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New Insights into the Agency Costs Debate

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Abstract

We document the net equity performance of US defined benefit and defined contribution schemes at plan level, using a unique and comprehensive database. Pension fund performance is measured taking into account fund-specific benchmarks and multiple cost components. Pension funds perform close to their benchmarks, whereas size-matched mutual funds strongly underperform. Cost, risk and style differences do not explain the performance gap between the two institutional arrangements. Our results are consistent with the notion that pension funds are less exposed to hidden agency costs than mutual funds. Efficient fund pooling provides pension boards with enough negotiating power and monitoring capacity to ensure that institutional asset managers serve the interests of participants.

Introduction

With a total asset value of more than $6 trillion, of which 40-50% is invested in equities, pension funds are a major player in the US financial services industry. However, surprisingly little is known about the performance of US pension funds. This lack of knowledge is a direct result of the scarcity of pension fund data. Data on pension fund performance is often of poor quality and generally narrowed down to specific types of funds or asset classes. For this reason, earlier studies are confined to gross return performance (before fees are deducted), managed accounts of pension funds (instead of overall plan performance) and/or compare performance with broad market indices (e.g. S&P 500). As a result of the low degree of generality of pension fund data, there is no consensus on pension fund performance. By contrast, the mutual fund sector is heavily regulated and as a result more transparent with respect to returns and fees. Regulation and higher transparency make data collection and examination considerably easier. The large number of mutual fund studies results in consensus on mutual fund underperformance.

This paper provides a comprehensive picture of the performance and persistence of the US pension fund industry. We examine the domestic equity portfolios of 716 Defined Benefit (DB) and 238 Defined Contribution (DC) plans. CEM Benchmarking Inc. has provided us with a hitherto unused dataset that has substantial advantages compared with data used in previous studies. The CEM database enables us to conduct a performance study on pension plan level. Our focus on plan level contrasts with most earlier literature on pension fund performance measurement, which is dominated by studies on delegated portfolios. In addition, the database contains a variety of pension fund types: DB and DC, and corporate and public funds. It also allows us to test for the influence of investment style (large versus small cap), outsourcing (internally/externally managed) and risk taking (active versus passive investments) on the equity performance of pension funds. Moreover, we contribute to a strand of the literature that has been largely ignored in the past decade. An additional advantage of the CEM database is that it contains fund-specific benchmark, return and cost information. Consequently, we are able to measure fund-specific net and gross returns. The cost structure contains more components than previously documented in the pension literature, as it includes direct investment, oversight, custodial and trustee, and audit costs.

Pension fund domestic equity performance is measured net of fund-specific benchmark returns and costs. We make a direct comparison between pension fund and mutual fund performance. To explain performance differences, we also compare pension funds with a size-matched mutual fund sample, correct for cost differences between the two service providers and apply risk and style adjustments in a random coefficients panel approach. By comparing the performance of pension and mutual funds, we provide new evidence on the effect of agency costs on the performance of both institutional arrangements. Consequently, we link our findings to agency costs in the financial services industry.

Our main results show that pension funds outperform mutual funds by approximately 250 basis points per year. After size-matching the mutual fund sample, differences are reduced to roughly 150 basis points. Costs are only to a minor extent responsible for the net performance differential. Risk and style corrections widen the performance gap to more than 200 basis points. We document no persistence in pension fund performance and only slight persistence in mutual fund performance. Which factors drive the performance differential between pension and mutual funds? We show striking similarities in net performance patterns over time, which makes skill differences highly unlikely. Furthermore, large parts of the assets of pension funds are externally managed by the same portfolio managers who are responsible for the mutual fund asset management. We also preclude fund size, fund type, degree of outsourcing, number of DC investment options and DC company stock holdings as factors driving pension fund performance.

In line with Mahoney (2004), Ambachtsheer (2005) and Swensen (2005), agency costs are introduced as possible drivers of mutual fund net performance. Mahoney (2004) and Ambachtsheer (2005) point out that mutual fund net returns suffer from misalignments of interest between investors and mutual funds. Mahoney (2004) and Swensen (2005) claim that mutual fund net returns are negatively affected by hidden costs in the mutual fund industry. These agency costs are typically contained in net returns rather than fees, and thus invisible and unmeasurable for individual investors. We find that the performance differential between pension and mutual funds of passively managed portfolios is small: approximately 30 basis points. Since passively managed portfolios are less vulnerable to hidden agency costs, (see Mahoney, 2004), we interpret our findings as indirect evidence of the presence of agency costs in the mutual fund business.

Why would pension funds not suffer from agency costs to the same extent as mutual funds? We suggest that pension funds are able to considerably reduce the hidden cost component in the portfolios delegated to institutional asset managers. Pension funds often demand separate accounts and have the capacity to monitor these accounts more rigorously than private individuals. Additionally, the size of the pooled funds enables pension funds to exert negotiating power. It makes pension funds less vulnerable to agency issues and, predictably, lowers the general cost level. Hence, pension funds suffer less from hidden costs in the mutual fund industry. Nevertheless, the unmeasurable and invisible character of agency costs makes it difficult to determine the extent to which hidden costs affect performance.

Although the number of US pension fund performance studies is limited and results are mixed, we provide an overview of the most important results in earlier literature. In contrast to our study, the majority of previous work on pension fund performance and persistence is conducted on delegated portfolio management. These so-called pension fund accounts are managed by institutional asset managers. Beebower and Bergstrom (1977) are among the first to study the performance of delegated portfolios for DB plans. They examine the performance of 148 US portfolios in a CAPM framework. In their study, the average portfolio outperforms the S&P 500 by 144 basis points per year. Furthermore, the authors document a significant pattern of persistence in performance. Coggin, Fabozzi, and Rahman (1993) document positive selectivity and negative timing skills for a random sample of 71 equity managers from US pension plans, using different, although not fund-specific, benchmarks. Busse, Goyal, and Wahal

(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 DB pension funds, in the period 1991-2004. Using a conditional multi-factor model, they find that the average fund manager outperforms the market by 124 basis points after expenses.

Despite the fact that a majority of earlier work is conducted on managed accounts, plan performance is more interesting for participants in a pension fund. Ultimately, most participants do not select a manager, but contribute directly to a plan. Studies on the pension plan level also have shortcomings. These studies generally fail to take into account costs, and benchmark funds against broad market indices regardless of investment style. Moreover, these studies are restricted to either DB or DC plans. For instance, Brinson, Hood, and Beebower (1986) study the returns of 91 DB plans during 1974-1983. Benchmarked against the S&P 500, these plans underperform by 110 basis points per year. Ippolito and Turner (1987) investigate a sample of 1,526 plans during 1977-1983 and find that the average plan underperforms the S&P 500 in a CAPM framework by 44 basis points per year. The widely cited study by Lakonishok, Shleifer, and Vishny (1992) questions the future of the DB industry. Their sample of 769 DB plans underperforms the S&P 500 by 260 basis points per year during 1983-1989. Finally, Elton, Gruber, and Blake (2006) examine mutual funds offered by 43 DC pension plans in the period 1993-1999. Using a multi-factor model, they document a 31 basis points underperformance per year. In conclusion, we note that pension fund performance studies have been performed on two levels, plan and managed accounts, in varying time periods and using different plan types and benchmarks. Results are therefore scarcely comparable.

Whereas performance studies have been carried out on two different levels, persistence has only been studied on the managed accounts level. For instance, Tonks (2005) documents persistence in performance on a one-year horizon, for managers employed by UK pension funds. Tonks (2005) does not take into account management costs. Christopherson, Ferson, and Glassman (1998) examine 273 DB pension fund accounts using a conditional multi-factor model and find significant persistence in performance. Busse, Goyal, and Wahal (2006) document persistence on a one-year horizon of portfolio manager excess returns. In contrast with the earlier work, we test for persistence in pension fund performance on the plan level.

The paucity of information on pension fund performance is in marked contrast to the abundance of evidence on mutual fund performance. A majority of performance studies concludes that mutual funds perform worse than a comparable passive market proxy. Malkiel (1995) and Gruber (1996) observe that mutual funds on average underperform the market by the amount of expenses charged to investors. Chan, Chen, and Lakonishok (2002) corroborate the underperformance of the mutual fund industry in a study on mutual fund investment styles. More recently, Elton, Gruber, and Busse (2004) show that index funds strongly underperform the S&P 500. Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994) and Brown and Goetzmann (1995) provide evidence of persistence in mutual fund performance on short horizons.

Our paper is organized as follows. In section 1, we discuss the details of the CEM pension fund database and CRSP mutual fund database. We describe the standard performance measurement procedure, persistence tests and risk adjustment methodology in section 2. Section 3 contains an overview and discussion of our empirical results. Section 4 gives our conclusions.

1 Data

DB and DC pension fund data are provided by CEM Benchmarking Inc. (CEM), which collects detailed information on pension fund performance. Via yearly questionnaires, CEM requests pension funds to provide information on their gross performance, fund-specific benchmarks and cost breakdowns. Tables 1 and 2 illustrate the diversity and evolution of the equity database by reporting the number of funds for different classifications, countries and regions. The Original panel shows the characteristics of the data provided. Pension funds are grouped into corporate, public and other funds. Furthermore, CEM distinguishes between US, Canadian and European funds. We focus on domestic equity investments by US 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 of 716 DB and 238 DC funds report to CEM over the sample period. In any given year, approximately 250 DB and 100 DC funds report. This implies that CEM retains information on funds entering and leaving the database. Pension funds may have several reasons for leaving the database. For instance, mergers and acquisitions among the underlying corporations may cause funds to stop reporting. Funds can also decide not to report as a consequence of bad performance. However, there is less incentive for a fund to do this, since all funds in the database are anonymous. Consequently, bad performing funds do not have to fear diminishing reputation. To test whether our results are affected by a potential reporting bias, we measure the performance of funds leaving the database before the end of the data period (2004) in the year before they leave the database. This pre-leaving performance can be compared to the performance of the complete sample to determine the effect of a possible reporting bias. We conclude that performance in the pre-leaving period is not significantly different from complete sample performance. Although the actual effect of the reporting bias cannot be measured, the pre-leaving performance provides the best possible picture of the effect of this bias. Finally, Tables 1 and 2 show that the database mainly contains US and corporate funds.

[Table 1 about here.]

[Table 2 about here.]

[Table 3 about here.]

[Figure 1 about here.]

The unique structure of the CEM database allows for an accurate evaluation of performance and persistence. It provides the opportunity to evaluate large and small cap, actively and passively managed and internally and externally managed (only for DB funds) equity investments separately. Figure 1 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 breakdowns create different aggregation levels as indicated in Figure 1. 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 domestic equity 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. 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 and one of them is missing, we regard the sum or difference as missing as well. Additionally, extreme outliers may influence our results in an undesirable way. Occasionally, funds report returns greater than 300% in absolute value. We address this by removing observations at a distance greater than three standard deviations from the cross-sectional mean. As a further refinement, we also exclude funds that report for less than two years.

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. A comparison of the original and modified panels in Tables 1 and 2 shows 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 indicates that pension funds initially have a stronger preference for passive investments than mutual funds. However, mutual funds shift over time toward more passively managed investments. Focusing on the lowest aggregation level for DB funds demonstrates that externally-managed equity holdings are on average larger than their internally-managed counterparts.

Mutual fund data are extracted from the CRSP database. The CRSP database is survivorship bias free. It covers all US mutual funds during 1962-2004. We select all funds with a US equity investment objective. Additionally, we find 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-proclaimed 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 with pension fund equity returns, we extract 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].

2 Methodology

2.1 Standard Performance Measurement

The pension fund database contains information on fund-specific returns, benchmarks and costs. Net performance is measured, on a yearly frequency, 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 of equity, for fund i at time t respectively. In order to measure the impact of costs, we define gross performance ($GVA_{i,t}$) 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, and also include record-keeping, 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 subtracting a fund-specific benchmark return, we reduce possible mis-specification. The majority of earlier studies correct by deducting returns of broad benchmark indices, such as the S&P 500. Second, costs are fund-specific as well, whereas most previous studies assume a common fixed cost component (e.g. 30 basis points for all funds). Third, costs contain both a direct and indirect component, in contrast to a proxy for direct investment costs only.

Our standard analysis starts at the highest aggregation levels (three and four, see Figure 1), i.e. aggregating over different equity classifications. In the standard analysis, we compute time series averages of NVA for each individual fund. Average performance (NVA_{mean}) is then measured as the average time series 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 carried out in turn for DB, DC and mutual funds. The procedure for mutual funds is largely the same, but benchmarks are treated differently, see section 1 for the style matching procedure. Within each type of service provider (DB, DC and mutual funds), the analysis is conducted for separate equity classifications, starting with the complete sample (aggregation level four). Thereafter, we analyze aggregation level three, i.e. large cap,

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

small cap, actively and passively managed equity investments respectively. Additionally, we apply our methodology on the low aggregation level. The standard performance analysis as described above is then conducted on aggregation level two for DB and DC pension funds and mutual funds and on aggregation level one 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.

2.2 Persistence Tests

The pension and mutual fund literature has addressed the question of persistence in manager performance in many different ways. However, persistence tests on plan performance are undocumented. We test for persistence in plan performance using two different tests.

In an evaluation study of persistence tests, Carpenter and Lynch (1999) divide persistence tests 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. The first test ranks funds 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 performance is evaluated. Persistence is then tested using a t-test on the time series of the portfolio performance. Since we consider only one ranking and evaluation period, results do not suffer from look-ahead bias. The chi-squared-test also ranks funds based on their past year performance. In this test, funds are split up into winners and losers. Similar breakdowns 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.

2.3 Risk and Style Adjustment

In the standard performance analysis, we compute NVA by subtracting appropriate benchmarks and fund-specific costs of equity from realized gross returns. 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). A fund manager who is supposed to invest only in large cap stocks may take a bet on small cap stocks in an effort to beat his large cap benchmark. Hence, risk and style adjustments

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

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 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. Though our adjustment methodology is unprecedented in the performance literature, risk-adjusted value added is introduced by Busse, Goyal, and Wahal (2006).

Random coefficient panel models capture fund-specific characteristics without estimating a large number of parameters. Hence, this panel approach 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:

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

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 the distributions of α_i and β_i as

$$\alpha_i = a_0 + \eta_{\alpha_i} \qquad (4)$$

$$\beta_{j,i} = b_j + \eta_{\beta_{j,i}} \quad \text{for} \quad j = M,\ SMB,\ HML,\ UMD. \qquad (5)$$

We assume the fund specific error terms that are contained in the vector η_i as

$$\eta_i' = \left[\begin{array}{ccccc} \eta_{\alpha_i} & \eta_{\beta_{M,i}} & \eta_{\beta_{SMB,i}} & \eta_{\beta_{HML,i}} & \eta_{\beta_{UMD,i}} \end{array} \right],$$

are independent across i and normally distributed with zero mean. Similarly, we specify the distribution of $\epsilon_{i,t}$ as normal with zero mean but with time-varying variance. For simplicity, we assume that $\epsilon_{i,t}$ are cross-sectionally and serially uncorrelated and independent of η_i for all i and t. Finally, we assume that the Fama French factors are serially uncorrelated and uncorrelated with the error terms η_i and $\epsilon_{i,t}$ for all i and t.

The independence assumptions simplify the estimation to a least squares estimation with time-varying variance. Small modifications to FGLS estimation techniques as described in Hsiao (2003) result in 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. Ultimately, risk and style adjusted NVAs are then represented by a_0.

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

2.4 Alternative Pension Fund Performance and Cost Drivers

The panel framework is also used to rule out potential drivers of pension fund performance and link the performance discrepancy between pension and mutual funds with agency costs. We focus on pension fund cost and performance. First, we consider scale advantages in costs and performance of pension funds. Total costs, costs of internally managed equities (for DB funds only) and NVA are regressed on fund size to determine whether large funds have advantages in costs and performance. The effect of pension fund negotiating power is measured by regressing the costs of external management (for DB funds) on fund size. Moreover, we attempt to identify alternative drivers of performance. For both DB and DC pension funds, NVA is regressed on a dummy for public funds. Finally, we select the DB percentage of internally managed equity holdings, number of DC investment options and log DC company stock holdings as possible drivers of NVA.

3 Empirical Results

3.1 Standard Performance Results

The standard performance measurement analysis is conducted at the two highest aggregation levels. As indicated in section 2, the NVAs for each individual fund are first averaged over time. We then compute the cross-sectional average of the mean NVAs time series. Table 4 reports the across-fund average NVA in the column labeled "Mean". Furthermore, we display the cross-sectional standard deviation ("s.d.") of average NVAs time series 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 maxima ("Max") and minima ("Min"). Once performance has been measured and characterized, we display additional information on the funds in the CEM database. The cross-sectional averages of time series average size of the equity holdings ("Size Eq. hold.") and total costs ("Costs") are presented. Finally, we measure the performance of all pension funds that stop reporting before the end of the data period ("PL Mean"; Pre-Leaving Mean). We collect all NVAs in the year before the funds stop reporting and average across all funds. Since only pension fund data may be affected by this bias, we perform this analysis exclusively for pension funds. 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 deduction 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 underperform their benchmarks after subtraction of costs. The mean NVA of "All"

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

mutual funds is -277 basis points. Furthermore, Table 4 shows that the performance in the year before departing the database does not differ much from results obtained from the complete database. The performance of leaving funds is often even higher than for the complete sample of funds. Although this result should be treated with caution, this is an indication that the effect of a reporting bias is small.

The characteristics of the mutual fund database differ markedly from those of the pension fund database. A 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 a 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 lead 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 be constructed roughly 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 have reported to CEM since 1997. For this reason, we additionally conduct the standard analysis on a sub-sample of mutual funds, ranging from 1997-2004 (”MF97+”). Sub-sampling scarcely affects our results and is therefore discarded thereafter[5]. As a second robustness test, we also conduct the standard analysis in a value weighted manner. These results are reported in Table 5. Value-weighting funds does not alter pension fund performance results substantially. Value-weighted mutual fund performance measures show that differences between pension and mutual funds can partly be explained by discrepancies in domestic equity 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 the performance of the mutual fund business 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 indicates that the database contains many small mutual funds and only a minority of larger ones. For instance, the average size of the equity holdings of Q1 does not exceed $1 mln. In Q9, the average size of equity mutual funds is $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 additionally conduct all mutual fund analyses for Q10. The matched mutual fund sample (Q10, ”All”) has a mean NVA of -165 basis points that differs significantly from zero, an average size of $2.1 bln. and a cost level of 87 basis points. This implies that even the 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

[5]Note that GVAs of ”LC” for mutual funds are now slightly positive.

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 4 about here.]

[Table 5 about here.]

[Table 6 about here.]

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 underperform benchmarks, whereas mutual funds underperform 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 to the question of whether outsourcing adds or destroys value for DB pension plans.

[Table 7 about here.]

[Table 8 about here.]

3.2 Persistence Results

The modest average NVA of financial services providers does not necessarily imply that all funds are unable to beat their benchmarks. From an investor's point of view, it is important to detect whether some of the DB, DC pension funds or mutual funds in our databases are repeated winners or losers. If performance is persistent over time, persistence tests yield valuable information on funds (not) to invest in.

We examine persistence in plan performance and start with measuring performance before subtraction of costs (GVA). 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 2.

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 find scarcely any persistence in the GVAs of pension funds. Non-persistent plan performance implies that investors with an investment horizon of one year cannot be advised to embrace or avoid certain pension plans. 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 manager performance. Even if manager performance is persistent, it would nevertheless be difficult for pension funds to select nothing but winners among managers. The relatively low (yearly) frequency at which we measure performance may be another explanation for the absence of persistence in pension fund performance. Tonks (2005) presents evidence of persistence in manager performance over short horizons. At longer intervals, the evidence becomes weaker. Nevertheless, Busse, Goyal, and Wahal (2006) document persistence in the winner portfolios of delegated managed accounts on the one-year horizon.

Our 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. This ambiguity in mutual fund persistence test results impedes clear investment guidelines for an investor with a one-year investment horizon. Grinblatt and Titman (1992) and Elton, Gruber, and Blake (1996) both find more conclusive evidence of persistence in mutual fund managers' risk-adjusted returns even after corrections for costs. In particular, past losers tend to remain losers, the so-called "icy hands" effect.

Persistence tests are also conducted on the performance measured as NVA, to determine the effect of costs on the persistence in fund performance. Table 10 documents the results of the NVA persistence tests. We find that NVA test results corroborate GVA findings. Hence, yearly fund performance is not persistent, either before or after subtraction of costs.

[Table 9 about here.]

[Table 10 about here.]

3.3 Risk and Style Adjusted Results

The panel data model described in section 2 enables us to risk-adjust the yearly returns provided by CEM. We start our panel analysis with the evaluation of risk adjusted NVA performances of pension funds. Table 11 reports parameter estimates of the panel regression and the corresponding p-values for DB and DC pension funds. The results for DB funds confirm the conclusions from 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 10% in four out of five cases. DC funds switch from negative to positive, but statistically insignificant, NVAs compared with Table 4. Panel results for mutual funds, in Table 12, also largely confirm the underperformance documented in the standard analysis (see Tables 4 and 6). Interestingly, the gap in performance between pension and mutual funds widens on the highest aggregation level and decreases in the categories small cap and passive. The exposure to the Fama-French factors is in all cases negligible in economic terms[6]. These low betas can be expected as returns are to a large extent corrected for risk by subtracting fund-specific benchmarks.

Summarizing, the picture of the performance differential after risk and style adjustments remains unchanged. Pension funds perform close to their benchmark and mutual funds underperform their benchmarks significantly. However, risk and style adjustments increase the gap in performance between pension and mutual funds by more than 60 basis points (see Tables 4,

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

6, 11 and 12) compared with the standard analysis on the highest aggregation level (”All”). By contrast, passive equity investments by mutual funds have NVAs comparable to pension funds after risk and style adjustments.

[Table 11 about here.]

[Table 12 about here.]

3.4 What Explains the Performance Differential?

Our empirical results disclose that pension funds perform close to their fund-specific benchmarks, whereas mutual fund perform substantially worse than style-matched benchmarks, even after correcting for size, costs, risk and style. Including loads in the analysis would only increase the performance difference.

How do we interpret the performance discrepancy? Apparently, other factors are responsible for the observed performance gap. Do pension fund managers have more skill than mutual fund managers in relative terms? This is unlikely, since pension funds hire (and fire) institutional asset managers who provide mutual funds for individual investors as well. These commonalities in the dynamics of DB, DC and mutual fund performance are reflected in figure 2. Although pension funds (left axis) perform relatively better than mutual funds (right axis), figure 2 indicates that pension and mutual fund performance is likely to be driven by common factors.

[Figure 2 about here.]

We theorize that agency costs in the financial services industry may be responsible for the observed performance differential. Lakonishok, Shleifer, and Vishny (1992) initiate the agency debate by arguing that the existence of multiple layers of agency relationships between companies, pension treasurers, money management firms and plan participants leads to underperformance of pension funds. Mahoney (2004) and Ambachtsheer (2005) extend the agency discussion and counter the argument by highlighting the inherent conflict that results from for-profit organizations providing management services directly to countless faceless mutual fund investors. They argue 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 in the mutual fund industry. Moreover, Mahoney (2004) and Swensen (2005) introduce soft dollars, pay-to-play and pricing games as possible explanations of the negative net performance of mutual funds. To support the arguments of Mahoney (2004), Ambachtsheer (2005) and Swensen (2005), we provide indirect evidence of the presence of agency costs in the mutual fund industry. On aggregation level three, it becomes clear that passively managed mutual funds can provide the same net returns as DB and DC pension fund equivalents. Since passive investments leave least room for agency issues, this indirectly supports the claim that mutual fund performance is affected by agency costs.

The presence of agency issues in the mutual fund industry is widely acknowledged. Mutual fund net performance is impacted by hidden costs in the industry. However, why should pension funds not suffer from these costs as well in their externally-managed equity mandates? Often, pension fund assets are managed on separate accounts. The accounts are thoroughly scrutinized by the pension fund. This monitoring power enables pension funds to detect possible hidden costs. As a result, pension funds are less vulnerable to soft dollar, pay-to-play and late pricing agreements between mutual funds and broker firms. Beside monitoring abilities, the efficient pooling of money in a pension plan equips pension funds with substantial negotiating power. The exertion of this power leads to higher demands on institutional asset management providers. More requirements leave less opportunity to extract wealth and consequently lead to lower cost levels for pension funds. As a result, plan participants benefit from negotiated lower costs, whereas mutual fund investors have fixed high fees and loads no matter what the actual level of mutual fund costs is.

To ascertain whether the performance differential is attributable to agency costs rather than other factors, we exclude several other factors possibly driving pension fund performance. Thereafter, we provide direct evidence of the negotiating power of pension funds. First, we rule out fund size as a factor driving pension fund performance, by regressing cost and performance variables on log fund size. Table 13 shows that pension funds have scale advantages in both total costs and costs of internally-managed equities. However, Table 13 also demonstrates that the scale advantages in costs do not lead to significant increases in net value added for larger funds. The independence of pension fund net performance with respect to fund size can be caused either by an offsetting size effect in GVA or by the fact that cost differences between large and small funds are too small to significantly affect NVA. Regardless of the origin of the independence of NVA, fund size is ruled out as a factor driving pension fund net performance. Table 14 also indicates that the performance of DB pension funds is not driven by fund type (public or non-public) or the relative size of internally managed equities. For DC pension funds we include a dummy for public funds, the number of DC investment options and DC company stock holdings as possible drivers of performance. All can be excluded as drivers of performance.

Finally, we provide direct evidence of the negotiating power of (large) pension funds in the construction of contracts for external management. We investigate the relationship between pension fund costs of external management and fund size by regressing the cost of externally managed equities on the log fund size. Table 14 provides evidence of the negotiating power of pension funds in the form of a significant negative loading on log fund size on the highest aggregation levels. This means that larger pension funds are better able to reduce the costs of external management.

[Table 13 about here.]

[Table 14 about here.]

4 Conclusion

Our major finding is that the DB and DC pension fund domestic equity performance, after subtraction of benchmarks, is close to zero. By contrast, mutual fund returns are substantially lower than their style-matched benchmarks. The performance discrepancy cannot be explained by differences in size or costs, nor by risk and style bets. We argue that the difference in performance between pension and mutual funds is attributable to hidden costs in the mutual fund industry. Hidden costs generated by agreements between mutual funds and broker firms typically impact net investments.

The presence of agency costs in the mutual fund business is supported by the substantially smaller performance differences for passively managed mandates. These mandates are typically strictly defined and thus leave little room for mutual funds to extract wealth. Furthermore, we argue that pension funds do not suffer from hidden costs in their externally managed mandates, as a result of their negotiating power. Subsequently, we provide direct evidence of the power that enables pension funds to detect and reduce hidden costs in all externally-managed mandates. Pension fund performance is therefore less likely to be exposed to agency costs.

We show that the evidence of persistence in yearly pension fund equity performance is weak. In line with previous literature, mutual funds show slight evidence of persistence on a one-year horizon. The absence of pension fund persistence 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 managers might be a difficult task.

Despite the direct and indirect evidence, agency costs are a plausible, but nonetheless implicit explanation for the performance differential. Unfortunately, we do not have access to measurable proxies for agency costs for the three investment options under consideration. As a result, we are not able to measure the exact impact of agency costs on performance. Hence, further investigation of the effect of agency costs on performance remains a subject for future research.

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List of Figures

Figure 1: **Data Structure**

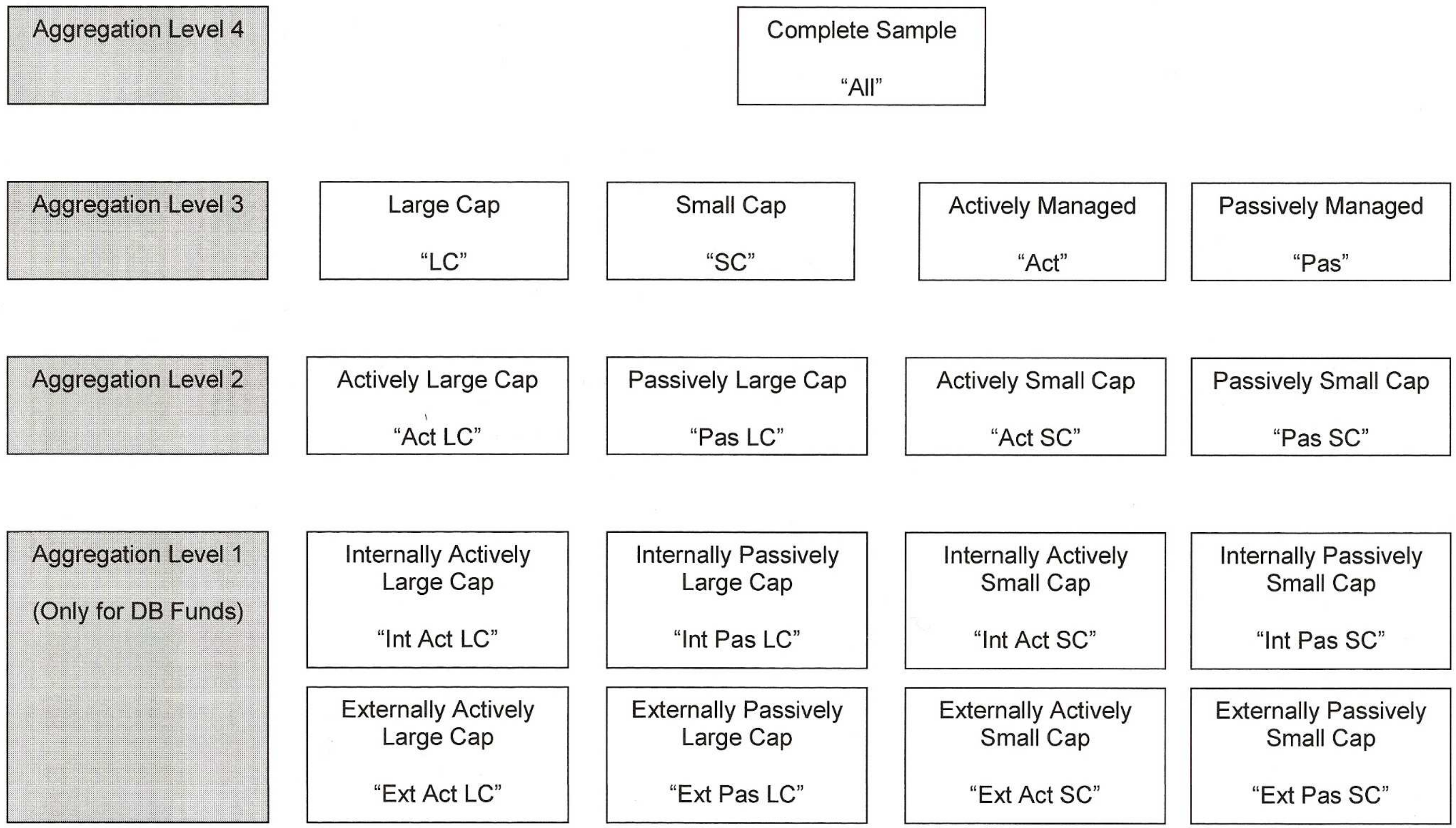
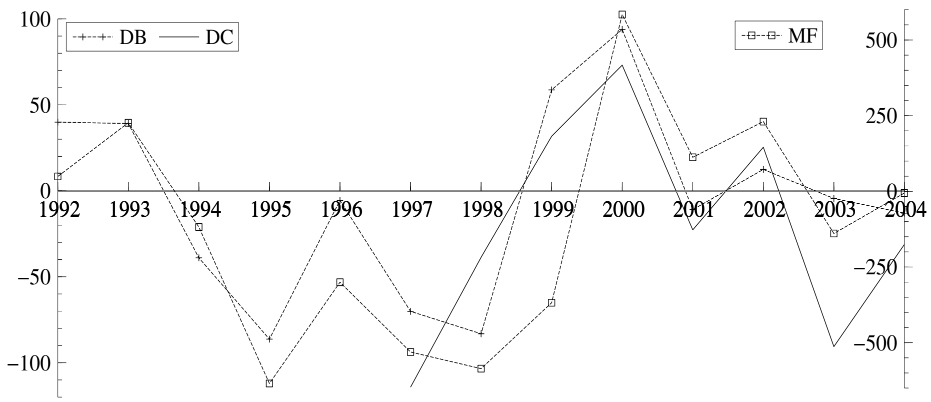


Figure 2: **Time Series NVA**



This figure displays the time series evolution of cross-sectional mean NVA in basis points for DB and DC pension funds and mutual funds in the period 1992-2004. DB and DC pension funds NVAs are expressed on the left axis and mutual fund NVAs on the right axis.

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 funds, "Pub" the number of public funds and "Oth" shows the number 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.

	Original DB												
	'92	**'93**	**'94**	**'95**	**'96**	**'97**	**'98**	**'99**	**'00**	**'01**	**'02**	**'03**	**'04**
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 number 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 dollars. Holdings are split up into large and small cap, actively and passively managed and internally and externally managed holdings, as illustrated in Figure 1.

	'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. "Mean" displays an equally weighted cross-sectional average of mean NVA time series. "s.d." displays the equally weighted cross-sectional standard deviation of the mean NVA time series. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "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. "PL Mean" denotes the mean NVA across all funds that stop reporting before 2004 in the year before they stop reporting. This measures the effect of a possible reporting bias. All numbers are domestic investments by US institutions.

					DB			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs	PL Mean
All	-12.49	166.59	-1.53	566.31	-583.95	2749.79	31.89	3.59
LC	-2.45	171.75	-0.29	608.14	-588.16	2525.97	29.11	3.16
SC	-46.87	295.02	-2.41	809.94	-957.81	223.82	58.18	-3.68
Act	-10.17	219.14	-0.94	746.62	-678.15	1550.78	42.37	-4.5
Pas	-26.62	119.73	-3.84	354.19	-504.88	1210.42	6.14	3.92
					DC			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs	PL Mean
All	-44.05	134.59	-4.58	385.44	-418.19	617.32	62.08	-42.49
LC	-39.86	143.48	-3.58	484.52	-492.49	525.38	48.83	-44.14
SC	-46.63	242.67	-2.26	568.74	-703.18	91.94	80.10	-47.00
Act	-48.49	259.51	-2.44	649.09	-667.33	331.38	82.59	-59.46
Pas	-24.02	35.16	-9.57	130.99	-179.21	285.94	31.71	-23.19
					MF			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs	PL Mean
All	-277.77	523.76	-33.27	1866.45	-2359.42	294.32	119.07	-
LC	-155.72	419.11	-19.19	1542.48	-1642.56	345.89	113.17	-
SC	-515.22	639.36	-28.47	1850.39	-3147.39	181.14	132.00	-
Act	-291.18	535.05	-33.29	1910.47	-2412.48	281.16	121.93	-
Pas	-78.33	184.81	-5.87	756.75	-1098.49	554.13	62.61	-
					MF97+			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs	PL Mean
All	-253.02	548.81	-28.12	1866.45	-2359.42	370.22	120.10	-
LC	-97.30	424.04	-11.45	1542.48	-1642.56	440.49	113.90	-
SC	-540.09	668.39	-27.96	1850.39	-3147.39	218.13	133.51	-
Act	-270.45	568.00	-28.32	1910.47	-2410.69	356.36	123.07	-
Pas	-65.33	183.25	-4.90	756.75	-1098.49	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. "Mean" displays a value weighted cross-sectional average of mean NVA time series. Weights for funds are time series averages of equity holdings. "s.d." displays the value weighted cross-sectional standard deviation of the mean NVA time series. "Max" and "Min" are respectively the maximum and minimum NVA of the series. "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			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs
All	-15.42	176.87	-1.77	566.31	-583.95	2749.79	14.69
LC	-12.05	185.76	-1.33	608.14	-588.16	2525.97	12.93
SC	-10.92	358.82	-0.46	809.94	-957.81	223.82	35.58
Act	-12.66	279.85	-0.92	746.62	-678.15	1550.78	24.77
Pas	-3.76	123.39	-0.53	354.19	-504.88	1210.42	1.90
				DC			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs
All	-23.71	156.12	-2.13	385.44	-418.19	617.32	44.02
LC	-18.37	184.83	-1.28	484.52	-492.49	525.38	39.66
SC	-59.34	242.54	-2.87	568.74	-703.18	91.94	69.22
Act	-32.14	314.71	-1.34	649.09	-667.33	331.38	70.78
Pas	-7.34	24.81	-4.14	130.99	-179.21	285.94	13.45
				MF			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs
All	-151.91	834.84	-11.42	1866.45	-2359.42	294.32	84.59
LC	-107.70	658.69	-8.45	1542.48	-1642.56	345.89	80.25
SC	-426.71	1119.96	-13.46	1850.39	-3147.39	181.14	102.77
Act	-162.25	870.23	-11.41	1910.47	-2412.48	281.16	90.27
Pas	-26.59	232.05	-1.59	756.75	-1098.49	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. "Mean" displays a cross-sectional average of NVA time series means. "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 million dollars. All numbers are domestic investments by US institutions.

				Q1			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs
All	-465.49	740.89	-11.95	1850.39	-2347.37	0.77	149.56
LC	-254.63	576.61	-6.90	1539.18	-1641.00	0.79	135.09
SC	-923.81	944.61	-10.35	1850.39	-3147.39	0.71	184.99
Act	-483.03	757.60	-11.94	1889.63	-2412.48	0.77	151.35
Pas	-109.88	345.25	-1.06	641.33	-894.20	0.77	91.90
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
				Q9			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs
All	-183.52	391.21	-9.39	1865.88	-2354.05	350.11	101.33
LC	-107.88	337.12	-5.35	1541.37	-1642.56	349.55	98.64
SC	-368.73	516.92	-7.81	1832.72	-3138.05	351.40	107.62
Act	-203.11	401.59	-9.70	1907.87	-2406.20	348.38	105.80
Pas	-72.30	127.58	-3.26	742.10	-1063.56	369.49	51.22
				Q10			
	Mean	s.d.	t-stat	Max	Min	Size Eq. hold.	Costs
All	-165.43	326.44	-10.16	1866.45	-2351.30	2113.69	87.12
LC	-108.76	249.61	-7.67	1541.21	-1638.31	2317.50	84.26
SC	-357.48	499.88	-6.86	1818.72	-3131.36	1426.95	96.77
Act	-177.99	341.10	-9.94	1908.92	-2411.37	2097.24	93.40
Pas	-55.51	92.92	-3.73	691.51	-1027.79	2266.85	28.71

Table 7: **Summary Statistics Specified**

This tables presents NVA summary statistics on aggregation level two. 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". "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			
	Mean	s.d.	t-stat	Max	Min	Costs
Act LC	-24.43	359.43	-1.38	943.26	-919.08	39.05
Pas LC	1.58	151.23	0.18	507.72	-514.80	5.90
Act SC	-20.61	469.59	-0.66	954.91	-1090.97	66.50
Pas SC	25.60	244.62	0.99	661.28	-580.67	9.12
			DC			
Act LC	-59.56	374.74	-1.93	874.00	-917.16	72.84
Pas LC	-16.79	27.69	-7.88	130.99	-183.89	22.75
Act SC	-114.99	385.22	-3.21	641.86	-842.99	95.11
Pas SC	-20.24	42.19	-3.75	102.00	-130.71	30.32
			MF			
Act LC	-168.61	729.16	-11.63	1585.09	-1669.67	116.12
Pas LC	-87.45	220.39	-4.79	586.25	-933.93	61.07
Act SC	-454.80	1093.52	-14.42	1850.39	-3181.84	134.44
Pas SC	-160.52	502.10	-2.17	1108.80	-1395.79	67.57
			Q10			
Act LC	-149.37	689.42	-3.61	1585.09	-1666.81	90.72
Pas LC	-62.47	211.94	-1.67	503.98	-865.86	28.16
Act SC	-362.71	1046.53	-3.20	1818.72	-3131.36	102.16
Pas SC	-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. "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			
	Mean	s.d.	t-stat	Max	Min	Costs
Act LC	-30.23	381.84	-0.69	876.37	-1217.20	10.58
Pas LC	6.66	170.05	0.28	665.06	-655.55	2.96
Act SC	59.61	110.85	1.52	253.75	-161.02	13.64
Pas SC	-2.04	237.31	-0.03	545.27	-637.57	4.36
			EXT			
	Mean	s.d.	t-stat	Max	Min	Costs
Act LC	-26.17	358.02	-1.45	933.80	-895.74	42.05
Pas LC	1.49	158.55	0.16	528.20	-514.80	6.50
Act SC	-21.35	484.91	-0.66	975.80	-1115.05	67.91
Pas SC	18.56	269.56	0.63	708.00	-612.76	9.44

Table 9: **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 10: **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 11: **Risk and Style Adjustment Analysis NVA DB-DC**

This table reports 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 and FF-factors are reported in basis points. 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	-0.01	0.03	0.02	0.03	36.21	-0.03	-0.02	-0.02	-0.03
	0.07	0.16	0.03	0.07	0.07	0.34	0.10	0.25	0.20	0.25
LC	-46.14	-0.01	0.03	0.03	0.02	26.06	-0.03	-0.01	-0.02	-0.02
	0.11	0.12	0.04	0.03	0.11	0.39	0.12	0.42	0.25	0.34
SC	30.60	-0.02	-0.01	0.00	-0.00	49.75	-0.04	-0.04	-0.04	-0.04
	0.39	0.23	0.35	0.49	0.50	0.37	0.16	0.18	0.22	0.29
Act	-62.49	-0.02	0.06	0.03	0.03	162.64	-0.08	-0.04	-0.08	-0.10
	0.09	0.12	0.01	0.05	0.11	0.16	0.04	0.19	0.10	0.12
Pas	-31.34	0.00	-0.02	0.01	0.01	-0.72	-0.01	-0.00	-0.01	-0.01
	0.10	0.36	0.02	0.08	0.13	0.48	0.03	0.19	0.11	0.20

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

This table reports 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 and FF-factors are reported in basis points. 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	-0.08	0.06	0.08	0.05	-256.06	-0.05	0.07	0.06	0.06
	0.02	0.05	0.19	0.12	0.30	0.01	0.07	0.08	0.08	0.14
LC	-370.42	-0.07	0.14	0.10	0.09	-251.27	-0.05	0.10	0.08	0.09
	0.00	0.02	0.00	0.02	0.08	0.00	0.06	0.01	0.02	0.03
SC	-134.25	-0.06	-0.21	-0.07	-0.10	-86.93	-0.05	-0.17	-0.11	-0.06
	0.26	0.18	0.01	0.20	0.19	0.26	0.13	0.00	0.02	0.21
Act	-344.73	-0.09	0.06	0.08	0.05	-275.94	-0.06	0.08	0.07	0.08
	0.02	0.05	0.19	0.10	0.29	0.01	0.06	0.06	0.07	0.11
Pas	-43.62	-0.05	-0.03	-0.01	-0.02	-14.41	-0.03	-0.03	-0.01	-0.02
	0.20	0.00	0.07	0.27	0.29	0.32	0.00	0.02	0.09	0.10

Table 13: **Scale Advantages in Cost and Performance**

This table displays parameter estimates and corresponding p values of regressions of costs and NVA on a constant and log fund size. NVA is computed as: R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. NVA and costs are reported in basis points and fund size in million dollars. Parameter estimates for the constant and log size are respectively denoted α and β. The first four columns of the table report results of regressions of total costs "C total" on log size "Size" performed for DB and DC pension funds. The fifth column displays estimation output of the regression of costs of internal management "C int" for DB funds on log size. In the last four columns, parameter estimates of NVA "**NVA**" on log fund size are displayed for DB and DC pension funds. All numbers are based on domestic investments by US institutions.

	C total-Size				**C int - Size**		**NVA -Size**			
	α_{DB}	β_{DB}	α_{DC}	β_{DC}	α_{DB}	β_{DB}	α_{DB}	β_{DB}	α_{DC}	β_{DC}
Tot	86.78	-7.29	121.00	-9.74	23.63	-1.90	-72.81	7.99	-126.33	12.53
	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.25	0.17	0.23
LC	78.60	-6.67	101.40	-7.64	68.39	-5.73	-68.32	7.89	-130.87	14.61
	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.26	0.17	0.21
SC	141.90	-11.47	144.19	-9.14	339.29	-29.98	-165.94	18.92	0.69	-8.65
	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.21	0.50	0.39
Act	91.97	-6.54	126.31	-6.93	141.24	-11.97	-123.72	14.99	-174.56	18.39
	0.00	0.00	0.00	0.01	0.00	0.00	0.16	0.17	0.23	0.28
Pas	18.12	-1.60	77.06	-7.49	32.23	-2.73	1.80	-1.86	-52.06	4.87
	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.41	0.01	0.05

Table 14: **Negotiation Power and Alternative Drivers**

This table displays parameter estimates and corresponding p values of regressions of pension fund costs and NVA on a constant (α) and different possible drivers (β). NVA is computed as: R - BMR - C, with R denoting gross returns, BMR fund-specific benchmark returns and C fund-specific costs. Costs and NVA are reported in basis points. The first panel reports results for DB pension funds and the second panel for DC pension funds. First, Costs of external "C ext" management are regressed on log fund size "Size". Furthermore, DB fund NVAs are regressed on the percentage of internally managed stocks "% H int" (compared to total stock holdings) and a dummy for public funds "D pub". In the second panel, DC NVAs are respectively regressed on a dummy for public funds "D pub", the number of investment options that the plan offers "Opt" and the log of total holdings in company stock "H cstk". All numbers are based on domestic investments by US pension funds.

	C ext - Size		**NVA - % H int**		**NVA - D pub**	
	α_{DB}	β_{DB}	α_{DB}	β_{DB}	α_{DB}	β_{DB}
Tot	79.58	-6.09	-9.56	17.25	-6.33	-2.85
	0.00	0.00	0.31	0.40	0.39	0.47
LC	92.11	-6.08	-7.28	27.81	-2.29	-3.98
	0.00	0.00	0.36	0.34	0.46	0.46
SC	121.70	-5.75	-29.14	53.33	-32.22	58.14
	0.00	0.00	0.22	0.34	0.24	0.20
Act	167.10	-9.29	-8.39	50.12	-4.78	7.97
	0.00	0.00	0.37	0.28	0.43	0.43
Pas	30.15	-2.25	-16.77	23.45	-9.36	-11.20
	0.00	0.00	0.11	0.30	0.27	0.33
	NVA - D pub		**NVA - Opt.**		**NVA - H cstk**	
	α_{DC}	β_{DC}	α_{DC}	β_{DC}	α_{DC}	β_{DC}
Tot	-32.28	3.23	-26.96	-0.32	-34.22	0.59
	0.07	0.48	0.24	0.44	0.18	0.47
LC	-22.44	7.77	-27.27	0.38	-18.41	-0.65
	0.18	0.46	0.26	0.43	0.33	0.47
SC	-63.75	-5.21	-11.38	-3.32	-100.04	8.26
	0.06	0.48	0.43	0.17	0.06	0.25
Act	-37.06	-3.54	-41.20	0.20	-46.32	2.27
	0.19	0.49	0.28	0.48	0.23	0.43
Pas	-14.35	-9.60	-15.37	0.00	-24.60	2.03
	0.00	0.21	0.01	0.50	0.00	0.05