Economies of Scale, Lack of Skill or Misalignment of Interest?

A Study on Pension and Mutual Fund Performance

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Abstract

This paper provides empirical evidence on the comparative performance of three important players in the US financial services industry: defined benefit (DB) pension funds, defined contribution (DC) pension funds, and mutual funds. We have access to a pension fund database, which provides fund-specific cost, benchmark and equity return information at the total plan level. This allows us to study both net and gross equity returns in great detail. Our empirical results clearly show that equity investments of DB and DC pension funds perform according to their fund-specific benchmarks, whereas mutual funds on average under-perform by about 150-200 basis points in the same period. We find modest evidence of persistence in mutual fund returns, while there is none in pension fund returns. The performance differential between pension and mutual funds cannot be fully explained either by differences in costs, as a result of economies of scale, or by size, risk and style deviations. We conclude that other factors must play an important role. Agency costs are a usual suspect.

1 Introduction

This paper provides empirical evidence on the comparative performance of three important players in the US financial services industry: defined benefit (DB) pension funds, defined contribution (DC) pension funds, and mutual funds. Individuals, who save for their retirement, can be members of a DB or DC pension plan. DB plan managers generally decide on both strategic asset allocation and security selection on behalf of their participants. In the case of DC plans, individuals have more degrees of freedom in making asset allocation choices, but the supply of investment vehicles is mostly determined by DC boards. Often, negotiations with institutional asset managers result in an array of mutual funds across major asset classes. Moreover, a substantial number of private individuals directly holds mutual fund vehicles to upgrade insufficient pension accruals or simply because they are not member of a pension plan.

The three saving options potentially have different returns to investors. Mutual fund management companies are for-profit organizations, whose predominant reason for existence is to maximize the collection of fees. DB and DC pension plans are not-for-profit institutions, who provide participants with a possibility to accrue retirement benefits in a pooled, cost and tax-efficient environment. The important question is whether these different objectives materialize in significant differences in returns. For instance, do professional mutual fund organizations attract more experienced and skilled portfolio managers, which consequently leads to higher returns for mutual fund investors? Or alternatively, do pension funds have a clear advantage vis-à-vis mutual funds as a result of economies of scale, which eventually leads to lower cost levels and hence higher net returns for participants? The first question has been answered unambiguously in the mutual fund literature. Gruber (1996) and Malkiel (1995), among many others, clearly document the inability of mutual funds to beat the market. The second question has not been addressed explicitly in the finance literature, largely because of the lack of fund-specific cost and benchmark information on pension funds.

Lakonishok, Schleifer, and Vishny (1992) introduce agency costs as an additional element in the discussion on the expected performance differences between (DB) pension funds and mutual funds. They document that DB pension plans in the US consistently under-perform broad benchmarks like

the S&P 500. The main argument put forward is the existence of multiple layers of agency relationships between companies, pension treasurers, money management firms and plan participants. Ambachtsheer (2005) extends this discussion by highlighting the inherent conflict that results from for-profit organizations providing management services directly to millions of faceless mutual fund investors. He argues that the combined forces of informational asymmetry between managers and clients, and the presence of pronounced principal-agent problems, logically lead to poor net investment returns.

To shed more light on this discussion, it is of vital importance to learn more about the comparative performance of DB, DC and mutual funds in a unified framework. Surprisingly little is known about this performance in the finance literature, mainly due to the absence of comprehensive pension fund data. Previous studies relied on gross returns (before fees are deducted), managed accounts of pension funds (instead of overall plan performance) and/or compared performance to broad market indices (e.g. S&P 500). In our study, we have access to an exclusive US pension fund database provided by CEM Benchmarking Inc. (CEM). This allows us to jointly address the above mentioned shortcomings in earlier research.

We contribute to the literature on the performance of financial services in five distinct ways. First, we measure the performance of equity portfolios of 716 DB plans, 238 DC plans and 4,030 mutual funds at the individual fund level in the US. Second, as we have full information on the cost structure of all individual pension- and mutual funds, we are able to present both gross and net comparative performance. The cost structure contains more components than previously documented in pension literature, including direct investment, oversight, custodial and trustee, and audit costs. Third, the CEM database allows us to employ fund-specific benchmarks in contrast to the majority of previous studies. Fourth, we test for the influence of investment style (large versus small cap), outsourcing (internally/externally managed) and risk taking (active versus passive investing) on the comparative performance of DB, DC and mutual funds. Fifth, we document evidence on the performance persistence of the three investment options. These contributions enable us to explicitly address the skill and cost arguments when assessing performance differences between pension and mutual funds.

In the empirical results section we show that (size-matched) mutual funds on average under-perform the corresponding benchmarks significantly, some-

times up to -300 basis points. Both DB and DC pension funds on average perform according to their fund-specific benchmarks, despite a huge difference in average size of their equity holdings. We find modest evidence of persistence in mutual fund returns and no evidence of pension fund return persistence. The deviations in performance between pension and mutual funds cannot be fully explained by differences in costs, size, risk and investment style. The performance differential might be an indication of the agency costs argument put forward by Ambachtsheer (2005).

Section 2 presents a brief overview of the existing literature on the equity performance and persistence of DB and DC pension funds and mutual funds respectively. Furthermore, we highlight the contributions of our study. In section 3 we discuss the details of the CRSP mutual fund database and the CEM pension fund database. We describe the performance measurement and risk adjustment methodology in section 4. Section 5 contains a discussion of empirical results. Finally, section 6 provides concluding comments.

2 The Performance Debate

Mutual funds and pension funds have been subject to decades of academic research. Mutual funds in particular, served as an excellent laboratory to investigate the performance of professional money managers. Due to data availability, studies on pension fund performance are relatively scarce. Below, we briefly discuss the existing literature on the performance of the financial services industry and subsequently indicate the contributions of our study.

2.1 Mutual Funds

Mutual funds are traditionally organized as a cost-efficient tool for retail investors who wish to build a diversified portfolio. They offer individual investors portfolios managed by professional managers. This may sound appealing, but private investors have to take into account that mutual fund companies are for-profit organizations. Mutual fund families charge investors around 1.2% in annual management fees and up to 5.0% in entry and/or exit load fees. As these fees are based on the amount of asset under management (AUM), a fund family clearly has an incentive to increase AUM. One way to realize this increase is through media attention. For in-

stance, Sirri and Tufano (1998) show that mutual fund flows are positively related to the amount of media attention a fund receives. Consequently, higher media attention leads to higher marketing costs, which inevitably puts a drag on net performance. Sirri and Tufano (1998) also provide evidence that individual investors are highly sensitive to past performance. Past high performance funds receive disproportionately large inflows when compared to the average fund. This reinforces our previous argument, as marketing efforts mainly stress past performance.

In light of the long-term debate on the efficiency of financial markets, academics have been investigating mutual fund returns for about four decades. The mutual fund sector is heavily regulated, which makes it highly transparent with respect to fund returns. A wealth of databases provides academics with over 40 years of investment returns and information on size and fees of US mutual funds, resulting in a large number of performance evaluation studies. The majority of earlier work [Sharpe (1966), Jensen (1968)] concludes that the performance of mutual funds is inferior to that of a comparable passive market proxy. During the late 80s and 90s some contrasting findings appeared. For instance, Grinblatt and Titman (1989, 1992), Ippolito (1989) and Wermers (2000) document that mutual fund managers possess enough private information to offset the expenses they incurred. Furthermore, Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994) and Brown and Goetzmann (1995) find evidence of persistence in mutual fund performance over short-term horizons. However, Carhart (1997) argued that this effect is mainly attributable to simple momentum strategies, and not to superior fund management. Finally, Malkiel (1995) and Gruber (1996) observe that most of the older studies are subject to survivorship bias. When adjusted for this bias, mutual funds on average under-perform the market proxy by the amount of expenses charged to investors. As a result, investing in a low cost index fund is preferred over choosing an actively managed fund.

2.2 Defined Benefit Pension Plans

In contrast to mutual funds, pension funds are not-for-profit institutions. DB plans promise participants a pattern of benefits after retirement, which does not solely depend on the investment performance of the fund. In a corporate DB plan, the corporation obligates itself to pay a certain level

of benefits to its participants. If the plan is under-funded, the corporation has to provide supplementary funding to the pension fund. Therefore, it is clearly in the interest of a corporation to achieve the highest possible returns on the pension plan assets to prevent a claim on the corporation. The same holds for public DB plans, where ultimately taxpayers will be addressed in case of under-funding.

Data on individual DB plans is difficult to obtain, narrowed down to specific plan types and generally of poor quality. As a result, academic studies on the performance of DB plans are limited in both number and sophistication. The majority of previous work is focused on delegated portfolio management. These so-called pension fund accounts are typically managed by well-known institutional asset managers, who report to investment consultants.

One of the first studies on delegated portfolio management for DB plans is conducted by Beebower and Bergstrom (1977). They examine the performance of 148 US portfolios by using a CAPM (1-factor) framework. In their study the average portfolio outperforms the S&P 500 by 1.44% per year. Although the estimate does not differ significantly from zero, the authors document a significant pattern of persistence in performance. Similar results are documented by later studies. Christopherson, Ferson, and Glassman (1998) examine 273 pension fund accounts using a conditional multi-factor extension of the CAPM and find significant persistence in performance. Busse, Goyal, and Wahal (July 2006) perform the most complete study on pension fund accounts so far. They study 6,260 portfolios managed by institutional asset managers on behalf of pension funds, in the period 1991-2004. Using a conditional multi-factor model, they find that the average fund outperforms the market by 1.24% after expenses. This outperformance is only marginally significant. While studies on delegated pension fund portfolios show slightly positive performance, research on overall DB plan performance are somewhat more negative. Brinson, Hood, and Beebower (1986) study the returns of 91 DB plans during 1974-1983. Benchmarked against the S&P 500, the plans under-perform by 1.10% per year. Ippolito and Turner (1987) investigate a much larger sample of 1,526 plans during 1977-1983 and find that the average plan under-performs the S&P 500 in a CAPM framework by 0.44% per year. Finally, the widely cited study by Lakonishok, Schleifer, and Vishny (1992) questions the future of the DB industry. Their sample

of 769 DB plans under-performs the S&P 500 by 2.60% per year during 1983-1989.

2.3 Defined Contribution Pension Plans

In contrast to DB plans, participants in a DC plan are not entitled to a fixed amount of benefits. Under a DC plan, the participant has an account to which both the employer and the employee make regular contributions. The ultimate benefit depends on the level of contributions and investment returns of assets in the account. An important difference with the DB plan is that DC members bear all the investment risk. The corporation or taxpayers have no obligation with respect to the final outcome of the benefit.

Mutual funds constitute a large part of the choices offered to participants. The DC plan sponsor can make a deal with a large mutual fund family, that offers a range of mutual funds to choose from. This is commonly referred to as a 401(k) plan. Although most plans offer a wide diversity of funds (equity, bonds, money market), Elton, Gruber, and Blake (2006) question the adequacy of choices offered to participants. They find that in over 60% of plans, participants would be better off with additional investment opportunities. Information on DC plans is scarce and often incomplete. The only exception is the study by Elton, Gruber, and Blake (2006) mentioned before. They investigate mutual funds offered by 43 DC plans in the period 1993-1999. Using a multi-factor model, they find that the average mutual fund offered under-performs the market by 0.31% per year. Interestingly, these funds significantly outperform matched mutual funds not offered in the DC plan. Hence, it seems that DC plan sponsors are able to pick the best performing funds for their participants.

2.4 Comparing DB, DC and Mutual Fund performance

To our knowledge, no previous study compared the performance of DB, DC and mutual funds in a unified framework. We expect differences in costs to be a main driver of the comparative performance of DB, DC and mutual funds. Although all three types of funds profit from economies of scale, significant differences are present. The size of the equity part of the average DB plan in our sample is $2,750 mln. DC plans and mutual funds, with respectively $617 mln. and $370 mln. in equities, on average are much

smaller. These economies of scale potentially leads to large differences in costs.

The above mentioned hypothesized differences in costs only matter in the absence of skill. Often, managers claim to possess sufficient stock-picking skills to offset higher fees. Empirical analysis on the relationship between risk adjusted returns and mutual fund fees clearly points towards the opposite. For instance, Malkiel (1995) and Carhart (1997) document a significant negative relationship. The current consensus is that mutual funds on average under-perform. Funds with high fees perform worst. Based on the research described in section 2, we cannot identify skill among delegated managers of DB plans.

Finally, we believe that the different agency relationships in pension and mutual funds have an impact on their comparative performance. Lakonishok, Schleifer, and Vishny (1992) argue that corporate treasurers have a bias against passive management, because it reduces their importance in the organization and therefore weakens the position of the treasurer. Additionally, Lakonishok, Schleifer, and Vishny (1992) claim that external management is preferred, as it reduces the responsibility for potentially poor performance. This explains why treasurers tend to out-source assets to active fund managers. These fund managers clearly have a different objective. They want to attract clients with good past performance in a commercial setting. Shifting the responsibility to external managers might therefore come at high costs. In a DC plan sponsors shift this responsibility to participants. Their only job is to make a deal with an external investment company to provide participants with an adequate array of investment opportunities. Consequently, both DB and DC officials have to select managers from a large for-profit pool. In this pool both institutional asset managers (delegated portfolio management) and mutual fund companies (mutual funds) are operating. Based on the discussion above, we expect agency relationships to influence the comparative performance of DB, DC and mutual funds.

2.5 Added value of our study

We complement previous work on pension fund performance in five ways. First, most previous work investigates managed pension accounts, delegated to outside parties. We investigate equity returns at the individual plan level, which allows us to address additional questions. For instance, what is the

relationship between pension plan size, fees and returns? Studying separate fund accounts does not allow for these types of tests. As we also collect information on retail mutual funds, we are able to make a direct comparison between different types of pension funds (DB and DC) and retail mutual funds. By using the same methodology, time frame and focus (equity), this allows for a more detailed comparison. Second, most previous studies have no (or limited) information on costs of pension fund portfolios and present returns gross of all expenses. We expect large differences in costs between for-profit and not-for-profit funds, which may have a substantial impact on results. We are able to determine detailed fund specific costs at different aggregation levels and take into account cost components that have not been incorporated before. In the empirical section both gross and net returns are reported. Third, the majority of previous studies on pension fund performance uses broad equity benchmarks to study active returns. For instance, Brinson, Hood, and Beebower (1986) and Lakonishok, Schleifer, and Vishny (1992) compare pension fund performance to the S&P 500 only. Later studies by Christopherson, Ferson, and Glassman (1998), Busse, Goyal, and Wahal (July 2006) and Elton, Gruber, and Blake (2006) employ more elaborate multi-factor models, but this benchmarking methodology is still a poor approximation. The CEM database provides fund-specific benchmarks. Fourth, we test for the influence of investment style (large versus small cap) and risk taking (active versus passive investing) on the comparative performance of DB, DC and mutual funds. Fifth, we document evidence on the persistence of all three investment options for retirement provision at the plan level.

3 Data

This section describes the characteristics of the mutual and pension fund databases. Data on equity investments are extracted from two different sources. Mutual fund data are retrieved from the CRSP database, the standard database for mutual fund research. DB and DC pension fund data are collected by CEM Benchmarking Inc. (CEM), which collects detailed information on pension fund performance in all asset classes. Furthermore, the CEM database contains fund-specific costs (breakdowns) and benchmarks.

3.1 Mutual Fund Data

To CRSP database is survivorship bias free. It covers all US mutual funds during 1962-2004. Beside fund returns, it provides a vast range of retrievable fund specific variables, for instance the expense ratio, net asset value (NAV), fund flows, turnover, investment style, portfolio holdings and manager information.

We select all funds with investment objective "US equity". Additionally, we retrieve the investment style for each fund in order to match it to specific style benchmarks. Value and income oriented funds are matched against the S&P 500 Barra Value benchmark, growth funds against the S&P 500 Barra Growth benchmark and blend funds against the S&P 500. For small cap funds we use the Russell 2000. Based on the self-acclaimed investment styles, funds are subsequently grouped into small and large cap funds and split into actively and passively managed funds. This procedure leads to a sample of 4,030 mutual funds. In order to enhance the comparison to CEM pension fund equity returns, we retrieve mutual fund returns at a yearly frequency. We consider the reported Total Expense Ratio (TER) as the expenses. TER includes management fees, 12b-1 distribution fees, administrative costs and other operational costs[1].

3.2 Pension Fund Data

By means of yearly questionnaires, CEM requests pension funds to provide insights in their gross performance, benchmarks and costs. Tables 1 and 2 illustrate the diversity and evolution of the CEM equity database by reporting the number of funds for different classifications, countries and regions. The "Original"-panel shows characteristics of the data as provided by CEM. Pension funds are grouped into corporate, public and other funds. Furthermore, CEM distinguishes between US, Canadian and European funds. Tables 1 and 2 also demonstrate the time frame of the analysis, 1992-2004 for DB funds and 1997-2004 for DC funds. A total number of 716 DB and 238 DC funds have reported to CEM in the corresponding sample period. In any given year, approximately 250 DB and 100 DC funds report to CEM. This implies that CEM saves information on funds entering and leaving the

[1]In addition to the TER, funds can charge entry and/or back end loads to investors. The inclusion of loads is beyond the scope of this paper.

database. Pension funds have several reasons to leave the database. For instance, mergers and acquisitions of the underlying corporations may cause funds to stop reporting. Finally, Tables 1 and 2 reveal that the database mainly contains US and corporate funds.

[Figure 1 about here.]

[Table 1 about here.]

[Table 2 about here.]

[Table 3 about here.]

[Figure 2 about here.]

The unique structure of the CEM database allows an accurate evaluation of performance and persistence. It provides the possibility to evaluate large and small cap, actively and passively managed and internally and externally managed (only for DB funds) equity investments separately. Figure 4 shows the structure of our pension fund database by representing all equity classifications. When starting at the highest aggregation level, containing all equity investments, subsequent split ups create different aggregation levels as indicated in Figure 4. Data provided by CEM are reported on low aggregation levels (e.g. gross returns on internally, passively managed large cap stocks). For this reason, we are able to measure differences between investment styles.

In order to measure these differences we need to aggregate the data. Higher aggregation level returns are computed as value weighted averages of lower level returns with lower level holdings as weights. Holdings are aggregated by addition of lower level holdings. If, on a certain level, funds report a positive holding but no return, value weighted aggregation is not possible. Hence, we exclude these observations. Performance is measured net of benchmark returns and costs, and thus consists of the difference of two variables. If two observations need to be added or subtracted, one of them missing, we consider the sum or difference as missing too. Additionally, extreme outliers may influence our results in an undesirable way. Occasionally, funds report returns larger than 300% in absolute value. We address this by removing observations that have distances larger than three standard deviations from the cross-sectional mean. As a further refinement, we

also exclude funds that report less than two years. Finally, we restrict the analysis to domestic equity investments by US pension funds. This allows us to compare our results directly with e.g. Christopherson, Ferson, and Glassman (1998) and Elton, Gruber, and Blake (1996).

The effect of this procedure can be measured by comparing the original and modified data set. Tables 1 and 2 summarize the yearly number of funds in each category, for both the original and modified data set. The modified panel in both tables displays data characteristics after outliers have been removed and data are aggregated up to the highest possible aggregation level. The modified panel only reports characteristics of US funds. Comparing the "Original" and "Modified" panels in Tables 1 and 2 reveals that only a minority of funds is excluded as a result of our aggregation and removal procedures.

Table 3 presents information on the size of the equity holdings in different classifications. The table shows that large cap investments dominate small cap equity investments. This dominance is more pronounced for DB pension funds. Furthermore, Table 3 reveals that pension funds initially have a stronger preference for passive investments than mutual funds. However, over time mutual funds shift toward more passively managed investments. Zooming in on the lowest aggregation level for DB funds, demonstrates that externally managed equity holdings are on average larger than their internally managed counterparts.

4 Methodology

This section describes the methodology used in the performance and persistence analysis. First, we present the standard performance measurement procedure for the three investment options under consideration. Subsequently, we provide the persistence methodology by introducing two tests suggested in Carpenter and Lynch (1999). Finally, we present a panel model estimation technique, which enables us to risk adjust returns using the well-known Fama and French (1996) framework. Due to data availability, this panel approach is conducted on higher aggregation levels only.

4.1 Standard Performance Measurement

As explained in the data description, the pension fund database contains information on fund-specific returns, benchmarks and costs. Net performance is measured as net value added ($NVA_{i,t}$), which is computed as $NVA_{i,t} = R_{i,t} - BMR_{i,t} - C_{i,t}$, with $R_{i,t}$ denoting gross return, $BMR_{i,t}$ the (fund-specific) benchmark return, and $C_{i,t}$ total costs, for fund i at time t respectively. In order to measure the impact of costs, we also introduce gross performance ($GVA_{i,t}$), which is measured as $GVA_{i,t} = R_{i,t} - BMR_{i,t}$. DB fund costs include direct investment, oversight, custodial and trustee, audit and other related costs. DC costs contain these components as well, but also include recordkeeping, communication and education costs. The performance measure ($NVA_{i,t}$) used in this study has three important advantages over performance measures previously used in the pension fund performance literature. First, by subtraction of a fund-specific benchmark return, we reduce possible misspecification. The majority of earlier studies correct by deducting returns of broad benchmark indices (for instance the S&P 500). Second, costs are fund-specific as well, whereas most previous studies assumed a common fixed cost component (e.g. 30 basis points for all funds). Third, costs contain both a direct and indirect component, opposed to a proxy for direct investment costs only.

Our standard analysis starts at the highest aggregation levels (3 and 4, see Figure 4), i.e. aggregating over different equity classifications. In the standard analysis, we compute time-series averages of NVA for each single fund. Average performance (NVA_{mean}) is then measured as the average NVA across funds,

$$NVA_{mean} = \frac{1}{N} \sum_{i=0}^{N} \sum_{t=0}^{T} \frac{I_{i,t}}{T_i} NVA_{i,t}, \tag{1}$$

with $I_{i,t}$ being a dummy for fund i, which has a value of one if the fund does report to CEM and a value of zero if the fund does not report to CEM in year t. T_i is the total number of years fund i is contained in the database, T is the maximum number of time periods that a fund can be included in the database, and N is the total number of funds.

The standard analysis is repeatedly executed for DB, DC and mutual funds. The procedure for mutual funds is largely the same, but benchmarks

are treated differently, see section 3.1 for the style matching procedure. Within each investment category (DB, DC and mutual funds), the analysis is conducted for separate equity classifications, starting with the complete sample (aggregation level 4). Thereafter, we analyze aggregation level 3, i.e. large cap, small cap, actively and passively managed equity investments respectively. Additionally, we apply our methodology on a lower aggregation level (see Figure 4). The standard performance analysis as described above is then conducted on aggregation level 2 for all options and on aggregation level 1 for DB funds only[2]. First, we divide pension fund equity investments into actively and passively managed holdings. Then, these portfolios are separated into large and small cap equity investments. For DB funds we add a distinction between externally and internally managed equity investments.

4.2 Persistence Tests

The pension and mutual fund literature has addressed the question of persistence in manager performance in many different ways. Particularly in the mutual fund literature, a large number of tests has been developed to test for persistence in manager performance, see for instance Brown and Goetzmann (1995) for empirical results. This methodology has been applied to pension fund performance as well, see for instance Tonks (2005) and Busse, Goyal, and Wahal (July 2006). Unfortunately, most of these studies suffer from the lack of data on the individual pension fund level. Instead, they document the persistence of managed accounts by delegated institutional asset managers.

Carpenter and Lynch (1999) show that persistence tests can roughly be divided into two categories: performance-ranked portfolio strategies tests and contingency table tests. In our persistence analysis, we adopt the "$TDIF$"-test out of the first and the chi-squared-test out of the second class. In the first test, each consecutive year funds are ranked into ten deciles based on their past year performance. A portfolio is then formed by taking a long position in the best performing decile and an equally large short position in the worst performing decile. One year later, the portfolio's performance is evaluated. Persistence is then tested with a t-test on the time-series of the portfolio performance. Since we consider only one ranking and evaluation

[2]No distinction between externally and internally managed stocks can be made for DC pension funds and mutual funds.

period, results do not suffer from look-ahead bias. The chi-squared-test also ranks funds based on their past year performance. However, funds are split up into winners and losers. Similar split ups for ranking periods allow us to construct transition matrices discriminating between the number of persistent winners (WW), losers (LL) and switchers (WL,LW). Under the H_0 of no persistence, the statistic

$$\frac{(WW - \frac{N}{4})^2 + (WL - \frac{N}{4})^2 + (LW - \frac{N}{4})^2 + (LL - \frac{N}{4})^2}{N} \tag{2}$$

with N denoting the sum of funds over the four categories, is chi-squared distributed with one degree of freedom.

The two persistence tests allow us to detect whether certain (types of) pension or mutual funds are consistently performing better or worse than their peers.

4.3 Risk and Style Adjustment

In the standard performance analysis, we compute NVA by subtracting appropriate benchmarks. The resulting net performance could be impacted by certain other investment decisions by portfolio managers, for instance a high beta (to the market) position or exposures to certain investment styles (e.g. to small cap or growth). For example, a fund manager who is supposed to invest in large cap stocks only, may take a bet on small cap stocks trying to beat his large cap benchmark. Hence, risk and style adjustments are required to evaluate true fund performance. The relatively short time horizon combined with the low frequency of our databases make risk adjustment a tedious task. Estimating any time series (4-)factor model using up to 13 time series observations is cumbersome and most likely leads to inefficient estimates. For this reason, we apply a panel model approach which allows us to adjust standard NVAs for risk.

Random coefficient panel models capture fund-specific characteristics without estimating a large number of parameters. Hence, this is an efficient way to risk adjust performance in a large N, small T panel. In a random coefficients model, fund-specific alphas and betas are assumed to be randomly drawn from a normal distribution. We specify the risk adjustment

model as:

$$NVA_{i,t} = \alpha_i + \beta_{M,i} R_{M,t} + \beta_{SMB,i} SMB_t + \beta_{HML,i} HML_t + \beta_{UMD,i} UMD_t + \epsilon_{i,t}, \tag{3}$$

where R_M is the excess market return, and SMB, HML and UMD are the well-known Fama and French-factors[3]. SMB and HML are included to capture risk associated with size and book-to-market and UMD detects possible momentum strategies. We specify α, β and ϵ distributions as:

$$\alpha_i \quad \sim N(a_0, \sigma_\alpha^2) \tag{4}$$

$$\beta_{j,i} \quad \sim N(b_j, \sigma_j^2) \quad \text{for} \quad j = M,\ SMB,\ HML,\ UMD \tag{5}$$

$$\epsilon_{i,t} \quad \sim N(0, \sigma_\epsilon^2). \tag{6}$$

For simplicity, we furthermore assume independence of the coefficients

$$\alpha_i \perp \beta_{j,i} \quad \beta_{j,i} \perp \beta_{k,i} \quad \text{for} \quad k,j = M,SMB,\ HML,\ UMD \quad \text{and} \quad j \neq k. \tag{7}$$

Risk and style adjusted NVAs are then represented by a_0. In addition, we provide a multi-level panel approach. This provides us with the opportunity to study drivers of pension and mutual fund performance. We include the ratio of internally managed to total equity investments (INT) and a dummy for public funds (PUB). In the mutual fund analysis, we incorporate a turnover estimate (TO). Hence, the multi-level extension can be specified as

$$\alpha_i = a_0 + a_{int} INT_{i,t} + a_{pub} DPUB_i + \eta_{\alpha,i} \tag{8}$$

for pension funds, and

$$\alpha_i = a_0 + a_{to} TO_{i,t} + \eta_{\alpha,i} \tag{9}$$

for mutual funds.

The single level panel model can be considered as a subclass of the multi-level model. Consequently, we focus on describing the multi-level estimation techniques. Substitution of equations (8) and (9) into equation (3) shows that the independence of coefficient assumptions simplifies the estimation

[3]Factors are obtained from Kenneth French's web-site.

to a least squares estimation with time-varying variance. Small modifications to FGLS-estimation techniques as described in Hsiao (2003) result in best linear unbiased parameter estimates. In the first stage, we run cross-sectional OLS regressions to determine coefficient variances for each t. In the second stage we apply GLS, using first stage time-varying variances to estimate parameters and compute corresponding p-values.

5 Empirical Results

In this section we present empirical results on the performance and persistence of DB pension funds, DC pension funds and mutual funds in the US. First, we document standard performance differences between the three investment options, on various aggregation levels (see Figure 4). Next, we investigate persistence in pension and mutual fund performance. Subsequently, we show risk adjusted performance differences by applying the panel data approach introduced in the previous section. In a multi-level panel analysis we investigate potential drivers of performance differences by taking into account fund-specific characteristics. Finally, we discuss the implications of our empirical results.

5.1 Standard Performance Results

The standard performance measurement analysis is conducted at the two highest aggregation levels. As indicated in section 4, the NVAs for each individual fund are first averaged over time. Then we compute the cross-sectional average of the time-series mean NVAs. Table 4 reports the across-fund average NVA in the column labeled "Mean". Furthermore, we display the cross-sectional standard deviation ("s.d.") of time series average NVAs and compute a t-statistic to indicate whether the cross-sectional means differ significantly from zero[4]. As a further characterization of the distribution of NVAs, we report the number of unique fund-time combinations ("NT"), cross-sectional maxima ("Max") and minima ("Min"). Once performance has been measured and characterized, we display additional information on the funds in the CEM database. The maximum number of consecutive

[4]This statistic should be treated with caution, as the assumption of normally distributed time-series means may be violated. Nevertheless, it gives insight in the significance of results.

years a pension fund is present in the database ("Cons. Yrs") is reported. Furthermore, the cross-sectional averages of time series average size of the equity holdings ("Size Eq. hold.") and total costs ("Costs") are presented. The analysis in Table 4 is performed on aggregation level four ("All") and three ("LC", "SC", "Act" and "Pas") for DB and DC pension funds and mutual funds.

Table 4 shows that both DB and DC pension funds, and mutual funds ("MF") are unable to beat their benchmarks after subtraction of costs. First, we present equally weighted results. The mean NVA of DB funds is not significantly different from zero, whereas the mean NVA of DC funds is significantly smaller than zero. For instance, the mean NVA of "All" DC funds is -44 basis points. Consistent with the mutual fund literature, Table 4 shows that mutual funds strongly under-perform their benchmarks after subtraction of costs[5]. The mean NVA of "All" mutual funds is -277 basis points. The characteristics of the mutual fund database differ strongly from those of the pension fund database. The mutual fund data set contains more data points and as a consequence has more extreme outliers ("Min" and "Max"). Furthermore, we observe that the maximum number of consecutive years a fund is enclosed in the database, is higher for mutual funds than for pension funds. A more striking result is the observed difference in the mean size of the equity holdings of the three fund types. On average, DB funds ("All") have equity holdings with an average size of $2.7 bln. The average size of DC and mutual fund equity portfolios is considerably smaller: $617 and $294 mln. respectively. Possibly, these differences in size are related to differences in costs. Mutual funds show substantially higher costs than pension funds. DB, DC and mutual funds ("All") have total costs of 32, 62 and 119 basis points respectively. To some extent, this difference explains the difference in net performance. However, Table 4 shows that the cost level is not the only driver of net performance. GVA performances can roughly be constructed by adding the total costs to the NVA performance. In virtually all cases, GVAs would be positive (though not statistically significant) for DB and DC pension funds. However, for mutual funds GVA is substantially negative at all aggregation levels.

Results displayed in the panel "MF" refer to the DB pension fund data period 1992-2004. DC funds report to CEM since 1997. For this reason, we

[5]Note that exit and entry loads are not included in the calculation.

additionally conduct the standard analysis on a subsample of mutual funds, ranging from 1997-2004 ("MF97+"). Subsampling hardly affects our results and is therefore discarded hereafter[6]. As a second robustness test, we also conduct the standard analysis in a value weighted manner. The results of the value weighted analysis are reported in Table 5. Value weighting funds does not alter pension fund performance results strongly. Value weighted mutual fund performance measures show that differences between pension and mutual funds can partly be explained by discrepancies in size. The value weighted mean NVA of mutual funds is approximately 100 basis points higher (-151.91) than the equally weighted mean NVA (-253.02). Hence, giving more weight to large funds improves mutual fund results considerably.

To control for the impact of size on mutual fund performance, we rank funds on the size of the equity holdings and split them into ten quantiles. Table 6 shows results for three different deciles. It reveals that the database contains many small mutual funds and only a minority of large mutual funds. For instance, the average size of the equity holdings of Q1 does not exceed \$1 mln. In Q9 equity mutual funds have a size of \$350 mln. Q10 consists of mutual funds that are comparable in size to the DB pension funds in the CEM database. Henceforth, we consider Q10 as the size matched mutual fund sample and conduct all analyses for Q10 additionally. The matched mutual fund sample (Q10, "All") has a mean NVA of -165 basis points that statistically differs from zero, an average size of \$2.1 bln. and a cost level of 87 basis points. This implies that even difference between pension funds and Q10 NVA cannot be fully explained by costs. Based on the performance analysis in Tables 4, 5 and 6, we conclude that DB and DC pension funds perform better than mutual funds in equity portfolio management, even after matching for size and correcting for costs.

Table 7 reports performance results for all classifications on the second aggregation level. The picture emerging from this table is identical to the picture of Table 4. DB and DC pension funds slightly under-perform benchmarks, whereas mutual funds under-perform considerably. Interestingly, a passively managed large cap investment is, in relative terms, most attractive in all four cases. Table 8 displays results from the lowest aggregation level by discriminating between internally and externally managed equity portfolios for DB funds. We find no conclusive answer on the question whether

[6]Note that GVAs of "LC" and "Pas" of mutual funds are slightly positive now.

outsourcing adds or destroys value for DB pension plans.

[Table 4 about here.]

[Table 5 about here.]

[Table 6 about here.]

[Table 7 about here.]

[Table 8 about here.]

5.2 Persistence Results

The modest NVAs of financial services providers does not necessarily imply that all funds are unable to beat their benchmarks. Active equity portfolio management is essentially a zero-sum game in which some providers potentially are persistent winners or losers. The obvious question is whether some of the DB, DC or mutual funds in our databases are repeated winners or losers? In the mutual fund literature, many studies have been conducted to measure persistence, see for instance Grinblatt and Titman (1992) and Elton, Gruber, and Blake (1996). Both studies find persistence in mutual fund manager's risk adjusted returns even after correction for costs. Especially, past losers tend to remain losers, the so-called "icy hands". The pension fund literature has studied this topic as well. Tonks (2005) detects evidence of persistence in manager performance on short horizons. At longer time intervals, the evidence becomes weaker. Busse, Goyal, and Wahal (July 2006) find persistence in the winner portfolios of delegated managed accounts on the one year horizon. However, on the individual pension fund level this question has never been investigated properly due to lack of data.

First, we examine persistence in NVA. We perform the analysis on aggregation level three and four for the DB, DC, MF and Q10 samples. The analysis comprises two persistence tests described in section 4. Table 9 displays transition probabilities of winners and losers and p-values of the two tests. The first row shows transition probabilities of current winners and the p-value of the chi-squared test proposed by Carpenter and Lynch (1999). The second row presents transition probabilities of current losers and the p-value of the ranked portfolio t-test. Table 9 demonstrates that we hardly

find persistence in the NVAs of pension funds. The only exception can be found for passively managed DC funds using the portfolio test. One explanation for the absence of persistence may be that we measure persistence at the total plan level. Fund performance is the sum of individual (external) manager performance. Even if manager performance were persistent, it would nevertheless be difficult for pension funds to select winners among all managers. The persistence evidence for mutual funds is somewhat mixed. Portfolio tests deny the presence of persistence for mutual funds. However, the chi-squared test results report low p-values, especially for actively managed equity portfolios, indicating persistence in performance. Table 10 documents the results of the GVA persistence tests, which corroborate the NVA results.

[Table 9 about here.]

[Table 10 about here.]

5.3 Risk and Style Adjusted Results

The panel data model described in section 4 enables us to risk adjust the yearly returns provided by CEM. NVAs are regressed on the well-known Fama-French factors: Market, SMB, HML and UMD. We start our single level panel analysis with the evaluation of risk adjusted NVA performances of pension funds. Table 11 reports parameter estimates of the single level panel with corresponding p-values for DB and DC pension funds. The panel results for DB funds confirm the results in Table 4. After risk adjustment, DB pension funds still have NVAs ("a_0"), which are not statistically different from zero. It should however be noted that p-values are around the 10% level in four out of five cases. DC funds switch from negative to positive, but statistically insignificant NVAs, when compared to Table 4. Panel results for mutual funds, see Table 12, largely confirm our standard analysis results presented in Tables 4 and 6. However, passive and small cap equity investments by mutual funds have NVAs comparable to pension funds. The exposure to the risk factors in all cases is negligible in economic terms[7]. This can be expected as returns are to a large extent corrected for the risk by subtracting fund-specific benchmarks.

[7]Panel results for GVAs increase a_0 with the appropriate cost level without material changes in other parameters.

In the multi-level panel approach we make a final effort to include drivers that may explain these performance differences. In Tables 13 and 14, we include economically relevant factors for both pension and mutual funds in the analysis. Possible drivers for DB pension funds are the ratio of internal versus total equity investments ("a_{int}") and a dummy for public funds ("a_{pub}"). For DC funds we merely include a dummy for public funds, given the absence of data on internal management. In the mutual fund panel regressions, we include turnover ("a_{to}") as a possible driver. Results in Table 13 indicate that neither the ratio of internal versus total investments nor the dummy for public funds can be marked as a clear driver of pension fund performance. On both the third and fourth aggregation level, these drivers show parameters that do not significantly differ from zero. As a result of the insignificance of these factors, results do not vary much from the corresponding single level regressions. In addition, mutual fund performance results are not affected by turnover, as displayed in Table 14 [8].

Summarizing, the panel data analysis does not alter the conclusions of the standard performance analysis. DB and DC pension funds show better NVAs than (matched) mutual funds.

[Table 11 about here.]

[Table 12 about here.]

[Table 13 about here.]

[Table 14 about here.]

5.4 Discussion of results

Briefly summarized, our empirical results show that net equity returns of DB and DC funds are similar to benchmark returns. NVAs for pension funds are generally not different from zero in both the standard and the panel analysis. In contrast, mutual funds under-perform corresponding benchmarks significantly: on average 150 - 200 basis points. If we included entry and exit loads as well, results would be even worse: approximately 250 - 300 basis points per year.

[8] Multi-level panel results for GVAs increase a_0 with the appropriate cost level without material changes in other parameters.

We can hardly detect any persistence in pension fund equity performance. This might either be caused by the yearly return frequency in our database, or by the fact that equity investments at the total plan level are a combination of individual mandates delegated to several institutional asset managers. Persistently picking the right asset manager, by pension fund managers, appears to be a difficult task. In line with the literature, mutual funds show slight evidence of persistence. Risk adjusted results in the panel analysis confirm results in the standard analysis. However, it becomes clear that passively managed mutual funds can provide the same net returns as DB and DC pension fund equivalents. Most probably, the limited impact of costs is an explanation of this result.

How do we interpret these results? Do pension fund managers have more skill than mutual fund managers in relative terms? Yes, but both are unable to beat the corresponding benchmarks. Moreover, pension funds hire (and fire) institutional asset managers who provide mutual funds to individual investors as well. So, if they are using the same portfolio managers, why do we find different returns? Is the lower cost level of pension funds an explanation? Potentially, but it cannot fully explain the difference in returns. Moreover, the multi-level panel analysis shows that other drivers of the return difference cannot be found.

This brings us to the agency cost argument. It is a plausible, but implicit and non-testable explanation. Agency costs are difficult to quantify. Unfortunately, we do not have access to measurable proxies for agency costs for the three investment options under consideration. Nonetheless, the fact that mutual funds provide services to remote, faceless individuals will most likely have a large impact on net returns. In contrast to mutual fund investors, participants of pension funds know that pension fund managers can exert negotiation power to providers of institutional asset management. Our results could be an indication that they do a fairly good job, despite the potential agency issues in the pension fund context.

6 Concluding Comments

Private individuals saving for retirement generally have three investment options. They can be member of a DB or DC pension plan. Additionally, these individuals can hold mutual funds, either to upgrade insufficient pension ac-

cruals or simply because they are not member of a pension plan. As mutual funds are for-profit and pension funds not-for-profit organizations, we suspect differences in their performance. Given the lack of pension fund data at the individual pension fund level, sound evidence on this performance differential is absent in the financial literature.

In this paper, we investigate the comparative performance of US pension and mutual funds using a unique, and hitherto unused database with fund-specific pension fund return and cost information, provided by CEM Benchmarking Inc. Our results can be summarized as follows. First, both DB and DC pension fund net returns do not differ significantly from their benchmarks. Second, mutual funds under-perform their benchmarks by about 150 to 200 basis points per year. The smallest under-performance (50 basis points) is found for passive mutual funds. Third, there is modest evidence of persistence in mutual fund returns and none in pension fund returns. Fourth, the under-performance of mutual funds relative to pension funds cannot be fully explained by differences in costs, fund size, risk and investment style. This suggests that other factors, not controlled for in this study, explain the difference in performance between pension and mutual funds. One of these factors might be a misalignment of interest between mutual fund companies and their clients. This remains a subject for future research.

Overall, our results indicate that both DB and DC pension funds are able to provide participants with equity portfolios that perform in line with market indices. In contrast, active mutual funds clearly lag DB and DC pension funds and their benchmarks. This cannot be fully explained by the higher fees they charge to private investors.

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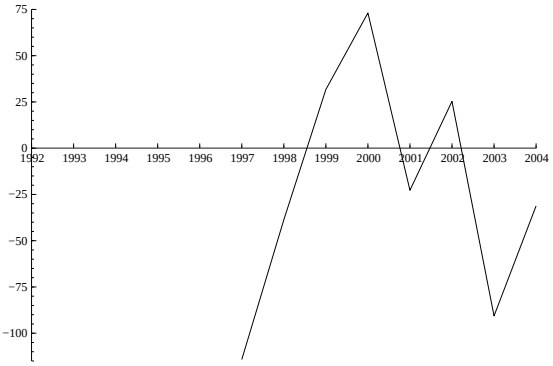
List of Figures

Figure 1: **DB**

This figure displays the time series evolution of cross-sectional mean NVA in basis points for DB pension funds in the period 1992-2004.

Figure 2: **DC**

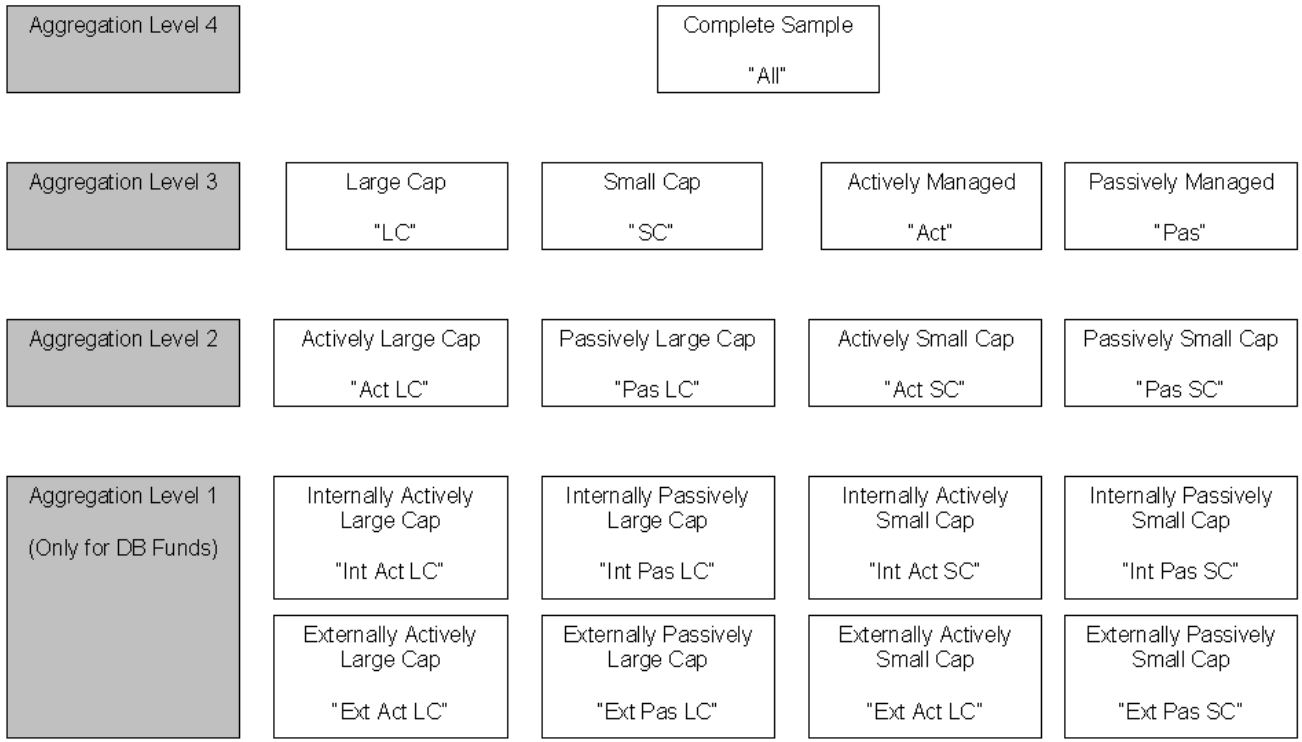


This figure displays the time series evolution of cross-sectional mean NVA in basis points for DC pension funds in the period 1997-2004.

Figure 3: **Mutual Funds**

This figure displays the time series evolution of cross-sectional mean NVA in basis points for mutual funds in the period 1992-2004.

Figure 4: **Data Structure**



List of Tables

Table 1: **Characteristics Original and Modified DB Database**

This table reports the number of funds per year for several DB pension fund classifications. DB funds are evaluated from 1992 to 2004. The panel "Original DB" displays characteristics of the original database. The panel "Modified DB" shows characteristics after data have been aggregated and after outliers have been removed. Furthermore the second panel displays only results for US funds. "Tot" displays the total number of funds in the sample, "Cor" the number of corporate fund, "Pub" the number of public funds and "Oth" shows the quantity of funds that have not been classified as either corporate or public, e.g. universities, churches etc. Further the table lists the number of US, Canadian or European funds in the sample each year.

	'92	**'93**	**'94**	**'95**	**'96**	**'97**	**'98**	**'99**	**'00**	**'01**	**'02**	**'03**	**'04**
Original DB													
Tot	164	220	269	298	296	273	286	305	284	290	266	265	257
Cor	112	140	162	170	177	154	155	156	137	137	119	122	126
Pub	28	51	72	93	87	93	97	114	110	117	110	106	92
Oth	24	29	35	35	32	26	34	35	37	36	33	37	39
US	83	136	169	192	185	168	174	182	165	176	153	153	153
Can	81	84	97	102	105	97	104	110	105	98	97	94	88
Eur	0	0	3	4	6	8	8	13	14	14	13	15	12
Modified DB (US)													
Tot	80	116	161	151	161	119	112	111	107	137	122	121	135
Cor	53	74	98	83	100	72	58	49	41	60	51	58	70
Pub	17	32	46	53	49	41	45	54	60	69	60	59	54
Oth	10	10	17	15	12	6	9	8	6	8	11	4	11

Table 2: **Characteristics Original and Modified DC Database**

This table reports the number of funds per year for several DC pension fund classifications. DC funds are evaluated from 1997 to 2004. The panel "Original DC" displays characteristics of the original database. The panel "Modified DC" shows characteristics after data have been aggregated and after outliers have been removed. Furthermore the second panel displays only results for US funds. "Tot" displays the total number of funds in the sample, "Cor" the number of corporate funds, "Pub" the number of public funds and "Oth" shows the quantity of funds that have not been classified as either corporate or public, e.g. universities, churches etc. Further the table lists the number of US, Canadian or European funds in the original sample each year.

Original DC								
	'97	**'98**	**'99**	**'00**	**'01**	**'02**	**'03**	**'04**
Tot	62	72	65	67	115	108	87	83
Cor	59	66	62	61	92	85	69	65
Pub	3	5	2	5	16	16	17	16
Oth	0	1	1	1	7	7	1	2
US	62	72	65	67	85	72	87	83
Can	0	0	0	0	30	36	0	0
Modified DC (US)								
Tot	40	48	43	42	71	70	72	80
Cor	39	44	41	39	58	55	57	65
Pub	1	3	1	2	10	12	14	14
Oth	0	1	1	1	3	3	1	1

Table 3: **Holdings Characteristics Pension and Mutual Fund Databases**

This table reports the percentages of cross-sectional average holdings for DB and DC pension funds and mutual funds. DB pension and mutual funds are evaluated from 1992 to 2004. DC pension funds are evaluated from 1997 to 2004. It displays only results for domestic investments by US funds. Holdings are reported in million dollar. Holdings are split up into large and small cap, actively and passively managed and internally and externally managed holdings, as illustrated in Figure 4.

	'92	**'93**	**'94**	**'95**	**'96**	**'97**	**'98**	**'99**	**'00**	**'01**	**'02**	**'03**	**'04**
							DB						
LC	99.34	98.40	98.03	96.65	90.84	91.28	91.64	91.21	89.87	90.32	91.61	91.42	90.87
SC	0.66	1.60	1.97	3.35	9.16	8.72	8.36	8.79	10.13	9.68	8.39	8.58	9.13
Act	46.60	52.33	58.53	55.75	54.51	53.88	51.94	51.00	48.15	49.68	50.96	49.76	49.29
Pas	53.40	47.67	41.47	44.25	45.49	46.12	48.06	49.00	53.17	51.67	53.83	50.24	50.71
Int	41.29	40.92	32.59	36.33	36.24	37.58	37.40	40.77	36.58	30.58	36.44	34.80	31.79
Ext	58.71	59.08	67.41	63.67	63.76	62.42	62.60	59.23	64.74	70.77	68.22	65.20	68.21
							DC						
LC	-	-	-	-	-	87.72	91.00	90.13	88.14	86.72	84.07	80.32	76.10
SC	-	-	-	-	-	12.28	9.00	9.87	11.86	13.28	15.93	19.68	23.90
Act	-	-	-	-	-	41.20	38.08	48.35	52.78	54.45	57.73	59.28	57.31
Pas	-	-	-	-	-	58.80	61.92	51.66	47.22	45.55	42.27	40.72	42.69
							MF						
LC	69.60	68.70	69.23	67.87	66.82	68.48	70.47	70.62	63.53	67.36	67.52	67.51	67.68
SC	30.40	31.30	30.77	32.13	33.18	31.52	29.53	29.38	36.47	32.64	32.48	32.49	32.32
Act	75.86	75.69	70.60	61.98	56.68	54.99	48.46	40.25	38.52	36.68	36.25	35.27	34.66
Pas	24.14	24.31	29.40	38.02	43.32	45.01	51.54	59.75	61.48	63.32	63.75	64.73	65.34

Table 4: **Summary statistics Equally weighted DB, DC and Mutual Fund US equity performance**

The different panels in this table display summary statistics on the NVA for DB and DC pension funds and for the complete mutual fund sample "MF" and a subsample of the mutual fund sample starting in 1997: "MF97". NVA is computed as: R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. NVA is reported in basis points. "NT" represents the number of unique time-fund combinations in the series. "Mean" displays an equally weighted cross-sectional average of time-series mean NVA. "s.d." displays the equally weighted cross-sectional standard deviation of the time-series mean NVA. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "Cons. Yrs" is an average across funds of the maximum number of consecutive years a fund is in the database. "Costs" are equally weighted across fund averages of time-series means of costs. "Size Eq. hold." is an across fund equally weighted average of time-series means of equity holdings. All numbers are domestic investments by US institutions.

DB

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	1699.00	-12.49	166.59	-1.53	566.31	-583.95	3.09	2749.79	31.89
LC	1788.00	-2.45	171.75	-0.29	608.14	-588.16	3.33	2525.97	29.11
SC	698.00	-46.87	295.02	-2.41	809.94	-957.81	2.30	223.82	58.18
Act	1686.00	-10.17	219.14	-0.94	746.62	-678.15	3.00	1550.78	42.37
Pas	1232.00	-26.62	119.73	-3.84	354.19	-504.88	3.20	1210.42	6.14

DC

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	510.00	-44.05	134.59	-4.58	385.44	-418.19	2.28	617.32	62.08
LC	505.00	-39.86	143.48	-3.58	484.52	-492.49	2.77	525.38	48.83
SC	336.00	-46.63	242.67	-2.26	568.74	-703.18	2.00	91.94	80.10
Act	441.00	-48.49	259.51	-2.44	649.09	-667.33	2.26	331.38	82.59
Pas	546.00	-24.02	35.16	-9.57	130.99	-179.21	2.64	285.94	31.71

MF

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	23395.00	-277.77	523.76	-33.27	1866.45	-2359.42	5.05	294.32	119.07
LC	15203.00	-155.72	419.11	-19.19	1542.48	-1642.56	4.69	345.89	113.17
SC	7120.00	-515.22	639.36	-28.47	1850.39	-3147.39	4.56	181.14	132.00
Act	22308.00	-291.18	535.05	-33.29	1910.47	-2412.48	5.05	281.16	121.93
Pas	1131.00	-78.33	184.81	-5.87	756.75	-1098.49	5.48	554.13	62.61

MF97+

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	18782.00	-253.02	548.81	-28.12	1866.45	-2359.42	4.42	370.22	120.10
LC	12100.00	-97.30	424.04	-11.45	1542.48	-1642.56	4.25	440.49	113.90
SC	5796.00	-540.09	668.39	-27.96	1850.39	-3147.39	4.03	218.13	133.51
Act	17848.00	-270.45	568.00	-28.32	1910.47	-2410.69	4.40	356.36	123.07
Pas	971.00	-65.33	183.25	-4.90	756.75	-1098.49	4.85	635.50	63.20

Table 5: **Summary statistics Value weighted DB, DC and Mutual Fund US equity performance**

The different panels in this table display summary statistics on the NVA for DB and DC pension funds and for mutual funds. NVA is computed as: R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. NVA is reported in basis points. "NT" represents the number of unique time-fund combinations in the series. "Mean" displays a value weighted cross-sectional average of time-series mean NVA. Weights for funds are time-series averages of equity holdings. "s.d." displays the value-weighted cross-sectional standard deviation of the time-series mean NVA. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "Cons. Yrs" is an average across funds of the maximum number of consecutive years a fund is in the database. "Costs" are value weighted (in the same way as NVA) across fund averages of time-series means of costs. "Size Eq. hold." is an across fund equally weighted average of time-series means of equity holdings. All numbers are domestic investments by US institutions.

					DB				
	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	1699.00	-15.42	176.87	-1.77	566.31	-583.95	3.09	2749.79	14.69
LC	1788.00	-12.05	185.76	-1.33	608.14	-588.16	3.33	2525.97	12.93
SC	698.00	-10.92	358.82	-0.46	809.94	-957.81	2.30	223.82	35.58
Act	1686.00	-12.66	279.85	-0.92	746.62	-678.15	3.00	1550.78	24.77
Pas	1232.00	-3.76	123.39	-0.53	354.19	-504.88	3.20	1210.42	1.90
					DC				
	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	510.00	-23.71	156.12	-2.13	385.44	-418.19	2.28	617.32	44.02
LC	505.00	-18.37	184.83	-1.28	484.52	-492.49	2.77	525.38	39.66
SC	336.00	-59.34	242.54	-2.87	568.74	-703.18	2.00	91.94	69.22
Act	441.00	-32.14	314.71	-1.34	649.09	-667.33	2.26	331.38	70.78
Pas	546.00	-7.34	24.81	-4.14	130.99	-179.21	2.64	285.94	13.45
					MF				
	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	23395.00	-151.91	834.84	-11.42	1866.45	-2359.42	5.05	294.32	84.59
LC	15203.00	-107.70	658.69	-8.45	1542.48	-1642.56	4.69	345.89	80.25
SC	7120.00	-426.71	1119.96	-13.46	1850.39	-3147.39	4.56	181.14	102.77
Act	22308.00	-162.25	870.23	-11.41	1910.47	-2412.48	5.05	281.16	90.27
Pas	1131.00	-26.59	232.05	-1.59	756.75	-1098.49	5.48	554.13	27.72

Table 6: **Summary statistics US Mutual Fund equity performance Q1, Q9 and Q10**

The different panels in this table display summary statistics on the NVA for 3 size-based mutual fund quantiles "Q1", "Q9" and "Q10". "Q1" denotes the quantile containing the smallest funds and "Q10" is the quantle containing the largest funds. NVA is computed as: R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. NVA is reported in basis points. "NT" represents the number of unique time-fund combinations in the series. "Mean" displays a cross-sectional average of time-series means NVA. "s.d." displays the standard deviation across funds of the time-series average of NVA. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "Cons. Yrs" is an average across funds of the maximum number of consecutive years a fund is in the database. "Size Eq. hold." is an across fund equally weighted average of time-series means of equity holdings. "Costs" is a cross-sectional average of time-series means of costs. Costs are reported in basis points and equity holdings in millions. All numbers are domestic investments by US institutions.

Q1

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	1166.00	-465.49	740.89	-11.95	1850.39	-2347.37	2.98	0.77	149.56
LC	747.00	-254.63	576.61	-6.90	1539.18	-1641.00	2.80	0.79	135.09
SC	362.00	-923.81	944.61	-10.35	1850.39	-3147.39	2.92	0.71	184.99
Act	1135.00	-483.03	757.60	-11.94	1889.63	-2412.48	2.99	0.77	151.35
Pas	34.00	-109.88	345.25	-1.06	641.33	-894.20	2.73	0.77	91.90
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.

Q9

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	3002.00	-183.52	391.21	-9.39	1865.88	-2354.05	6.22	350.11	101.33
LC	2010.00	-107.88	337.12	-5.35	1541.37	-1642.56	5.81	349.55	98.64
SC	869.00	-368.73	516.92	-7.81	1832.72	-3138.05	5.34	351.40	107.62
Act	2787.00	-203.11	401.59	-9.70	1907.87	-2406.20	6.21	348.38	105.80
Pas	216.00	-72.30	127.58	-3.26	742.10	-1063.56	5.91	369.49	51.22

Q10

	NT	Mean	s.d.	t-stat	Max	Min	Cons.Yrs	Size Eq. hold.	Costs
All	3607.00	-165.43	326.44	-10.16	1866.45	-2351.30	7.40	2113.69	87.12
LC	2736.00	-108.76	249.61	-7.67	1541.21	-1638.31	6.77	2317.50	84.26
SC	726.00	-357.48	499.88	-6.86	1818.72	-3131.36	5.58	1426.95	96.77
Act	3313.00	-177.99	341.10	-9.94	1908.92	-2411.37	7.48	2097.24	93.40
Pas	302.00	-55.51	92.92	-3.73	691.51	-1027.79	7.18	2266.85	28.71

Table 7: **Summary statistics Specified**

This tables presents NVA summary statistics on aggregation level 2. NVA is computed as:R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. NVA is reported in basis points. Results are reported for the complete DB, DC and mutual fund sample, respectively denoted as: "DB", "DC" and "MF" and for the matched mutual fund sample "Q10". "NT" represents the number of unique time-fund combinations in the series. "Mean" displays an equally weighted cross-sectional average time-series means of net value added (NVA). "s.d." displays the standard deviation across funds of the time-series averages of NVA. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "Costs" is the cross-sectional mean of time-series average costs. Costs are reported in basis points. All numbers are domestic investments by US institutions and are displayed in basis points.

				DB			
	NT	Mean	s.d.	t-stat	Max	Min	Costs
Act LC	1841.00	-24.43	359.43	-1.38	943.26	-919.08	39.05
Pas LC	1378.00	1.58	151.23	0.18	507.72	-514.80	5.90
Act SC	686.00	-20.61	469.59	-0.66	954.91	-1090.97	66.50
Pas SC	234.00	25.60	244.62	0.99	661.28	-580.67	9.12
				DC			
Act LC	406.00	-59.56	374.74	-1.93	874.00	-917.16	72.84
Pas LC	514.00	-16.79	27.69	-7.88	130.99	-183.89	22.75
Act SC	278.00	-114.99	385.22	-3.21	641.86	-842.99	95.11
Pas SC	147.00	-20.24	42.19	-3.75	102.00	-130.71	30.32
				MF			
Act LC	14379.00	-168.61	729.16	-11.63	1585.09	-1669.67	116.12
Pas LC	881.00	-87.45	220.39	-4.79	586.25	-933.93	61.07
Act SC	6840.00	-454.80	1093.52	-14.42	1850.39	-3181.84	134.44
Pas SC	256.00	-160.52	502.10	-2.17	1108.80	-1395.79	67.57
				Q10			
Act LC	2488.00	-149.37	689.42	-3.61	1585.09	-1666.81	90.72
Pas LC	260.00	-62.47	211.94	-1.67	503.98	-865.86	28.16
Act SC	676.00	-362.71	1046.53	-3.20	1818.72	-3131.36	102.16
Pas SC	46.00	-118.58	527.39	-0.59	1108.80	-1226.64	31.24

Table 8: **Summary statistics Specified DB Int-Ext**

This table splits DB results on the lowest aggregation level into internally and externally managed equity holdings. "NT" represents the number of unique time-fund combinations in the series. "Mean" displays a weighted average across funds time-series means of net value added (NVA). Weights for funds are time-series averages of equity holdings. NVA is computed as: R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. NVA is reported in basis points. "s.d." displays the cross-sectional standard deviation of the time-series averages of NVA. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "Costs" is the cross-sectional mean of time-series average costs. All numbers are domestic investments by US institutions.

INT							
	NT	Mean	s.d.	t-stat	Max	Min	Costs
Act LC	308.00	-30.23	381.84	-0.69	876.37	-1217.20	39.05
Pas LC	252.00	6.66	170.05	0.28	665.06	-655.55	5.90
Act SC	20.00	59.61	110.85	1.52	253.75	-161.02	66.50
Pas SC	33.00	-2.04	237.31	-0.03	545.27	-637.57	9.12
EXT							
	NT	Mean	s.d.	t-stat	Max	Min	Costs
Act LC	1758.00	-26.17	358.02	-1.45	933.80	-895.74	39.05
Pas LC	1232.00	1.49	158.55	0.16	528.20	-514.80	5.90
Act SC	675.00	-21.35	484.91	-0.66	975.80	-1115.05	66.50
Pas SC	214.00	18.56	269.56	0.63	708.00	-612.76	9.12

Table 9: **Persistence tests DB, DC and Mutual Fund NVA**

This table presents persistence test results for pension funds and mutual funds, based on their NVA. NVA is computed as R - BMR - C, with R denoting gross return, BMR the benchmark return and C the fund-specific costs. The test is performed on the complete sample of DB and DC pension fund and mutual funds, respectively denoted as "DB", "DC" and "MF". Additionally the test is conducted on the matched mutual fund sample "Q10". The columns indicating "W" and "L" show transition probabilities for winners and losers of previous period. The columns "P-value" displays p-values for two different persistence tests. The first row shows the transition probabilities for previous period winners and the p-value of the Chi-squared test proposed by Carpenter and Lynch (1999). The second row shows the transition probabilities of previous period losers and the p-value of a portfolio test. Each period 10 decile portfolios are formed. Next period, differences in performance between the previously best and worst performing portfolios are computed. Then a t-test on the differences is conducted.

	DB			**DC**			**MF**			**Q10**		
	W	L	P-value	W	L	P-value	W	L	P-value	W	L	P-value
All	0.51	0.49	0.83	0.58	0.42	0.48	0.59	0.41	0.00	0.59	0.41	0.01
	0.49	0.51	0.42	0.41	0.59	0.39	0.41	0.59	0.15	0.41	0.59	0.17
LC	0.54	0.46	0.48	0.57	0.43	0.53	0.57	0.43	0.00	0.57	0.43	0.09
	0.45	0.55	0.26	0.42	0.58	0.46	0.43	0.57	0.25	0.43	0.57	0.31
SC	0.53	0.47	0.72	0.61	0.39	0.45	0.59	0.41	0.00	0.63	0.37	0.13
	0.46	0.54	0.50	0.36	0.64	0.34	0.41	0.59	0.26	0.37	0.63	0.32
Act	0.55	0.45	0.36	0.57	0.43	0.54	0.59	0.41	0.00	0.60	0.40	0.01
	0.44	0.56	0.27	0.41	0.59	0.42	0.41	0.59	0.14	0.40	0.60	0.15
Pas	0.61	0.39	0.12	0.66	0.34	0.15	0.59	0.41	0.15	0.60	0.40	0.41
	0.39	0.61	0.17	0.34	0.66	0.05	0.40	0.60	0.50	0.40	0.60	0.50

Table 10: **Persistence tests DB, DC and Mutual Fund GVA**

This table presents persistence test results for pension funds and mutual funds, based on their GVA. GVA is computed as R - BMR, with R denoting gross return and BMR the fund-specific benchmark return. The test is performed on the complete sample of DB and DC pension fund and mutual funds, respectively denoted as "DB", "DC" and "MF". Additionally the test is conducted on the matched mutual fund sample "Q10". The columns indicating "W" and "L" show transition probabilities for winners and losers of previous period. The columns "P-value" displays p-values for two different persistence tests. The first row shows the transition probabilities for previous period winners and the p-value of the Chi-squared test proposed by Carpenter and Lynch (1999). The second row shows the transition probabilities of previous period losers and the p-value of a portfolio test. Each period 10 decile portfolios are formed. Next period, differences in performance between the previously best and worst performing portfolios are computed. Then a t-test on the differences is conducted.

	DB			**DC**			**MF**			**Q10**		
	W	L	P-value	W	L	P-value	W	L	P-value	W	L	P-value
All	0.51	0.49	0.84	0.57	0.43	0.56	0.58	0.42	0.00	0.59	0.41	0.02
	0.49	0.51	0.42	0.42	0.58	0.38	0.42	0.58	0.16	0.41	0.59	0.18
LC	0.56	0.44	0.25	0.56	0.44	0.57	0.57	0.43	0.00	0.57	0.43	0.08
	0.43	0.57	0.24	0.43	0.57	0.35	0.43	0.57	0.25	0.42	0.58	0.32
SC	0.48	0.52	0.89	0.51	0.49	0.94	0.58	0.42	0.00	0.63	0.37	0.13
	0.49	0.51	0.50	0.49	0.51	0.41	0.42	0.58	0.31	0.37	0.63	0.26
Act	0.56	0.44	0.32	0.59	0.41	0.47	0.59	0.41	0.00	0.60	0.40	0.01
	0.44	0.56	0.35	0.40	0.60	0.38	0.41	0.59	0.16	0.40	0.60	0.17
Pas	0.62	0.38	0.09	0.57	0.43	0.38	0.52	0.48	0.76	0.59	0.41	0.45
	0.38	0.62	0.11	0.38	0.62	0.03	0.48	0.52	0.40	0.40	0.60	0.42

Table 11: **Single Level Risk and Style Adjustment Analysis NVA DB-DC**

This table reports single level panel performance parameter estimates with their accompanying p-values, based on funds' NVA. NVA is computed as R - BMR - C, with R denoting gross return, BMR the fund-specific benchmark return and C the fund-specific costs. NVA is reported in basis points and FF-factors are reported in percentages. Results are displayed for both DB and DC pension funds. a_0 represents the net performance after risk adjustment. b_M, b_{SMB}, b_{HML} and b_{UMD} are risk loadings on their corresponding FF-factors. All parameters are weighted cross-sectional averages, estimated using FGLS. Each pair of rows displays results for a different stock classification. "All" concerns the complete sample, "LC" and "SC" display respectively large and small cap stock investments. "Act" and "Pas" describe respectively the active and passive stocks investments. All estimates are restricted to domestic stock investments by US institutions.

	DB					**DC**				
	a_0	b_M	b_{SMB}	b_{HML}	b_{UMD}	a_0	b_M	b_{SMB}	b_{HML}	b_{UMD}
All	-54.02	-1.16	3.47	2.30	2.87	36.21	-2.99	-1.72	-2.46	-3.00
	0.07	0.16	0.03	0.07	0.07	0.34	0.10	0.25	0.20	0.25
LC	-46.14	-1.37	3.07	3.01	2.48	26.06	-3.03	-0.53	-2.19	-1.98
	0.11	0.12	0.04	0.03	0.11	0.39	0.12	0.42	0.25	0.34
SC	30.60	-2.47	-1.33	0.14	-0.02	49.75	-4.36	-4.27	-4.27	-4.47
	0.39	0.23	0.35	0.49	0.50	0.37	0.16	0.18	0.22	0.29
Act	-62.49	-1.73	5.59	3.35	3.07	162.64	-8.04	-4.30	-7.71	-10.14
	0.09	0.12	0.01	0.05	0.11	0.16	0.04	0.19	0.10	0.12
Pas	-31.34	0.27	-2.44	1.34	1.32	-0.72	-0.70	-0.36	-0.58	-0.62
	0.10	0.36	0.02	0.08	0.13	0.48	0.03	0.19	0.11	0.20

Table 12: **Single Level Risk and Style Adjustment Analysis NVA MF-Q10**

This table reports single level panel performance parameter estimates with their accompanying p-values, based on funds' NVA. NVA is computed as R - BMR - C, with R denoting gross return, BMR the fund-specific benchmark return and C the fund-specific costs. NVA is reported in basis points and FF-factors in percentages. Results are displayed for the complete mutual fund sample "MF" and for the matched sample "Q10". a_0 represents the net performance after risk adjustment. b_M, b_{SMB}, b_{HML} and b_{UMD} are risk loadings on their corresponding FF-factors. All parameters are weighted cross-sectional averages, estimated using FGLS. Each pair of rows displays results for a different stock classification. "All" concerns the complete sample, "LC" and "SC" display respectively large and small cap stock investments. "Act" and "Pas" describe respectively the active and passive stocks investments. All estimates are restricted to domestic stock investments by US institutions.

	MF					**Q10**				
	a_0	b_M	b_{SMB}	b_{HML}	b_{UMD}	a_0	b_M	b_{SMB}	b_{HML}	b_{UMD}
All	-330.95	-8.46	6.12	7.63	4.63	-256.06	-5.36	7.17	6.22	6.47
	0.02	0.05	0.19	0.12	0.30	0.01	0.07	0.08	0.08	0.14
LC	-370.42	-7.47	14.01	10.04	8.93	-251.27	-4.58	10.35	7.74	8.93
	0.00	0.02	0.00	0.02	0.08	0.00	0.06	0.01	0.02	0.03
SC	-134.25	-6.01	-20.69	-6.67	-9.65	-86.93	-4.95	-17.43	-10.69	-5.64
	0.26	0.18	0.01	0.20	0.19	0.26	0.13	0.00	0.02	0.21
Act	-344.73	-8.85	6.42	8.39	4.89	-275.94	-6.02	8.43	7.04	7.51
	0.02	0.05	0.19	0.10	0.29	0.01	0.06	0.06	0.07	0.11
Pas	-43.62	-5.46	-3.21	-1.19	-1.52	-14.41	-2.98	-2.78	-1.32	-1.74
	0.20	0.00	0.07	0.27	0.29	0.32	0.00	0.02	0.09	0.10

Table 13: **Multi-Level Risk and Style Adjustment Analysis NVA DB-DC**

This table reports multi-level panel performance parameter estimates with their accompanying p-values, based on funds' NVA. NVA is computed as R - BMR - C, with R denoting gross return, BMR the fund-specific benchmark return and C the fund-specific costs. NVA is reported in basis points and the FF-factor in percentages. Multi-level means that drivers of net performance are included. a_0 represents the net performance after risk adjustment and correction for possible drivers. For DB pension funds a ratio of internally managed vs. total investment and a dummy for public funds are selected as drivers. for DC funds only the dummy for public funds is included as driver. a_{int} and a_{Pub} are loadings on the internal ratio and public dummy. b_M, b_{SMB}, b_{HML} and b_{UMD} are loadings on the corresponding FF-factors. All parameters are weighted cross-sectional averages, estimated using FGLS. The analysis is conducted for both DB and DC pension funds. Each pair of rows displays results for a different stock classifications. "All" concerns the complete sample, "LC" and "SC" display respectively large and small cap stock investments. "Act" and "Pas" describe respectively the active and passive stocks investments. All estimates are restricted to domestic stock investments by US institutions.

	DB						
	a_0	a_{int}	a_{Pub}	b_M	b_{SMB}	b_{HML}	b_{UMD}
All	-66.54	57.31	-5.27	-1.80	5.58	3.30	3.02
	0.09	0.24	0.45	0.12	0.01	0.05	0.12
LC	-45.91	33.16	-9.87	-1.40	3.10	2.97	2.46
	0.13	0.30	0.39	0.12	0.04	0.03	0.11
SC	23.22	69.20	18.83	-3.35	-1.61	-2.39	-1.47
	0.42	0.30	0.40	0.16	0.33	0.29	0.40
Act	-66.54	57.31	-5.27	-1.80	5.58	3.30	3.02
	0.09	0.24	0.45	0.12	0.01	0.05	0.12
Pas	-29.56	22.32	-10.81	0.24	-2.41	1.30	1.30
	0.13	0.31	0.33	0.38	0.03	0.08	0.13
	DC						
	a_0	a_{int}	a_{Pub}	b_M	b_{SMB}	b_{HML}	b_{UMD}
All	25.65	-	-4.50	-2.90	-1.36	-2.04	-2.03
	0.38	-	0.47	0.10	0.29	0.24	0.32
LC	25.24	-	1.51	-3.02	-0.51	-2.17	-1.93
	0.39	-	0.49	0.12	0.43	0.25	0.34
SC	48.80	-	9.33	-4.36	-4.28	-4.29	-4.47
	0.38	-	0.47	0.16	0.18	0.22	0.29
Act	163.62	-	-8.95	-8.03	-4.32	-7.66	-10.09
	0.16	-	0.47	0.04	0.19	0.10	0.12
Pas	1.12	-	-10.64	-0.73	-0.37	-0.60	-0.67
	0.47	-	0.18	0.02	0.18	0.10	0.18

Table 14: **Multi-Level Risk and Style Adjustment Analysis NVA MF-Q10**

This table reports multi-level panel performance parameter estimates with their accompanying p-values, based on funds' NVA. NVA is computed as R - BMR - C, with R denoting gross return, BMR the fund-specific benchmark return and C the fund-specific costs. NVA is reported in basis points and the FF-factors in percentages. Multi-level means that turnover is included as a driver of net performance. a_0 represents the net performance after risk adjustment and correction for turnover. a_{to} is the loading on the turnover factor. b_M, b_{SMB}, b_{HML} and b_{UMD} are loadings on the corresponding FF-factors. All parameters are weighted cross-sectional averages, estimated using FGLS. The analysis is conducted on both the complete mutual fund sample "MF" and the matched sample "Q10". Each pair of rows displays results for a different stock classifications. "All" concerns the complete sample, "LC" and "SC" display respectively large and small cap stock investments. "Act" and "Pas" describe respectively the active and passive stocks investments. All estimates are restricted to domestic stock investments by US institutions.

MF						
	a_0	a_{to}	b_M	b_{SMB}	b_{HML}	b_{UMD}
All	-310.58	-26.73	-8.33	6.14	8.14	5.00
	0.04	0.30	0.05	0.19	0.11	0.28
LC	-359.96	-14.02	-7.30	13.75	10.57	9.15
	0.00	0.43	0.03	0.00	0.01	0.08
SC	-109.23	-24.31	-5.45	-19.89	-6.55	-8.39
	0.30	0.27	0.20	0.01	0.21	0.22
Act	-324.73	-25.26	-8.69	6.44	8.92	5.28
	0.03	0.31	0.05	0.19	0.09	0.28
Pas	-50.51	8.52	-5.23	-3.61	-1.04	-1.16
	0.17	0.42	0.00	0.04	0.30	0.34
Q10						
	a_0	a_{to}	b_M	b_{SMB}	b_{HML}	b_{UMD}
All	-271.17	14.71	-7.12	8.05	7.31	7.69
	0.03	0.42	0.05	0.10	0.09	0.13
LC	-280.78	-23.18	-5.59	12.82	10.71	10.13
	0.01	0.39	0.05	0.00	0.01	0.03
SC	-90.88	52.56	-4.17	-15.31	-17.41	-1.06
	0.28	0.16	0.22	0.02	0.00	0.45
Act	-299.08	30.06	-7.83	8.81	8.41	8.30
	0.03	0.34	0.04	0.09	0.07	0.13
Pas	-44.56	48.39	-3.13	-1.82	-1.51	0.27
	0.17	0.37	0.01	0.16	0.19	0.45