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The Determinants of the Flow of Funds of Managed Portfolios: Mutual Funds versus Pension Funds

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Abstract: Due to differences in financial sophistication and agency relationships, we posit that investors use different criteria to select portfolio managers in the retail mutual fund and fiduciary pension fund industry segments. We provide evidence on investors' manager selection criteria by estimating the relation between manager asset flow and performance. We find that pension fund clients use quantitatively sophisticated measures like Jensen's alpha, tracking error, and outperformance of a market benchmark. Pension clients also punish poorly performing managers by withdrawing assets under management. In contrast, mutual fund investors use raw return performance and flock disproportionately to recent winners but do not withdraw assets from recent losers. Mutual fund manager flow is significantly positively related to Jensen's alpha, a seemingly anomalous result in light of a relatively unsophisticated mutual fund client base. We provide preliminary evidence, however, that this relation is driven by a high correlation between Jensen's alpha and widely available summary performance measures, such as Morningstar's star rating. By documenting differences in the flow-performance relation, we contribute to the growing literature linking fund manager behavior to the implicit incentives to increase assets under management. We show that several forces combine to weaken the incentive for pension fund managers to engage in the type of risk-shifting behavior identified in the mutual fund literature.

JEL classification: G2, G1, L1

Key words: mutual funds, pension funds, fund flows, performance evaluation

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1. Introduction

The mutual fund and pension fund segments of the money management industry are similar in many basic ways. Both deliver portfolio management services to its clients; choose investments from the same universe of risky assets; and employ both passive and active fund managers. Due to the expansion of the mutual fund segment over the past decade, they are also comparable in terms of total assets under management and the total number of portfolio products.[1] One important difference in these two industry segments, however, is their disparate clienteles. The typical retail mutual fund investor differs substantially from the typical pension trustee in their investment needs and financial background. As a result, these two client types are likely to use different criteria when selecting a money manager. Because portfolio managers are typically compensated as a percentage of assets under management, they have strong incentives to focus their efforts on attracting clients, delivering the dimension of performance or service that results in increased assets. To better understand these implicit incentives deriving from client behavior, we analyze whether differences in client characteristics between these two segments translate into differences in the relation between manager asset flow and performance.

Our work builds on earlier papers by Sirri and Tufano (1998), Ippolito (1992), and Patel, Zeckhauser and Hendricks (1994) who present evidence that a flow-performance relation exists in the mutual fund segment. We focus on two main differences in client characteristics across the two industry segments: financial sophistication and the existence of agency problems. Using a compilation of survey evidence, practitioner sources, and academic studies, we argue that pension fund sponsors are more financially sophisticated than mutual fund investors. In addition, we show that several aspects of the typical pension manager selection process can be interpreted as resulting from the layers of agency relationships inherent in the pension segment. Lakonishok, Shleifer, and Vishny (1992), in an overview of the less studied pension fund segment, argue that pension sponsor officials as fiduciaries have agency problems that induce them to value manager characteristics that are easily justified to superiors or a trustee committee. The mutual fund segment is quite different in that mutual fund clients invest only on their own behalf.

We document several differences in the relation between flow and manager characteristics consistent with these fundamental client differences. First, we find that pension fund sponsors appear to be more

quantitatively sophisticated than mutual fund investors. For example, pension manager flow is significantly positively related to risk-adjusted performance measures, such as Jensen's alpha, and negatively related to tracking error, a measure of diversifiable risk. Surprisingly, the relation with tracking error is most pronounced for pension managers that outperform their benchmark, indicating that sponsors punish managers who take on diversifiable risk, even if it results in outperformance. Mutual fund manager flow, on the other hand, is unrelated to tracking error and has a strong relation with unadjusted raw return performance. We do find, however, a significant positive relation between mutual fund manager flow and Jensen's alpha. This result, while consistent with the empirical findings in the previous literature, is anomalous in light of the differences in client sophistication between the two segments. We provide evidence suggesting that the strong statistical relation between mutual fund flow and Jensen's alpha is driven by a high correlation between alpha and widely-available summary performance measures, such as Morningstar's star rating. In particular, when Morningstar star ratings are included as an additional explanatory variable in mutual fund manager flow regressions, alpha is no longer significant.

Second, we find that pension sponsors appear to prefer manager characteristics that can be justified ex-post to a trustee committee. For example, we find that beating a market benchmark attracts an additional $165.54 million in flow to the average pension manager and boosts his asset growth rate by 20 percentage points. Furthermore, we find that it is whether or not a manager beats a benchmark that is important; the magnitude of the excess returns is not significantly related to flow. In contrast, we find that mutual fund manager flow is primarily positively related to the magnitude of the excess returns, and especially pronounced at the top of the performance distribution. This suggests that beating a benchmark is a discrete event in the pension segment, possibly because it serves to validate the manager's competence. Alternatively, sponsors may simply use the beating of a benchmark as a low-cost screening mechanism to narrow the field of managers under consideration for hire. We also find that the relation between manager flow and performance is much noisier in the pension fund segment. This supports the characterization of that segment as relatively more individualized and influenced by non-performance manager characteristics.

Consistent with previous research, the mutual fund flow-performance relation is highly convex, implying that mutual fund investors disproportionately flock to good performers, but do not punish poor performers by

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[1] The 1995 *Pensions and Investments* magazine Top 1000 money managers issue covered 7953 pension fund products collectively controlling $3.1 trillion. In the same year, ICI's Mutual Fund Factbook lists 5357 mutual funds controlling $2.1

withdrawing assets. In contrast, the flow-performance relation is approximately linear in the pension fund segment. Pension sponsors withdraw assets from managers with poor alpha performance, as well as allocate flow toward good performers. By documenting differences in the flow-performance relation, we contribute to the growing literature linking fund manager behavior to their implicit incentives to increase assets under management. The shape of the flow-performance relation in the mutual fund industry implies that winners take all in this segment. As a result of the convexity in rewards, mutual fund managers have an implicit incentive to alter the risk of their portfolios to increase the chances that they are among the winners. Brown, Harlow, and Starks (1996) and Chevalier and Ellison (1997) find empirical support for this prediction. In contrast, we show that several forces combine to weaken the incentive for pension fund managers to engage in this same type of risk-shifting behavior. In addition to the lack of convexity in the flow-performance relation and the withdrawal of assets for poor performance, pension fund sponsors appear to explicitly punish this type of behavior through their punishment of high tracking error and tendency to fire managers who substantially deviate from their stated investment policies.

Our comparison of pension fund and mutual fund managers provides new insights into previous studies that focus only on mutual funds. In stark contrast to the high degree of autocorrelation in mutual fund flows, we find that pension fund flows exhibit very little autocorrelation. We explore reasons why the autocorrelation of flows appears to be a result unique to mutual funds, and not a universal characteristic of managed funds. In addition, we find large and robust differences in the role of asset size in attracting flow. Large mutual funds attract flow approximately in proportion to their size. In contrast, large pension fund managers attract much less dollar flow than smaller funds, with the top 10% of managers ranked by asset size actually losing assets on average. We conjecture that these results are also related to differences in agency relationships and sophistication across the two segments. For example, the high degree of autocorrelation in mutual fund flows may be driven by the allocation behavior of participants in defined contribution (401k) retirement plans. The importance of personal relationships and face-to-face contact between pension managers and clients may induce decreasing returns to scale in this segment, resulting in a negative relation between flow and asset size. We provide some supporting arguments and preliminary evidence for these conjectures, as well as discuss implications for managerial incentives.

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trillion in aggregate.

In a broader sense, this paper also contributes conceptually to the large literature on fund performance evaluation. The focus in this literature has traditionally been, "do mutual funds exhibit superior risk-adjusted performance?" The puzzle of active portfolio management whereby mutual fund managers underperform passive benchmarks, yet continue to attract assets to manage, may be reconciled by shifting the focus to "do mutual funds exhibit superior performance in the eyes of their investors?" Our results suggest that the answers to these questions might be quite different.

2. Comparison of the pension fund and mutual fund management industry segments

In a given year there is a fair amount of hiring and firing activity in both the mutual fund and pension fund industry segments, resulting in a large volume of inflows and outflows. Twenty-nine percent of mutual fund owners surveyed in 1995 indicated that they had conducted an exchange (transferred out of one fund and into another within the same mutual fund company) and 14% closed an account. During that same year, 22% of pension plan sponsors terminated a manager, 28% hired a manager and 15% terminated and hired a manager within the year.[2]

Previous evidence suggests that past performance influences the manager selection and termination decision, and is thereby an important determinant of flow. Despite different sample periods, methodologies, and performance measures, Chevalier and Ellison (1997), Gruber (1996), Patel, Zeckhauser, and Hendricks (1994), Ippolito (1992), and Sirri and Tufano (1998) all find that past performance is an important determinant of flow in the mutual fund segment. Lakonishok et al (1992) provide some evidence that performance is related to the growth in the number of clients in the pension fund segment as well. Although these studies establish the importance of a manager's track record in determining the amount of assets he controls, there has been relatively little discussion of which performance measures and manager characteristics matter most. A careful comparison of a typical client in the two segments will shed light on how and why the flow-performance relation is likely to differ across these groups.

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[2] Unless otherwise noted, the sources for the survey information on mutual fund investors comes from various publications from the Investment Company Institute including: the 1996 national survey of mutual fund investors *The People Behind the Growth*, the 1993 survey *Understanding Shareholder's Redemption Decisions,* the 1997 survey *Understanding Shareholder's Use of Information and Advisors*, and the 1996 survey *Shareholder Assessment of Risk Disclosure Methods.* (All available at www.ici.org.) Unless otherwise noted, the survey information on pension fund sponsors comes from various surveys by Greenwich Associates (compiled in *Investment Management Report* 1996 and 1997).

As of 1995, the mutual fund segment served more than 30 million households while the pension fund segment served around 45,000 corporate and public plan sponsors and endowments. The median mutual fund assets per household is $18,000 while the average pension fund assets is in the range of $67 million.[3] Individuals typically have a much smaller portfolio of managers to monitor: the median household owns three mutual funds with two different fund families. The average number of portfolio managers per plan sponsor is 8.9, with plans over $1 billion in assets employing as many as 20 managers. These basic differences imply that a pension fund manager's flows will be much more discrete, as the loss or gain of one or two clients may change assets under management by millions of dollars. In addition, by controlling a large amount of assets pension fund sponsors have more market power in contracting for portfolio management services than mutual fund investors. Indeed, Halpern and Fowler (1991) report that fees vary considerably by pension fund client for the same manager.

The question of interest is how these two very different client pools allocate money to the managers competing for their assets. In this section we focus on two client differences that will guide our empirical analysis of the relation between flow and performance in these two industry segments.

2.1. Client differences: financial sophistication

The typical pension fund client is arguably more financially sophisticated than the typical mutual fund investor. Pension fund sponsors are often finance professionals with expertise in the area of investment management. In addition, most pension sponsors rely heavily on the recommendations of consultants when deciding which managers to hire or retain. As a result, the performance evaluation measures favored by consultants likely influence the relation between flow and performance in this segment. A consultant's screening service generally includes a high degree of quantitative analysis including risk-adjusted measures such as Jensen's alpha, the Sharpe measure, and tracking error. These measures are commonly found in many of the available pension manager databases and evaluation software packages. In addition, firms such as BARRA, Mobius, and Wilshire Associates market software that performs sophisticated return attribution analysis that decomposes portfolio returns into exposure to various passive indices.

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[3] McGraw-Hill's 1995 *Money Market Directory* and the 1995 *Directory of Pension Funds and their Investment Managers* (McGraw Hill).

Tracking error, in particular, is a commonly used measure in this industry segment. Besides being a standard measure included in popular client software packages, at least nine articles on tracking error have appeared since 1992 in the practitioner-oriented *Journal of Portfolio Management* and *Financial Analysts Journal*. Tracking error, a measure of diversifiable risk, measures the volatility of a portfolio's deviation from benchmark returns. One performance measure advocated by pension consultants and academic researchers, the appraisal ratio, uses tracking error as a component.[4] The appraisal ratio is defined as Jensen's alpha divided by diversifiable risk (tracking error), and can be interpreted as a benefit-to-cost ratio of an actively managed portfolio. The proper application of an appraisal ratio implies that after controlling for alpha, a sponsor should optimally allocate capital to managers with lower tracking error.

Managers in the pension segment are often selected and evaluated according to their investment style or specialty. For example, a sponsor may conduct a search for a manager that invests only in large-capitalization value stocks. As a result, the sponsor would compare a potential manager's track record to an index of value stocks or other large-cap value managers. Virtually all pension managers state their investment style and benchmark when marketing themselves to potential clients.

The more sophisticated (quantitative) methods of risk adjustment and benchmarking that are commonplace in the pension fund industry do not appear to be common among mutual fund owners.[5] Capon et al (1996) report that 75% of recent mutual fund purchasers surveyed did not know the investment style of their funds, and 39.3% did not know whether their fund was a load or no-load fund. When choosing a fund or monitoring a current investment, mutual fund investors typically rely on sources of investment advice or information less likely to endorse sophisticated risk-adjusted measures of fund performance. Most use the media for information: 53% use newspapers, magazines or investment newsletters (most frequently mentioned are the *Wall Street Journal* and *Money* magazine) and only 19% consult a ratings service like Morningstar or Lipper. According to a 1995 *Money* magazine poll of mutual fund investors, only 26.7% said they compared their fund's return to a benchmark.[6]

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[4] For example, see Treynor and Black (1973) and Bodie, Kane, and Marcus (1999), p. 759.

[5] Admati and Pfleiderer (1997) present a model in which tying manager compensation directly, or indirectly through flow, to observed benchmark-adjusted performance does not lead to optimal portfolios, or aligned incentives between the manager and client. Nevertheless, we refer to the use of benchmarks as sophisticated in the sense that they are quantitative measures endorsed by pension consultants and portfolio theory.

[6] "Why Funds Don't Beat the Market," *Money* (August 1995, pp. 58-67)

A confounding factor in a characterization of mutual fund investors as unsophisticated is that 59% of mutual fund owners consult with a financial advisor such as a broker or financial planner before purchasing mutual funds. In addition, fund recommendations in newspapers and magazines are typically based on performance measures that incorporate some form of risk adjustment. Many fund advertisements feature Morningstar star ratings based on fund rankings on both risk and return. Together, these factors may implicitly introduce an element of more sophisticated decision making into the fund selection process. However, the magnitude of this effect is an empirical question.

These differences in the level of client financial sophistication suggest that different performance measures may be important in each industry segment. We expect flow in the pension fund segment to be related to risk-adjusted measures of performance such as Jensen's alpha, tracking error, and style-adjusted returns. Flow in the mutual fund segment is likely to be more closely related to raw returns and summary performance measures, such as popular rankings like Morningstar "stars."

2.2. Client differences: the manager selection process and agency issues

Relative to the mutual fund segment, manager selection is often a lengthy and costly process for pension sponsors. Many retain consultants such as Wilshire Associates, Frank Russell, or RogersCasey to monitor the performance of current managers and make hiring and firing recommendations. Greenwich Associates reports that "for every manager actually selected by the average fund, 22 are screened by pension fund consultants, 16 complete a written questionnaire, 5 are interviewed personally, and 4 reach the final set. Thus, a strong track record is only a starting point in attracting clients as presumably only those with good records make it to the interview stage of the process.

Survey and anecdotal evidence suggest that non-performance manager characteristics such as personality, credibility, reputation, and attentiveness are very important in the ultimate hiring and retention decision. For example, 25% of plan sponsors listed a "lack of credibility with investment committee or trustees" as the reason for termination of their manager. According to scoring sheets from CalPERS' recent manager search, only ten points out of 550 were allocated to performance for those managers making it past the initial screening, while 150 points were allocated to the "investment committee interview."[7] Most sponsors frequently meet one-on-one with their managers to ask questions, examine holdings, and assess performance. For

example, 78% of sponsors meet at least once a year with the most important managers and apparently value personal contact highly.[8] Overall, the picture emerging from this industry segment is that manager characteristics unobservable to a researcher play an important role in attracting pension assets. In contrast, mutual fund investors have little opportunity for personal contact with portfolio managers, and are more likely to rely on a track record or a fund analyst's report to guide their decision. Even Morningstar inputs only quantitative variables into its star ratings even though they are clearly influential enough to gain access to fund management.

It is not clear why pension sponsors rely so heavily on hired consultants and qualitative characteristics when choosing a portfolio manager. One view is that hiring an expert to screen the universe of managers based on quantitative performance measures, and then evaluating finalists on qualitative variables, is a cost-effective method of judiciously monitoring large sums of pension liabilities. Perhaps sponsors are better able to discern aspects of manager skill and predict future performance from face-to-face meetings than through past performance alone. Alternatively, Lakonishok, Shleifer, and Vishny (1992) argue that these practices can be interpreted as evidence of an agency problem.

The majority of pension fund assets are in defined benefit plans, where typically a corporate treasurer, as a fiduciary, is responsible for investing the pension assets.[9] Lakonishok, Shleifer and Vishny (1992) argue that an agency problem between senior corporate management, the corporate treasurer, and the outside portfolio managers can account for many facts about the pension fund segment. Specifically, since the corporate treasurer must answer to senior management in the event of inferior plan performance, he may choose managers and strategies that reduce his own job risk. As a result, he may tend to choose strategies where blame can be easily transferred to others and his decisions can be defended ex-post. For example, Lakonishok, et al argue that the common practices of externally managing pension assets and hiring professional pension consultants are popular because they provide convenient scapegoats in the event of an unpleasant outcome.[10]

Under this agency interpretation, we expect that sponsors value manager characteristics that reduce a corporate treasurer's job risk. For example, outperforming a market benchmark may be convincing evidence

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[7] http://www.calpers.ca.gov/invest/invest.htm

[8] According to a Nelson/Wilshire poll, a recent trend toward the introduction of client service personnel to interact with sponsors in place of the portfolio management team is viewed negatively by 65% of the plan sponsors surveyed.

[9] According to Greenwich Associates, 86% of corporate pensions managed 63.2% of their pension assets via defined benefit plans in 1994.

[10] Eighty-six percent of pension plans surveyed by Greenwich Associates managed less than 5% internally in 1994. Sixty percent of pension plans surveyed by Greenwich Associates used the services of a pension fund consultant in 1994 and 84% of those used their consultant to monitor current managers in addition to providing other services.

of competency to trustees, even if the manager was not a top performer among peer managers. Indeed, a recent survey of sponsors ranked performance relative to market indices as more important than the investment performance of other managers.[11] In this environment, managers who take concentrated bets on stocks and consequently deviate substantially from market benchmarks take a risk of being "wrong and alone."[12] Tracking error captures this idea because it dynamically measures the volatility of a portfolio's deviation from benchmark returns. Bernstein (1998) discusses this issue, stating that "clients love affair with benchmarks has made large tracking errors extremely perilous for [pension] managers." Thus, client attention to tracking error can be interpreted as the result of agency problems because it focuses on the cost of manager bets that deviate from the benchmark, while ignoring the potential benefit in terms of increased return.

Differences in the manager selection and evaluation processes in the pension fund and mutual fund segments suggest three differences in the relation between flow and performance. First, tracking error and performance relative to a market index are likely to be related to pension fund flows and not mutual fund flows, both because of agency reasons and because of their reliance on sophisticated concepts like benchmarking. In addition to being less quantitative, mutual fund investors do not need to justify hiring decisions to superiors or beneficiaries.

Second, we should observe lower explanatory power of quantitative performance measures in explaining flow in the pension fund segment, because qualitative manager characteristics are generally more important to pension fund sponsors than to mutual fund investors.[13] Note that this does not necessarily contradict the notion that pension sponsors are more quantitatively sophisticated than mutual fund investors. A weak statistical relation may suggest that sponsors use quantitative measures primarily as a first screen, or as a supplement to qualitative manager characteristics. If pension sponsors are more sophisticated, however, then those performance measures that are related to flow should be the risk-adjusted and quantitative variety, and not raw returns. Finally, differences in the attention paid to monitoring managers suggest that pension fund

[11] "Time Horizons of Pension Fund Managers," by Financial Executives Research Foundation, 1993.
[12] Mark Kritzman, "Wrong and Alone," *Economics & Portfolio Strategy* (New York: Peter L. Bernstein, Inc. :1998)
[13] We recognize that non-performance factors such as fund reputation or services may be important to mutual fund investors as well. However, they are unlikely to greatly weaken the cross-sectional relation between flow and performance because reputation in the mutual fund industry is largely based on marketing, which also tends to focus on performance. In addition, there is a great deal of homogeneity in services offered across fund complexes, implying little cross-sectional dispersion along this dimension.

sponsors are more likely to punish poorly performing managers by withdrawing assets than mutual fund investors.

3. Description of the sample

3.1. Pension fund sample

Data on pension fund money managers are from the June 1995 *M-Search Database* compiled and distributed by Mobius, Inc. This database contains numerous firm and manager characteristics for 1320 management firms offering approximately 4500 portfolio products over the period 1985 to 1994. Each management firm typically offers more than one investment product, each with a given style or objective. As in studies of the mutual fund industry, the unit of analysis is the individual fund product (e.g., the analog of Fidelity Magellan). Although other terms such as "fund" or "product" are often used, we will refer to this unit of analysis as the fund manager.

For each manager we have an annual time-series of assets under management and the number of distinct clients, and quarterly returns. Assets and client numbers are broken down by tax treatment of the client account (tax-exempt, taxable) so that we are able to isolate the flows from tax-exempt, fiduciary clients. Tax-exempt clients, who control approximately 88% of total sample assets, include university endowments and non-profit foundations in addition to public and corporate pension sponsors. We collectively refer to this client group as pension fund sponsors.

The Mobius database is sold primarily to sponsors to aid in selecting and monitoring portfolio managers. Managers do not pay to be included in *M-Search*, and Mobius does not provide any consulting services for manager selection or evaluation. A typical use of the Mobius database is to do an initial screening of managers with a certain investment style. The data are provided to Mobius via self-reported manager surveys. While this may cause some concern regarding the quality of the data, management firms do have an incentive to provide Mobius with complete, accurate, and timely information. Managers have an incentive to be complete since *M-Search* screens will exclude a manager from a search if data are missing. They arguably have an incentive to be accurate, since clients may check the data of the managers who make their final screen against alternative sources (e.g., *Nelson's Directory of Investment Managers*, *Pensions and Investments*, private consultants,

etc).[14] Finally, they have an incentive to be timely since Mobius will drop a firm after failing to report returns for three consecutive quarters.

To focus on a set of relatively homogeneous managers, we analyze only active domestic equity managers who invest according to a growth, value, or general equity investment style. As a result, we exclude all non-equity, international, and passive index managers. Investment style is determined as of December 1994, and applied to the historical data for each manager. We use product names and supplementary manager-supplied style information on *M-Search* to assign each pension fund manager to a style category. Using a similar style classification on this same data set, Horan (1998) reports that the Mobius growth and value style categories are consistent with a classification using loadings on the Fama-French book-to-market factor (HML).

Due to data requirements and quality reasons, we impose four additional screens. First, because we use three-year performance measures in our empirical tests we require portfolio returns to be available for three consecutive years. Most pension sponsors and consultants require the existence of a three-year performance track record to be considered in the initial phases of a manager search. Second, we require returns to be total returns, including cash holdings, gross of management fees. We analyze gross returns because they are reported more frequently than net returns, resulting in a larger sample, and because, unlike the mutual fund industry, fees vary considerably by client.[15] Third, we require each set of returns to be the composite of all fully discretionary portfolios managed by the firm in a given style, including the performance of any portfolios terminated during the measurement period. This ensures that the analyzed returns measure the manager's actual performance, as opposed to the performance of a self-selected "representative" composite of his portfolio.[16] Finally, to increase

[14] *Nelson's Directory* is a comprehensive print directory based on the survey responses of approximately 2500 money management firms with U.S. institutional clients, including those firms based outside of the U.S. To check the accuracy of our data, we compared a subsample to numbers presented in *Nelson's directory*. Ninety percent of this subsample either matched exactly or were within 10% of the values reported in *Nelson's*. In addition, Coggin and Trzcinka (1995) report that checks of the Mobius data against the March 1993 PIPER database confirmed the accuracy of the Mobius data.

[15] Other studies of pension fund manager performance such as Lakonishok, Shleifer and Vishny (1992) and Coggin, Fabozzi, and Rahman (1993) also use returns gross of fees. Christopherson, Ferson, and Glassman (1998) conduct their tests using returns gross of fees, and with an estimate of fees subtracted out. As we describe later, our solution to the issue of comparability of mutual fund and pension fund managers is to add back fees and expenses to mutual fund returns to check the robustness of the results.

[16] In most cases, the composite is the market-value weighted average of portfolios managed in a given style. In a few instances, an equally weighted composite was used when market-value weighted composite returns were unavailable.

the precision of our tests we exclude managers that control less than $20 million in tax-exempt assets.[17] These restrictions leave a final sample of 562 pension fund managers from 388 management firms, for a total of 2,461 manager-year observations over the 1987 to 1994 period. These 562 managers control assets that aggregate to $634 billion at the end of 1994, which represents 47% of the 1994 actively managed domestic equity industry assets according to figures from the 1996 *Nelson's Directory*.

Data availability limits us to analyzing only annual measures of flow, which implies that we effectively ignore the short-term dynamics of investment and redemption behavior. However, while managers are clearly affected by daily and weekly flows that require efficient cash management, it is not clear that the overall industry picture that we are studying here would benefit from higher frequency flow measurement. For example, monthly flows are largely due to sponsor-specific cash needs and the desire to rebalance the overall sponsor portfolio, and less likely to be due to the hiring and firing of managers for performance reasons. In addition, most other cross-sectional studies of the flow-performance relation use annual data, so this allows us to better compare our results.

3.2. Mutual fund sample

All data on mutual fund managers are from Morningstar, Inc.'s July 1995 *Mutual Funds OnDisc*. By using the same data availability criteria and screens described above, we arrive at a sample of 483 mutual fund managers in 352 different fund families for a total of 2,676 manager-years. Specifically, we require the funds to be all-equity mutual funds in the growth, value, or domestic equity styles with three years of consecutive returns data. We also exclude funds that are closed to new investors and institutional funds that have investment minimums greater than $25,000. In addition, we exclude the manager-years where the fund merged with another fund, since the flow measures may be distorted.[18] We restrict our sample to annual observations in the period from 1987 to 1994 to be directly comparable to the pension fund sample. Our final sample of 483 managers aggregate to $389 billion at the end of 1994, which represents approximately 55% of the 1994 domestic equity mutual fund industry assets according to figures from the 1996 Mutual Fund Factbook. We use

[17] For example, the standard deviation of percentage flow is 40 times greater in the sample funds with less than $20 million in assets than in the rest of the sample.

[18] We thank Judy Chevalier for providing a list of merged mutual funds and merger dates. We supplemented this list with the list of fund mergers in Wiesenberger to completely cover the 1987-1994 period.

the Morningstar-assigned style code (nine categories broken down by market capitalization and by growth, value, or blend) to classify mutual funds into style categories similar to those in the pension fund sample. As in the pension manager sample, investment style is determined as of December 1994 and applied to the historical data for each manager. Chan, Chen, and Lakonishok (1998) report that the mutual funds in their sample generally had consistent styles over time.

3.3. Potential biases

Our sample of fund managers contains only the firms existing or included in the Mobius or Morningstar databases as of June 1995. If poorly performing firms and/or managers have dropped out of the database during the sample period, this may induce survivorship bias. Several recent studies, including Grinblatt and Titman (1989), Brown and Goetzmann (1995), Malkiel (1995), Carhart (1995), and Elton, Gruber, and Blake (1996), have confirmed the economic significance of survivorship bias in equity mutual fund performance studies. We are not aware of any evidence on survivorship bias in the pension fund segment, but we have reason to believe that it is less prevalent in the data than for the mutual fund segment.[19] More importantly, three studies have confirmed that survivorship bias does not affect inferences on the flow-performance relation. Sirri and Tufano (1998), Chevalier and Ellison (1997), and Goetzmann and Peles (1997) repeat their analyses on samples free of survivorship bias and report no changes in inferences.

Finally, because managers join the databases at different times in their history (i.e., not just when the fund starts up initially), our results may also suffer from back-fill bias. For example, managers may have a greater incentive to volunteer information to Mobius after a period of good performance. Since Mobius began selling its database in 1989, the number of covered manager products has grown by 500%. Again, however, any survivorship or back-fill bias is likely to be less severe in our study of the relation between flow and performance than in a study that attempts to characterize the average performance of fund managers.

3.4. Measures of flow and performance

[19] Not all managers deleted from Mobius are poor performers. According to sources at Mobius, managers are also deleted from the Mobius database when they are successful and closing to new clients, or when they do not find Mobius to be a productive source of client contacts. Also, due to the importance of client contact and servicing discussed in Section 2, poor performance is not the sole reason for a firm to go out of business in the pension fund segment. To assess the potential severity of the survivorship bias in our sample we obtained from Mobius a list of firms deleted in 1995. Of 89 deleted firms we were able to find 71 (80%) listed in *Nelson's 1995 Directory* indicating that they had not gone out of business, but were dropped from the database for other reasons. Of these, 31 (35%) were also listed in *Nelson's 1996 Directory*. Of those with return data for 1993, the 1993 return distribution for the sample and deleted groups are not statistically different.

We analyze three measures of net manager flows. The first is the annual net dollar flow in or out of a fund, defined as the annual change in total net assets minus appreciation.

$$Flow_{it} = TNA_{it} - TNA_{it-1}(1 + R_{it})$$

The second measure, net percentage flow, scales net dollar flow by the total net assets in year t-1 and can be interpreted as an asset growth rate net of appreciation. In robustness checks, we also analyze the percentage change in the number of pension clients as an alternative measure of flow. Client data are useful for studying the more discrete pension fund flows, where gaining or losing one client results in millions of dollars in flow.

While most previous papers in the mutual fund flow-performance literature have analyzed only percentage flows, we focus on the dollar measure. Conceptually, the dollar flow measure more precisely addresses our question of interest, "what drives investment dollars across the two industry segments?" As noted in previous studies, however, percentage flow may be preferable when dollar flow is positively related to fund size, whereby larger funds attract higher flows regardless of performance. While there is indeed a strong positive empirical relation between dollar flows and fund size in the mutual fund segment, the pension fund segment displays the opposite relation. The univariate correlation between fund size and dollar flow is a statistically significant -0.314. Controlling for a potential size effect in a multiple regression format, rather than by scaling the flows, preserves this information for analysis. We address possible reasons behind the different flow-size relation across the industry segments in Section 4.5, and we note in the text any instances where results differ across the two flow measures.

There are many issues that surface when deciding on a set of performance measures to study. The performance evaluation literature is large, and there is considerable debate as to which measures are most appropriate. Since a goal of this paper is to infer which measures are important to clients in each industry segment, we focus on the measures suggested by our study of client characteristics outlined in Section 2. Specifically, measures expected to be important to pension sponsors as a result of their financial sophistication, use of consultants, and potential agency problems include: performance relative to the S&P 500 market benchmark, style-adjusted performance, tracking error, and risk-adjusted measures such as a one-factor Jensen's alpha. Measures expected to be important to mutual fund investors include historical raw returns and summary rankings within their style objective (a proxy for media rankings). All of these performance measures

are annualized, and lagged so as to be observable to the client before a hiring decision is made. The appendix defines these variables.

3.5. Comparative summary statistics

Table 1 contains manager-year statistics that highlight some of the basic similarities and differences across the two segments. The distribution in assets under management indicates skewness in both segments, but there are clearly larger asset pools in the pension manager sample. As mentioned earlier, pension manager flows are expected to be relatively lumpy, as the median number of client accounts is only 14 versus 12,609 for mutual fund managers. Combining these client statistics with the median assets under management in each industry implies that the typical pension client has a $21 million investment with the median manager, while the typical mutual fund client has $13,000.

Comparing the flow distributions provide the first indication that there are interesting differences between the two industries. Although both distributions are centered approximately at zero, the tails appear to be quite different. Consistent with previous studies, the distribution of mutual fund flows appears to be asymmetric. The top 5% experience net inflows nearly three times larger than the outflows at the bottom 5% ($302 million in inflows versus $109 million in outflows). In contrast, the distribution of pension manager flows is more symmetric; the bottom 5% of pension managers actually suffer larger dollar outflows than the top 5% gains, $524 million in outflows versus $400 million in inflows. These statistics, along with the results of Sirri and Tufano (1998) and Chevalier and Ellison (1997), suggest that the shape of the flow-performance relation may differ in the two industries. We explore this possibility in section 5.

Unlike the flow distributions, the distributions of performance measures are similar, especially if returns are measured gross of management fees for both segments (not reported). We also find that the distribution of manager-years in the broad domestic equity, growth and value style categories is roughly similar in both samples. Panels B and C of Table 1 contain pairwise correlation coefficients of our flow and performance variables, estimated separately for each industry segment. The pairwise correlations between performance variables are not high enough to cause concern over multicollinearity problems in our regressions.

4. Relating flow and performance in the two industry segments

In section 2 we argue that differences in the typical client in the mutual fund and pension fund segments imply differences in the relation between flow and performance. In this section, we test for these differences using a linear regression framework relating both dollar and percentage cross-sectional flows, pooled over eight years, to lagged performance measures. In addition to control variables for asset size, fund age, and lagged flow, we include a set of sixteen time-style interaction dummies, one for each year and style combination. For example, V88 = 1 if this observation is a value manager in the year 1988, and 0 otherwise. This specification fits a separate intercept for each year-style category of the data. The time component of the interaction term picks up any cross-sectional correlations in the observations due to differing average flows across sample years. The style component adjusts for the fact that in any given year, growth funds may experience average flow that is significantly different from that of value funds, or of general equity `funds. Combining the time and style components adjusts for both of these potential effects. Including this set of interaction terms reduces this source of correlation in the residuals, mitigates bias, and increases the precision of our estimated coefficients. Several of the interaction term dummies are significant in all specifications, suggesting that the correction is necessary. In addition, all t-statistics reported in the tables are based on a correction for heteroskedasticity using the method of White (1980).

Our hypotheses regarding the expected differences between the flow-performance relation in the two industry segments imply that some variables should be significant determinants of flow in only one segment (e.g., tracking error in the pension segment). We therefore estimate the flow-performance regressions separately for each segment, and compare the relations across the two segments. For completeness, we also report in the tables the results of t-tests comparing the magnitudes of the estimated coefficients across the segments. In general the t-test results confirm the significance analysis, and as a result, we discuss them only when the results require explanation. We also conduct numerous robustness checks of the data.[20] For simplicity we report only the results of the robustness checks that affect our inferences. Thus, all other results can be assumed to be robust to alternative specifications.

[20] We repeated our tests using mutual fund returns gross of management fees and expenses (adding annual fees and expenses back in to annual returns and annual alphas.) For the pension fund sample, we repeated all tests using the percentage change in number of clients as the dependent variable flow measure. We also repeated our tests after first eliminating the largest 10% of both samples in asset size; we also analyzed the sample after removing the smallest managers in asset size (<$250 million in assets). Finally, we repeated our tests using style-specific (growth, value, and generic domestic equity) benchmarks instead of only the generic S&P500 benchmark.

We begin with an analysis of the relative financial sophistication of the two client groups. Next, we consider the role of performance benchmarks in each industry. Finally, we explore whether the lack of punishment for poor performance documented for mutual funds extends to the pension fund segment. This has particular importance for determining the impact of flow on managerial incentives.

4.1. Which type of performance matters?

Given the relative financial sophistication of pension sponsors, we expect to find that risk-adjusted performance measures are significantly related to pension manager flow. Similarly, consistent with previous research, we expect to observe that unadjusted raw returns explain mutual fund manager flow. We begin our analysis with a parsimonious test of this hypothesis that will also allow for comparison with the results in previous flow-performance studies of mutual funds. Specifically, for each industry segment we regress flows on lagged returns, one-factor Jensen's alpha, and tracking error, pooling eight years of cross-sectional data from 1987-1994. These regressions also include control variables for asset size, lagged flow, fund age, and time-style interaction dummies (not reported). Table 2 contains the results of regressions for both dollar and percentage flows for each industry segment.

Overall, the results in Table 2 provide mixed support for our hypothesis. In the pension fund segment, both alpha and tracking error have the predicted relation with flows. Specifically, the significant coefficients on Jensen's alpha indicate that pension sponsors reward 1% higher alpha performance with an additional $12.7 million in net dollar flow, or 2.3% additional net asset growth. In addition, the coefficients on tracking error are negative and significant in both the dollar and percentage flow regressions. The signs and significance of these coefficients are consistent with a sophisticated pension fund clientele. We would not expect tracking error to be important to mutual fund investors, which is consistent with what we find.

Contrary to our predictions, lagged raw return is significantly related to pension fund manager flow, and Jensen's alpha is significantly related to mutual fund manager flow. These results indicate that both unadjusted and risk-adjusted returns are related to manager flow in both segments. While this appears inconsistent with our hypothesis, this test may be too simplistic to draw conclusions. For example, the significance of raw returns for pension managers may be due to the high correlation between lagged return and lagged return in excess of a market benchmark. Similarly, the importance of Jensen's alpha to mutual fund investors may be due to a

correlation with summary ranking measures, such as Morningstar star ratings. We provide some evidence supporting these conjectures in the next sections.

4.2. Do market benchmarks matter?

We argue in Section 2 that performance relative to a benchmark is important to relatively sophisticated pension clients, but not to mutual fund investors. To test this we use the S&P 500 as the market benchmark for several reasons. First, industry surveys indicate that 47.1% of pension fund managers actually use the S&P500 as their primary benchmark, while anecdotal evidence and the practitioner literature suggests its use is even more widespread.[21] Second, at the expense of dispersion among style categories, we study only three broad style groups to preserve comparability across segments and focus on clientele differences. While we expect pension sponsors to evaluate managers according to a style-specific benchmark (e.g., small-cap value), we do not have information on the actual style benchmark sponsors use to evaluate any of our managers. However, 40% of our pension sample manager-years are in the generic domestic equity objective, and thus the style-specific and generic (S&P 500) benchmarks coincide for a significant portion of our sample. In addition, the annual frequency of our data makes it particularly difficult to distinguish the importance of style-specific benchmarks from the S&P500 due to the high correlation of annual benchmark returns.[22]

Table 3 panels A and B present the results of regressions designed to test the importance of outperformance of a benchmark in the two industry segments. We make several changes from the specification in Table 2 in order to investigate two issues. First, we wish to test whether flow is affected by the level of performance relative to the S&P 500 (excess returns), or by the discrete event of beating the benchmark. Second, to test for the asymmetric effects of good and poor performance suggested in earlier research, we estimate the effects of the performance variables separately for managers with returns both above and below the S&P 500 Index. We do this by creating two dummy variables: OUTP equals 1 if a manager observation outperformed the S&P500, and equals zero otherwise; UNDERP equals 1 if a manager underperformed the S&P500, and equals zero otherwise. We then interact these dummies with the continuous performance measurement variables to arrive at the following specification:

[21] *Nelson's 1998 Survey of Performance Benchmarks*

$$Flow_t^i = b_0 + b_1 OUTP + b_2 OUTP * Z_t^i + b_3 UNDERP * Z_t^i + b_4 TS_t^i + b_5 C_t^i + e_t^i$$

where Z_t^i is a vector of performance variables, TS_t^i is a vector of time-style dummy interactions, and C_t^i is a vector of control variables. In this setting, the additional flow from outperformance of the S&P 500, conditional on other performance and control variables, is estimated by b_1. The additional flow attributable to performance measures conditional on whether or not the manager outperformed the S&P 500 is estimated by b_2 and b_3, for outperforming and underperforming managers respectively. This methodology is equivalent to running two separate regressions for the outperforming and underperforming subsamples of managers, with the restriction that coefficients on control variables and time-style dummies are identical across the subsamples.

The regressions in Table 3 Panel A support the hypothesis that outperformance of a benchmark is a discrete event for pension managers. The coefficient on the outperformance dummy is both statistically and economically significant. Irrespective of the magnitude of the outperformance, beating a benchmark attracts an additional $165.54 million to the average pension manager and boosts his asset growth rate by 20 percentage points. The insignificant coefficients on excess returns further support the idea that beating a benchmark is an important, but discrete event. Since the specification in Table 3 effectively separates the sample according to whether the manager outperformed the S&P 500, the insignificance of excess returns reveals that, within each of these subsamples, there is no significant relation between flow and the *magnitude* of a manager's raw return. Thus, these results suggest that the anomalous significance of raw return in the pension fund regression of Table 2 may be due to a "benchmark effect".

The significance of beating a benchmark has at least two interpretations. First, the importance of agency relationships implies that sponsors may prefer a manager that outperforms his benchmark because it is easier to justify his hire to superiors. In other words, beating a benchmark may provide validation of skill. Alternatively, since the pension manager hiring process typically involves several stages including an initial performance screen that narrows the available choices to an acceptable set, it may be that beating a benchmark elevates the manager to a pool of potential hires. Both explanations imply that pension managers who outperform their benchmark will have higher average flow, all else equal.

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[22] We have also run our specifications substituting style-adjusted performance measures (alphas, tracking errors, excess returns and outperformance of a style benchmark). The results look similar to those reported using the S&P500.

The lack of quantitative sophistication or agency relationships implies that mutual fund flow is unrelated to a manager's performance relative to a benchmark. However, since return in excess of a benchmark is highly correlated with raw return performance (perfectly correlated in each cross-section), we expect excess returns to be significantly related to mutual fund flows. We find no reason to suspect, however, that the mere presence of outperformance acts as a discrete event affecting mutual fund flows. Table 3 Panel B presents mixed evidence related to this issue. The coefficient on OUTP is significantly positive for dollar flow, but insignificantly different from zero for percentage flow. In contrast to pension managers, the magnitude of the outperformance is a significant determinant of flow. The estimated coefficients on excess returns are highly significantly positive, and similar in magnitude for excess returns both above and below the benchmark. After conducting additional diagnostics, we conclude that there is a weak positive effect on mutual fund flow associated with the event of outperformance of the benchmark, and a much stronger positive effect associated with the magnitude of the outperformance.[23] Overall, we find that beating a market benchmark is a significant, discrete event only in the pension segment.

4.3. The role of Jensen's alpha in explaining flow in the two industries

Table 2 showed that Jensen's alpha is significantly positively related to flow in both segments, a result seemingly inconsistent with differences in financial sophistication across the two clienteles. Additional evidence in Table 3 sheds light on this puzzling result by highlighting the differences in symmetry for managers performing above and below the S&P 500 Index in the two segments. Panel A shows that the relation between pension manager flow and Jensen's alpha is positive, highly statistically significant, and approximately symmetric across good and bad performance. Specifically, an additional 1% of alpha performance implies approximately an additional 2% growth rate for pension managers performing both above and below the S&P 500.[24] The dollar flow regression also indicates a positive relation with alpha, but the coefficient on alpha performance below the

[23] We do find that the coefficients on excess returns in the pension fund and mutual fund regressions are not significantly different from each other. This may not be surprising, however, in light of the large standard errors on the pension fund coefficients. Similar mixed results on the significance of OUTP for mutual funds occur in robustness checks where we delete small funds, large funds, and add back expenses. The significance of outperforming a benchmark may also be driven by the popularity of mutual fund "select lists."

[24] We find a very similar result when we use the same specification for a regression of flow measured by growth in the number of clients. Specifically, an additional 1% of alpha performance implies an additional 3% client growth rate for pension managers both above and below the S&P 500.

S&P 500 is more than twice as large than the one above the S&P 500. However, this is driven by the largest 10% of pension managers since the coefficients also display symmetry when these managers are deleted.

Panel B shows that the symmetric impact of alpha in the pension industry does not extend to the mutual fund industry. For example, in the percentage flow regression, the coefficient on alpha is three times larger in the subsample of funds outperforming the S&P 500 than in the underperforming subsample. Alpha performance apparently contributes positively and significantly to fund flows primarily when mutual fund managers outperform the S&P 500, and do not seem to matter much for managers that underperform.[25] This result suggests that the anomalous importance of alpha in the mutual fund segment documented in Table 2 appears to be primarily driven by the huge impact of alpha at the top end of the mutual fund alpha distribution.

The statistical significance of a risk-adjusted performance measure in explaining mutual fund flow is also reported in Sirri and Tufano (1998) and Gruber (1996). Both studies report a significant relation between mutual fund flow and Jensen's alpha, even after controlling for other performance measures. Furthermore, Sirri and Tufano report a significantly higher coefficient in the top quintile of alpha performance relative to the other quintiles, but provide little explanation for this result. Our focus on client sophistication posits that the importance of Jensen's alpha to mutual fund investors is an anomaly and prompts us to investigate it further.

One way to reconcile the lack of sophistication on the part of mutual fund investors with the significance of a risk-adjusted measure such as Jensen's alpha is to explore its relation with a commonly used summary ranking measure—Morningstar's coveted star rating. For 1994, the only year for which we have star ratings data, the correlation between stars and Jensen's alpha is 0.51. Furthermore, there is a much higher correlation of stars and alpha for funds outperforming the S&P 500 than for those underperforming (0.48 versus 0.16), suggesting that alpha is a better proxy for stars within this group. Thus, the highly asymmetric importance of alpha reported in Table 3 panel B supports the idea that star ratings may be driving the relation between flow and alpha.

To investigate this further, we add the Morningstar star rating as an additional right hand side performance variable to the regression specification of Table 2. Specifically, Table 4 contains the results of both dollar and percentage 1994 flow regressions with alpha, lagged return, tracking error, and star rating as

[25] The perverse negative coefficient on alpha for underperforming managers in the dollar flow regression is being driven by the smallest mutual fund managers in our sample. When we delete managers with less than $250 million in assets, the coefficient becomes insignificant. Overall, the importance of alpha for underperforming mutual funds is minimal.

regressors.[26] Consistent with anecdotal evidence, the impact on mutual fund flow appears to be economically significant as an additional star implies a higher growth rate of 17 percentage points, and additional dollar flow of $34.6 million. While alpha is not statistically significant in either dollar flow specification, in the percentage flow regression we find that the coefficient on alpha is no longer statistically significant when the star rating is added to the regression. The effect of alpha appears to be subsumed by Morningstar's star rating, which we interpret as evidence that the anomalous importance of risk-adjusted performance measures may be the result of a correlation with influential summary ranking measures.

4.4. Evidence on the importance of agency relationships in the pension industry segment

In Section 2, we argue that pension sponsor agency problems may underlie many aspects of the manager selection process in the pension segment. While we cannot offer one direct test for the presence of agency problems, three empirical results are collectively consistent with such an interpretation. Agency problems imply that sponsors value manager characteristics that reduce a corporate treasurer's job risk. In the last section we argued that the importance of outperforming a benchmark in determining pension manager flow might be due to a need for sponsors to have concrete validation of their choice of manager. In this section, we discuss agency interpretations of two other results.

First, tracking error may serve as a sponsor safety indicator since it measures a manager's deviation over time from a passive market benchmark. Managers with low tracking error may be considered safe choices because they are unlikely to perform very differently than the passive benchmark. Directing flow away from high tracking error managers suggests that sponsors desire to avoid bad surprises at the cost of forgoing the possibility of good surprises. The results in Table 2 support the expected negative relation between pension manager flow and tracking error. Table 3 sharpens the picture by indicating that tracking error is punished significantly for pension fund managers that outperform the S&P 500, and not for those who underperform. This implies that underperformance of the benchmark leads to the ultimate penalty of either loss of clients and flow,

[26] Ideally we would use star ratings for each year of our panel 1987-1994. However, this is not possible since many years of our sample period pre-date the availability of star ratings in electronic CD or floppy disk form. Historical star ratings are also not available from Morningstar Inc directly since Morningstar applies any changes in star rating algorithms to all previous periods, and hence the ratings available from them would not match the ratings available to investors in that previous time period. In a separate study, we are investigating the relation between mutual fund flow and star ratings from 1996 to 1999, a period over which the same rating algorithm was used throughout.

or being removed from the pool of potential hires. In other words, tracking error is not as relevant for underperforming managers since the underperformance itself dominates the decision to retain or hire the manager. Under either a sophistication or agency interpretation, tracking error should not matter to mutual fund investors, which is consistent with what we find in Tables 2 and 3.

Second, the strength of the relation between quantitative performance measures and manager flow also has an agency interpretation. If non-performance manager characteristics such as reputation and personality serve to validate the selection of managers, then the relation between flow and performance should be weaker in the pension fund segment than in the mutual fund segment. The first row of Table 5 shows that with the same right hand side performance variables, the mutual fund regression adjusted R^2 estimates are nearly three times higher than the comparable pension fund estimates. Performance variables alone explain only 2% of the cross-sectional variation in pension fund dollar flows and only 5.6% of the variation in percentage flows. The importance of client servicing in the pension fund industry and the fact that performance measures are often used for screening purposes only, are both consistent with this result. Other potential reasons, however, for the relatively weak statistical relation between pension flow and performance variables include noise introduced by the liquidity needs of clients, differing investment horizons, or data quality issues.

4.5. The role of non-performance variables in explaining flow

Non-performance control variables, such as asset size and lagged flow have not received much attention in the mutual fund flow-performance literature. Differences in the importance of these variables across the segments offer interesting insights into the inner workings of the industry and, as we will argue in Section 6, have implications for managerial incentives. Table 5 reports the proportion of flow explained solely by non-performance control variables in the two segments. As a group, these variables appear to be very important in explaining flow, with adjusted R^2 coefficients comparable to, or exceeding, the explanatory power of performance variables. Panel B reports the estimated coefficients from these regressions in the two segments.

Differences in the autocorrelation of flows are economically significant and highly robust. Mutual fund flows are highly autocorrelated, while pension fund flows display little to no autocorrelation. For example, the last line of Panel A shows that lagged flows explain a negligible amount of the variation in pension dollar flows, while they explain nearly half of the cross-sectional variation in mutual fund dollar flows. This implies that on

average mutual funds that have attracted a high level of dollar flow, or a high asset growth rate, will continue to do so in the future, all else equal. There is no such expectation for pension fund managers.

One explanation for the difference in autocorrelation is that there is some "herding" toward specific managers in the mutual fund segment, but not in the pension segment. Alternatively, this difference may be related to how managers are chosen and monitored over time in the two segments. Survey evidence shows that most mutual fund investors are saving for retirement, holding funds for relatively long periods, and are net contributors to their mutual fund accounts. Anecdotally, mutual fund investors tend to choose a fund, and then continue to invest automatically for a number of years without much further scrutiny. If true, this effect would be amplified by the growth in defined contribution (401k) plans that typically lock investors into a menu of funds or complexes.[27] In contrast, pension fund sponsors are not net contributors to their accounts, rebalance their portfolios regularly, and are purported to be more vigilant monitors, and so will not be shuttling money to the same managers year after year.

If 401k participant behavior is related to the mutual fund flow autocorrelations, we might expect the autocorrelations to be higher for funds with a large amount of 401k business. To test this, we supplement our data with *Pensions and Investments*' annual listing of the fifty funds with the largest 401k assets under management.[28] We find that, on average, mutual funds attracting the most 401k dollars exhibit a higher correlation between flow and lagged flow than the rest of the sample (not reported). In addition, within this sample of funds with a large amount of 401k business, a fund's correlation coefficient between flow and lagged flow is significantly positively related to the percentage of fund assets from 401k accounts. Thus, the limited menu of choices typical of 401k plans, together with mechanical investment behavior on the part of participants, may underlie the positive autocorrelation in this segment.

There are also significant differences in the relation between flow and asset size in the two segments. The pension fund coefficients on asset size are negative, significant, and highly robust to alternative specifications for both dollar and percentage flow. This indicates that pension managers that manage a large amount of assets receive less flow and grow less quickly, all else equal. The mutual fund coefficients on asset size indicate that managers attract flow approximately in proportion to their size. Thus, while large mutual fund managers

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[27] Gruber (1996) conjectures that constraints on choices in retirement accounts contribute to autocorrelated flows in the mutual fund industry. He also argues that the autocorrelation in flows may reflect unobservable differences in fund reputation and services, or marketing effort.

[28] *Pensions and Investments* magazine annual special report on mutual funds (2/8/93 p. 17, 2/7/94 p. 13, 3/6/95 p. 17).

experience statistically significant higher dollar flow, large pension fund managers actually attract fewer dollars. In fact, the largest 10% of pension fund managers in our sample experience large outflows while the largest 10% of mutual fund managers experience large inflows.

The highly robust negative relation between pension manager asset size and flow may also be driven by client behavior. For example, pension sponsors may believe that managers with large assets under management will be unable to provide the level of service and personal attention individual sponsors require. Thus, the importance of agency relationships and client servicing may drive the negative relation between flow and asset size, inducing either clients to avoid large managers, or managers to stop taking clients above some threshold. Alternatively, decreasing returns to scale may be driven by performance considerations. It may be more difficult for managers to post good performance when assets under management grow too large due to price pressure when buying and selling stocks. Pension fund sponsors may be aware of this indirect effect of size on performance and steer money away from large managers.

5. Do pension fund sponsors punish poor performance with outflows?

Sirri and Tufano (1998) document that the flow-performance relation in the mutual fund industry is highly convex. They conclude, "Mutual fund consumers chase returns, flocking to funds with the highest recent returns, though failing to flee from poor performers (p. 1590)." In other words, managers appear to receive large rewards in terms of increased flow for posting high returns, and little punishment even for severe underperformance. This convexity of the flow-performance relation in the mutual fund industry has spawned a growing literature including Chevalier and Ellison (1997), Brown, Harlow, and Starks (1996), Busse (1998), Koski and Pontiff (1999), Karceski (1999), and Chen and Pennachi (1999), some of which we discuss in the next section. Adding pension fund manager data not only allows for a test of convexity on a new set of managers, but also is an interesting test of client differences. Because pension sponsors are hypothesized to be more vigilant and sophisticated monitors, we expect the shape of the flow-performance relation to be significantly different from mutual funds.[29] Specifically, we expect pension sponsors to withdraw assets from poorly performing managers, and not to flock to last year's winners.

[29] We interpret the lack of punishment for poor performance among mutual funds as indicative of a lack of sophistication or vigilance among individual investors. Tax considerations provide an alternative to this interpretation, since taxable mutual fund investors might not liquidate poorly performing funds to avoid realizing taxable capital gains. Recent work by

We first present evidence on convexity in the relation between flow and performance in the form of the graphs depicted in Figures 1 through 4. Our methodology differs somewhat from that of Sirri and Tufano (1998)'s Figure 1, which is a univariate plot of the relation between lagged return ranking and percentage flow. Since we have shown that other performance and control variables are important, we use a multivariate framework in creating the data for our graphs. Specifically, we rank managers by style objective and year to form deciles according to a performance measure, either Jensen's alpha or lagged return. We then run a piecewise linear regression over these deciles, while controlling for all variables included in the regression of Table 2.[30] For example, to create Figure 1 depicting the relation between lagged return percentile ranking and percentage flow, we first estimate coefficients on the lagged return deciles while controlling for alpha, tracking error, asset size, etc. We then substitute average values for all included variables into the estimated regression equation. Thus, Figure 1 depicts the relation between expected flow and lagged return ranking for the average manager observation. These figures sharpen the analysis in the tables by allowing for non-linear relations between flow and the measures of performance.

Figure 1 displays the familiar convexity result for the mutual fund industry. Top performing mutual funds have large growth rates and poor performers have small, but positive growth rates. Figure 2 depicts the analogous results for alpha performance deciles and looks quite similar to Figure 1. The top 10% of mutual fund managers ranked by lagged return performance, and the top 20% of managers ranked by alpha performance attract disproportionate amounts of flow. Compared to mutual funds, the flow-performance relation for pension funds appears much less convex. Larger percentage growth rates start with funds above the 60th percentile according to either performance measure, and flow is relatively more symmetric around zero across good and bad performance. For example, pension managers appear to experience asset shrinkage when among the bottom 20% of alpha performers.[31]

Bergstresser and Poterba (1999), who study fund inflows and outflows separately, provides some weak evidence in support of this view. Although they find a significant negative relation between fund outflows and unrealized capital gains, tax and performance variables explain only 2% of the variation in outflows. Interestingly, they find that most of the explanatory power for the net version of flows studied in this literature comes from the strong relation between tax and performance variables and *inflows*.

[30] We also tested a model with decile dummies that allow for the intercept to change across deciles. The decile dummies were insignificantly different from zero, so we dropped them from the final specification. We also repeated the analysis using quintile and quartile specifications and find the deciles to be the most illustrative.

[31] This result is strengthened if we delete the largest managers (the top 10% of managers ranked by asset size) suggesting that the result is not merely a case of large funds losing assets.

Several interesting comparisons emerge when we repeat the analysis for dollar flows. Figure 3 shows a weakly convex pattern for mutual fund flows, with poor performers experiencing low dollar flow, and managers above the 80th return percentile experiencing higher dollar flow. A "lack of punishment" view is still evident for mutual funds since poorly performing managers show small, but positive, inflows rather than outflows.[32] The interesting contrast is for the pension fund sample. The relation between dollar flow and performance in this industry appears linear, with poor performers losing assets and top performers gaining assets. This is consistent with our results in Table 2, where we do not include a dummy variable for outperformance of the S&P500. Both the linear shape of this relation and the dollar outflows for poor performance are robust to repeating the analysis on various subsamples of the data suggesting that pension sponsors do punish managers of poorly performing funds by withdrawing assets.[33]

Figure 4 aids in interpreting the results of Table 3 Panel A as evidence of punishment. Specifically, this table shows that the coefficient on alpha is significantly positive for both managers that performed above and below the S&P 500. Moreover, a significantly positive coefficient on alpha is robust to an analysis of the percentage change in the number of clients (client growth). This implies that higher alpha always increases dollar flow, percentage flow, and client growth. Figure 4 tells us that this result is not just a relative flow result; poor alpha performance results in outflows and asset shrinkage. To confirm this, we analyzed the subset of managers that underperformed the S&P 500 and divided this sample into the bottom-third and top-third alpha performers. On average the low alpha group lost 3.6 clients while the top alpha group gained 0.4 clients. As a group, the low alpha group experienced a net loss of 1,951 clients while the high alpha group experienced a net gain of 152 clients.

6. Implications for managerial incentives and risk shifting

Our empirical findings have implications for the incentives facing fund managers. Two recent papers have tested one dimension of managerial incentives that derive from the flow-performance relation—the

[32] Low dollar growth, and therefore a low growth rate, may possibly be interpreted as punishment since these funds would clearly be growing at a rate below the mutual fund industry during our sample period. Nevertheless, the interpretation in the literature has been to equate punishment with outflows.

[33] Specifically, the mutual fund and pension fund graphs respectively look very similar when we delete the top 10% of mutual and pension managers ranked by asset size. In addition, we repeated the test on managers with $250 million or greater in assets to have comparably sized managers for the mutual fund and pension fund samples. These graphs also do not appear materially different.

alteration of risk over the course of the year. Brown, Harlow and Starks (1996) and Chevalier and Ellison (1997) use the convexity of the flow-performance relation as the fundamental feature of the tournament played by mutual fund managers seeking to attract assets. Specifically, given the observed lack of punishment for poor performance in conjunction with large flow gains for top performers, fund managers have an implicit incentive to alter the risk of their portfolios to maximize the payoffs from this implicit contract. These authors find evidence that mutual fund managers indeed respond to these implicit incentives and systematically alter the riskiness of their portfolios during the last part of the year.[34] Do pension fund managers have the same incentive to risk-shift? In this section we argue that the body of empirical evidence on the implicit and explicit incentives facing pension managers suggests that they do not.

While the risk-shifting literature has focused on the implicit incentive derived from the shape of the flow-performance relation, portfolio manager behavior is clearly also influenced by any explicit incentives, such as contractual performance-based compensation. A further complication in this industry is that the observable contractual arrangements are between the management firm and client, rather than between the management firm and individual portfolio managers. Thus, while explicit performance-related incentives surely have the power to influence portfolio manager behavior, the exact nature of these individual incentives is generally unobservable. Aggregate data sources, however, suggest that these explicit incentives do not generally differ across the pension and mutual fund segments.

The typical fee contract in both industry segments is a percentage of assets under management, without an explicit performance component. Only 2.3% of mutual funds and 24.5% of pension fund sponsors use performance-based fee contracts with their management firms.[35] While we cannot speak directly to the explicit manager incentives provided by their employment contracts, surveys suggest that portfolio manager compensation in both segments is commonly tied to firm-wide performance and asset-generation in addition to, or instead of, portfolio return performance.[36] Other common components of manager compensation, such as equity stakes, also serve to align the interests of portfolio managers and management firms toward the goal of

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[34] Note that the empirical identification of risk-shifting behavior is somewhat controversial. Busse (1998) and Koski and Pontiff (1998) argue that the empirical relation between performance and risk are driven by methodology or mechanically by flows, and is not the result of incentives. Chen and Pennachi (1999) provide an alternative test based on tracking error.

[35] See Ackermann (1997) Table 1 and *Institutional Investor* PensionForum November 1997, p. 59.

[36] According to the 1999 Investment Management Compensation Survey (AIMR) 57% of surveyed portfolio managers have bonuses tied to firm-wide business performance, while 66% reported a bonus tied to individual portfolio performance (not mutually exclusive categories).

attracting assets. In addition, Khorana (1996) finds that the probability of termination for a fund manager is significantly negatively related to recent flow measured versus other funds with the same objective. For these reasons, we conclude that the explicit incentives of managers generally reinforce the implicit incentives from the flow-performance relation. We now turn to the implicit incentives of pension managers.

Figures 1 through 4 in the previous section show that the shape of the flow-performance relation in the pension segment materially differs from that of mutual funds. Specifically, we find that pension fund managers risk losing a significant amount of flow if they take on diversifiable risk that does not pay off, but instead result in low returns. Increasing systematic risk is a similarly unattractive strategy since we find that outflows result from poor market risk-adjusted performance. In contrast to mutual funds, there is no disproportionate reward of increased flow for being at the very top of the performance distribution.

The relatively weak statistical relation between performance variables and flow documented in Table 5 also weakens any performance-based incentives present for pension fund managers. With only 2% of the variation in dollar flows explained by performance, managers do not have a large incentive to pursue any effort intensive policies in an attempt to post good performance numbers. The unobservable, qualitative manager characteristics that dominate the attraction of clients and assets likely motivate managers to excel along these dimensions. Manager actions that fit this category include increasing client services, such as the timeliness of reporting, and increasing personal contact with clients.[37]

The high level of monitoring common in the pension industry provides another disincentive for taking on idiosyncratic risk in the hopes of winning the yearly tournament for assets. Anecdotal and survey evidence suggest that sponsors and their hired consultants monitor their managers closely once hired, including checks on whether the manager has deviated from his investment philosophy or style. It is not uncommon to dismiss a manager for failing to stay within their investment guidelines, even when their performance is strong. Consistent with this, according to a Greenwich Associates survey of sponsors terminating a manager in 1994, 26% reported doing so for violation of a specific investment restriction. In sum, the linear and symmetric relation between flow and performance, the relative importance of non-performance manager characteristics, and the explicit punishment for deviating from investment policies, implies little incentive for pension managers to risk-shift.

[37] Nelson/Wilshire Survey on Plan Sponsor Attitudes Toward Investment Manager Client Servicing, June 1997, http://www.nelnet.com.

Finally, the highly robust difference in the autocorrelation of pension and mutual fund flows has implications for managerial incentives. The lack of autocorrelation for pension managers implies that they face independent yearly tournaments to perform well and attract new business. In contrast, high positive autocorrelation in mutual fund flows implies that good performance in the current year translates into higher flow next year, and in future years as well. Thus, high autocorrelation may strengthen mutual fund managers' incentives to pursue portfolio strategies that post high returns or Morningstar ratings. On the other hand, a steady stream of flow may provide a manager with a cushion, and therefore may reduce his incentive to undertake effort-intensive portfolio strategies.[38] The opposing effects on incentives are not necessarily contradictory, but rather imply that fund managers face different incentives at different stages in the life of the fund. Consistent with this, the empirical risk-shifting literature incorporates the age and size of the funds in their analysis. We point out that these fund attributes are positively related to a possibly more fundamental driver of incentives, the autocorrelation in flow.

7. Conclusion

We document empirical differences in the flow-performance relation across the mutual fund and pension fund industry segments that suggest that these managers operate in fundamentally different environments. In order to attract additional assets under management pension fund managers must exhibit a positive Jensen's alpha and low tracking error. Although lagged raw return initially appears to be an important determinant of pension manager flow, further analysis in Table 3 reveals that this is explained by the presence of a benchmark effect whereby outperformance of a benchmark index drives flow. While tracking error does not appear to be a concern for mutual fund managers, we find a strong relation between mutual fund manager flow and both raw returns and Jensen's alpha. The importance of a risk-adjusted performance measure appears anomalous in light of a relatively unsophisticated mutual fund client base. However, Table 4 shows that the relation between alpha and flow is subsumed by a popular summary performance measure, Morningstar star ratings. Overall, we find supportive evidence that differences in the flow-performance relations are related to client differences across the retail mutual fund and fiduciary pension fund segments.

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[38] This may be especially true for fund managers that cater to the 401K market. According to *Business Week*, Stephen R. Petersen, portfolio manager of the $9 Billion Fidelity Equity-Income fund, estimates that 75% of the monthly inflows to his fund come from retirement plans. This steady source of flow has allowed him to operate with fewer cash holdings since "I don't get wild swings in cash flows or redemptions." (*Business Week*, 7/24/95, p. 76, "What's Pumping Up Mutual Funds")

The results also paint an intriguing picture of the tournament structures under which managers make portfolio decisions. The figures illustrate striking differences in the degree to which clients punish poorly performing managers by withdrawing assets. In contrast to mutual fund investors, pension fund sponsors punish poorly performing managers by withdrawing assets under management. Recent literature focuses on the incentive of mutual fund managers to alter the risk of their portfolios over time depending on their performance relative to their peers. Our evidence suggests that pension managers do not have a strong incentive to engage in such risk-shifting, but a direct test for this behavior is necessary to resolve this issue. The contrast in incentives across the two industry segments may lead to more powerful theories and tests of their effect on managerial behavior, perhaps building on recent contributions by Admati and Pfleiderer (1997), Chen and Pennachi (1999), and Cuoco and Kaniel (1998).

There is much work left to be done in understanding the money management industry. The explanation underlying the observed negative relation between pension manager flow and asset size is unresolved. Goetzmann, Ingersoll and Ross (1998) interpret the same negative relation in the hedge fund industry from a supply-side perspective. They argue that managers of large hedge funds are unwilling to accept new clients due to the decreasing returns to scale feature of arbitrage strategies. We suggest an alternative, demand-side interpretation. It may be that investors consciously avoid large managers since they do not provide the desired level of servicing or return performance.

Through our comparative study design we uncovered some issues in the mutual fund segment that also deserve further study. Our comparison with the pension segment led us to identify the significance of Jensen's alpha to mutual fund investors as an anomaly, and the high degree of autocorrelation in mutual fund flows as unique to this segment. We provide some preliminary evidence that these phenomena are related to behavior specific to mutual fund investors, such as a reliance on widely-available summary ranking measures, and a tendency to shuttle money to the same funds year after year without further scrutiny beyond the initial decision. Our results suggest that these two influences are likely to significantly affect mutual fund flows, and as a result, managerial incentives.

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Appendix: Description of Variables Used in the Regressions

Variable	Description
Annual Dollar Flow	The annual net flow in or out of a fund, where net flow is defined as the annual change in total net assets minus the appreciation in the funds assets. Assumes cash flow occurs at the end of the year. $F_{it} = TNA_{it} - TNA_{it-1}(1 + R_{it})$
Annual Percentage Flow	The annual net flow as a percentage of the total net assets of the fund at the beginning of the year.
Annual Percentage Change in Number of Clients	The number of clients in year t minus the number of clients in year t-1, divided by the number of clients in year t-1.
Lagged return	Total annual return including reinvested dividends and capital gains, lagged one year. For mutual fund managers, the returns are net of management fees and expenses, but gross of any load charges. For pension fund managers, the returns are net of expenses but gross of management fees.
Jensen's alpha	The annualized alpha observable at the beginning of the year in which the flow is measured. This measure is computed over the previous three-year period using quarterly returns for pension funds and monthly returns for mutual funds, and then annualized.
Excess Return	Total annual return minus the return on the S&P 500 Index, lagged one year.
Tracking error	Tracking error is the annualized standard deviation of the residuals from a market model regression of portfolio excess returns (versus the risk-free rate) on the excess S&P500 return. This measure is computed over the previous three year period, using quarterly returns for pension funds and monthly returns for mutual funds, and then annualized.
Dummy = 1 if outperformed the S&P500	Dummy equals one if the lagged annual return is higher than the S&P500 return over the same period. Otherwise the dummy equals zero.
Asset size	Total assets of the fund at the beginning of the year in which flow is measured (TNA_{it-1}).
Length of track record (age)	The number of years of previous consecutive returns.

Table 1. Summary statistics of performance and non-performance manager characteristics in the 1987-1994 sample period.

Panel A. The 95th through 5th Percentiles in the pension fund manager and mutual fund manager distributions

This panel contains the distribution of manager characteristics in the pension fund and mutual fund industry segments over all manager-years used in the analysis of Tables 2-4. The pension fund data is from the June 1995 *M-Search Database*, distributed by Mobius, Inc. The mutual fund database is from the July 1995 *Mutual Funds OnDisc* CD distributed by Morningstar, Inc. These managers are from the actively managed domestic equity, domestic growth, and domestic value style categories only. There are 2,461 manager-years in the pension sample and 2,676 manager-years in the mutual fund sample. There are 562 individual pension managers and 483 individual mutual fund managers. All flow and performance variables are on an annual basis and are defined in the Appendix. Due to a lack of pension fund fee data, pension manager returns are gross of management fees, while the mutual fund manager returns are net of management fees and expenses.

	Pension fund manager distribution					Mutual fund manager distribution				
	95th	75th	Median	25th	5th	95th	75th	Median	25th	5th
Assets under management in $millions (asset size)	4465	936.5	299	102	29.5	2060.1	492.9	167.9	66.12	26.5
Number of clients	116	34	14	6	1	214332*	42613*	12609*	2562*	168*
Flow measures:										
Dollar flow ($millions)	399.76	57.35	0.61	-50.49	-523.61	301.62	26.00	-1.74	-19.59	-108.95
Percentage flow	1.104	0.213	0.004	-0.143	-0.490	0.825	0.152	-0.018	-0.112	-0.273
Percentage change in number of clients	1.00	0.25	0.021	-0.043	-0.344	N/A	N/A	N/A	N/A	N/A
Performance measures:										
Annual returns	0.451	0.256	0.151	0.064	-0.057	0.420	0.228	0.132	0.047	-0.076
Jensen's alpha	0.094	0.034	0.006	-0.018	-0.063	0.088	0.020	-0.006	-0.033	-0.085
Tracking error	0.143	0.084	0.058	0.041	0.023	0.129	0.085	0.060	0.043	0.028
Excess return (S&P500)	0.190	0.067	0.015	-0.033	-0.111	0.167	0.048	-0.005	-0.055	-0.135

	Pension funds	Mutual funds
Percentage outperforming the S&P 500 Index:	58.4%	47.2%
Percentage with a five-year or longer track record:	78.9%	90.2%

* Based on 1994 data only due to availability.

Table 1. Summary statistics (continued)

The symbols *, **, and *** indicate statistical significance at the 10, 5, and 1% levels.

Panel B. Pearson correlation coefficients in the pension fund segment

	Dollar flow	% flow	% Change in number of clients	Lagged return	Jensen's alpha	Tracking error	Excess return (S&P 500)	Outperform S&P 500 dummy	Asset size
Percentage flow	0.371***								
% Change in number of clients	0.123***	0.307***							
Lagged return	0.084***	0.119***	0.059***						
Jensen's alpha	0.127***	0.206***	0.155***	0.270***					
Tracking error	0.055***	0.069***	0.045**	0.150***	0.277***				
Excess return (S&P500)	0.105***	0.169***	0.108***	0.684***	0.505***	0.327***			
Outperform S&P 500 dummy	0.118***	0.174***	0.103***	0.391***	0.382***	0.150***	0.675***		
Asset size	-0.314***	-0.117***	-0.059***	-0.021	-0.032	-0.203***	-0.050**	-0.013	
Fund age	-0.022	-0.029	0.017	-0.016	0.120***	0.079***	0.122***	0.151***	0.120***

Panel C. Pearson correlation coefficients in the mutual fund segment

	Dollar flow	% flow	% Change in number of clients	Lagged return	Jensen's alpha	Tracking error	Excess return (S&P 500)	Outperform S&P 500 dummy	Asset size
Percentage flow	0.350***								
% Change in number of clients									
Lagged return	0.120***	0.177***							
Jensen's alpha	0.229***	0.349***		0.286***					
Tracking error	-0.011	0.132***		0.089***	0.101***				
Excess return (S&P500)	0.198***	0.327***		0.677***	0.553***	0.163***			
Outperform S&P 500 dummy	0.155***	0.255***		0.438***	0.439***	0.125***	0.714***		
Asset size	0.530***	-0.010		0.026	0.109***	-0.147***	0.051***	0.048**	
Fund age	0.048**	-0.123***		-0.015	0.006	-0.165***	0.012	-0.020	0.217***

Table 2. OLS regressions of pension fund and mutual fund manager flow on performance measures

This table reports the results of pooled time-series cross-sectional regressions of annual dollar flow and annual percentage flow (fund growth rates) on manager characteristics for the sample of 2,461 pension fund manager-years and 2,676 mutual fund manager-years over the sample period 1987-1994. These managers are from the actively managed domestic equity, growth, and value style categories only. All flow and performance variables are on an annual basis and are defined in the Appendix. Each column represents a separate regression, and we include as regressors, but do not report, asset size, lagged flow, fund age, as well as year (1988-1994) and style (growth, value) interaction dummies as control variables. We use the natural log of asset size in the percentage flow regression and asset size in the dollar regression. T-statistics based on White standard errors are in parentheses and N represents the number of manager-year observations. The symbols *, **, *** indicate statistical significance at the 10, 5, and 1% level. The letters a, b, and c indicate that the pension fund manager coefficients are statistically different from the corresponding coefficients in the mutual fund manager regression at the 10, 5, and 1% level.

	Pension fund managers		Mutual fund managers	
	Dollar flow	Percentage flow	Dollar flow	Percentage flow
Intercept	42.85	0.71***, c	-16.63	0.16***
	(1.12)	(8.74)	(-1.28)	(2.96)
Jensen's alpha	1271.22***, c	2.34***, a	379.83***	3.24***
	(4.79)	(6.59)	(3.48)	(8.10)
Lagged return	168.62**	0.42***	194.39***	0.45***
	(2.55)	(2.99)	(4.48)	(5.94)
Tracking error	-629.93***, c	-0.70*, c	80.50	1.21***
	(-2.65)	(-1.93)	(0.61)	(2.82)
Control variables included in each regression:	Fund age, asset size, lagged flow, and year and style (growth, value) interaction term dummies			
Adjusted R-squared	0.118	0.108	0.503	0.237
N	2461	2461	2676	2676

Table 3. The importance of market benchmark performance measures

Panel A: The pension fund segment

This panel reports pooled, cross-sectional time-series regressions of percentage and dollar flow on excess market returns and other performance measures for the pension fund sample only. To test the importance of outperforming a benchmark, we estimate separate coefficients of each performance variable for those managers outperforming the S&P 500 (above S&P500) and for those underperforming the S&P 500 (below S&P 500). Specifically, we regress:

$$Flow_t^i = b_0 + b_1 OUTP + b_2 OUTP * Z_t^i + b_3 UNDERP * Z_t^i + b_4 TS_t^i + b_5 C_t^i + e_t^i$$

Where Z_t^i is a vector of performance variables, TS_t^i is a vector of time-style dummy interactions, and C_t^i is a vector of control variables. OUTP is equal to one if the manager's lagged return gross of management fees is greater than the lagged return on the S&P 500, and zero otherwise. UNDERP is equal to one if the manager's lagged return gross of management fees is less than the lagged return on the S&P 500, and zero otherwise. Excess return is defined as the manager's lagged return less the lagged return on the S&P 500. We include in the regressions, but do not report, asset size, lagged flow, and fund age, in addition to the style (growth, value) and year (1988-1994) interaction dummies, as control variables. We use the natural log of asset size in the percentage flow regression and asset size in the dollar regression. T-statistics based on White standard errors are in parentheses and N represents the number of manager-year observations. The symbols *, **, *** indicate statistical significance at the 10, 5, and 1% level. The letters a, b, and c indicate that the pension fund manager coefficients are statistically different from the corresponding coefficients in the mutual fund manager regressions in Panel B at the 10, 5, and 1% level.

	Dependent variable Dollar flow	Dependent variable Percentage flow
Intercept	-28.63	0.65***, c
	(-0.55)	(7.72)
Outperform S&P500 Dummy	165.54***, b	0.20***, a
	(3.40)	(3.63)
Excess return (above S&P 500)	23.60	0.21
	(0.33)	(1.08)
Excess return (below S&P500)	223.68	0.23
	(1.56)	(1.53)
Jensen's alpha (above S&P500)	781.37***	2.13***, c
	(3.41)	(4.36)
Jensen's alpha (below S&P500)	1829.91***, c	1.82***
	(2.93)	(4.05)
Tracking error (above S&P500)	-790.52***, a	-0.95**, b
	(-3.08)	(-1.99)
Tracking error (below S&P500)	247.43	-0.18
	(0.59)	(-0.36)
Control variables included:	Fund age, asset size, lagged flow, and year and style interaction dummies	
Adjusted R-squared	0.125	0.115
N	2461	2461

Table 3. The importance of market benchmark performance measures (continued)

Panel B: The mutual fund segment

This panel reports pooled, cross-sectional time-series regressions of percentage and dollar flow on excess market returns and other performance measures for the mutual fund sample only. To test the importance of outperforming a benchmark, we estimate separate coefficients of each performance variable for those managers outperforming the S&P 500 (above S&P500) and for those underperforming the S&P 500 (below S&P 500). Specifically, we regress:

$$Flow_t^i = b_0 + b_1 OUTP + b_2 OUTP * Z_t^i + b_3 UNDERP * Z_t^i + b_4 TS_t^i + b_5 C_t^i + e_t^i$$

Where Z_t^i is a vector of performance variables, TS_t^i is a vector of time-style dummy interactions, and C_t^i is a vector of control variables. OUTP is equal to one if the manager's lagged return net of management fees is greater than the lagged return on the S&P 500, and zero otherwise. UNDERP is equal to one if the manager's lagged return net of management fees is less than the lagged return on the S&P 500, and zero otherwise. Excess return is defined as the manager's lagged return less the lagged return on the S&P 500. We include in the regressions, but do not report, asset size, lagged flow, and fund age, in addition to the style (growth, value) and year (1988-1994) interaction dummies, as control variables. We use the natural log of asset size in the percentage flow regression and asset size in the dollar regression. T-statistics based on White standard errors are in parentheses and N represents the number of manager-year observations. The symbols *, **, *** indicate statistical significance at the 10, 5, and 1% level.

	Dependent variable Dollar flow	Dependent variable Percentage flow
Intercept	-42.08***	0.14***
	(-2.69)	(3.04)
Outperform S&P500 Dummy	60.43**	0.07
	(2.50)	(1.50)
Excess return (above S&P 500)	126.70**	0.24*
	(2.08)	(1.90)
Excess return (below S&P500)	205.07***	0.40***
	(3.92)	(3.93)
Jensen's alpha (above S&P500)	878.40***	4.60***
	(4.58)	(6.83)
Jensen's alpha (below S&P500)	-244.66*	1.41***
	(-1.94)	(5.25)
Tracking error (above S&P500)	-199.72	1.12
	(-0.84)	(1.54)
Tracking error (below S&P500)	50.64	0.36
	(0.37)	(1.04)
Control variables included:	Fund age, asset size, lagged flow, and year and style interaction dummies	
Adjusted R-squared	0.510	0.258
N	2676	2676

Table 4. Evidence on the importance of Morningstar star ratings in the mutual fund industry segment

This panel contains the coefficients from a regression of 1994 mutual fund flow on performance and non-performance manager characteristics (control variables). Each column represents a separate regression using only 1994 mutual fund data from the July 1995 *Mutual Funds OnDisc* CD distributed by Morningstar, Inc. The Morningstar star rating ranges from one to five stars, with five stars representing the highest rating. We include in the regressions, but do not report, asset size, lagged flow, fund age, and dummy variables indicating whether the fund is managed in a growth or value style, as control variables. We use the natural log of asset size in the percentage flow regressions and asset size in the dollar regressions. T-statistics based on White standard errors are in parentheses and N represents the number of manager-year observations. The symbols *, **, *** indicate statistical significance at the 10, 5, and 1% level.

	Dollar flow	Dollar flow	Percentage flow	Percentage flow
Intercept	-59.17*	-177.64***	0.29	-0.14
	(-1.86)	(-3.11)	(1.51)	(-0.77)
Jensen's alpha	222.39	-135.81	3.97***	2.21
	(0.70)	(-0.41)	(2.75)	(1.54)
Lagged return	704.46***	651.30***	1.78***	1.54***
	(4.30)	(4.19)	(4.42)	(3.97)
Tracking error	-174.82	166.60	-2.64**	-1.11
	(-0.37)	(0.44)	(-2.30)	(-1.07)
Morningstar star rating		34.61*		0.17***
		(1.93)		(5.38)
Control variables included:	Fund age, asset size, lagged flow, and style (growth, value) dummies			
Adjusted R-squared	.659	0.662	0.230	0.264
N	419	419	419	419

Table 5. The importance of non-performance manager characteristics

Panel A. An industry segment comparison of the explanatory power of performance and non-performance manager characteristics to explain cross-sectional flow

This panel contains the adjusted R-squared under various regression specifications for the Pension Fund and Mutual Fund segments (regressed separately). Column two lists the variables included in the regression. We use the natural log of asset size in the percentage flow regressions and asset size in the dollar regressions.

		Pension fund managers		Mutual fund managers	
	Variables included in the regression:	Dollar flow	Percentage flow	Dollar flow	Percentage flow
Quantitative performance variables only:	Jensen's alpha, lagged return, tracking error, Outperform S&P500 Dummy	0.020	0.056	0.058	0.143
Control Variables only:	Asset size, lagged flow, length of track record (age), time and style interaction dummies	0.104	0.074	0.492	0.130
Quantitative performance and control variables:	Both sets of performance and control variables listed above.	0.122	0.116	0.504	0.240
Lagged flow only:	Lagged dollar and percentage flow respectively	0.0004	0.019	0.473	0.078

Table 5. (continued)

Panel B. A comparison of the relation of flow to non-performance manager characteristics in the two industry segments

This panel contains the coefficients from a regression of flow in each segment on non-performance manager characteristics (control variables). Each column represents a separate regression and we also include, but do not report, style (growth, value) and year (1988-1994) interaction dummies as regressors. We use the natural log of asset size in the percentage flow regressions and asset size in the dollar regressions. T-statistics based on White standard errors are in parentheses and N represents the number of manager-year observations. The symbols *, **, *** indicate statistical significance at the 10, 5, and 1% level. The letters a, b, and c indicate that these pension fund manager coefficients are statistically different from the corresponding coefficients in the mutual fund manager regression at the 10, 5, and 1% level respectively. In the joint regression used to test the difference in pension fund and mutual fund coefficients, we also interact a pension fund dummy with the time-style interaction terms (not reported).

	Pension fund managers		Mutual fund managers	
	Dollar flow	Percentage flow	Dollar flow	Percentage Flow
Intercept	38.92	0.77***, c	12.56	0.19***
	(1.02)	(9.70)	(1.25)	(4.68)
Lagged flow	0.019 c	0.032*, b	0.66***	0.13***
	(0.17)	(1.86)	(6.89)	(3.31)
Asset Size	-0.084***, c	-0.09***, c	0.036*	-0.01
	(-4.89)	(-10.02)	(1.88)	(-1.42)
Length of track record	-0.33	-0.03***, b	-1.53	-0.01***
	(-0.06)	(-3.41)	(-1.26)	(-3.79)
	Time and style (growth,value) interaction dummies are included.			
Adjusted R-squared	0.104	0.074	0.492	0.130
N	2461	2461	2676	2676

Figure 1. The Estimated Piecewise Linear Relation between Percentage Flow and Return Ranking

To create this plot, we rank the lagged return of managers by style objective and year to form deciles. We then estimate a piecewise linear regression over these deciles. In the same regression, we control for all variables included in the regression of Table 2. We then substitute average values for all included variables into the estimated regression equation. Thus, Figure 1 depicts the relation between expected percentage flow and lagged return ranking for the average manager observation.

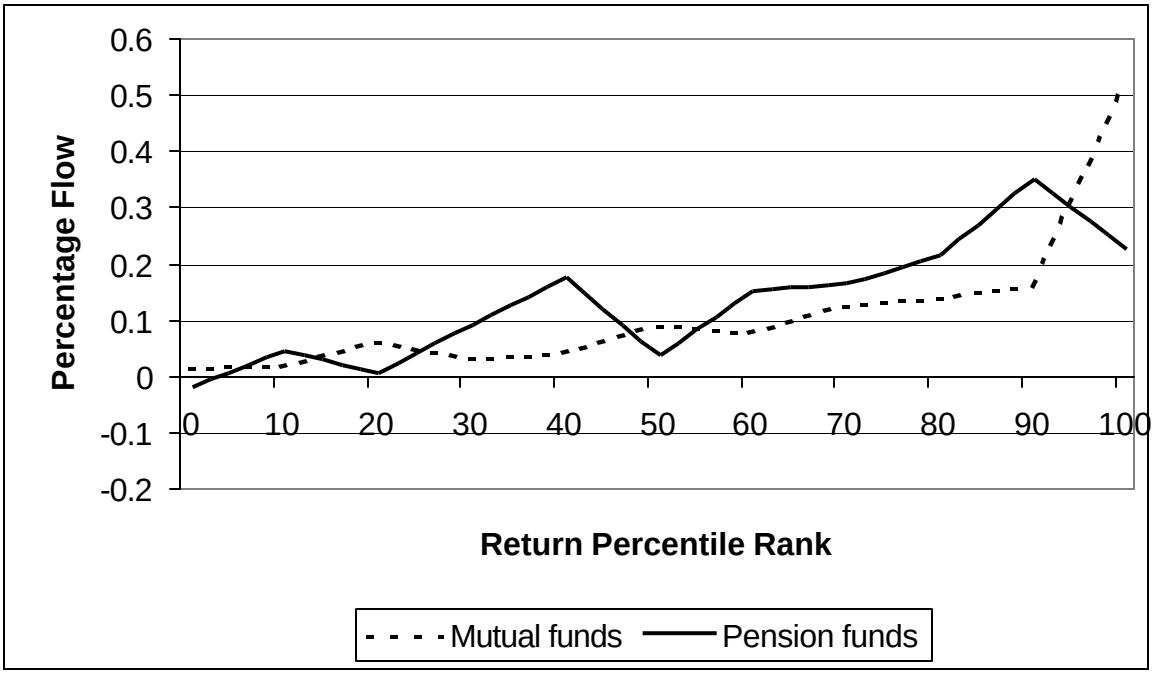

Figure 2. The Estimated Piecewise Linear Relation between Percentage Flow and Jensen's Alpha Ranking

To create this plot, we rank the Jensen's alpha of managers by style objective and year to form deciles. We then estimate a piecewise linear regression over these deciles. In the same regression, we control for all variables included in the regression of Table 2. We then substitute average values for all included variables into the estimated regression equation. Thus, Figure 2 depicts the relation between expected percentage flow and Jensen's alpha ranking for the average manager observation.

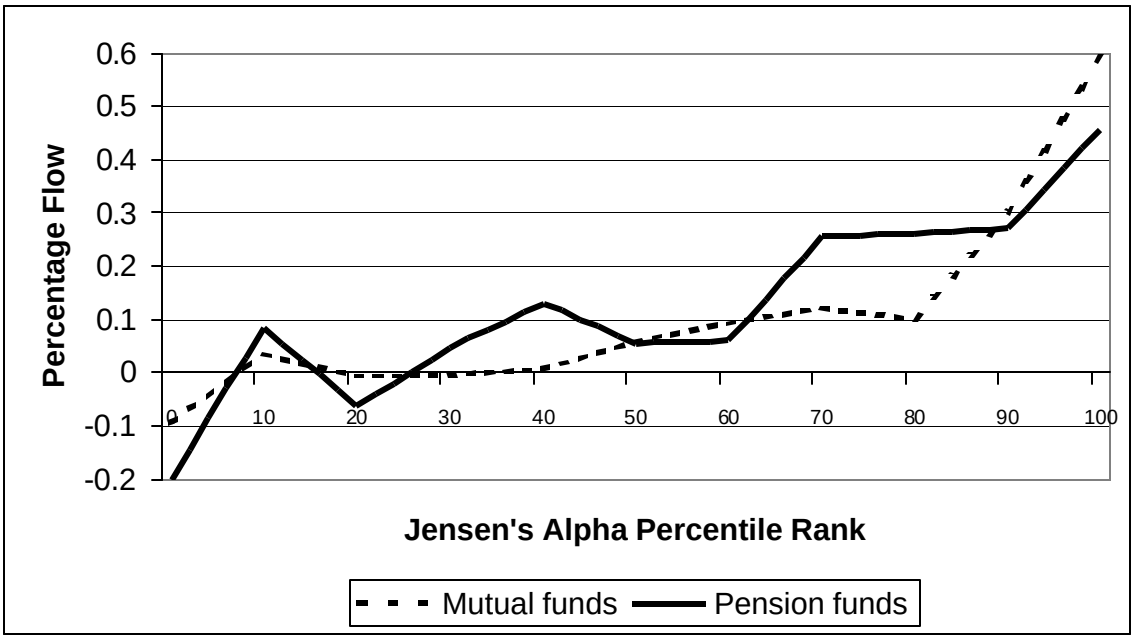

Figure 3. The Estimated Piecewise Linear Relation between Dollar Flow and Return Ranking

To create this plot, we rank the lagged return of managers by style objective and year to form deciles. We then estimate a piecewise linear regression over these deciles. In the same regression, we control for all variables included in the regression of Table 2. We then substitute average values for all included variables into the estimated regression equation. Thus, Figure 3 depicts the relation between expected dollar flow and lagged return ranking for the average manager observation.

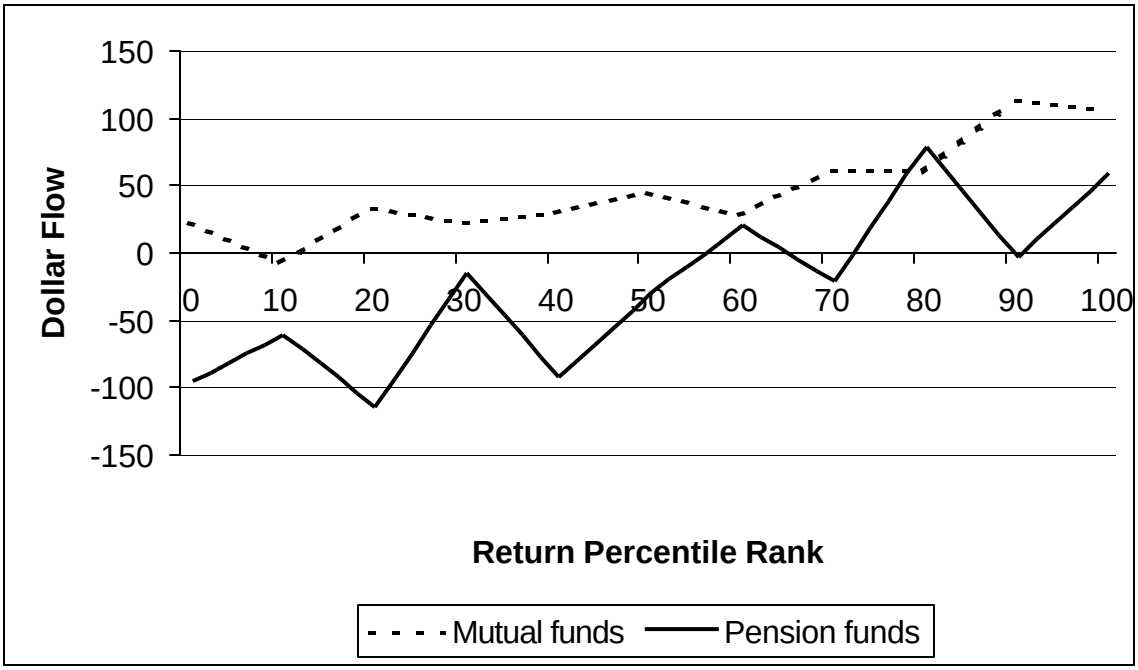

Figure 4. The Estimated Piecewise Linear Relation between Dollar Flow and Alpha Ranking

To create this plot, we rank Jensen's alpha of managers by style objective and year to form deciles. We then estimate a piecewise linear regression over these deciles. In the same regression, we control for all variables included in the regression of Table 2. We then substitute average values for all included variables into the estimated regression equation. Thus, Figure 4 depicts the relation between expected dollar flow and lagged alpha ranking for the average manager observation.