-0.359 (0.526)	-0.389 (0.189)	0.277 (0.759)	1.302 (0.143)
Age	-2.192 (0.285)	-0.836*** (0.000)	-0.798*** (0.000)	-0.914*** (0.000)	-1.161*** (0.000)
Age * Performance	0.873 (0.186)	3.271** (0.034)	3.446 (0.458)	0.192 (0.866)	0.358 (0.846)
Lag Fund Size	-0.051 (0.166)	-0.073** (0.049)	-0.107*** (0.003)	-0.104*** (0.005)	-0.080** (0.028)
Number of Funds Under Management	0.032** (0.033)	0.002 (0.656)	0.001 (0.822)	-0.001 (0.837)	-0.004 (0.470)
Institutional Fund Dummy	-0.174 (0.115)	-0.063 (0.528)	-0.111 (0.272)	-0.183* (0.061)	-0.092 (0.386)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3490	0.3467	0.3430	0.3498	0.3545
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	14.132 (0.233)	14.482 (0.297)	10.474 (0.356)	18.862 (0.126)	13.625 (0.234)
Lag Fund Flows	0.259*** (0.000)	0.268*** (0.000)	0.235*** (0.000)	0.230*** (0.000)	0.240*** (0.000)
Low	-11.698 (0.263)	-8.281 (0.537)	3.964 (0.494)	10.861 (0.421)	13.435 (0.416)
Low * Number of Funds Under Management	1.507 (0.235)	-1.971 (0.277)	-0.957 (0.136)	-0.509 (0.814)	-1.818 (0.304)
Mid	0.163 (0.825)	0.423 (0.740)	-1.859*** (0.007)	-2.052*** (0.000)	-2.096*** (0.000)
Mid * Number of Funds Under Management	-0.006 (0.269)	-0.005 (0.334)	-0.008 (0.179)	-0.006 (0.166)	-0.006 (0.165)
High	1.276 (0.881)	-8.953 (0.188)	-11.517* (0.061)	-17.582*** (0.002)	-27.248** (0.022)
High * Number of Funds Under Management	0.901 (0.284)	0.083 (0.525)	-0.039 (0.744)	0.325** (0.039)	0.289 (0.150)
Lag Tracking Error	-1.239 (0.496)	-4.073 (0.103)	-1.180 (0.568)	-2.683 (0.164)	-2.526 (0.238)
Lag Volatility	2.977 (0.443)	2.985 (0.501)	1.993 (0.569)	0.576 (0.870)	1.314 (0.724)
Age	-14.162 (0.185)	-0.725*** (0.000)	-0.268 (0.135)	-0.369 (0.368)	-0.464 (0.282)
Age * Performance	2.649 (0.368)	4.828 (0.361)	22.497*** (0.000)	18.608*** (0.000)	15.125*** (0.000)
Lag Fund Size	-0.059 (0.156)	-0.101* (0.065)	-0.159*** (0.000)	-0.129*** (0.001)	-0.090** (0.023)
Number of Funds Under Management	-0.298 (0.240)	0.399 (0.272)	0.197 (0.124)	0.107 (0.805)	0.369 (0.296)
Institutional Fund Dummy	-0.174 (0.175)	-0.090 (0.461)	-0.222** (0.041)	-0.268*** (0.005)	-0.222** (0.024)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3609	0.3903	0.3802	0.3528	0.3580
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	19.815 (0.479)	1.031 (0.980)	6.150 (0.577)	30.010 (0.434)	-140.521 (0.379)
Lag Fund Flows	0.278*** (0.000)	0.168*** (0.010)	0.164** (0.037)	0.273*** (0.006)	-0.707 (0.427)
Low	-7.826 (0.896)	112.699 (0.370)	-3.913 (0.747)	33.641 (0.745)	-173.184 (0.236)
Low * Number of Funds Under Management	0.919 (0.842)	1.289 (0.666)	1.431 (0.231)	17.822 (0.229)	-59.656 (0.375)
Mid	-1.140 (0.525)	-1.101 (0.596)	8.650 (0.163)	7.964* (0.058)	-19.339 (0.343)
Mid * Number of Funds Under Management	0.007 (0.752)	-0.010 (0.609)	-0.180** (0.013)	-0.187 (0.153)	1.255 (0.298)
High	266.940 (0.400)	-91.519 (0.260)	42.861 (0.397)	-0.337 (0.983)	83.702 (0.218)
High * Number of Funds Under Management	2.343 (0.189)	1.138 (0.258)	-0.460 (0.433)	0.066 (0.614)	-1.476 (0.307)
Lag Tracking Error	2.969 (0.618)	-1.121 (0.894)	28.295* (0.064)	15.508 (0.136)	-39.565* (0.085)
Lag Volatility	6.146 (0.379)	-4.410 (0.686)	-3.777 (0.406)	-0.398 (0.940)	28.794 (0.138)
Age	-9.846 (0.625)	-0.988 (0.177)	-1.368 (0.143)	-0.194 (0.898)	5.152 (0.449)
Age * Performance	6.706 (0.389)	-1.641 (0.906)	-61.178 (0.370)	-13.483 (0.667)	-19.126 (0.144)
Lag Fund Size	-0.066 (0.502)	-0.141 (0.245)	0.072 (0.614)	0.233 (0.371)	-0.992 (0.261)
Number of Funds Under Management	-0.180 (0.845)	-0.243 (0.684)	-0.218 (0.338)	-3.461 (0.242)	11.324 (0.379)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.4899	0.4964	0.4927	0.5014	0.5043
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-38.383 (0.598)	22.829 (0.319)	8.555 (0.735)	155.906 (0.371)	-33.453 (0.884)
Lag Fund Flows	0.166*** (0.001)	0.323 (0.137)	0.286*** (0.000)	0.210*** (0.001)	0.143 (0.356)
Low	-140.359 (0.165)	78.608* (0.079)	-40.592 (0.749)	-349.258 (0.378)	-595.606 (0.358)
Low * Number of Funds Under Management	3.834 (0.303)	0.393 (0.568)	0.338 (0.594)	-0.209 (0.614)	2.214 (0.130)
Mid	2.141 (0.297)	3.420 (0.590)	1.896 (0.610)	-1.747 (0.876)	-9.532* (0.076)
Mid * Number of Funds Under Management	-0.008 (0.612)	0.010 (0.879)	-0.018 (0.485)	-0.021 (0.669)	-0.027 (0.519)
High	89.367 (0.121)	-13.670 (0.519)	-15.113 (0.299)	-17.456 (0.416)	-54.630 (0.443)
High * Number of Funds Under Management	5.731 (0.266)	-15.004** (0.034)	6.350 (0.427)	-1.953 (0.669)	0.651 (0.616)
Lag Tracking Error	0.991 (0.856)	7.524 (0.296)	2.256 (0.725)	-12.712 (0.290)	-0.247 (0.977)
Lag Volatility	19.754 (0.406)	-10.120 (0.245)	-0.417 (0.874)	-35.424 (0.465)	46.962 (0.459)
Age	8.653 (0.563)	-0.184 (0.884)	-0.504 (0.514)	0.741 (0.826)	-4.200 (0.399)
Age * Performance	-1.725 (0.599)	-14.889 (0.384)	-23.241 (0.573)	47.531 (0.269)	94.034* (0.078)
Lag Fund Size	0.032 (0.798)	-0.383 (0.275)	-0.027 (0.820)	-0.257 (0.254)	0.091 (0.625)
Number of Funds Under Management	-0.765 (0.304)	-0.089 (0.488)	-0.062 (0.616)	0.057 (0.467)	-0.432 (0.137)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.5062	0.5090	0.5107	0.5185	0.5155
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 7
Regression Results for Determinants of Monthly Fund Flows for 2000 - 2010

This table examines the effect of fund past performance, fees and search costs on the index funds flows. The sample includes open-end U.S. index funds from January 2000 to September 2010. The dependent variable is the monthly fund flows. The independent variables include the fund flows in the prior period (Lag Fund Flows); raw returns in the prior period; differential returns in the prior period; CAPM alphas in the prior period; 3-factor alphas in the prior period; 4-factor alphas in the prior period; tracking error in the prior period; volatility in the prior period; expense ratio in the prior month; 12b-1 ratio in the prior month; the front-end load dummy, which equals 1 when fund charges frond-end load and 0 otherwise; the natural log of fund's TNA in the prior period as fund size; lagged number of all mutual funds under management; lagged number of all index funds under management; lagged total assets under management; lagged total index funds assets under management; lagged fund age, which is the natural log of the years from the fund's first offer day to period *t*; and the Institutional Fund Dummy, which equals 1 if the funds are institutional funds, and equals 0 if the funds are retail funds.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.954*** (0.005)	1.897*** (0.000)	1.783*** (0.000)	2.487*** (0.000)	1.831*** (0.000)
Lag Fund Flows	0.202*** (0.000)	0.206*** (0.000)	0.203*** (0.000)	0.202*** (0.000)	0.203*** (0.000)
Performance	0.075 (0.259)	0.480* (0.061)	-1.643** (0.047)	0.677*** (0.000)	0.477*** (0.009)
Lag Tracking Error	0.592* (0.088)	0.730** (0.031)	1.012*** (0.004)	0.629* (0.093)	0.773** (0.034)
Lag Volatility	0.230 (0.103)	0.264*** (0.001)	0.275*** (0.000)	0.116 (0.332)	0.245*** (0.005)
Lag Expense Ratio	-13.564*** (0.000)	-11.836*** (0.000)	-13.881*** (0.000)	-12.024*** (0.000)	-12.17*** (0.000)
Lag 12b-1 Ratio	1.793 (0.545)	-0.355 (0.905)	-0.234 (0.937)	0.847 (0.772)	0.563 (0.849)
Front Load Dummy	-0.145* (0.083)	-0.116 (0.175)	-0.120 (0.162)	-0.106 (0.221)	-0.110 (0.208)
Lag Fund Size	-0.051* (0.090)	-0.057* (0.055)	-0.054* (0.075)	-0.051* (0.087)	-0.052* (0.085)
Number of Funds Under Management	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Number of Index Funds Under Management	0.003 (0.475)	0.003 (0.384)	0.003 (0.404)	0.003 (0.405)	0.003 (0.454)
Total AUM	0.000 (0.462)	0.000 (0.340)	0.000 (0.407)	0.000 (0.720)	0.000 (0.546)
Total Index Funds AUM	0.000 (0.449)	0.000 (0.381)	0.000 (0.413)	0.000 (0.570)	0.000 (0.452)
Lag Fund Age	-1.127*** (0.000)	-1.138*** (0.000)	-1.119*** (0.000)	-1.151*** (0.000)	-1.143*** (0.000)
Institutional Fund Dummy	-0.097* (0.093)	-0.100* (0.093)	-0.101* (0.093)	-0.068 (0.233)	-0.084 (0.154)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2453	0.2429	0.2462	0.2462	0.2451
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	12.598 (0.104)	8.951 (0.264)	14.985* (0.056)	16.030** (0.038)	14.620* (0.063)
Lag Fund Flows	0.224*** (0.000)	0.224*** (0.000)	0.224*** (0.000)	0.225*** (0.000)	0.224*** (0.000)
Performance	-0.146 (0.846)	-0.146 (0.846)	-4.505 (0.218)	-6.127** (0.021)	-5.664** (0.021)
Lag Tracking Error	0.922 (0.587)	0.922 (0.587)	0.721 (0.687)	0.797 (0.659)	0.672 (0.708)
Lag Volatility	-0.340 (0.863)	-0.340 (0.863)	-2.553 (0.169)	-2.918 (0.125)	-2.637 (0.179)
Lag Expense Ratio	-8.226*** (0.002)	-8.226*** (0.002)	-11.922** (0.011)	-14.000*** (0.000)	-13.64*** (0.000)
Lag 12b-1 Ratio	-0.842 (0.777)	-0.842 (0.777)	-1.775 (0.552)	-1.407 (0.633)	-1.293 (0.661)
Front Load Dummy	-0.249*** (0.008)	-0.249*** (0.008)	-0.245** (0.013)	-0.245** (0.013)	-0.238** (0.015)
Lag Fund Size	-0.008 (0.765)	-0.008 (0.765)	-0.006 (0.827)	-0.008 (0.768)	-0.009 (0.740)
Number of Funds Under Management	0.001** (0.028)	0.001** (0.028)	0.001** (0.048)	0.001** (0.035)	0.001** (0.026)
Number of Index Funds Under Management	0.004 (0.356)	0.004 (0.356)	0.002 (0.622)	0.002 (0.598)	0.002 (0.681)
Total AUM	0.000 (0.280)	0.000 (0.280)	0.000 (0.399)	0.000 (0.489)	0.000 (0.381)
Total Index Funds AUM	0.000 (0.380)	0.000 (0.380)	0.000 (0.334)	0.000 (0.397)	0.000 (0.323)
Lag Fund Age	-0.915*** (0.000)	-0.915*** (0.000)	-0.916*** (0.000)	-0.920*** (0.000)	-0.921*** (0.000)
Institutional Fund Dummy	-0.046 (0.379)	-0.046 (0.379)	-0.050 (0.318)	-0.048 (0.340)	-0.047 (0.353)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2607	0.2607	0.2618	0.2627	0.2634
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.634**	0.509	0.379	1.062	0.714
	(0.025)	(0.361)	(0.492)	(0.149)	(0.266)
Lag Fund Flows	0.208***	0.212***	0.209***	0.212***	0.212***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Performance	0.066	0.092	-2.279	0.317	-0.040
	(0.473)	(0.855)	(0.148)	(0.243)	(0.887)
Lag Tracking Error	1.256	1.767**	1.986**	1.848*	2.045*
	(0.140)	(0.021)	(0.050)	(0.073)	(0.053)
Lag Volatility	0.139	0.325***	0.346***	0.220	0.292**
	(0.397)	(0.001)	(0.001)	(0.112)	(0.016)
Lag Expense Ratio	-17.924***	-14.600***	-16.673***	-16.711***	-17.78***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
Lag 12b-1 Ratio	38.107***	29.538**	29.301**	34.175**	35.452***
	(0.004)	(0.045)	(0.037)	(0.011)	(0.007)
Front Load Dummy	-0.634***	-0.528***	-0.558***	-0.561***	-0.581***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Lag Fund Size	-0.002	0.003	-0.001	-0.006	-0.011
	(0.960)	(0.956)	(0.990)	(0.887)	(0.795)
Number of Funds Under Management	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.004)	(0.003)	(0.009)	(0.006)	(0.006)
Number of Index Funds Under Management	-0.004	-0.005	-0.004	-0.004	-0.004
	(0.450)	(0.341)	(0.477)	(0.459)	(0.454)
Total AUM	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.036)	(0.023)	(0.038)	(0.045)	(0.043)
Total Index Funds AUM	0.000**	0.000**	0.000**	0.000**	0.000**
	(0.037)	(0.019)	(0.029)	(0.038)	(0.036)
Lag Fund Age	-0.623***	-0.672***	-0.633***	-0.653***	-0.643***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3285	0.3255	0.3279	0.3278	0.3276
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	2.178*** (0.004)	2.507*** (0.000)	2.419*** (0.000)	3.743*** (0.002)	2.348*** (0.000)
Lag Fund Flows	0.171*** (0.000)	0.180*** (0.000)	0.175*** (0.000)	0.170*** (0.000)	0.172*** (0.000)
Performance	0.000 (0.999)	-0.122 (0.797)	-2.688* (0.078)	1.018*** (0.000)	0.762*** (0.002)
Lag Tracking Error	0.041 (0.946)	0.957 (0.135)	0.799 (0.134)	0.385 (0.483)	0.958* (0.097)
Lag Volatility	0.138 (0.460)	0.126 (0.146)	0.148* (0.088)	-0.122 (0.574)	0.132 (0.204)
Lag Expense Ratio	-10.504*** (0.001)	-9.548*** (0.003)	-12.343*** (0.001)	-8.033** (0.012)	-8.081** (0.012)
Lag 12b-1 Ratio	-6.898* (0.068)	-8.397** (0.030)	-7.963** (0.045)	-8.505** (0.026)	-8.743** (0.024)
Front Load Dummy	0.025 (0.804)	0.045 (0.666)	0.034 (0.754)	0.052 (0.615)	0.073 (0.474)
Lag Fund Size	-0.139*** (0.000)	-0.147*** (0.000)	-0.148*** (0.000)	-0.137*** (0.000)	-0.140*** (0.000)
Number of Funds Under Management	0.001** (0.014)	0.001*** (0.006)	0.001*** (0.004)	0.001** (0.011)	0.001*** (0.006)
Number of Index Funds Under Management	0.027*** (0.001)	0.027*** (0.001)	0.027*** (0.001)	0.031*** (0.000)	0.029*** (0.000)
Total AUM	0.000* (0.060)	0.000* (0.054)	0.000* (0.087)	0.000** (0.028)	0.000* (0.069)
Total Index Funds AUM	0.000* (0.061)	0.000* (0.053)	0.000* (0.060)	0.000** (0.021)	0.000** (0.046)
Lag Fund Age	-1.191*** (0.000)	-1.156*** (0.000)	-1.143*** (0.000)	-1.246*** (0.000)	-1.220*** (0.000)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3312	0.3315	0.3345	0.3339	0.3314
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 8
Regression Results for the Effect of Expense Ratio on the Flow-Performance relationship using Monthly Data for 2000 - 2010

This table examines the effect of fund expense ratios on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	3.436*** (0.003)	2.746*** (0.000)	3.300*** (0.000)	3.011*** (0.001)	3.175*** (0.000)
Lag Fund Flows	0.210*** (0.000)	0.215*** (0.000)	0.211*** (0.000)	0.212*** (0.000)	0.210*** (0.000)
Low	-5.629* (0.096)	-4.508* (0.074)	-7.860** (0.022)	-3.090 (0.292)	-3.140 (0.294)
Low * Expense Ratio	39.766 (0.277)	29.870 (0.195)	46.399 (0.161)	45.729 (0.103)	48.810* (0.072)
Mid	0.247 (0.483)	-0.572 (0.124)	-1.200** (0.016)	0.030 (0.945)	0.037 (0.926)
Mid * Expense Ratio	-2.963 (0.681)	4.108 (0.598)	-10.635 (0.338)	9.391 (0.253)	-6.797 (0.356)
High	2.415 (0.381)	-3.426 (0.177)	3.333 (0.281)	3.870 (0.224)	2.984 (0.323)
High * Expense Ratio	-20.784 (0.605)	9.978 (0.845)	-52.685 (0.457)	-24.362 (0.692)	90.883 (0.145)
Lag Tracking Error	0.628 (0.112)	0.988** (0.038)	0.870** (0.028)	0.765* (0.075)	0.618 (0.152)
Lag Volatility	0.256 (0.156)	0.303*** (0.000)	0.348*** (0.000)	0.134 (0.331)	0.148 (0.215)
Age	-1.375*** (0.000)	-1.067*** (0.000)	-0.907*** (0.000)	-1.092*** (0.000)	-1.108*** (0.000)
Age * Performance	0.022 (0.746)	1.420*** (0.002)	4.167*** (0.001)	0.112 (0.675)	-0.025 (0.927)
Lag Fund Size	-0.002 (0.953)	-0.006 (0.818)	-0.002 (0.958)	0.002 (0.951)	-0.002 (0.939)
Expense Ratio	-16.337*** (0.008)	-16.797*** (0.000)	-19.311*** (0.000)	-19.682*** (0.000)	-19.178*** (0.000)
Front load Dummy	-0.130 (0.130)	-0.105 (0.221)	-0.144 (0.112)	-0.150 (0.103)	-0.144 (0.130)
Institutional Fund Dummy	-0.091* (0.099)	-0.100* (0.066)	-0.076 (0.202)	-0.072 (0.173)	-0.090 (0.103)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2629	0.2619	0.2623	0.2678	0.2682
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	17.128* (0.085)	7.605 (0.379)	19.759** (0.038)	31.353*** (0.004)	19.686** (0.022)
Lag Fund Flows	0.222*** (0.000)	0.219*** (0.000)	0.214*** (0.000)	0.214*** (0.000)	0.218*** (0.000)
Low	-49.232 (0.110)	-18.935*** (0.004)	-22.918* (0.088)	-83.540*** (0.008)	-17.770 (0.244)
Low * Expense Ratio	170.878 (0.277)	120.850** (0.042)	142.936 (0.224)	637.062** (0.014)	131.962 (0.312)
Mid	-1.322* (0.075)	-1.459** (0.020)	-3.124*** (0.000)	-3.416*** (0.000)	-3.128*** (0.000)
Mid * Expense Ratio	10.230 (0.347)	10.719 (0.230)	-21.886 (0.114)	-18.706 (0.190)	-22.473* (0.051)
High	9.407 (0.328)	-6.017* (0.084)	-10.489 (0.141)	42.696 (0.333)	-55.410 (0.176)
High * Expense Ratio	422.579 (0.587)	19.258 (0.881)	116.401 (0.887)	-4019.271 (0.139)	2032.600 (0.364)
Lag Tracking Error	-1.247 (0.452)	-0.646 (0.713)	-0.828 (0.628)	-2.141 (0.218)	-1.296 (0.430)
Lag Volatility	-0.319 (0.875)	0.504 (0.809)	-2.537 (0.250)	-2.661 (0.213)	-3.058 (0.144)
Age	-2.340 (0.737)	-0.766*** (0.000)	-0.297*** (0.007)	0.941*** (0.003)	0.241 (0.448)
Age * Performance	3.406** (0.019)	5.322*** (0.000)	19.775*** (0.000)	14.545*** (0.000)	12.667*** (0.000)
Lag Fund Size	0.033 (0.176)	0.041* (0.100)	0.022 (0.351)	0.028 (0.254)	0.026 (0.276)
Expense Ratio	-41.862 (0.181)	-31.197*** (0.006)	-26.564 (0.220)	-128.854** (0.012)	-29.581 (0.255)
Front load Dummy	-0.307*** (0.001)	-0.299*** (0.002)	-0.316*** (0.002)	-0.388*** (0.000)	-0.336*** (0.002)
Institutional Fund Dummy	-0.052 (0.325)	-0.051 (0.330)	-0.037 (0.483)	-0.058 (0.257)	-0.058 (0.267)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2614	0.2864	0.2841	0.2649	0.2629
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.863 (0.318)	2.643 (0.217)	3.938 (0.392)	5.426 (0.146)	1.770 (0.474)
Lag Fund Flows	0.231*** (0.000)	0.231*** (0.000)	0.232*** (0.000)	0.232*** (0.000)	0.234*** (0.000)
Low	-12.310* (0.076)	-13.659 (0.234)	-16.005 (0.501)	18.694 (0.493)	-4.229 (0.776)
Low * Expense Ratio	66.069 (0.509)	157.498 (0.467)	185.229 (0.685)	163.746 (0.326)	96.251 (0.355)
Mid	0.562 (0.399)	1.224 (0.101)	1.508 (0.112)	1.550** (0.047)	1.693** (0.025)
Mid * Expense Ratio	-14.948 (0.400)	-34.246* (0.068)	-69.833*** (0.000)	-6.875 (0.722)	-24.228 (0.200)
High	-4.044 (0.438)	-4.883 (0.276)	0.487 (0.912)	6.490 (0.311)	3.053 (0.625)
High * Expense Ratio	-39.567 (0.619)	103.241 (0.360)	90.386 (0.523)	-19.292 (0.876)	-86.599 (0.439)
Lag Tracking Error	1.177 (0.274)	1.169 (0.281)	1.388 (0.505)	1.749 (0.101)	1.678 (0.141)
Lag Volatility	0.451 (0.187)	0.346*** (0.002)	0.233* (0.062)	-0.486 (0.312)	0.246 (0.368)
Age	-1.097* (0.051)	-0.872*** (0.000)	-0.666*** (0.000)	-0.501 (0.124)	-0.702*** (0.001)
Age * Performance	0.101 (0.425)	0.544 (0.673)	4.854* (0.062)	0.217 (0.822)	0.501 (0.512)
Lag Fund Size	0.041 (0.253)	0.021 (0.583)	0.017 (0.674)	0.034 (0.373)	0.025 (0.520)
Expense Ratio	-11.515 (0.489)	-23.267 (0.579)	-18.946 (0.834)	-27.105 (0.414)	-9.196 (0.588)
Front load Dummy	-0.574*** (0.000)	-0.480*** (0.005)	-0.507*** (0.003)	-0.564*** (0.002)	-0.529*** (0.004)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3554	0.3611	0.3575	0.3665	0.3654
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	2.697** (0.050)	2.273** (0.022)	4.540*** (0.000)	2.161* (0.086)	1.201 (0.447)
Lag Fund Flows	0.184*** (0.000)	0.188*** (0.000)	0.179*** (0.000)	0.186*** (0.000)	0.175*** (0.000)
Low	2.365 (0.500)	3.215 (0.480)	-7.458 (0.139)	0.249 (0.952)	5.534 (0.312)
Low * Expense Ratio	-3.375 (0.924)	-76.834 (0.233)	-2.819 (0.955)	44.010 (0.231)	-30.895 (0.443)
Mid	0.182 (0.734)	-2.203*** (0.000)	-2.736*** (0.001)	-0.162 (0.792)	-1.230* (0.059)
Mid * Expense Ratio	-1.760 (0.854)	29.048** (0.018)	10.834 (0.454)	1.078 (0.934)	-5.750 (0.621)
High	6.863 (0.155)	-5.159 (0.135)	-2.041 (0.715)	9.484 (0.160)	6.074 (0.500)
High * Expense Ratio	-30.026 (0.600)	-38.530 (0.574)	-139.248 (0.274)	-113.935 (0.244)	86.389 (0.555)
Lag Tracking Error	1.296* (0.083)	2.148*** (0.009)	2.211*** (0.001)	1.006 (0.193)	1.048 (0.134)
Lag Volatility	0.096 (0.722)	0.219** (0.025)	0.267*** (0.004)	0.156 (0.470)	0.437* (0.087)
Age	-0.590 (0.657)	-0.939*** (0.000)	-0.626*** (0.000)	-1.050*** (0.000)	-1.150*** (0.000)
Age * Performance	-0.334 (0.192)	2.619*** (0.000)	9.582*** (0.000)	0.192 (0.662)	0.468 (0.261)
Lag Fund Size	-0.063** (0.031)	-0.061** (0.039)	-0.053* (0.063)	-0.056* (0.073)	-0.054* (0.069)
Expense Ratio	-11.268* (0.055)	-5.577 (0.616)	-20.195*** (0.005)	-19.332*** (0.000)	-12.102** (0.044)
Front load Dummy	0.027 (0.836)	0.026 (0.807)	-0.013 (0.902)	-0.001 (0.991)	-0.062 (0.632)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3715	0.3719	0.3703	0.3732	0.3761
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 9
Regression Results for the Effect of Marketing Expense on the Flow-Performance relationship using Monthly Data for 2000 - 2010

This table examines the effect of fund marketing expense, measured as the 12b-1 ratio, on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.664**	1.732***	2.323***	1.354*	2.005***
	(0.046)	(0.002)	(0.000)	(0.092)	(0.004)
Lag Fund Flows	0.217***	0.221***	0.213***	0.216***	0.214***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Low	-1.538	-2.527	-7.531***	1.021	-0.739
	(0.385)	(0.216)	(0.000)	(0.642)	(0.727)
Low * 12b-1 Ratio	-11.279	28.881	78.867**	5.664	62.177
	(0.811)	(0.396)	(0.022)	(0.901)	(0.229)
Mid	0.267	-0.287	-0.650**	0.643**	0.238
	(0.278)	(0.231)	(0.028)	(0.037)	(0.446)
Mid * 12b-1 Ratio	5.292	10.872	58.311***	23.521	-15.035
	(0.667)	(0.358)	(0.003)	(0.174)	(0.407)
High	1.165	-2.828	1.527	4.371*	5.329**
	(0.502)	(0.106)	(0.464)	(0.054)	(0.032)
High * 12b-1 Ratio	-749.776	4183.095	-1595.055	-431.516	365.289
	(0.145)	(0.282)	(0.386)	(0.135)	(0.580)
Lag Tracking Error	0.485	0.902**	0.989**	0.715*	0.590
	(0.203)	(0.028)	(0.020)	(0.084)	(0.153)
Lag Volatility	0.267*	0.298***	0.353***	0.147	0.135
	(0.089)	(0.000)	(0.000)	(0.289)	(0.265)
Age	-1.401***	-1.151***	-1.063***	-1.211***	-1.231***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age * Performance	-0.002	1.492***	4.033***	-0.095	-0.028
	(0.982)	(0.000)	(0.001)	(0.713)	(0.916)
Lag Fund Size	0.056**	0.042*	0.040	0.051**	0.052**
	(0.021)	(0.089)	(0.127)	(0.044)	(0.046)
12b-1 Ratio	-2.331	-12.842**	-17.333***	-5.826	-13.657
	(0.775)	(0.028)	(0.001)	(0.429)	(0.133)
Institutional Fund Dummy	0.050	0.044	0.096	0.074	0.065
	(0.408)	(0.491)	(0.134)	(0.218)	(0.291)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2538	0.2533	0.2523	0.2590	0.2585
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	15.314 (0.124)	7.180 (0.395)	13.270 (0.150)	13.889 (0.103)	10.450 (0.290)
Lag Fund Flows	0.224*** (0.000)	0.220*** (0.000)	0.214*** (0.000)	0.221*** (0.000)	0.223*** (0.000)
Low	-17.156 (0.546)	-7.593 (0.101)	-45.048*** (0.007)	-11.418 (0.262)	-0.104 (0.997)
Low * 12b-1 Ratio	-121.129 (0.428)	36.394 (0.489)	459.003** (0.024)	16.132 (0.890)	-39.307 (0.896)
Mid	-0.739 (0.193)	-0.998** (0.036)	-3.024*** (0.000)	-3.015*** (0.000)	-2.801*** (0.000)
Mid * 12b-1 Ratio	40.131** (0.020)	30.223** (0.040)	0.954 (0.966)	36.033 (0.252)	-9.795 (0.709)
High	4.662 (0.611)	-3.255 (0.208)	-6.736 (0.197)	-19.796** (0.043)	-4.497 (0.489)
High * 12b-1 Ratio	1121.087 (0.434)	187.610 (0.935)	-4269.394 (0.213)	-1569.182 (0.229)	4709.025 (0.371)
Lag Tracking Error	-1.148 (0.471)	-0.666 (0.695)	-0.996 (0.528)	-2.317 (0.132)	-1.952 (0.212)
Lag Volatility	-1.501 (0.478)	0.094 (0.964)	1.516 (0.454)	-0.468 (0.818)	-0.364 (0.858)
Age	-0.918 (0.888)	-0.936*** (0.000)	-0.517*** (0.000)	0.593* (0.063)	-0.139 (0.684)
Age * Performance	2.922** (0.027)	4.469*** (0.001)	19.503*** (0.000)	14.614*** (0.000)	12.617*** (0.000)
Lag Fund Size	0.050** (0.019)	0.064*** (0.005)	0.031 (0.168)	0.038* (0.092)	0.042* (0.060)
12b-1 Ratio	17.310 (0.568)	-13.969 (0.149)	-80.458** (0.041)	-7.226 (0.745)	8.199 (0.892)
Institutional Fund Dummy	0.057 (0.321)	0.069 (0.233)	0.079 (0.176)	0.062 (0.266)	0.052 (0.355)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2452	0.2693	0.2703	0.2474	0.2469
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.160 (0.415)	1.107 (0.215)	2.558** (0.048)	4.309* (0.054)	0.648 (0.777)
Lag Fund Flows	0.225*** (0.000)	0.234*** (0.000)	0.231*** (0.000)	0.226*** (0.000)	0.227*** (0.000)
Low	-12.429** (0.035)	-4.841 (0.283)	-11.211* (0.076)	-2.634 (0.825)	-3.400 (0.722)
Low * 12b-1 Ratio	-7623.303 (0.111)	59.322 (0.984)	6170.619 (0.164)	-6813.066 (0.420)	-3404.648 (0.308)
Mid	0.366 (0.273)	0.412 (0.347)	0.684 (0.227)	1.000* (0.053)	0.895* (0.052)
Mid * 12b-1 Ratio	-139.505 (0.720)	-283.367 (0.239)	276.147 (0.244)	345.929 (0.125)	-64.048 (0.728)
High	-3.537 (0.194)	-2.282 (0.387)	0.394 (0.912)	1.488 (0.775)	-13.056 (0.499)
High * 12b-1 Ratio	-4062.821 (0.511)	-28465.070 (0.179)	3774.853* (0.081)	-1109.202 (0.323)	15386.900 (0.169)
Lag Tracking Error	1.024 (0.189)	1.227** (0.031)	1.650 (0.200)	2.360** (0.013)	1.825** (0.033)
Lag Volatility	0.464* (0.085)	0.368*** (0.001)	0.350*** (0.001)	-0.219 (0.480)	0.370 (0.183)
Age	-1.510*** (0.004)	-1.147*** (0.000)	-1.085*** (0.000)	-0.972*** (0.000)	-1.138*** (0.000)
Age * Performance	0.019 (0.865)	0.601 (0.620)	3.569 (0.183)	1.392 (0.268)	0.259 (0.662)
Lag Fund Size	0.121*** (0.000)	0.082** (0.020)	0.054 (0.119)	0.102*** (0.004)	0.105** (0.003)
12b-1 Ratio	1668.692* (0.080)	128.041 (0.832)	-1262.054 (0.142)	1288.429 (0.439)	688.358 (0.299)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3407	0.3413	0.3485	0.3573	0.3597
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.756 (0.146)	1.533 (0.113)	2.000** (0.018)	1.128 (0.371)	0.684 (0.644)
Lag Fund Flows	0.192*** (0.000)	0.209*** (0.000)	0.190*** (0.000)	0.194*** (0.000)	0.186*** (0.000)
Low	3.936 (0.197)	1.436 (0.692)	-0.915 (0.756)	4.729 (0.274)	3.523 (0.352)
Low * 12b-1 Ratio	-42.246 (0.466)	-107.462 (0.321)	-47.236 (0.290)	-30.164 (0.647)	-13.777 (0.823)
Mid	0.324 (0.383)	-1.079*** (0.006)	-1.687*** (0.000)	0.257 (0.524)	-0.481 (0.287)
Mid * 12b-1 Ratio	17.233 (0.307)	31.813** (0.049)	42.539* (0.094)	16.434 (0.468)	6.820 (0.741)
High	8.819* (0.053)	-6.663** (0.016)	-0.702 (0.858)	7.346 (0.350)	7.328 (0.331)
High * 12b-1 Ratio	-191.920* (0.051)	7611.116 (0.288)	-3446.109 (0.247)	23906.540 (0.341)	-773.928 (0.180)
Lag Tracking Error	0.400 (0.548)	0.939 (0.213)	2.197*** (0.001)	0.107 (0.878)	0.365 (0.582)
Lag Volatility	0.076 (0.768)	0.214** (0.027)	0.304*** (0.001)	0.066 (0.754)	0.350 (0.171)
Age	-0.971 (0.408)	-0.880*** (0.000)	-0.690*** (0.000)	-1.094*** (0.000)	-1.166*** (0.000)
Age * Performance	-0.413* (0.071)	2.686*** (0.000)	9.216*** (0.000)	-0.230 (0.744)	0.307 (0.452)
Lag Fund Size	-0.036 (0.144)	-0.033 (0.254)	-0.012 (0.650)	-0.033 (0.258)	-0.027 (0.357)
12b-1 Ratio	-3.623 (0.724)	3.355 (0.868)	-4.296 (0.573)	-4.391 (0.711)	-9.537 (0.410)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3697	0.3651	0.3616	0.3775	0.3709
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 10
Regression Results for the Effect of Number of Index Funds Under Management on the Flow-Performance relationship using Monthly Data for 2000 - 2010

This table examines the effect of number of index funds provided by a fund family on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	0.839 (0.359)	0.393 (0.438)	0.523 (0.331)	1.103 (0.155)	1.370* (0.063)
Lag Fund Flows	0.213*** (0.000)	0.218*** (0.000)	0.211*** (0.000)	0.221*** (0.000)	0.221*** (0.000)
Low	1.796 (0.430)	-0.049 (0.981)	-0.838 (0.637)	6.040** (0.012)	3.824 (0.141)
Low * Number of Index Funds Under Management	-0.338* (0.065)	-0.168 (0.277)	-0.215 (0.227)	-0.404** (0.039)	-0.333 (0.102)
Mid	0.727*** (0.007)	0.750*** (0.009)	0.336 (0.316)	0.845*** (0.003)	0.819*** (0.004)
Mid * Number of Index Funds Under Management	-0.013 (0.416)	-0.067*** (0.000)	-0.072*** (0.003)	-0.010 (0.503)	-0.039** (0.022)
High	-2.988 (0.236)	-3.802* (0.054)	1.007 (0.697)	3.005 (0.256)	3.368 (0.209)
High * Number of Index Funds Under Management	0.506*** (0.005)	0.252* (0.070)	0.086 (0.490)	0.172 (0.395)	0.393* (0.090)
Lag Tracking Error	0.503 (0.182)	0.887** (0.033)	1.149*** (0.002)	0.676 (0.105)	0.464 (0.280)
Lag Volatility	0.254 (0.134)	0.232*** (0.002)	0.258*** (0.001)	-0.047 (0.708)	-0.009 (0.940)
Age	-1.194*** (0.000)	-1.060*** (0.000)	-1.010*** (0.000)	-1.151*** (0.000)	-1.184*** (0.000)
Age * Performance	0.011 (0.856)	0.760** (0.035)	2.723*** (0.008)	0.089 (0.729)	-0.167 (0.508)
Lag Fund Size	0.049* (0.053)	0.046* (0.078)	0.032 (0.253)	0.042 (0.113)	0.043* (0.100)
Number of Index Funds Under Management	0.072** (0.045)	0.069** (0.021)	0.085*** (0.004)	0.086** (0.026)	0.086** (0.034)
Institutional Fund Dummy	0.108* (0.068)	0.091 (0.157)	0.007 (0.906)	0.123** (0.032)	0.113* (0.054)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2639	0.2576	0.2575	0.2653	0.2665
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	4.167 (0.644)	1.788 (0.817)	2.843 (0.736)	5.820 (0.536)	5.447 (0.522)
Lag Fund Flows	0.224*** (0.000)	0.221*** (0.000)	0.213*** (0.000)	0.217*** (0.000)	0.222*** (0.000)
Low	1.563 (0.839)	2.591 (0.717)	-8.492*** (0.005)	1.037 (0.952)	-8.102 (0.155)
Low * Number of Index Funds Under Management	-18.734 (0.273)	-1.374 (0.238)	-0.016 (0.954)	-2.812 (0.519)	0.351 (0.699)
Mid	0.349 (0.524)	0.280 (0.517)	-1.987*** (0.000)	-2.009*** (0.000)	-1.552*** (0.008)
Mid * Number of Index Funds Under Management	-0.055* (0.056)	-0.053*** (0.007)	-0.090*** (0.001)	-0.080*** (0.001)	-0.085*** (0.001)
High	-6.894 (0.624)	-8.795** (0.011)	-7.953* (0.065)	-1.892 (0.876)	-26.100 (0.130)
High * Number of Index Funds Under Management	-0.262 (0.920)	1.070** (0.041)	0.946 (0.122)	-2.028 (0.601)	2.539 (0.371)
Lag Tracking Error	0.720 (0.611)	1.389 (0.334)	-0.750 (0.635)	-1.424 (0.359)	-0.469 (0.764)
Lag Volatility	0.138 (0.948)	0.930 (0.630)	1.455 (0.479)	0.350 (0.863)	0.682 (0.734)
Age	-2.636 (0.579)	-0.909*** (0.000)	-0.538*** (0.000)	0.468* (0.094)	-0.177 (0.614)
Age * Performance	2.509** (0.029)	3.224** (0.011)	16.861*** (0.000)	14.248*** (0.000)	11.449*** (0.000)
Lag Fund Size	0.036 (0.117)	0.043* (0.065)	0.013 (0.588)	0.031 (0.195)	0.031 (0.176)
Number of Index Funds Under Management	3.772 (0.270)	0.299 (0.196)	0.054 (0.277)	0.599 (0.492)	-0.027 (0.880)
Institutional Fund Dummy	0.108** (0.044)	0.088 (0.112)	-0.018 (0.745)	0.028 (0.621)	0.029 (0.601)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2579	0.2846	0.2788	0.2573	0.2583
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	0.776 (0.711)	-12.333 (0.289)	7.244*** (0.000)	9.035 (0.229)	3.433 (0.485)
Lag Fund Flows	0.244*** (0.000)	0.232*** (0.000)	0.227*** (0.000)	0.240*** (0.000)	0.243*** (0.000)
Low	-3.168 (0.658)	68.867 (0.260)	-32.976*** (0.001)	-11.507 (0.811)	-6.254 (0.759)
Low * Number of Index Funds Under Management	-0.660 (0.303)	-5.734 (0.257)	2.307** (0.017)	0.799 (0.833)	0.427 (0.725)
Mid	0.389 (0.324)	1.177** (0.018)	1.123 (0.111)	0.573 (0.242)	0.963** (0.046)
Mid * Number of Index Funds Under Management	-0.012 (0.612)	-0.097*** (0.000)	-0.173*** (0.000)	0.004 (0.886)	-0.062* (0.089)
High	-6.310 (0.148)	-5.387 (0.148)	-5.405 (0.288)	-4.603 (0.555)	-5.915 (0.330)
High * Number of Index Funds Under Management	0.308 (0.241)	0.127 (0.590)	0.562*** (0.003)	0.555 (0.286)	1.472* (0.068)
Lag Tracking Error	1.157 (0.220)	1.931** (0.029)	1.181 (0.453)	1.302 (0.183)	1.888 (0.101)
Lag Volatility	0.357 (0.298)	0.260** (0.020)	0.125 (0.248)	-0.614 (0.119)	0.011 (0.972)
Age	-1.453*** (0.004)	-1.132*** (0.000)	-1.039*** (0.000)	-1.035*** (0.000)	-1.136*** (0.000)
Age * Performance	0.070 (0.559)	0.376 (0.782)	4.509 (0.105)	1.288 (0.316)	0.538 (0.588)
Lag Fund Size	0.068** (0.040)	0.051 (0.148)	0.032 (0.392)	0.056 (0.107)	0.059* (0.094)
Number of Index Funds Under Management	0.130 (0.300)	1.189 (0.241)	-0.381** (0.046)	-0.167 (0.825)	-0.061 (0.805)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3572	0.3516	0.3449	0.3600	0.3641
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.137 (0.444)	-0.312 (0.728)	0.744 (0.285)	0.136 (0.912)	-0.838 (0.509)
Lag Fund Flows	0.196*** (0.000)	0.206*** (0.000)	0.188*** (0.000)	0.202*** (0.000)	0.191*** (0.000)
Low	-0.125 (0.977)	3.716 (0.366)	-0.568 (0.810)	8.682** (0.048)	8.979** (0.036)
Low * Number of Index Funds Under Management	0.268 (0.397)	-0.301 (0.310)	-0.424* (0.079)	-0.253 (0.479)	-0.371 (0.272)
Mid	1.311*** (0.003)	0.670 (0.129)	-0.429 (0.394)	1.209*** (0.003)	1.336*** (0.003)
Mid * Number of Index Funds Under Management	-0.011 (0.787)	-0.072** (0.026)	-0.052 (0.130)	-0.072** (0.016)	-0.130*** (0.001)
High	-0.438 (0.919)	-5.831** (0.037)	-0.365 (0.944)	0.883 (0.866)	2.493 (0.702)
High * Number of Index Funds Under Management	0.825** (0.016)	-0.079 (0.794)	-0.353 (0.354)	0.406 (0.343)	0.833* (0.067)
Lag Tracking Error	-0.015 (0.982)	1.735** (0.021)	2.870*** (0.000)	0.441 (0.526)	0.321 (0.650)
Lag Volatility	0.181 (0.539)	0.146 (0.132)	0.236** (0.013)	-0.033 (0.851)	0.167 (0.381)
Age	-0.405 (0.741)	-0.882*** (0.000)	-0.637*** (0.000)	-1.116*** (0.000)	-1.230*** (0.000)
Age * Performance	-0.304 (0.224)	1.250** (0.040)	8.683*** (0.000)	0.450 (0.344)	0.034 (0.930)
Lag Fund Size	0.015 (0.582)	0.023 (0.404)	-0.007 (0.822)	-0.002 (0.946)	0.009 (0.767)
Number of Index Funds Under Management	-0.029 (0.629)	0.103* (0.092)	0.110*** (0.007)	0.093 (0.163)	0.133** (0.040)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3480	0.3443	0.3534	0.3578	0.3546
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 11
Regression Results for Determinants of Monthly Fund Flows for 1995 - 1999

This table examines the effect of fund past performance, fees and search costs on the index funds flows. The sample includes open-end U.S. index funds from January 1995 to December 1999. The dependent variable is the monthly fund flows. The independent variables include the fund flows in the prior period (Lag Fund Flows); raw returns in the prior period; differential returns in the prior period; CAPM alphas in the prior period; 3-factor alphas in the prior period; 4-factor alphas in the prior period; tracking error in the prior period; volatility in the prior period; expense ratio in the prior month; 12b-1 ratio in the prior month; the front-end load dummy, which equals 1 when fund charges frond-end load and 0 otherwise; the natural log of fund's TNA in the prior period as fund size; lagged number of all mutual funds under management; lagged number of all index funds under management; lagged total assets under management; lagged total index funds assets under management; lagged fund age, which is the natural log of the years from the fund's first offer day to period *t*; and the Institutional Fund Dummy, which equals 1 if the funds are institutional funds, and equals 0 if the funds are retail funds.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	5.027 (0.347)	11.685*** (0.000)	12.165*** (0.000)	2.187 (0.584)	3.160 (0.393)
Lag Fund Flows	0.203*** (0.000)	0.225*** (0.000)	0.216*** (0.000)	0.200*** (0.000)	0.199*** (0.000)
Performance	0.922 (0.103)	1.101 (0.553)	2.414 (0.554)	4.927*** (0.003)	4.645** (0.018)
Lag Tracking Error	-6.926*** (0.002)	-5.378** (0.018)	-6.639*** (0.007)	-5.558** (0.012)	-6.019*** (0.008)
Lag Volatility	0.168 (0.925)	-2.025*** (0.007)	-2.136*** (0.002)	1.069 (0.431)	0.574 (0.628)
Lag Expense Ratio	-0.470 (0.958)	-0.158 (0.988)	-2.649 (0.790)	-2.388 (0.805)	-1.978 (0.838)
Lag 12b-1 Ratio	12.129 (0.457)	28.505 (0.103)	29.778* (0.098)	24.346 (0.132)	31.198** (0.042)
Front Load Dummy	-0.307 (0.109)	-0.295 (0.107)	-0.290 (0.113)	-0.289 (0.117)	-0.286 (0.118)
Lag Fund Size	-0.514*** (0.000)	-0.407*** (0.002)	-0.401*** (0.001)	-0.482*** (0.000)	-0.454*** (0.000)
Number of Funds Under Management	0.004 (0.191)	0.003 (0.376)	0.003 (0.323)	0.005 (0.131)	0.004 (0.230)
Number of Index Funds Under Management	-0.027 (0.712)	-0.040 (0.652)	-0.020 (0.784)	-0.049 (0.537)	-0.030 (0.697)
Total AUM	0.000 (0.107)	0.000 (0.127)	0.000* (0.064)	0.000 (0.228)	0.000 (0.107)
Total Index Funds AUM	0.000 (0.455)	0.000 (0.532)	0.000 (0.576)	0.000 (0.389)	0.000 (0.509)
Lag Fund Age	-0.484** (0.045)	-0.528** (0.038)	-0.474* (0.051)	-0.478** (0.043)	-0.571** (0.020)
Institutional Fund Dummy	-0.677*** (0.003)	-0.543** (0.024)	-0.576** (0.014)	-0.659*** (0.004)	-0.618*** (0.007)
No. of Observations	2442	2442	2442	2442	2442
Avg. R-squared	0.4623	0.4734	0.4622	0.4708	0.4684
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	40.620 (0.160)	51.431* (0.077)	-20.060 (0.565)	16.588 (0.600)	45.461 (0.103)
Lag Fund Flows	0.221*** (0.000)	0.221*** (0.000)	0.214*** (0.000)	0.219*** (0.000)	0.227*** (0.000)
Performance	2.449 (0.437)	2.449 (0.437)	31.186** (0.010)	18.978* (0.054)	6.335 (0.355)
Lag Tracking Error	-10.288** (0.046)	-10.288** (0.046)	-3.978 (0.459)	-10.760** (0.033)	-9.872* (0.054)
Lag Volatility	-1.342 (0.886)	-1.342 (0.886)	22.654** (0.043)	15.777 (0.183)	0.852 (0.918)
Lag Expense Ratio	7.105 (0.502)	7.105 (0.502)	46.093*** (0.005)	31.371** (0.033)	13.541 (0.210)
Lag 12b-1 Ratio	23.572 (0.190)	23.572 (0.190)	26.823 (0.160)	38.612* (0.062)	22.860 (0.188)
Front Load Dummy	-0.256* (0.092)	-0.256* (0.092)	-0.273* (0.092)	-0.268* (0.093)	-0.267* (0.096)
Lag Fund Size	-0.378*** (0.005)	-0.378*** (0.005)	-0.345*** (0.009)	-0.309** (0.017)	-0.361*** (0.008)
Number of Funds Under Management	0.009** (0.043)	0.009** (0.043)	0.009** (0.024)	0.010** (0.016)	0.007* (0.083)
Number of Index Funds Under Management	-0.093 (0.339)	-0.093 (0.339)	-0.113 (0.265)	-0.101 (0.308)	-0.061 (0.544)
Total AUM	0.000 (0.690)	0.000 (0.690)	0.000 (0.541)	0.000 (0.385)	0.000 (0.954)
Total Index Funds AUM	0.000 (0.255)	0.000 (0.255)	0.000 (0.171)	0.000 (0.205)	0.000 (0.348)
Lag Fund Age	-0.526** (0.050)	-0.526** (0.050)	-0.754** (0.014)	-0.794*** (0.010)	-0.661** (0.021)
Institutional Fund Dummy	-0.670** (0.017)	-0.670** (0.017)	-0.556* (0.062)	-0.553* (0.062)	-0.620** (0.037)
No. of Observations	1949	1949	1949	1949	1949
Avg. R-squared	0.5441	0.5441	0.5516	0.5505	0.5461
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	81.761 (0.152)	-74.322 (0.578)	-24.671 (0.453)	85.331 (0.236)	64.101 (0.355)
Lag Fund Flows	-0.542 (0.403)	-0.070 (0.882)	0.424* (0.099)	0.260 (0.283)	0.317 (0.190)
Performance	10.757 (0.295)	14.180 (0.155)	-27.325 (0.118)	-11.316 (0.541)	-3.623 (0.732)
Lag Tracking Error	-21.046 (0.464)	-53.431 (0.115)	8.610 (0.652)	32.124 (0.139)	7.825 (0.751)
Lag Volatility	-37.993 (0.127)	30.015 (0.526)	11.329 (0.317)	-29.537 (0.241)	-20.022 (0.407)
Lag Expense Ratio	67.809 (0.289)	62.819 (0.168)	-40.951 (0.325)	-40.277 (0.180)	-24.421 (0.421)
Lag 12b-1 Ratio	-789.580 (0.563)	-972.740 (0.340)	345.100 (0.375)	919.862 (0.132)	978.503** (0.057)
Front Load Dummy	-0.488* (0.088)	-0.452* (0.069)	-0.479* (0.074)	-0.530* (0.072)	-0.526* (0.072)
Lag Fund Size	-0.254 (0.670)	-0.219 (0.654)	-1.185*** (0.003)	-0.970*** (0.003)	-0.816*** (0.001)
Number of Funds Under Management	0.054 (0.401)	0.069 (0.178)	-0.002 (0.931)	-0.018 (0.521)	-0.024 (0.377)
Number of Index Funds Under Management	-1.812 (0.328)	-1.374 (0.279)	0.436 (0.565)	0.530 (0.468)	0.555 (0.449)
Total AUM	0.000 (0.520)	0.000 (0.231)	0.000 (0.581)	0.000 (0.931)	0.000 (0.438)
Total Index Funds AUM	0.001 (0.418)	0.001 (0.405)	0.002 (0.272)	0.002 (0.233)	0.000 (0.756)
Lag Fund Age	-2.468 (0.145)	0.421 (0.836)	1.374 (0.314)	-0.757 (0.586)	-0.909 (0.531)
No. of Observations	1274	1274	1274	1274	1274
Avg. R-squared	0.6858	0.6859	0.6834	0.6941	0.6900
P-value (F-Test)	0.002	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-113.644 (0.365)	56.742 (0.210)	-77.124 (0.346)	-50.968 (0.523)	-137.37** (0.034)
Lag Fund Flows	0.581 (0.133)	0.767** (0.030)	0.019 (0.950)	0.503** (0.023)	0.276 (0.140)
Performance	10.937 (0.413)	-55.481 (0.208)	186.756* (0.065)	10.065 (0.683)	62.214*** (0.009)
Lag Tracking Error	-8.595 (0.583)	-184.843 (0.384)	40.174 (0.713)	0.274 (0.983)	-3.343 (0.847)
Lag Volatility	21.881 (0.682)	-11.105 (0.232)	16.048 (0.268)	14.448 (0.629)	49.633** (0.030)
Lag Expense Ratio	202.940 (0.239)	-306.571 (0.275)	355.633 (0.221)	56.298 (0.156)	21.408 (0.699)
Lag 12b-1 Ratio	28.232 (0.939)	-249.491 (0.185)	1337.686 (0.315)	127.914 (0.437)	146.783 (0.279)
Front Load Dummy	-0.038 (0.180)	-0.088 (0.170)	-0.097 (0.224)	-0.055 (0.226)	-0.056 (0.223)
Lag Fund Size	0.162 (0.907)	-1.583* (0.081)	4.516 (0.408)	0.476 (0.483)	-0.508 (0.523)
Number of Funds Under Management	0.041 (0.516)	0.020 (0.747)	0.241 (0.257)	0.054 (0.133)	0.055* (0.088)
Number of Index Funds Under Management	-0.684 (0.456)	-0.361 (0.654)	-2.915 (0.322)	-0.879 (0.120)	-0.548 (0.337)
Total AUM	0.000 (0.383)	0.000 (0.505)	0.000 (0.226)	0.000 (0.102)	0.000 (0.162)
Total Index Funds AUM	0.001 (0.185)	0.000 (0.277)	0.002 (0.273)	0.001* (0.095)	0.000 (0.281)
Lag Fund Age	-3.595* (0.073)	4.634 (0.191)	-6.260 (0.255)	-2.752* (0.051)	-0.767 (0.706)
No. of Observations	1168	1168	1168	1168	1168
Avg. R-squared	0.7904	0.7919	0.7832	0.7867	0.7878
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table 12
Regression Results for Determinants of Monthly Fund Flows Using Information Ratio as Performance Measure

This table examines the effect of fund past information ratio, fees and search costs on the index funds flows. The sample includes open-end U.S. index funds spans from January 1995 to September 2010. The dependent variable is the monthly fund flows. The independent variables include the fund flows in the prior period (Lag Fund Flows); information ratio in the prior period; tracking error in the prior period; volatility in the prior period; expense ratio in the prior month; 12b-1 ratio in the prior month; the front-end load dummy, which equals 1 when fund charges frond-end load and 0 otherwise; the natural log of fund's TNA in the prior period as fund size; lagged number of all mutual funds under management; lagged number of all index funds under management; lagged total assets under management; lagged total index funds assets under management; lagged fund age, which is the natural log of the years from the fund's first offer day to period *t*; and the Institutional Fund Dummy, which equals 1 if the funds are institutional funds, and equals 0 if the funds are retail funds.

Panel A reports the regression results for the full time period. Panel B reports the results for the earlier subperiod and Panel C reports the results for the recent subperiod. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: Full Time Period (1995-2010)

Variables	All Funds	S&P 500 Funds	Institutional Funds	Retail Funds
Constant	5.181*** (0.000)	28.880*** (0.002)	10.871* (0.063)	2.508 (0.125)
Lag Fund Flows	0.224*** (0.000)	0.223*** (0.000)	0.169*** (0.000)	0.240*** (0.000)
Lag Information Ratio	0.044 (0.278)	0.094* (0.053)	0.099 (0.200)	0.123 (0.432)
Lag Volatility	-0.615** (0.017)	-4.269** (0.043)	-2.681 (0.165)	-0.019 (0.968)
Lag Expense Ratio	-10.605*** (0.001)	-0.970 (0.797)	-12.567** (0.034)	-3.610 (0.608)
Lag 12b-1 Ratio	5.983 (0.205)	10.509* (0.084)	82.671 (0.124)	1.489 (0.945)
Front Load Dummy	-0.156* (0.063)	-0.243*** (0.002)	-0.423*** (0.002)	0.023 (0.746)
Lag Fund Size	-0.160*** (0.000)	-0.126*** (0.006)	-0.202*** (0.008)	-0.199* (0.090)
Number of Funds Under Management	0.003*** (0.003)	0.003** (0.026)	0.003 (0.232)	0.004 (0.371)
Number of Index Funds Under Management	-0.016 (0.541)	-0.026 (0.417)	-0.034 (0.495)	-0.039 (0.750)
Total AUM	0.000 (0.679)	0.000 (0.873)	0.000 (0.391)	0.000 (0.653)
Total Index Funds AUM	0.000 (0.201)	0.000 (0.150)	0.000 (0.128)	0.000 (0.631)
Lag Fund Age	-0.999*** (0.000)	-0.767*** (0.000)	-0.736*** (0.001)	-0.954*** (0.000)
Institutional Fund Dummy	-0.212*** (0.009)	-0.190* (0.063)		
No. of Observations	23994	15557	12418	11576
Avg. R-squared	0.2936	0.3330	0.4064	0.4386
P-value (F-Test)	0.000	0.000	0.000	0.000

Panel B: Earlier Time Period (1995-1999)

Variables	All Funds	S&P 500 Funds	Institutional Funds	Retail Funds
Constant	12.041*** (0.000)	69.604*** (0.004)	32.030* (0.081)	2.545 (0.617)
Lag Fund Flows	0.258*** (0.000)	0.216*** (0.000)	0.070 (0.425)	0.375*** (0.001)
Lag Information Ratio	-0.024 (0.840)	0.153 (0.293)	0.108 (0.638)	0.314 (0.524)
Lag Volatility	-2.492*** (0.001)	-12.030** (0.020)	-9.181 (0.131)	-0.350 (0.817)
Lag Expense Ratio	-10.670 (0.224)	11.645 (0.267)	-10.865 (0.511)	6.007 (0.779)
Lag 12b-1 Ratio	17.841 (0.188)	32.487* (0.073)	195.553 (0.243)	23.691 (0.730)
Front Load Dummy	-0.326* (0.091)	-0.289* (0.068)	-0.496* (0.065)	-0.059 (0.201)
Lag Fund Size	-0.388*** (0.002)	-0.369*** (0.005)	-0.619*** (0.004)	-0.313 (0.393)
Number of Funds Under Management	0.007** (0.040)	0.009* (0.056)	0.005 (0.477)	0.010 (0.483)
Number of Index Funds Under Management	-0.062 (0.445)	-0.091 (0.366)	-0.103 (0.512)	-0.190 (0.622)
Total AUM	0.000 (0.600)	0.000 (0.996)	0.000 (0.543)	0.000 (0.812)
Total Index Funds AUM	0.000 (0.201)	0.000 (0.157)	0.001 (0.132)	0.000 (0.595)
Lag Fund Age	-0.640*** (0.007)	-0.461* (0.073)	-0.487 (0.415)	-0.511 (0.357)
Institutional Fund Dummy	-0.493** (0.026)	-0.540* (0.075)		
No. of Observations	2442	1949	1274	1168
Avg. R-squared	0.4286	0.5167	0.6182	0.7202
P-value (F-Test)	0.000	0.000	0.000	0.000

Panel C: Recent Time Period (2000-2010)

Variables	All Funds	S&P 500 Funds	Institutional Funds	Retail Funds
Constant	1.991*** (0.000)	9.938 (0.203)	1.029* (0.083)	2.491*** (0.000)
Lag Fund Flows	0.208*** (0.000)	0.225*** (0.000)	0.215*** (0.000)	0.177*** (0.000)
Lag Information Ratio	0.075*** (0.000)	0.067*** (0.007)	0.095** (0.021)	0.034 (0.213)
Lag Volatility	0.257*** (0.000)	-0.659 (0.733)	0.342*** (0.003)	0.135 (0.108)
Lag Expense Ratio	-10.575*** (0.000)	-6.837*** (0.009)	-13.359*** (0.001)	-8.083*** (0.007)
Lag 12b-1 Ratio	0.468 (0.872)	0.287 (0.920)	30.167** (0.024)	-8.838** (0.014)
Front Load Dummy	-0.077 (0.360)	-0.222** (0.015)	-0.388*** (0.010)	0.062 (0.551)
Lag Fund Size	-0.053* (0.073)	-0.014 (0.602)	-0.007 (0.868)	-0.146*** (0.000)
Number of Funds Under Management	0.002*** (0.000)	0.001* (0.052)	0.002*** (0.005)	0.001*** (0.008)
Number of Index Funds Under Management	0.006 (0.141)	0.004 (0.329)	-0.002 (0.746)	0.032*** (0.000)
Total AUM	0.000 (0.748)	0.000 (0.508)	0.000** (0.046)	0.000* (0.056)
Total Index Funds AUM	0.000 (0.921)	0.000 (0.590)	0.000 (0.108)	0.000** (0.025)
Lag Fund Age	-1.166*** (0.000)	-0.910*** (0.000)	-0.852*** (0.000)	-1.161*** (0.000)
Institutional Fund Dummy	-0.082 (0.171)	-0.028 (0.583)		
No. of Observations	21552	13608	11144	10408
Avg. R-squared	0.2307	0.2476	0.3080	0.3076
P-value (F-Test)	0.000	0.000	0.000	0.000

Table 13
Model 1 Regression Results Summary

This table presents the summarization of the Fama MacBeth (1973) regressions based on different time periods and subsamples. Raw, Dif, CAPM, 3F and 4F in the parentheses denote the relationship is relatively significant when Raw Returns, Differential Returns, CAPM alphas, and 3 or 4 Alphas are used as performance measures, respectively.

Period and Data Range	Lag Fund Flows	Lag Performance	Lag Tracking Error	Lag Information Ratio	Lag Volatility	Lag Expense Ratio	Lag 12b-1 Ratio
All Funds							
Full Period	Positive	Positive	Negative	-	Negative (Dif/CAPM)	Negative	Positive (4F)
Recent Period	Positive	Positive	Positive	Positive	Positive	Negative	-
Early Period	Positive	Positive (3F/4F)	Negative	-	Negative	-	Positive (4F)
S&P 500							
Full Period	Positive	-	-	Positive	-	-	-
Recent Period	Positive	Negative (3F/4F)	-	Positive	-	Negative	-
Early Period	Positive	Positive (CAPM/3F)	Negative	-	-	Positive (CAPM/3F)	-
Institutional							
Full Period	Positive	-	-	-	-	Negative (CAPM/3F/4F)	Positive (4F)
Recent Period	Positive	-	Positive	Positive	Positive	Negative	Positive
Early Period	-	-	-	-	-	-	Positive (4F)
Retail							
Full Period	Positive	Positive (CAPM/4F)	-	-	-	-	-
Recent Period	Positive	Positive (3F/4F)	-	-	-	Negative	Negative
Early Period	-	Positive (4F)	-	-	Positive (4F)	-	-

Period and Data Range	Front Load Dummy	Lag Fund Size	Lag Number of Funds Under Management	Lag Number of Index Funds Under Management	Lag of Total AUM	Lag of Index Funds AUM	Lag Fund Age	Institutional Dummy
All Funds								
Full Period	Negative	Negative	Positive	-	-	-	Negative	Negative
Recent Period	-	Negative	Positive	-	-	-	Negative	-
Early Period	-	Negative	-	-	-	-	Negative	Negative
S&P 500								
Full Period	Negative	Negative	Positive	-	-	-	Negative	Negative
Recent Period	Negative	-	Positive	-	-	-	Negative	-
Early Period	Negative	Negative	Positive	-	-	-	Negative	Negative
Institutional								
Full Period	Negative	Negative (CAPM/3F/4F)	-	-	-	-	Negative (Raw)	
Recent Period	Negative	-	Positive	-	Positive	Positive	Negative	
Early Period	Negative	Negative	-	-	-	-	-	
Retail								
Full Period	-	Negative (Dif)	-	-	-	-	Negative	
Recent Period	-	Negative	Positive	Positive	Positive	Positive	Negative	
Early Period	-	-	-	-	-	-	Negative (Raw/3F)	

Appendix

Table A1
Regression Results for the Effect of Number of Index Funds Under Management on the Flow-Performance relationship using Monthly Data for 1995 - 2010

This table examines the effect of number of index funds under management on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-0.285 (0.928)	2.789** (0.048)	3.449*** (0.001)	6.797* (0.062)	1.289 (0.542)
Lag Fund Flows	0.246*** (0.000)	0.250*** (0.000)	0.235*** (0.000)	0.225*** (0.000)	0.241*** (0.000)
Low	1.663 (0.818)	10.740*** (0.008)	4.476 (0.220)	2.842 (0.592)	4.960 (0.390)
Low * Number of Index Funds Under Management	0.890 (0.616)	-1.291 (0.172)	-1.331 (0.138)	-0.796 (0.297)	-1.133 (0.180)
Mid	0.461 (0.235)	0.233 (0.636)	-0.406 (0.522)	0.431 (0.367)	0.325 (0.461)
Mid * Number of Index Funds Under Management	0.117 (0.310)	0.119 (0.248)	0.020 (0.806)	0.027 (0.732)	-0.024 (0.784)
High	-7.370** (0.024)	-5.609* (0.070)	-20.090 (0.362)	2.674 (0.384)	1.577 (0.649)
High * Number of Index Funds Under Management	0.700 (0.295)	0.113 (0.886)	-0.328 (0.426)	-0.495 (0.301)	-0.322 (0.632)
Lag Tracking Error	-0.189 (0.863)	0.791 (0.317)	-0.167 (0.858)	0.329 (0.697)	1.017 (0.283)
Lag Volatility	1.285 (0.141)	-0.638** (0.029)	-0.478* (0.098)	-1.471 (0.185)	0.157 (0.788)
Age	-0.425 (0.759)	-0.703*** (0.000)	-0.780*** (0.000)	-0.982*** (0.000)	-1.233*** (0.000)
Age * Performance	-0.094 (0.779)	2.891** (0.040)	2.556 (0.684)	1.136 (0.368)	0.617 (0.702)
Lag Fund Size	-0.054 (0.143)	-0.076** (0.036)	-0.071* (0.065)	-0.077** (0.039)	-0.057 (0.110)
Number of Index Funds Under Management	-0.230 (0.508)	0.208 (0.245)	0.273* (0.100)	0.179 (0.197)	0.260* (0.084)
Institutional Fund Dummy	-0.218** (0.018)	-0.171* (0.060)	-0.238** (0.012)	-0.249** (0.015)	-0.162 (0.122)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3615	0.3540	0.3511	0.3583	0.3576
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	0.966 (0.958)	-4.836 (0.839)	10.377 (0.421)	24.390** (0.029)	55.355 (0.392)
Lag Fund Flows	0.256*** (0.000)	0.276*** (0.000)	0.237*** (0.000)	0.236*** (0.000)	0.254*** (0.000)
Low	58.288 (0.299)	116.379 (0.218)	11.209 (0.583)	2.270 (0.849)	-223.601 (0.514)
Low * Number of Index Funds Under Management	-29.692 (0.433)	-64.148 (0.224)	-8.491 (0.117)	-2.858 (0.857)	105.726 (0.511)
Mid	-0.972 (0.231)	0.499 (0.650)	-1.330* (0.073)	-1.575** (0.036)	-1.473** (0.032)
Mid * Number of Index Funds Under Management	0.111 (0.420)	-0.065 (0.661)	0.054 (0.690)	-0.009 (0.929)	0.027 (0.745)
High	32.015 (0.227)	-10.322 (0.697)	-3.375 (0.544)	-2.078 (0.810)	-17.146 (0.170)
High * Number of Index Funds Under Management	-10.329* (0.080)	8.381 (0.609)	-0.253 (0.757)	-0.913 (0.742)	1.475 (0.507)
Lag Tracking Error	-3.318 (0.138)	-4.268 (0.130)	-1.047 (0.625)	-2.739 (0.156)	-2.618 (0.248)
Lag Volatility	2.594 (0.492)	0.695 (0.855)	0.433 (0.893)	-2.008 (0.508)	1.775 (0.553)
Age	-23.033** (0.027)	-0.673*** (0.000)	-0.555*** (0.002)	0.407 (0.347)	-0.101 (0.855)
Age * Performance	5.391** (0.049)	7.659* (0.053)	3.829 (0.614)	11.037** (0.017)	8.605* (0.084)
Lag Fund Size	-0.075** (0.047)	-0.100** (0.040)	-0.105** (0.014)	-0.083** (0.032)	-0.081** (0.049)
Number of Index Funds Under Management	5.898 (0.436)	12.853 (0.223)	1.688 (0.120)	0.598 (0.851)	-21.136 (0.511)
Institutional Fund Dummy	-0.233** (0.027)	-0.194* (0.059)	-0.315*** (0.001)	-0.361*** (0.000)	-0.241** (0.013)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3689	0.4006	0.3924	0.3610	0.3612
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-26.416 (0.233)	-413.904 (0.237)	-3.463 (0.811)	-32.170 (0.391)	-31.064 (0.498)
Lag Fund Flows	0.227*** (0.001)	-0.226 (0.585)	0.246*** (0.000)	0.183 (0.191)	0.327*** (0.000)
Low	-38.901 (0.480)	1756.190 (0.311)	-17.819 (0.667)	169.543 (0.336)	31.053 (0.890)
Low * Number of Index Funds Under Management	-8.124 (0.800)	-184.667 (0.430)	2.251 (0.740)	-21.429 (0.263)	-10.365 (0.674)
Mid	-4.417 (0.289)	-34.796 (0.333)	1.213 (0.593)	-2.376 (0.560)	-3.321 (0.377)
Mid * Number of Index Funds Under Management	-0.734 (0.259)	3.059 (0.323)	-0.045 (0.939)	0.779 (0.422)	1.010 (0.385)
High	510.302 (0.314)	248.066 (0.422)	-13.252 (0.336)	-10.219 (0.357)	-3.306 (0.822)
High * Number of Index Funds Under Management	-246.882 (0.333)	-79.378 (0.386)	-1.516 (0.419)	0.293 (0.827)	0.667 (0.849)
Lag Tracking Error	-18.347** (0.017)	-284.325 (0.326)	-4.566 (0.524)	12.960 (0.488)	-13.363 (0.440)
Lag Volatility	18.752** (0.019)	47.505 (0.313)	4.037 (0.373)	0.843 (0.915)	12.263* (0.085)
Age	-50.610 (0.391)	4.360 (0.465)	-0.674* (0.078)	0.664 (0.694)	-3.209 (0.120)
Age * Performance	29.612 (0.232)	100.997 (0.352)	9.718 (0.617)	2.116 (0.909)	21.800 (0.323)
Lag Fund Size	-0.260** (0.028)	-1.801 (0.320)	-0.174 (0.121)	-0.513 (0.367)	-0.001 (0.997)
Number of Index Funds Under Management	2.026 (0.750)	37.486 (0.422)	-0.421 (0.757)	4.019 (0.296)	1.565 (0.749)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.5040	0.5056	0.4933	0.5066	0.5096
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	13.258 (0.666)	11.400 (0.457)	-44.137 (0.565)	137.139 (0.130)	-102.990 (0.839)
Lag Fund Flows	0.263*** (0.000)	0.223*** (0.000)	0.356*** (0.000)	0.299*** (0.000)	-0.343 (0.460)
Low	-21.834 (0.789)	24.543** (0.012)	291.067 (0.437)	-231.774 (0.234)	-1061.930 (0.257)
Low * Number of Index Funds Under Management	59.387 (0.101)	8.477 (0.570)	-50.966 (0.471)	-16.089 (0.188)	112.710 (0.198)
Mid	2.611 (0.135)	-4.011 (0.310)	3.631 (0.287)	-13.189* (0.075)	-17.739 (0.295)
Mid * Number of Index Funds Under Management	-0.181 (0.691)	2.367 (0.220)	1.194 (0.399)	1.703 (0.113)	-11.416 (0.138)
High	-13.954 (0.714)	-23.209 (0.515)	6.191 (0.483)	23.268 (0.602)	-213.026 (0.434)
High * Number of Index Funds Under Management	3.354 (0.227)	23.780* (0.094)	-31.723 (0.216)	-9.061 (0.579)	-5.597 (0.803)
Lag Tracking Error	1.080 (0.737)	0.656 (0.894)	3.125 (0.711)	1.393 (0.836)	28.812 (0.534)
Lag Volatility	0.458 (0.955)	-4.816 (0.372)	-5.664 (0.379)	-40.878 (0.119)	89.181 (0.603)
Age	-8.411 (0.513)	-0.745 (0.326)	-2.669* (0.061)	0.706 (0.755)	9.527 (0.666)
Age * Performance	-4.145 (0.199)	-11.300 (0.686)	-100.926* (0.090)	45.257 (0.110)	283.584** (0.019)
Lag Fund Size	0.092 (0.455)	-0.087 (0.419)	0.044 (0.706)	0.107 (0.540)	0.866 (0.179)
Number of Index Funds Under Management	-11.796 (0.105)	-2.583 (0.479)	9.751 (0.480)	2.614 (0.259)	-18.852 (0.239)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.5124	0.5136	0.5180	0.5276	0.5229
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table A2
Regression Results for the Effect of Total AUM Under Management on the Flow-Performance relationship using Monthly Data for 1995 - 2010

This table examines the effect of total assets under management, defined as the natural log of all mutual funds' TNA in a family, on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.590 (0.749)	4.294*** (0.010)	6.010*** (0.000)	5.336 (0.108)	1.583 (0.674)
Lag Fund Flows	0.221*** (0.000)	0.237*** (0.000)	0.224*** (0.000)	0.202*** (0.000)	0.223*** (0.000)
Low	-8.993 (0.428)	1.776 (0.558)	0.527 (0.886)	-2.560 (0.675)	-3.661 (0.691)
Low * Total AUM	-0.001** (0.050)	0.000 (0.745)	0.000 (0.812)	0.000 (0.880)	0.000 (0.808)
Mid	0.413 (0.241)	0.476 (0.300)	-0.079 (0.880)	0.599* (0.100)	-0.051 (0.893)
Mid * Total AUM	0.000 (0.913)	0.000 (0.512)	0.000** (0.044)	0.000 (0.727)	0.000 (0.331)
High	-3.993 (0.181)	-2.721 (0.269)	-5.741* (0.090)	-3.133 (0.243)	-2.852 (0.381)
High * Total AUM	0.000 (0.374)	0.000 (0.290)	0.001 (0.312)	0.000*** (0.006)	0.000 (0.602)
Lag Tracking Error	0.024 (0.981)	-0.161 (0.791)	1.651 (0.132)	1.260 (0.182)	3.423** (0.025)
Lag Volatility	2.556 (0.191)	-0.420 (0.339)	-0.766** (0.020)	-0.787 (0.432)	0.694 (0.535)
Age	-3.002 (0.197)	-0.890*** (0.000)	-0.769*** (0.000)	-0.872*** (0.000)	-1.025*** (0.000)
Age * Performance	1.173 (0.170)	1.139 (0.514)	3.660 (0.438)	-0.441 (0.739)	1.119 (0.599)
Lag Fund Size	-0.101** (0.018)	-0.141*** (0.001)	-0.154*** (0.000)	-0.166*** (0.000)	-0.139*** (0.001)
Total AUM	0.000** (0.046)	0.000 (0.534)	0.000 (0.905)	0.000 (0.768)	0.000 (0.466)
Institutional Fund Dummy	-0.128 (0.276)	-0.007 (0.952)	-0.105 (0.314)	-0.150 (0.150)	-0.019 (0.868)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3605	0.3439	0.3418	0.3491	0.3517
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	4290.148 (0.314)	21.960* (0.057)	9.341 (0.395)	-634.829 (0.294)	-583.195 (0.279)
Lag Fund Flows	0.247*** (0.000)	0.247*** (0.000)	0.230*** (0.000)	0.221*** (0.000)	0.245*** (0.000)
Low	-21356.730 (0.318)	-9.540 (0.467)	-6.174 (0.226)	4006.377 (0.247)	674.673 (0.558)
Low * Total AUM	0.065 (0.962)	0.002 (0.549)	-0.001 (0.191)	1.153 (0.493)	-3.508* (0.098)
Mid	-0.414 (0.575)	0.178 (0.832)	-2.304*** (0.001)	-1.779*** (0.007)	-1.711*** (0.008)
Mid * Total AUM	0.000 (0.725)	0.000 (0.853)	0.000 (0.211)	0.000 (0.369)	0.000 (0.515)
High	-1.395 (0.889)	0.151 (0.990)	-9.454** (0.034)	-13.474*** (0.001)	3.511 (0.888)
High * Total AUM	0.002 (0.378)	-0.002 (0.345)	0.000* (0.091)	-0.010 (0.335)	-0.001 (0.424)
Lag Tracking Error	-0.910 (0.622)	-1.648 (0.435)	1.689 (0.426)	-1.166 (0.576)	2.739 (0.290)
Lag Volatility	1.021 (0.747)	-0.230 (0.938)	3.240 (0.330)	-0.017 (0.996)	-2.273 (0.485)
Age	-13.382 (0.216)	-0.811*** (0.000)	-0.328* (0.074)	0.253 (0.572)	0.348 (0.589)
Age * Performance	2.331 (0.435)	3.838 (0.317)	20.621*** (0.002)	10.845** (0.015)	5.958 (0.250)
Lag Fund Size	-0.106** (0.020)	-0.139*** (0.008)	-0.164*** (0.001)	-0.164*** (0.001)	-0.107** (0.013)
Total AUM	-0.013 (0.962)	0.000 (0.552)	0.000 (0.181)	-0.231 (0.493)	0.702* (0.098)
Institutional Fund Dummy	-0.149 (0.240)	-0.116 (0.331)	-0.264** (0.011)	-0.253** (0.013)	-0.142 (0.166)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3496	0.3826	0.3774	0.3489	0.3500
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-6.587 (0.779)	87.753 (0.341)	-33.467 (0.283)	8.551 (0.752)	-258.168 (0.277)
Lag Fund Flows	0.278*** (0.000)	0.171** (0.024)	0.179*** (0.002)	0.511* (0.065)	2.245 (0.268)
Low	-40.675 (0.361)	-331.120 (0.467)	168.814 (0.353)	0.380 (0.992)	-60.276 (0.131)
Low * Total AUM	-0.018 (0.316)	0.034 (0.341)	-0.004 (0.636)	-0.014 (0.378)	0.049* (0.066)
Mid	0.917 (0.634)	-1.209 (0.608)	-4.816 (0.218)	9.443 (0.142)	-5.666 (0.493)
Mid * Total AUM	0.000 (0.418)	0.000 (0.639)	0.000 (0.638)	0.000 (0.881)	-0.002 (0.332)
High	2885.940 (0.306)	-22.006 (0.538)	-1.738 (0.923)	31.395 (0.264)	-20.818 (0.430)
High * Total AUM	-0.216 (0.314)	0.004 (0.217)	-0.001 (0.195)	0.000 (0.986)	0.002 (0.303)
Lag Tracking Error	-5.077 (0.472)	-2.905 (0.700)	7.033 (0.539)	-41.233 (0.348)	-71.149 (0.246)
Lag Volatility	11.948 (0.119)	-7.764 (0.376)	3.419 (0.616)	-10.124 (0.338)	104.463 (0.236)
Age	-18.087 (0.417)	-1.430*** (0.002)	-0.579 (0.164)	2.479 (0.227)	-13.933 (0.322)
Age * Performance	-2.887 (0.729)	3.337 (0.759)	1.215 (0.937)	-68.135 (0.232)	-19.649 (0.333)
Lag Fund Size	-0.122 (0.250)	-0.311** (0.038)	0.533 (0.505)	0.501 (0.442)	-0.982 (0.203)
Total AUM	0.004 (0.316)	-0.007 (0.342)	0.001 (0.632)	0.003 (0.376)	-0.009** (0.045)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.4875	0.4879	0.4861	0.4927	0.5015
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	74.939 (0.148)	0.754 (0.939)	-5.880 (0.714)	43.445 (0.254)	50.520 (0.525)
Lag Fund Flows	0.190* (0.053)	0.486*** (0.010)	0.310*** (0.000)	0.212*** (0.004)	0.312*** (0.000)
Low	44.823 (0.864)	44.483* (0.098)	49.440 (0.512)	-101.124 (0.237)	-97.441 (0.673)
Low * Total AUM	0.009 (0.138)	-0.004 (0.772)	-0.001 (0.348)	0.000 (0.662)	0.014 (0.415)
Mid	-3.792 (0.249)	3.275 (0.345)	3.235 (0.519)	-4.454 (0.544)	2.465 (0.633)
Mid * Total AUM	0.000 (0.234)	0.000 (0.514)	0.000 (0.547)	0.000 (0.496)	0.000 (0.902)
High	97.805 (0.496)	-37.292 (0.410)	-5.142 (0.711)	12.789 (0.641)	-51.497 (0.481)
High * Total AUM	0.008 (0.324)	-0.017 (0.457)	0.343 (0.310)	0.005 (0.184)	-0.004 (0.217)
Lag Tracking Error	3.703 (0.367)	9.203 (0.299)	1.581 (0.751)	-3.419 (0.566)	12.885** (0.032)
Lag Volatility	-21.392** (0.044)	-2.633 (0.290)	-1.194 (0.523)	-16.601 (0.189)	-25.552 (0.430)
Age	-17.129 (0.378)	-0.630 (0.258)	-1.831*** (0.010)	2.919 (0.183)	5.491 (0.184)
Age * Performance	-0.141 (0.985)	-9.476 (0.445)	-68.223 (0.156)	-11.844 (0.486)	-28.202 (0.395)
Lag Fund Size	-0.120 (0.567)	-0.134 (0.295)	0.001 (0.993)	-0.061 (0.760)	-0.168 (0.259)
Total AUM	-0.002 (0.137)	0.001 (0.767)	0.000 (0.360)	0.000 (0.548)	-0.003 (0.415)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.5116	0.5087	0.5118	0.5172	0.5139
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table A3
Regression Results for the Effect of Total Index Funds AUM on the Flow-Performance relationship using Monthly Data for 1995 - 2010

This table examines the effect of total index funds assets under management, defined as the natural log of all index funds' TNA in a family, on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-2.459 (0.609)	4.423*** (0.000)	4.272*** (0.001)	3.774 (0.221)	-0.617 (0.849)
Lag Fund Flows	0.223*** (0.000)	0.239*** (0.000)	0.231*** (0.000)	0.214*** (0.000)	0.233*** (0.000)
Low	12.395 (0.191)	4.396 (0.319)	9.595** (0.042)	-0.305 (0.966)	1.712 (0.773)
Low * Total Index Funds AUM	-0.005 (0.495)	-0.002 (0.640)	-0.001 (0.884)	0.002 (0.617)	0.000 (0.905)
Mid	0.721** (0.022)	0.598 (0.237)	0.341 (0.618)	1.207*** (0.001)	0.411 (0.248)
Mid * Total Index Funds AUM	0.000 (0.981)	0.000 (0.976)	0.000*** (0.000)	-0.001*** (0.006)	-0.001** (0.019)
High	-0.158 (0.957)	-4.088 (0.110)	-0.447 (0.914)	-0.845 (0.738)	0.366 (0.894)
High * Total Index Funds AUM	0.000 (0.732)	0.000 (0.884)	0.019 (0.330)	0.002 (0.219)	0.001 (0.641)
Lag Tracking Error	-0.553 (0.692)	-0.421 (0.548)	1.671 (0.208)	1.287 (0.192)	2.846* (0.058)
Lag Volatility	2.059 (0.187)	-0.638*** (0.010)	-0.809** (0.029)	-0.693 (0.450)	0.920 (0.329)
Age	-0.797 (0.589)	-0.885*** (0.000)	-0.927*** (0.000)	-0.864*** (0.000)	-1.069*** (0.000)
Age * Performance	-0.160 (0.683)	1.373 (0.444)	-3.896 (0.592)	-1.946 (0.216)	-0.966 (0.565)
Lag Fund Size	-0.100** (0.017)	-0.124*** (0.005)	-0.148*** (0.002)	-0.172*** (0.001)	-0.119*** (0.006)
Total Index Funds AUM	0.001 (0.479)	0.000 (0.634)	0.000 (0.717)	0.000 (0.751)	0.000 (0.480)
Institutional Fund Dummy	-0.154* (0.081)	-0.126 (0.163)	-0.143 (0.210)	-0.123 (0.268)	-0.064 (0.587)
No. of Observations	23994	23994	23994	23994	23994
Avg. R-squared	0.3498	0.3470	0.3466	0.3534	0.3552
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-378.503 (0.381)	13.699 (0.420)	12.122 (0.333)	-292.946 (0.303)	-259.941 (0.089)
Lag Fund Flows	0.244*** (0.000)	0.257*** (0.000)	0.245*** (0.000)	0.233*** (0.000)	0.256*** (0.000)
Low	1641.467 (0.308)	17.867 (0.614)	25.879 (0.113)	1334.604 (0.312)	241.466 (0.178)
Low * Total Index Funds AUM	25.405 (0.458)	-1.541 (0.290)	-0.082 (0.156)	-23.325 (0.247)	-77.078 (0.184)
Mid	-0.292 (0.692)	0.004 (0.997)	-0.650 (0.465)	-0.838 (0.312)	-1.007 (0.201)
Mid * Total Index Funds AUM	0.000 (0.874)	0.000 (0.966)	0.000** (0.014)	-0.001* (0.070)	0.000 (0.114)
High	22.308 (0.183)	-5.313 (0.470)	-0.254 (0.974)	1.954 (0.863)	-4.224 (0.658)
High * Total Index Funds AUM	0.069 (0.477)	0.000 (0.916)	0.001 (0.717)	-0.015 (0.772)	0.011 (0.395)
Lag Tracking Error	-1.670 (0.468)	-1.290 (0.534)	1.359 (0.527)	-0.917 (0.674)	1.565 (0.535)
Lag Volatility	-0.391 (0.893)	-1.007 (0.755)	0.130 (0.968)	-0.741 (0.806)	-0.906 (0.767)
Age	-14.605 (0.239)	-0.813*** (0.000)	-0.763*** (0.001)	1.336* (0.058)	0.548 (0.476)
Age * Performance	1.081 (0.718)	5.938 (0.146)	-0.271 (0.976)	2.156 (0.722)	1.053 (0.875)
Lag Fund Size	-0.107** (0.020)	-0.111** (0.020)	-0.169*** (0.002)	-0.163*** (0.002)	-0.108** (0.016)
Total Index Funds AUM	-5.081 (0.458)	0.308 (0.290)	0.017 (0.150)	4.666 (0.247)	15.416 (0.184)
Institutional Fund Dummy	-0.207** (0.032)	-0.240*** (0.010)	-0.254** (0.022)	-0.224** (0.037)	-0.098 (0.380)
No. of Observations	15557	15557	15557	15557	15557
Avg. R-squared	0.3503	0.3849	0.3799	0.3520	0.3516
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	68.117* (0.054)	-8.783 (0.918)	57.994* (0.069)	27.812 (0.159)	-10.694 (0.601)
Lag Fund Flows	0.301*** (0.000)	0.164 (0.220)	0.345*** (0.000)	0.326*** (0.000)	0.251*** (0.000)
Low	-52.331 (0.254)	123.342 (0.663)	-163.468 (0.216)	-107.737* (0.074)	99.967* (0.062)
Low * Total Index Funds AUM	2.345 (0.316)	-0.516 (0.454)	-0.611 (0.446)	0.202 (0.158)	0.106 (0.350)
Mid	-3.639 (0.107)	6.054 (0.384)	-8.490 (0.473)	3.737* (0.075)	2.416 (0.220)
Mid * Total Index Funds AUM	0.003 (0.285)	-0.005 (0.287)	0.001 (0.864)	-0.001 (0.287)	-0.003 (0.110)
High	-51.816 (0.650)	206.271 (0.200)	-16.355 (0.396)	8.690 (0.304)	9.682 (0.251)
High * Total Index Funds AUM	0.092 (0.557)	0.178 (0.294)	-0.042 (0.181)	0.003 (0.399)	0.003 (0.791)
Lag Tracking Error	-0.231 (0.977)	11.964 (0.311)	20.694 (0.251)	-7.561 (0.380)	4.334 (0.539)
Lag Volatility	-5.149 (0.690)	-28.944 (0.254)	-10.106 (0.248)	-3.377 (0.543)	-2.285 (0.733)
Age	-24.539 (0.266)	-1.192* (0.078)	-0.062 (0.955)	-0.116 (0.931)	-1.213 (0.436)
Age * Performance	7.211 (0.290)	-26.538 (0.424)	65.520 (0.291)	-21.522 (0.278)	-26.122 (0.135)
Lag Fund Size	-0.321 (0.137)	-0.509 (0.393)	1.121 (0.403)	-0.029 (0.873)	-0.204* (0.093)
Total Index Funds AUM	-0.469 (0.316)	0.108 (0.436)	0.122 (0.438)	-0.039 (0.167)	-0.019 (0.389)
No. of Observations	12418	12418	12418	12418	12418
Avg. R-squared	0.4923	4893	0.4904	0.5044	0.5049
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-488.326 (0.335)	-3.687 (0.724)	51.412 (0.615)	138.402 (0.118)	-133.710 (0.482)
Lag Fund Flows	0.255*** (0.007)	0.234*** (0.000)	0.055 (0.838)	-0.067 (0.785)	0.226*** (0.006)
Low	2832.263 (0.245)	5.973 (0.580)	284.912 (0.115)	687.924 (0.302)	700.051 (0.428)
Low * Total Index Funds AUM	-3.009 (0.314)	-0.207* (0.090)	-0.391 (0.152)	-0.818 (0.311)	0.019 (0.963)
Mid	-0.841 (0.786)	-0.145 (0.936)	16.277 (0.164)	3.648 (0.604)	-3.429 (0.735)
Mid * Total Index Funds AUM	0.001 (0.793)	-0.001 (0.228)	-0.013 (0.208)	-0.022 (0.192)	-0.005 (0.414)
High	-166.252 (0.243)	40.251 (0.238)	-259.741 (0.306)	11.565 (0.929)	0.925 (0.980)
High * Total Index Funds AUM	0.008 (0.981)	0.171 (0.445)	0.082 (0.211)	0.033 (0.762)	-0.021 (0.876)
Lag Tracking Error	2.031 (0.656)	4.498 (0.287)	-28.046 (0.356)	-25.398 (0.402)	8.054 (0.546)
Lag Volatility	-24.809 (0.105)	-1.355 (0.465)	-30.928 (0.313)	-13.843 (0.525)	-0.883 (0.950)
Age	-5.718 (0.762)	-0.785 (0.130)	-1.232 (0.307)	-31.603 (0.363)	9.645 (0.225)
Age * Performance	-14.354 (0.182)	5.008 (0.609)	-85.446 (0.143)	236.067 (0.347)	1.092 (0.989)
Lag Fund Size	0.012 (0.959)	-0.185** (0.046)	-1.206 (0.329)	-1.547* (0.089)	-0.073 (0.681)
Total Index Funds AUM	0.602 (0.314)	0.042* (0.085)	0.082 (0.146)	0.172 (0.301)	-0.002 (0.983)
No. of Observations	11576	11576	11576	11576	11576
Avg. R-squared	0.5108	0.5096	0.5186	0.5190	0.5189
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table A4
Regression Results for the Effect of Number of Funds Under Management on the Flow-Performance relationship using Monthly Data for 2000 - 2010

This table examines the effect of number of funds provided by a fund family on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	0.596 (0.476)	1.140 (0.013)	1.293 (0.021)	1.206 (0.133)	1.392 (0.056)
Lag Fund Flows	0.212 (0.000)	0.219 (0.000)	0.213 (0.000)	0.212 (0.000)	0.210 (0.000)
Low	2.039 (0.441)	-2.769 (0.141)	-3.329 (0.089)	4.154 (0.078)	1.597 (0.500)
Low * Number of Funds Under Management	-0.014 (0.087)	0.005 (0.450)	0.008 (0.271)	0.000 (0.982)	0.004 (0.585)
Mid	0.295 (0.289)	0.130 (0.664)	-0.162 (0.620)	0.733 (0.026)	0.316 (0.312)
Mid * Number of Funds Under Management	0.001 (0.327)	-0.001 (0.364)	-0.001 (0.226)	0.001 (0.607)	0.001 (0.338)
High	1.358 (0.500)	-1.735 (0.404)	0.403 (0.872)	-0.508 (0.819)	2.123 (0.421)
High * Number of Funds Under Management	0.004 (0.536)	-0.002 (0.779)	0.000 (0.947)	0.019 (0.007)	0.020 (0.005)
Lag Tracking Error	0.708 (0.058)	0.933 (0.018)	1.217 (0.001)	0.913 (0.026)	0.819 (0.043)
Lag Volatility	0.343 (0.033)	0.279 (0.000)	0.308 (0.000)	0.059 (0.654)	0.129 (0.268)
Age	-1.244 (0.000)	-1.185 (0.000)	-1.134 (0.000)	-1.245 (0.000)	-1.301 (0.000)
Age * Performance	0.000 (0.995)	0.910 (0.026)	2.868 (0.007)	0.026 (0.913)	-0.280 (0.275)
Lag Fund Size	0.061 (0.011)	0.046 (0.064)	0.026 (0.331)	0.041 (0.111)	0.047 (0.067)
Number of Funds Under Management	0.003 (0.028)	0.001 (0.578)	0.000 (0.792)	0.001 (0.486)	0.000 (0.906)
Institutional Fund Dummy	0.175 (0.003)	0.189 (0.002)	0.109 (0.065)	0.194 (0.001)	0.205 (0.000)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2473	0.2488	0.2477	0.2545	0.2552
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	9.123 (0.274)	6.939 (0.440)	11.152 (0.174)	7.758 (0.396)	9.317 (0.266)
Lag Fund Flows	0.224*** (0.000)	0.222*** (0.000)	0.214*** (0.000)	0.220*** (0.000)	0.224*** (0.000)
Low	-11.292* (0.080)	-20.733* (0.079)	-12.325*** (0.001)	6.021 (0.714)	-1.617 (0.773)
Low * Number of Funds Under Management	0.025 (0.760)	0.079 (0.189)	0.014 (0.212)	-0.059 (0.568)	0.053 (0.369)
Mid	-0.375 (0.541)	-0.519 (0.262)	-2.770*** (0.000)	-2.377*** (0.000)	-2.217*** (0.000)
Mid * Number of Funds Under Management	0.002 (0.224)	0.000 (0.935)	-0.001 (0.256)	-0.004** (0.021)	-0.002 (0.256)
High	4.990 (0.663)	-6.872** (0.015)	-6.765 (0.110)	-18.257*** (0.010)	-26.551* (0.072)
High * Number of Funds Under Management	-0.053 (0.676)	0.033 (0.126)	-0.137 (0.365)	0.295 (0.155)	0.168 (0.481)
Lag Tracking Error	0.194 (0.895)	0.568 (0.699)	-1.769 (0.253)	-2.267 (0.159)	-2.043 (0.199)
Lag Volatility	-0.467 (0.809)	0.605 (0.754)	-0.044 (0.982)	-0.363 (0.854)	-0.363 (0.853)
Age	-0.576 (0.911)	-0.937*** (0.000)	-0.547*** (0.000)	0.395 (0.189)	-0.087 (0.787)
Age * Performance	2.236* (0.067)	3.618*** (0.007)	18.246*** (0.000)	15.442*** (0.000)	12.567*** (0.000)
Lag Fund Size	0.053** (0.013)	0.055** (0.014)	0.005 (0.818)	0.027 (0.255)	0.032 (0.160)
Number of Funds Under Management	-0.005 (0.751)	-0.016 (0.194)	-0.001 (0.496)	0.013 (0.520)	-0.009 (0.416)
Institutional Fund Dummy	0.108* (0.057)	0.118** (0.036)	0.043 (0.427)	0.065 (0.242)	0.072 (0.179)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2469	0.2722	0.2643	0.2455	0.2468
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	-3.221 (0.328)	-31.382 (0.366)	3.375** (0.012)	7.854** (0.028)	-5.195 (0.462)
Lag Fund Flows	0.227*** (0.000)	0.233*** (0.000)	0.227*** (0.000)	0.222*** (0.000)	0.229*** (0.000)
Low	10.561 (0.414)	170.683 (0.352)	-14.553** (0.030)	-18.728 (0.190)	6.836 (0.663)
Low * Number of Funds Under Management	-0.133 (0.302)	-0.447 (0.412)	-0.015 (0.671)	0.114 (0.369)	-0.402 (0.385)
Mid	0.177 (0.698)	0.174 (0.744)	-0.531 (0.355)	1.003* (0.078)	0.664 (0.215)
Mid * Number of Funds Under Management	0.001 (0.773)	-0.001 (0.770)	-0.002 (0.508)	0.000 (0.906)	0.000 (0.963)
High	0.735 (0.865)	-1.028 (0.748)	3.511 (0.517)	4.688 (0.525)	4.694 (0.502)
High * Number of Funds Under Management	-0.023 (0.340)	-0.010 (0.550)	-0.058 (0.111)	0.041 (0.367)	-0.090 (0.420)
Lag Tracking Error	1.351 (0.107)	1.743** (0.047)	2.175* (0.088)	2.562** (0.018)	2.513** (0.023)
Lag Volatility	0.632* (0.051)	0.266** (0.020)	0.212* (0.051)	-0.538 (0.220)	0.713 (0.179)
Age	-1.241** (0.021)	-1.218*** (0.000)	-1.089*** (0.000)	-1.023*** (0.000)	-1.281*** (0.000)
Age * Performance	0.059 (0.635)	0.936 (0.517)	6.549** (0.019)	1.178 (0.431)	0.323 (0.705)
Lag Fund Size	0.092*** (0.003)	0.058* (0.088)	0.057 (0.118)	0.075** (0.027)	0.087** (0.011)
Number of Funds Under Management	0.027 (0.296)	0.091 (0.399)	0.005 (0.485)	-0.021 (0.394)	0.082 (0.379)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3410	0.3427	0.3408	0.3528	0.3509
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.189 (0.291)	0.579 (0.417)	1.368* (0.086)	0.300 (0.778)	0.360 (0.703)
Lag Fund Flows	0.191*** (0.000)	0.208*** (0.000)	0.183*** (0.000)	0.200*** (0.000)	0.198*** (0.000)
Low	5.765** (0.047)	-0.997 (0.673)	-0.254 (0.919)	9.972*** (0.001)	6.218** (0.042)
Low * Number of Funds Under Management	-0.020** (0.023)	-0.009 (0.467)	-0.009 (0.233)	-0.015** (0.016)	-0.010 (0.218)
Mid	0.701** (0.046)	0.026 (0.952)	-0.912* (0.066)	0.427 (0.311)	-0.100 (0.814)
Mid * Number of Funds Under Management	0.002 (0.200)	0.000 (0.911)	0.000 (0.815)	0.002 (0.239)	0.002 (0.166)
High	1.785 (0.632)	-3.833 (0.178)	-2.927 (0.552)	-6.379 (0.333)	-4.602 (0.483)
High * Number of Funds Under Management	0.008 (0.402)	0.013 (0.507)	0.008 (0.605)	0.039* (0.072)	0.035* (0.079)
Lag Tracking Error	0.400 (0.491)	0.842 (0.229)	2.364*** (0.002)	0.632 (0.275)	0.686 (0.273)
Lag Volatility	0.057 (0.825)	0.260*** (0.009)	0.269*** (0.009)	0.023 (0.897)	0.150 (0.295)
Age	-1.580** (0.030)	-0.892*** (0.000)	-0.745*** (0.000)	-1.074*** (0.000)	-1.237*** (0.000)
Age * Performance	-0.179 (0.288)	1.502** (0.011)	8.949*** (0.000)	0.555 (0.151)	0.073 (0.868)
Lag Fund Size	0.010 (0.693)	0.008 (0.765)	-0.029 (0.330)	-0.014 (0.645)	0.001 (0.982)
Number of Funds Under Management	0.004** (0.020)	0.003 (0.312)	0.003** (0.047)	0.003** (0.018)	0.002 (0.238)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3368	0.3392	0.3388	0.3460	0.3444
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table A5
Regression Results for the Effect of Total AUM Under Management on the Flow-Performance relationship using Monthly Data for 2000 - 2010

This table examines the effect of total assets under management, defined as the natural log of all mutual funds' TNA in a family, on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.418* (0.084)	1.425*** (0.003)	1.237** (0.014)	1.531** (0.043)	1.617** (0.017)
Lag Fund Flows	0.209*** (0.000)	0.217*** (0.000)	0.212*** (0.000)	0.209*** (0.000)	0.209*** (0.000)
Low	0.299 (0.887)	-2.659 (0.138)	-1.697 (0.311)	3.421* (0.064)	1.329 (0.477)
Low * Total AUM	0.000 (0.121)	0.000 (0.153)	0.000 (0.818)	0.000 (0.527)	0.000 (0.661)
Mid	0.398 (0.103)	-0.034 (0.895)	-0.393 (0.155)	0.608** (0.035)	0.148 (0.604)
Mid * Total AUM	0.000 (0.103)	0.000 (0.348)	0.000 (0.782)	0.000 (0.166)	0.000** (0.020)
High	0.478 (0.788)	-0.561 (0.778)	0.694 (0.757)	1.766 (0.404)	4.389 (0.083)
High * Total AUM	0.000 (0.885)	0.000 (0.591)	0.000 (0.472)	0.000* (0.092)	0.000** (0.043)
Lag Tracking Error	0.537 (0.134)	0.813* (0.056)	1.217*** (0.001)	0.744* (0.065)	0.583 (0.144)
Lag Volatility	0.277* (0.095)	0.294*** (0.000)	0.336*** (0.000)	0.050 (0.688)	0.145 (0.215)
Age	-1.345*** (0.000)	-1.186*** (0.000)	-1.167*** (0.000)	-1.208*** (0.000)	-1.268*** (0.000)
Age * Performance	0.045 (0.481)	0.806* (0.068)	2.477** (0.017)	0.058 (0.800)	-0.208 (0.373)
Lag Fund Size	0.044* (0.094)	0.032 (0.233)	0.015 (0.594)	0.028 (0.300)	0.033 (0.226)
Total AUM	0.000 (0.133)	0.000 (0.117)	0.000 (0.852)	0.000 (0.788)	0.000 (0.866)
Institutional Fund Dummy	0.175*** (0.004)	0.183*** (0.004)	0.141** (0.019)	0.187*** (0.001)	0.210*** (0.000)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2452	0.2443	0.2428	0.2495	0.2491
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	6128.147 (0.314)	8.249 (0.362)	9.925 (0.225)	-783.225 (0.372)	13.463 (0.160)
Lag Fund Flows	0.224*** (0.000)	0.221*** (0.000)	0.216*** (0.000)	0.219*** (0.000)	0.223*** (0.000)
Low	-30453.440 (0.319)	-16.672* (0.092)	-8.354*** (0.002)	4961.796 (0.319)	-26.702 (0.243)
Low * Total AUM	1.611 (0.198)	0.000 (0.152)	0.000 (0.920)	2.705 (0.196)	0.001* (0.095)
Mid	-0.148 (0.794)	-0.073 (0.869)	-3.058*** (0.000)	-2.735*** (0.000)	-2.150*** (0.001)
Mid * Total AUM	0.000*** (0.002)	0.000** (0.037)	0.000 (0.473)	0.000 (0.845)	0.000 (0.372)
High	-3.817 (0.774)	-3.274 (0.248)	-4.709 (0.161)	-13.075*** (0.005)	13.436 (0.708)
High * Total AUM	0.000 (0.257)	0.000 (0.147)	0.000 (0.256)	-0.015 (0.329)	-0.002 (0.379)
Lag Tracking Error	0.318 (0.837)	0.582 (0.697)	-1.358 (0.382)	-2.072 (0.196)	-1.055 (0.517)
Lag Volatility	-0.615 (0.765)	0.354 (0.857)	0.234 (0.907)	-1.310 (0.513)	-0.279 (0.890)
Age	0.358 (0.943)	-1.007*** (0.000)	-0.548*** (0.000)	0.375 (0.248)	0.030 (0.939)
Age * Performance	1.648 (0.182)	1.741 (0.213)	18.398*** (0.000)	14.001*** (0.000)	10.293*** (0.000)
Lag Fund Size	0.047** (0.047)	0.053** (0.031)	0.017 (0.493)	0.032 (0.189)	0.030 (0.212)
Total AUM	-0.322 (0.198)	0.000 (0.132)	0.000 (0.984)	-0.541 (0.196)	0.000* (0.094)
Institutional Fund Dummy	0.095* (0.089)	0.100* (0.083)	0.038 (0.497)	0.071 (0.209)	0.089 (0.116)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2407	0.2641	0.2587	0.2408	0.2429
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	2.652 (0.237)	-25.141 (0.374)	-31.844 (0.392)	8.059** (0.021)	2.651 (0.385)
Lag Fund Flows	0.237*** (0.000)	0.236*** (0.000)	0.236*** (0.000)	0.233*** (0.000)	0.239*** (0.000)
Low	-7.753 (0.278)	137.141 (0.362)	239.684 (0.367)	-18.975 (0.176)	-6.003 (0.510)
Low * Total AUM	0.000 (0.531)	-0.001 (0.367)	-0.001 (0.321)	0.000 (0.510)	0.000 (0.876)
Mid	-0.061 (0.868)	-0.277 (0.551)	-0.771 (0.191)	0.460 (0.330)	0.123 (0.796)
Mid * Total AUM	0.000* (0.062)	0.000 (0.162)	0.000 (0.197)	0.000** (0.012)	0.000 (0.145)
High	7.679 (0.383)	-1.599 (0.730)	4.601 (0.436)	12.897* (0.053)	-9.355 (0.454)
High * Total AUM	0.000* (0.063)	0.000 (0.642)	0.000 (0.348)	0.000 (0.629)	0.000 (0.357)
Lag Tracking Error	1.385* (0.076)	1.876** (0.025)	1.435 (0.314)	2.484** (0.029)	2.461** (0.033)
Lag Volatility	0.217 (0.635)	0.354*** (0.003)	0.239** (0.038)	-0.724 (0.154)	0.117 (0.787)
Age	-1.538** (0.032)	-1.219*** (0.000)	-1.159*** (0.000)	-0.966*** (0.000)	-1.112*** (0.000)
Age * Performance	0.002 (0.988)	1.207 (0.400)	4.077 (0.231)	0.619 (0.647)	0.433 (0.693)
Lag Fund Size	0.076** (0.028)	0.049 (0.181)	0.046 (0.236)	0.062* (0.076)	0.074** (0.037)
Total AUM	0.000 (0.393)	0.000 (0.372)	0.000 (0.326)	0.000 (0.357)	0.000 (0.994)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3317	0.3282	0.3228	0.3403	0.3410
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.980* (0.087)	1.023 (0.132)	1.678* (0.013)	0.706 (0.506)	0.095 (0.927)
Lag Fund Flows	0.193*** (0.000)	0.201*** (0.000)	0.179*** (0.000)	0.193*** (0.000)	0.192*** (0.000)
Low	2.409 (0.336)	-2.250 (0.317)	-1.623 (0.443)	7.440*** (0.008)	5.423** (0.050)
Low * Total AUM	0.000* (0.062)	0.000 (0.936)	0.000 (0.690)	0.000 (0.162)	0.000 (0.177)
Mid	0.766** (0.013)	-0.081 (0.838)	-0.886* (0.069)	0.498 (0.174)	-0.046 (0.907)
Mid * Total AUM	0.000 (0.167)	0.000 (0.336)	0.000 (0.904)	0.000 (0.133)	0.000** (0.028)
High	4.525 (0.273)	-3.508 (0.167)	-0.224 (0.952)	-1.369 (0.674)	6.525** (0.050)
High * Total AUM	0.000 (0.972)	0.000 (0.860)	0.000 (0.215)	0.000** (0.024)	0.000* (0.054)
Lag Tracking Error	0.087 (0.883)	0.567 (0.403)	1.903*** (0.008)	0.613 (0.355)	0.520 (0.451)
Lag Volatility	0.021 (0.939)	0.274*** (0.004)	0.308*** (0.001)	0.040 (0.824)	0.206 (0.191)
Age	-1.331* (0.091)	-0.925*** (0.000)	-0.832*** (0.000)	-1.189*** (0.000)	-1.204*** (0.000)
Age * Performance	-0.112 (0.511)	1.215* (0.065)	8.276*** (0.000)	0.628 (0.127)	-0.214 (0.604)
Lag Fund Size	-0.006 (0.826)	-0.017 (0.585)	-0.046 (0.159)	-0.020 (0.565)	-0.014 (0.677)
Total AUM	0.000* (0.054)	0.000 (0.942)	0.000 (0.267)	0.000 (0.198)	0.000 (0.358)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3386	0.3366	0.3420	0.3420	0.3399
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Table A6
Regression Results for the Effect of Total Index Funds AUM on the Flow-Performance relationship using Monthly Data for 2000 - 2010

This table examines the effect of family index funds size, defined as the natural log of all index funds' TNA in a family, on the sensitivity of flows to past performance. Following Sirri and Tufano (1998), each month, fractional performance ranks ranging from zero to one are assigned to fund based on its performance in the past 12 months relative to other funds. In this table, fractional ranks are defined on the basis of funds' raw return, differential return, CAPM alpha, 3-factor alpha, and 4-factor alpha. The fractional ranks for funds in the bottom quintile performance level (Low) are defined as Min (Rank_{t-1}, 0.2). Funds in the medium three performance quintiles (Mid) are given ranks defined as Min (0.6, $\mathrm{Rank}_{t-1} - \mathrm{Low}$). The highest quintile performance ranks (High) are defined as $\mathrm{Rank}_{t-1} - \mathrm{Mid} - \mathrm{Low}$. Each month a piecewise linear regression is performed by regressing monthly fund flows.

Panel A reports the regression results for all kinds of index funds. Panel B reports the results for only S&P 500 index funds. Panel C reports the results for all institutional index funds. Panel D reports the results for all retail index funds. We report the Fama and MacBeth (1973) two steps procedure coefficients and *t*-statistics. *p*-values are given in the parentheses. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

Panel A: All Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.248 (0.122)	1.014** (0.032)	0.980* (0.068)	1.347* (0.054)	1.477** (0.021)
Lag Fund Flows	0.214*** (0.000)	0.218*** (0.000)	0.215*** (0.000)	0.216*** (0.000)	0.217*** (0.000)
Low	-1.087 (0.520)	-1.531 (0.382)	-0.577 (0.738)	4.363** (0.017)	1.978 (0.265)
Low * Total Index Funds AUM	0.000 (0.766)	0.000 (0.300)	-0.001* (0.053)	0.000 (0.243)	0.000 (0.103)
Mid	0.635*** (0.006)	0.069 (0.773)	-0.623** (0.027)	0.717*** (0.004)	0.372 (0.145)
Mid * Total Index Funds AUM	0.000* (0.095)	0.000 (0.894)	0.000 (0.746)	0.000 (0.583)	0.000 (0.837)
High	1.095 (0.544)	-0.952 (0.619)	0.022 (0.992)	3.079 (0.136)	5.481** (0.020)
High * Total Index Funds AUM	0.000 (0.599)	0.000 (0.802)	0.000 (0.717)	0.000* (0.082)	0.000 (0.256)
Lag Tracking Error	0.570 (0.119)	0.664* (0.088)	0.975** (0.012)	0.698* (0.090)	0.554 (0.186)
Lag Volatility	0.324** (0.046)	0.312*** (0.000)	0.336*** (0.000)	0.035 (0.763)	0.125 (0.253)
Age	-1.350*** (0.000)	-1.153*** (0.000)	-1.065*** (0.000)	-1.180*** (0.000)	-1.215*** (0.000)
Age * Performance	0.013 (0.843)	0.809** (0.040)	3.816*** (0.001)	0.143 (0.552)	-0.032 (0.895)
Lag Fund Size	0.049* (0.058)	0.037 (0.162)	0.024 (0.397)	0.037 (0.171)	0.040 (0.143)
Total Index Funds AUM	0.000 (0.896)	0.000 (0.264)	0.000** (0.025)	0.000 (0.172)	0.000* (0.073)
Institutional Fund Dummy	0.154** (0.011)	0.152** (0.020)	0.101 (0.102)	0.166*** (0.006)	0.178*** (0.004)
No. of Observations	21552	21552	21552	21552	21552
Avg. R-squared	0.2561	0.2480	0.2489	0.2557	0.2570
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel B: S&P 500 Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	70.514 (0.192)	10.880 (0.293)	11.282 (0.152)	11.532 (0.205)	11.271 (0.183)
Lag Fund Flows	0.227*** (0.000)	0.225*** (0.000)	0.215*** (0.000)	0.219*** (0.000)	0.222*** (0.000)
Low	-35.032 (0.215)	-26.995 (0.189)	-7.530*** (0.005)	0.770 (0.908)	3.654 (0.556)
Low * Total Index Funds AUM	6.043 (0.319)	0.008 (0.203)	0.000 (0.985)	-0.310 (0.313)	-0.002 (0.254)
Mid	-0.284 (0.600)	-0.221 (0.600)	-2.873*** (0.000)	-2.751*** (0.000)	-2.329*** (0.000)
Mid * Total Index Funds AUM	0.000 (0.529)	0.000 (0.710)	0.000 (0.942)	0.000*** (0.001)	0.000*** (0.001)
High	-4.575 (0.721)	-4.253 (0.119)	-5.723 (0.123)	6.008 (0.705)	-9.045 (0.473)
High * Total Index Funds AUM	0.004 (0.304)	0.000 (0.933)	0.000 (0.282)	-0.026 (0.723)	0.015 (0.390)
Lag Tracking Error	0.611 (0.688)	1.101 (0.471)	-0.573 (0.715)	-1.846 (0.252)	-1.158 (0.469)
Lag Volatility	-0.970 (0.628)	0.041 (0.983)	-0.279 (0.885)	-1.405 (0.484)	-1.023 (0.609)
Age	-0.754 (0.879)	-0.970*** (0.000)	-0.550*** (0.000)	0.840* (0.086)	-0.098 (0.779)
Age * Performance	2.843** (0.018)	3.314*** (0.010)	17.651*** (0.000)	13.233*** (0.000)	10.817*** (0.000)
Lag Fund Size	0.040* (0.077)	0.045* (0.053)	0.022 (0.361)	0.031 (0.202)	0.034 (0.167)
Total Index Funds AUM	-1.209 (0.319)	-0.002 (0.202)	0.000 (0.987)	0.062 (0.314)	0.000 (0.389)
Institutional Fund Dummy	0.102* (0.071)	0.094* (0.100)	0.012 (0.826)	0.055 (0.340)	0.063 (0.272)
No. of Observations	13608	13608	13608	13608	13608
Avg. R-squared	0.2405	0.2660	0.2622	0.2444	0.2434
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel C: All Institutional Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.504 (0.552)	-68.475 (0.335)	4.345** (0.019)	4.642 (0.153)	-2.095 (0.757)
Lag Fund Flows	0.242*** (0.000)	0.238*** (0.000)	0.238*** (0.000)	0.243*** (0.000)	0.247*** (0.000)
Low	-2.076 (0.826)	356.060 (0.325)	-15.506 (0.119)	1.131 (0.898)	5.304 (0.747)
Low * Total Index Funds AUM	-0.004 (0.423)	-0.088 (0.315)	0.001 (0.771)	-0.006* (0.082)	0.006* (0.086)
Mid	0.206 (0.545)	-0.192 (0.671)	-1.005 (0.130)	0.478 (0.250)	0.241 (0.562)
Mid * Total Index Funds AUM	0.000 (0.929)	0.000*** (0.008)	0.000*** (0.002)	0.000 (0.362)	0.000 (0.339)
High	5.828 (0.481)	-2.128 (0.605)	1.064 (0.846)	5.349 (0.435)	3.204 (0.528)
High * Total Index Funds AUM	-0.003* (0.061)	0.000 (0.245)	0.000 (0.425)	0.001 (0.724)	0.006 (0.156)
Lag Tracking Error	1.640* (0.076)	1.655** (0.028)	1.809 (0.377)	2.222** (0.036)	2.177** (0.046)
Lag Volatility	0.272 (0.536)	0.307*** (0.008)	0.213* (0.081)	-0.603 (0.157)	0.969 (0.328)
Age	-1.387*** (0.009)	-1.174*** (0.000)	-1.096*** (0.000)	-0.867*** (0.001)	-1.151*** (0.000)
Age * Performance	0.068 (0.616)	1.139 (0.413)	4.362 (0.218)	1.167 (0.305)	0.228 (0.758)
Lag Fund Size	0.081** (0.022)	0.033 (0.357)	0.061 (0.122)	0.062* (0.084)	0.074** (0.041)
Total Index Funds AUM	0.001 (0.427)	0.017 (0.316)	0.000 (0.494)	0.001* (0.087)	-0.001* (0.078)
No. of Observations	11144	11144	11144	11144	11144
Avg. R-squared	0.3471	0.3368	0.3356	0.3553	0.3545
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000

Panel D: All Retail Index Funds

Performance Measured by	Raw Return	Differential Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Constant	1.651 (0.158)	0.683 (0.387)	1.418** (0.046)	1.162 (0.281)	0.395 (0.731)
Lag Fund Flows	0.191*** (0.000)	0.204*** (0.000)	0.178*** (0.000)	0.187*** (0.000)	0.186*** (0.000)
Low	2.172 (0.441)	-0.018 (0.994)	-1.460 (0.483)	7.690*** (0.002)	4.795* (0.059)
Low * Total Index Funds AUM	0.000 (0.411)	-0.001 (0.240)	-0.001 (0.239)	0.000 (0.366)	0.000 (0.566)
Mid	1.015*** (0.002)	0.315 (0.430)	-0.522 (0.287)	0.876*** (0.009)	0.455 (0.189)
Mid * Total Index Funds AUM	0.000 (0.572)	0.000** (0.037)	0.000** (0.013)	0.000 (0.137)	0.000 (0.155)
High	2.580 (0.527)	-4.733* (0.077)	-1.869 (0.629)	1.149 (0.765)	0.108 (0.979)
High * Total Index Funds AUM	0.000 (0.209)	0.000 (0.440)	0.000 (0.602)	0.001*** (0.001)	0.001*** (0.000)
Lag Tracking Error	0.202 (0.735)	0.771 (0.264)	1.542** (0.027)	0.679 (0.286)	0.644 (0.354)
Lag Volatility	0.054 (0.838)	0.210** (0.031)	0.279*** (0.004)	-0.055 (0.755)	0.211 (0.270)
Age	-1.225 (0.112)	-1.016*** (0.000)	-0.835*** (0.000)	-1.183*** (0.000)	-1.319*** (0.000)
Age * Performance	-0.190 (0.241)	1.259** (0.070)	7.754*** (0.000)	0.605 (0.111)	0.178 (0.657)
Lag Fund Size	0.002 (0.931)	0.001 (0.979)	-0.033 (0.303)	-0.015 (0.632)	-0.010 (0.755)
Total Index Funds AUM	0.000 (0.242)	0.000 (0.168)	0.000** (0.044)	0.000 (0.125)	0.000 (0.249)
No. of Observations	10408	10408	10408	10408	10408
Avg. R-squared	0.3384	0.3389	0.3522	0.3446	0.3446
P-value (F-Test)	0.000	0.000	0.000	0.000	0.000