ABSENCE OF VALUE:
AN ANALYSIS OF INVESTMENT ALLOCATION DECISIONS BY INSTITUTIONAL PLAN SPONSORS

Scott D. Stewart, CFA
John J. Neumann
Christopher R. Knittel
Jeffrey Heisler, CFA

FORTHCOMING: *Financial Analysts Journal, Nov/Dec 2009*

February 2006
Revised March 2009

The authors thank the following for useful comments: two anonymous referees, Michael Salinger, Don Smith, participants at the following meetings: 2002 Chicago Quantitative Alliance, 2006 Eastern Finance Association, 2006 Financial Management Association, 2006 Academy of Finance and the December 2007 Boston QWAFAFEW. All errors remain the responsibility of the authors.

Stewart: Department of Finance and Economics, Boston University School of Management, sstewart@bu.edu, 617-353-2353.
Neumann: Department of Economics and Finance, St. John's University Tobin College of Business, neumannj@stjohns.edu, 718-990-5554.
Knittel: Department of Economics, University of California at Davis and NBER, crknittel@ucdavis.edu, 530-752-3344.
Heisler: Venus Capital Management, Inc. Boston, MA 02110

Keywords: Manager Selection, Asset Allocation, Performance Attribution, Pension Plans, Foundations, Endowments

ABSENCE OF VALUE:
AN ANALYSIS OF INVESTMENT ALLOCATION DECISIONS BY INSTITUTIONAL PLAN SPONSORS

Abstract

Institutional plan sponsors are charged with investing over $10 trillion in assets for pension plans, endowments and foundations, yet there has been no comprehensive study examining whether or not their investment decisions contribute to their asset values. This paper utilizes a dataset covering 80,000 yearly observations of institutional investment product assets, accounts and returns over the period 1984-2007 to study this question. Results document that plan sponsors may not be acting in their stakeholders' best interests when they make rebalancing or reallocation decisions. Investment products receiving contributions subsequently underperform products experiencing withdrawals over 1, 3 and 5-year periods. For investment decisions among equity, fixed income and balanced products, most of the underperformance can be attributed to product selection decisions. Tests suggest these results are not due to survivorship and other biases. Much like individual investors, who seem to switch mutual funds at the wrong time, institutional investors do not appear to create value from their investment decisions. In fact, the study estimates that over $170 billion were lost over the period examined.

1. INTRODUCTION

Institutional plan sponsors include those responsible for pension plans, endowments, foundations and other large pools of assets. These assets are very large, estimated at over $10 trillion in December, 2006, yet there has been limited research on institutional investors. This includes Heisler, Knittel, Neumann and Stewart (2007) which documented the importance of historical performance measures, performance trends and product attributes in determining plan sponsors' decisions to allocate assets among professional money managers' investment products. Del Guercio and Tkac (2002) and Lakonishok, Shleifer, and Vishny (1992) also studied the institutional investment decision making process. However, the question remains whether these decisions are adding value for the ultimate beneficiaries or stakeholders on whose behalf the plan sponsors are acting. This question is important due to the size of institutional plans and the relative level of sophistication their sponsors possess relative to individual investors. Pension plans, endowments and foundations are typically staffed with professionals with years of experience and advanced degrees. Working on their own or with the aid of consultants, institutional sponsors devote considerable time and resources to selecting asset classes and products that are expected to perform well in the future.

The central goals of this study are to document whether these efforts pay off by exploring the economic significance of allocation decisions and to attribute components of performance to individual product selection and asset class or style category allocation decisions. While we do not observe performance of the plans directly, we can observe the allocation of their assets to investment products through time. The data we utilize are available in the PSN Database which includes 80,000 institutional product annual returns as well as annual assets, accounts and descriptive information between 1984 and 2007. Our analysis finds that new allocations often underperform prior allocations as measured over the 1, 3, and 5-year periods after these decisions

are made. We show that these decisions have cost stakeholders in the institutional plans over $170 billion in the aggregate, gross of any transaction costs. Further, underperformance is driven more by the selection of new investment products rather than the new asset class or style mix.

The remainder of this paper is organized as follows. Section 2 provides a brief survey of the related literature. In Section 3, we describe the dataset and in Section 4 the methodology including asset flow measures, portfolio construction techniques and performance calculations. A summary of historical asset levels and fund flows is also provided. Investment products are ranked into quintiles by the percentage of asset inflows and outflows captured, and performance is evaluated in Section 5. Post-flow returns for a portfolio of products receiving the largest inflows are means tested against returns for a portfolio of products experiencing the largest outflows. We also analyze allocation decisions among the equity, fixed income, and balanced products in the dataset by creating flow-weighted portfolios and attribute active performance to multiple sources. Data integrity, including survivorship bias is discussed in Section 3 and tested in Section 6, including a confirmation of asset-flow performance results using account-flows. We conclude the paper in Section 7 with a discussion of the results and a presentation of their economic significance.

2. LITERATURE SURVEY

Heisler et al. (2007) determined that long-term total returns and a track record of consistent positive or negative benchmark-relative returns factor heavily into institutional plan sponsors' decisions to allocate assets to, or pull them from, equity products. Sizeable negative short-term total returns play a modest but statistically significant role in decisions to shift assets away from products. Movement of an entire account from one product to another is subjected to

a higher hurdle that includes both the sign and level of longer-term benchmark-relative returns. Style benchmarks reflecting the growth or value style strategy that the product pursued are as important as the S&P500 index in product selection. Extremeness of style, as measured by betas relative to style indexes, is not as important in determining flows, suggesting a limit to the sophistication of pension plan, endowment and foundation sponsors. In addition to favoring attractive past performance, these investors also tend to prefer smaller investment products and those with longer track records.

The results of this study are consistent in spirit with recent work by Goyal and Wahal (2008), who use a matched sample of manager hiring and firings in the institutional market over a 3-year period. They find that fired managers outperformed newly-hired managers subsequent to this replacement. The bulk of their firings sample is from a short period, the post tech bubble of 2000-2003, and the 3-year returns of matched hire/fire transitions total 129 observations. Our study explores 80,000 observations over 22 years and focuses on 1, 3 and 5-year performance periods.

Prior research on individual stock and mutual fund investors report mixed findings. The Quantitative Analysis of Investor Behavior (2005) by DALBAR, Inc. suggests that the tendency for mutual fund investors' to chase (or flee) recent performance produces lower long-term returns relative to a dollar cost averaging strategy. Odean (1998) examines the trades of discount brokerage clients and finds that unprofitable trades were held longer than profitable trades. In addition, the profitable stocks that were sold generally outperformed comparable stocks by 2.35% while the unprofitable stock positions that were held underperformed by 1.06%.

Gruber (1996) examines the quarterly cash flows of 227 mutual funds and finds positive post-flow alpha for funds experiencing positive cash flows as well as positive alpha savings by

disinvesting from negative cash flow portfolios. With annual cash flows, however, the alpha is negative on new cash inflows and positive on outflows. Zheng (1999) calculates a Grinblatt and Titman (1993) measure to detect evidence of selection ability by mutual fund investors in the aggregate and finds that weight changes in each fund relative to all funds produces a positive return difference over the succeeding month. The author then calculates excess market returns, one-factor and Fama-French three-factor models for a series of eight portfolios constructed with funds receiving new money flows. These tests find weak evidence of a "smart money effect" – smart buying and selling decisions – until the data are segmented into large and small funds. However, three-factor model results suggest that the apparent smart money effect is primarily due to money flows into and from small funds, and is very short-lived[1].

Several studies discuss the importance of investment style in evaluating the behavior of investments. Barberis and Shleifer (2003) note that investment styles follow specific life cycles and propose that investors allocate assets based on style, with assets moving to the style which has recently performed well. Looking at the return of individual stocks, their evidence suggests that short-term returns trend, but longer-term returns reverse. Teo and Woo (2004) also study this style effect, utilizing mutual funds instead of individual stocks, and find evidence of style return reversal.

3. DATA

While we do not have direct access to the decisions made by institutional investors, we can observe the results of their decisions through a database of the managers they hire. This

[1]This may appear contrary to our finding in the institutional market, but we don't study subsequent 1-month returns since they are not available in the PSN database.

database provides an opportunity to measure asset and account flows between products and analyze the performance of those products.

3.1 PSN Database

The PSN Investment Manager Database is compiled by Effron Enterprises, Inc. and provides historical information on thousands of investment products, including annual summary information about each product, quarterly performance, and assets and number of accounts under management. The information, self-reported by the investment product managers, includes the asset class and product style and is used by both the managers for comparisons to their peers and by plan sponsors and pension consultants to identify candidate investment managers. Product clients include retirement plans, foundations and endowments. Products exclude hedge funds, real estate, private equity and other alternative asset classes. The PSN universes include:

- Domestic equities including growth, value, growth at a reasonable price (GARP) and core
- International and global equities
- Domestic, global and international fixed income
- Domestic balanced

The analysis of asset and account flow and post-flow performance in this paper covers the 1984-2007 period.

Assets and number of products are summarized in Table 1. As of December 2006, the PSN database included 6,120 products totaling $13.5 trillion in domestic and international equity, domestic and international fixed income and balanced products. Net of mutual fund assets, the remaining $10 trillion exceeds the $6.5 trillion figure provided in Pensions and Investments for the top 1000 pension plans in 2006[2] in the United States. This indicates that the

[2] Pensions and Investments reports the assets of the 100 largest endowments and 100 largest foundations together total $500 billion as of December 2006. The remaining $3 trillion represents smaller funds, foreign plan sponsors and non-public funds including churches, private foundations and non-pension corporate assets.

PSN database represents a very large sample of investment products and in turn, institutional assets. These levels have grown dramatically since 1984 with the growth in the investment industry. The figures in Table 1 suggest asset growth rates appear to be cyclical, with strong growth in the late 1980's, the early 1990's, the late 1990's and 2003-2004. This is undoubtedly related to stock market performance. The growth rate in the number of products reflects a steady decline as the absolute number increases, with up-ticks in 1992, 1996 and 2001. The two growth series are related, with a correlation of 0.488.

3.2 Data Quality

3.2.1 Impact of Mutual Fund Data

The PSN database includes only institutional products offered in separate account or pooled vehicles. Performance information includes only the gross returns of these products. Products which are exclusively offered in mutual fund format are excluded, but the level of product assets may include assets from the institutional product's corresponding mutual fund. Given that mutual fund assets are 15.5% of total database assets (14.8% of assets among the post-flow 1-year sample products), we run our tests including and excluding products with significant mutual fund assets and find no material difference in our results. This evidence is discussed later in the paper.

3.2.2 Survivorship Bias

Bias can take two forms: one in which "old" data is purged from a database after the product is liquidated or the manager stops reporting, and the second when the time series of reported data is interrupted. The vendor reports that once submitted to PSN, all records are retained, whether or not they have been updated, so that the records of expired products survive. Our investigation finds that between 24% and 37% of products which first report assets and

returns data in years from 1984 to 1994 continued to report through 2007. The fact that this number is not (close to) 100% in any year suggests that data purges are not a concern.

Instances of interruption in the time series of reported data could be one-time, temporary, or permanent. The overall impact of interruptions is unlikely to be large due to the structure of the source database and our sample sizes. If a product is missing from the database in any year, it may be because it was liquidated, or because the manager did not report its information. If the product was liquidated and its assets were distributed among existing products, then we pick up those distribution decisions in the inflow portfolios and the defunct product is excluded from outflow portfolios. If the product was transformed into another new product and its assets transferred, then both products are excluded from the respective inflow and outflow portfolios in that year since the outflow product lacks a post-flow return and the inflow product is new and lacks flows in that initial year.

Importantly, there is no requirement by PSN that the final quarter of a liquidated product's performance is reported by the manager, or that a product that continues to exist but is no longer actively marketed is reported to PSN. The concern here is that poorly performing products which continue to do poorly are not advertised and are not in the database, biasing upward the subsequent returns of portfolios of products which have lost assets (due in part to poor investment performance). This is relevant only if poorly performing products never resume reporting since performance records may be added to the PSN database at any time. While the average attrition rate of products which begin to report assets and returns data but discontinue one or both pieces of information in some future year is only 3.23%[3], we calculate excess returns for these products in their last reporting year and observe these to be noticeably lower than

[3] This closely matches the figure based on a non-survivor-biased sample in Busse, Goyal, and Wahal (2006)

excess returns calculated across the entire database in roughly half the years covered by our sample.

To explore the possible impact of this bias on the results, we conduct our tests in two ways and compare the results. In the first approach, for each 5-year rolling period, we include an investment product in each post-flow period (1-year, 3-year, 5-year) if it carries sufficient data for that test, regardless of whether the data is available to include it in other post-flow periods. In the second approach, we restrict the sample to products that existed for all five years of any 5-year post-flow period and so is eligible for all three post-flow period tests. This ensures that a product with inflows or outflows continues to report data for at least five years after the flows are calculated, thereby eliminating survivorship problems for the 1-year and 3-year tests. That there is little difference in results between the two approaches suggests that survivor bias is not the source of our main result -- that institutional plan sponsors do not create value through manager and asset allocation/equity-style rotation. All results are discussed in detail in Sections 5 and 6.

4. METHODOLOGY

We calculate asset flows for every product in the PSN database and collect performance subsequent to these flows. The goal is to determine whether products with significant inflows perform differently than products with significant outflows and if different, to examine the source of these performance differences. Similar analyses are conducted with account gains and losses.

4.1 Description of Flows Measures

Consistent with almost all of the investment literature that studies asset flows, including that reviewed in Section 2, we calculate product *i*'s dollar flows from year-end *t-1* to *t* as

$$DollarFlows_{i,t} = Assets_{i,t} - Assets_{i,t-1} \cdot (1+R_{i,t}) \ , \qquad (1)$$

where $R_{i,t}$ is product *i*'s return between year-ends *t-1* and *t*. This approach is designed to capture the change in assets from one year to another, adjusted for the return earned on those assets.

In our initial tests, we rank products into flow quintiles based on the measure introduced in Heisler et al. (2007). This measure of *captured flows* scales dollar flows by the total amount of dollar flows among all products within the dataset that year. For a specific product, this measures the percentage of aggregate flow activity captured (or lost) by that product in that year, and is defined as

$$Asset\ Flows_{i,t} = \frac{DollarFlows_{i,t}}{\sum_{j} |\, \text{Assets}_{j,t} - \text{Assets}_{j,t-1}\,(1+\text{R}_{j,t})\,|} \ . \qquad (2)$$

In later tests, we create portfolios each year which consist solely of either products with inflows or products with outflows. To calculate the flow-weighted portfolio returns, each product's weight is taken as its inflows or outflows relative to the total inflows and outflows in a given year:

$$w_{i,t} = \frac{DollarFlows_{i,t}}{\sum_{j=1}^{N} DollarFlows_{j,t}} \ , \qquad (3)$$

where $w_{i,t}$ represents the weight of product *i* at end-of-year *t* with aggregate products *N*. The equation provides the opportunity to build flow-weighted portfolios and measure the subsequent performance of aggregate investors' decisions to move assets between products from one year to the next. The returns of decisions within categories are also explored by including only products within a particular category.

4.2 Summary of Flows

Table 2 contains dollar inflows and outflows, and their proportions by product style category for the products in the database from 1985 to 2006 for which flows can be derived and subsequent performance can be measured. In order to compute the dollar flow calculation (1), a product must exist for at least two consecutive year-end periods with a full year's return in between[4]. This restriction results in a smaller sample size than the total PSN database, on average 21% fewer products and 11% lower assets. Dollar Flows are calculated annually using expression (1) and asset flows are calculated relative to total assets among all products in our test sample. Annual inflows range from 9.0 to 16.4% of sample assets, with an average of 12.5%. Outflows are lower, averaging 10.3% per year, thereby reflecting net contributions to the investment management universe, ranging from 5.0% to 15.8%. Flow activity in domestic equity and domestic fixed income, the largest overall allocations, represent the bulk of allocation changes. On average, international equity and the combination of global equity, global fixed income and international fixed income investments experience net inflows at the expense of domestic equity, domestic balanced and domestic fixed income mandates. Activity (and assets, though not shown here) in balanced mandates shrinks through time, reflecting the transition by plan sponsors to specialist managers over the last 22 years.

4.3 Performance Calculations

We compute the performance of investment decisions using several techniques. The first involves ranking and assigning individual products into quintiles based on their captured flows and examining the 1-year, 3-year and 5-year performance of the extreme quintile portfolios

[4] Note that flows are not implied to have been directed to new products when they appear in the database with assets for the first time.

commencing immediately after the flows occur. This approach is straightforward and facilitates statistical testing.

To confirm these results and facilitate performance attribution, we also construct two separate asset flow-weighted portfolios of all products, one of products with net outflows and one of products with net inflows in each year, and then compare the post-flow performance of these two competing portfolios over the subsequent 1, 3, and 5-year periods. Similar tests are run using account flow data, to confirm that the asset flow results are not biased by a small group of large plans. Constructing and comparing portfolios based on flows this way is similar to the portfolio construction in Zheng (1999). It is also similar to the positive and negative cash flow portfolios in Gruber (1996).

Finally, the differences in performance between the inflows and outflows portfolios are subject to a Brinson attribution technique. The goal is to explore the source of the difference in returns between products receiving and losing assets. The analysis calls for performance evaluation by comparison to one or more benchmark-based portfolios. We assign the portfolios of outflow products, those consisting of products from which plan sponsors withdrew money each year, as the benchmarks for the inflow portfolios, those consisting of products experiencing dollar contributions. A negative active return corresponds with a loss of value due to plan sponsor investment decisions. This technique provides the opportunity to identify the impact of product selection within asset class and equity style categories and the impact of allocation between those categories. The asset class and equity style category reallocation effect in our tests is calculated as:

$$\textit{(inflow portfolio weight – outflow portfolio weight)} \cdot \textit{outflow portfolio return.} \qquad (4)$$

The investment product selection component is calculated by employing the outflow portfolio weights in a calculation including the performance difference between the new portfolio and the benchmark portfolio:

(inflow portfolio return – outflow portfolio return) · outflow portfolio weight. (5)

The remaining unattributed portion of the return differences between the inflow and outflow portfolios is the interaction component:

(inflow weight – outflow weight) · (inflow return – outflow return). (6)

5. RETURNS FOR PRODUCTS EXPERIENCING INFLOWS AND OUTFLOWS

The underlying assumption of the portfolio construction method used is that assets which flow out of one set of products are redirected into the set of products receiving inflows. We note that this is a simplification. As Table 2 demonstrates, inflows and outflows are not the same each year. In addition to attracting money from their competitors, asset managers can gain flows either because plan sponsors place new plan contributions with them or reallocate existing money from investment products in private equity and other asset classes not included in the PSN database. These, too, however, are active selection decisions by the sponsor and will help determine flow proportions. Similarly, lost flows are not necessarily reinvested with another product in the database. They can be withdrawn from the PSN universe altogether either because the funds are needed to meet some liability or because the sponsor reallocates out of public markets and into other asset classes. These decisions also represent active choices by the sponsor, who has decided to pull assets from the products observed to lose flows. The value of all these decisions is evaluated in this section.

5.1 Ranked Quintiles

We begin with a simple calculation of the subsequent, post-flow performance of investment products which received the most inflows and the products which lost the most outflows. For this initial test, products are ranked by their captured asset flows (equation 2) and placed into quintiles each year. Note that sorting products in a given year by this measure is equivalent to sorting by dollar flows. Average annual gross returns over the subsequent 1, 3, and 5-year horizons for each quintile are calculated, and a t-test of equivalence is performed between the means of quintile 1 (largest flow gainers) and quintile 5 (largest flow losers). This is essentially testing the equivalence of post-flow performance of equally-weighted portfolios of the 20% of products which attracted the greatest inflows or lost the most outflows in each year.

Table 3 reports the results of this analysis. The t-statistics in Panels A and B report the results of the means tests between quintiles 1 and 5 using the gross returns in the 1, 3, or 5-year post-flow periods. In 14 of the 17 formation periods where post-flow 1-year performance is measured prior to the tech bubble burst in 2002, the quintile portfolio of products receiving the most inflows performed worse than the quintile portfolio of products experiencing the largest outflows. This difference is statistically significant at the 5% level in ten of those years. This result suggests that plan sponsors' asset allocation decisions did not benefit their stakeholders after one year. Among the five post-flow 1-year periods following the tech-bubble burst, the quintile 1 return was significantly larger four times, suggesting that plan sponsors did add some value in the intermediate term. The wealth effect of these 1-year post-flow return differences is displayed in Figure 1 and shows a cumulative negative impact from yearly investment changes.

In 16 of the 20 post-flow 3-year periods, the largest flow gainers underperformed the largest flow losers, with the difference significant for ten of the periods. Over the post-flow 5-

year horizons, the mean return difference is negative in all but two of the eighteen formation periods, with nine outflow quintile returns significantly better than the inflow quintile returns.

The test results suggest that on average, decisions made by plan sponsors to direct money from one group of investment products (quintile 5) to a second group of products (quintile 1) did not benefit their stakeholders. In most cases, the products which received the largest inflows significantly unperformed over the post-flow horizons. The mean return difference for the 1-year post-return periods is reported in Table 3 as -1.059%, significant at the 5% level. Moreover, this negative performance persists over 3 or more years, and does not appear to entirely reverse, as reflected by the annualized mean differences of -0.760% over 3 years and -0.635% over 5 years, both of which are statistically significant ($t = -2.38$ and $t = -6.92$, respectively) at the 5% level.[5] This performance is examined more closely in the remainder of this paper.

5.2 Weighted Inflow and Outflow Portfolios

The test utilizing quintile portfolios is straightforward, but the mean return difference calculation excludes performance for the 60% of products in quintiles 2, 3, and 4 and equal weights the product returns within the quintile portfolios. To address these issues, and to facilitate a performance attribution analysis, an alternative technique is used. Each year, portfolios of products either exclusively receiving inflows or suffering outflows are formed. Portfolio weights are determined at the beginning of each period based on a product's flows relative to total portfolio inflows or outflows (equation 3). This technique harnesses all of the reporting products in the sample and places more importance on those products which the

[5] When calculating the standard errors for the 3- and 5-year returns we account for autocorrelation by using Newey-West heteroskedastic and autocorrelation consistent standard errors. An alternative non-regression-based technique is the Fama-MacBeth estimator. Skoulakis (2008) presents simulation evidence that in cases like ours, a large cross-section and relative small time-series, both estimators yield reliable standard error estimates. For all three cases we report t-statistics in Table 3 using only the annual differences. When we conduct the tests across the entire sample,

sponsors themselves deemed most important as revealed by their dollar flow allocation decisions. Weighting returns by the size of the flow accurately measures the impact of the aggregate annual investment decisions made by the institutional investors using the products in the PSN universe. Table 4, Panel A reports that the post-flow 1-year average performance difference between the inflow and outflow portfolios (the "In-Out" mean) is -1.124%, very similar to the average difference of -1.059% between quintiles 1 and 5. This is consistent with the earlier conclusion that institutional investment decisions did not add value to their plans over the sample period. The 3- and 5-year differences, reported in Table 4, Panel B are -0.861 and -0.671, respectively.[6]

5.3 Performance Attribution for Category and Product Decisions

The flow-weighted portfolio construction technique facilitates attribution of performance from institutional investor active decisions. Consider Table 2 which contains annual aggregate dollar flows from 1985 to 2006 for products in the PSN database and percentages of the aggregate flows based on their equity, fixed-income, balanced or other asset class designation. Expressing the flow activity by asset class offers some insights in an aggregate sense into what sponsors were thinking in any given year. For example, following the equity market decline and simultaneous interest rate decline beginning in 2000, there were spikes in outflows from domestic equities in 2000 and 2001 and from domestic fixed income in 2002. Domestic fixed income also attracted a larger share of inflows in 2001 and 2002 than in years before or after. Following the strong performance of balanced strategies in the 1987 domestic equity market crash, balanced mandates experienced a one year spike in contributions at the expense of

---

the serial correlation-corrected t-stats are -4.7, -4.3, and – 4.2 for the 1, 3, and 5-year post-flow period return differences, respectively.

domestic equity, before beginning a secular decline in flow activity. This hints of a certain amount of inter-class re-allocation in addition to intra-class movement.

Because the analysis in Table 3 employs only product information, there is room to argue that the superior post-flow performance of the "outflow portfolios" could be due partly to asset class or equity style allocation decisions as well as investment product (or manager) selection. To quantify the contributions from the two sources, we use the Brinson attribution approach to decompose inflow and outflow portfolio flow-weighted performance differences into their category allocation, product selection, and interaction components. By using all reporting products with their classification into one of the ten PSN categories, we are able to capture the effect of flow decisions between and across investment categories and asset classes. The return differences and decompositions are reported in Table 4.

The results in Table 4 clearly indicate that most of the post-flow underperformance of the inflow asset class portfolios is due to product selection, not the category reallocation decisions. For mean return differences over the 1, 3 and 5-year post-flow periods, the portion attributed to product selection is more negative than the difference due to category allocation and the interaction effect (displayed in the table for 1-year period only) combined. Interestingly, the variability of the category allocation effect is greater than the product selection effect, for all three periods. This is likely due to the greater diversification in selecting many individual managers relative to a limited number of asset classes or equity styles. There does not appear to be a clear pattern relating sign or magnitude of the selection and allocation effects. The largest 1-year return attributed to category allocation was 7.3% following 1985 when the product selection return was -2.3%, while the largest product selection return was -3.7% in the following

[6] The 1-year difference is statistically significant at the 10% level, while the 3- and 5-year differences are significant at the 5% level.

year when the category allocation return was -2.0%. Put another way, of the fifteen negative post-flow 1-year return differences, product selection is the highest contributor six times, category allocation four times, and in four other years both sources were significant contributors. In fact, the correlation between the two effects is zero for the 1-year and 3-year periods and slightly negative for the 5-year period.

5.4 Allocation Decisions Between and Within Category

Another way to view performance attribution is to construct asset flow portfolios within asset classes or equity styles by including only the products within the relevant category. The difference in performance between the inflow and outflow portfolios will provide a measure of the product selection decision within asset class or equity style and identify whether there is value added from the decisions within each category. The results of this analysis are presented in Table 5 which reports performance of flow-weighted portfolios in 10 PSN-designated categories.

One, 3 and 5-year average post-flow returns for inflow and outflow portfolios are reported for 5 domestic equity styles and 5 additional asset classes. The average of the 22 post-flow 1-year period returns for inflow portfolios is lower than the outflow portfolio returns for all ten categories. The mean underperformance across these groups (not displayed in the table) is -0.960%. For eight of the 10 groups, the average of the 20 post-flow 3-year inflow portfolio returns is lower than that of the outflow portfolios. The difference in the average returns of the inflow and outflow portfolios for the 18 post-flow 5-year periods is also negative for eight of the ten categories[7]. The only positive return differences (two in the 3-year and two in the 5-year

[7] It should be noted that almost all of the mean return differences are more negative, favoring the outflow portfolios, when the restriction that a product had to exist for all five years in any rolling period is enforced, based on the techniques described in Section 6.

results) are calculated for global equity, international fixed income and global fixed income products, all of which reflect low levels of assets. Overall, the performance figures in Table 5 confirm the results presented in Table 4, showing broad value destruction from institutional investment decisions.

The performance of investment decisions is determined by both skill and luck. The information ratio is a risk-return measure of skill, equal to the ratio of benchmark-relative active return to active risk. If institutional investors exhibit the same skill level[8] in investment selection in every category, they should display higher absolute return differences for higher volatility categories. This pattern is observed in Table 5. The higher volatility categories of Domestic Growth and International Equity reflect the largest levels of underperformance (-1.777% and -1.705% over one year) and the lowest underperformance is observed for the lowest volatility Domestic Fixed Income category (-0.296%).

6. CONFIRMATION OF RESULTS

The description of the PSN dataset in Section 3 introduced the concerns that the results presented in Tables 3 through 5 are affected by two potential data biases. The first is potential survivor bias, due to the possibility of poorly performing products which continue to perform poorly, dropping out of the sample or failing to report in years with poor performance. If institutional investors reduce their allocation to these products and our analysis excludes them, the negative performance differences we compute may be exaggerated or even of the wrong sign.

To test for this bias, we repeat the tests reported in Table 3 for a subsample that includes only products which exist for all five years of a given 5-year post-flow period. This sample excludes products which disappear from the dataset or fail to report required data within a five

year period. The results are reported in Table 6 under the heading "Existing for 5 Years" alongside the results from Table 3 which are summarized under the column heading "Full Sample". The 5-year requirement limits the 1-year and 3-year return periods to end following the 2002 flow year. The similarity of the results indicates that survivor bias is not the source of the underperformance from institutional investors reported in Tables 3, 4 and 5. In fact, the mean return difference is actually more negative for the subsample than for the full sample, and the sign of the return difference in each year is the same for all 1-year return periods and the same in all but one of the 3-year return periods. The average 1-year return difference for the subsample is -1.682% compared with the full sample average difference of -1.574% for the post-flow periods following flow years 1985 to 2002. For the 3-year post-flow periods the mean return difference is -0.962% for the subsample and -0.891% for the full sample for the 1985-2002 flow periods. The 1 and 3-year mean differences are all significant at the 5% level.

The second potential bias involves the presence of mutual fund assets in the dataset. While all products are offered as institutional separate accounts and commingled pools and returns are gross of fees, some observations include mutual fund assets. While this represents a small portion of assets in the full dataset, we construct a new subsample excluding all products in a given year with mutual fund assets greater than 10% of total assets, a threshold we believe to be appropriate given that it reduces the proportion of mutual fund assets to less than 0.6% of the aggregate assets, compared to 15.5% for the full dataset. Return differences for this new subsample are presented in Table 6 under the heading "Limits Mutual Funds". Over the full 1985-2006 sample period, the 1-year post-flow return difference for the subsample is -0.999% compared to a return difference of -1.059% for the full sample. Three and 5-year return differences are also very similar for both samples, suggesting that mutual fund asset flows are

[8]For discussions of investment decisions, skill and value-added see Grinold (1989) and Stewart (1998).

not influencing the observed return differences. The negative performance displayed from changing investment allocations through time appear to be due to the decisions of institutional plan sponsors, not retail mutual fund investors.

The PSN records include the number of accounts for each product in addition to asset levels. As a further check on the asset flow results, and to ensure that a few very large plans are not biasing our results, return differences are examined for portfolios formed based on changes in the number of accounts. Similar to the asset flow test, an account change-weighted portfolio of products whose account totals grew is compared to a similarly-formed portfolio of products which lost accounts. Table 7 reports the subsequent performance differences of these portfolios under the heading "Account-Weight," alongside the asset flows-weighted portfolio figures from Table 4 under the heading "Asset-Weight". These results confirm our previous conclusions. Not only are the signs and return differences for the asset flow-weighted and account-weighted portfolios similar in a majority of the subsequent return periods, but the averages of the annual return differences are more negative for the account-weighted portfolios than for the asset flow-weighted portfolios: -2.167%, -1.719%, and -1.703% over the 1, 3, and 5-year post-flow periods.

These results complement the conclusions from Heisler et al (2007). It was shown that products which experience especially poor results lose accounts in addition to assets. Interestingly, it is the performance of these products that experience especially strong performance subsequent to being fired.

7. DISCUSSION

The preceding analyses document that plan sponsors are not acting in their stakeholders' best interests when they make rebalancing or reallocation decisions with plan assets. Portfolios

of products to which they allocate money underperform relative to the products from which assets are withdrawn. Performance is lower over 1 and 3-year periods and shows no signs of reversal even after two more years. When post-flow performance is decomposed into allocations between asset categories and product selection within categories, product selection detracts more from performance than asset allocation, though both sources detract. Tests for biases in the PSN database confirm these results.

The economic significance of these findings may be gauged by measuring the dollar impact of the return differences between portfolios of products that received inflows and products which experienced outflows. This quantifies the value that was added or foregone by sponsors' decisions regarding their plan assets. Table 8 shows that the value foregone by placing assets with the inflow portfolio products instead of the outflow portfolio products has been considerable, totaling $56.2 billion from the first year following investment decisions. The annual figures vary widely, especially as total assets grow to over $10 trillion, with dollar impacts of $51 billion lost in the year following allocation changes made in 2000 and $45 billion gained in the year after 2002. Table 8 also displays 3 and 5-year performance impacts for each year assuming static product portfolios. In order to avoid double counting in the total estimate of longer-term results, we assume sponsors reallocate a portion of assets at the end of years 1 and 3. The resulting 5-year weighted[9] average impact, without compounding, sums to $170.2 billion for the full sample period, a significant figure for the institutional investment industry.

Although only estimates, these figures most likely underestimate the economic impact since we exclude the transactions costs required to implement the allocation changes; the

[9] Over the sample period, inflows represent on average 12.5% of product assets. We assume a constant reallocation rate with 12.5% of the reallocated capital earning the 1-year performance impact, 25% the 3-year impact and 62.5% the 5-year impact. Different weighting schemes yield similar totals.

estimated dollar impact over 1-year periods would double assuming 100 bp round-trip transaction costs. Clearly, plan sponsors could have saved hundreds of billions of dollars in assets if they had simply held course.

The results prompt several questions. The largest asks why plan sponsors appear to fail in their goal of increasing the value of plan assets. Heisler et al. (2007) demonstrate that institutional investors are sophisticated in their use of historical track records to help determine where to allocate their money. Perhaps investment officers, either because they believe it themselves, or their supervisors do, find comfort in extrapolating past performance when in fact excess performance is random or cyclical. Randomness would lead to zero performance impact while reversion would lead to negative results.

There are several experiments we can suggest to better understand this behavior. The first is to study the PSN database in more detail, perhaps documenting mean reversion in product returns relative to benchmarks following extended periods of excess return. Heisler et al. (2007) suggests that institutional investors on average do not seem to fully understand "extremeness of style", for example the difference between deep value and relative value equity styles. Perhaps mistakes are made as a result of this misunderstanding. Another approach would be to survey investment officers, to learn about their process and identify common mistakes. There are no fool-proof methods for manager selection, though Stewart (1998) presents a quantitative technique shown to be effective with large samples of managers. Treynor (1990) offers a qualitative approach, listing 10 key questions to ask of a prospective manager. With pension plans, foundations and endowments continuing to receive billions of dollars in contributions annually for the foreseeable future, and given the billions that have been lost in the past, clearly the process of selecting investment managers needs review.

Table 1.
Summary Information on PSN Database
Year-end assets, number of products and number of accounts, 1985-2006.

Year-End	$B Assets	% Asset Growth	Mutual Fund Assets % of Total	Products	% Product Growth	Accounts (000)	% Account Growth
1985	$ 319.7	-	0.3%	542	-	39.0	-
1986	$ 485.9	52.0%	0.2%	720	32.8%	67.6	73.3%
1987	$ 585.9	20.6%	0.2%	971	34.9%	47.8	-29.3%
1988	$ 742.1	26.7%	0.3%	1,246	28.3%	49.1	2.8%
1989	$ 984.2	32.6%	0.4%	1,556	24.9%	58.7	19.6%
1990	$ 1,002.3	1.8%	0.7%	1,777	14.2%	74.5	27.0%
1991	$ 1,378.5	37.5%	1.1%	2,027	14.1%	92.7	24.4%
1992	$ 1,701.3	23.4%	1.2%	2,560	26.3%	141.5	52.6%
1993	$ 2,252.5	32.4%	1.7%	2,963	15.7%	165.3	16.9%
1994	$ 2,460.8	9.2%	2.1%	3,285	10.9%	162.5	-1.7%
1995	$ 3,333.9	35.5%	2.4%	3,658	11.4%	186.2	14.6%
1996	$ 4,094.6	22.8%	3.4%	4,140	13.2%	240.4	29.1%
1997	$ 5,508.3	34.5%	4.4%	4,476	8.1%	279.0	16.1%
1998	$ 6,573.7	19.3%	7.1%	4,839	8.1%	340.4	22.0%
1999	$ 8,500.3	29.3%	7.5%	5,230	8.1%	383.2	12.6%
2000	$ 8,130.6	-4.3%	9.0%	5,371	2.7%	538.8	40.6%
2001	$ 7,979.8	-1.9%	12.4%	5,856	9.0%	728.7	35.2%
2002	$ 7,892.8	-1.1%	20.0%	6,364	8.7%	1,098.2	50.7%
2003	$ 10,268.3	30.1%	20.2%	6,481	1.8%	1,251.2	13.9%
2004	$ 11,719.7	14.1%	20.8%	6,483	0.0%	1,582.8	26.5%
2005	$ 12,403.6	5.8%	21.6%	6,349	-2.1%	1,783.7	12.7%
2006	$ 13,537.9	9.1%	25.8%	6,120	-3.6%	1,689.7	-5.3%

Table 2.
Asset Flow Summary
All products, by year and product category, 1986-2006.
Percentage flow as proportion of assets; portion of flow sums to 100%.

----------Panel A: INFLOWS----------

Flow Year	Flows: Dollars in (million's)	Flows: Percentage Flow[a]	Portion of Flow: Domestic Balanced	Domestic Equity	Domestic Fixed Inc	International Equity	Other[b]
1985	$14,569	12.5%	10.8%	39.8%	31.5%	13.3%	4.7%
1986	$31,981	12.3%	20.6%	44.8%	29.5%	3.7%	1.5%
1987	$33,921	9.7%	14.9%	39.2%	35.5%	6.3%	4.1%
1988	$44,435	9.1%	23.0%	23.3%	41.0%	10.2%	2.5%
1989	$59,058	9.0%	8.8%	40.7%	27.1%	14.2%	9.1%
1990	$78,420	10.3%	13.2%	36.6%	29.6%	14.2%	6.4%
1991	$118,717	11.1%	9.1%	47.8%	27.8%	9.0%	6.2%
1992	$155,631	12.4%	8.0%	37.8%	36.5%	13.9%	3.8%
1993	$277,109	14.6%	9.3%	27.7%	36.6%	15.9%	10.5%
1994	$283,095	13.2%	5.0%	32.4%	39.2%	16.6%	6.9%
1995	$375,200	13.1%	3.8%	37.2%	36.4%	14.6%	7.9%
1996	$555,330	15.4%	5.0%	32.9%	30.6%	22.0%	9.5%
1997	$784,125	16.4%	2.1%	32.7%	28.2%	19.0%	18.1%
1998	$751,666	12.5%	1.6%	39.3%	34.8%	14.0%	10.3%
1999	$890,718	12.6%	1.0%	43.5%	30.8%	16.5%	8.1%
2000	$895,444	11.9%	0.9%	47.0%	25.7%	18.2%	8.3%
2001	$1,028,015	13.9%	2.4%	37.5%	39.6%	13.5%	6.9%
2002	$997,562	14.1%	1.3%	38.9%	37.8%	10.5%	11.4%
2003	$1,225,925	13.1%	2.0%	39.9%	29.6%	13.5%	15.0%
2004	$1,313,969	12.4%	1.3%	41.7%	23.3%	18.4%	15.4%
2005	$1,446,709	12.6%	1.0%	37.0%	28.2%	17.6%	16.2%
2006	$1,519,014	12.1%	0.7%	33.4%	31.2%	16.2%	18.6%
Mean		12.5%	6.6%	37.8%	32.3%	14.1%	9.1%

---------- Panel B: OUTFLOWS----------

Flow Year	Flows: Dollars in (millions)	Flows: Percentage Flow[a]	Portion of Flow: Domestic Balanced	Domestic Equity	Domestic Fixed Inc	Internationa Equity	Other[b]
1985	-$10,358	-8.9%	25.1%	42.5%	31.8%	0.4%	0.2%
1986	-$12,950	-5.0%	21.4%	55.5%	9.9%	10.2%	3.0%
1987	-$29,077	-8.3%	13.6%	61.0%	18.5%	6.2%	0.7%
1988	-$53,189	-10.9%	10.1%	60.3%	25.3%	3.0%	1.3%
1989	-$84,490	-12.8%	17.6%	39.8%	36.4%	3.6%	2.5%
1990	-$87,709	-11.5%	25.7%	37.3%	31.8%	3.7%	1.4%
1991	-$108,328	-10.1%	19.9%	34.9%	37.4%	4.9%	2.9%
1992	-$179,735	-14.3%	10.7%	27.9%	27.3%	6.4%	27.7%
1993	-$149,559	-7.9%	12.9%	45.0%	29.9%	9.6%	2.5%
1994	-$198,604	-9.2%	14.6%	33.0%	37.9%	4.8%	9.7%
1995	-$328,761	-11.4%	10.8%	30.5%	43.7%	9.9%	5.1%
1996	-$383,349	-10.6%	12.4%	32.3%	43.4%	8.6%	3.4%
1997	-$444,234	-9.3%	12.2%	48.3%	22.3%	10.7%	6.5%
1998	-$609,653	-10.1%	8.9%	44.7%	25.9%	12.1%	8.5%
1999	-$842,677	-12.0%	5.7%	54.2%	22.0%	12.6%	5.5%
2000	-$1,189,611	-15.8%	5.1%	56.4%	26.2%	8.0%	4.3%
2001	-$931,655	-12.6%	4.8%	53.9%	27.4%	6.2%	7.7%
2002	-$789,397	-11.1%	4.2%	26.3%	53.9%	9.3%	6.5%
2003	-$807,270	-8.6%	4.2%	43.3%	28.1%	15.8%	8.6%
2004	-$907,154	-8.5%	3.5%	50.5%	25.5%	15.4%	5.1%
2005	-$975,080	-8.5%	2.1%	47.1%	26.4%	18.3%	6.1%
2006	-$1,190,117	-9.5%	1.6%	43.9%	19.0%	20.7%	14.8%
Mean		-10.3%	11.2%	44.0%	29.5%	9.1%	6.1%

[a] Percentage of assets using $Percentage\ Flow_t = \frac{DollarFlow_t}{\sum_{j=1}^{N} Assets_{j,t}} \bullet 100\%$

[b] Global equity and fixed income, international fixed income

Table 3.
Post-Flow Returns

Post-flow 1, 3, and 5-year annualized gross returns averaged across all products in the flows quintiles formed in the year shown. The t-statistics report the result of an equality of (equally-weighted portfolio) means test between the portfolio of products in quintile 1 (largest flow gainers) and the portfolio of products in quintile 5 (largest flow losers).

PANEL A: Subsequent One-Year Returns					***PANEL B: Ann. Subsequent Three and Five-Year Returns***				
						Subsequent Three-Year		Subsequent Five-Year	
Flow Year	**Quintile 1[a]** (Greatest Inflows)	**Quintile 5** (Greatest Outflows)	**Q1-Q5**	**t-stat[b]**	**Flow Year**	**Q1-Q5**	**t-stat[b]**	**Q1-Q5**	**t-stat[b]**
1985	21.154	17.097	4.056	***1.644***	1985	3.043	**2.552**	-0.071	-0.100
1986	3.915	7.977	-4.062	**-2.945**	1986	-2.049	**-2.701**	-1.371	**-2.282**
1987	13.115	13.557	-0.442	-0.472	1987	-1.220	**-2.221**	-0.589	-0.967
1988	21.076	22.980	-1.904	***-1.776***	1988	-2.594	**-3.599**	-1.321	**-3.075**
1989	-0.770	0.564	-1.334	-1.436	1989	-2.151	**-3.664**	-0.645	**-2.344**
1990	25.221	26.206	-0.985	-0.821	1990	-0.289	-0.565	-0.234	-0.573
1991	6.144	8.977	-2.833	**-4.477**	1991	-0.664	***-1.842***	-0.849	**-2.123**
1992	17.643	16.276	1.367	1.277	1992	-0.043	-0.114	-0.196	-0.435
1993	-0.471	-0.506	0.035	0.094	1993	-0.500	-1.201	-1.190	**-2.238**
1994	23.029	23.794	-0.765	-1.021	1994	-0.060	-0.089	0.730	1.115
1995	13.541	14.755	-1.215	**-2.060**	1995	-2.580	**-4.242**	-1.558	**-3.401**
1996	14.991	17.851	-2.860	**-3.566**	1996	-1.426	**-2.167**	-1.044	**-3.435**
1997	10.436	14.432	-3.996	**-5.508**	1997	-2.274	**-6.230**	-0.065	-0.25
1998	17.322	23.010	-5.688	**-3.765**	1998	-0.562	***-1.709***	-0.209	-0.719
1999	-0.405	1.920	-2.325	**-3.181**	1999	-0.264	-0.408	-1.294	**-3.323**
2000	-6.740	-1.207	-5.533	**-8.646**	2000	-2.997	**-7.832**	-1.759	**-6.134**
2001	-9.928	-7.891	-2.037	**-3.004**	2001	-0.146	-0.507	-0.043	-0.143
2002	26.669	24.484	2.185	**2.863**	2002	0.744	***1.643***	0.284	0.701
2003	13.107	12.103	1.004	**3.000**	2003	0.388	1.165		
2004	9.198	7.946	1.252	**3.505**	2004	0.437	1.276		
2005	14.201	13.661	0.540	1.329					
2006	9.662	7.419	2.243	**5.070**					
Mean	11.005	12.064	-1.059	**-1.951**	Mean	-0.760	**-2.380**	-0.635	**-6.920**

[a] Quintiles ranked by flows using equation 2

[b] **Bold** designating t-statistic significant at 5% level, ***bold italics*** designating significant at the 10% level

Figure 1.
Cumulative Returns of Outflow and Inflow Portfolios
Growth of initial $1 in investments in quintile 1 (largest flow gainers) and quintile 5 (largest flow losers) using the post-flow 1-year returns shown in Table 3 from 1986 to 2007.

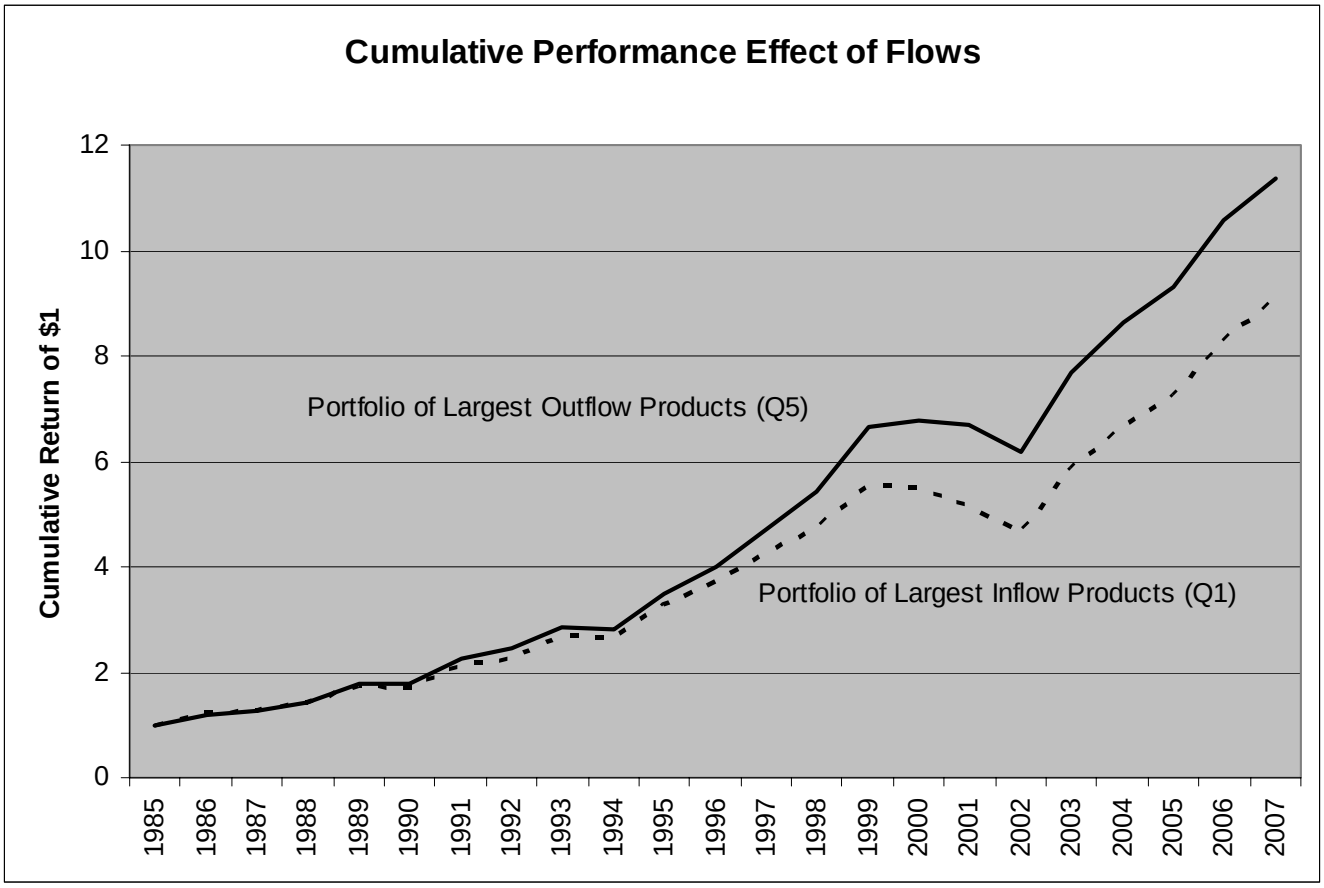

Table 4.
Flow-weighted Portfolio Post-flow Returns and Brinson Attribution

Flow-weighted portfolio[a] return differences decomposed into category and product selection components over 3 post-flow periods

PANEL A: Subsequent 1-Year Returns

	----------Returns----------			----------Sources[b]----------		
Flow Year	**Inflow**	**Outflow**	**In-Out**	**Category**	**Product**	**Interaction**
1985	22.447	17.100	5.347	7.328	-2.298	0.316
1986	4.587	9.033	-4.446	-1.963	-3.660	1.176
1987	13.539	13.221	0.319	-1.508	2.366	-0.540
1988	18.247	26.025	-7.778	-4.417	-2.709	-0.652
1989	-1.227	1.958	-3.185	-2.247	-1.156	0.217
1990	24.491	24.941	-0.450	-0.533	0.068	0.014
1991	6.430	8.675	-2.245	-0.625	-1.175	-0.445
1992	15.526	18.025	-2.499	-0.790	-0.271	-1.438
1993	-0.776	0.438	-1.215	0.138	-1.140	-0.213
1994	22.517	24.391	-1.874	-1.831	0.484	-0.527
1995	12.839	12.900	-0.061	1.232	-1.139	-0.154
1996	14.637	15.589	-0.952	-2.542	1.086	0.505
1997	12.034	17.692	-5.658	-1.805	-2.714	-1.140
1998	18.433	17.150	1.283	-0.143	0.660	0.767
1999	-1.821	0.655	-2.476	-0.677	-2.453	0.654
2000	-8.609	-2.940	-5.669	-2.748	-2.021	-0.900
2001	-8.337	-8.002	-0.336	1.915	-2.741	0.491
2002	21.789	17.260	4.529	5.061	-0.301	-0.231
2003	12.343	11.547	0.797	0.114	0.884	-0.202
2004	8.578	7.839	0.739	0.301	0.559	-0.121
2005	13.390	13.802	-0.413	-0.267	-0.435	0.289
2006	8.901	7.386	1.516	0.140	1.935	-0.559
Mean	10.453	11.577	-1.124	-0.267	-0.735	-0.122
Std Dev	*9.756*	*9.067*	*3.124*	*2.547*	*1.648*	*0.642*

PANEL B: Annualized Subsequent Three and Five-Year Returns

Subsequent 3-Year				Subsequent 5-Year		
-Return-	**------Sources[b]------**			**-Return-**	**------Sources[b]------**	
In-Out	**Category**	**Product**		**In-Out**	**Category**	**Product**
3.231	2.721	-0.630		0.091	0.629	-1.286
-2.994	-2.170	-1.534		-1.549	-1.200	-0.231
-1.299	-0.753	-0.338		-1.405	-1.241	-0.165
-4.214	-2.412	-1.926		-2.109	-1.176	-0.577
-1.865	-1.461	-0.470		-0.145	-0.076	-0.119
-0.796	-0.024	-0.764		-0.987	-0.253	-0.806
-0.819	0.293	-0.894		-0.428	0.250	-1.048
-0.686	-0.056	-0.099		-0.424	-0.153	0.110
-1.445	-2.540	0.617		-2.024	-3.171	0.583
-1.149	-1.505	0.343		0.859	1.341	-0.088
-0.514	0.899	-1.535		-1.539	-0.419	-1.241
-1.150	-1.538	0.288		-0.963	-1.508	0.197
-2.415	-1.437	-1.034		0.309	0.389	-0.011
0.155	-0.085	0.239		0.156	0.148	0.036
-0.106	1.096	-1.479		-1.768	-0.161	-1.708
-2.711	-0.814	-1.371		-1.250	0.114	-0.920
-0.536	0.738	-0.597		-0.618	0.621	-0.233
2.150	2.600	-0.281		1.724	2.316	-0.384
0.198	0.106	0.187				
-0.258	0.327	-0.467				
-0.861	-0.301	-0.587		-0.671	-0.197	-0.438
1.662	*1.490*	*0.730*		*1.040*	*1.200*	*0.608*

[a] Inflow and outflow portfolio weights calculated using (3) $w_{i,t} = \frac{DollarFlow\ s_{i,t}}{\sum_{j=1}^{N} DollarFlow\ s_{j,t}}$

[b] Sources calculated using equations (4), (5) and (6)

Table 5.

Performance of Flow-Weighted Portfolios, by Product Category, Over Subsequent Time Periods

Average returns over the 22 1-year, 20 3-year, and 18 5-year post-flow periods of flow-weighted portfolios formed using products which either received inflows or lost outflows. Returns of the two portfolios within each PSN product category are weighted by products' annual flows relative to total inflows or outflows[a].

	------- One Year Returns------			---Ann. Three Year Returns---			----- Ann. Five Year Returns---		
Category	**Inflow**	**Outflow**	**In-Out**	**Inflow**	**Outflow**	**In-Out**	**Inflow**	**Outflow**	**In-Out**
Domestic Growth	12.870	14.647	-1.777	12.224	13.743	-1.518	12.179	13.414	-1.235
Domestic GARP	13.745	14.539	-0.794	12.883	13.425	-0.543	12.361	13.125	-0.764
Domestic Balanced	10.672	11.361	-0.689	10.440	11.018	-0.578	10.349	11.020	-0.672
Domestic Value	12.981	14.265	-1.285	13.051	13.729	-0.678	12.948	13.368	-0.420
Domestic Core	12.940	13.304	-0.364	12.454	12.917	-0.462	12.215	12.766	-0.550
Global Equity[b]	11.477	12.715	-1.239	10.691	11.991	-1.299	10.781	10.771	0.009
International Equity	13.287	14.991	-1.705	10.015	10.915	-0.900	8.656	8.881	-0.225
Domestic Fixed	7.720	8.016	-0.296	7.553	7.839	-0.287	7.719	8.015	-0.296
Global Fixed[c]	7.842	8.579	-0.736	7.829	7.500	0.330	7.742	7.491	0.251
International Fixed	12.560	13.272	-0.711	11.398	11.135	0.262	10.765	11.077	-0.313

[a] using equation (3), portfolio weights defined by $w_{i,t} = \frac{DollarFlows_{i,t}}{\sum_{j=1}^{N} DollarFlows_{j,t}}$

[b] There are no Global Equity outflow products in 1985, so returns begin with 1986 portfolio

[c] There are no Global Fixed Income outflow products in 1985 and 1986, so returns begin with 1987 portfolio

Table 6.
Analysis of Influence of Survivorship Bias and Mutual Fund Exposure

Return differences from Table 3 ("Q1-Q5") compared with return differences from two subsamples:
Products in the dataset with 5 or more consecutive post-flow return years and products with less than 10% of assets in mutual funds

	Panel A			Panel B			Panel C	
	Subsequent One-Year Returns			***Subsequent 3-Year Ann. Returns***			***Sub.. 5-Yr Ann. Rets.***	
Flow Year	**Full Sample**	Existing for 5 Years[a]	Limits Mutual Funds[b]	**Full Sample**	Existing for 5 Years[a]	Limits Mutual Funds[b]	**Full Sample**	Limits Mutual Funds[b]
1985	4.056	4.056	4.320	3.043	3.043	3.090	-0.071	0.110
1986	-4.062	-4.062	-4.062	-2.049	-2.049	-2.049	-1.371	-1.371
1987	-0.442	-0.408	-0.262	-1.220	-1.235	-1.305	-0.589	-0.670
1988	-1.904	-1.895	-1.889	-2.594	-2.612	-2.490	-1.321	-1.298
1989	-1.334	-1.329	-1.308	-2.151	-2.104	-2.019	-0.645	-0.603
1990	-0.985	-0.952	-0.668	-0.289	-0.295	-0.114	-0.234	-0.086
1991	-2.833	-3.390	-2.893	-0.664	-0.861	-0.732	-0.849	-0.926
1992	1.367	0.888	1.606	-0.043	-0.185	0.035	-0.196	-0.092
1993	0.035	0.063	0.133	-0.500	-0.625	-0.450	-1.190	-1.117
1994	-0.765	-0.838	-0.802	-0.060	0.094	-0.236	0.730	0.697
1995	-1.215	-1.329	-1.382	-2.580	-2.859	-2.622	-1.558	-1.605
1996	-2.860	-2.626	-2.929	-1.426	-1.291	-1.254	-1.044	-0.970
1997	-3.996	-4.398	-3.639	-2.274	-2.503	-2.209	-0.065	0.042
1998	-5.688	-6.006	-5.517	-0.562	-0.901	-0.446	-0.209	-0.044
1999	-2.325	-3.055	-1.747	-0.264	-0.568	-0.043	-1.294	-1.205
2000	-5.533	-5.016	-5.121	-2.997	-2.940	-2.743	-1.759	-1.566
2001	-2.037	-1.909	-2.696	-0.146	-0.305	-0.257	-0.043	0.144
2002	2.185	1.932	3.055	0.744	0.871	0.902	0.284	0.389
2003	1.004		0.680	0.388		0.411		
2004	1.252		0.938	0.437		0.364		
2005	0.540		0.557					
2006	2.243		1.640					
Mean 85-02	-1.574	-1.682	-1.433	-0.891	-0.962	-0.830	-0.635	-0.565
Full Mean	-1.059		-0.999	-0.760		-0.708	-0.635	-0.565

[a] Includes only products which existed for five or more years subsequent to flow year

[b] Includes only products with less than 10% of assets in mutual funds

Table 7.

Account Flow-weighted versus Asset Flow-weighted Post-flow Returns

Post-flow return differences between inflow and outflow portfolios formed by asset flow weights ("In-Out" columns in Table 4) compared to portfolios formed by account change weights. A negative sign indicates that the asset inflow (account increase) portfolio under-performed the asset outflow (account decrease) portfolio.

	PANEL A *One-Year "In-Out" Returns*		***PANEL B*** *Three-Year "In-Out" Returns*		***PANEL C*** *Five-Year "In-Out" Returns*	
Flow Year	**Asset Weight[a]**	**Account Weight[b]**	**Asset Weight[a]**	**Account Weight[b]**	**Asset Weight[a]**	**Account Weight[b]**
1985	5.347	0.361	3.231	0.397	0.091	-0.459
1986	-4.446	-4.812	-2.994	-2.171	-1.549	-1.803
1987	0.319	0.334	-1.299	-1.452	-1.405	-1.001
1988	-7.778	-1.426	-4.214	0.622	-2.109	-0.349
1989	-3.185	-4.921	-1.865	-0.455	-0.145	0.092
1990	-0.45	8.269	-0.796	0.511	-0.987	0.171
1991	-2.245	-1.599	-0.819	-3.055	-0.428	-0.808
1992	-2.499	-6.581	-0.686	-1.246	-0.424	1.599
1993	-1.215	-0.779	-1.445	-0.599	-2.024	-1.446
1994	-1.874	0.092	-1.149	-0.883	0.859	-1.19
1995	-0.061	3.122	-0.514	1.523	-1.539	-0.834
1996	-0.952	2.187	-1.15	4.886	-0.963	-0.049
1997	-5.658	0.406	-2.415	-1.688	0.309	-2.865
1998	1.283	-17.326	0.155	-2.556	0.156	-2.578
1999	-2.476	-10.497	-0.106	-9.732	-1.768	-7.628
2000	-5.669	-15.39	-2.711	-8.081	-1.25	-4.933
2001	-0.336	0.811	-0.536	-0.157	-0.618	-1.267
2002	4.529	-2.651	2.15	-3.646	1.724	-5.311
2003	0.797	-4.512	0.198	-4.301		
2004	0.739	-0.318	-0.258	-2.289		
2005	-0.413	3.372				
2006	1.516	4.183				
Mean	-1.124	-2.167	-0.861	-1.719	-0.671	-1.703

[a] Portfolio weights based on asset flows (equation 3), returns from Table 4

[b] Portfolio weights based on account flows

Table 8.
Economic Significance of Performance Differences, 1985 to 2006
Opportunity cost in dollar returns calculated by applying the subsequent return differences between inflow and outflow portfolios in Table 4 to the inflows, from Table 2.

		$ Million Performance Impact			
		Static Product Portfolio			Reallocation
Flow Year	Inflows, in billions	Subsequent 1-Year[a]	Subsequent 3-Years[b]	Subsequent 5-years[b]	Subsequent 5-years[c]
1985	$14.6	$779	$1,795	$104	$611
1986	$32.0	($1,422)	($3,780)	($4,109)	($3,691)
1987	$33.9	$108	($1,650)	($3,976)	($2,884)
1988	$44.4	($3,456)	($7,468)	($7,675)	($7,096)
1989	$59.1	($1,881)	($4,018)	($602)	($1,616)
1990	$78.4	($353)	($2,490)	($6,509)	($4,735)
1991	$118.7	($2,665)	($3,334)	($3,982)	($3,656)
1992	$155.6	($3,890)	($4,069)	($5,511)	($4,948)
1993	$277.1	($3,366)	($14,961)	($46,270)	($33,080)
1994	$283.1	($5,305)	($13,432)	$22,416	$9,989
1995	$375.2	($229)	($7,540)	($45,379)	($30,276)
1996	$555.3	($5,284)	($25,620)	($36,064)	($29,606)
1997	$784.1	($44,369)	($68,963)	$13,346	($14,445)
1998	$751.7	$9,647	$3,755	$7,006	$6,523
1999	$890.7	($22,054)	($2,500)	($87,997)	($58,380)
2000	$895.4	($50,759)	($74,538)	($66,232)	($66,374)
2001	$1,028.0	($3,450)	($18,843)	($43,180)	($32,130)
2002	$997.6	$45,181	$80,057	$127,887	$105,591
2003	$1,225.9	$9,767	$8,970		
2004	$1,314.0	$9,710	($12,340)		
2005	$1,446.7	($5,971)			
2006	$1,519.0	$23,026			
Total	$12,880.6	($56,237)			($170,202)

[a] year dollar flow times following 1-year return difference; negative indicates loss in value

[b] year dollar flow times subsequent multi-year difference; assumes static portfolio

[c] % inflow-weighted average of 1, 3 and 5-year $ impact; We assume a constant reallocation rate with 12.5% of the reallocated capital earning the 1-year performance impact, 25% the 3-year impact and 62.5% the 5-year impact.

REFERENCES

Barberis, Nicholas, and Andrei Shleifer (2003). "Style investing." *Journal of Financial Economics,* Vol. 68 (May): 161-199.

Busse, Jeffrey, Amit Goyal and Sunil Wahal (2006). "Performance Persistence in Institutional Investment Management." Working Paper, Arizona State University.

DALBAR, Inc. *QAIB 2005: Quantitative Analysis of Investor Behavior*. Boston: DALBAR, Inc., 2005.

Del Guercio, Diane, and Paula A. Tkac (2002). "The determinants of the flow of funds of managed portfolios: mutual funds versus pension funds." *Journal of Financial and Quantitative Analysis,* Vol. 37 (December): 523-557.

Fama, Eugene F., and Kenneth R. French (1992). "The Cross-section of expected stock returns." *Journal of Finance,* Vol. 47 (June): 427-465.

Goyal, Amit and Sunil Wahal (2008). "The Selection and Termination of Investment Management Firms by Plan Sponsors." *Journal of Finance*, Vol. 63 (August): 1805-1847.

Grinblatt, Mark, and Sheridan Titman (1993). "Performance measurement without benchmarks: An examination of mutual fund returns." *Journal of Business,* Vol. 66 (January): 47-68.

Grinblatt, Mark, and Sheridan Titman (1994). "A study of monthly mutual fund returns and performance evaluation techniques." *Journal of Financial and Quantitative Analysis,* Vol. 29 (September): 419-444.

Grinold, Richard (1989). "The Fundamental Law of Active Management." *Journal of Portfolio Management*, Vol. 15, No. 3 (Spring): 30-37.

Gruber, Martin J. (1996). "Another puzzle: the growth in actively managed mutual funds." *Journal of Finance,* Vol. 51 (July): 783-810.

Heisler, Jeffrey, Christopher R. Knittel, John J. Neumann, and Scott D. Stewart (2007). "Why do institutional plan sponsors hire and fire their investment managers?" *Journal of Business and Economic Studies,* Vol. 13 (Spring): 88-115.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny (1992). "The structure and performance of the money management industry." *Brookings Papers: Microeconomics,* 339-391.

Odean, Terrance (1998). "Are Investors Reluctant to Realize Their Losses?" *Journal of Finance*, Vol. 53 (October): 1775-1798.

Skoulakis, Georgios. 2008. “Panel Data Inference in Finance: Least-Squares vs. Fama-MacBeth.” Mimeo, University of Maryland.

Stewart, Scott (1998). “Is consistency of performance a good measure of manager skill?” *Journal of Portfolio Management,* Vol. 24, No. 3 (Spring): 22-32.

Teo, Melvyn, and Sung-Jun Woo (2004). “Style effects in the cross-section of stock returns.” *Journal of Financial Economics,* Vol. 74 (November): 367-398.

Treynor, Jack (1990). “The ten most important questions to ask in selecting a money manager.” *Financial Analysts Journal*, (May/June): 4-5.

Zheng, Lu (1999). “Is Money Smart? A Study of Mutual Fund Investors' Fund Selection Ability.” *Journal of Finance*, Vol. 54 (June): 901-933.