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Author(s): Diane Del Guercio and Paula A. Tkac

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The Determinants of the Flow of Funds of Managed Portfolios: Mutual Funds vs. Pension Funds

Diane Del Guercio and Paula A. Tkac*

Abstract

This study compares the relations between asset flow and performance in the retail mutual fund and fiduciary pension fund segments of the money management industry, and relates empirical differences to fundamental differences in the clientele they serve. A striking difference is the shape of the flow-performance relation. In contrast to mutual fund investors, pension clients punish poorly performing managers by withdrawing assets under management and do not flock disproportionately to recent winners. We interpret these and other empirical differences in the context of the manager evaluation procedures typical in each segment. We conclude that pension managers have little incentive to engage in the risk-shifting behavior previously identified among mutual fund managers.

I. 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 their clients; choose investments from the same universe of risky assets; and employ both passive and active fund managers. In addition, both manager types are typically compensated at a percentage of assets under management. This aspect of compensation structure, together with the empirical relation between mutual fund flow and performance, has recently spawned a growing literature linking fund managers' behavior to their implicit incentives to increase

*Del Guercio, dianedg@oregon.uoregon.edu, Lundquist College of Business, University of Oregon, Eugene, OR 97403; Tkac, paula.tkac@atl.frb.org, Research Department, Federal Reserve Bank of Atlanta, 1000 Peachtree St. NE, Atlanta, GA 30309. We gratefully acknowledge research support from the Oregon Joint Professional Schools of Business Program. We thank Carl Ackermann, Stephen Brown (the editor), John Chalmers, Larry Dann, Jerry Dwyer, Wayne Ferson, Laura Field, Aditya Kaul, Josef Lakonishok (associate editor and referee), Mark LaPlante, Kai Li, Tim Loughran, Wayne Mikkelson, Megan Partch, Jim Peterson, Roberta Romano, Paul Schultz, Katherine Spiess, Laura Starks, René Stulz, and seminar participants at the Oregon Research Roundup, Oregon State University, Pacific Northwest Finance Conference, Portland Society of Chartered Financial Analysts, Securities and Exchange Commission, Tenth Annual Finance and Accounting Conference in 1999, University of Alberta, University of California Riverside, University of Notre Dame, and the 1998 Western Finance Association meetings for helpful suggestions. We have also benefited from conversations with Wes Wilson.

assets under management.¹ Given the prima facie similarities between mutual fund and pension fund managers, we might expect them to face similar implicit incentives. However, the empirical flow-performance relation is ultimately driven by the choices of clients, and the retail mutual fund and fiduciary pension fund industry segments serve materially different clientele, each with different evaluation procedures and criteria for choosing managers. This implies that the empirical flow-performance relation and the resulting implicit managerial incentives may differ significantly as well. Our study addresses this question by comparing the empirical relations between asset flow and performance in the mutual fund and pension fund segments. We then relate the observed empirical differences to fundamental differences in client characteristics between the two segments.

While there is an extensive literature on the performance and behavior of mutual fund managers, much less is known about pension fund managers, primarily because of relatively limited data accessibility. Yet, this important group of managers in the capital markets controls \$7.3 trillion in tax-exempt assets, exceeding the \$5.2 trillion in assets under management in the mutual fund segment.² Thus, there is much more to learn about professional institutional management than what can be gleaned from studies of only the mutual fund segment of the industry. While most studies on pension managers primarily focus on portfolio performance, we study the flow-performance relation in the pension segment. We argue that a comparison to the mutual fund flow-performance relation, viewed through the lens of a comparison of the typical clients in each segment, can broaden our understanding of both manager types and allow for a more complete picture of the industry.

The typical retail mutual fund investor differs substantially from the typical pension trustee in investment needs and financial background. Using a compilation of survey evidence, practitioner sources, and academic studies, we argue that pension fund sponsors are more likely than mutual fund investors to use risk-adjusted performance measures in evaluating managers. In addition, the process used in the pension fund segment to screen and select managers typically involves several stages whereby managers are first screened on their quantitative performance track records, but subsequently evaluated in face-to-face meetings on non-performance characteristics such as reputation and credibility. Lakonishok, Shleifer, and Vishny (1992) 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. We show that several aspects of the pension manager selection process can be interpreted as resulting from the layers of agency relationships inherent in the pension segment.

We document several differences in the relation between flow and manager characteristics that can be understood in terms of these fundamental client differences. First, we find that pension manager flow is significantly positively related

¹ See for example Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Busse (2000), Koski and Pontiff (1999), and Chen and Pennacchi (1999). We discuss this literature in more detail in Section VI.

² The 2000 *Pensions and Investments* magazine Top 1000 money managers issue covered 10,115 pension fund products collectively controlling \$7.3 trillion in institutional tax-exempt assets. In the same year, ICI's Mutual Fund Factbook lists 6,746 mutual funds controlling \$5.2 trillion in aggregate (excluding money market funds).

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 benchmarks, indicating that sponsors punish managers who take on diversifiable risk, even if they happened to post good performance as a result. 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 somewhat surprising given survey evidence that mutual fund investors do not use risk-adjusted performance measures when evaluating funds. We provide evidence suggesting that the strong statistical relation between mutual fund flow and Jensen's alpha is due to 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 evidence consistent with a preference by pension sponsors for manager characteristics that can be justified ex-post to a trustee committee. For example, we find that beating a market benchmark attracts an additional \$132.7 million in flow to the average pension manager and boosts his asset growth rate by 19 percentage points, all else equal. 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 is especially pronounced at the top of the performance distribution. This suggests that beating a benchmark is a discrete event only 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 quantitative performance variables have much lower explanatory power to explain flow in the pension fund segment relative to the mutual fund segment. This supports the characterization of that segment as relatively more individualized and influenced by non-performance manager characteristics.

One of the most striking differences between the two segments is the shape of the flow-performance relation. 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 withdrawing assets. In contrast, the flow-performance relation is approximately linear in the pension fund segment. For example, the relation between pension manager flow and Jensen's alpha is positive and symmetric across both good and bad performance. We find evidence that pension managers lose a significant amount of both assets and clients when they underperform.

By documenting differences in the flow-performance relation, we contribute to the growing literature linking fund managers 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 comparative study design highlights previously documented drivers of mutual fund flow that are not universal to all managed funds and, therefore, possibly best understood in terms of clientele differences. In stark contrast to the high degree of autocorrelation in mutual fund flows, we find that pension fund flows exhibit very little autocorrelation. 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 related to differences in evaluation and allocation procedures 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 retirement plans. Similarly, 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.

II. 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.³

Previous evidence at the individual fund level suggests that past performance influences the manager selection and termination decision, and is thereby an im-

³To ensure that the cited statistics pertain to the same time period as our data sample, we primarily cite survey evidence from the mid-1990s. Examination of more recent surveys indicates that the key characteristics of clients and the manager selection process we describe have not changed materially from this earlier period. Thus, 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*).

portant determinant of flow. Despite different sample periods, methodologies, and performance measures, Ippolito (1992), Patel, Zeckhauser, and Hendricks (1994), Gruber (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), and Edelen (1999) 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 might differ across these groups.

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.⁴ 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 fee rates charged vary considerably by pension fund client for the same manager and recent surveys indicate that pension fund clients routinely negotiate and renegotiate fees with their managers.⁵

The question of interest is how these two very different client pools allocate flow 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 net flow and performance in these two industry segments.

A. Client Differences: Use of Risk-Adjusted Performance Measures

The typical pension fund client arguably has more financial expertise than the average mutual fund investor. Pension fund sponsors are often finance professionals trained in the area of investment management. In addition, most pension sponsors rely heavily on the recommendations of professional consultants when deciding which managers to hire or retain. 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. Firms such as BARRA, Mobius, and Wilshire

⁴McGraw-Hill's 1995 *Money Market Directory* and the 1995 *Directory of Pension Funds and their Investment Managers* (McGraw Hill).

⁵See for example *Institutional Investor*, July 2001, "Let's Make a Deal," p. 121.

Associates market software that performs sophisticated return attribution analysis that decomposes portfolio returns into exposure to various passive indices.

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. Sponsors expect the managers they hire to stick closely to their stated investment style and, with the aid of consultants and return attribution software, often verify that they actually do.

Tracking error 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 the *Financial Analysts Journal*. Tracking error, a measure of diversifiable risk, measures the volatility of a portfolio's deviation from benchmark returns. In addition, a performance measure advocated by pension consultants and academic researchers known as the appraisal ratio uses tracking error as a measure of the cost of deviating from a diversified passive portfolio.⁶

The 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. Capon et al. (1996) report that 75% of recent mutual fund purchasers surveyed did not know the investment style of their funds, and only 26.7% of fund investors report that they compare their fund's return to a benchmark.⁷ Only 14% of surveyed investors said they use standard deviation to measure risk, 10% use beta, and only 4% use an alpha or Sharpe measure. Sixty-nine percent of investors cite a narrative description of risks or a bar chart of annual returns as their preferred method to identify risk. 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 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).

While survey evidence suggests that mutual fund investors do not knowingly use risk-adjusted performance measures, they may do so indirectly. Fund recommendations in newspapers and magazines are typically based on performance measures that incorporate some form of risk adjustment, and 59% of mutual fund owners consult with a financial advisor such as a broker or financial planner before purchasing mutual funds. Many fund advertisements feature Morningstar star ratings based on fund rankings on both risk and return. Together, these factors may implicitly induce an indirect relation between flow- and risk-adjusted

⁶Specifically, the appraisal ratio, which is sometimes referred to as the information ratio, is defined as the ratio of Jensen's alpha to tracking error. See Treynor and Black (1973) and Bodie, Kane, and Marcus (1999), p. 759 and Gupta and Prajogi (1999).

⁷According to the survey reported in "Why Funds Don't Beat the Market," *Money* (August 1995, pp. 58-67).

performance measures. However, the magnitude of this effect in aggregate is an empirical question.

B. 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 Callan Associates 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 a CalPERS’ manager search, only 10 points out of 550 (2%) were allocated to performance for those managers making it past the initial screening, while 150 points were allocated to the “investment committee interview.”⁸ 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.⁹ 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. Along these same lines, perhaps qualitative characteristics such as reputation are important to sponsors because the cost of monitoring reputable managers is lower. Because reputation is implicitly a capital asset, it depreciates

⁸<http://www.calpers.ca.gov/invest/rfp/>.

⁹According 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.

if managers fail to act in the client's best interest (Davis and Steil (2001), p. 123). 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.¹⁰ 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.¹¹

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 of competency to trustees, even if the manager was not a top performer among peer managers. Indeed, a 1993 survey of sponsors ranked performance relative to market indices as more important than the investment performance of other managers.¹² 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."¹³ 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 likely 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 incorporation of risk adjustments. The performance measures likely to be related to flow in the pension segment are the risk-adjusted and quantitative variety such as Jensen's

¹⁰According to Greenwich Associates, 86% of corporate pensions managed 63.2% of their pension assets via defined benefit plans in 1994.

¹¹Eighty-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. A June 2000 *Institutional Investor* magazine survey indicates that 79% of pension sponsors use consultants for manager hiring decisions (p. 194).

¹²"Time Horizons of Pension Fund Managers," by Financial Executives Research Foundation, 1993.

¹³Mark Kritzman, "Wrong and Alone," *Economics & Portfolio Strategy* (New York: Peter L. Bernstein, Inc. (1998)).

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.” Second, we should observe lower explanatory power of quantitative performance measures in explaining flow in the pension fund segment, because qualitative manager characteristics and unobservable services are generally more important to pension fund sponsors than to mutual fund investors.¹⁴ A weak statistical relation is consistent with sponsors using quantitative measures primarily as a first screen or as a supplement to qualitative manager characteristics, such as in the CalPERS’ search we reported on earlier. Finally, differences in the attention paid to monitoring managers suggest that pension fund sponsors are more likely to punish poorly performing managers by withdrawing assets than mutual fund investors.

III. Description of the Sample

A. 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, 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

¹⁴We 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.

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).¹⁵ 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 three 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 use only the returns that are 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 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 2,462 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*.

The pension fund manager returns we study are total returns gross of management fees and overhead expenses (e.g., custodial fees), but net of any trading costs, such as brokerage commissions. While the treatment of trading costs is

¹⁵*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.

¹⁶In 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. Any cash holdings or cash equivalents are included in calculating returns on the composites.

¹⁷For 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.

common to both the mutual fund and pension fund industry segments, the treatment of fees when computing returns differs because of the nature of the pension fund segment. Unlike in mutual funds where SEC regulations mandate that all shareholders of a fund be charged the same fees, there is considerable variation in fees across clients in the pension fund segment, typically by the amount of assets managed on behalf of the client. Thus, there is no single “net of fees” performance measure that applies to all clients of a particular pension manager. Moreover, it is not fruitful to simply net out a fee estimate from a manager’s stated fee schedule because widespread departures from these schedules are common, and negotiations routinely occur on an account-by-account basis.¹⁸

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.

B. 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 2,677 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. Returns are net of management fees and expenses, but gross of any applicable load charges. We 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.¹⁹ 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

¹⁸See, for example, *Institutional Investor*, October 1994, “The Squeeze on Fees,” p. 66 and *Institutional Investor*, July 2001, “Let’s Make a Deal,” p. 121. Note also that the Association for Investment Management and Research (AIMR) in their industry performance presentation standards recommend that pension manager returns be reported gross of management fees for precisely these reasons (www.aimr.com/standards/pps). Thus, the inability for researchers to treat pension fund fees in the same way as mutual funds, where all clients are charged the same fees, is a pervasive issue when studying pension fund returns. (See for example, Christopherson, Ferson, and Glassman (1998), Lakonishok, Shleifer and Vishny (1992), and Coggin, Fabozzi, and Rahman (1993)). 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.

¹⁹We 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.

figures from the 1996 Mutual Fund Factbook. We use 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.

C. 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. There is much less 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.²⁰ 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.

D. Measures of Flow and Performance

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,

²⁰Not 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 II, poor performance is not the sole reason for a firm to go out of business in the pension fund segment. Consistent with this, Ferson and Khang (2001) report that the discontinued pension funds in their sample performed better than the sample as a whole. 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 is not statistically different.

$$\text{Flow}_t^i = \text{TNA}_t^i - \text{TNA}_{t-1}^i (1 + R_t^i),$$

where TNA_t^i is fund i 's total net assets and R_t^i is the fund's return over the prior year. 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. All three net manager flow measures can be viewed as the aggregation of allocation decisions of all of the manager's clients.

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 univariate correlation 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 IV.E, 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 the average client in each industry segment, we focus on the measures suggested by our study of client characteristics outlined in Section II. Specifically, measures expected to be important to pension sponsors as a result of their financial expertise, 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. On the other hand, we expect historical raw returns to be more important to the typical mutual fund investor. All of these performance measures are annualized, and lagged so as to be observable to the client before a hiring decision is made.²¹ The Appendix defines these variables.

²¹Another reason to use only lagged performance measures is to mitigate the possibility that we are capturing the effect of flow on returns, rather than the other way around. Edelen (1999) shows that the additional trading costs and the cash balances necessary to manage flow impact fund performance. Thus, funds with higher flow this year may be more likely to have poorer performance this year, which in turn could affect flow next year. We control for this possibility by including lagged flow in all of our regression specifications.

E. 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 vs. 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 provides 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 vs. \$109 million in outflows). In contrast, the distribution of pension manager flows is more symmetric; the bottom 5% of pension managers actually suffers larger dollar outflows than the top 5% gains, \$524 million in outflows vs. \$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 V.

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.

IV. Relating Flow and Performance in the Two Industry Segments

In Section II, we argue that differences in the typical client in the mutual fund and pension fund segments should manifest in differences in the relation between flow and performance. In this section, we empirically examine these potential differences using a linear regression framework relating both dollar and percentage cross-sectional flows, pooled over eight years, to lagged performance measures. We estimate the flow-performance regressions separately for each segment. For completeness, we also report in the tables the results of *t*-tests comparing the magnitudes of the estimated coefficients across the segments.

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

	Pension Fund Manager Distribution					Mutual Fund Manager Distribution				
	95th	75th	Median	25th	5th	95th	75th	Median	25th	5th
Assets under mgmt. in \$millions (asset size)	4465	936.5	299	102	29.5	2060.1	492.9	167.9	66.12	26.5
No. of clients	116	34	14	6	1	214332 ^a	42613 ^a	12609 ^a	2562 ^a	168 ^a
<i>Flow Meas.:</i>										
Dollar flow (\$millions)	399.76	57.35	0.61	-50.49	-523.61	301.62	26.00	-1.74	-19.59	-108.95
% flow	1.104	0.213	0.004	-0.143	-0.490	0.825	0.152	-0.018	-0.112	-0.273
% change in no. of clients	1.00	0.25	0.021	-0.043	-0.344	N/A	N/A	N/A	N/A	N/A
<i>Perf. Meas.:</i>										
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&P 500)	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%		

Panel B. Pearson Correlation Coefficients in the Pension Fund Segment

	Dollar Flow	% Flow	% Change in No. of Clients	Jensen's Alpha	Tracking Error	Lagged Excess Return (S&P 500)	Out-perform S&P 500 Dummy	Asset Size
Percentage flow	0.371***							
% change in no. of clients	0.123***	0.307***						
Jensen's alpha	0.127***	0.206***	0.155***					
Tracking error	0.055***	0.069***	0.045**	0.277***				
Lagged excess return (S&P 500)	0.105***	0.169***	0.108***	0.505***	0.327***			
Outperform S&P 500 dummy	0.118***	0.174***	0.103***	0.382***	0.150***	0.675***		
Asset size	-0.314***	-0.117***	-0.059***	-0.032	-0.203***	-0.050**	-0.013	
Fund age	-0.022	-0.029	0.017	0.120***	0.079***	0.122***	0.151***	0.120***

Panel C. Pearson Correlation Coefficients in the Mutual Fund Segment

	Dollar Flow	% Flow	Jensen's Alpha	Tracking Error	Lagged Excess Return (S&P 500)	Out-perform S&P 500 Dummy	Asset Size
Percentage flow	0.350***						
Jensen's alpha	0.229***	0.349***					
Tracking error	-0.011	0.132***	0.101***				
Lagged excess return (S&P 500)	0.198***	0.327***	0.553***	0.163***			
Outperform S&P 500 dummy	0.155***	0.255***	0.439***	0.125***	0.714***		
Asset size	0.530***	-0.010	0.109***	-0.147***	0.051***	0.048**	
Fund age	0.048**	-0.123***	0.006	-0.165***	0.012	-0.020	0.217***

Panel A 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 2,462 manager-years in the pension sample and 2,677 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. Because pension fund fees vary by client, pension manager returns are gross of management fees. Mutual fund manager returns are net of management fees and expenses, but gross of any load charges.

^aBased on 1994 data only due to availability.

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

We conduct numerous robustness checks of the data, but for brevity's sake only report the results of robustness tests that affect our inferences. To check whether differences in the treatment of fees across the pension fund (gross of fees) and mutual fund (net of fees) segments affect our inferences, we add back annual fees and expenses to mutual fund performance measures and repeat our tests. To check whether the discreteness of pension fund flow, whereby the loss of one client might imply millions of dollars in outflow, influences our results, we repeat all tests using the percentage change in number of pension clients as the dependent variable flow measure.²² Unless we report otherwise, all results are robust to these alternative specifications.

In addition to control variables for asset size, fund age, and lagged flow, we include a set of 16 time-style interaction dummies in our pooled regressions, 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 White's (1980) method.

We begin with an analysis of the general relation between flow and alternative performance measures. Next, we consider the role of performance benchmarks in each industry segment. 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.

A. Which Type of Performance Matters, Raw or Risk-Adjusted?

Given the survey evidence outlined in Section II, we expect to find that risk-adjusted performance measures are significantly related to pension manager flow, and that unadjusted raw returns explain mutual fund manager flow. We begin our analysis with a parsimonious linear specification that allows for comparison with the results in previous flow-performance studies of mutual funds. Specifically, for each industry segment we regress flows on lagged excess returns, one-factor

²²We also repeated our tests after substituting style-adjusted performance measures (alphas, tracking errors, and outperformance of a style (growth, value, and generic domestic equity) benchmark) for S&P 500-adjusted performance measures. 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 checked whether load charges affect mutual fund flow, or whether results differ between load funds and no-load funds. The results of these alternative specifications, none of which materially affect our inferences, are available upon request.

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). We include returns in excess of the S&P 500, rather than raw returns, as a regressor because we pool across years with different levels of average market performance. However, we interpret the significance of this variable as revealing the importance of raw return performance to clients.²³ Table 2 contains the results of regressions for both dollar and percentage flows for each industry segment.

TABLE 2
OLS Regressions of Pension Fund and Mutual Fund Manager Flow on Performance Measures

	Pension Fund Managers		Mutual Fund Managers	
	Dollar Flow	Percentage Flow	Dollar Flow	Percentage Flow
Intercept	78.71** (2.27)	0.80***,a (9.06)	17.04 (1.31)	0.24*** (4.58)
Jensen's alpha	1152.96***,a (3.87)	2.09*** (5.64)	203.28* (1.91)	2.70*** (6.82)
Lagged excess return	287.41*** (3.19)	0.67*** (3.41)	345.85*** (6.18)	0.93*** (7.94)
Tracking error	-717.43***,a (-3.07)	-0.89***,a (-2.41)	20.22 (0.15)	1.03** (2.40)
Control variables included in each regression:	Fund age, asset size, lagged flow, and year and style (growth, value) interaction term dummies			
Adjusted R ²	0.118	0.109	0.505	0.245
N	2462	2462	2677	2677

Table 2 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 2,462 pension fund manager-years and 2,677 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. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. ^a indicates that the pension fund manager coefficients are statistically different from the corresponding coefficients in the mutual fund manager regression at the 1% level.

Both alpha and tracking error have the expected relation with pension fund flows. Specifically, the significant coefficients on Jensen's alpha indicate that pension sponsors reward 1% higher alpha performance with an additional \$11.5 million in net dollar flow, or 2.1% additional net asset growth. In addition, the coefficients on tracking error are negative and significant in both the dollar and percentage flow regressions. Although we discuss alternative interpretations later in the paper, the signs and significance of the coefficients on alpha and tracking error are consistent with the proper use of an appraisal (information) ratio in manager evaluation. In contrast, the mutual fund regression reveals that tracking error is either insignificantly different from zero or significantly positive, suggesting that mutual fund investors are not using tracking error as a risk-adjusted performance measure.

²³This interpretation is also justified by an unreported robustness test where we replace excess return with an annual raw-return ranking variable, with identical inferences to those we report for excess returns.

Contrary to the survey evidence discussed in Section II, we find that lagged excess return is significantly related to pension fund manager flow, and Jensen's alpha is significantly related to mutual fund manager flow. Thus, both unadjusted and risk-adjusted returns are related to manager flow in both segments, implying that the performance-flow relations appear to be similar for mutual funds and pension funds. However, we show in the next section that a linear specification with only continuous explanatory variables, such as the one in Table 2, masks important differences between the two segments. For example, we will show that there are non-linearities in the relation between flow and alpha that are unique to the mutual fund segment, and that the significance of excess returns for pension managers is due to its high correlation with whether the manager beat a market benchmark.

B. Does Beating a Market Benchmark Matter?

Table 3, panels A and B, presents the results of regressions designed to assess 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 determine whether flow is affected by the level of performance relative to the S&P 500, or by the discrete event of beating the benchmark. Second, to test for the asymmetric effects of good and poor performance suggested in earlier mutual fund research, we estimate the effects of the performance variables separately for managers with lagged returns both above and below the S&P 500 Index.

We focus on the S&P 500 as the benchmark in our analysis for several reasons. First, in order to better highlight clientele differences we must preserve comparability across segments. Thus, at the expense of dispersion among style categories, we confine our sample to managers in three broad style groups, with general domestic equity funds representing 40% of the sample. While we expect that many pension sponsors evaluate managers according to style-specific benchmarks (e.g., small-cap value), we are unable to empirically distinguish between the use of style-specific and broad market benchmarks in our sample. The large percentage of observations from the general domestic equity style, coupled with the annual frequency of our data, implies that style-specific and broad market benchmarks are very highly correlated. Thus, for each industry segment we provide evidence on the use of benchmarks in evaluating managers, but do not attempt to determine the precise type of benchmark. We note, however, that the S&P 500 appears to be the most predominate benchmark according to industry surveys and anecdotal evidence.²⁴

To examine the discrete impact on flow of beating the S&P 500 and potential asymmetries in the relation to performance, we create two dummy variables: OUTP equals one if a manager observation outperformed the S&P 500, and equals zero otherwise; UNDERP equals one if a manager underperformed the S&P 500,

²⁴According to *Nelson's 1998 Survey of Performance Benchmarks*, 47.1% of pension fund managers use the S&P 500 as their primary benchmark.

and equals zero otherwise. We then interact these dummies with the continuous performance measurement variables to arrive at the following specification,

$$\text{Flow}_t^i = \beta_0 + \beta_1 \text{OUTP} + \beta_2 \text{OUTP} * Z_t^i + \beta_3 \text{UNDERP} * Z_t^i + \beta_4 \text{TS}_t^i + \beta_5 C_t^i + \varepsilon_t^i,$$

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 β_1 . The additional flow attributable to performance measures conditional on whether or not the manager outperformed the S&P 500 is estimated by β_2 for outperforming managers and β_3 for underperforming managers. This methodology is equivalent to running two separate Table 2

TABLE 3
The Importance of Market Benchmark Performance Measures

	Dependent Variable	
	Dollar Flow	Percentage Flow
Intercept	13.46 (0.30)	0.70***,b (8.30)
Outperform S&P 500 dummy	132.72***,a (3.02)	0.19***,a (3.74)
Lagged excess return (above S&P 500)	105.51 ^a (1.02)	0.20 (0.61)
Lagged excess return (below S&P 500)	104.73 (0.27)	0.29 (0.65)
Jensen's alpha (above S&P 500)	754.54*** (3.31)	2.09***,b (4.30)
Jensen's alpha (below S&P 500)	1891.30***,b (2.58)	1.82*** (3.40)
Tracking error (above S&P 500)	-872.34*** (-3.35)	-0.93* (-1.82)
Tracking error (below S&P 500)	57.92 (0.13)	-0.25 (-0.45)
Control variables include:	Fund age, asset size, lagged flow, and year and style interaction dummies	
Adjusted R^2	0.124	0.115
N	2462	2462

Panel A reports pooled, cross-sectional time-series regressions of percentage and dollar flow on returns in excess of the S&P 500 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&P 500) and for those underperforming the S&P 500 (below S&P 500). Specifically, we regress:

$$\text{Flow}_t^i = \beta_0 + \beta_1 \text{OUTP} + \beta_2 \text{OUTP} * Z_t^i + \beta_3 \text{UNDERP} * Z_t^i + \beta_4 \text{TS}_t^i + \beta_5 C_t^i + \varepsilon_t^i,$$

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. Thus, the β_2 coefficients are in the table below next to the phrase (above S&P 500) while the β_3 coefficients are next to the phrase (below 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. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. ^a and ^b 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 5% and 1% levels, respectively.

(continued on next page)

TABLE 3 (continued)
The Importance of Market Benchmark Performance Measures

	Dependent Variable	
	Dollar Flow	Percentage Flow
Intercept	-3.77 (-0.26)	0.22*** (4.93)
Outperform S&P 500 dummy	40.84* (1.84)	0.03 (0.53)
Lagged excess return (above S&P 500)	359.82*** (3.87)	0.87*** (3.38)
Lagged excess return (below S&P 500)	307.45*** (3.16)	0.85*** (4.66)
Jensen's alpha (above S&P 500)	752.96*** (4.11)	4.28*** (6.56)
Jensen's alpha (below S&P 500)	-341.14** (-2.41)	1.09*** (3.99)
Tracking error (above S&P 500)	-365.24 (-1.53)	0.66 (0.89)
Tracking error (below S&P 500)	15.99 (0.12)	0.38 (1.03)
Control variables include:	Fund age, asset size, lagged flow, and year and style interaction dummies	
Adjusted R^2	0.511	0.263
N	2677	2677

Panel B reports pooled, cross-sectional time-series regressions of percentage and dollar flow on returns in excess of the S&P 500 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&P 500) and for those underperforming the S&P 500 (below S&P 500). Specifically, we regress:

$$\text{Flow}_t^i = \beta_0 + \beta_1 \text{OUTP} + \beta_2 \text{OUTP} * Z_t^i + \beta_3 \text{UNDERP} * Z_t^i + \beta_4 \text{TS}_t^i + \beta_5 C_t^i + \epsilon_t^i,$$

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. Thus, the β_2 coefficients are in the table below next to the phrase (above S&P 500) while the β_3 coefficients are next to the phrase (below 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. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

regressions for the outperforming and underperforming subsamples of managers, with the restriction that coefficients on control variables and time-style dummies and variances are identical across the subsamples.

The results in Table 3, panel A suggest 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 \$132.7 million to the average pension manager and boosts his asset growth rate by 19 percentage points, all else equal. The insignificant coefficients on lagged excess returns further support the idea that beating a benchmark is an important but discrete event. These results also suggest that the significance of excess return in the pension fund regression of Table 2 is due to a "benchmark effect." The specification in Table 3 effectively separates the sample according to whether the manager outperformed the S&P 500, and reveals that, within each of these subsamples,

there is no relation between flow and the magnitude of a manager's lagged excess return.

The significance of beating a benchmark has at least two interpretations. First, agency considerations imply 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.

In the case of mutual funds, evidence on the significance of beating a benchmark is much weaker. The coefficient on OUP in Table 3, panel B is only very weakly positive for dollar flow, and insignificantly different from zero for percentage flow. In contrast to pension managers, the *magnitude* of the outperformance is a highly significant determinant of flow, with positive coefficients on lagged excess returns both above and below the benchmark. Given the lack of agency relationships and the self-professed infrequent use of market benchmarks in fund selection, it is not surprising that beating a market benchmark is not a discretely important event for mutual funds.

C. The Role of Jensen's Alpha in Explaining Flow in the Two Segments

The parsimonious and linear regression in Table 2 did not reveal much of a difference in the relation between flow and Jensen's alpha across the two industry segments. In this section, we show that separately examining alpha performance above and below the S&P 500 Index highlights interesting differences in the relation across the two segments, which in turn suggests results that are worthy of further analysis. Table 3, 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. We also find a very similar result when we use the same specification for a regression of flow measured by growth in the number of clients (not reported). 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. The dollar flow regression also indicates a positive relation with alpha, but the coefficient on alpha performance below the S&P 500 is more than twice as large as the one above the S&P 500. This appears to be driven by the largest 10% of pension managers since the coefficients also display symmetry when these managers are deleted.

Table 3, 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 four 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 does not seem

to matter as much for managers that underperform.²⁵ This result suggests that the importance of alpha in the mutual fund segment documented in Table 2 appears to be primarily driven by the huge impact of alpha among funds outperforming the S&P 500.

The statistical significance of a risk-adjusted performance measure in explaining mutual fund flow is also reported in Gruber (1996), Sirri and Tufano (1998), and Fant and O'Neal (2000). Furthermore, Sirri and Tufano and Fant and O'Neal report a significantly higher coefficient in the top quintile of alpha performance relative to the other quintiles, but provide little explanation for this result. The contrast to the symmetry of the relation we observe in the pension fund segment, as well as the survey evidence suggesting that mutual fund investors do not use risk-adjusted measures to evaluate managers, prompts us to investigate further the importance of Jensen's alpha to mutual fund investors.

One way to reconcile the somewhat puzzling results on 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 vs. 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 is consistent with 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 excess return, tracking error, and star rating as 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 15 percentage points, and additional dollar flow of \$32.6 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 is subsumed by Morningstar's star rating, which suggests that the importance of risk-adjusted performance measures may be the result of a correlation with influential summary ranking measures.

²⁵The perverse negative coefficient on alpha for underperforming managers in the dollar flow regression is 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. Sirri and Tufano (1998) and Fant and O'Neal (2000) also find that alpha is negative and insignificant in the bottom quintile of mutual fund performers.

²⁶Ideally 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. However, Del Guercio and Tkac (2001) do find a robust relation between mutual fund flow and star ratings after controlling for Jensen's alpha in the 1996–1999 period.

TABLE 4
Evidence on the Importance of Morningstar Star Ratings in the Mutual Fund Industry Segment

	Dollar Flow		Percentage Flow	
Intercept	13.27 (0.41)	-104.53** (-1.98)	0.42** (2.41)	0.01 (0.03)
Jensen's alpha	188.28 (0.64)	-148.74 (-0.49)	3.72*** (2.78)	2.18 (1.61)
Lagged excess return	672.94*** (4.40)	616.82*** (4.29)	1.70*** (4.62)	1.47*** (4.09)
Tracking error	-131.69 (-0.32)	202.55 (0.61)	-2.32** (-2.28)	-0.90 (-0.96)
Morningstar star rating		32.61** (1.98)		0.15*** (5.10)
Control variables include:	Fund age, asset size, lagged flow, and style (growth, value) dummies			
Adjusted R^2	0.658	0.660	0.230	0.259
N	460	460	460	460

Table 4 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. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

D. Evidence on the Importance of Agency Relationships in the Pension Industry Segment

In Section II, we argue that pension sponsor agency problems may influence 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 noted 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 in dollar flow terms for pension fund managers that outperform the S&P 500, and not for those who underperform. The percentage flow regression shows the same pattern, but here the coefficient on tracking error above the S&P 500 is only weakly negative. One interpretation for the lack of significance of tracking error below the S&P 500 is that underperformance of the benchmark already leads to the ultimate penalty of either loss of clients and flow, or being removed from the pool of potential hires. In other words, tracking

error is not as relevant for underperforming managers since the fact that they underperformed dominates the decision to retain or hire the manager. Mutual fund investors invest on their own behalf, and thus are not apt to find tracking error attractive as a measure of safety, 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 if agency concerns were absent. While we cannot dismiss the idea that non-performance and reputational considerations are important to mutual fund investors as well, there is no agency problem to magnify their importance. In addition, mutual fund investors rarely obtain personalized services or interact with managers, and thus primarily base their decisions on objective attributes of managers. For these reasons we expect a stronger statistical relation between flow and performance 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 5.5% 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.

E. The Role of Non-Performance Variables in Explaining Flow

The relation between flow and non-performance control variables, such as asset size and lagged flow, have not received much attention in the mutual fund flow-performance literature. However, differences in the importance of these variables across the segments offer interesting insights into the inner workings of the industry. 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 in Table 5 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 flow relative to other funds will continue to do so in the future, all else equal. Other studies such as Gruber (1996), Patel, Zeckhauser, and Hendricks (1994), and Fant and O'Neal (2000) also find a strong positive relation

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

	Variables Included in the Regression	Pension Fund Managers		Mutual Fund Managers	
		Dollar Flow	Percentage Flow	Dollar Flow	Percentage Flow
Quantitative performance variables only:	Jensen's alpha, lagged excess return, tracking error, outperform S&P500 dummy	0.020	0.055	0.061	0.153
Control variables only:	Asset size, lagged flow, length of track record (age), time and style interaction dummies	0.104	0.075	0.492	0.130
Quantitative performance and control variables:	Both sets of performance and control variables listed above	0.123	0.117	0.505	0.225
Lagged flow only:	Lagged dollar and percentage flow, respectively	0.0004	0.019	0.473	0.078

Panel A contains the adjusted R^2 under various regression specifications for the Pension Fund and Mutual Fund segments (regressed separately). Column 2 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.

Panel B. A Comparison of the Relation of Flow to Non-Performance Manager Characteristics in the Two Industry Segments

	Pension Fund Managers		Mutual Fund Managers	
	Dollar Flow	Percentage Flow	Dollar Flow	Percentage Flow
Intercept	38.92 (1.02)	0.77***,b (9.70)	12.56 (1.25)	0.19*** (4.68)
Lagged flow	0.019 ^b (0.17)	0.032*,s (1.86)	0.66*** (6.89)	0.13*** (3.31)
Asset size	-0.084***,b (-4.89)	-0.09***,b (-10.02)	0.036* (1.88)	-0.01 (-1.42)
Length of track record	-0.33 (-0.06)	-0.03***,a (-3.41)	-1.53 (-1.26)	-0.01*** (-3.79)
Time and style (growth,value) interaction dummies are included				
Adjusted R^2	0.104	0.074	0.492	0.130
N	2462	2462	2677	2677

Panel B 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. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. ^a and ^b indicate that these pension fund manager coefficients are statistically different from the corresponding coefficients in the mutual fund manager regression at the 5% and 1% levels, 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).

between flow and lagged flow. We find that this result is unique to mutual funds and does not extend to 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. Anecdotal, mutual fund investors tend to choose a fund, and then continue to invest automatically for a number of years without much further scrutiny. Gruber (1996)

conjectures that constraints on choices in retirement accounts contribute to auto-correlated flows in the mutual fund industry. 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.

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 dollar and percentage flow and the growth in the number of clients. This indicates that pension managers that manage a large amount of assets receive less flow and grow less quickly, all else equal. In fact, the largest 10% of pension fund managers in our sample experience large outflows. The mutual fund coefficients on asset size, on the other hand, indicate only a very weak positive relation between mutual fund dollar flow and asset size, and no relation between percentage flow and asset size.

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.

V. 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 on the implications for manager incentives, which we discuss in the next section.²⁷ By analyzing the pension fund segment in a similar manner, we can determine whether this phenomena is specific to mutual funds, or if it is universal among managed funds. The answer to this question broadens our understanding of mutual fund flows and manager incentives.

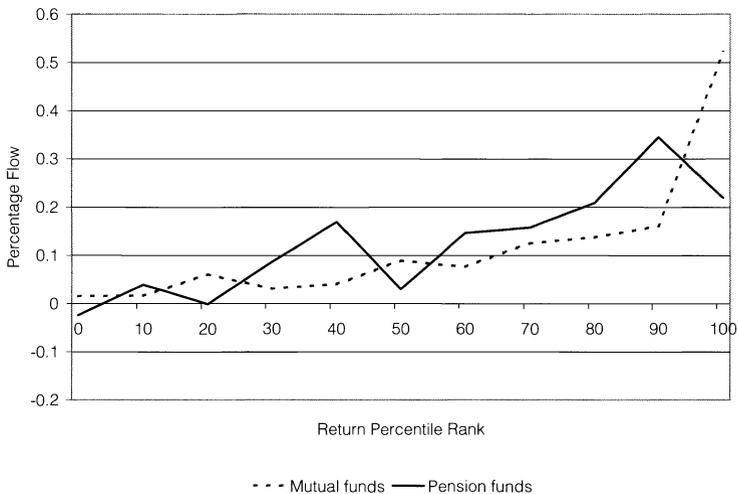
We first present evidence on convexity in the relation between flow and performance in the form of the graphs depicted in Figures 1–4. We adopt a multivari-

²⁷This literature includes Chevalier and Ellison (1997), Brown, Harlow, and Starks (1996), Koski and Pontiff (1999), Busse (2001), Karceski (2000), and Chen and Pennacchi (2000).

ate framework, rather than the univariate approach in Sirri and Tufano (1998)'s figure 1, since we have shown that multiple performance and control variables are important determinants of mutual fund flow. 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 2.²⁸ For example, to create Figure 1 depicting the relation between lagged return percentile ranking and expected percentage flow, we first estimate coefficients on the lagged return deciles while controlling for alpha, tracking error, and asset size. 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

The Estimated Piecewise Linear Relation between Percentage Flow and Return Ranking



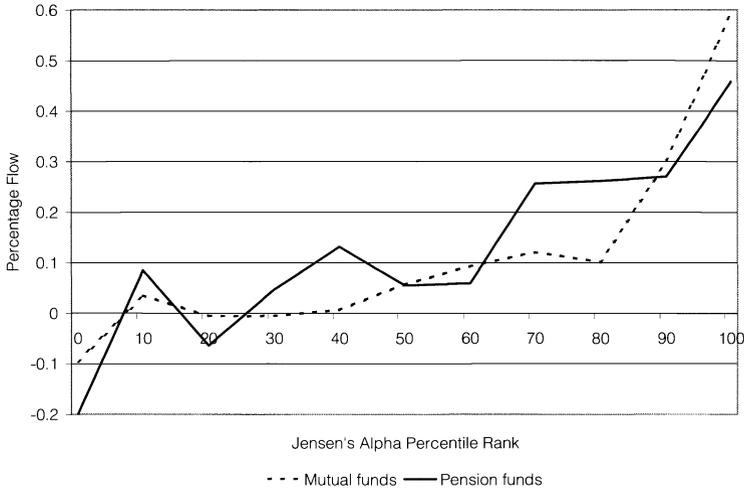
To create this plot, we rank the lagged return of managers by style objective and year to form deciles. We then estimate a piecewise linear regression over these deciles. In the same regression, we control for all variables included in the regression of Table 2. We then substitute average values for 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 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

²⁸We 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.

FIGURE 2

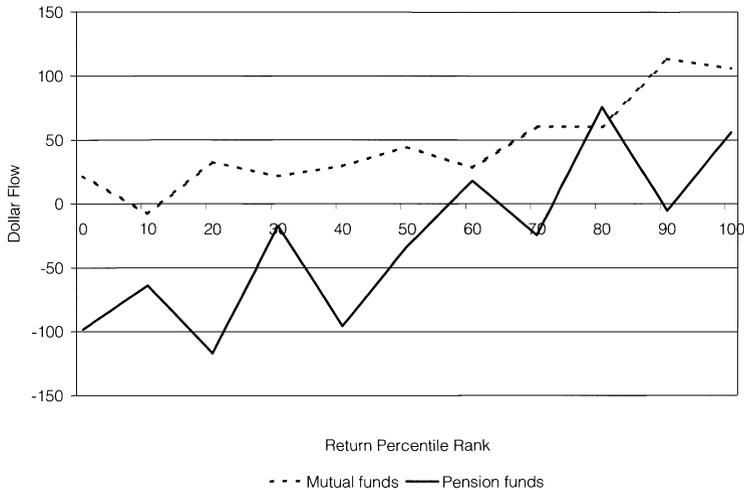
The Estimated Piecewise Linear Relation between Percentage Flow and Jensen's Alpha Ranking



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.

ranked by alpha performance attract disproportionate amounts of flow. Compared to mutual funds, the flow-performance relation for pension funds appears 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. To confirm these results, we conduct a Chow test of whether the piecewise regression slopes are equivalent across all performance deciles. Under this test, we can reject a linear flow-performance relation for mutual funds at the 1% level, both for alpha ranking deciles and for lagged return ranking deciles. The same test cannot reject linearity for either performance measure across all deciles in the pension manager sample.²⁹

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 Chow test confirms the weakly convex pattern, as we can reject that mutual fund slopes are equivalent at all performance deciles at the 5% significance level. In addition, a “lack of punishment” view is still evident for mutual funds since poorly performing managers show small, but positive, inflows rather than outflows. The interesting contrast is for the pension fund sample. As Figure 3 indicates, and a Chow test confirms, the relation between dollar flow and performance in this industry is approximately 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&P 500. 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.³⁰

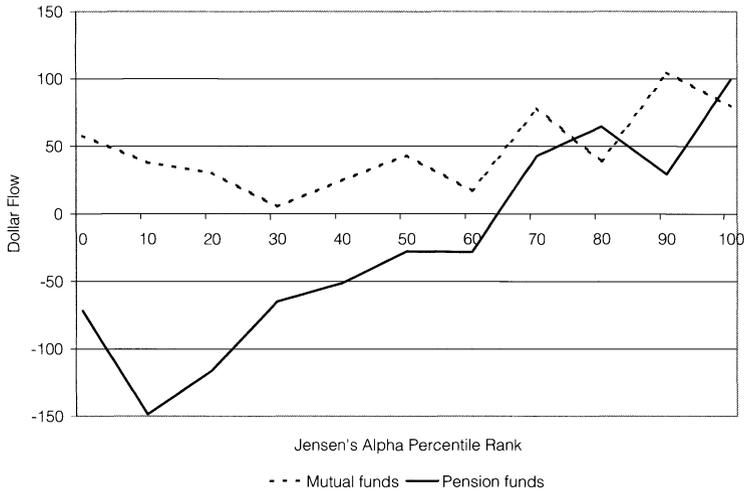
Figure 4 aids in interpreting the results of Table 3, panel A as evidence of punishment. Specifically, this table shows that the coefficient on alpha is significantly positive and symmetric across pension fund managers that performed above and below the S&P 500. Moreover, a significantly positive coefficient 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 pension manager 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 experi-

²⁹We have also run a similar Chow test for the percentage change in number of pension clients as the dependent variable. Again, we cannot reject a linear relation between this measure of flow and pension manager performance.

³⁰We have also checked 95% confidence bands around the average predicted values. The 95th percentile band displays flows below zero for pension managers in both Figures 3 and 4, indicating that we can reject the hypothesis that net flows are zero (or positive) for approximately the bottom-third of pension managers. This is not the case for mutual funds. Flows are insignificantly different from zero for the bottom 15% of managers (and significantly positive for managers with higher performance). Our inferences also remain unchanged when we delete the top 10% of mutual and pension managers ranked by asset size, or delete managers with \$250 million or greater in assets.

enced a net loss of 1,951 clients while the high alpha group experienced a net gain of 152 clients.

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.

Together these results suggest that, in aggregate, pension fund sponsors punish poorly performing managers by severing the client-manager relationship and/or withdrawing their assets, while mutual fund investors do not. Client differences in tax treatment potentially explain this empirical difference. Because mutual fund investments are largely taxable, mutual fund investors may not liquidate poorly performing funds in order to avoid realizing taxable gains.³¹ Pension fund sponsors do not have the same disincentives since the assets they manage are tax-exempt. Alternatively, pension sponsors may be more likely to punish poor performers because of their fiduciary responsibilities as stewards of the pension assets. Specifically, since the corporate treasurer must answer to senior management in the event of inferior plan performance, he might want to sever the relation with underperforming outside managers so as not to be accused of being asleep at the wheel, or of having poor judgement. Mutual fund investors do not have to defend their choices to anyone, and may not feel inclined to take drastic action,

³¹Recent work by Bergstresser and Poterba (2001), 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*.

such as withdrawing all of their assets from a fund. For example, in the event that a mutual fund investor does not want to withdraw assets from a manager, he can still minimize the impact of this poorly performing fund on his overall holdings by allocating current and future investments to managers with better performance records. This behavior would result in a weak or non-existent relation between poor performance and net mutual fund flows.

VI. 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 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.³² Do pension fund managers have the same incentive to risk-shift? We argue that the empirical evidence in Sections IV and V suggests that they do not.

Figures 1–4 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 results 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

³²Note that the empirical identification of risk-shifting behavior is somewhat controversial. Busse (2001) and Koski and Pontiff (1999) 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 Pennacchi (2000) provide an alternative test based on tracking error. 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. These explicit incentives, however, 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. (See Ackermann (1997) Table 1 and *Institutional Investor Pension Forum*, November 1997, p. 59.)

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.³³

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 suggests 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 managers 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.

VII. 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 excess 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 major concern for mutual fund managers, we find a strong relation between mutual fund manager flow and both excess returns and Jensen's alpha. The importance of a risk-adjusted performance measure is somewhat surprising in light of the fact that 75% of mutual fund investors surveyed state that they do not use any quantitative performance measures when evaluating funds. However, Table 4 shows that the relation between alpha and flow is subsumed by a popular summary performance measure, Morningstar star ratings.

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 and do not flock disproportionately to last year's winners. 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.

³³Nelson/Wilshire Survey on Plan Sponsor Attitudes toward Investment Manager Client Servicing, June 1997, <http://www.nelnet.com>.

Through our comparative study design we also uncover two relations that are notably and robustly different across the two segments of the money management industry, and thus worthy of further study. First, we find that the high degree of autocorrelation in mutual fund flows is unique to this segment, and conjecture that this is driven by a tendency by mutual fund investors to shuttle money to the same funds year after year without further scrutiny beyond the initial decision. Second, we find a negative relation between manager flow and asset size only in the pension segment. We conjecture that this is driven by a perception among pension sponsors that large managers are more likely to suffer performance problems or provide inferior client service than smaller managers.

Overall, we find supportive evidence that differences in the flow-performance relations are related to the client differences across the retail mutual fund and fiduciary pension fund segments that we identify in Section II. While our conclusions are based on a sample period ending in 1994, we have reason to believe that our results would survive an analysis of more recent data. Updated surveys and recent articles in practitioner publications suggest that the pension manager selection process has changed little since our sample period. In addition, more recent studies using mutual fund flow and performance data from the late 1990s, such as Bergstresser and Poterba (2001) and Del Guercio and Tkac (2001), find results consistent with those we report.

Some issues especially pertinent to the pension fund segment are necessarily only touched on in this paper, and deserve deeper analysis. For example, our industry comparison focus forced us to tilt our sample toward comparable managers, at the expense of including a wider variety of managers employing many different investment styles and strategies. As a result, we have limited results on the importance of manager style on net flows and, in particular, whether clients use broad market (e.g., S&P 500) vs. specialized style (e.g., Russell 2000 Growth) benchmarks in manager evaluation. While industry insiders and practitioner publications suggest that pension managers are evaluated based on style benchmarks, whether this holds in practice is ultimately an empirical question. Another issue worthy of a deeper analysis is that of investment horizon. While many studies have documented that mutual fund flow is strongly related to short-term performance, pension sponsors are anecdotally more patient investors. Our results indicate that a mix of one-year and three-year performance measures influence pension fund flow. Reconciling this empirical observation with the presumed patience of pension sponsors warrants additional research, especially given that the investment horizon of sponsors has implications for the investment horizon of portfolio managers, and potentially corporate managers of their portfolio companies as well. Definitive evidence on these phenomena awaits further research.

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 (TNA) minus the appreciation in the funds assets. Assumes cash flow occurs at the end of the year. $F_{it} = TNA_{it} - TNA_{it-1}(1 + R_{it})$, where R_{it} is the fund's return over the prior year.
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 $t - 1$. (pension funds only)
Lagged Excess Return	Total annual return including reinvested dividends and capital gains minus the return on the S&P 500 Index, 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. The S&P 500 is used as the market benchmark.
Tracking Error	Tracking error is the annualized standard deviation of the residuals from a market model regression of portfolio excess returns (vs. the risk-free rate) on the excess S&P 500 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 = One if Outperformed the S&P 500	Dummy equals one if the lagged annual return is higher than the S&P 500 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.

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