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Public Pension Governance and Asset Allocation

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Abstract

This paper analyses the relationship between governance, asset allocation, and risk among state and local government-operated pension systems in the United States of America. It is argued that governance influences investment decisions and risk profiles of public sector pension systems, creating the potential for agency problems to exist between decision makers, plan members, and taxpayers.

Keywords: Public pension governance, portfolio management, risk

JEL Classification codes: J2, H7, D7, G2

As of September 30, 2012, U.S. state and local government pension funds held assets valued at just under $3.1 trillion (Board of Governors of the Federal Reserve System, 2012). These assets are expected to fund pensions for tens of millions of Americans. However, their ability to do so has been significantly weakened by the recession beginning in 2008 which included a collapse of the U.S. equity and housing markets. These bursting bubbles caused deep reductions in the value of assets held in state and local government pension funds, revealing another pending bubble in these defined benefit (DB) public pension funds.[1] Solving the resulting funding shortfalls in state and local pension systems can be expected to dominate policy discussions for years to come. The absolute size of state and local pension funds in terms of assets and the number of members implies that even small improvements in the administration and investment performance of these programs could result in significant gains in retirement security for millions of individuals in the United States of America.

Demands on public pensions are already growing as the American 'Baby Boom' generation has begun to draw on the promises of their retirement plans. This generation is expected to draw benefits for 30 years or more, longer than any previous generation. This is of great concern for many public pension beneficiaries because they may not be eligible for Social Security benefits. This implies that the general health of public pension systems is of great importance to their post-retirement plans. This concern about the health of public pension systems is heightened by the fact that, unlike private DB pensions, public pensions are not subject to federal government oversight, nor are they insured by the Pension Benefit Guaranty Corporation.

The concerns about public pensions are a result of declining asset values, increasing pension promises, and more beneficiaries living longer in retirement. In addition, to avoid raising taxes in the past, many state and local governments have failed to fully fund their pensions since the 1980s or 1990s. Recent estimates of state pension underfunding are as high as $3.23 trillion (Novy-Marx & Rauh, 2009), with another $574 billion of estimated underfunding for municipal pension plans (Novy-Marx & Rauh, 2011c). In addition to the underfunded pensions, underfunding of health care benefits for state and local retirees is estimated to be an additional $500 billion (Clark, 2009; Clark & Morrill, 2011), placing a further strain on the ability of governments to meet their pension obligations; numbers which Brown and Wilcox (2009), Novy-Marx and Rauh (2011b), and Wilcox (2006) believe are calculated incorrectly and underestimated as a result.

The Little Hoover Commission (2011) estimated that California's 10 largest public pension plans are underfunded by a combined $240 billion. Chicago's pension systems are estimated to be underfunded by $20-40 billion while the state of Illinois's projected underfunding is estimated to be $60 billion. These figures are symptomatic of the shortfall in state and local government pension plans. Wilshire Consulting has compiled data on state retirement systems for sixteen years. In their 2011 report, the 126 retirement plans which were reviewed had an aggregate funding ratio of 69% in 2010, up from 65% in 2009 but down from 95% in 2007 (Bonafede, Foresti, & Walker, 2011) and down from 90% in 1990 (Mitchell & Smith, 1994), where the funding ratio is defined as the total assets in a plan divided by the total liabilities. Munnell (2012) finds funding ratios as low as 37.4% for the Illinois SERS and 17.4% for the Atlanta Board of Education. A funding ratio below 80% is generally believed to put the long-term viability of a pension in jeopardy (U.S. Government Accountability Office, 2008). Such low funding ratios may also harm credit ratings (McKillop & Pogue, 2009). These low funding ratios indicate there may not be sufficient funds to pay for future pension liabilities, possibly leading pension funds to take more risks in the hope of generating higher returns (Pennacchi & Rastad, 2011).

The alternatives to taking greater risks in order to raise the funding ratio are to either raise taxes, reduce benefits, or declare bankruptcy. Raising taxes is always a politically unpopular action and it can have devastating adverse economic impacts on the municipality. Despite these adverse impacts, raising taxes may be necessary (Brown, Clark, & Rauh, 2011) since Novy-Marx and Rauh (2011a) have shown very little impact from reducing benefits, and declaring bankruptcy is onerous. Bankruptcy is declared in the hope that the underfunded pension obligation will be reduced or eliminated by the courts. Nine U.S. municipal governments filed for bankruptcy in the first seven months of 2012, including three in California, raising the total number of U.S. municipal bankruptcies filed since 1980 to 52. Of the nine bankruptcies filed in 2012, seven indicated that pension obligation shortfalls are a large part of the debt which drove them to bankruptcy. The group driven by large underfunded pension obligations is diverse, including Stockton, California, the largest U.S. city ever to file for bankruptcy, and Central Falls, Rhode Island, the smallest city in the smallest state in the U.S. While bankruptcy may reduce or eliminate unfunded pension obligations, it can have a negative impact on the municipality's future economic prospects since it is an indication of higher risk, making it difficult to get credit without paying very high interest rates.

Unless investment returns increase dramatically, the pension obligation shortfalls will either lead to more bankruptcy filings or become a liability imposed on future taxpayers through higher taxes or increased borrowing (Novy-Marx & Rauh, 2011a; Rauh, 2010; Schneider & Damanpour, 2002). These potential investment returns are controlled not only by the market but also by the investment decisions made by the pension administrators. The need to understand the incentives which drive the decisions of public pension administrators has been called for in a recent long-term study of public pension plans (Public Plans Practices Task Force, 2010). Understanding these incentives may also impact public pensions around the world, since these pensions, many of them at the national level and under varying administrative structures, have also suffered during the current economic downturn. This paper begins the process of understanding these incentives by studying the impact of U.S. public pensions' administrative structure and administrators' characteristics on investment decisions.

Literature Review

Most of the previous papers analyzing the investment behavior of public pension funds in the United States of America (Albrecht & Hingorani, 2004; Useem & Mitchell, 2000) have looked at the relationship between governance structure and measures of overall pension fund performance, typically real rates of return. Useem and Mitchell (2000) looked primarily for a direct link between asset allocation and returns and found that measures of system governance have limited explanatory power and are generally insignificant in models that

control for asset allocation. Perhaps not surprisingly, they find that asset allocation is the primary determinant of fund performance. Albrecht and Hingorani (2004) expanded upon these models by looking not only at the direct effect of governance on rates of return, but also at the indirect effect, through asset allocation.

This paper builds on the work by Albrecht and Hingorani (2004) in a couple of important ways. First, this paper focuses exclusively on the link between governance, particularly board composition, and asset allocation. This focus enables the examination of the effect of this element of governance on a much larger set of asset allocation variables than have been examined in previous papers. Additionally, this paper improves on prior empirical work in this area, which has typically used cross-sectional data, by using an expanded panel dataset that includes data for 1994, 1996, 1998, and 2000.

Hypotheses

This analysis seeks to explain the variation in asset allocation among pension systems by analyzing the extent to which various governance factors influence asset allocation decisions. Based on Albrecht and Hingorani (2004), two broad types of governance variables are anticipated to be important with regard to these decisions. The first broad type is that of board membership: the degree of residual claimancy of the trustee, how they were selected to be there, and the number of trustees. These are expected to play an important role in shaping the incentives of the board members and, in turn, how the system invests its assets. The second broad type of governance variable considered is that of external (legal/regulatory) controls. The effects of these controls vary from system to system and generally either proscribe certain investment types or enforce various methods of investment oversight. In addition to the governance variables, a third group of independent variables is used to control for characteristics of the pension system and its participants. Each of these variables of interest will be explored further below.

Each dependent variable measures the percentage of total assets held in that asset class. Five broad asset classes are considered: alternate investments, total equities, total bonds, and cash and short term investments. In addition, equities are further broken out into three sub-classes, domestic equity, real estate equity, and international equity. Finally, fixed income investment is broken out into three sub-classes: international bonds, domestic bonds, and domestic government bonds. Except for domestic government bonds, data for each of these variables were collected in all four survey years. Data on domestic government bonds were collected only in the first three survey years. The variables are defined in Table 1.

Table 1
Definition of Variables

Independent variables	Dependent variables (in order from riskiest to least risky)
Board composition variables *Active* – percentage of the governing board who are active members of the pension system *Retired* – percentage of the governing board who are retired members of the pension system *Exofficio* – percentage of the governing board who are exofficio members *Appointed* – percentage of the governing board who are appointed members *Boardsize* – natural log of the total number of board members *External control variables* *Constitution* – regulated by state constitutional provisions *Evaluation* – independent performance audit is required *Prudent* – prudent person investment restriction exists *Policy* – written ethics standards and policy guidelines proscribed *List* – established list of securities permitted, or strongly incentivized, for investment *Underlying plan characteristics – control variables* *Income* – average income of currently active system members *Pctretired* – percentage of total system members who are retired *Assets* – total system assets in billions of dollars	*Alternative investments* – percentage of total assets invested in assets other than those shown below (e.g., venture capital, private equity) *Total equity* – percentage of total assets invested in equities of all kinds *International equity* – percentage of total assets invested in equities of non-U.S. companies *Real estate equity* – percentage of total assets invested in real estate-focused equity *Domestic equity* – percentage of total assets invested in equities of U.S. companies *Total bonds* – percentage of total assets invested in bonds of all kinds *International bonds* – percentage of total assets invested in bonds of non-U.S. companies *Domestic bonds* – percentage of total assets invested in bonds of U.S. companies *Government bonds* – percentage of total assets invested in bonds of governmental entities *Cash* – percentage of total assets invested in cash and short-term investments

Board Composition

Munnell, Aubry, and Quinby (2011) explored the effect on funding ratios of having employees and/or retirees on the Board. Their finding of no significant effect may be the result of opposing attitudes toward risk for employees and retirees. Abel (2001) argues that risk aversion increases with age. That argument may lead one to believe that systems with a high percentage of board members who are retired pension system members should seek to move the investments out of risky assets and into relatively safe assets, while active system members on the board should tend to want riskier portfolios (Amir, Guan, & Oswald, 2010; Lucas & Zeldes, 2009; Pennacchi & Rastad, 2011). The first hypothesis in this study, however, is that the exact opposite will occur within public pension systems; boards that are dominated by active system members should tend to move out of equity and into relatively safe domestic bonds, while boards that are dominated by retired members on the board of trustees should seek to increase investment in riskier asset classes (for example, venture capital and international equity). Thus, our first hypothesis is:

H1: The higher the percentage of board members who are active participants in the system (*Active*), the lower the percentage of assets in riskier investments.

The rationale regarding retired pension system members is as follows. Typically, members of DB plans receive an annuity upon retirement, the annual value of which is usually determined by a complicated formula that varies among systems and incorporates the employee's final average salary and years of service. This annuity either terminates or, if the employee has a surviving spouse, is diminished upon death. One effect this may have is that any investment or risk preferences based on a bequest motive will either be reduced or eliminated, effectively shortening the time horizon of plan members. While this is true of all members, the time horizons of older and retired members will likely be shortened more than those of younger, active members.

On its own, a shorter time horizon (or a larger discount rate) would not necessarily prompt retired members to prefer riskier portfolios than active members. In fact, experimental results have shown that higher degrees of risk aversion are correlated with shorter time horizons (Anderhub, Güth, Gneezy, & Sonsino, 2001), implying that, if anything, retired members should prefer safer portfolios than active members. However, this will not be the case if the elected political leaders (or their agents) who have influence over either benefits or contribution rates have short time horizons as well (Hess & Squire, 2009). A simple framework is offered to explore this hypothesis.

The Employee Retirement Income Security Act of 1974 (ERISA), which only applies in the private sector, mandates that all private pension systems be fully funded at all times. As noted above, this is not true of the public sector, where many pension systems now have funding ratios well below 100%. However, in the long run, pension assets must equal pension liabilities for public retirement systems as well. Any shortfall in investment return must be met by an increase in contribution rates, a reduction in benefit, or an increase in general taxation. A windfall in investment return must be met by a wage hike, increase in benefits, or a decrease in general taxation. If political leaders are myopic, they will have a strong incentive to postpone their reaction to investment shortfalls, as wage cuts, tax increases, and benefits reductions are politically unpopular. As an example of this phenomenon, Eaton and Nofsinger (2004) have found that poorly performing public pension systems tend to manipulate their actuarial assumptions to make their retirement programs appear to be more fiscally sound. Thus, rather than make the politically unpopular move of increasing taxes or reducing benefits, or look irresponsible for not fixing an ailing pension system, politicians would prefer to use "creative accounting" to make the pension system appear to be more solvent. Their discovery of this tactic provides some evidence that politicians wish to delay the tax increases and/or benefits reductions necessitated by under-performing pension systems. On the other hand, myopic politicians will have a strong incentive to rush to react to investment windfalls. Tax reductions, wage hikes, and/or benefits increases (such as the so-called "13th check") which take advantage of such overfunding are policies that are likely to be pursued in the short run due to their political popularity (Hess & Squire, 2009).

These incentives imply that retired system members will receive most of the benefit from a high rate of return while bearing disproportionately little risk. One can draw an analogy between this argument and a standard public finance argument of loss offsets; if the government taxes profits without loss offsets, entrepreneurs will invest in fewer risky projects than they otherwise would. If the entrepreneur loses money, they bear the full cost, but if the entrepreneur earns a profit, they only receive part of the benefit. In the context of

investment income for retired system members, losses are subsidized through intergenerational transfers, but benefits are fully realized by retired members, leading to retired members wanting to invest in more risky assets than would otherwise be the case. The resulting hypothesis is:

H2: The higher the percentage of board members who are retired participants in the system (*Retired*), the higher the percentage of assets in riskier investments.

Board size is expected to be a strong determinant of asset allocation choice as well. Larger boards will tend to hold riskier portfolios, eschewing bonds in general, particularly domestic bonds, in favor of international investments. This result would be consistent with a wide variety of different literatures across the social sciences that associate group size with risks taken and/or performance in risky activities.

The theoretical framework for this phenomenon is provided by the literature in experimental psychology on group polarization and the "risky shift." In the 1960s and 1970s, psychologists began to take notice of a fairly persistent phenomenon: Decisions made by groups tend to be significantly more risk preferring than the average risk position of the individuals within the group (see, for example, Hong, 1978). This phenomenon was termed the risky shift, and was a particular example of the general phenomenon known as group polarization. Group polarization describes a situation in which an initial attitudinal predisposition, however small or large, by the individual members of the group is somehow exacerbated following group discussion. Within the context of the risky shift, for example, a group of individuals who have varying risk preferences will, upon being placed in a situation where the group can observe their risk-related decisions (or must make a group decision), endorse a position that is near the risk preference of the individual who prefers the most risk.[2] This mechanism implies that board risk preference will be increasing in board size, but at a decreasing rate: the likelihood of the marginal board member with a random risk preference to prefer a position riskier than any other board member is higher in a small board than in a large board. The natural log of the size of the board is used to capture this effect (Schneider & Damanpour, 2002).[3] The third hypothesis to be tested is:

H3: The larger the size of the Board (*Boardsize*), the greater the percentage of assets placed in riskier investments.

The final two variables looking at board composition are the percentage of the board that is either exofficio or appointed. These two variables are included to test whether board members who hold their position by virtue of some political process have an impact on asset allocation. If trustees are pressed to make decisions with their political implications in mind, there is a greater likelihood that investment and other decisions will not be wealth maximizing. Appointees are anticipated to be more likely to make decisions in this manner, as they hold their position by the grace of some elected official, whereas exofficio members are on the board by their own virtue and face electoral constraints that restrain their ability to make non-wealth maximizing decisions (Schneider & Damanpour, 2002).

Typically, these non-wealth maximizing decisions come in the form of economically targeted investments. Economically targeted investments, or ETIs, are investments that are made based upon criteria other than the standard risk-return criterion. For example, in the early 1980s many public pension funds made large sacrifices to returns in the name of increased home-ownership by subsidizing high-risk home mortgages for low-income borrowers. The primary argument for ETIs comes from Watson (1994), who argues that, if capital markets are inefficient, there must be some worthy projects that do not get funded.

If these worthy projects can be identified, and furthermore determined to have some measurable corollary benefit to the plan participants (e.g., increased incomes or employment opportunities for plan members), then they are good candidates for targeted investing. Despite the adverse selection problem that obviously arises, making it very difficult for investors to select the worthy project from the lemons (Nofsinger, 1998),[4] ETIs are often used as justification for the *de facto* funneling of the assets of public pension funds into the state coffers to finance social investments, shore up budget deficits, encourage home-ownership by low-income households, or even engage in public works projects.[5] Previous empirical research has shown that ETIs tend to reduce risk-weighted returns (Nofsinger, 1998). The hypotheses then are:

H4: The larger the percentage of exofficio members on the Board (*Exofficio*), the lower the percentage of assets placed in riskier investments.

H5: The larger the percentage of appointed members on the Board (*Appointed*), the lower the percentage of assets placed in riskier investments.

It should be noted that the hypotheses laid out for each of the five board composition variables are fundamentally related to the riskiness of the overall portfolio held by the pension systems. While it is anticipated that a greater proportion of their portfolio will be held in riskier asset classes, doing so does not necessarily imply that their portfolio is in fact riskier. In fact it could imply less risk; if the correlation between the relatively riskier asset classes and the relatively safer asset classes is less than one, holding the riskier assets will reduce the overall risk associated with the portfolio (Stalebrink, Kriz, & Guo, 2010). The issue of overall portfolio risk will be addressed later in this paper.

Regulations

The five regulation variables can be broadly interpreted as examining the impact of the regulatory framework within which the systems operate. The five variables look at various types of regulations that are ostensibly designed to provide protections to plan participants (and by extension, taxpayers), preventing trustees from acting imprudently in carrying out their fiduciary duties. The potential result of the imposition of these regulations is to constrain the investment options available to the pension systems, causing movement away from the optimal allocation among investment choices for a desired level of risk.

While a plausible case has been made above for why board composition might have an effect on portfolio risk, such a case may not be possible for the different types of investment restrictions represented by the regulation variables. Prudent person laws, investment policy statements, and independent performance evaluations are designed for the purpose of reducing agency problems. However, the existence of agency problems would lead to these restrictions having an effect on risk-adjusted returns, not risk per se. And, while constitutional and investment list restrictions may limit the classes of assets invested in, they do not put constraints on the riskiness of the portfolio chosen. As a result, the discussion of these variables will focus on the effects on investment allocation decisions rather than risk.

Legal lists originated in England in the eighteenth century as a list of assets for which, if they earned poor or negative returns, a trustee could not be held liable. These lists typically included only government bonds. Not surprisingly, cautious trustees generally concentrated their investments in these relatively safe assets. In the early eighteenth century the legal list evolved into the prudent person rule, a new standard that freed trustees to select any portfolio that, ex ante, would be selected by a prudent investor. Often, these investment restrictions are enacted at the constitutional level; historically state constitutions have limited equity investments through means ranging from the complete prohibition of all equity investments to equity caps to banning certain types of assets. Many systems subject the investment decisions made by the board to external performance evaluators. Finally, some systems have adopted written ethical standards or policy guidelines that create a degree of transparency in investment decisions – should the board not live up to these standards or guidelines, members and beneficiaries are given recourse. Although these regulations are justifiable in terms of helping resolve the principal – agent problem that exists between trustees and plan members, they could potentially provide a means through which policy makers external to the board of trustees can influence investment decisions.

While the preceding discussion of board composition and ETIs examines the incentives of board members, political decision makers outside the board of trustees are often capable of influencing investment decisions through external political restrictions and regulations that constrain board members. State legal lists could be used to resolve the principal-agent dilemma, but it is also plausible that they could be a means by which states coerce the plans they sponsor to invest only in state approved assets. Systems subject to such legal lists are expected to exhibit a strong tendency to invest much less in international equity and hold more domestic (particularly government) bonds and other more traditional investments, such as domestic equity and cash (Stalebrink et al., 2010). The closely related prudent person restriction, on the other hand, is expected to have a negligible effect on investment decisions. The resulting hypotheses are:

H6: The existence of a legal list (*List*) will result in a lower percentage of assets being placed in particular types of investments than would otherwise be the case.

H7: The existence of the prudent person rule (*Prudent*) will result in a lower percentage of assets being placed in particular types of investments than would otherwise be the case.

Constitutional investment restrictions have become less common in recent years. Whereas many state constitutions historically have contained clauses restricting the amount of equity investment that systems are able to pursue, these caps have been increased or disappeared since the early 1990s. Using a similar specification but restricting their analysis to data from 1992, Useem and Mitchell (2000) find that the relationship between equity investment and constitutional investment restrictions was negative and significant at the 1% level. This leads to the next hypothesis:

H8: The existence of constitutional restrictions on investment options (*Constitution*) will result in a lower percentage of assets being placed in particular types of investments than would otherwise be the case.

Finally, both independent performance evaluations and the existence of written ethics standards or policy guidelines are expected to have wide ranging effects on investments if there is an agency problem stemming from asymmetric information between the trustees and plan participants, causing moral hazard. The existence of independent evaluations or policy guidelines helps limit the liability of trustees. If trustees are risk averse, they will be more likely to pursue risky investments when they feel protected from downside risk. Hence, an independent evaluation or standard is part of an optimal contract, as trustees will only pursue riskier strategies if they know the participants verify that bad years are a result of bad luck, not an imprudent investment decision. Moreover, it could also be the case that evaluations and standards are binding constraints on any opportunistic actions of the trustees and serve as a monitoring device. This leads to the hypotheses that:

H9: The existence of independent evaluations (*Evaluation*) will result in a higher percentage of assets being placed in particular types of investments than would otherwise be the case.

H10: The existence of written policy guidelines (*Policy*) will result in a higher percentage of assets being placed in particular types of investments than would otherwise be the case.

Data

All of the pension plan and pension system data come from the biennial survey administered by the Public Pension Coordinating Council (PPCC) (Zorn, 1996, 1998, 2000, 2002). The PPCC is sponsored by the National Association of State Retirement Administrators, the National Conference on Public Employee Retirement Systems, and the National Council on Teacher Retirement. Each of these groups is interested in improving government sponsored pension programs in the United States of America, and the data from the survey are collected and synthesized into a report that outlines broad trends in public pensions and gives general summary statistics. Between 1995 and 2001, the survey was administered in odd years, requesting system-level and plan-level data for the prior year. For example, the 1995 survey reports data from 1994, and was published in 1996.

The survey underwent some revisions between each of the four collection years. Between 1995 and 1999, the survey was modified slightly, but none of the variables examined in this paper were affected. The 2001 survey, however, was shortened substantially and many questions were omitted. Two of the governance variables and one of the dependent variables that had been included in the 1995, 1997, and 1999 surveys were dropped in 2001. The availability of each variable is discussed below.

While the PPCC took great care to attempt to get high quality data, there are nevertheless some missing observations in the data. Some systems did not complete the survey in all four collection years, and others

did not fully complete every question in the questionnaires. Observations for which variables of interest were missing are omitted, and estimates of the system are done with an unbalanced panel. In addition, the pension systems holding all assets in cash were eliminated. These adjustments yield between 570 and 573 observations, including data from 246 systems, for the primary regressions, and between 450 and 453 observations, including data from 237 systems, for the estimations that omit the 2001 survey data.

Despite undergoing constant revision, the survey remained consistent in its overall structure during the period examined. The survey was broken into three sections: system, DB plan, and defined contribution (DC) plan. The survey instructions defined a pension system as an organization charged with the responsibility of administering one or more pension plans. A pension plan is the actual program by which employees are provided either annuities or a lump sum payment upon retirement on the basis of any contributions made during their working years. Many systems administered more than one plan during this time period, and a few systems administered both DB and DC plans simultaneously. For example, while the Public Employees' Retirement System of Mississippi administered only one DB plan, the Minnesota State Retirement System administered six DB plans, and the State Universities Retirement System of Illinois administered two plans, one DB and one DC. As has been the custom within this literature, only systems that administer DB plans exclusively are considered. This is an inherent weakness in the literature, since DC trustees are able to exert considerable control over the assets held by the pension system.[6]

The system level surveys include most of the questions on governance and investment performance. The plan level surveys take a more detailed look at each individual plan, including membership, funding ratios, and benefit formulas.

Table 2 examines the distribution of asset allocations among ten asset classes by presenting the means and standard deviations. Also presented are the means and standard deviations for the board composition, external control, and underlying plan characteristics variables.

Table 2
Summary Statistics of Variables

Dependent Variables	Mean	Standard Deviation
Alternative Investments	1.20	3.04
Total Equity	54.89	16.16
*International Equity**	8.19	7.01
*Real Estate Equity**	2.24	3.26
*Domestic Equity**	44.29	13.15
Total Bonds	38.72	15.01
International Bonds	2.28	4.13
Domestic Bonds	36.15	15.59
*Government Bonds***	12.24	17.90
Cash	3.83	4.82
Independent Variables	**Mean**	**Standard Deviation**
*Active***	52.33	23.73
*Retired***	10.05	11.22
Appointed	43.84	30.08
Exofficio	16.35	19.91
Boardsize	8.11	1.46
Constitution	0.18	0.39
Evaluation	0.88	0.33
List	0.25	0.43
Policy	0.97	0.17
Prudent	0.90	0.31
Income	33 919.00	26 091.00
Pctretired	20.99	18.09
Assets	5.97	12.63
N	573	

Note. (a) * For *Real Estate Equity*, *Domestic Equity*, and *International Equity*, $n = 143$ in 1994, $n = 155$ in 1998, so $n = 570$ total. ** In 2000, survey did not include questions about domestic government bonds, active or retired board membership. $N = 453$ for these variables. (b) Means of the dependent variables may not add to 100 due to the omission of some investments which were only in very small quantities, such as mortgage backed securities.

Methodology

The variables described in Tables 1 and 2 are used to examine the relationship between governance factors and asset allocation. The models are estimated with a two-sided-Tobit specification because the dependent variables, the proportion of system assets allocated to specific asset classes, are naturally bounded by 0 and 100. Each model is estimated with system-level random effects and yearly fixed effects. Yearly fixed effects are included in each model because there is a clear trend of pension systems reallocating system assets from fixed income to equity investments over this time period. There are a number of reasons why this trend may emerge. For example, pension systems may have been attempting to take advantage of the bull market during the late 1990s, or they may not have been active in rebalancing their portfolios during this time. Including the yearly fixed effects allows the estimation of the effect of governance on asset allocation independent of these potential temporal trends. System-level random effects are chosen in favor of fixed effects because many of the governance variables are relatively time invariant within each system.[7]

As stated above, the scope of the survey was reduced in the last survey. Data on active/retired board members and government bond holdings was not collected for 2001. As a result, two sets of models are estimated and reported. The first set of models are the primary regressions, which use data from all four survey years. The second set of models estimate the same equations, but limit the dataset to including data from just the 1995, 1997, and 1999 surveys. This enables testing of the effect of active and retired board members as well as the effect of all the governance variables on government bonds.

The general form of the regressions is:

$$allocation\ class_{i,j,t} = \beta X_{i,t} + v_t + \mu_i + \varepsilon_{i,j,t}. \quad (1)$$

In Equation 1, the dependent variables are each of the specific asset allocation class variables discussed in the previous section and $j = 1, 2,...,10$ for the 10 different asset classes. The measures of pension governance and the control variables for system i at time t are contained in the matrix $X_{i,t}$. The term μ_i is a pension system specific error term. The year fixed effect is v_t and the error term is $\varepsilon_{i,j,t}$.

Governance and Investment Allocation Results

The results from the regressions are reported in Tables 3 through 6. The empirical results generally support most of the hypotheses laid out above.

Table 3
Broad Asset Classes-Large Sample

	Alternate Investments	Total Equity	Total Bonds	Cash
Appointed (-)	0.088 (0.044)	-3.684 (-1.115)	-0.076 (-0.025)	-0.653 (-0.545)
Exofficio (-)	-2.640 (-0.937)	-0.757 (-0.166)	7.824 (0.459)	-2.605 (-1.512)
Boardsize (+)	2.790* (1.882)	7.795*** (3.242)	-7.599*** (-3.368)	0.938 (1.081)
Constitution (-)	-0.159 (-0.113)	-1.611 (-0.828)	-0.199 (-0.120)	1.113 (1.553)
Evaluation (+)	0.972 (0.634)	9.494*** (4.534)	-3.986** (-2.337)	-0.212 (-0.274)
List (-)	-1.565 (-1.204)	-5.979*** (-3.214)	4.758*** (3.041)	0.552 (0.793)
Policy (+)	-5.246** (-2.305)	8.489* (1.927)	2.489 (0.666)	-0.789 (-0.487)

Prudent (-)	-1.485 (-0.880)	4.518* (1.897)	-0.220 (-0.110)	-0.235 (-0.261)
Income	0.005 (0.443)	0.018 (1.027)	-0.029** (-2.061)	0.009 (1.300)
Pctretired	-3.878 (-1.270)	3.133 (0.774)	0.340 (0.104)	-3.703** (-2.202)
Assets	0.082** (2.394)	0.104 (1.587)	-0.120** (-2.111)	-0.002 (-0.075)
Intercept	-5.818 (-1.303)	14.194* (1.906)	61.468*** (9.314)	5.385** (1.967)
N	573	573	573	573

Note. (a) The sign next to the independent variables is the expected direction of the relationship with riskier investments. (b) z-statistics reported under coefficients *** - 0.01; ** - 0.05; * - 0.10. (c) This table uses data from 1994-2000. (d) The results are from random effects Tobit estimation.

Table 4
Narrow Asset Classes-Large Sample

	International Equity	Real Estate Equity	Domestic Equity	International Bonds	Domestic Bonds
Appointed (-)	-3.445* (-1.787)	-1.088 (-0.728)	-1.424 (-0.479)	-2.445 (-1.231)	1.041 (0.337)
Exofficio (-)	-2.861 (-1.079)	0.796 (0.368)	0.516 (0.127)	0.334 (0.116)	0.771 (0.186)
Boardsize (+)	5.168*** (3.647)	1.612 (1.484)	4.302** (1.995)	3.172** (2.229)	-10.461*** (-4.551)
Constitution (-)	-0.046 (-0.039)	-1.342 (-1.606)	-1.002 (-0.577)	-1.036 (-0.764)	-0.171 (-0.099)
Evaluation (+)	5.679*** (4.110)	0.119 (0.120)	5.969*** (3.250)	4.761*** (2.846)	-6.033*** (-3.357)
List (-)	-4.775*** (-4.223)	-2.027** (-2.466)	-1.760 (-1.062)	-1.602 (-1.259)	4.817*** (2.941)
Policy (+)	-1.786 (-0.677)	2.606 (1.193)	7.826* (1.943)	0.118 (0.036)	2.751 (0.706)
Prudent (-)	2.352 (1.625)	-0.217 (-0.204)	2.279 (1.074)	3.365* (1.930)	-1.813 (-0.866)
Income	0.003 (0.301)	0.006 (0.953)	0.003 (0.176)	-0.011 (-0.845)	-0.022 (-1.481)
Pctretired	-0.498 (-0.197)	1.191 (0.605)	4.529 (1.272)	0.458 (0.137)	0.462 (0.133)
Assets	0.072** (1.973)	0.040 (1.499)	0.012 (0.211)	0.020 (0.506)	-0.062 (-1.041)
Intercept	-11.258** (-2.532)	-6.644* (-1.827)	17.725*** (2.614)	-13.664*** (-2.690)	66.525*** (9.806)
N	570	570	570	573	573

Note. (a) The sign next to the independent variables is the expected direction of the relationship with riskier investments. (b) z-statistics reported under coefficients *** - 0.01; ** - 0.05; * - 0.10. (c) This table uses data from 1994-2000. (d) The results are from random effects Tobit estimation.

Table 5
Broad Asset Classes-Small Sample

	Alternate Investments	Total Equity	Total Bonds	Cash
Active (-)	0.845 (0.373)	0.115 (0.029)	3.504 (0.972)	-0.947 (-0.658)
Retired (+)	9.168** (2.413)	3.951 (0.533)	-1.671 (-0.257)	-1.677 (-0.623)
Appointed (-)	2.070 (1.052)	-3.202 (-0.848)	-1.897 (-0.544)	-0.719 (-0.532)
Exofficio (-)	1.858 (0.618)	-2.380 (-0.438)	0.492 (0.097)	-3.446* (-1.732)
Boardsize (+)	2.270* (1.690)	8.998*** (3.551)	-9.991*** (-4.087)	0.957 (1.044)
Constitution (-)	-0.041 (-0.033)	-2.309 (-1.070)	0.702 (0.384)	1.420* (1.857)
Evaluation (+)	0.036 (0.025)	12.782*** (5.242)	-4.322** (-2.154)	-0.399 (-0.464)
List (-)	-1.224 (-0.947)	-6.542*** (-2.958)	5.000** (2.597)	0.644 (0.806)
Policy (+)	-6.561*** (-2.984)	12.319** (2.484)	0.530 (0.122)	-1.019 (-0.581)
Prudent (-)	-0.398 (-0.241)	4.779* (1.718)	-0.156 (-0.066)	0.287 (0.286)
Income	-5.604* (-1.742)	4.898 (0.996)	-0.154 (-0.040)	-4.903** (-2.580)
Pctretired	-0.001 (-0.035)	0.042 (1.359)	-0.036 (-1.618)	0.013 (1.066)
Assets	0.067* (1.942)	0.091 (1.193)	-0.076 (-1.130)	-0.013 (-0.480)
Intercept	-4.940 (-1.046)	3.629 (0.417)	68.041*** (8.591)	6.372** (2.027)
N	453	453	453	453

Note. (a) The sign next to the independent variables is the expected direction of the relationship with riskier investments. (b) z-statistics reported under coefficients *** - 0.01; ** - 0.05; * - 0.10. (c) This table uses data from 1994-1998. (d) The results are from random effects Tobit estimation.

Table 6
Narrow Asset Classes-Small Sample

	International Equity	Real Estate Equity	Domestic Equity	International Bonds	Domestic Bonds	Government Bonds
Active (-)	0.927	1.760	-0.095	-2.875	5.861	-6.034
	(0.412)	(1.012)	(-0.026)	(-1.096)	(1.564)	(-0.750)
Retired (+)	14.377***	4.942	-6.447	3.916	-4.251	3.964
	(3.532)	(1.610)	(-0.967)	(0.797)	(-0.629)	(0.264)
Appointed (-)	-3.178	-0.866	-1.257	-3.476	-0.803	-12.984*
	(-1.506)	(-0.547)	(-0.364)	(-1.451)	(-0.223)	(-1.764)
Exofficio (-)	-3.052	0.254	-1.646	1.676	0.220	-12.098
	(-0.995)	(0.110)	(-0.329)	(0.491)	(0.042)	(-1.109)
Boardsize (+)	4.718***	1.478	5.572**	3.450**	-12.377***	-8.492
	(3.337)	(1.358)	(2.388)	(2.230)	(-4.936)	(-1.587)
Constitution (-)	0.140	-0.863	-2.489	-1.274	1.005	3.392
	(0.114)	(-0.971)	(-1.276)	(-0.859)	(0.525)	(0.797)
Evaluation (+)	7.703***	0.885	7.137***	4.461**	-5.735***	-1.681
	(4.662)	(0.780)	(3.272)	(2.381)	(-2.711)	(-0.376)
List (-)	-6.178***	-1.536	-1.543	-1.543	4.720**	14.181***
	(-4.797)	(-1.616)	(-0.767)	(-1.051)	(2.359)	(3.359)
Policy (+)	-0.736	2.637	12.437***	0.133	0.498	-12.386
	(-0.252)	(1.235)	(2.673)	(0.038)	(0.110)	(-1.277)
Prudent (-)	1.736	0.450	2.381	3.926**	-1.501	6.254
	(1.074)	(0.376)	(0.953)	(1.977)	(-0.611)	(1.263)
Income	-1.959	1.867	6.272	2.514	-0.833	6.870
	(-0.678)	(0.870)	(1.471)	(0.646)	(-0.206)	(0.782)
Pctretired	0.026	0.013	0.004	-0.025	-0.021	0.027
	(1.124)	(1.211)	(0.158)	(-0.938)	(-0.862)	(0.546)
Assets	0.063	0.066**	0.008	0.013	-0.026	-0.187
	(1.582)	(2.295)	(0.109)	(0.276)	(-0.375)	(-1.072)
Intercept	-14.392***	-9.413**	10.139	-13.364**	70.489***	37.841**
	(-2.764)	(-2.370)	(1.248)	(-2.273)	(8.616)	(2.186)
N	450	450	450	453	453	453

Note. (a) The sign next to the independent variables is the expected direction of the relationship with riskier investments. (b) z-statistics reported under coefficients *** - 0.01; ** - 0.05; * - 0.10. (c) This table uses data from 1994-1998. (d) The results are from random effects Tobit estimation.

In this section, the signs on the coefficients for *Boardsize*, *Constitution*, *Evaluation*, *List* and *Prudent* are as expected for the broad asset classes in both samples. *Policy* and *Appointed* do not have the anticipated signs for the broad asset classes in either sample. *Exofficio* has the anticipated signs for the broad asset classes in the large sample but not in the small sample. *Retired* has the anticipated signs, but *Active* does not.

For the broad asset classes, a larger board appears to result in a shift of investments out of bonds and into equity, as anticipated. Interestingly, the size of the shift is approximately equal, as indicated by the approximate equality of the absolute values of the coefficients for total equity and total bonds, in both Tables 3 and 5. A larger board results in higher investments in riskier domestic and international equity and bonds, and lower investments in safer government bonds. These phenomena seem to be indicative of the taking on of riskier portfolios.

Independent performance evaluations have a very large effect on investment decisions. Systems subject to independent performance evaluations have a strong tendency to have much larger equity holdings, both in domestic and international equity, and smaller bond holdings. A greater portion of their bonds are held in international bonds rather than domestic bonds. This was also anticipated in this study, since such an evaluation may reduce the liability exposure of the board.

The existence of a legal list appears to reduce investments in equity and increase investments in bonds. The analysis of the narrower asset classes indicate a legal list reduces investments in riskier international and real estate equity and increase investments in safer domestic and government bonds. The effect in the case of government bonds is very strong. This was anticipated since a legal list often only permits more conservative investments.

Contrary to expectations, the existence of written ethics standards or policy guidelines reduced investments in riskier alternative investments. Written investment policies have a weak effect on asset allocation, with their presence hinting at a likely increase in equity holdings, especially domestic equities. Since investments in equities increased, this may indicate the anticipated effect of a reduction in trustee liability was limited.

Board composition with respect to appointees/exofficio membership has little significant effect.[8] Relative to boards dominated by active system members, boards that are dominated by retired members on the board of trustees seek to increase investment in riskier alternative investments and international equity.[9]

Governance and Risk

Much of the foregoing analysis has argued that the effects of pension system governance on investment strategies may be indicative of governance having a systematic effect on the riskiness of pension asset holdings. It is not necessarily the case, however, that systems with greater investments in relatively risky asset classes also bear more risk (Stalebrink et al., 2010). For example, while international securities on their own may be riskier than domestic securities, diversification of one's portfolio through the purchase of international securities would have the effect of reducing the risk in the portfolio, not increasing it since international equity markets are segmented from U.S. equity markets (Johnson & Soenen, 2009). Therefore, a more detailed analysis is necessary.

Most studies of public pension governance use investment returns or funding as dependent variables. However, if the goal is to "achieve the most desirable risk-return combination" (Sharpe, 2002, p. 74), then such studies omit a critical part of the decision making by public pension governing bodies. The governing bodies may be more conscious of this issue, as evidenced by the use of portfolio budgets, which assess the amount of risk and where it is to be allocated to control portfolio risk.

In the previous part of this study, the effect of governance characteristics on choice of investments was analyzed. However, as shown by Stalebrink et al. (2010), the risk level of a portfolio can differ from the risk characteristics of the investments within that portfolio. Sharpe (2002) pointed out that the riskiness of a portfolio is not simply the sum of the risks of the component investments. Brown and Wilcox (2009) and Wilcox (2006) assert that the commonly accepted method of valuing a public pension fund's liabilities encourage excessive risk-taking because discount rates are tied to expected rates of return. By taking on riskier portfolios with higher rates of return, a pension fund can reduce its liabilities and justify reduced government contributions. Therefore, an understanding of the effect of governance characteristics on risk-taking is incomplete without the study of portfolio risk in addition to the riskiness of asset classes. In this section, the question of the effect of governance on portfolio risk is addressed directly.

The hypotheses as to how the board composition variables might affect risk-taking among asset classes were laid out above. The rationales underlying the hypotheses for classes of investments are applicable to portfolio risk as well. Retired system members are anticipated to want riskier portfolios than active members, as the politicized nature of these pension systems could lead to intergenerational risk transfers. Larger boards are expected to hold riskier portfolios than smaller boards due to the psychological phenomenon of group polarization. Finally, if ETI activity is present, one predicts appointed membership to be associated with higher levels of risk relative to exofficio membership and elected membership. It should be noted that the regulation variables are omitted from this analysis because they do not limit the riskiness of investments in pension plans, given the wide range of investments and risk profiles available. Rather, they constrain the investment options available and, in turn, reduce the investment returns to the affected pension system (Useem & Mitchell, 2000).

As acknowledged above, pension systems may use riskier asset classes to diversify their portfolio. Using riskier asset classes as diversification tools makes their use as indicators of portfolio risk problematic. To address this problem, the portfolio risk of each system is estimated using two methods, the market model (Sharpe, 1963, 1964) and asset class factor modeling, or style analysis (Sharpe, 1992).

Financial models examining risk are typically estimated using long data series. The PPCC survey did not collect monthly data, and is limited to yearly data between 1990 and 2000 inclusive. Estimating financial models using only eleven observations is difficult at best. However, these measures are being estimated only to be used as dependent variables, so any errors-in-variables problems associated with their imprecision will simply inflate the standard errors of the second stage regressions. Therefore, while the models explaining risk will be estimated with high error, as long as the measures of risk are estimated without bias, the estimated coefficients of the second stage regressions will be unbiased as well.

The market model states that there is a linear relationship between risk and return which can be written as:

$$(R_i - R_f) = \alpha + \beta(R_m - R_f) + \varepsilon_i. \tag{2}$$

In this model, the rate of return on portfolio *i* is given by R_i, R_f is the risk free rate of return, and R_m is the market rate of return. The estimated beta measures portfolio risk, alpha measures the extent to which the portfolio outperformed (or underperformed) the market, and the error term is often associated with luck. Betas for each of the pension systems reporting 11 years of rate of return data are estimated using ordinary least squares, with the return on the Wilshire 5000 as the market rate of return and the 30-day Treasury Bill rate as the risk free rate of return. The first measure of portfolio risk, based on the market model, is labelled Estimated Beta and used as the first measure of risk in Equation 6.

A style analysis model (Sharpe, 1992) generally takes the form of:

$$R_i = \beta_1 F_1 + \beta_2 F_2 + \cdots + \beta_n F_n + \varepsilon_i, \tag{3}$$

where R_i denotes the return on asset *i* and F_j denotes the value of the j^{th} factor. In this specification, each factor is the rate of return on a specific asset class. This method of analysis differs from a simple factor model in that it adds the following constraints:

$$\sum_{j=1}^{n} \beta_{i,j} = 1, \tag{4}$$

$$0 \le \beta_{i,j} \le 1, \quad \forall j. \tag{5}$$

Because of data limitations, the number of factors is restricted to only two asset classes, the Wilshire 5000 and the Lehman Brothers Aggregate Bond index. The estimated coefficients on the Wilshire 5000 rate of return are labelled Estimated Style and serve as the second measure of portfolio risk in Equation 6.

Data

Of the 237 systems used in the first part of this study, only 67 systems reported rates of return for each year between 1990 and 2000. Both risk estimates are computed for each of these 67 systems in the PPCC dataset. The same data is used for governance data and controls as in the earlier section. However, because the risk estimates do not vary within each system, a dataset of means is created by averaging the governance data over the available collection years. Finally, systems which did not respond to all of the governance questions are dropped from the data, leaving 58 observations for the analysis.

Methodology

The effect of board composition on risk is estimated by running regressions of the form:

$$risk_i = \beta X_i + \varepsilon_i, \tag{6}$$

where $risk_i$ is the portfolio risk measure identified above as either Estimated Beta from Equation 2 or Estimated Style from Equation 3, and X_i includes both the board composition variables and the same three control variables from before. Because the ordinary least squares (OLS) estimates display heteroskedasticity, the equations are estimated using both weighted least squares (WLS) and multiplicative heteroskedastic models. The WLS and multiplicative heteroskedastic regression (M-HR) results are reported in Table 7.

Table 7
Risk and Board Composition

	WLS		M-HR	
	Estimated Beta	Estimated Style	Estimated Beta	Estimated Style
Active (-)	-0.029 (-0.390)	-0.016 (-0.200)	-0.050 (-0.830)	-0.064 (-1.130)
Retired (+)	0.267* (1.680)	0.273 (1.580)	0.175 (1.250)	0.162 (1.200)
Appointed (-)	0.048 (0.710)	0.034 (0.470)	0.023 (0.440)	-0.007 (-0.120)
Exofficio (-)	-0.201** (-2.330)	-0.213* (-1.880)	-0.221*** (-3.190)	-0.277*** (-3.880)
Boardsize (+)	0.083* (1.790)	0.076 (1.440)	0.083** (2.150)	0.080* (1.960)
Income	0.001 (1.000)	0.001 (1.380)	0.001 (0.910)	0.001 (1.510)
Pctretired	-0.310 (-1.370)	-0.323 (-1.410)	-0.356* (-1.820)	-0.505** (-2.480)
Assets	-0.001 (-0.840)	-0.001 (-1.190)	-0.001 (-1.080)	-0.001** (-2.040)
Intercept	0.328** (2.460)	0.262* (1.790)	0.378*** (3.332)	0.372*** (3.270)
Active = Retired	3.250* (0.080)	2.450 (0.120)	2.730* (0.100)	3.320* (0.070)
N	58	58	58	58

Note. (a) The sign next to the independent variables is the expected direction of the relationship with riskier investments. (b) *** - 0.01; ** - 0.05; * - 0.10. (c) Data is averaged over the four collection years. (d) Columns 1 and 2 use WLS regression and report t-statistics. Columns 3 and 4 use maximum likelihood estimates of multiplicative heteroskedastic regression (M-HR) and report z-statistics. (e) The *Active = Retired* test uses F-statistics.

Governance and Risk Results

Overall the results are reasonably strong, especially considering that the dependent variables are likely to have been measured with error. The results for both measures of risk are comparable, strengthening the findings discussed below. For the most part, the results are in line with the hypotheses laid out above.

All of the coefficients for *Active*, *Retired*, *Exofficio*, and *Boardsize* in this section have the expected signs. Three of the four signs for *Appointed* are in the opposite direction from what was anticipated. This may be an indication that political implications are less important influences on decision making for appointees than expected.

The coefficients for *Retired* are only significant at the 10% level in one of the estimations which signifies that retired members do not tend to behave differently from non-system members on the board. The more relevant comparison is between retired and active board members, and the last row in the table shows the result of an *F*-test of the equality of the two coefficients. In all four specifications the *Retired* coefficient is considerably higher than the *Active* coefficient, and this difference is significant at the 10% level in three of the four specifications. The magnitude of these estimates imply that, relative to a board composed entirely of active system members, a board composed entirely of retired system members would be expected to hold a riskier portfolio, with a beta 0.2 to 0.3 higher.

The results also provide evidence that board size is positively correlated with portfolio risk. Intuitively, these coefficients imply a doubling of board size is correlated with a 0.08 increase in beta. The results are statistically significant at the 10% level in two of the specifications and at the 5% level in one other.

An interesting result is the effect of exofficio membership on risk. The negative signs on the coefficients for *Exofficio* indicate that exofficio members desire less risky portfolios than board members elected by system participants. The expectation of less risky portfolios is consistent with the estimated coefficients, all of which are significant. In addition, exofficio members are predicted to have less incentive to engage in ETIs than appointed members, which would lead to less risky portfolios. An *F*-test (not reported) of the equality of the *Exofficio* and *Appointed* variables is rejected at the 5% level in each regression.

Conclusions

The governance and performance of public pensions is becoming one of the more salient issues in American public policy. This paper makes two contributions to the literature on the governance of public pension systems. First, it qualifies prior assertions in the literature that asset allocation is the primary determinant of investment returns. Governance has at least an indirect effect on investment performance by affecting these asset allocation decisions. Second, evidence has been presented showing that pension board composition, in addition to influencing asset allocation, also may have an effect on portfolio risk. In addition, this paper highlights many potentially fruitful avenues for further research by postulating multiple hypotheses to explain why governance has the effect it does. Moreover, the results have a number of public policy implications that system participants and government sponsors alike can exploit to change the incentives of trustees, including deficiencies in the pension system, such as 13th checks, and reasons for the current underfunded status of many public pension systems.

The issues discussed in this paper and the public policy implications are not exclusive to the United States of America. While our research focuses on the pensions provided in the United States of America at the state and local levels, we believe the applicability of the lessons is not limited to the United States of America pensions. For example, Impavido (2002) surveyed public pension systems from multiple nations and found widespread governance issues ranging from the institutionalization of ETIs to heavy-handed portfolio restrictions. Ammann and Zingg (2010) find governance issues in Swiss pension funds effecting investment performance. Clare, Nitzsche, and Cuthbertson (2010) question the ability of active fund managers to solve the underfunding problems of UK pensions, despite their claims of high future returns. This paper has continued this discussion of public pension governance by focusing on a number of issues raised in the international arena by these authors.

These findings are limited by the generalizability of the findings. The dataset used has a response bias toward large funds (Schneider & Damanpour, 2002) which would be expected to diversify investments better than small funds (Guillén, 2008). In addition, the dataset includes information on investment options in aggregated form. It is possible that a finer breakdown may give greater specificity to the effects which were tested. Further limits are imposed by the time period tested, which was one of economic growth, and the pension systems tested, which were limited to defined benefit plans. Testing data from a period of economic decline or comparisons with DC plans may lead to different findings. The methodology used in this study could be used to better understand fund management in these alternate time periods or plan structures.

Endnotes

[1] While public pensions can be either DB or DC, this paper focuses only on DB which is the predominant form for state and local governments. Public pensions, for purposes of this paper, are defined as those issued by state and local governments, excluding those sponsored by the federal government.

[2] It is of note that some experiments in this literature found the opposite conclusion – a "cautious shift" could result (Weller & Wenger, 2009). Despite their seemingly contradictory nature, psychologists think of both the risky shift and the cautious shift as examples of group polarization. Which one will occur is thought to be culturally dependent. For example, Hong (1978) argues that while American culture tends to exalt risk-taking behavior, Confucian cultural beliefs are such that cautiousness is applauded. Experimentally, he finds that individually, Taiwan Chinese and Americans are significantly different, with statistically significant risky-shifting by Americans and cautious-shifting by Taiwan Chinese.

[3] While the present paper does not attempt to examine actual pension performance relative to the market, research implies that larger boards may in fact perform worse than smaller boards. Cox and Hayne (2006) examine performance in a winner's curse experiment among both individuals and groups, finding that groups perform less rationally than individuals; within the context of a common value auction, this implies that groups take on substantially more risk than individuals. Moreover, Yermack's (1996) analysis of the relationship between board size and market valuation in large U.S. corporations shows that board size is negatively correlated with Tobin's Q.

[4] Nofsinger (1998) argues that, even with inefficient capital markets, it is unlikely that fund managers can identify these opportunities because of the lemons problem. It is not evident whether a potential investment project is one that should have gone unfunded or not, and given that capital markets are considered to be very efficient, there will only be a few "good" projects that receive too little investment. This implies that fund managers attempting to make ETIs must choose from a set that includes a large number of bad projects and a small number of good projects.

[5] It is unlikely that the approach taken in this paper would be able to identify any significant ETI activity. ETIs may be accomplished by targeting specific assets within an asset class rather than by favoring one asset class over another. For example, rather than investing in private equity funds based on their expected returns, a system could target its investments by buying disproportionately more funds based in the local and state jurisdictions of their sponsors, resulting in underdiversification and the possibility of lower returns within this asset class (Lerner, Schoar, & Wongsunwai, 2007).

[6] Participants in DC systems are not typically given free rein over the investment of their individual balances, but rather are given a menu of investment styles from which to choose, and trustees are able to determine what assets constitute the items on the menu. Since they are often nonprofessional investors, participants, and possibly trustees, may tend toward risk-free investments, especially following recent losses (Rengifo & Trifan, 2010)

[7] The robustness of these specifications is checked by estimating the models with pooled OLS and feasible generalized least squares (FGLS) as well. The pooled OLS specification includes yearly fixed effects and system level clustering of standard errors; the FGLS estimation includes yearly fixed effects and system-level random effects. Hausman (1978) tests confirm the choice of random effects over fixed effects. The results are not reported but are generally consistent across specifications.

[8] Estimates are relative to the percentage of the governing board elected by system members, which is omitted to prevent collinearity.

[9] Estimates are relative to the percentage of the governing board made up of nonmembers, which is omitted to prevent collinearity.

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We would like to thank Mark Crain, John Crockett, Stephen Miller, Christis Tombazos, and Gordon Tullock for their comments on previous versions. We would also like to thank Summer Atkinson for her assistance.