FAJ Financial Analysts Journal
Volume 65 • Number 6

Absence of Value: An Analysis of Investment Allocation Decisions by Institutional Plan Sponsors

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To determine whether the investment decisions of institutional plan sponsors contribute to their asset values, this study used a dataset of 80,000 yearly observations of institutional investment product assets, accounts, and returns for 1984–2007. Results show that plan sponsors may not be acting in their stakeholders' best interests when they make rebalancing or reallocation decisions. Investment products that receive contributions subsequently underperform products experiencing withdrawals over one, three, and five years. For investment decisions among equity, fixed-income, and balanced products, most of the underperformance can be attributed to product selection. Tests suggest that these results are not attributable to survivorship or other biases. Much like individual investors who switch mutual funds at the wrong time, institutional investors do not appear to create value from their investment decisions.

Institutional plan sponsors are responsible for pension plans, endowments, foundations, and other large pools of assets. These assets are huge (estimated to be more than $10 trillion in December 2006), yet the research on institutional investors is limited. Heisler, Knittel, Neumann, and Stewart (2007) documented the importance of historical performance measures, performance trends, and product attributes in shaping 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. The question remains, however, whether these decisions add value for the ultimate beneficiaries or stakeholders on whose behalf the plan sponsors act. This question is important because of the size of institutional plans and their sponsors' sophistication relative to that of individual investors. Pension plans, endowments, and foundations are typically staffed with professionals who have advanced degrees and years of experience. 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.

The central goals of our study were to assess the success of these efforts by exploring the economic significance of allocation decisions and to attribute performance components to product selection, asset class, or style category allocation decisions. Although we did not observe the plans' performance directly, we did observe the allocation of their assets to investment products over time. The data we used are available in the PSN database, which includes 80,000 institutional product observations whose data include annual returns, annual assets, and accounts for 1984–2007.

Literature Survey

Heisler et al. (2007) determined that long-term total returns and a track record of consistently positive or negative benchmark-relative returns factor heavily into institutional plan sponsors' decisions to allocate assets to, or pull them from, equity products. They showed that sizable negative short-term total returns play a modest but statistically significant role in decisions to shift assets away from

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products. Movement of an entire account from one product to another is subject to a higher hurdle that includes both the sign and the level of longer-term benchmark-relative returns. Benchmarks that reflect the growth- or value-style strategy that the product pursued are as important as the S&P 500 Index in product selection. Extremeness of style, as measured by betas relative to style indices, is not as important in determining flows, which suggests a limit to the sophistication of pension plan, endowment, and foundation sponsors. In addition to favoring attractive past performance, these investors tend to prefer small investment products and those with long track records.

Goyal and Wahal (2008) used a matched sample of manager hirings and firings in the institutional market over a three-year period. They found that newly hired managers underperformed fired managers. The bulk of their firings sample was from a short period (the post-tech bubble of 2000–2003), and the three-year returns of the matched hire/fire transitions totaled 129 observations. Our study explored 80,000 observations over 22 years and focused on one-, three-, and five-year performance periods.

Research on individual stock and mutual fund investors has produced mixed results. In "QAIB 2005: Quantitative Analysis of Investor Behavior" (Dalbar, Inc. 2005), the authors noted that the tendency for mutual fund investors to chase (or flee) recent performance produces lower long-term returns than does a dollar cost averaging strategy. Odean (1998) examined the trades of discount brokerage clients and found that unprofitable trades were held longer than profitable trades. In addition, the profitable stocks that were sold generally outperformed comparable stocks by 2.35 percent, whereas the unprofitable stocks that were held underperformed by 1.06 percent.

Gruber (1996) studied the quarterly cash flows of 227 mutual funds and found positive postflow alphas for funds with positive cash flows, as well as positive alpha savings from disinvesting in negative cash flow portfolios. With annual cash flows, however, the alpha is negative for new cash inflows and positive for outflows. Zheng (1999) calculated a Grinblatt and Titman (1993) measure to detect evidence of the selection ability of mutual fund investors and found that weight changes in each fund relative to all funds produce a positive return difference over the succeeding month. She then calculated excess market returns and one-factor and Fama–French (1992) three-factor models for a series of eight portfolios constructed with funds that receive new money flows. She found weak evidence of a "smart money effect"—smart buying and selling decisions—until the data were segmented into large and small funds. The results of the three-factor model, however, suggest that the apparent smart money effect is primarily attributable to money flows into and out of small funds and is short lived.[1]

Several studies have looked at the importance of investment style in evaluating the behavior of investments. Barberis and Shleifer (2003) noted that investment styles follow specific life cycles and proposed that investors allocate assets on the basis of style by moving them to the style that has performed well recently. With respect to the return of individual stocks, their evidence suggests that short-term returns trend but longer-term returns reverse. Using mutual funds instead of individual stocks, Teo and Woo (2004) also studied this style effect and found evidence of style return reversal.

Data

Although we did not have direct access to the decisions made by institutional investors, we were able to observe the results of their decisions through a database of the managers they hire. This database allows researchers to measure asset and account flows between products and to analyze the performance of those products.

PSN Database. Compiled by Informa Investment Solutions, the PSN investment manager database comprises historical information on thousands of investment products, including annual summary information about each product, quarterly performance, and assets and number of accounts under management. Reported by the investment product managers themselves, the information includes asset class and product style and is used by managers for comparisons with their peers and by plan sponsors and pension consultants to identify investment manager candidates. Product clients include retirement plans, foundations, and endowments. Products exclude hedge funds, real estate, private equity, and other alternative asset classes. The PSN universe consists of the following products:

- 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

Our analysis of asset and account flows covers 1984–2006; our analysis of postflow performance covers 1986–2007.

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 (domestic and international equity, domestic and international fixed income, and balanced). Net of mutual fund assets, the remaining $10 trillion far exceeds the $6.5 trillion figure provided in *Pensions & Investments* for the top 1,000 U.S. pension plans in 2006.[2] Thus, the PSN database represents a very large sample of investment products and institutional assets. These levels have risen dramatically since 1984 with the growth in the investment industry. The data in Table 1 suggest that asset growth rates are cyclical, with strong growth in the late 1980s, the early 1990s, the late 1990s, and 2003–2004. This growth 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 upticks in 1992, 1996, and 2001. The two growth series are related, with a correlation of 0.488.

Data Quality. The applicability of the data to our tests is affected by two main factors.

- *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 those products. Products that are offered exclusively as mutual funds 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 percent of total database assets (14.8 percent of assets among the post-flow one-year sample products), we ran our tests both with and without products that had significant mutual fund assets and found no material difference in our results. We discuss this evidence later in the article.

- *Survivorship bias.* Bias can take two forms: (1) when "old" data are purged from a database after the product is liquidated or the manager stops reporting and (2) when the time series of reported data is interrupted. The vendor reports that all records are retained once they are submitted to PSN, whether or not they have been updated; thus, the records of expired products survive. Our investigation found that between 24 percent and 37 percent of products that first reported asset and return data from 1984 to 1994 continued to report through 2007. That this number is not (close to) 100 percent in any year suggests that data purges are not a concern.

Table 1. Summary Information on PSN Database, 1985–2006

Year-End	Assets ($ billions)	Asset Growth (%)	Mutual Fund Assets % of Total	No. of Products	Product Growth (%)	No. of Accounts (thousands)	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

Note: Assets, number of products, and number of accounts are as of year-end.

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

Importantly, PSN does not require managers to report the final quarter of a liquidated product's performance or a product that continues to exist but is no longer actively marketed. The concern here is that poorly performing products that continue to do poorly are not advertised and are not in the database, which can create an upward bias for the subsequent returns of portfolios of products that have lost assets (in part, because of poor investment performance). This bias is relevant only if poorly performing products never resume reporting because performance records may be added to the PSN database at any time. Although the average attrition rate of products that began to report asset and return data but later discontinued reporting one or both pieces of information was only 3.23 percent,[3] we calculated excess returns for such products in their last reporting year and observed that their returns were noticeably lower than 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 our results, we used two approaches in conducting our tests and compared the results. In the first approach, we included an investment product in each postflow period (one-year, three-year, five-year) if it had sufficient data for that particular period, regardless of whether the data were available for other postflow periods. In the second approach, we restricted the sample to products that existed for all five years of any five-year postflow period and were thus eligible for all three postflow period tests. This approach ensured that a product with inflows or outflows continued to report data for at least five years after the flows were calculated, thereby eliminating survivorship bias for the one-year and three-year tests. We found little difference in our results between the two approaches, which suggests that survivor bias is not the source of our main finding—namely, that institutional plan sponsors do not create value through manager and asset allocation/equity-style rotation.

Methodology

We calculated asset flows for every product in the PSN database and measured performance data subsequent to the flows. Our goal was to determine whether products with significant inflows perform differently than products with significant outflows and, if so, to examine the source of these differences. We conducted similar analyses of account gains and losses.

Description of Flow Measures. Consistent with almost all the investment literature concerning asset flows, including that reviewed earlier in this article, we calculated product i's dollar flows from year-end $t-1$ to t as

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

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 ranked products by placing them into flow quintiles on the basis of 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 for that year. For a specific product, this measure provides the percentage of aggregate flow activity captured (or lost) by that product in that year and is defined as

$$AssetFlows_{i,t} = \frac{DollarFlows_{i,t}}{\sum_{j} \left| Assets_{j,t} - Assets_{j,t-1}(1+R_{j,t}) \right|}. \qquad (2)$$

In later tests, we created portfolios for each year that consisted solely of products with inflows or products with outflows. To calculate the flow-weighted portfolio returns, we took each product's weight 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 year-end t with aggregate products N. Equation 3 allowed us 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. We also explored the returns of decisions within categories by including only products within a particular category.

Summary of Flows. **Table 2** reports dollar inflows and outflows and their proportions by product-style category for the products in the database for which flows could be derived and subsequent performance could be measured (1985–2006). To compute the dollar flow calculation (Equation 1) for a product, it must have existed 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 percent fewer products and 11 percent lower assets. Using Equation 1, we calculated annual dollar flows, as well as asset flows relative to total assets among all products in our test sample. Annual inflows range from 9.0 percent to 16.4 percent of sample assets, with an average of 12.5 percent. Reflecting net contributions to the investment management universe, annual outflows are lower, ranging from 5.0 percent to 15.8 percent, with an average of 10.3 percent. Flow activity in domestic equity and domestic fixed income, the largest overall allocations, represents 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, not shown here) in balanced mandates shrinks over time, reflecting the transition from plan sponsors to specialist managers over the last 22 years.

Performance Calculations. We computed the performance of investment decisions by using several techniques. The first involves ranking and assigning to quintiles individual products on the basis of their captured flows and examining the one-, three-, and five-year performance of the extreme quintile portfolios beginning immediately after the flows occur. This approach is straightforward and allows for statistical testing.

To confirm these results and facilitate performance attribution, we also constructed two separate asset-flow-weighted portfolios of all products for each year—one of products with net outflows and one of products with net inflows—and then compared the postflow performance of these two competing portfolios over the subsequent one-, three-, and five-year periods. To confirm that the asset flow results were not biased by a small group of large plans, we ran similar tests with account flow data. Constructing and comparing portfolios on the basis of flows in this manner is similar to the portfolio construction in Zheng (1999) and the positive and negative cash flow portfolios in Gruber (1996).

Finally, following Brinson, Hood, and Beebower (1986), we applied their attribution technique to the differences in performance between the inflow and outflow portfolios. Our goal was to explore the source of the difference in returns between products that receive assets and products that lose assets. The analysis calls for performance evaluation by comparisons with one or more benchmark-based portfolios. We used 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 with dollar contributions). A negative active return corresponds to a loss of value attributable to plan sponsor investment decisions. This technique allowed us to identify the impact of product selection within asset-class and equity-style categories, as well as the impact of allocation between those categories. The effect of asset-class and equity-style category reallocation in our tests is calculated as

$$\left(\textit{Inflow portfolio weight} - \textit{Outflow portfolio weight}\right) \times \left(\textit{Outflow portfolio return}\right). \quad (4)$$

The investment product selection component is calculated by using the outflow portfolio weights, including the performance difference between the new portfolio and the benchmark portfolio:

$$\left(\textit{Inflow portfolio return} - \textit{Outflow portfolio return}\right) \times \left(\textit{Outflow portfolo weight}\right). \quad (5)$$

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

$$\left(\textit{Inflow weight} - \textit{Outflow weight}\right) \times \left(\textit{Inflow return} - \textit{Outflow return}\right). \quad (6)$$

Returns for Products with Inflows and Outflows

The underlying assumption of the portfolio construction method is that assets that flow out of one set of products are redirected into the set of products receiving inflows. We note that this assumption 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 if 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 actions, however, are also active selection decisions by the sponsor and help determine flow proportions. Similarly, lost flows are not necessarily reinvested with another

Table 2. Asset Flow Summary, 1985–2006

	Flows		Portion of Flows				
Flow Year	Amount ($ millions)	Percentage Flow[a]	Domestic Balanced	Domestic Equity	Domestic Fixed Income	International Equity	Other[b]
A. Inflows							
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
B. Outflows							
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

Note: Percentage flow is calculated as a proportion of assets; portion of flows sums to 100 percent for each year.

[a]Percentage of assets is calculated from $PercentageFlow_t = DollarFlows_t \Big/ \sum_{j=1}^{N} Assets_{j,t}$ (100%).

[b]Global equity and fixed income; international fixed income.

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. We assessed the value of all these decisions in our study.

Ranked Quintiles. We began with a simple calculation of the subsequent, postflow performance of the investment products that received the most inflows and the products that lost the most outflows. For this initial test, we ranked products by their captured asset flows (Equation 2) and placed them into quintiles for each year. Note that sorting products in a given year by this measure is equivalent to sorting by dollar flows. We calculated the average annual gross returns over the subsequent one-, three-, and five-year horizons for each quintile and performed a *t*-test of equivalence between the means of Quintile 1 (largest flow gainers) and Quintile 5 (largest flow losers). This approach essentially tests the equivalence of postflow performance of equally weighted portfolios of the 20 percent of products that attracted the greatest inflows or lost the most outflows in each year.

Table 3 reports the results of our analysis. The *t*-statistics in Panels A and B show the results of the means tests between Quintiles 1 and 5 for the gross returns in the one-, three-, and five-year postflow periods. In 14 of the 17 formation periods where postflow one-year performance is measured before the end of the three-year bear market (which began with the tech-bubble burst in the spring of 2000), the quintile portfolio of products with the most inflows performed worse than the quintile portfolio with the largest outflows. This difference is statistically significant at the 5 percent level in 10 of those years. This result suggests that plan sponsors' asset allocation decisions did not benefit their stakeholders after one year. Among the five postflow one-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 one-year postflow return differences is displayed in **Figure 1**, which shows a cumulative negative impact from yearly investment changes.

In 16 of the 20 postflow three-year periods, the largest flow gainers underperformed the largest flow losers, with the difference statistically significant for 10 of those periods. Over the postflow five-year horizons, the mean return difference is negative in all but 2 of the 18 formation periods, with nine outflow quintile returns that are 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 that received the largest inflows significantly underperformed over the postflow horizons. The mean return difference for the one-year postreturn periods is reported in Table 3 as –1.059 percentage points, significant at the 5 percent level. Moreover, this negative performance persists over three or more years and does not appear to reverse entirely, as reflected by the annualized mean differences of –0.760 percentage points over three years and –0.635 percentage points over five years, both of which are statistically significant (t = –2.38 and –6.92, respectively) at the 5 percent level.[5]

Weighted Inflow and Outflow Portfolios. Although the test of quintile portfolios is straightforward, the mean return difference calculation excludes performance for 60 percent of the products in Quintiles 2, 3, and 4 and equal-weights the product returns in the quintile portfolios. To address these issues and to facilitate a performance attribution analysis, we used an alternative technique. For each year, we formed portfolios of products that either received inflows or suffered outflows. We determined portfolio weights at the beginning of each period on the basis of a product's flows relative to total portfolio inflows or outflows (Equation 3). This technique harnessed all the reporting products in the sample and placed more importance on those products that the 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 who use the products in the PSN universe. Panel A of **Table 4** reports that the postflow one-year average performance difference between the inflow and outflow portfolios (the "In – Out" mean) is –1.124 percentage points—very similar to the average difference of –1.059 percentage points between Quintiles 1 and 5. This finding is consistent with our earlier finding that institutional investors' decisions did not add value to their plans over the sample period. As reported in Panels B and C of Table 4, the three- and five-year differences are –0.861 percentage points and –0.671 percentage points.[6]

Table 3. Postflow Returns (Asset Flows), 1985–2006

Flow Year	Quintile 1[a] (greatest inflows)	Quintile 5 (greatest outflows)	Q1 – Q5 (pps)	*t*-Statistic
A. Subsequent one-year returns				
1985	21.154%	17.097%	4.056	1.644*
1986	3.915	7.977	–4.062	–2.945**
1987	13.115	13.557	–0.442	–0.472
1988	21.076	22.980	–1.904	–1.776*
1989	–0.770	0.564	–1.334	–1.436
1990	25.221	26.206	–0.985	–0.821
1991	6.144	8.977	–2.833	–4.477**
1992	17.643	16.276	1.367	1.277
1993	–0.471	–0.506	0.035	0.094
1994	23.029	23.794	–0.765	–1.021
1995	13.541	14.755	–1.215	–2.060**
1996	14.991	17.851	–2.860	–3.566**
1997	10.436	14.432	–3.996	–5.508**
1998	17.322	23.010	–5.688	–3.765**
1999	–0.405	1.920	–2.325	–3.181**
2000	–6.740	–1.207	–5.533	–8.646**
2001	–9.928	–7.891	–2.037	–3.004**
2002	26.669	24.484	2.185	2.863**
2003	13.107	12.103	1.004	3.000**
2004	9.198	7.946	1.252	3.505**
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**
B. Annualized subsequent three-year returns				
1985			3.043	2.552**
1986			–2.049	–2.701**
1987			–1.220	–2.221**
1988			–2.594	–3.599**
1989			–2.151	–3.664**
1990			–0.289	–0.565
1991			–0.664	–1.842*
1992			–0.043	–0.114
1993			–0.500	–1.201
1994			–0.060	–0.089
1995			–2.580	–4.242**
1996			–1.426	–2.167**
1997			–2.274	–6.230**
1998			–0.562	–1.709*
1999			–0.264	–0.408
2000			–2.997	–7.832**
2001			–0.146	–0.507
2002			0.744	1.643*
2003			0.388	1.165
2004			0.437	1.276
Mean			–0.760	–2.380**
C. Annualized subsequent five-year returns				
1985			–0.071	–0.100
1986			–1.371	–2.282**
1987			–0.589	–0.967
1988			–1.321	–3.075**

(continued)

Table 3. Postflow Returns (Asset Flows), 1985–2006 (continued)

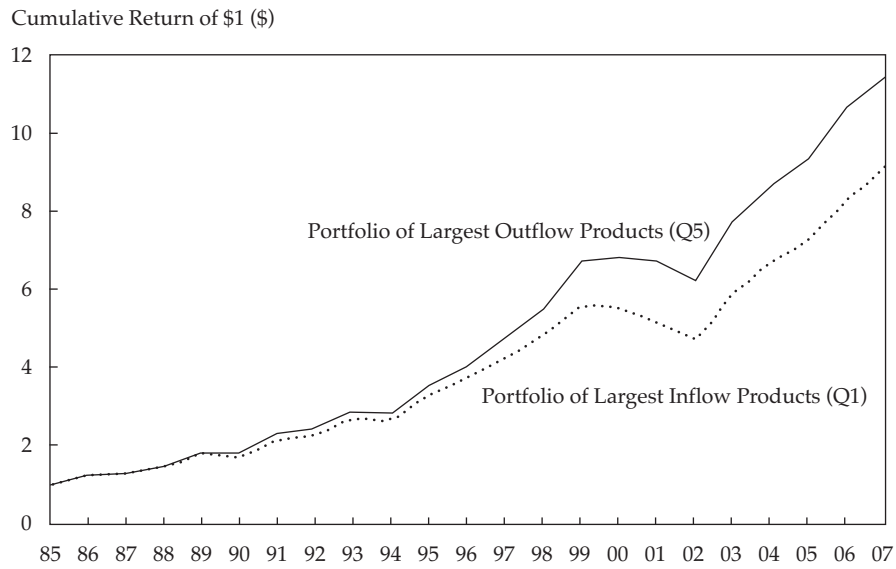
Flow Year	Quintile 1[a] (greatest inflows)	Quintile 5 (greatest outflows)	Q1 – Q5 (pps)	*t*-Statistic
1989			–0.645	–2.344**
1990			–0.234	–0.573
1991			–0.849	–2.123**
1992			–0.196	–0.435
1993			–1.190	–2.238**
1994			0.730	1.115
1995			–1.558	–3.401**
1996			–1.044	–3.435**
1997			–0.065	–0.25
1998			–0.209	–0.719
1999			–1.294	–3.323**
2000			–1.759	–6.134**
2001			–0.043	–0.143
2002			0.284	0.701
2003				
2004				
Mean			–0.635	–6.920**

Notes: Postflow one-, three-, and five-year annualized gross returns are averaged across all products in the flow quintiles formed for the year shown. The *t*-statistics report the results of an equality of means test (for equally weighted portfolios) between the portfolio of products in Quintile 1 (largest flow gainers) and the portfolio of products in Quintile 5 (largest flow losers); pps stands for percentage points. Returns are calculated in the year following asset flow calculations (e.g., a one-year postflow return following the 1986 flow period is calculated in 1987).

[a]Quintiles are ranked by flows (Equation 2).

*Significant at the 10 percent level.
**Significant at the 5 percent level.

Figure 1. Cumulative Returns of Outflow and Inflow Portfolios



Note: This figure shows the growth of the initial $1 in investments in Quintile 1 (largest flow gainers) and Quintile 5 (largest flow losers) by using the postflow one-year returns shown in Table 3 for 1986–2007 (based on asset flows for 1985–2006).

Table 4. Flow-Weighted Portfolio Postflow Returns and Brinson Attribution (Asset Flows), 1985–2006

	Returns			Sources[a]		
Flow Year	Inflow	Outflow	In – Out (pps)	Category	Product	Interaction
A. Subsequent one-year returns						
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
B. Annualized subsequent three-year returns						
1985			3.231	2.721%	–0.630%	
1986			–2.994	–2.170	–1.534	
1987			–1.299	–0.753	–0.338	
1988			–4.214	–2.412	–1.926	
1989			–1.865	–1.461	–0.470	
1990			–0.796	–0.024	–0.764	
1991			–0.819	0.293	–0.894	
1992			–0.686	–0.056	–0.099	
1993			–1.445	–2.540	0.617	
1994			–1.149	–1.505	0.343	
1995			–0.514	0.899	–1.535	
1996			–1.150	–1.538	0.288	
1997			–2.415	–1.437	–1.034	
1998			0.155	–0.085	0.239	
1999			–0.106	1.096	–1.479	
2000			–2.711	–0.814	–1.371	
2001			–0.536	0.738	–0.597	
2002			2.150	2.600	–0.281	
2003			0.198	0.106	0.187	
2004			–0.258	0.327	–0.467	
2005						
2006						
Mean			–0.861	–0.301	–0.587	
Std. dev.			1.662	1.490	0.730	

(continued)

Table 4. Flow-Weighted Portfolio Postflow Returns and Brinson Attribution (Asset Flows), 1985–2006 (continued)

	Returns			Sources[a]		
Flow Year	Inflow	Outflow	In – Out (pps)	Category	Product	Interaction
C. Annualized subsequent five-year returns						
1985			0.091	0.629%	–1.286%	
1986			–1.549	–1.200	–0.231	
1987			–1.405	–1.241	–0.165	
1988			–2.109	–1.176	–0.577	
1989			–0.145	–0.076	–0.119	
1990			–0.987	–0.253	–0.806	
1991			–0.428	0.250	–1.048	
1992			–0.424	–0.153	0.110	
1993			–2.024	–3.171	0.583	
1994			0.859	1.341	–0.088	
1995			–1.539	–0.419	–1.241	
1996			–0.963	–1.508	0.197	
1997			0.309	0.389	–0.011	
1998			0.156	0.148	0.036	
1999			–1.768	–0.161	–1.708	
2000			–1.250	0.114	–0.920	
2001			–0.618	0.621	–0.233	
2002			1.724	2.316	–0.384	
2003						
2004						
2005						
2006						
Mean			–0.671	–0.197	–0.438	
Std. dev.			1.040	1.200	0.608	

Notes: Flow-weighted portfolio return differences are decomposed into category and product selection components over three postflow periods; pps stands for percentage points. Inflow and outflow portfolio weights are calculated by using Equation 3.

[a]Sources are calculated by using Equations 4, 5, and 6.

Performance Attribution for Category and Product Decisions. The flow-weighted portfolio construction technique facilitates performance attribution for institutional investors' 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 into what sponsors were thinking in any given year. For example, following the equity market decline and simultaneous interest rate decline that began in 2000, outflows from domestic equities spiked in 2000 and 2001 and outflows from domestic fixed income spiked in 2002. Domestic fixed income also attracted a larger share of inflows in 2001 and 2002 than in other years. 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 domestic equity, before beginning a 20-year decline in flow activity. This outcome hints of a certain amount of interclass reallocation in addition to intraclass movement.

Because we used only product information in our Table 3 analysis, one might argue that the superior postflow performance of the "outflow portfolios" could be attributable partly to asset-class or equity-style allocation decisions, as well as to investment product (or manager) selection. To quantify the contributions from these two sources, we used 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 1 of the 10 PSN categories,

we were able to capture the effect of flow decisions between and among 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 postflow underperformance of the inflow asset-class portfolios is attributable to product selection, not to the category reallocation decisions. For mean return differences over the one-, three-, and five-year postflow periods, the difference attributed to product selection is more negative than the difference attributed to category allocation and the interaction effect (displayed in the table for one-year periods only) combined. Interestingly, the variability of the category allocation effect is greater than that of the product selection effect for all three periods. This result is likely attributable to the greater diversification in selecting many individual managers as compared with a limited number of asset classes or equity styles. No clear pattern emerges concerning sign or magnitude of the selection and allocation effects. The largest one-year return attributed to category allocation was 7.3 percent following 1985, when the product selection return was –2.3 percent; the largest product selection return was –3.7 percent the following year, when the category allocation return was –2.0 percent. Put another way, of the 15 negative postflow one-year return differences, product selection is the highest contributor six times and category allocation is the highest contributor four times; in four other years, both sources are significant contributors. In fact, the correlation between the two effects is zero for the one-year and three-year periods and slightly negative for the five-year period.

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

One-, three-, and five-year average postflow returns for inflow and outflow portfolios are reported for five domestic equity styles and five additional asset classes. The average of the 22 postflow one-year period returns for inflow portfolios is lower than the outflow portfolio returns for all 10 categories. The mean underperformance among these groups (not shown in the table) is –0.960 percent. For 8 of the 10 groups, the average of the 20 postflow three-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 postflow five-year periods

Table 5. Performance of Flow-Weighted Portfolios by Product Category over Subsequent Time Periods (Asset Flows), 1985–2006

Category	Inflow	Outflow	In – Out (pps)
A. One-year returns			
Domestic growth	12.870%	14.647%	–1.777
Domestic GARP	13.745	14.539	–0.794
Domestic balanced	10.672	11.361	–0.689
Domestic value	12.981	14.265	–1.285
Domestic core	12.940	13.304	–0.364
Global equity[a]	11.477	12.715	–1.239
International equity	13.287	14.991	–1.705
Domestic fixed	7.720	8.016	–0.296
Global fixed[b]	7.842	8.579	–0.736
International fixed	12.560	13.272	–0.711
B. Annualized three-year returns			
Domestic growth	12.224%	13.743%	–1.518
Domestic GARP	12.883	13.425	–0.543
Domestic balanced	10.440	11.018	–0.578
Domestic value	13.051	13.729	–0.678
Domestic core	12.454	12.917	–0.462
Global equity[a]	10.691	11.991	–1.299
International equity	10.015	10.915	–0.900
Domestic fixed	7.553	7.839	–0.287
Global fixed[b]	7.829	7.500	0.330
International fixed	11.398	11.135	0.262
C. Annualized five-year returns			
Domestic growth	12.179%	13.414%	–1.235
Domestic GARP	12.361	13.125	–0.764
Domestic balanced	10.349	11.020	–0.672
Domestic value	12.948	13.368	–0.420
Domestic core	12.215	12.766	–0.550
Global equity[a]	10.781	10.771	0.009
International equity	8.656	8.881	–0.225
Domestic fixed	7.719	8.015	–0.296
Global fixed[b]	7.742	7.491	0.251
International fixed	10.765	11.077	–0.313

Notes: This table presents the average returns over the 22 one-year, 20 three-year, and 18 five-year postflow periods of flow-weighted portfolios formed with products that either received inflows or lost outflows. Returns of the two portfolios in each PSN product category are weighted by each product's annual flows relative to total inflows or outflows; pps stands for percentage points. Portfolio weights are defined by Equation 3.

[a]Returns begin with the 1986 portfolio because there were no global equity outflow products in 1985.

[b]Returns begin with the 1987 portfolio because there were no global fixed-income outflow products in 1985 and 1986.

is also negative for 8 of the 10 categories.[7] The only positive return differences (two in the three-year and two in the five-year 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 results in Table 5 confirm the results presented in Table 4—all 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 greater 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 highest levels of underperformance (–1.777 percentage points and –1.705 percentage points over one year), and the lowest underperformance is observed for the lowest-volatility category of domestic fixed income (–0.296 percentage points).

Confirmation of Results

The description of the PSN dataset introduced the concern that the results presented in Tables 3–5 are affected by two potential data biases. The first is survivorship bias: the possibility that poorly performing products that continue to perform poorly may drop out of the sample or fail to report in years with poor performance. If institutional investors reduced their allocations to these products and our analysis excluded them, the negative performance differences we computed may be exaggerated or even be of the wrong sign.

To test for this bias, we repeated the tests reported in Table 3 for a subsample that included only products that existed for all five years of a given five-year postflow period. This subsample excluded products that disappeared from the dataset or failed to report required data within a five-year period. The results are reported in **Table 6** in the column "Existing for Five Years" alongside the results from Table 3 that are summarized in the column "Full Sample." The five-year requirement forces the one-year and three-year return periods to end following the 2002 flow year. The similarity of the results indicates that survivorship bias is not the source of the underperformance of institutional investors reported in Tables 3–5. 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 one-year return periods and the same in all but one of the three-year return periods. The average one-year return difference for the subsample is –1.682 percentage points, compared with the full sample's average difference of –1.574 percentage points for the postflow periods following the flow years 1985–2002. For the three-year postflow periods, the mean return difference is –0.962 percentage points for the subsample and –0.891 percentage points for the full sample for 1985–2002. The one- and three-year mean differences are all significant at the 5 percent level.

The second potential bias involves the presence of mutual fund assets in the dataset. All products were offered as institutional separate accounts and commingled pools, and returns were gross of fees, but some observations included assets of mutual fund versions of the products. Although this group represented a small portion of assets in the full dataset, we constructed a new subsample that excluded all products in a given year with mutual fund assets greater than 10 percent of total assets—a threshold that we believed was appropriate because it reduced the proportion of mutual fund assets to less than 0.6 percent of the aggregate assets, compared with 15.5 percent for the full dataset. Return differences for this subsample are presented in Table 6 under the heading "Limits Mutual Funds." Over the full 1985–2006 sample period, the one-year postflow return difference for the subsample is –0.999 percentage points, compared with a return difference of –1.059 percentage points for the full sample. The three- and five-year return differences are also very similar for both samples, which suggests that mutual fund asset flows are not influencing the observed return differences. The negative performance observed for changing investment allocations over time appears to be a result of the decisions of institutional plan sponsors, not retail mutual fund investors.

In addition to asset levels, the PSN records include the number of accounts for each product. As a further check on our asset flow results and to ensure that a few very large plans were not biasing our results, we examined return differences for portfolios formed on the basis of changes in the number of accounts. As with the asset flow test, an account-change-weighted portfolio of products whose account totals have grown is compared with a similarly formed portfolio of products that have lost accounts. **Table 7** reports the subsequent performance differences of these portfolios under the heading "Account Weight" alongside the asset-flow-weighted portfolio numbers from Table 4 under the heading "Asset Weight." These

Table 6. Analysis of Influence of Survivorship Bias and Mutual Fund Exposure (Asset Flows), 1985–2006

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

Note: In this table, return differences from Table 3 ("Q1 – Q5") are compared with return differences from two subsamples: products in the dataset with five or more consecutive postflow return years and products with less than 10 percent of assets in mutual funds; pps stands for percentage points.

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

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

results confirm our previous findings. Not only are the signs and return differences for the asset-flow-weighted and account-flow-weighted portfolios similar in a majority of the subsequent return periods, but also the averages of the annual return differences are more negative for the account-flow-weighted portfolios than for the asset-flow-weighted portfolios: –2.167 percentage points, –1.719 percentage points, and –1.703 percentage points over the one-, three-, and five-year postflow periods.

These findings complement those of Heisler et al. (2007), who showed that products with especially poor performance lost both accounts and assets. Our results demonstrate that products suffering account losses subsequently experience stronger performance than products that merely lost assets.

Table 7. Account-Flow-Weighted vs. Asset-Flow-Weighted Postflow Returns (Account Flows), 1985–2006

	One-Year "In – Out" Returns		Three-Year "In – Out" Returns		Five-Year "In – Out" Returns	
Flow Year	Asset Weight (pps)[a]	Account Weight (pps)[b]	Asset Weight (pps)[a]	Account Weight (pps)[b]	Asset Weight (pps)[a]	Account Weight (pps)[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

Notes: In this table, postflow return differences between inflow and outflow portfolios formed by asset flow weights ("In – Out" column in Table 4) are compared with portfolios formed by account-change weights. A negative sign indicates that the asset inflow (account increase) portfolio underperformed the asset outflow (account decrease) portfolio; pps stands for percentage points.

[a]Portfolio weights are based on asset flows (Equation 3) and returns from Table 4.
[b]Portfolio weights are based on account flows.

Conclusion

The preceding analyses show that plan sponsors are not acting in their stakeholders' best interests when they make rebalancing or reallocation decisions concerning plan assets. Portfolios of products to which they allocate money underperform compared with the products from which assets are withdrawn. Performance is lower over one- and three-year periods and shows no signs of reversal even after two more years. When postflow performance is decomposed into allocations between asset categories and product selection within categories, product selection detracts more from performance than does asset allocation. 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 portfolios of products that experienced outflows. This measure quantifies the value that was added or forgone by sponsors' decisions regarding their plan assets. **Table 8** shows that the value forgone by placing assets with the inflow portfolio products instead of with 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 have grown to more than $10 trillion, with $51 billion lost in the year following allocation changes made in 2000 and $45 billion gained in the year following allocation changes made in 2002. Table 8 also displays three- and five-year performance impacts for each year (assuming static product portfolios). To avoid double counting in estimating the total longer-term results, we assumed that sponsors reallocated a portion of assets at the end of Years 1 and 3.

The resulting five-year weighted average impact, without compounding, sums to –$170.2 billion for the full sample period—a significant

Table 8. Economic Significance of Performance Differences (Asset Flows), 1985–2006

		Performance Impact ($ millions)			
		Static Product Portfolio			Reallocation
Flow Year	Inflows ($ billions)	Subsequent One Year[a]	Subsequent Three Years[b]	Subsequent Five Years[b]	Subsequent Five 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

Note: The opportunity cost in dollar returns is calculated by applying the subsequent return differences between inflow and outflow portfolios in Table 4 to the inflows in Table 2.

[a]Yearly dollar flow times the following one-year return difference; a negative amount indicates a loss in value.

[b]Yearly dollar flow times the subsequent multiyear difference; assumes a static portfolio.

[c]Assumes that 12.5 percent of capital is reallocated every year, realizing the subsequent one-year performance impact; 25 percent is reallocated every three years, realizing the subsequent three-year performance impact; and 62.5 percent is reallocated every five years, realizing the subsequent five-year performance impact.

figure for the institutional investment industry.[9] Although only estimates, these figures most likely underestimate the economic impact because we excluded the transaction costs required to implement the allocation changes: Assuming round-trip transaction costs of 100 bps, the estimated dollar impact over one-year periods would double. Clearly, plan sponsors could have saved hundreds of billions of dollars in assets if they had simply stayed the course.

Our findings prompt several questions. The most important is why plan sponsors appear to fail in their goal of increasing the value of plan assets. Heisler et al. (2007) demonstrated that institutional investors are sophisticated in their use of 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, whereas reversion would lead to negative results.

We suggest several experiments to shed light on 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 returns. Heisler et al. (2007) suggested 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 because of this misunderstanding. Another approach would be to survey investment officers to learn about their processes and identify common mistakes. Although no foolproof methods for manager selection exist, Stewart (1998) presented a quantitative technique shown to be effective with large samples of managers. Treynor (1990) offered a qualitative approach by listing 10 key questions to ask prospective managers. With pension plans, foundations, and endowments continuing to receive billions of dollars in annual contributions—and given the billions of dollars that have already been lost—the process of selecting investment managers clearly needs review.

For useful comments, the authors thank Michael Salinger, Don Smith, and participants at the following meetings: Chicago Quantitative Alliance (2002), Eastern Finance Association (2006), Financial Management Association (2006), Academy of Finance (2006), and Boston QWAFAFEW (December 2007).

This article qualifies for 1 CE credit.

Notes

1. These results may appear contrary to our findings in the institutional market, but we did not study subsequent one-month returns because they were unavailable in the PSN database.
2. As of December 2006, *Pensions & Investments* reported that the assets of the 100 largest endowments and 100 largest foundations together totaled $500 billion. The remaining $3 trillion represents smaller funds, foreign plan sponsors, and nonpublic funds, including churches, private foundations, and nonpension corporate assets.
3. This percentage closely matches the number based on a non-survivor-biased sample in Busse, Goyal, and Wahal (2006).
4. Note that flows are not implied to have been directed to new products when they appeared in the database with assets for the first time.
5. When calculating the standard errors for the three- and five-year returns, we accounted for autocorrelation by using Newey–West heteroscedastic- and autocorrelation-consistent standard errors. An alternative non-regression-based technique is the Fama–MacBeth estimator. Skoulakis (2008) presented simulation evidence that in cases like ours (a large cross section and relatively small time series), both techniques yield reliable estimates of standard errors. For all three cases, we calculated the *t*-statistics in Table 3 by using only the annual differences. Conducting the tests across the entire sample, we found serial correlation–corrected *t*-statistics of –4.7, –4.3, and –4.2 for the one-, three-, and five-year postflow period return differences.
6. The one-year difference is statistically significant at the 10 percent level, and the three- and five-year differences are significant at the 5 percent level.
7. Techniques for testing for survivorship bias are described in the next section. Note that almost all the mean return differences are more negative (favoring the outflow portfolios) when the restriction that a product must exist for all five years in any rolling period is enforced, which suggests the absence of survivorship bias.
8. For discussions of investment decisions, skill, and added value, see Grinold (1989) and Stewart (1998).
9. Over the sample period, inflows represent, on average, 12.5 percent of product assets. We assumed a constant reallocation rate, with 12.5 percent of the reallocated capital earning the one-year performance impact, 25 percent earning the three-year impact, and 62.5 percent earning the five-year impact. Different weighting schemes yielded similar totals.

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