Does the Governance of Public Pension Plans Matter?

Christopher K. Merker

Robert W. Baird & Co.
Marquette University
Fund Governance Analytics
2324 N. 90th Street
Wauwatosa, WI 53226
United States
(414) 731-8496
cmerker@fundgovernanceanalytics.com

Sarah W. Peck*

Marquette University
College of Business Administration
P.O. Box 1881
Milwaukee, WI 53201-1881
United States
(414) 288-1446
sarah.peck@marquette.edu

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*Corresponding author.

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Abstract: We construct a unique data base public plan board of trustees' governance practices by reading meeting minutes and create a governance index. We find that on an annual basis a one unit increase in our governance index increases excess asset allocation bench market returns by about 36 basis points, and in turn, a one percentage increase in predicted excess returns decreases the required contribution by the plan sponsors by about $10.3 million. The cumulative effect of good governance practice can have a sizeable impact on a plan's financial performance. We conclude, that, yes, the governance practices of the plan's board matters.

1.0 Introduction

As baby boomers age, securing funds for retirement has come to the forefront of the public consciousness. Two-thirds of working households ages 55 to 64 have not saved more than one year's worth of salary, and 90% of all working households fail tests of retirement assets for meeting future retirement needs.[1] Public pension plans are an important source of retirement savings- there are over 4,000 plans for 30 million workers. The plan's sponsors, state and local municipalities, invest taxpayer money to pay promised retirement benefits to retirees. Yet, these plans are in crisis- 40% of all states have a funding ratio below 70% with a $1.2 trillion funding gap for the largest 100 plans. Moreover, the "Pension Crisis" has revealed fraud and self-dealing and abuses in many plans. [2] Plans in Chicago, Illinois, and most recently the city of Dallas are examples of pension plans in crisis.[3]

There are social costs when pensions underperform or fail. Taxpayers must make up for performance and/or funding shortfalls and/ or employees must give up hard earned benefits. The pension crisis has spurned unprecedented legal challenges to pension fund operations and benefit payments to retirees in such states as Illinois and New Jersey, as well as cities, like Detroit. The courts largely have upheld the beneficiaries' rights to the promised benefits.[4] Thus cutting benefits to "solve" the pension crisis is unlikely to be an option. Better returns on the plan's invested assets is one way to ameliorate the funding crisis.

The investment of pension plan assets is overseen by a board of trustees who owe a fiduciary duty to the beneficiaries (both active employees and retirees). Despite the pension crisis there has been a paucity of empirical research that examines the link between the board of trustees as fiduciaries and the

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[1] "The Retirement Crisis: Is it Worse than We Think?", Nari Rhee, Ph.D., National Institute on Retirement Security, June 2013.
[2] "Public pensions America's Greece?", *The Economist*, December 29, 2014.
[3] "The Pension Crisis in Chicago and Illinois," *Chicago Tribune, May 25, 2012.*
"From Bad Dream To Nightmare: Dallas Struggles With Police, Fire Pension Fund Crisis", *Forbes*, March 17, 2017.
[4] "Public pension benefits & the law" Ronald A. Wirtz, Editor, *Fedgazette*, Federal reserve Bank of Minneapolis, January 2011 issue.

return performance of the invested assets they oversee. The purpose of this study is to provide that research and we find that, indeed, there is a link between pension board governance and plan returns.

Our empirical investigation is guided by the research paradigms established in the corporate governance literature. Like pension board trustees, directors of corporate boards have a fiduciary duty. While pension board trustees owe a fiduciary duty to beneficiaries, corporate directors owe a fiduciary duty to shareholders. Fama's seminal 1980 article that points out that agency conflicts can make it difficult for directors to fulfill this duty. Since then there has been an extensive body of research documenting the relation between shareholder wealth and corporate board practices. For a review of the literature, see for example, Hermalin and Weisbach, 2003 and more recently, Goergen and Renneboog, 2014. In this study, we ask whether the governance practices of pension boards impact the returns on the plan's invested assets in the same way that governance practices of corporate boards impact shareholder returns. Hence, we adopt many of the same variables that have been identified as significant in corporate board governance research as potentially important in pension plan board governance.

To investigate pension plan governance, we construct a unique data base by collecting data on a plan's governance practices from the meeting minutes posted on the web sites of various plans. We use this data to create seventeen governance variables and then investigate whether they explain return performance. We find that at the most only three of these variables are statistically significant, but we also find evidence of severe multicollinearity which can render our parameter estimates insignificant. Consequently, we use principal component analysis to address the problem of multicollinearity and turn the seventeen variables into a governance index. We then employ this index in subsequent tests of whether governance impacts the financial performance of the plan. We find a positive and statistically significant relation between the index and the returns on the plan's assets. Further, in a two stage least squares regression, we find that the governance index impacts the plan's returns and the returns, in turn, reduce the size of the required contribution needed by the plan's sponsors to shore up the plan. Our parameter estimates indicate that on an annual basis a one unit increase in our governance index increases

excess asset allocation bench market returns by about 36 basis points (0.36%), and in turn, a one percentage increase in predicted excess returns decreases the required contribution by the plan sponsors by about $10.3 million. The cumulative effect of good governance practice can have a sizeable impact on a plan's financial performance. Thus, we conclude, that, yes, the governance practices of the plan's board of trustees matters.

2.0 How Public Pension Plans Work

The management of pension fund assets is the responsibility of a board of trustees who play the role of a financial fiduciary. In the simplest terms, fiduciaries are charged with achieving the risk-return objectives for their clients. The definition of the Fiduciary Standard has been clarified and refined over the years. Brown (1977), Klesch (1977) and Pozen (1977) explain the evolution and application of the prudent man and prudent expert rules as defined under ERISA. One initial focus of the standard under ERISA was integrating modern portfolio theory. Brown (1977) finds that ERISA was intended to allow flexibility in the selection of investments not found in personal trust law, i.e., the prudent man rule was not intended to restrict pension fund investment to a narrow list of the largest corporations; the fund manager instead is to consider each investment in the context of its effect on the overall riskiness of the portfolio.

Pension plan assets are managed with these objectives, but also have some additional constraints specifically regarding the demographic characteristics among current and future retirees, which along with market conditions impact the plan's funding requirements. Most of these plans are, what are known as, defined benefit (DB) plans, which are plans that provide a guaranteed benefit to the future retiree. The benefits are usually determined by some type of formula that includes age, number of years of service, and average salary, among other factors. The focus of our research is on DB plans.

The funding and payment of benefits as overseen by the board requires additional outside expertise and other service providers including actuaries, investment consultants, investment managers,

Third Party Administrators (TPAs), custodians, etc. Actuaries evaluate mathematically the funding requirements to ensure benefits are paid to future retirees. Consultants advise on the portfolio allocation and help with searches for external managers who make the investments. TPAs process benefit payments on behalf of plans, and a custodian is a specialized financial institution responsible for safeguarding the financial assets.

A key focus of a plan's solvency is the funding ratio. The funding ratio is the ratio of the actuarial value of the plan's assets to the actuarial value of the liabilities. Prior to 2014, the Government Accounting Standards Board (GASB) ruling 25 and Actuarial Standards of Practice (ASOP) item 27 stipulate that public pension liabilities are to be discounted at the expected rate of return on pension assets. The actuarial value of the liabilities is determined using information about how the benefits are awarded, the demographics of members in the plan, mortality rates, and employment rates. Thus, the actuarial value of the assets is determined by a set of complex assumptions, smoothing, techniques, and, most importantly, the board's assumption about return that can be earned on the plan's assets in the long term. The rate of return is approved annually by the plan's board members. The process to set the investment return rate must be robust enough to ensure this assumption is reasonable and appropriate for the plan. The rate must be realistic to avoid masking plan funding issues. For example, if the assumption is too high and investments earn less than expected, a funding shortfall could result. Effective for fiscal year 2014, GASB via Statements No. 67 and 68 changed the reporting requirements for public pension plans- in particular, the rate allowed for determining liabilities under some circumstances must be discounted with a lower rate, i.e., the General Obligation (GO) municipal bond rate, and more limitations in smoothing methods for the assets which were initially allowed so that plans could smooth out volatility in market returns. Because of the change in the GASB rules in 2014, we limit our sample to years prior to 2014.

The plan sponsor is the state or municipality that promised the benefits for state and municipal employees. The plan sponsor makes annual required contributions to maintain the asset base in relation to the projected liability obligation. The annual required contribution (ARC) is the sum of the benefits

that accrued in the current year plus the cost to pay off the plan's unfunded liability. The size of the ARC is governed by GASB standards. Although not legally mandated, most plans try to comply with GASB standards, but often ending up paying less.

The hope is that the investment returns will be enough (either to meet or exceed the assumed actuarial rate) to offset as much as possible the ongoing and future required contributions. Thus, the returns earned by the plan's assets play a critical role in the financial stability of the plan and the financing burden of the plan's sponsors. The board of trustees, in turn, have a fiduciary obligation to maximize the return earned by the plan's assets. Consequently, we measure whether governance matters by testing whether it has an impact on the return earned by the plan's assets and, in turn, whether the returns impact the contribution required and paid by the plan's sponsors.

3.0 Literature Review

3.1 Governance of Public Plans

While there has been much research on the role that U.S. public pension plans play in corporate governance (see, for example, DelGuercio and Hawkins, 1999, as one of the earliest papers in this area), surprisingly, there is a paucity of empirical research on the governance of the board of trustees, themselves, of these plans. Most of the extant research has used an organizational design method. Ambachtsheer, Capelle, and Scheibelhut (1998) looked at three drivers of pension fund performance: fund size, proportion of assets passively managed, and quality of the fund's organizational design for 80 U.S. and Canadian pension funds (1993-1996), using differing and smaller sub-samples for each factor. For their measure of quality of fund design, they created a composite measure of organizational design following Jaques (1996) from the results of a survey of the plan's administrators' perceptions of what they termed "barriers to excellence, including such items as, poor process, insufficient skills, lack of innovation, and conflicting beliefs, among others. For six plans, they regressed RANVA (Risk-adjusted net value added) against three factors - fund size, percentage of funds invested in passive investments, and

the Jaques OD score (organizational design score-) and found that that good organizational design was statistically significantly positively related to a fund's returns.

Other research has used the institutional framework, which incorporates not just political influences, but other exogenous factors amongst established institutional structures. Matkin, Chen, Gang, and Khalid (2016) examine the impact of institutional factors in the environment including, for example, policies and procedures and professional norms and standards (i.e. GASB, actuarial standards). They perform a thorough examination of the Florida Public Pension System utilizing this approach, and demonstrate how investment markets, legislative action and actuarial norms and standards impacted the performance and funding level of the plan over thirty years.

Unlike these papers, our paper is one of the first to analyze public pension plan's governance practices in the tradition of empirical corporate governance research. We assemble a unique data base and construct variables that both align with those used in corporate governance research but also reflect the way that the board of trustees typically operate. We then test whether these governance practices are linked to measures of financial performance.

3.2 Public Plan Financial Performance

Besides governance research, the research on plan's financial metrics are also relevant to our study. The board of trustees typically will employ external asset managers and thus the selection of those managers can have an impact on the fund's returns. Goyal and Wahal (2008) find in a sample of round-trip firing and hiring decisions that if plan sponsors had stayed with the fired investment managers, their excess returns would be no different from those delivered by newly hired managers. While we do not explicitly investigate the hiring and firing of fund managers, we implicitly assume that the board's fiduciary duty is implemented in their hiring and firing decisions of external managers. Furthermore, if they employ good governance practices, those decisions, should be captured in higher returns.

Buoubaker, Gounopoulos, Nguyen, and Pltalidis (2017) examine the impact of monetary policy on asset allocation decisions by public pension plans. They show that the effect of a persistently low interest rate environment led to a substantial increase in pension funds' allocation to equity assets for the sample period January 1998 to December 2013. Buoubaker, et. al., (2017) used the Public Plans Database (PPD) from the Center for Retirement Research at Boston College as the source for their asset allocation data. We also use the PPD data base for data on asset allocation and other financial measures. Since Buoubaker, et. al., show that the returns on different asset classes can vary over time, we measure the return of the plan assets net of an asset allocated benchmark return for each year.

Novy-Marx and Rauh (2011) focused on the funding ratio. At the time of their study Government Accounting Standards Board (GASB) ruling 25 and Actuarial Standards of Practice (ASOP) item 27 stipulated that public pension liabilities are to be discounted at the expected rate of return on pension assets. Novy-Marx and Rauh make the point that the liabilities should be discounted at the rate that reflects the risk of the liability cash flow. They calculate the present value of state employee pension liabilities using discount rates that reflect the risk of the payments from a taxpayer perspective and assume that retirement benefits have the same default and recovery characteristics as state general obligation debt. Using this discounting method, they find that pension liabilities are understated by at least about 15%. Given that Novy-Marx and Rauh find that the reported funding ratio is likely to be understated, we control for the funding ratio in our tests but do not examine the funding ratio as a dependent variable. We instead use the annual dollar amount of the required and subsequently actually paid contribution to capture funding issues and the plan's financial stability. While these amounts are driven by actuarial assumptions, they are more likely to capture the funding burden of the plan on its sponsors.

3.3 Governance Indices

Because we test whether governance matters by constructing a governance index from seventeen governance variables, a review of research using or evaluating governance indices is relevant. Gompers,

Ishii, and Metrick (2003) create a governance index by using the incidence of 24 governance provisions that are related to shareholder rights. They find that firms with stronger shareholder rights had higher firm value, higher profits, higher sales growth, lower capital expenditures, and made fewer corporate acquisitions. Their Governance Index ("*G"*) is just the sum of one point for the existence (or absence) of each provision. While, their governance index is simplistic, it doesn't account for the pairwise correlations between the governance provisions; ours does.

Daines, Gow, and Larcker (2010) test the efficacy of three commercially available governance indices- the CGQ (the ''Corporate Governance Quotient'' calculated by RiskMetrics/ISS), the GMI (a measure of governance quality produced by Governance Metrics International), and the TCL (a rating produced by The Corporate Library). They find little evidence that the rankings are useful in predicting subsequent accounting restatements or share-holder litigation. They find that the TCL has a positive relation with future Tobin's Q, and the TCL and the CGQ have a relatively small positive relation with future alpha (excess stock price return). None of the ratings predict the subsequent changes in a firm's cost of debt, as measured by its credit rating. Thus, the authors conclude that the predictive ability of the leading commercial governance ratings (CGQ, TCL, and GMI) is weak at best. In contrast, we find that our governance index is positive and statistically significantly related to the excess asset allocation benchmark return in the following year and moreover, economically significant; a one unit increase in the index increases the excess asset allocated benchmark return earned by the fund by around 360 basis points.

4.0 Sample and Variables

Our sample begins with the Public Plans Database (PPD) provided by the Center for Retirement Research (CRR) at Boston College which includes extensive financial and actuarial data from 2001 to

2016.[5] Under the accounting rules set by the Governmental Accounting Standards Board (GASB), pension systems for government employees, and the government entities sponsoring those pensions, must present two schedules on the system's financial status: 1) the Schedule of Plan Funding and the Schedule of Employer Contributions; and 2) the Schedule of Plan Funding which provides histories of the plan's funded status (i.e., its assets, liabilities, and unfunded liabilities), and the payroll covered by the plan. We limit our analysis to defined benefit (DB) plans which include 150 of the largest state and municipal pension systems from this population representing in aggregate assets of over $3.025 trillion as of fiscal year end 2013. This sample covers 95 percent of public pension membership and assets nationwide.

We use CRR PPD data base for financial data for the public pension plans for the years 2008 to 2013. We collect governance data on public pension fund from 2008 to 2012. The difference in years in the two data sets occurs when we use a one-year lag between when governance and the financial outcomes are measured in our tests. Our sample of is limited to the years 2008 to 2013 for two reasons. First, GASB via Statements No. 67 and 68 changed the reporting requirements for public pension plans- in particular, the rate allowed for determining pension liabilities effective for fiscal year 2014. Limiting our sample to the year before the enactment of the accounting change makes it easier to control for changes in funding ratios year to year. Finally, the period after the financial crisis in 2007 increases the power of the tests; if governance matters for public pension funds then it is likely to matter most when there is a financial crisis.

To our knowledge there is no data base, such as those provided by Institutional Shareholder Services (ISS), that readily contains pension plan governance metrics. Thus, we create our own. Public pension plans, as tax payer funded government entities, are subject to some type of open meeting laws and most plans make their meeting minutes available on their web sites. Using the internet, we search

[5] *Public Plans Data.* 2001-2016. Center for Retirement Research at Boston College, Center for State and Local Government Excellence, and National Association of State Retirement Administrators.

these plans' web sites for meeting minutes of the full board for each plan in the CRR PPD data base for the five years between 2008 and 2012. This yields 2,784 meeting minutes for 72 plans. Because the financial data is measured on an annual basis, we create annual variables from the data collected from the monthly meeting minutes. Our final sample with observations on all the variables included in our tests consists of 209 plan-year observations; 60 plans over five years. We do not require plans to have meeting minutes for all five years. On average, plans have meeting minutes for 3.83 (median=4) of the five years over which we collect data.

The availability of minutes varies across plans for a variety of reasons. Some plans make archived meeting minutes available while other do not. Other plans do not make any meeting minutes available on their web site. The California Public Employees' Retirement System (CalPERS), for example, only provides live webcasts of meetings (see https://www.calpers.ca.gov). Other plans, such as the State of Wisconsin Investment Board (SWIB), only post meeting agendas, but no minutes (see http://www.swib.state.wi.us/board-meetings).

As our study is exploratory, we initially collect 42 data items from the meeting minutes. Some of these we discard because of inconsistent reporting, i.e., we don't have enough observations to warrant inclusion. An example of the type of item we collect but ultimately discard is the dollar amount approved for travel to educational conferences. We reduce our governance variables to seventeen; those that we both have sufficient observations and in our judgement merit inclusion in our tests. We then require plans to have data available for all seventeen governance variables as well as financial variables. This reduces our final sample to 209 plan-years.

4.1 Financial Variables

We use four variables to measure the financial performance of the fund. First, we use an annual unadjusted money weighted average return measure net of investment expenses. While the corporate governance research is focused on testing the relation between corporate governance variables and

measures of abnormal return performance, abnormal return performance may not be the correct measure of financial performance for fund governance. Unlike publicly traded stock, the beneficiaries' claims on the fund's assets are non-liquid; they can't sell their stock like shareholders and reinvest in one that earns better abnormal returns. Second the board's fiduciary duty includes both selecting the fund's asset allocation and then either the best performing fund managers or investments within those asset classes. Most funds have some type of loose statutory constraints on assets they can invest in, for example, restricting plans to invest in no more than 75% equities or prohibitions on derivatives. Otherwise the board has wide latitude in selecting both the portfolio asset allocation and the specific external managers or internal investments. Table 1 reports the funds' returns. In 2008 and 2009, the period spanning the financial crisis, they vary from -18% to about -4.5%. As markets recovered in the later part of the sample, return performance increases, ranging from 1.6 to 21%. Table 1 also reports the standard deviation of returns for each year, indicating there is considerable variation in the returns which can potentially be explained by the fund's governance practices.

Second, we measure returns excess of an asset allocated benchmark return. We collect data on asset classes available from the CRR PPD database and various benchmarks. The asset classes and their benchmarks indicated in parentheses are: - domestic equities (S&P 500 Index), international equities (MSCI EAFE Index), domestic fixed income (Barclays U.S. Aggregate Fixed Income Index), international fixed income (Citigroup World Government Bond Index ex U.S.), real estate (NAREIT Index), alternative investments (Morningstar Broad Hedge Fund Index), and cash (US 30 Day Treasury Bill). Using the plan's asset allocation and the benchmark returns we create a variable, asset allocation benchmark return, for each plan for each year in the sample. Within this broader set of asset classes, we do not have data on sub-classes, for example, small cap growth stocks, mid-cap value stocks, etc. Thus, our excess return measure will capture the extent, that the board makes finer distinctions in asset allocations which improve the fund's performance along with better selection of external managers.

Table 1 shows that funds allocate about 38 to 30% of their assets to domestic equites and that the amount allocated to domestic equities has fallen over time. The precipitous drop in the stock market during the financial crisis is likely to have caused plans to pull back on their investments in equities. About 15to 18% is allocated to international equities with no discernable pattern over time. Domestic fixed income varies between 23 to 28% and appears to decline over time. This is consistent with Buoubaker, et. al. (2017) findings that a low interest rate environment has led pension plans to rely less on fixed income. International fixed income, real estate, alternatives, and cash make up the remaining asset classes and their allocations vary from year to year. Table 1 shows that the asset allocation benchmark return varies from about -23% in 2008 right after the financial crisis to about 11% in 2012.

We also use the amount of required and paid contributions as measures of the financial stability of the fund. Specifically, we are interested in whether the fund's return performance has any impact on the size of the contributions that are required and/ or paid by the plan's sponsors to shore up the funding ratio of the fund. Typical amounts of required contributions vary from about $250 to $715 million dollars with required contributions increasing over the sample period. The contributions paid, not surprisingly, are lower than the required contributions and the gap between required and paid contributions increases over the sample period, reflecting the increasing financial pressure on plan sponsors.

We also include several control variables in our tests. First, we control for the plan's market value of assets. The size of the funds' assets is likely to impact investment opportunities available to the board. Second, we include investment expenses which typically include investment management fees, investment consultant, and custodial expenses. Better performing managers are likely to charge higher fees. Paying more for an investment consultant is likely to yield better advice and subsequently better returns. We measure investment expenses as a percentage of fund's assets. Third, we include the total number of members (both employees and retirees) as proxy for political pressure. While beneficiaries cannot "vote with their feet" by selling their claims on the market like shareholders can, they can vote out government officials when they are unhappy with how the fund is being managed. The size of the

membership may also increase the visibility of the board and impact the attractiveness of being a trustee. Finally, we include the funding ratio. Boards of plans with lower funding ratios are likely to be under greater pressure to increase the fund's returns.

Table 1 also shows the differences in the means and medians of the dependent financial variables that we use in our tests between those plans with and without data available from meeting minutes to construct our governance variables. Table 1 shows, the number pension plans with minutes data increases over the sample period. This is to be expected as not all plans archive their meeting minutes. Overall, the results show that there are no systematic differences in our financial variables between plans with and without meeting minutes that might distort our conclusions from our test results.

4.2 Pension Governance Variables

Table 2 reports the mean and median governance variables for each year in the sample that we collect from the data of boards' meeting minutes. Boards typically meet monthly or quarterly. Total meeting minutes are the total meeting minutes that are available per year per plan. As Table 2 shows these range from 10 to 11 meetings per year. These roughly correspond to a monthly board meeting; although there can be special meetings and we include these in our data collection. Many boards recess in August thus in any year the meetings are typically only 11.

Board meetings characteristically involve discussions and decisions about operations and staffing of the pension plan administrator, approvals of payment of disability benefits, hearing beneficiaries who are contesting their benefits, and review and selection of the plans' invested assets. Table 2 also reports variables as proxies for board engagement- investment related word counts, meeting minutes pages, meeting durations, and attendance. We total each of these variables per year and then average these over the number of meetings in each year to create an annual measure for each of these variables for each plan in our sample to correspond to our annual financial data.

We use total investment related word count for a measure of how much time the board devotes to reviewing the plan's investments during a meeting and/or how much return performance is disclosed to the public. Investment related word counts are the total of forms of the words "returns," "performance," "risk," "fees," "asset," "allocate," and "adjust." Since plans typically use outside investment managers we also include in our count words of the form of "alert," "watch," and "terminate" which are often used when discussing manager performance. These types of discussions often occur in the meeting minutes when the investment committee or the investment consultant is reporting to the full board or when an external manager is presenting to the full board. Table 2 shows that the number of investment related words for a meeting is typically between 10 and 20.

We record the number pages in the meeting minutes. The number of pages in the meeting minutes can influence the investment word count; a higher word count might just be a result of a longer and more detailed recording of the meeting minutes. The number of pages in meeting minutes can also reflect how professional, diligent, and engaged the board is. Or number of pages in meeting minutes can also reflect how transparent the board is or how cautious the board is in recording their deliberations. The duration of the meeting is measured using the recorded meeting start and adjournment times. Longer meetings can influence both the page and word counts. Yet, longer meetings can also measure the level of engagement of the board. The number of pages in the meeting minutes ranges between 6 and 10 and meetings typical last about 2 ½ hours.

The meeting minutes record the board members who are present and/or absent from a meeting. We measure the average percent of the board present per meeting for each year for each plan in the sample. Attendance is around 80 to 85% with attendance increasing over the sample period suggesting that the board is more engaged over time; in part, this might be in response to plans in crisis. The percentage of the board members who serve on the investment and audit committee can also reflect the degree of engagement of board members. While their can be other board committees, the investment and audit committee are most prevalent. We find that about 20% of the board serves on the investment committee and about 7.5% on the audit committee.

For many of our other board variables we use some of the well-established findings in the corporate governance literature to guide our variable selection. Yermack (1996) shows that board size can impact a firm's valuations. Thus, we investigate whether board size also influences the financial performance of the pension plan. The corporate governance literature has also shown that board composition, i.e., the division between outside or independent directors and insider or management directors also has an impact on shareholder wealth (see, for example, Byrd and Hickman, 1992). Board composition is specified by legislation or rules governing the board. We supplement the information in the minutes with other material on the plans' website as needed about the different stakeholders that trustees represent. Boards are typically made up of appointees; retirees or annuitants; employees or active members; and others. The state treasurer or some other type of government financial officer, such as State Auditor, Chief Financial Officer, State Comptroller, most of the time serve on the board. The corporate governance literature has shown that the inclusion of directors with finance backgrounds impacts shareholder value (see, for example, Fich and Shivdasani, 2007; and Burak, Malmendier, and Tate, 2008). Table 2 shows that a municipal financial officer typically represents one seat on the board.

Retirees and employees can be either elected or appointed. Analogous to corporate directors who have stock ownership which aligns their interests with shareholders, retirees and employees are both members and beneficiaries of the plan and thus have an economic interest in selecting investments that maximize the returns on plan assets. But their incentives can be different because of their different time horizons. Employees have longer horizons and thus might be more willing to take higher risks to improve return performance. Yet, eclipsing the economic incentives of either group is their understanding of return, risk, and portfolio management; this understanding is important in taking actions that achieve their economic objectives. Employees make up about a thirty percent of the board and retirees about fifteen percent.

Appointees (other than retirees and employees) are made by government officials (governor, mayor, senators, or representatives). Unlike SEC 144 and 10-K filings, most plans provide a paucity of

biographical information on these board members. Appointees represent about a third of the board seats. The "other" category includes other commissioners, state administrators, alternates, and, less frequently, citizens that are elected and is makes up about 15% of the board.

Corporate governance research has shown that board tenure can have an impact on firm performance (see, for example, Bebchuk and Cohen, 2005) so we collect data on turnover of board members and the board chair. Turnover in board members is expressed as percentage of board size and chairperson turnover within a year is also scaled by board size. Larger (smaller) boards may have a larger (smaller) pool of candidates from which to draw on board chairs. About 20% of the board seats turnover each year in the beginning of the sample increasing to about 25% towards the end of the sample period. Similarly, we find that turnover in the board chair also increases over the sample period. These measures suggest that the board is more engaged and board turnover increases either because new members are more engaged or more time is required for board members increasing attrition.

Finally, we collect data on whether the investment consultant or retirement office staff are present at the meetings. Typically, there is one staff person who attends meetings and about 30-40% of the time the investment consultant attends a meeting. We also measure whether there is a change in the investment consultant. On the one hand, continuity of an investment consultant from year to year can benefit return performance from professionals who have accumulated a better knowledge of plan assets or can provide better advise to the board via increased familiarity. On the other hand, using the same consultant year in and year out can lead to complacency. Table 2 shows that most boards did not change their investment consultant during the years in our study.

We do not collect data on board compensation. Unlike corporate directors, trustees are typically only reimbursed for expenses and paid a nominal fee for board meeting attendance, e.g., $10 per meeting.

5.0 Creating a Governance Index

Once we have identified and created our 17 governance variables we investigate which ones, if any, have an impact on the return's earned by the plans assets. We regress both the excess asset allocation return and the unadjusted return against the 17 variables along with other control variables. The results are reported in Table 3. We also include both plan and year fixed effects (the Hausman test rejects random effects). To the extent there are other institutional or legislative factors that vary across plans or across time, we control for these via fixed effects.

We identify four plan variables that vary over time for plans and include these variables separately from the fixed effects. First, many variables that change over time are related to the component of the funding ratio. Thus, we separate out the funding ratio as a time varying variable that can impact our regression results. Additionally, the funding ratio may impact the returns of the assets. On the one hand, board members might feel under increasing pressure to select investments that can achieve higher returns when the funding ratio is low. On the other hand, plans with low funding ratios might be symptomatic of poor return performance of the plan assets. Second, we separate out the total members in the plan. While the total members in the plan are related to the funding ratio, they can also proxy for political pressure on board members. Third, we control for investment expenses. Boards that spend proportionately more for the advice of investment consultants and/or spend more on investment management fees are likely to have better return performance. However, investment expense also includes the cost of hiring custodians and other professionals. If custodial related expenses constitute most of the investment expense and are irrelevant to return performance, we may find no relation between investment expense and returns. Finally, we control for size via the market value of the plan's assets. Plans with larger assets sizes might have access to better investment opportunities.

Table 3 reports the regression results with a Rogers cluster correction for the covariance matrix along with the White heteroskedasticity adjustment (see Wooldridge, 2002, and Petersen, 2009). In Model I the excess asset allocation benchmark return net of fees is the dependent variable. Model II uses

the annual return net of fees as the dependent variable. The table shows that for Model I, of the seventeen governance variables we include, only four are statistically significant. Meetings that last longer have better returns. Surprisingly as the percentage of board members who are in the investment committee increases, returns fall. This might suggest an over involvement of a board with no professional investment expertise in investment selection. As the presence of a staff member increases, returns improve. Staff might play a bigger role in investment selection than the board or the presence of staff might proxy for the overall diligence and professionalism of the board. Finally, more turnover in the board chair improves return performance; chair turnover may improve board functioning with a fresh set of eyes overseeing investments. In Model II, since the unadjusted return is the dependent variable and we include the asset allocation benchmark return as a control variable. For this regression, we find the presence of the investment consultant but not staff at the meeting, as in Model I, improves returns. An actively involved investment consultant- one who attends meetings- would likely improve returns.

Yet, there is likely to be considerable multicollinearity between our independent variables making our results difficult to interpret. We test the severity of the multicollinearity using condition indices. The condition indices are the square roots of the ratio of the largest eigenvalue to each individual eigenvalue. The largest condition index is the condition number of the scaled independent variable matrix. Belsley, Kuh, and Welsch (1980) suggest that, when this number is larger than 100, the estimates might have a fair amount of numerical error (although the statistical standard error almost always is much greater than the numerical error). We find that the highest condition index for our regression using an excess asset allocation benchmark return is 5,868.49 and for a regression using an unadjusted return is 5,991.21. Multicollinearity is a severe problem in our regressions.

Principal components analysis (PCA) is a commonly used econometric method used to address multicollinearity. PCA, a data reduction technique, seeks to explain observable phenomena with a fewer number of variables. By reducing the number of variables to their "principal components", the essential statistical properties are preserved, without the repetitive and potentially distortive effects of

multicollinearity (i.e., sign reversal or over-estimated standard errors.) We apply principle component analysis to our seventeen governance variables to create a governance index. Besides addressing the problem of multicollinearity, there are two other reasons for creating an index. First, our overriding research question is whether governance matters for the returns earned by public pension assets. An index allows us to test whether governance matters without a more detailed parsing of whether any one governance variable matters- certainly a topic worthy of future research. Second, limiting principle component analysis to the governance variables at the exclusion of the other control variables makes interpretation of our results easier. It also has the added benefit of summarizing the PCA factors into a manageable index term.

We estimate the 17 factors using an orthogonal varimax rotation, the most prevalent method, applied to standardized variables to reduce the influence of any one variable because they are measured using different units (see Jackson, 2003). Our results are shown in Table 4. To determine how many factors to retain, we use the Kaiser criteria that the eigenvalue for a given factor must be greater than one to determine the number of factors to use in creating the index. We find that seven factors have an eigenvalue greater than one. This is consistent with the Scree plot of eigenvalues versus factors dropping off rapidly for the first seven factors. Those factors account for 68% of the total variance of all seventeen variables.

We then create a standardized governance index using the seven factors. We multiply the seven factors for each of seventeen standardized variables for each plan in our sample and then sum each of these in turn weighted by the proportion of the variance explained by each factor. Finally, we standardize the index to 100. Standardization doesn't impact the statistical properties but does make the measure easier to interpret.

Table 4 reports the descriptive statistics for the governance index for each year. Most plans score poorly (below 50) and there is considerable variation in the index. The mean and median measures of the index, along with the standard deviation suggest the presence of outliers. Additionally, the Kurtosis

measure for the sample is 15.22. Because the data is hand collected, we confirm that the outliers in our sample are not caused by data errors. To reduce the influence of these outliers in our subsequent tests, we Winsorize the governance index at the 5% level. When we re-run the regressions reported in Table 3 the highest condition index falls to 316.33 using the excess benchmark asset allocation return as the dependent variable and to 331.42 for the annual return. Thus, while multicollinearity still exists, it has been substantially reduced increasing the reliability of our parameter estimates.

We further "back test" the validity of the governance index by examining the differences in the seventeen governance variables by dividing the sample by the median governance index for each year. Our results are reported in Table 5. Panel A shows that boards that meet more often and longer and have longer meeting minutes have higher governance scores, but that these measures decline over time. Attendance appears to be similar for both sub-samples and consistent over the sample period. Panel B shows no discernable difference across high and low governance plans or changes over time. This is not surprising as the board size is mandated by the legislature. We do find that better governed boards have a higher percentage of active (employees) and retired members. These board members have a vested interest in ensuring the plans earn higher returns. In contrast, plans with more appointees on the board have lower governance scores. We find no differences in a municipal financial officer's, e.g., State Treasurer, presence on the board either between high and low governance index plans or over time. We do find that better governed plans have more board members on both the investment and audit committee and that this result is consistent throughout the sample period.

Panel C shows that better governed boards have more turnover in both the board members, the board chair position and investment consultant. This suggests that turnover may improve return performance by reducing complacency in those overseeing the investments. However, Panel D shows that plans with a higher governance index have higher attendance of both the investment consultant and staff at their meetings. Finally, Panel D shows that plans with a higher governance index have higher excess

asset allocation benchmark returns. This finding holds throughout our sample period. We report the results of further tests this relation in the next section.

6.0 Relation between the Governance Index and Pension Plan Asset Returns

We regress both the excess asset allocation return and the unadjusted return against our governance index along with other control variables. The results are reported in Table 6. Once again, we include both plan and year fixed effects and correct for both heteroscedacity and clustering in our standard errors. We report the results using both the Winsorized governance index and the index without any adjustment for outliers and the regressions using either the excess asset allocation benchmark return or the unadjusted return. The results show that the governance index whether Winsorized is positive and statistically significantly related to both our return measures. Moreover, Panel A Model I shows that a 1 unit increase in the Winsorized index increases returns by almost 36 basis points. Model I and Model II also show that an increase in the size of the plan's assets increases returns. It is likely that plans with larger assets garner more interest by investment consultants and have more opportunities to solicit better investment opportunities provided by external investment managers via higher mandates. We also find that as the funding ratio increases, return performance falls. Boards of funds with higher funding ratios are likely to experience less pressure to improve return performance.

In Panel B we use unadjusted returns as the dependent variable. We find similar results to those reported in Panel A. However, we find that in Model III, investment expenses have a statistically significant and positive impact on returns. We also find in both Models III and IV, that the size of the plan's membership has a statistically significant negative relation to returns. If the size of the membership is a proxy for political pressure, it is likely that the board is skittish about investing in riskier and thus higher returning assets. The potential poor performance of riskier assets can lead to "headline risk" which board trustees may want to avoid.

The pension board's trustees only have purview over the investment of the plan's assets. However, ultimately these returns impact the size of the contribution that must be made by the plan's sponsors, i.e., the states and municipalities and their taxpayers. To see whether these returns have an impact we run a two stage least squares regression where in the first stage we estimate returns as a function of the governance index, and in the second stage the predicted returns are used to explain the contribution requirements by the plan's sponsors. Again, we use fixed effects and corrected standard errors. The results are reported in Table 7.

In Panel A, we find that the excess asset allocation benchmark return is statistically significantly positively related to the governance index. Corresponding to the results reported in Table 6, we find that investment expenses and the size of the plan's assets are statistically significantly positively related to returns and the size of the plan's membership and the funding ratio are statistically significantly negatively related to returns. In Model I we use the required contribution in the second regression and Model II we use the paid contribution. The paid contribution may be a more relevant measure of the financial burden borne by the plan sponsors. Regardless of the contribution measure we use, the predicted excess asset allocation benchmark return is statistically significantly negatively related to the returns. In Model I, a one percent increase in the predicted return decreases the required contribution by $10.3 million and in Model II the paid contribution by about $6. 5 million dollars.

As a robustness check we use the log of the contribution variables to reduce the impact of outliers. The results are shown in Panel B. Again, both Model III and Model IV show that returns are statistically significantly positively related to the governance index and negatively related to either measure- required or paid- of plan contribution. In Panel C we use the unadjusted return as the dependent variable in the first stage regression. Both Model V and Model VI show that returns are statistically significantly positively related to the governance index and negatively related to either measure- required or paid- of the plan's sponsors contribution.

7.0 Conclusion and Suggestions for Future Research

This study seeks to fill a gap in the governance literature and address a pressing public policy problem of pension funding by investigating whether the governance practices of the board of trustees that oversee the management of the plan's assets matter. We construct a unique data base from public pension plan's board meeting minutes from which we cull governance variables. To circumvent problems in multicollinearity, we use principal component analysis to create a governance index.

We find that this index is statistically significantly positively related to returns, either an excess asset allocation benchmark return or an unadjusted return measure. We also find in a two stage least squares regression that the predicted returns are statistically significantly negatively related to the amount of contribution required to be or ultimately paid by the plan's sponsors. A one unit increase in the governance index increases the excess asset allocation benchmark return by about 36 basis points, and in turn, a one percent increase in the predicted return decreases the required contribution by $10.3 million and the paid contribution by about $6. 5 million dollars.

Future research in this area can delve deeper into the implications of our findings. For example, analysis of the external manager selection process and its link to governance may prove fruitful. Further a study of this type would update the findings of Goyal and Wahal (2008). Our research also has implications for recent research on municipal bond yields and ratings. Schwert (2016) finds that default risk accounts for 74% to 84% of the average municipal bond spread and suggests that rising retirement costs is likely to increase default risks further. Aubry, Crawford, and Munnell (2017) examine both municipal bond ratings and yields relative to pension costs for different time periods. Prior to the financial crisis, 2005-2008 they find no relation but for 2009 to 2014 they find that the unfunded actuarial liability (UAAL) as a percentage of revenue increases bond spreads and report credit rating downgrades in the latter part of their sample. We propose that governance practices, and specifically, our governance index is likely to increase the explanatory power of municipal bond yields and credit ratings changes. Moreover, the new GASB rules enacted in 2014, reduces the discount rate applied to the plan's liabilities

exacerbating the funding gap which will increase the required contributions by the plans' sponsors. It is likely that governance by the board will become increasingly important to shoring up the funding of the plan, and, in turn impact municipal bond yields. Finally, it is likely that the governance practices of other government agencies might have an impact on bond yields and ratings. The corporate world along with its' regulators have long embraced the importance of governance practices in improving a firm's financial performance for shareholders and bondholders. Our study suggests that it is time for government agencies to do so as well.

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Table 1: Financial Variables Sample Characteristics of Defined Benefit Public Pension Plans from 2008 to 2012. The results show no overall systematic differences in these characteristics between plans with and without governance data. Governance data is collected from meeting minutes available on plan's web sites. Financial variables are from the Center for Retirement Research at Boston College Public Pension Plans data base. Investment returns are money weighted average net investment returns for the year. Net Market Assets is the fair market of the assets at year end. Percent of different asset classes are the fair value of net assets over fair value total market value of net assets as of year end. The asset allocated benchmark return is calculated as %domestic equities *S&P 500 Index + %international equities *MSCI EAFE Index + %domestic fixed income * Barclays U.S. Aggregate Fixed Income Index+ % international fixed income *Citigroup World Government Bond Index ex U.S.+% real estate *NAREIT Index + %alternative investments *Morningstar Broad Hedge Fund Index +% cash *US 30 Day Treasury Bill. Investment expenses includes investment advisory and custodial fees. The annual required contribution is the sum of the benefits that accrued in the current year plus the cost to pay off the plan's unfunded liability calculated according to GASB standards. The paid contribution is the actual amount paid by the plan's sponsors into the fund. The funded ratio is equal the actuarial assets divided by the actuarial liability calculated under GASB standards. Total Members = Total beneficiaries including disability retirees, spousal survivors, dependent survivors, DROP members, other members and active members. This table shows the difference in select financial characteristics between pension plans with meeting minutes and those without. Means and medians are reported. Difference in means are tested with a T-test and differences in medians are tested with a Wilcoxon rank test. Statistical significance is denoted as follows: *** at the 1% level; ** at the 5% level; and * at the 10% level. The results show no overall systematic differences in these characteristics between the two samples.

	2008		2009		2010		2011		2012	
	Plans with Governance Variables	Plans without Governance Variables	Plans with Governance Variables	Plans without Governance Variables	Plans with Governance Variables	Plans without Governance Variables	Plans with Governance Variables	Plans without Governance Variables	Plans with Governance Variables	Plans without Governance Variables
Mean One Year Return (%)	-6.25	-8.66	-13.36	-10.07	13.39	13.44	17.87	15.58	4.33	4.92
Median One Year Return (%)	-4.58	-5	-18.05	-18.05	13.47	13.54	21.1	20.4	1.635	2.2
Standard Deviation of One Year Return (%)	7.69	8.97	13.70	16.11	1.82	3.36	7.97	9.18	5.46	5.74
Mean Percentage of Total Equities	54.10	50.46 *	50.92	49.27	49.81	49.62	50.23	49.84	50.80	47.49
Median Percentage of Total Equities	55.50	54.00	52.59	52.28	51.00	52.20	53.11	52.00	53.18	49.00
Mean Percentage of Domestic Equities	37.75	37.37	35.20	35.00	32.61	34.68	32.41	34.06	34.76	32.45
MedianPercentage of Domestic Equities	38.67	38.00	35.08	35.73	34.00	34.00	32.36	33.00	34.85	30.40
Mean Percentage of International Equities	16.35	15.51	15.52	16.37	15.97	16.28	16.70	17.15	15.24	16.92
Median Percentage of International Equities	18.30	16.70	18.06	17.00	17.40	16.73	18.10	18.00	16.50	17.30
Mean Percentage of Fixed Income	27.39	27.63	27.28	27.96	27.25	27.17	25.16	24.86	25.30	23.98
Median Percentage of Total Fixed Income	25.20	27.00	26.90	28.76	26.10	27.00	24.67	23.60	24.39	24.00
Mean Percentage of Domestic Fixed Income	26.91	27.92	26.67	28.24	26.86	27.06	24.65	24.70	24.95	23.78
Median Percentage of Domestic Fixed Income	25.20	26.60	26.25	28.10	26.10	26.20	24.60	23.60	24.39	23.13
Mean Percentage of International Fixed Income	0.48	1.03	0.61	1.12 **	0.39	1.06	0.51	1.04	0.35	1.15 ***
Median Percentage of International Fixed Income	0	0	0	0	0	0 **	0	0 **	0	0 **
Mean Percentage of Real Estate	7.01	5.67	6.68	4.84 **	6.07	4.80 *	6.27	5.30	6.73	5.69
Median Percentage of Real Estate	7.24	5.57	5.97	4.875	5.60	4.60	6.52	5.60	6.71	6.11
Mean Percentage of Alternatives	9.24	8.55	11.57	9.4885	13.18	10.56	14.50	11.77	14.19	14.96
Median Percentage of Alternatives	8.50	8.00	9.70	9.085	11.20	9.30	12.30	9.30	12.50	13.70
Mean Percentage of Cash	2.05	2.10	2.91	2.56455	2.77	2.49	2.89	2.29	2.17	1.80
Median Percentage of Cash	1.30	1.20	2.55	1.35	1.80	1.66	2.10	1.40	1.63	1.20
Mean Percentage of Other Investmens	0.20	0.79 **	0.60	0.87496	0.84	1.17	0.83	1.62 *	0.85	1.51
Median Percentage of Other Investments	0	0	0	0	0.00	0.00	0.00	0	0.00	0.00
Mean Asset Allocation Benchmark Return	-23.50	-22.45**	19.51	19.15	11.09	10.91	1.20	1.15	11.25	11.04
Median Asset Allocation Benchmark Return	-23.62	-22.87	19.67	19.66	11.04	10.95	0.87	0.91	11.56	11.11
Mean Net Market Assets ('000$)	12,143,714.36	17,539,598.28	9,919,517.94	14,409,013.65	11,086,924.96	16,150,063.86 *	13,454,382.58	18,099,134.29	12,674,853.00	19,160,907.98 *
Median Net Market Assets ('000$)	7,757,630.25	6,255,207.57	7,760,275.85	5,128,332.25	8,232,523.43	5,547,281.00	9,703,496.64	6,024,488.00	9,463,138.60	6821303.54 *
Mean Required Contribution ('000$)	340,839.78	527, 152.3 *	389,709.11	554,672.60	490,640.68	585,964.39	563,836.82	649,590.80	571,575.36	715,934.51
Median Required Contribution ('000$)	251,400.00	280327 *	315,595.49	259,308.00	301,657.05	263,115.05	408,600.00	263,418.05	397,226.17	274,106.00
Mean Paid Contribution ('000$)	347,580.46	482,458.39	326,588.07	485, 546.52*	415,349.39	478,627.87	454,777.79	528,313.11	459,150.86	580,410.37
Median Paid Contribution ('000$)	236,763.00	242,314.85	300,245.94	194179.1245*	290,761.87	192,595.80	308,823.00	212,933.24	321,654.46	261,943.00
Mean Investment Expense as Percentage of Market Assets	0.34	0.37	0.39	0.36	0.41	0.36	0.40	0.35	0.37	0.35
Median Investment Expense as Percentage of Market Assets	0.34	0.32	0.33	0.33	0.37	0.33865 *	0.35	0.33	0.35	0.32
Mean Funding Ratio	0.89	0.82 **	0.82	0.76	0.77	0.74	0.75	0.73	0.73	0.71
Median Funding Ratio	0.86	0.83	0.79	0.77	0.75	0.75	0.71	0.74	0.69	0.72
Mean Total Members	104,354.93	166,315.79 **	118,412.76	166,440.18	120,093.21	172,054.43 *	136,643.27	168,867.48	135,692.57	176,471.17
Median Total Members	59,485.00	75,280.00	77,827.00	70,062.50	76,438.00	73,381.00	80,855.00	70,473 **	81,312.00	71,119.00
Number of Plans	29	131	36	126	43	119	45	117	56	105

Table 2: Descriptive Statistics for Fund Governance Variable for 209 Plan-years for 2008 to 2012. Governance data is collected from meeting minutes available on plan's web sites. The variables are measured on an annual basis using the data collected from the monthly meeting minutes. Investment related word counts are the total of forms of the word: returns, performance ,risk, fees, asset ,allocate, and adjust, alert, watch, and terminate. The duration of the meeting is measured using the recorded meeting start and adjournment times. Meeting minutes record the board members who are present and/or absent from a meeting. Active members are current employees. Appointees (other than retirees and employees) are made by government officials. The municipal financial professional can be the state treasurer or some other type of government financial officer, such as State Auditor, Chief Financial Officer, or State Comptroller. Turnover in board members and the board chair is expressed as percentage of board size. Staff is retirement office staff or other government administrator staff. Investment consultant presence at meetings or turnover is measured as an indicator variable, 1 or 0.

Panel A: Board Engagement	**2008**	**2009**	**2010**	**2011**	**2012**
Mean Total Meetings Per Plan	11.66	10.86	10.65	10.47	10.16
Median Total Meetings Per Plan	11.00	11.00	11.00	10.00	10.00
Mean Number of Investment Related Words Per Meeting	13.05	13.16	13.07	20.72	22.25
Median Number of Investment Related Words Per Meeting	8.30	8.99	9.33	9.13	11.13
Mean Number of Pages Per Meeting	8.12	7.35	8.02	9.86	9.54
Median Number of Pages Per Meeting	6.70	6.20	6.44	7.00	7.56
Mean Duration of Meetings (hours)	2.84	2.54	2.44	2.54	2.65
Median Duration of Meetings (hours)	2.63	2.58	2.58	2.39	2.33
Mean Percentage of Board Present at Meeting	80.86	81.47	82.93	82.15	83.14
Median Percentage of Board Present at Meeting	81.33	83.55	83.03	84.17	85.71
Panel B: Board Structure					
Mean Total Board Size (members)	10.72	10.81	10.72	10.78	11.34
Median Total Board Size (members)	11.00	11.00	11.00	11.00	11.50
Mean Percentage of Board who are Appointed	30.92	30.94	30.70	31.37	29.31
Median Percentage of Board who are Appointed	30.77	32.05	33.33	33.33	29.67
Mean Percentage of Board who are Active Members	28.44	27.77	29.50	30.02	33.83
Median Percentage of Board who are Active Members	28.57	28.57	30.77	30.77	36.04
Mean Percentage of Board who are Retired Members	14.35	15.21	14.04	13.77	13.41
Median Percentage of Board who are Retired Members	14.29	14.29	14.29	14.29	13.33
Mean Percentage of Board Classfiied as Other	17.18	16.25	16.24	15.86	14.14
Median Percentage of Board Classfiied as Other	14.29	6.67	13.33	7.69	3.85
Mean Percentage of Board who are Municipal Financial Professionals (e.g., State Treasurer)	8.23	9.43	9.17	8.65	9.04
Median Percentage of Board who are Municipal Financial Professionals (e.g., State Treasurer)	7.69	8.71	8.33	7.69	8.01
Mean Percentage of Board on Investment Committee	23.95	16.78	18.48	19.16	19.03
Median Percentage of Board on Investment Committee	7.69	6.67	7.69	7.69	6.46
Mean Percentage of Board on Audit Committee	10.24	10.72	10.85	12.79	15.01
Median Percentage of Board on Audit Committee	6.67	6.67	6.67	7.94	9.09
Panel C: Board Turnover					
Mean Percentage of Board Turnover	19.24779	28.77574	22.25224	23.15027	24.11959
Median Percentage of Board Turnover	1.242474	4.718168	3.910366	5.496787	4.453245
Mean Percentage Turnover in Board Chair	12.5	22.64957	16.66667	15.38462	15.38462
Median Percentage Turnover in Board Chair	0	0	0	0	0
Panel D: Professional Expertise used by the Board					
Mean Staff at Meeting as Percentage of Board Size	6.66	5.64	5.88	4.66	4.25
Median Staff at Meeting as Percentage of Board Size	0.00	0.00	0.00	0.00	0.00
Mean Consultant Present at Meeting (1 or 0)	0.33	0.40	0.35	0.41	0.42
Median Consultant Present at Meeting (1 or 0)	0.13	0.22	0.27	0.33	0.31
Mean Change in Investment Consultant (1 or 0)	0.00	0.17	0.16	0.13	0.07
Median Change in Investment Consultant (1 or 0)	0.00	0.00	0.00	0.00	0.00

Table 3: Regressions of Different Return Measures on Corporate Governance Variables. This table shows that while regressions of measures of investment returns are statistically significant and have explanatory power, few variables are statistically significant. Additionally the condition index indicates severe multicollinearity. The condition indices are the square roots of the ratio of the largest eigenvalue to each individual eigenvalue. Standard errors are corrected for heteroscedacity and clustering. Investment returns are money weighted average net investment returns for the year. The excess asset alocation benchmark return is the investment return minus the asset allocation benchmark return. Statistical significance is dnoted as follows: *** at the 1% level; ** at the 5% level; and * at the 10% level. For data sources and definitions for other variables see Tables 1 and 2.

	Dependent Variable= Excess Asset Allocation Benchmark Return in Following Year (Model I)		Dependent Variable= Return in Following Year (Model II)	
Independent Variable	**Parameter Estimate**	**P-value**	**Parameter**	**P-value**
Number of Investment Related Words Per Meeting	0.061287	0.3954	0.038934	0.4896
Number of Pages Per Meeting	-0.10917	0.7122	-0.02895	0.8991
Duration of Meetings (hours)	1.494083	0.0983 *	1.129828	0.2142
Total Board Size (members)	-0.33279	0.3484	-0.38738	0.2464
Percentage of Board Present at Meeting	0.106258	0.2003	0.077079	0.3524
Percentage of Board who are Retired Members	1.32E+14	0.6993	9.74E+13	0.7813
Percentage of Board who are Active Members	-2.64E+12	0.9691	-1.64E+13	0.715
Percentage of Board who are Appointed	-6.95E+13	0.5516	-6.94E+13	0.5425
Percentage of Board on Investment Committee	-0.11053	0.0243 **	-0.09299	0.0329 **
Percentage of Board on Audit Committee	-0.00491	0.9492	-0.05292	0.5105
Staff at Meeting as Percentage of Board Size	0.082885	0.0115 **	0.035597	0.1799
Percentage of Board who are Municipal Financial Professionals (e.g., State Treasurer)	3.44E+13	0.8735	1.10E+14	0.6243
Consultant Present at Meeting (1 or 0)	5.082231	0.1842	6.971101	0.0615 *
Total Meetings Per Year	-0.05382	0.8611	0.128757	0.6429
Percentage of Board Turnover	0.024932	0.4566	0.012151	0.7185
Percentage Turnover in Board Chair	0.176316	0.0135 **	0.148252	0.035 **
Change in Investment Consultant (1 or 0)	-1.87915	0.1969	-1.68975	0.1302
Funding Ratio	-52.564	0.0003 ***	-63.5256	<.0001 ***
Log Market Value of Assets	66.42505	0.0003 ***	69.92172	0.0001 ***
Log Total Plan Members	-3.34279	0.8193	-11.0801	0.4242
Investment Expense as Percentage of Market Assets	3.373588	0.262	1.021453	0.7334
Asset Allocation Benchmark Return	---	---	0.313311	0.0474 **
Plan Fixed Effects	yes		yes	
Year Fixed Effects	yes		yes	
F-Value of Statistical Significance of Regression	16.75	<.0001 ***	7.06	<.0001 ***
R-Square	0.9078		0.8605	
Highest Condition Index	5,868.49		5,991.21	

Table 4: Principal Component Analysis and the Governance Index for 209 plan-years for 2008 to 2012. Panel A reports the eigenvalues used to determine how many factors to include in the index. Panel B reports the descriptive statistics of the governance index over time. Seventeen variables are used in the analysis. The principal component analysis uses an orthogonal varimax rotation applied to standardized variables. The number of factors used in the index is determined by the number with eigen values greater than one. We multiply the seven factors for each of seventeen standardized variables for each plan in our sample and then sum each of these in turn weighted by the proportion of the variance explained by each factor. The index is standardized to 100. For data sources and information on the seventeen governance variables see Table 2.

Panel A: Eigenvalues and Variance Explained

Variable	Eigenvalue	Proportion of Variance Explained	Cumulative Proportion of Variance Explained
Eigenvalues above 1:			
1	2.95611159	0.1739	0.1739
2	2.05854901	0.1211	0.295
3	1.70659457	0.1004	0.3954
4	1.35897542	0.0799	0.4753
5	1.28909547	0.0758	0.5511
6	1.17146004	0.0689	0.62
7	1.02314846	0.0602	0.6802
Eigenvalues below 1:			
8	0.94360474	0.0555	0.7357
9	0.85340016	0.0502	0.7859
10	0.79143134	0.0466	0.8325
11	0.69225367	0.0407	0.8732
12	0.58227591	0.0343	0.9075
13	0.47105317	0.0277	0.9352
14	0.41164049	0.0242	0.9594
15	0.380266	0.0224	0.9818
16	0.19997193	0.0118	0.9935
17	0.11016801	0.0065	1

Table 5: Differences in Returns and Governance Variables and the Governance Index for 289 Plan-years for 2008 to 2012. This table corroborates the governance index. For construction of the governance index see Table 4. For explanation of the governance variables see Table 2.

	All Years		2008		2009		2010		2011		2012	
	Governance Index Above the Annual Media	Governance Index Below the Annual Media	Governance Index Above the Annual Media	Governance Index Below the Annual Media	Governance Index Above the Annual Media	Governance Index Below the Annual Media	Governance Index Above the Annual Media	Governance Index Below the Annual Media	Governance Index Above the Annual Media	Governance Index Below the Annual Media	Governance Index Above the Annual Media	Governance Index Below the Annual Media
Panel A: Board Engagement												
Mean Total Meetings Per Plan	12.1887	9.0777	13.1333	10.0714	12.6667	9.0556	12.3333	9.0455	12.2609	8.5909	11.2414	9
Median Total Meetings Per Plan	12	9	12	10	12	9.5	12	9.5	12	8	11	9
Mean Number of Investment Related Words Per Meeting	25.1678	8.9744	17.0745	8.7389	19.0345	7.2774	18.47	7.9074	32.2483	8.6623	32.3954	11.3514
Median Number of Investment Related Words Per Meeting	11.7461	7	10.2222	6.0852	12.9286	5.7078	10.8696	7.6731	10.5833	7.5519	14.5833	8.2
Mean Number of Pages Per Meeting	11.1326	6.2418	9.4514	6.6979	9.3868	5.3093	10.2605	5.8758	13.0572	6.5237	12.1909	6.6956
Median Number of Pages Per Meeting	7.77778	6.09091	7.16667	6.60769	7.8	4.77972	7.77778	5.54167	7.52	6.6014	8.3	6.90909
Mean Duration of Meetings (hours)	3.07022	2.09815	3.42231	2.21493	2.98778	2.08536	2.93424	1.96668	2.96429	2.10316	3.12176	2.14918
Median Duration of Meetings (hours)	3.00972	1.94792	3.04722	1.74083	3.16597	1.88702	2.96852	1.99419	2.7625	2.10009	2.92917	1.76833
Mean Percentage of Board Present at Meeting	81.9757	82.5892	81.4322	80.2404	80.9876	81.9544	82.4903	83.3409	81.6059	82.7092	82.7909	83.5201
Median Percentage of Board Present at Meeting	84.6032	83.0303	81.8182	79.3706	86.6733	81.5341	82.3077	83.8228	84.1667	84.0035	86.631	83.5165
Panel B: Board Structure												
Mean Total Board Size (members)	11.2642	10.5534	11	10.4286	11.4444	10.1667	10.6667	10.7727	11	10.5455	11.931	10.7037
Median Total Board Size (members)	11	11	11	11	11	11	11	11	11	11	12	11
Mean Percentage of Board who are Appointed	27.2992	33.883	23.3538	39.0336	27.3451	34.5249	31.258	30.1676	29.5449	33.2811	24.6638	34.3022
Median Percentage of Board who are Appointed	25	35.7143	25	46.1538	28.5714	34.5238	28.5714	33.3333	28.5714	39.2857	20	36.3636
Mean Percentage of Board who are Active Members	33.9247	26.626	33.1274	23.4114	31.0004	24.5373	31.5765	27.5258	33.4195	26.4671	38.2533	29.0818
Median Percentage of Board who are Active Members	36.9318	28.5714	37.5	23.0769	32.0513	25.8242	33.3333	27.9221	37.5	28.5714	40	30.7692
Mean Percentage of Board who are Retired Members	15.9296	12.1358	17.5254	10.9438	17.8721	12.553	16.2123	11.9717	14.3383	13.1803	14.9558	11.7583
Median Percentage of Board who are Retired Members	14.2857	13.3333	16.6667	11.2121	15.4762	13.8095	14.2857	12.2222	14.2857	13.8095	13.3333	13.3333
Mean Percentage of Board who are Municipal Financial Professionals (e.g., State Treasurer)	8.36249	9.53191	8.5871	7.8398	9.2772	9.5825	7.3602	10.9011	7.2029	10.1727	9.3241	8.7379
Median Percentage of Board who are Municipal Financial Professionals (e.g., State Treasurer)	8.33333	7.69231	8.33333	7.41758	9.09091	7.69231	8.33333	8.71212	7.69231	8.39161	8.33333	7.69231
Mean Percentage of Board on Investment Committee	32.0076	6.1001	37.6698	9.2437	29.2761	4.2894	31.5019	6.0407	31.4268	6.3319	31.6011	5.5368
Median Percentage of Board on Investment Committee	12.381	0	20.4082	7.1795	13.6364	0	12.381	0	11.1111	0	12.381	0
Mean Percentage of Board on Audit Committee	18.2879	6.0922	14.9253	5.225	15.4318	6.01	16.9951	4.9905	20.0762	5.1804	21.318	8.2374
Median Percentage of Board on Audit Committee	11.7188	0	11.1111	0	10.4257	0	11.1111	0	16.9231	0	14.2857	0
Panel C: Board Turnover												
Mean Percentage of Board Turnover	26.8914	20.3197	14.6277	24.1979	35.5754	21.9761	27.9105	16.8511	23.2708	23.0243	29.9782	17.827
Median Percentage of Board Turnover	21.4286	14.2857	11.1111	17.1429	33.3333	20	28.5714	10	18.1818	14.8352	16.6667	14.2857
Mean Percentage Turnover in Board Chair	5.23094	3.07077	1.66138	0.79365	4.88977	4.54656	6.38356	1.54959	7.64101	3.2551	4.54292	4.35693
Median Percentage Turnover in Board Chair	0	0	0	0	0	0	0	0	0	0	0	0
Mean Change in Investment Consultant (1 or 0)	0.12264	0.09709	0	0	0.11111	0.22222	0.2381	0.09091	0.17391	0.09091	0.06897	0.07407
Median Change in Investment Consultant (1 or 0)	0	0	0	0	0	0	0	0	0	0	0	0
Panel D: Professional Expertise used by the Board												
Mean Staff at Meetings Percentage of Board Size	6.84374	3.60421	9.42593	3.70296	7.58577	3.69054	8.95064	2.94951	5.49509	3.79514	4.59149	3.87335
Median taff at Meetings Percentage of Board Size	0	0	0	0	0	0	0	0	0	0	0	0
Mean Consultant Present at Meeting (1 or 0)	0.46651	0.30795	0.40998	0.25186	0.44684	0.34386	0.42042	0.27757	0.51955	0.30383	0.49926	0.3412
Median Consultant Present at Meeting (1 or 0)	0.4	0	0.25	0	0.26136	0.12143	0.4	0.04545	0.54545	0.12143	0.41667	0
Panel E: Return Performance												
Mean Excess Asset Allocation Benchmark Return	0.37866	-1.35298	-28.6276	-29.9986	6.1068	3.902	20.138	16.8558	-5.3643	-5.6668	2.0728	-1.3248
Median Excess Asset Allocation Benchmark Return	1.35273	-1.0335	-33.6106	-33.5361	4.9998	4.3858	21.4637	20.5322	-7.6095	-7.7759	0.8308	-3.4184
Number of Plans	106	103	15	14	18	18	21	22	23	22	29	27

Table 6: Test of Governance Index Variable on Fund Returns. This table shows that plans with a higher governance index earn higher returns. Investment returns are money weighted average net investment returns for the year. The excess asset alocation benchmark return is the investment return minus the asset allocation benchmark return. For contruction of the governance index see Table 4. For data sources and definitions for other variables see Tables 1 and 2. Statistical significance is denoted as follows: *** at the 1% level; ** at the 5% level; and * at the 10% level.

Panel A: Dependent Variable= Excess Asset Allocation Benchmark Return in Following Year

Model I

Variable	Parameter	P-value	
Governance Index After Winsorizing at 95%	0.359912	0.0127	**
Investment Expenses as Percentage of Market Value of Assets	2.136194	0.4642	
Log Market Value of Assets	64.48387	0.0001	***
Funding Ratio	-58.8029	<.0001	***
Log Total Membership	-10.4067	0.3323	
Plan Fixed Effects	yes		
Year Fixed Effects	yes		
R-Square	0.8984		
F - Value	18.73	P-value <.0001	

Model II

Variable	Parameter	P-value	
Governance Index	0.299702	0.001	***
Investment Expenses as Percentage of Market Value of Assets	2.60937	0.37	
Log Market Value of Assets	69.40441	<.0001	***
Funding Ratio	-54.5648	0.0001	***
Log Total Membership	-9.67845	0.3818	
Plan Fixed Effects	yes		
Year Fixed Effects	yes		
R-Square	0.8994		
F - Value	18.95	P-value <.0001	

Table 6 (cont'd)

Panel B: Dependent Variable= Annual Return in Following Year

Model III Variable	Parameter Estimate	P-value		Model IV Variable	Parameter Estimate	P-value	
Governance Index After Winsorizing at 95%	0.300798	0.0627	*	Governance Index	0.277635	0.0027	***
Investment Expenses as Percentage of Market Value of Assets	0.337004	0.0486	**	Investment Expenses as Percentage of Market Value of Assets	0.114843	0.9669	
Asset Allocation Benchmark	-0.2547	0.9265		Asset Allocation Benchmark	0.330935	0.0469	**
Log Market Value of Assets	67.50382	<.0001	***	Log Market Value of Assets	72.04852	<.0001	***
Funding Ratio	-64.5608	<.0001	***	Funding Ratio Prior Year	-60.5284	<.0001	***
Log Total Membership	-18.8381	0.0298	**	Log Total Membership	-18.3737	0.0387	**
Plan Fixed Effects	yes			Plan Fixed Effects	yes		
Year Fixed Effects	yes			Year Fixed Effects	yes		
R-Square	0.8446			R-Square	0.8469		
F - Value	8.93	P-value <.0001		F - Value	9.07	P-value <.0001	

Table 7: Governance Index and Funding of Plans. The results of a two stage non linear regression with heteroskedastic corrected standard errors are reported. This table shows that plans with a higher governance index lead to higher returns and higher returns in turn lead to a lower contribution by the plan sponsors. Investment returns are money weighted average net investment returns for the year. The excess asset alocation benchmark return is the investment return minus the asset allocation benchmark return. The annual required contribution is the sum of the benefits that accrued in the current year plus the cost to pay off the plan's unfunded liability calculated according to GASB standards. The paid contribution is the actual amount paid by the plan's sponsors into the fund. For contruction of the governance index see Table 4. For data sources and definitions for other variables see Tables 1 and 2. Statistical significance is denoted as follows: *** at the 1% level; ** at the 5% level; and * at the 10% level.

Panel A:

	Dependent Variable= Excess Asset Allocation Benchmark Return Following Year		**Dependent Variable= Required Contribution**		**Dependent Variable= Paid Contribution Following Year (Model II)**	
Independent Variable	**Parameter**	**P-value**			**Parameter**	**P-value**
Excess Asset Allocation Benchmark Return Following Year	---	---	-10306.3	0.0222 **	-6482.76	0.037 **
Governance Index After Winsorizing at 95%	0.364948	0.0221 **	---	---	---	---
Investment Expenses as Percentage of Market Value of Assets	10.82092	0.0094 ***	213751.2	0.0349 **	76532.16	0.2714
Log Market Value of Assets	38.86901	<.0001 ***	104745.2	0.7402	19252.06	0.9045
Funding Ratio	-56.2539	<.0001 ***	-1152124	0.0007 ***	-651207.00	0.0054 ***
Log Total Membership	-52.711	<.0001 ***	-1597.52	0.9945	52221.54	0.8109
Plan Fixed Effects	yes		yes		yes	
Year Fixed Effects	yes		yes		yes	
Adjusted R^2 =	0.8408			0.9513	0.9611	

Table 7 (cont'd)
Panel B:

Dependent Variable= Excess Asset Allocation Benchmark Return Following Year			**Dependent Variable= Log Required Contribution Following Year (Model III)**		**Dependent Variable= Log Paid Contribution Following Year (Model IV)**	
Independent Variable	**Parameter Estimate**	**P-value**			**Parameter Estimate**	**P-value**
Excess Asset Allocation Benchmark Return Following Year	---	---	-0.03852	0.0024 ***	-0.02055	0.002 ***
Governance Index After Winsorizing at 95%	0.359726	0.0215 **	---	---	---	---
Investment Expenses as Percentage of Market Value	9.922129	0.0157 **	0.553885	0.0476 **	0.130361	0.3367
Log Market Value of Assets	33.74015	<.0001 ***	1.539284	0.0196 **	0.911576	0.0037 ***
Funding Ratio	-48.1212	<.0001 ***	-5.22093	<.0001 ***	-1.616	0.0005 ***
Log Total Membership	-45.9304	<.0001 ***	-0.73469	0.4084	-0.00403	0.9924
Plan Fixed Effects	yes		yes		yes	
Year Fixed Effects	yes		yes		yes	
Adjusted R^2 =	0.8494		0.8779		0.9613	

Table 7 (cont'd)
Panel C:

Dependent Variable= Annual Return Following Year			**Dependent Variable= Log Required Contribution Following Year (Model V)**		**Dependent Variable= Log Paid Contribution Following Year (Model VI)**	
Independent Variable	**Parameter Estimate**	**P-value**	**Parameter Estimate**	**P-value**	**Parameter Estimate**	**P-value**
Annual Return Following Year	---	---	-0.04388	0.0027 ***	-0.02494	0.0018 ***
Governance Index After Winsorizing at 95%	0.280272	0.0573 *	---	---	---	---
Asset Allocation Benchmark Return	0.256994	0.0398 **	0.012675	0.1449	0.00406	0.3327
Investment Expenses as Percentage of Market Value of Assets	13.65831	0.0005 ***	0.732532	0.0234 **	0.249979	0.1207
Log Market Value of Assets	45.01535	<.0001 ***	1.99484	0.0124 **	1.200479	0.002 ***
Funding Ratio	-60.6433	<.0001 ***	-5.72075	<.0001 ***	-1.91083	0.0004 ***
Log Total Membership	-59.784	<.0001 ***	-1.30069	0.2189	-0.36304	0.4768
Plan Fixed Effects	yes		yes		yes	
Year Fixed Effects	yes		yes		yes	
Adjusted R^2 =	0.7652		0.8711		0.9587	