OUTRAGED BY COMPENSATION: IMPLICATIONS FOR PUBLIC PENSION PERFORMANCE

ALEXANDER DYCK*
University of Toronto, Rotman School of Management

PAULO MARTINS MANOEL
University of California, Berkeley

ADAIR MORSE
University of California, Berkeley & NBER

Abstract

We model public pension funds that contract with investment managers and the resulting portfolio allocation and performance. Frictions in optimal contracting emerge from board members' sensitivity to employee and public outrage over high compensation. In global data covering $5.4 trillion in assets, we estimate a system of compensation and returns equations. Relaxing outrage constraints by one standard deviation results in $81,000-$179,000 more compensation, and $13-32 million of incremental value-add annually for an average public pension fund (15-35 bps excess performance in alternatives and 8-18 bps in public equities). Outrage is orthogonal to distortions from underfunding and political payoffs to local investment.

Keywords: Public pension funds, pension governance, underfunding, pension board of directors, trustees, fund management, bureaucracy, politicization, asset allocation, compensation
JEL codes: G11, G23, G30

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1. Introduction

In 2018, global public pensions and sovereign funds held $21.5 trillion in assets according to the Official Monetary and Financial Institutions Forum. However large that sum seems, it is insufficient; Scarfstein (2018) documents that the average OECD public pension is on the hook to replace 44% of the population's lifetime average pre-retirement income, but holds just 6.8% of GDP in assets.[1] In such an environment, the importance of the financial performance of public pension assets cannot be understated. Yet, growing evidence suggests that politicization causes distortions in public pensions' investment decisions, thereby lowering performance. The literature points to two primary sources of these distortions – politicians' private-benefit extraction and political pressure stemming from plan underfunding.[2] This paper explores a new and complementary source for political distortions.

We study the possibility that pension workers and beneficiaries can be prone to outrage over the compensation of investment managers. This outrage threat causes trustees to hire lower-skilled managers and offer less-than-optimal incentive contracts, leading to performance implications. Outrage can emerge in a public sector setting because the trustees either are selected by public sector employees or politicians or are themselves politicians. As a result, trustees have career concerns sensitive to information emerging in the public domain. What becomes more troubling is that outrage may increase with local income inequality, particularly the difference in the pay of investment managers relative to local workers. Thus, the friction at the heart of this paper sheds light on an additional loss that *main street* communities face from inequality.

To illustrate outrage constraints in public pension funds, consider the dilemma of the Oregon State Treasurer in his service as the chair of the state pension fund. *The Oregonian* newspaper reports: "Unspoken, but also politically inconvenient is the compensation to attract talent from the private sector. The state's existing investment officers are some of the best paid public employees, making an average of $200,000 a year. But Treasury officials quietly

[1] By contrast, private pension systems are on the hook for just 17% of lifetime average pre-retirement income, have coffers with capital amounting to 58.6% of GDP.

[2] Hochberg and Rauh (2013) and Bradley, Pantzalisa and Yuan (2016), present evidence of pension fund overinvestment in local assets, leading to lower returns. Adonov, Hochberg and Rauh (2017) document that politicians on pension fund boards leads to weaker performance in private equities. Theoretical and empirical understanding of the importance of underfunding, and resulting risking-up pressures, for public pensions is found in Rauh (2009), Novy-Marx and Rauh, (2011), Ang, Chen and Sundaresan (2012), Addoum, van Binsbergen and Brandt (2015) and Adonov, Bauer and Cremers (2017).

complain that staff is underpaid by industry standards, and bristle about having to explain and get approval from the Legislature to release performance-based pay each year." As Treasurer Read pleads: "If we have the talent, we will be able to make the decisions better." Attempts by Treasurer Reed to hire better-paid investment professionals were rebuffed, with concerns about compensation exceeding members' wages and public pay scales – i.e., outrage.[3] Appendix Table 1 provides a sampling of other anecdotes of how similar tensions arise across many different types and many different geographies of pension funds.

To identify the importance of this human capital channel for public pension fund performance, we first introduce an agency model of portfolio choice. Public pension trustees must hire and compensate an investment manager, who constructs the portfolio over three assets – a mean-variance efficient risky asset, a political risky asset that is non-frontier in returns, and fixed income. Boards choose the skill level (ability to capture the risk premium) of the investment manager. Boards then set the manager's compensation contract to induce the desired skill level and incentivize the optimal risk-taking in the portfolio.

The model incorporates the three agency frictions that arise from political influence on the composition of the board of trustees. First, we introduce an 'outrage pay constraint' on skill that binds for some public pension funds. If a pension fund is in a low reference wage area or has trustees from occupations that are sensitive to wage comparisons (teachers, municipal workers, etc.), the trustees hire managers below a skill threshold to avoid compensation breaching outrage. We also incorporate the previously-documented effects of private benefit extraction and risking-up pressures of unfunded liabilities. Private benefit incentives emerge from political motives (local economy-building and direct vote-chasing) to tilt investments locally, as documented by Bradley, Pantzalis and Yuan (2016), Bernstein, Lerner, and Schoar (2013), Hochberg and Rauh (2013), Brown, Pollet, and Weisbenner (2015), and Dyck and Morse (2011). In addition, private-benefit-taking can emerge from pay-to-play schemes generating campaign contributions or direct side payments (Adonov, Hochberg and Rauh (2017)). Underfunding affects the risk preferences of boards (Adonov, Bauer and Cremers (2017)), as modelled in swinging-for-the-fences or gambling-for- resurrection models of Ang, Chen, and Sundaresan (2012) and Addoum, Van Binsbergen and Brandt (2015).

[3] "Treasurer looks to reorganize investment division into quasi-public entity," Ed Sickinger, Jan 16, 2013

The model produces comparative statics relating board agency to outcomes in investment manager skill and asset allocation decisions, with implications for portfolio risk and performance. Of particular interest are the predictions arising from introducing an outrage pay constraint. If outrage binds, the public pension fund hires lower skill managers. Because managers lack skill to capture the risk premium, they choose to tilt the portfolio towards fixed income and away from risky assets. The fund then has lower returns within risky asset classes and lower portfolio returns.

To test the theoretical predictions we use a global sample of large public pension funds that account for $5.4 trillion in assets at the end of our sample period. We explore the choices of large public pension funds as these funds typically include investments in alternatives where skill has a significant impact on returns given the underlying high volatility, and also because these funds are more likely to have available data. The final data set includes 176 public pension funds from five regions – the U.S., Canada, Oceania, Scandinavia and the U.K., and Continental Europe for 1995-2014. The average (median) fund has $45 ($14) billion in AUM.

We hand collect data for each fund on compensation. In addition we hand collect biographical information on the professions of trustees. We use this information to capture variation across funds in their exposure to outrage constraints. For example, some funds impose expertise requirements and preclude politicians from serving on the board, while others do neither. A global sample of public pension funds provides heterogeneity in fund exposure to political agency costs and differences in compensation to test the importance of the human capital channel.

Our empirical methodology mimics our theoretical setting by setting up a system of two equations whereby compensation is determined by outrage, politicization, underfunding, along with fund characteristics such as size and time. Performance is then determined by outrage-predicted compensation along with other board, fund and time characteristics. With a structurally-motivated, linear system of two equations we can draw causal interpretations under exogeneity conditions - that the outrage determinants do not affect within-asset class performance except through the mechanism of managerial contracting.

The outrage determinants are the income of local citizens and working beneficiaries, and the percentages of municipal workers, teachers and public sector finance administrators on a board. Many board members are sensitive to industry wages, as they are elected or appointed by industry members and work in the industry themselves. So, for example, if trustees are municipal workers or teachers, both of which receive relatively low wages compared to finance salaries, they are

predicted to be prone to outrage. A substantial fraction of board members have experience in public financial administration (auditors, revenue commissioners, etc.), which we predict makes them sensitive to concerns about salary levels of public officials. Finally, we predict all board members are sensitive to compensation in their local community. Consistent with these predictions, we find that a one standard deviation increase in the percent of trustees who are municipal workers or whose background is in public sector financial administration results in $126,000 to $179,000 lower investment manager compensation, and a one standard deviation decrease in the income of local citizens results in $81,000 lower investment manager compensation.

We then test for a relationship between outrage-predicted compensation and performance. We find that an increase in compensation resulting from relaxing the outrage constraint raises returns. An advantage of the quantitative analysis is that it provides a simple estimate of the costs and benefits of outrage. A one standard deviation higher income of local citizens, or a one standard deviation lower participation of municipal workers or local public finances administrators, results in higher excess returns in alternatives (15-35 basis points per year) and in public equities (8-18 basis points per year). For a plan with an average allocation to alternatives, our estimates suggest that if that fund were to relax outrage it would benefit by producing additional annual benefits of $13 to $32 million in annual value-add. The projected benefit from relaxing outrage is even greater for plans with an above average allocation to alternatives, which is more common with underfunded plans. We document that these results are not driven by realizing excess risk. In fact, the tracking error of these less outrage-bound managers is lower.

Finally, consistent with the prior literature, we find that distortions arising from politicians' payoffs to local investment and distortions arising from underfunding also impact asset allocation and returns. Importantly, including them in the model and in our regressions does not eliminate the importance of the human capital channel. Consistent with Adonov, Bauer and Cremers (2017) we find that underfunding leads to increased asset allocation to alternatives. Consistent with Adonov, Hochberg and Rauh (2017) and Hochberg and Rauh (2013) we find that politicization has a direct effect on returns in alternatives asset classes, lowering returns in alternatives by 60 bps per year. We interpret our results as complementing these papers, showing an important and neglected human capital channel whereby politics can also undermine returns.

The rest of the paper is organized as follows. In section 2 we fix ideas by introducing a theoretical model of portfolio choice with political agency costs and management contracting.

Section 3 lays out our empirical methodology, and section 4 describes our data. In section 5 we present our empirical results, and we conclude in section 6.

2. Model of Portfolio Choice with Political Agency Costs

Imagine a setup in which beneficiaries of a pension fund would optimally invest in a mean-variance efficient portfolio over a risky asset and fixed income. The board of trustees for this pension fund achieves this objective by making management contracting choices to maximize beneficiaries' utility subject to manager participation and incentives. In our setting, because the pensions are *public pension fund*s, the trustees are affected by being in the political domain. Although trustees have a fiduciary duty to act in the best interests of their beneficiaries, political private costs and benefits from their funds' choices create incentives to deviate from a strict interpretation of this duty. We call the resulting distortions *political agency costs*.

Our model and empirical analysis consider three political agency costs. The first emerges from outrage, the inability of politicized boards to optimally pay for investment manager skill because of political costs emerging from workers, retirees, and other voters in the community. The second emerges from politicized boards' preference for investing in political assets. Political assets are defined as investments which generate private benefits to a political board member, either in the form of local-tilted assets (which generate positive media attention, reputation, and ultimately votes and legacies) or in the form of pay-to-play allocations (which involve kickbacks from asset managers to politicians or political campaigns in return for asset allocations). The third political agency cost emerges from the pressure of liabilities that can induce public pension fund boards to risk-up portfolios to meet funding needs (e.g., to pay pensioners) rather than to have to face disclosure of shortfalls.

The focus of our model is on how these political agency costs affect allocations and performance, working through the mechanism of hiring and compensating an investment manager.

2.1. Assets and Investment Manager Heterogeneity

A public pension fund board hires and sets a linear compensation contract for an investment manager to allocate the pension's capital among assets. Managers are risk averse and are assumed to have the same risk aversion as the beneficiaries of the pension fund, λ. Managers are

heterogeneous in one dimension, their skill in the selection of assets within each asset class (or in the selection of asset manager for delegation within each asset class), represented by the parameter *s*. Skill levels are transparent, and their supply is perfectly competitive. A manager of type *s* has an outside option $O(s)$, where $O(\cdot)$ is an increasing function such that skilled managers have higher outside options.

The manager chooses portfolio weights among three assets: fixed income, a mean-variance efficient risky security (MV security) and a political asset. Fixed income pays a riskless return r_f:

$$Fixed\ Income: E[R_f] = r_f.$$

The MV security has variance σ_{MV}^2 and risk premium φ_{MV}:

$$MV\ security: E[R_{MV}] = r_f + s\varphi_{MV}.$$

The political asset is also risky, but has variance σ_P^2 and risk premium φ_P.

$$Political\ Asset: E[R_P] = r_f + s\varphi_P\ .$$

We assume that $\varphi_P/\sigma_P < \varphi_{MV}/\sigma_{MV}$, such that the MV security dominates the political asset in Sharpe ratio terms.

In both risky securities, managers earn a fraction *s* of the potential risk premium, in proportion to their skill. Only managers with maximal skill (i.e., $s = 1$) can capture the full risk premium with their asset selections. This assumption is empirically motivated; while some investment managers in public pension funds have significant financial experience from working previously in a finance position in a public pension fund or the private sector, others prior experience is limited to a managerial or civil servant role with no asset management responsibilities.

Differences in *s* can also be interpreted as delegation costs. If managers delegate portfolio management (or a fraction thereof) to external institutions, they incur intermediation fees, reducing the effective fraction of the risk premium earned by the fund. The skill variable *s* captures both the managers' skill and the ability to economize on intermediation costs, such as internally managing assets.

Managers form portfolios by selecting the weights on MV-efficient securities, political assets, and fixed income as $\mathrm{w_{MV}}$, $\mathrm{w_P}$, and $(1 - \mathrm{w_{MV}} - \mathrm{w_P})$, respectively.[4] For tractability, we

[4] A pension fund not affected by agency problems would invest in a combination of the MV security and fixed income.

assume that the MV security and political assets have a joint normal distribution with correlation ρ, which is large enough to prevent hedging between asset classes.[5]

2.2. Utility & Political Agency Costs

Under the assumption of mean-variance preferences, the utility of beneficiaries, and that of the board if no political agency costs are at work, is given by:

$$U_{board}^{no\ agency} = U_{beneficiaries} = E[R - manager\ pay] - \frac{1}{2}\lambda Var[R - manager\ pay], \qquad (1)$$

where ***R*** is the total return of the portfolio; *manager pay* is the compensation paid to an investment manager; and $\boldsymbol{\lambda}$ is the risk aversion of beneficiaries. We introduce three political agency costs that cause the board's utility to deviate from that of the beneficiaries.

Outrage Pay Constraints

First, trustees in public pension funds are in a political domain, and this leads them to consider potential political costs arising from their choices. Such costs arise for trustees if beneficiaries or others in the community become outraged by the compensation of investment managers. In practice, these private costs usually take the form of negative media attention and the resulting negative reputation consequences. If the board were to set compensation sufficiently high such that outrage occurred, it would have to bear some utility cost:

$$U_{board} = E[R - manager\ pay] - \frac{1}{2}\lambda Var[R - manager\ pay] - outrage\ cost. \qquad (2)$$

If trustees' utility consequences of outrage are large they would want to preclude the possibility of outrage altogether. The easiest way for trustees to ensure that compensation, which is stochastic, does not go over the outrage threshold is to hire lower quality managers. To model this intuition, we assume that each fund has a threshold on skill, $s^{outrage}$. Thus the board's utility reverts to equation (1), but with a constraint:

$$U_{board} = E[R - manager\ pay] - \frac{1}{2}\lambda Var[R - manager\ pay]$$

$$subject\ to:$$

$$(outrage\ constraint):\ s \leq s^{outrage}. \qquad (3)$$

[5] Hochberg and Rauh (2012) find no evidence of such hedging. See the appendix for the explicit restriction on ϱ that prevents the portfolio manager from taking short positions in any asset class.

For some funds, the threshold is large and never binding. This is more likely if the reference wage level of beneficiaries or others in the community is sufficiently high.

Private Benefits from Politicized Investing

Second, allocation choices can create private benefits for political trustees. These private benefits include votes from investing locally and creating employment opportunities for local citizens, or side-payments (e.g. in the form of campaign contributions or direct payouts) from pay-to-play arrangements.[6] We incorporate the political agency cost from private benefits from politicized investing in our model by assuming that the board receives a riskless, private benefit worth κ dollars for each dollar invested in political assets:

$$U_{Board} = E[R - manager\ pay] - \frac{1}{2}\lambda Var[R - manager\ pay] + \kappa w_P. \quad (4)$$

Liability-Driven Preference for Risk

Finally, effective board risk aversion, λ_B, can be affected by liability obligations of the pension fund. Ang, Chen, and Sundaresan (2012) model the tensions pensions face due to the constant need to fund payments to retirees. Their main inference is that when funding is low, pension boards have a lower effective risk aversion; i.e., a desire to "swing for the fences." The friction often at work is that boards having to go back to legislatures to request funds to cover a down year of returns face a personal reputational cost. The resulting risk-taking behavior is similar to gambling for resurrection ideas of van Binsbergen and Brandt (2015). Such increased risk taking in the presence of underfunded liabilities has been found in US public pension funds, for example, by Adonov, Bauer and Cremers (2017).

We assume that underfunded status results in a higher risk appetite:

$$\lambda_B = \frac{\lambda}{\theta}. \quad (5)$$

where θ is an exogenous politically-determined variable that captures the risking-up pressure. The final utility formulation for the board, incorporating all political agency issues, is thus given by:

$$U_{Board} = E[R - manager\ pay] - \frac{1}{2}\lambda_B Var[R - pay] + \kappa w_P.$$

[6] Andonov, Hochberg and Rauh (2017) find that U.S. pension funds with political boards tend to invest in local and less profitable private equity funds, Dyck and Morse (2011) and Bernstein, Lerner and Schoar (2013) show a similar pattern in the investments of sovereign wealth funds. Bradley, Pantzalisa and Yuan (2016)) show not only a local bias but a bias to invest in politically-connected firms.

$$subject\ to: \tag{6}$$

$(outrage\ constraint)$: $s \leq s^{outrage}$ if reference wages are low.

2.3. Solving for the Optimal Contract and Manger Skill

We solve the model by considering post-hiring portfolio choice, assuming that a manager with skill *s* already is hired. The board asserts its preferences for risk and for political investments by offering a compensation contract to the investment manager to induce preferred portfolio choice. For any skill *s*, we derive the optimal contract. Next, we calculate the optimal manager skill *s* chosen by the board, from which we can figure out the resulting asset allocation.

We restrict our model to linear contracts. The manager receives a cash salary *c*, independent of her performance. In addition, the board gives a share $1-a$ of the realized financial return to the manager to induce risk-taking. The board also asserts its political preferences by giving the manager an additional transfer of b dollars for each dollar invested in political assets. Linear compensation is given by:

$$manager\ pay\big(R, w_p | c, a, b\big) = c + (1-a)R + bw_p \tag{7}$$

Like the beneficiaries, we assume that the investment manager has CARA utility with risk aversion λ. Thus, the manager chooses risk and political asset weight $\big(w_{mv}, w_p\big)$ solving the following program:

$$\max_{w_{mv}, w_P} U_M = \max_{w_{mv}, w_P} \Big\{E[manager\ pay] - \tfrac{1}{2}\lambda Var[manager\ pay]\Big\} \tag{8}$$

The board maximizes the expected monetary payoff penalized by the variance, with penalizing factor $\lambda_B = \lambda/\theta$, which depends on the risking-up pressure θ. The optimization problem is restricted by: (i) the manager's incentive constraint and (ii) the manager's participation constraint, which obligates the board to offer a contract that generates an expected utility for the manager not smaller than her outside option $O(s)$.

The participation constraint is the channel connecting political asset investing to manager contracting. Because political assets are dominated in performance relative to the MV security, boards realize less utility from the skill of managers. Thus, the higher the political benefits κ are, the less willing is the board to pay compensation for skill.

The underlying program, which defines the optimal contract and the indirect utility $V_B(s)$ of the board when hiring the manager with skill *s*, is given by:

$$
\begin{aligned}
V_B(s) \equiv \max_{c,a,T} U_B &= E[R - manager\ pay] - \frac{1}{2}\lambda_B Var[R - manager\ pay] + \kappa w_P \\
&= (\kappa - b)w_P + aE[R] - c - \frac{1}{2}\lambda_B a^2 Var[R] \\
&\textit{subject to:} \\
\textit{(participation constraint)} \quad & c + (1-a)E[R] + bw_P - \frac{1}{2}\lambda_M (1-a)^2 Var[R] \geq O(s) \\
\textit{(incentive constraint)} \quad & \{w_{mv}, w_P\} = \underset{w_{mv}, w_P}{\operatorname{argmax}} \{U_M | c, a, b\}.
\end{aligned}
\tag{9}
$$

In the appendix, we show that the optimal contract is given by:

$$
\begin{aligned}
a^* &= \frac{\lambda}{\lambda + \lambda_B} \\
b^* &= (1 - a^*)\kappa.
\end{aligned}
\tag{10}
$$

The optimal payment factor a^* reflects the standard sharing rule in which the less risk averse agent receives a larger component of the risky outcome. In the optimal contract, the manager receives the same fraction $1 - a^*$ of the financial return R and of the political return κ. The resulting base salary c^* is the number that makes the participation constraint binding.

Finally, the board will choose the manager skill that satisfies the outrage constraint (if local reference wages are low) and maximizes their ex-ante utility:

$$
\max_s V_B(s), \ \text{s.t.}\ s \leq s^{outrage}. \tag{11}
$$

If the outrage constraint is not binding, then marginal disturbances around the optimal s^* are such that the marginal increase on the squared Share ratio is equal to the marginal cost of hiring a slightly better manager.[7] If outrage is binding, the public pension fund will hire a lower skilled manager, foregoing opportunities for increase in the portfolio Sharpe ratio.

2.4 Comparative Statics

The solution to (11) sets up comparative statics illustrating how funds differ in their performance-cost tradeoffs when choosing manager skill. For instance, boards facing high private benefits κ from political investing as well as boards facing an outrage constraint on compensation both prefer to hire managers with lower skill compared to the optimal manager for the beneficiaries. On the other hand, boards facing a personal cost from not having sufficient returns to cover pension

[7] In the appendix we show that this leads to the following first order condition on the marginal payment to managers: $O'(s^*) = \frac{(\sigma_P^2 \varphi_{MV}^2 - 2\rho\sigma_P\sigma_{MV}\varphi_{MV}\varphi_P + \sigma_{MV}^2\varphi_P^2)s^* + (\sigma_{MV}^2\varphi_P - \rho\sigma_P\sigma_{MV}\varphi_{MV})\kappa}{\lambda\sigma_P^2\sigma_{MV}^2(1-\rho^2)}$

liabilities might optimally choose a higher-skilled manager to benefit from risking-up the portfolio. Table 1 reports these comparative statics, focusing not just on how the agency issues affect manager contracting of skill, but to how ultimately these frictions translate into portfolio choice effects -- allocations and performance.

Panel A isolates the effect the outrage constraint being binding or not has on performance and allocations. The mechanical consequence of a binding outrage constraint is that the board of an outrage-prone pension fund hires a less skilled manager ($\Delta s < 0$). The lower skilled manager realizes lower risky asset returns per unit of risk ($\Delta R_{MV} < 0$, $\Delta R_P < 0$)); thus the board optimally sets a contract to induce more portfolio weight on fixed income ($1 - \Delta w_{mv} - \Delta w_P > 0$). There is no point in paying compensation for extra risk not rewarded with a capture of extra risk premium. The combination of more investment in fixed income and weaker managerial skill adds up (on both counts) to a portfolio with poorer overall expected performance ($\Delta R < 0$).

Panel B looks at the partial derivatives with respect to changes in the other political agency issues. Boards with greater benefits from investments in political assets ($\partial\kappa$) hire less skilled managers, since the expected return payoff from skill is lower in the portfolio tilted toward the political asset. Lower skill leads to smaller within-asset-class expected returns ($\Delta R_{mv} < 0, \Delta R_P < 0$) and less investment in the MV security ($\Delta w_{mv} < 0$). In addition, these boards design contracts to incentivize greater investment in the political asset ($\Delta w_P > 0$), which further reduces overall performance ($\Delta R < 0$).

By contrast, boards with higher liability-driven risk-up pressure (larger θ) hire more skilled managers to take more advantage of the risky asset classes ($\Delta s > 0$, $\Delta w_{mv} + \Delta w_P > 0$), hence increasing within-asset class and overall performance ($\Delta R_{mv} > 0, \Delta R > 0$). The extra risk that these boards induce may be rewarded with realization of expected capture of the risk premium, but the extra risk is above the utility preferences of the beneficiaries. As stakeholders and taxpayers, beneficiaries may find themselves bailing out pension liabilities from taxes when bad returns realizations occur.

Although we do not explicitly include the cross partials in Table 1, one final piece of intuition is worth highlighting. When public pension funds have high liability pressures, the effect of an outrage constraint is very damaging. Public boards that incentivize a poorly-skilled investment manager to take on more risk end up with a more risky portfolio that underperforms in the risky asset classes.

3. Empirical Methodology

We use a two-equation, linear sytem of equations to estimate how agency affects public pension fund outcomes working through the compensation contract mechanism. We set up our system to focus on the mechanism of outrage, because we can make plausible exogeneity arguments and because the novelty of our paper vis-à-vis the prior literature is in the introduction of outrage.

We choose the linear system approach, rather than a structural model approach, for three reasons. First, our dataset of compensation observations is limited in sample size, making inference from more complex non-linear moment optimization problematic. Second, the point of the model is to motivate comparative statics by combining agency with portfolio choice rather than to provide an exact parameter calibration of relationships. Third, because our model is one of outrage working through the mechanism of compensation contracts to distortions in performance, outrage only affects outcomes through the management contract. This restriction lends itself to a structural two-stage least squares (2SLS) specification, where we can make linear exogeneity assumptions as if we were in the familiar instrument setting.

Our linear system of equations, with subscripts *i* and *t* respectively refering to the public pension fund and year, is as follows:

System Equation I:

$$Log(Manager\ Compensation)_{it} = Outrage_{it}\Phi_1 + \phi_2 Underfunding_{i,t-1} + \phi_3 PoliticalChair_i + X_{it}^{covariates}\,\Gamma^{eq\ I} + \varepsilon_{it}^{eq\ I}$$

System Equation II:

$$Performance_{it} = Log(\widehat{Manager\ Compensation}_{it}) + \beta_2 Underfunding_{i,t-1} + \beta_3 PoliticalChair_i + X_{it}^{covariates}\,\Gamma^{eq\ II} + \varepsilon_{it}^{eq\ II}$$

The equations are naturally dynamic in events; the manager contracting happens first, followed by the realization of returns. In System Equation I, the *Outrage* variables include (i) trustee occupation variables and (ii) reference wage variables. System Equation I also includes the covariates from System Equation II (the log of lagged public pension fund size and year fixed effects) and the two other political agency variables, *Political Chair* and *Underfunding*. System Equation II takes the outrage-predicted compensation as predetermined, included alongside *Politicial Chair* and *Underfunding*, as well as controls of lagged fund size and year fixed effects. We estimate this system using 2SLS and cluster standard errors at the fund level.

We are interested in interpreting outrage working through the mechanism of compensation on performance. The exogeneity condition for a causal interpretation is that outrage variables are exogeneous to performance conditional on compensation. We contend that this condition is plausible because the outrage vaiables, described in the data section, either reflect board composition percentages or local income levels that should be unrelated to investment performance.

We do not make the same exogeneity assumption when we consider *Political Chair* and *Underfunding*. A policitized chairperson might steer investment choices for political private benefits through pay-to-play arrangements or local favoritism. Likewise, underfunding may not only impact compensation, but also could directly impact portfolio choice by triggering active intervention of the board. Thus, we set up the system so that we can use *Outrage*, but not the other agency variables, as predetermined causes of some variation in compensation that can later potential explain performance.

4. Data

4.1. Public pension funds Sample

Our sample is from the union of two sets of public pension funds. We source U.S. public pension funds from the Center for Retirement Research (CRR) dataset at Boston College. Globally, we collect all public pension funds with over $10 billion in assets identified in *Pensions & Investments* in 2011. Because of the need to manually search for trustees and managers compensation and personal characteristics, we limited the sample to funds in North America, Oceania, and Europe. Table 2 defines all variables and their sources. When expressed in monetary units, all data are converted to 2010 U.S. dollars.

Table 3 reports statistics about funds in our sample. In total, we have 176 funds and 1,688 fund-year observations. The average public pension fund is large, having $45 billion in assets, with a median of $14 billion. Fifty-nine percent of the funds are from the United States, with the other 41% divided equally among Canada, Continental Europe, Scandinavia and the UK, and Oceania. As shown in Panel B, we have reasonable geographical variation in the distribution of funds for most years. As of the last year in the sample, the public pension funds in our sample cover $5.4 trillion in assets.

4.2. Allocations and Performance Data

. In terms of portfolio choice variables, we collect each fund's asset allocations, performance and the fraction of assets managed via delegation over 1995-2011 from a combination of sources: annual reports, funds' current and cached websites, direct requests to the funds, the Boston College CRR dataset and CEM Benchmarking. We analyze performance in three primary asset classes: (i) alternatives (hedge funds, private equity and real estate), (ii) public equities, and (iii) fixed income. When we make inferences, we assume that alternatives not only have the highest expected risk, but they also provide the greatest opportunities for private benefit-taking by politicians because of their "2-and-20" compensation structure, which affords opportunities for kickbacks and local investing bulky tilting of portfolios.

Table 4 reports summary statistics of allocations and returns. At the portfolio level, net returns are 3.4% per annum. Excess returns, defined as the sum of allocation weights times net returns minus a fund-asset class benchmark, are -2.4%. As another measure of performance we use the closeness of the investment manager performance relative to benchmark performance, i.e., the realized tracking error. We estimate in-sample, fund-level tracking error, as the standard deviation of the error term in a no constant model where we regress each fund's annual realized return on its benchmark. We produce one measure of tracking error per fund, with a cross-sectional mean tracking error or 0.065 across 117 funds.

Turning to the asset-class level statistics, the mean distribution of allocations is fixed income (0.513), public equities (0.346), and alternatives (0.126). In net returns, raw mean performance is alternatives (5.8%), public equities (4.8%), and fixed income (2.0%). Excess returns are all indistinguishable from zero.

We also report in Table 4 a measure of investment delegation for each asset class defined as the fraction of assets managed by external institutions in each asset class. Pension funds are more likely to delegate management the greater the *ex ante* risk associated with the asset class. On average, the fractions of assets managed via delegation are 66.8% for fixed income, 81.9% for equities, and 83% for alternatives (excluding hedge funds, which are all outsourced). Averages do not convey the heterogeneity across funds. Although the median pension fund delegates the entire allocation for all asset classes, 30% of funds manage more than half of assets in-house.

4.3. Investment Manager Compensation and Skill Data

We hand-collect compensation data for investment managers, starting with searches in annual reports (for public pension funds with disclosure mandates) and public filings. For the remaining sample, we issue freedom of information requests and search for each named manager and public pension fund in newspaper databases. As we search, we look for the highest paid investment executive, which could be either the CEO or CIO depending on the fund. The resulting sample covers 127 public pension funds with a total panel of 525 observations, including all geographies spanned by our sample.[8] We report summary statistics on compensation in our dataset in Table 5. The median total compensation of the investment executives is $500,271 USD, with a mean of $766,178. A quarter of the fund managers make salary of $262,112 or less.

In our theory, we model skill as an underlying trait of managers to be hired by the trustees. Naturally, the compensation of managers is intrinsically related to skill, because of their outside option. However, we ideally would have some intrinsic measure of skill. Thus, we hand gather the prior professions of all investment managers. Table 6, Panel A reports the breakdown of these professions focusing on the immediately prior job.

For almost two thirds of the fund managers their immediate prior experience was in finance, with 4.9% of managers working as a senior investment manager at another pension fund, 31.1% in the private sector in a financial capacity, and 30% as a bureaucrat with financial responsibility. But notably for the other third of investment managers, their prior experience was either as a civil servant with no financial expertise or as a non-financial executive in a pension fund (16.4% + 18% = 34.4%).

Figure 1 depicts box plots of the distribution of compensation by prior profession categories. The no-financial-expertise professionals (non-finance civil servants, the 5th category and pension executives, the 2nd category) which together account for 34.4% of the sample are clearly paid less. The mean compensation of non-finance civil servants is only $244,372. Even two standard deviations higher compensation for these individuals does not put them in the realm of the median (or mean) compensation for everyone else. The non-finance pension executives fare a little better, with a mean of $459,576. However, the box plot well portrays that the skew in this category is large; most investment managers with non-finance pension experience have quite

[8] Because the panel is short, we interpolate (but do not extrapolate) the data for funds for which we have a time series but with gaps.

modest salaries. The lack of compensation for these public servants reflects strongly the dialogues presented as outrage examples in Appendix Table 1. For example, a recruiter quoted in the New Mexico State Investment example (#7 in Appendix Table 1) states: "Pay scales in public plans tend to reflect the pay scales for the state bureaucracy." In the Missouri State Employees Retirement example (#5), the state senator in charge of appropriations calls the idea of bonuses (performance pay) to investment managers "unconscionable" in lieu of payments to services for the disabled, college scholarships, etc.

4.4. Outrage Variables

Our outrage variables are of two types -- (i) reference wage variables and (ii) trustee occupation variables. Reference wage variables include the reference wages of the working beneficiaries and the reference wages of the locals in the voting area. We collect information on the average wages of working beneficiaries either directly from the annual report or as a calculation from data on the employee contributions and the reported average rates of contributions (also predominantly from funds' annual reports). As reported in Table 5, the average wage of working beneficiaries is $46,045, with a median of $53,637. We define *Constituent Outrage* as minus one times the log of constituent wage income.

We also collect information on the average household income in the municipality (or MSA) where the fund is located. For each fund we look for the finer measure of regional income calculated by the agency responsible for collecting and compiling income statistics in each country. We presume board members are also likely to be drawn from the same region, and would be sensitive to this average wage. The average regional household income (Table 5) is $50,035, with a median of $46,409. For our regressions we define *Regional Outrage* as minus one times the log of regional household income in that year.

Trustee occupation variables emerge from, first, sourcing the names of the trustees from the websites and, then, looking up biographical information from c.v.'s on the funds' websites or other web information sources (e.g., Linkedin). Data availability force us to use a single cross-section of data (2011) for trustee biographies. We were concerned about this limitation. However, empirically, the average fund is in the data for three years, making the board information for one

year likely to be relevant for the entire sample period.[9]

Table 6, panel B provides a tabulation and descriptions of professional titles. We split the table into broad categories of civil servant and non-civil servants, each representing about half of the mean distribution of trustees. We further break civil servants into politicians, finance civil servants and other civil servants. Politicians (those representing the government at large or elected as a politician) are somewhat rare as non-chair trustees, accounting for 6.4% of board seats. Finance civil servants (most commonly, treasurer, revenue commissioner, controller, auditor, and finance directors) hold 34.4% of seats. Other civil servants (clerks, commissioners, public university academics, and legal government officials) hold 13.7%. Among non-civil servants, teachers represent 14.7% of the mean distribution. Next are municipal workers (7.7%), who are fire workers, librarians, workers at city hospitals, and other such public municipal service occupations that are not internal to the running of the government administration per se. Finally, the largest non-civil servant category is professionals (23.1%), who are financial sector professionals as well professionals from medicine, media, NGOs, or other private firms.

We use three board occupation categories to capture outrage – *Municipal Workers*, *Teachers*, and *Finance Civil Servants*. A trustee is more likely to perceive costs from outrage, and thus more likely to want to implement outrage pay constraints on investment manager compensation, if she herself has a history as a local worker (variables: *Municipal Workers* and *Teachers*), or if she is involved in the finances of the local government directly (*Finance Civil Servants*). The exogeniety condition asserts that these trustees do not influence performance except through their role in manager contracting.

One concern would be if our use of trustee occupations as outrage variables were correlated with politicians on the board, which prior research has found has a causal effect on portfolio performance (Adonov, Hochberg and Rauh (2017)). Figure 2 illustrates why we do not think this

[9] In addition, we took steps to understand how these particular people arrived to be trustees. We gathered the charter for each public fund and coded the process for voting on each trustee seat. Trustee seats are specific to representing certain stakeholders, reflected in who appoints, elects or is ex offico the trustee. We use these data in the construction of the Political Chair variable, but this collection process also convinced us that the type of person in each position is likely to be very stable. The charters are usually decades-old and are often quite secific as to the stakeholder process in electing, appoining or designating trustees. If the public funds is, for example, a public railway or teachers union, and the trustee seat turning over is designated to be elected by such workers, it is unlikely a different occupation would emerge. Of course, other pensions are less specific, but even having the trustees seat representing the retirees versus the workers, or being a ex officio trustee, implies a stickiness in the biography of who represents a particular trustee seat.

to be the case. Panel A (a.i.) shows how we divide the pie of all trustees into politicians, other civil servants and not-a-civil-servant. If *Municipal Workers*, *Teachers,* and *Finance Civil Servants* accounted for all of the non-politician variation in the other civil servants and not-a-civil-servant categories, our estimations would just be picking up one minus the Adonov et al (2017) result. However, as figure (a.ii) shows, our categories do not absorb the one minus political distribution. In fact, in Panel B, we randomly pick six public pension funds and show their distribution. The shadings and the outrage categories vary tremendously. In aggregate, we find the correlation between the professions of politicians and *Teachers*, *Municipal Workers,* and *Finance Bureaucrats* to be limited, lying between -0.07 and -0.18. To make sure that the main regressions that we describe below are not driven by this small correlation, in unreported estimations, we re-run estimations defining the outrage variables based on professional designation as a fraction of the non-politician board members, obtaining similar results.

4.5. Political Chair and Underfunding Variables

Using the data we collected on the process by which each member of the board is appointed or elected, we construct a dummy variable called *Political Chair* if the chair is appointed by an executive of government (e.g., governor, mayor, finance minister, king, etc.) or ministry of government. Fourteen percent of boards have a *Political Chair*.

Finally, we measure the extent of underfunding pressures by creating an index of two variables. We have data on the funded ratio (the level of assets-to-liabilities), but not for all funds. The other measure of liability strain comes from Rauh (2008), who finds that funds with a higher age profile of pension beneficiaries have more liability concerns. Thus, we construct the average age of pension beneficiaries, using data on the average age of workers and retirees with the fraction of members being retired. Then we construct the *Underfunded Index* as the negative of the standardized funded ratio plus the standardized age variable. The underfunded index has correlations of 0.81 with age and of -0.79 with the funded ratio.

5. Results

5.1. Does Outrage Affect Compensation?

Before any formal analysis, we examine the raw data for indications of associations

between outrage and realized compensation. In Figure 3 (for municipal workers), Figure 4 (for teachers), and Figure 5 (for finance civil servants), we plot the percent of trustees who fall into four quartiles of the outrage variable in Panel A, and then show mean and median compensation across these quartiles of the outrage variable. In all plots there is a negative relationship, with higher percentages of trustees sensitive to outrage associated with lower compensation levels.

Table 7 explores the multivariate relationship between compensation and political agency variables. As a baseline, in column (1), we regress log compensation on the controls – lagged fund size and year fixed effects. Lagged fund size significantly associates with compensation, but more importantly for our purposes we note that size and year fixed effects alone have limited explanatory power with an R-squared of 0.06.

In columns (2) to (4), we explore the impact of outrage. Column (2) adds the two reference wages outrage variables, finding a negative and significant relationship between *Regional Outrage* and compensation. The R-squared in column (2) increases sharply to 0.20. Column (3) uses the trustee composition outrage variables in addition to the baseline controls. All three trustee composition outrage variables – *Municipal Workers*, *Teachers*, and *Finance Civil Servants* – negatively associate with compensation, are significant and, again, the R-squared increases sharply to 0.17. In column (4), we include both the reference wages outrage variables and the trustee composition outrage variables. All five of the outrage variables have negative coefficients. In this case, the R-squared is 0.31. This increase in the obtained R-squared indicates that the outrage variables are not simply linear combinations of each other, but capture different aspects of the outrage constraint.

In column (5) we explore the relationship between other political agency issues (*Political Chair* and *Underfunded Index*) and compensation. We find a strong negative association between *Political Chair* and compensation (column (5)) and an insignificant impact of underfunding. In column (6) we include these political agency variables along with the outrage variables. The political chair and underfunded index are at least partially orthogonal to the relationship between outrage and compensation (column (6)), as coefficients are similar in size and significance.

We evaluate the economic impact of the outrage constraints on the average fund by considering a one standard deviation increase in outrage for all political agency variables that are statistically significant in column (6). Larger outrage by way of *Municipal Workers* reduces compensation by $113,912; on *Finance Civil Servant,* by $162,612 ; and on *Regional Outrage,* by

$73,304. These changes are 16%, 23%, and 11% of the mean compensation in sample. The underlying changes in logs for these three variables, off a mean compensation in sample of $692,000, are -0.18, -0.27, and 0.11, respectively. Funds that have *Political Chair* = 1 pay their investment managers $192,079 less (-0.60 in log dollars) in compensation than those with *Political Chair* = 0.

5.2. Do Outrage Pay Constraints Affect Returns?

5.2.1 Main Performance Results

In section 3 we described our empirical methodology that relies on a two-equation, linear sytem of equations to estimate how agency affects public pension fund outcomes working through the compensation contract mechanism. In Table 8 we report results from estimating both equations in our system using 2SLS. The first column repeats the test of outrage on compensation provided in Table 1, and is system equation I, including additional control variables. The results are very similar to those in Table 7 for these tests. Our focus is on columns (1) to (4), where we estimate the effect of outrage on returns through *Log Compensation* (system equation II). The outcome variables across the models are excess returns for the entire portfolio (model 1), excess returns in alternatives (model 2), excess returns in public equities (model 3) and excess returns in fixed income (model 4). Excess returns are defined as returns minus the benchmark. (Columns labeled (5) to (8) of Table 8 reproduce excess returns estimates in OLS, for reference comparisons).

Our main variable of interest is *Outrage-Predicted Log Compensation*. In column (1) we find that log compensation explained by outrage has a positive and significant effect on portfolio excess returns. The coefficient is a positive 0.0185. To understand the economic impact of outrage on portfolio excess returns, we consider a one standard deviation change in either *Municipal Workers*, *Finance Civil Servants* or *Regional Outrage* (iteratively, because all acting together is unlikely). We choose to use the magnitude from the equation I coefficient estimates in Table 7, rather than the in-sample estimates for equation I from each column of each table to allow for consistency in interpretation throughout the paper.

A one standard deviation decrease in *Municipal Workers* increases compensation by 0.18 in incremental log compensation, which results in 33 basis points (= 0.18 * 0.0185) higher portfolio returns. Likewise a one standard deviation decrease in *Finance Civil Servants* leads to 0.27 in incremental log compensation, resulting in 50 basis points higher portfolio returns. A one standard

deviation decrease in *Regional Outrage*, working through 0.11 in incremental log compensation, results in 21 basis points higher excess returns. Evaluated at the mean fund of $45 billion in AUM, these higher returns would generate, at least $93 million more in wealth per annum with a standard deviation unwinding of outrage.

In columns (2) to (4), we replace portfolio excess returns with excess returns in alternatives (2), public equities (3) and fixed income (4).[10] Our results for the risky asset classes are very consistent with the model. In particular, *Outrage-Predicted Log Compensation* positively and significantly predicts excess returns in alternatives (coefficient of 0.0131) and equities (0.0069). For alternatives, a one standard deviation lower outrage (taking the average across the effect for *Municipal Workers, Finance Civil Servants*, and *Regional Outrage*) predicts 24 more basis points of returns. For public equities (column 3), a standard deviation lower outrage (again averaging across the three outrage variables) predicts 13 basis points of excess returns. Yet, we find a negative impact on fixed income excess returns (-0.0074) perhaps reflect differences in attention or risk strategies (lower risk) when higher compensated managers focus more time or risk on the risky portfolios.

We can interpret the implications as a weighted-average portfolio with sample weights of 0.126 for alternatives, 0.513 for equities, and 0.346 for fixed income. Together the asset-class results of columns (2)-(4) suggest that *Outrage-Predicted Log Compensation* result in 5 basis points lower returns, with a value add loss of $21 million. The results imply that for a financial cost of approximately $117,000 (the average of the effects from Table 7) in increased compensation, the average fund will experience an increase in excess returns worth $21 million to $93 million.

We also note before leaving Table 8 that *Political Chair* has a negative and significant impact in alternatives, consistent with Andonov, Hochberg and Rauh (2017). We discuss the *Political Chair* result in greater length and related evidence in section 5.3 below.

[10] The number of observations varies by column because some public funds do not have exposures to all of the asset classes, and some funds only report performance at the aggregate portfolio level. We do not report the first equation estimation for each column; they are materially the same as the estimation presented in the first column.

5.2.2. Robustness of Return Results to Realized Tracking Error

Higher excess returns do not necessarily reflect a higher Sharpe ratio if the excess return performance arises from taking on increased risk within the asset classes. We address this possibility in Table 9 by studying the realized tracking error. These regressions are purely cross-sectional with one observation per fund estimated from within-fund performance data. As before, we first include the compensation equation, System Equation I, as the first, unnumbered column. With the fewer number of observations, we drop the agency variables without power in these tests.

In column (1), we find that *Outrage-Predicted Log Compensation* has a negative and significant impact on realized tracking error. This counters the concern that our findings from Table 8 result from increased within asset-class risk, and instead support the model assumption that higher compensated managers have skill in security selection helping to lower tracking errors.

To explore the robustness of this finding, in columns (2) and (3) we split the sample into those with low portfolio allocation to alternatives (below median indicated as 'Low Risk'), and those with high allocation to alternatives (above median indicated as 'High Risk'). If the higher returns in risky asset classes (and lower returns in fixed income) arise from a sorting of funds by how risky the security selection is within asset class, we would be surprised to see any lower tracking error for the outrage-predicted compensation for the risky funds. Yet, this is what we find. The lower realized tracking errors are concentrated in riskier funds. This is again consistent with our story that the managers that are paid more because of lower outrage are simply higher skill.

5.3. Do Outrage Pay Constraints affect Asset Allocations?

In Table 10 we explore the possibility that outrage pay constraints also affect funds' asset allocation, also a prediction in the theory section. As before, the System Equation I estimation is presented in the first unnumbered column, with similar results as in Table 7. The F-statistic for the relevance of instruments is 23.2.

Because the asset class weights are constrained to be between 0 and 1, with many funds having low exposures to alternatives, we estimate Table 10 using a Tobit second stage model. Because the asset class weights are jointly determined, we report two sets of standard errors. The top standard error is a fund-clustered standard error, as before, and the bottom is a robust standard error under the seemingly-unrelated-regression assumption (SUR).

The results indicate that funds with compensation less constrained by outrage exhibit an increase in their risky asset exposures. In particular, the positive and significant coefficient on log compensation for alternatives (column 1) and fixed income (column 3), and the negative and significant coefficient on public equities (column 2) shows that lower outrage/high compensation funds have higher allocations to alternatives and fixed income in lieu of public equities. Inside our model, such an effect may arise with the hiring of a skilled manager that can extract a larger fraction of the premia in riskier asset classes. Using SUR standard errors, only the negative impact on public equities is significant at conventional levels, but we proceed to discuss the impact, as in our sample size this is a rather stringent robustness specification.

We calculate the economic magnitudes focusing on a one standard deviation decrease in outrage measured by either *Municipal Workers*, *Finance Civil Servants* or *Regional Outrage*. For a decrease in *Municipal Workers*, we find that relaxing outrage-hindered compensation results in about 0.9% more allocation to both alternatives and fixed income, with an offset of 2% decrease in public equities weights. (The estimates need not perfectly add up to 0.) For a decrease in *Finance Civil Servants*, we find that relaxing outrage-hindered compensation results in about 1.3% more allocation to both alternatives and fixed income, with an offset of 3.1% decrease in public equities weights. In percentage changes, alternatives increase by 7.1% to 10.6% and public equities decrease by 4.1% to 6.1%. The percentage change effect for fixed income are small. For a decrease in *Regional Outrage*, we find that relaxing outrage-hindered compensation results in about 0.6% more allocation to both alternatives and fixed income, with an offset of 1.3% decrease in public equities weights.

5.3.1 Do Outrage Pay Constraints Affect Delegation?

One possible mechanism driving the underperformance of outrage-constrained pension funds is the payment of intermediation fees, which could be a consequence of less skilled managers delegating larger fractions of their portfolios to external institutions. We investigate this possibility now by applying our two equations specification, using the fraction of assets managed via delegation (in each asset class) as outcome variable. We use the same asset classes defined in the previous sections, with the only difference being that for alternatives we do not include hedge funds, as they are delegation institutions. Given that our delegation fraction is a number between 0 and 1, we estimate our model using a Tobit specification on the second stage and show the results in Table 11.

The negative and significant coefficient on log compensation in 5 of the 6 models shows that funds that are able to avoid outrage constraints on compensation are more likely to reduce their use of delegation and manage assets in-house. The economic impact is large: a reduction of one standard deviation in *Municipal Workers* [or in *Finance Civil Servants* or in *Regional Outrage*] is followed by a reduction of around 9% [or 14% or 6%] in the fraction of assets managed via delegation in alternatives. The economic magnitudes are similar for fixed income.

5.4. Other Agency Costs: Can We Speak to Mechanisms?

The results in 5.2 speak to the impact of the compensation channel on allocation and performance in public pension funds. As noted in the introduction and in the theory model, this is not the only channel of political influence. In this sub-section we turn our attention to the other channels of distortions arising from politicians' payoffs to local investment and distortions arising from underfunding.

The key variables in our empirical setup to explore the potential distortions from politicians' payoffs to local investing is *Political Chair*. Pay-to-play arrangements of political funds may cause public pension funds to invest in political assets (e.g. local assets) to provide private political benefits for the board chair. The key variable to predict risking-up of portfolios due to pressures from liability obligations is *UnderfundedIndex*.

These variables are introduced in Tables 8-11 in the compensation regressions (System Equation I) as well as in the outcome regressions (System Equation 2). We include the variables in both equations because we believe these political variables will fail the exogeneity condition, with *Political Chair* and underfunding also being directly correlated with outcomes.

Returning to the excess returns system in Table 7, we find that *Political Chair* significantly explains variation in compensation. Over-and-above this effect, in Table 8 we find that *Political Chair* significantly explains lower returns in alternatives (model 2). The point estimate is large; 367 basis points lower performance in alternatives for *Political Chair* =1 funds. This is consistent with the research of Andonov, Hochberg and Rauh (2017) that found that political funds were more likely to invest in local private equity that underperformed.

Our theory suggests that politically compromised boards will not have the incentive to pay for highly-skilled managers, since the *Political Chair* will be making selections into political assets and thus the portfolio need for skill is lower. Using the language of our model, a large reward for

political investments L leads to a manager with low skill (s), large weights in political assets (w_P), and small weights on vanilla assets (w_{MV}). Our empirical results suggest that above any role in compensation, *Political Chair* affects performance directly. One way to see this is that pay-to-play relationships need not be dependent on the manager skill level.

The asset allocation estimations in Table 10 are also consistent with a pay-to-play interpretation for *Political Chair*. Pay-to-play anecdotes in the media suggest that such activity is primarily about a Political Chair or, often, board and manager collusion, directing funds to particular asset manager who represent alternatives funds (e.g., hedge funds, private equity, etc.). What is different about these alternatives funds structures is that they are by definition bulky investments that are not atomistic in properties like stocks. In Table 10 we find a negative, significant coefficients on *Political Chair* for public equities allocation, offset by positive (but not significant) shifts to alternatives and fixed income. The fact that these shifts do not result in additional positive returns (Table 8) or risk (Table 9) supports the punchline of these anecdotes and the prior literature.

Finally, we turn our attention to the impact of *UnderfundedIndex*. The only significant impact is on asset class weights. Consistent with prior papers, notably, Andonov, Bauer and Cremers (2017) we find that *UnderfundedIndex* strongly predicts higher allocations to alternatives and negative allocations to fixed income, with significant results using the SUR standard errors.

6. Conclusion

The paper introduces a model in which trustees of public pension funds worry about their private costs arising from outrage over high compensation, and this leads them to alter management contracts and lowers management skill. The end result of this political constraint on human capital choice is distortions in portfolio allocation and most importantly weaker performance in the risky asset classes. This political agency cost is nested in a broader model that also allows for distortions coming from politicians' private benefits of local investment and from underfunding that have been the focus of prior literature.

We then test these predictions using a hand-collected global panel data set that includes information on investment manager compensation and structural features of boards and trustees that predict outrage. We use a two-equation, linear version of the model relationships to estimate

how agency affects public pension fund outcomes working through the compensation contract mechanism. In our model, outrage only affects allocations and performance through the management contract. This restriction lends itself to a structural two-stage least squares (2SLS) specification, where we can make linear assertions as if we were in an instrumental variables (IV) setting.

We find there are outrage pay constraints on compensation driven by public pension funds' governance structures. Second, and most importantly, those outrage pay constraints impact fund performance and hence beneficiary welfare. We find that relaxing outrage constraints on compensation improves portfolio excess returns, with the gains coming as expected from the risky asset classes where skill is particularly important. The excess portfolio returns associated with weaker outrage pay constraints does not come at the expense of greater overall risk, with realized tracking error lower for funds that are less affected by outrage pay constraints. These results are consistent with politically-related contracting constraints reducing managerial skill.

The empirical results provide quantitative estimates of the costs and benefits of relaxing outrage constraints. For a plan with an average allocation to alternatives, our estimates suggest that if that fund were to relax outrage, with a cost of $81,000 to $179,000, it would benefit by producing additional benefits of $13 to $32 million in annual value-add. The projected benefit from relaxing outrage is even greater for plans with an above average allocation to alternatives, which is more common with underfunded plans.

Our paper suggests that measures to change the governance of public pension funds to insulate them from outrage and other political agency costs have the potential to benefit beneficiaries. Freeing boards from frictions on hiring and paying qualified managers is associated with better returns. And this may be of increasing importance. Growing income inequality between finance and average salaries increases outrage pressures to which public pension fund boards are particularly exposed.

Of course it is natural to ask if it possible for funds to change outrage constraints. Funds cannot change the fact that disclosure and media attention of high finance salaries will lead to public outrage. But funds can take steps to make board members less sensitive to these concerns. One way to do this is to ask the beneficiaries and political entities that are plan sponsors to appoint experts to fill these positions, rather than having the trustees be either beneficiaries or politicians.

It is instructive to see that in spite of political interests in board choices, outside of the United States there are no public pension fund board chairs that are politicians.

Bibliography

Andonov, Aleksandar, Rob Bauer and Martijn Cremers, "Pension Fund Asset Allocation and Liability Discount Rates", 2017, *Review of Financial Studies,* 30 (8), 2555-2595.

Andonov, Aleksandar R., Yael V. Hochberg and Joshua D. Rauh, "Political Representation and Governance: Evidence from the Investment Decisions of Public Pension Funds", 2017, *Journal of Finance,* forthcoming.

Ang, Andrew, Bingxu Chen and Suresh Sundaresan, "Liability Driven Investment with Downside Risk", 2013, *Journal of Portfolio Management,* 40, 1, 71-87.

Bergstresser, Daniel, Mihir Desai, and Joshua D. Rauh, 2006. "Earnings manipulation, pension assumptions and managerial investment decisions," *Quarterly Journal of Economics,* 121, 157–195.

Bernstein, Shai, Josh Lerner and Antoinette Schoar. 2013. "The Investment Strategies of Sovereign Wealth Funds." *Journal of Economic Perspectives,* 27(2): 219-38.

Bradley, D., C. Pantzalis and X. Yuan, 2016, "The influence of political bias in state pension funds," *Journal of Financial Economics,* 119(1): 69-91.

Brown, Jeffrey R., Joshua M. Pollet and Scott J. Weisbenner, "The In-State Equity Bias of State Pension Plans", 2015, Working Paper.

Dyck, Alexander and Adair Morse, "Sovereign Wealth Fund Portfolios", 2011, Working Paper.

Dyck, Alexander and Lukasz Pomorski, 2015, " Investor Scale and Performance in Private Equity Investments," *Review of Finance.*

Hochberg, Yael V. and Joshua D. Rauh, 2013. "Local Overweighting and Underperformance: Evidence from Limited Partner Private Equity Investments," *Review of Financial Studies,* vol. 26(2), pages 403-451.

Novy-Marx, Robert, and Joshua D. Rauh, 2009. "The liabilities and risks of state-sponsored pension plans," *Journal of Economic Perspectives,* 23, 191–210.

Novy-Marx, Robert M. and Joshua D. Rauh, 2014, "Funding Soft Liabilities", Working Paper.

van Binsbergen, Jules and Michael W. Brandt, "Optimal Asset Allocation in Asset Liability Management". In Handbook of Fixed Income, edited by Pietro Veronesi, (2015).

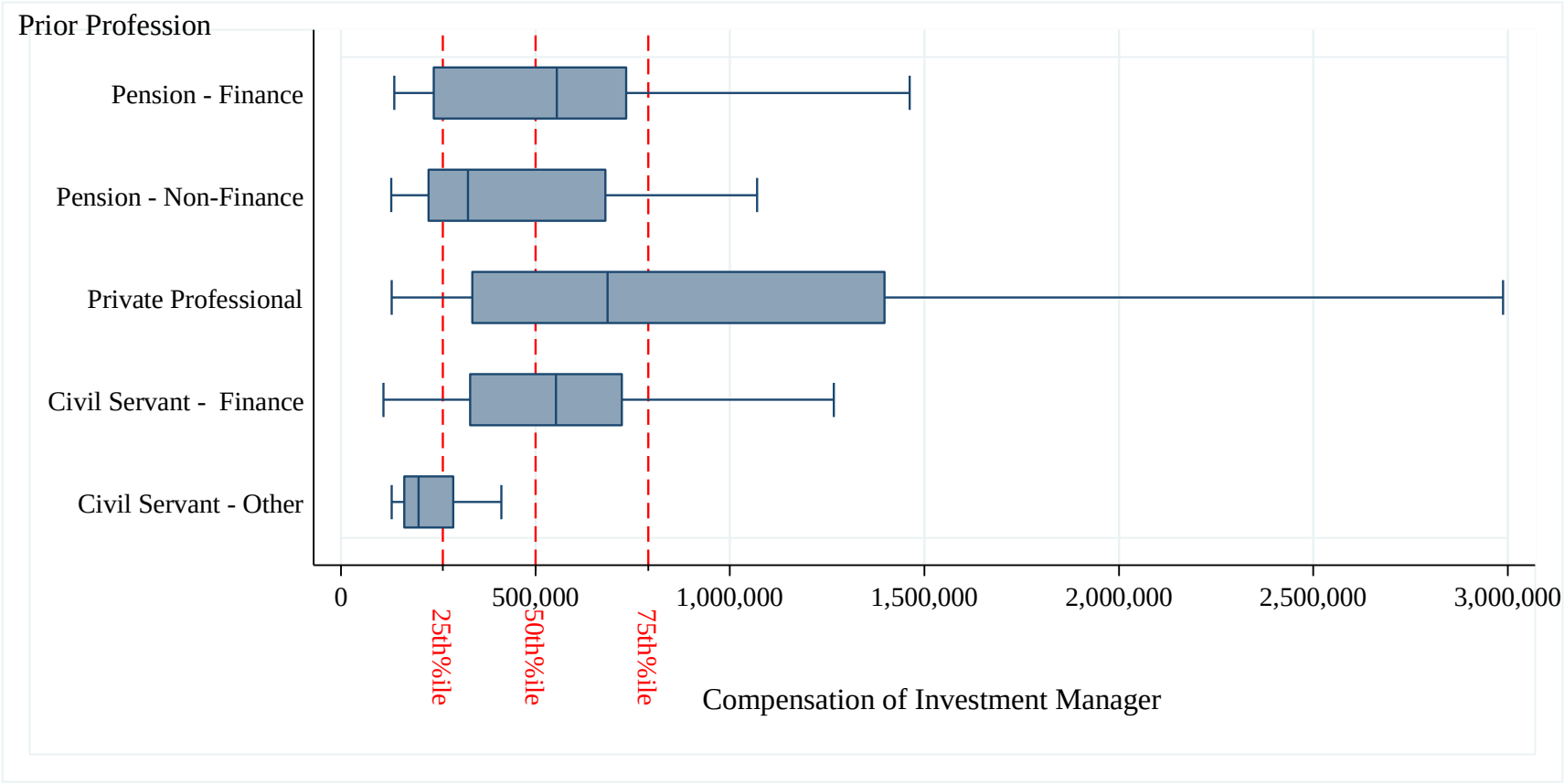

Figure 1: Compensation of Investment Manager by Prior Profession

Graphed are the distribution of investment manager compensation for each category of prior professions of the managers. The box plot displays the mean (box center line) as well as the first (box edges) and second (stem edges) standard deviations. The dashed (red) line indicates the overall sample 25th , 50th, and 75th percentiles. The distribution of the sample is as follows (also reported in Table 6, along with the more detailed titles of the professions under the categories): Pension – Finance (4.9%), Pension – Non-Finance (18.0%), Private Professional (31.1%), Civil Servant – Finance (29.5%), and Civil Servant – Non-Finance (16.4%).

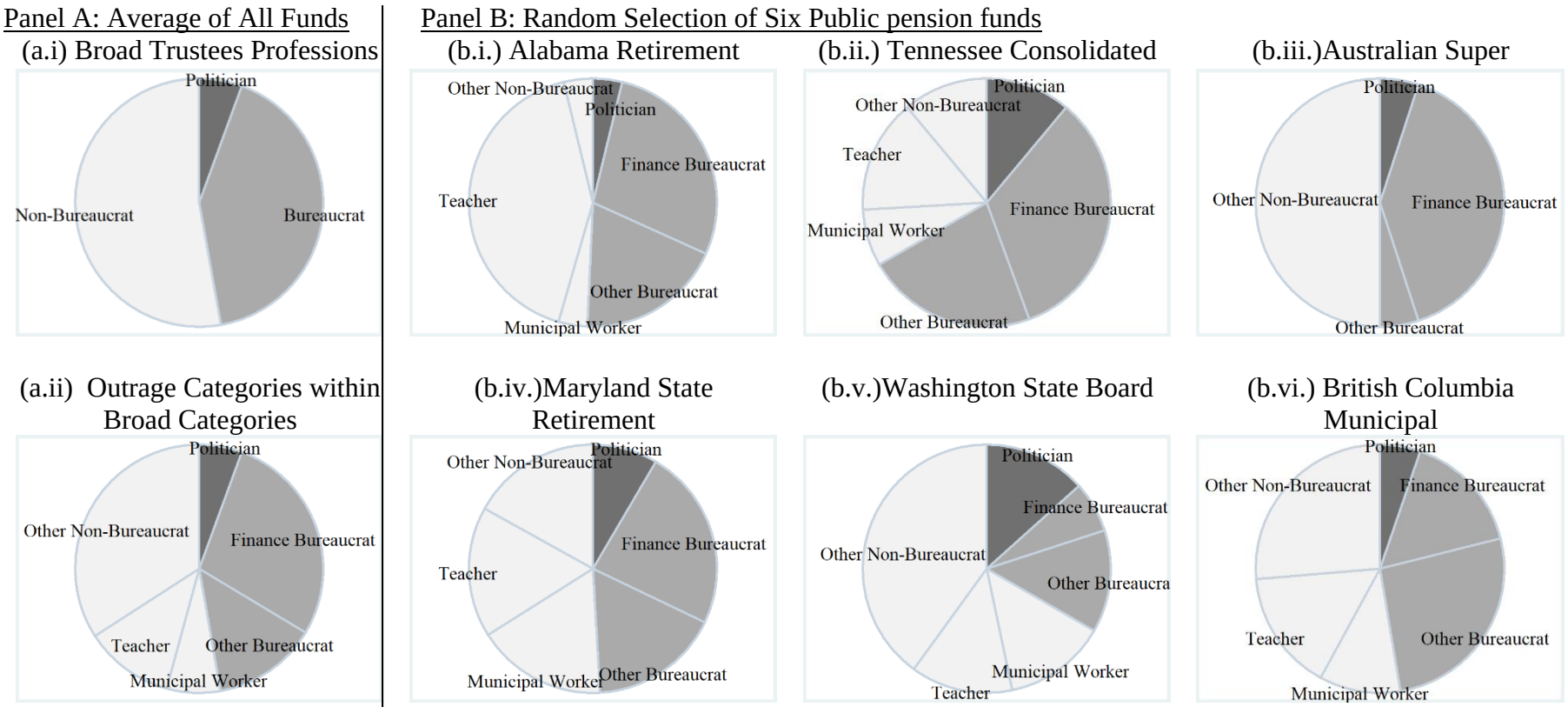

Figure 2: Board of Trustee Professions for All Funds and Six Randomly Drawn Funds

The figure shows Board of Trustee composition based on the profession of the trustee. Panel A, a.i presents average profession distributions in three broad categories: politician, civil servant and not-a-civil-servant. In Panel A (a.ii) and Panel B we introduce further sub-categories. "Politicians" includes any representative or elected official of municipal, state or federal government. "Finance Bureaucrats" are civil servant with financial experience. "Other Bureaucrats" are civil servant without financial experience. "Teachers" are certified public-school teachers. "Municipal Workers" are workers providing basic services to city residents, usually through city government "Other Non-Bureaucrats" includes local professionals and individuals owning or working on private firms and NGOs. In Panel A, we combine the categories "Finance Bureaucrats" and "Other Bureaucrats" into one "Bureaucrat" category, and combine "Teacher", "Municipal Worker" and "Other Non-Bureaucrat" into one "Non-Bureaucrat" category. Tables 2 and 6 provide data sources and details.

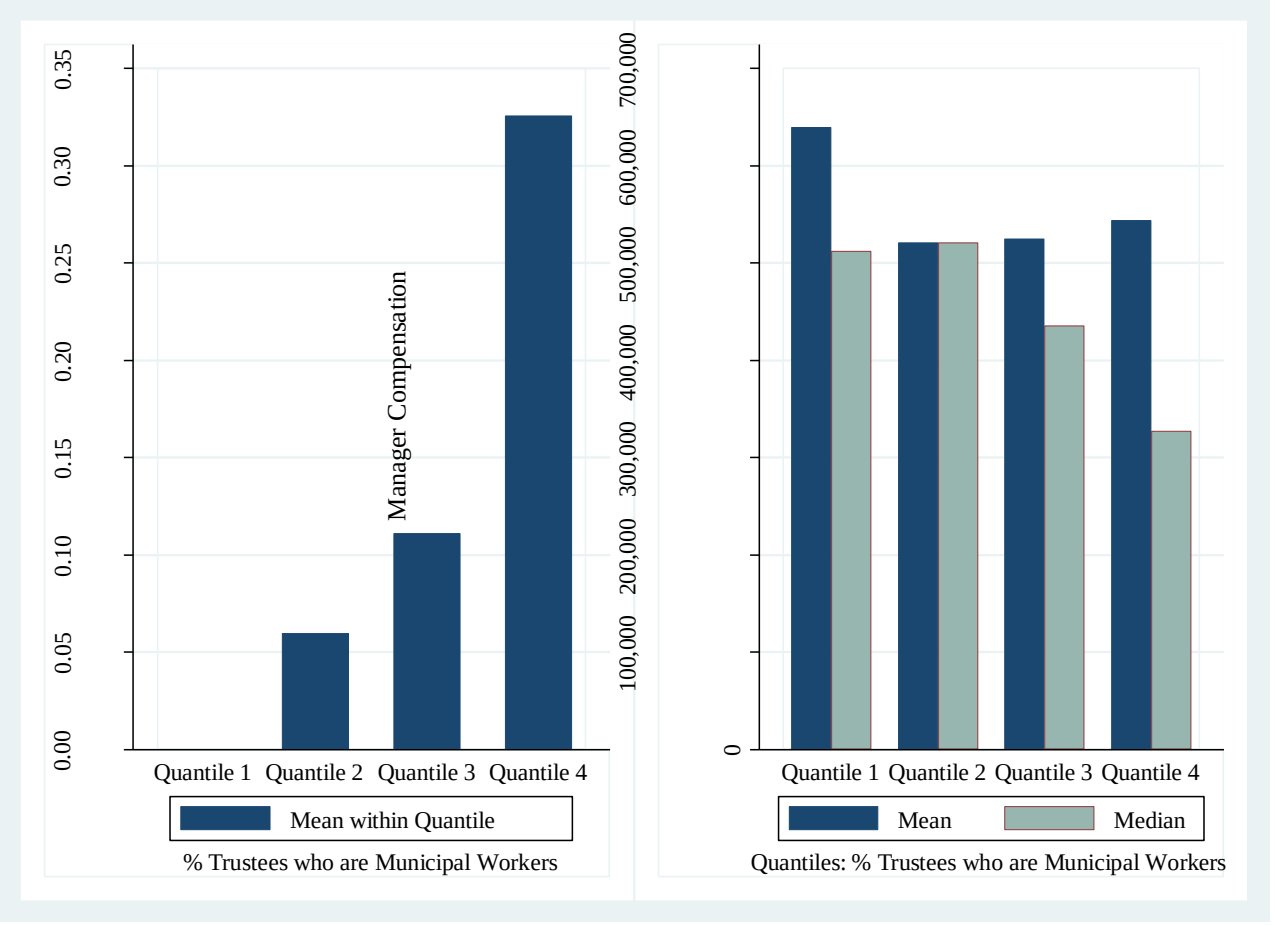

Figure 3: Percentage of Trustees who are Municipal Workers & Relationship to Compensation

The left panel presents the quantiles of the percentage of trustees who are municipal workers. Municipal workers are those working in the police, fire department, library, community hospital, etc. This panel simply displays the average percent of trustees (the y-axis) for each quantile to summarize the quantile used in the right panel. The right panel plots the mean (blue/darker bars) and median (green/lighter bars) manager compensation of the pension fund per quantile of percentage municipal workers. Manager compensation is defined as the higher of the CEO or CIO compensation for a pension fund. Data are collapsed to a single average observation per pension.

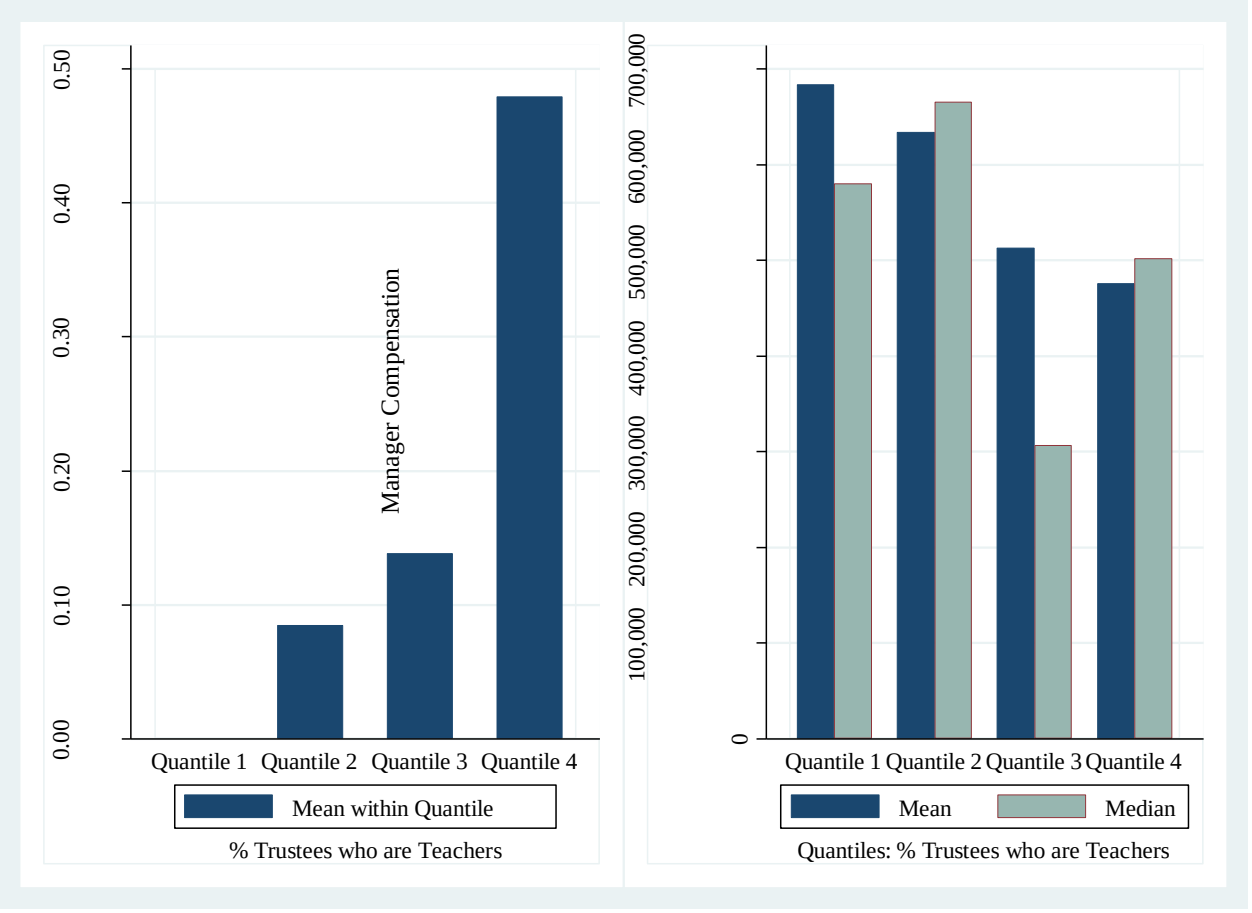

Figure 4: Percentage of Trustees who are Teachers & Relationship to Compensation

The left panel presents the quantiles of the percentage of trustees who are teachers. This panel simply displays the average percent of trustees (the y-axis) for each quantile to summarize the quantile used in the right panel. The right panel plots the mean (blue/darker bars) and median (green/lighter bars) manager compensation of the pension fund per quantile of percentage teachers. Manager compensation is defined as the higher of the CEO or CIO compensation for a pension fund. Data are collapsed to a single average observation per pension.

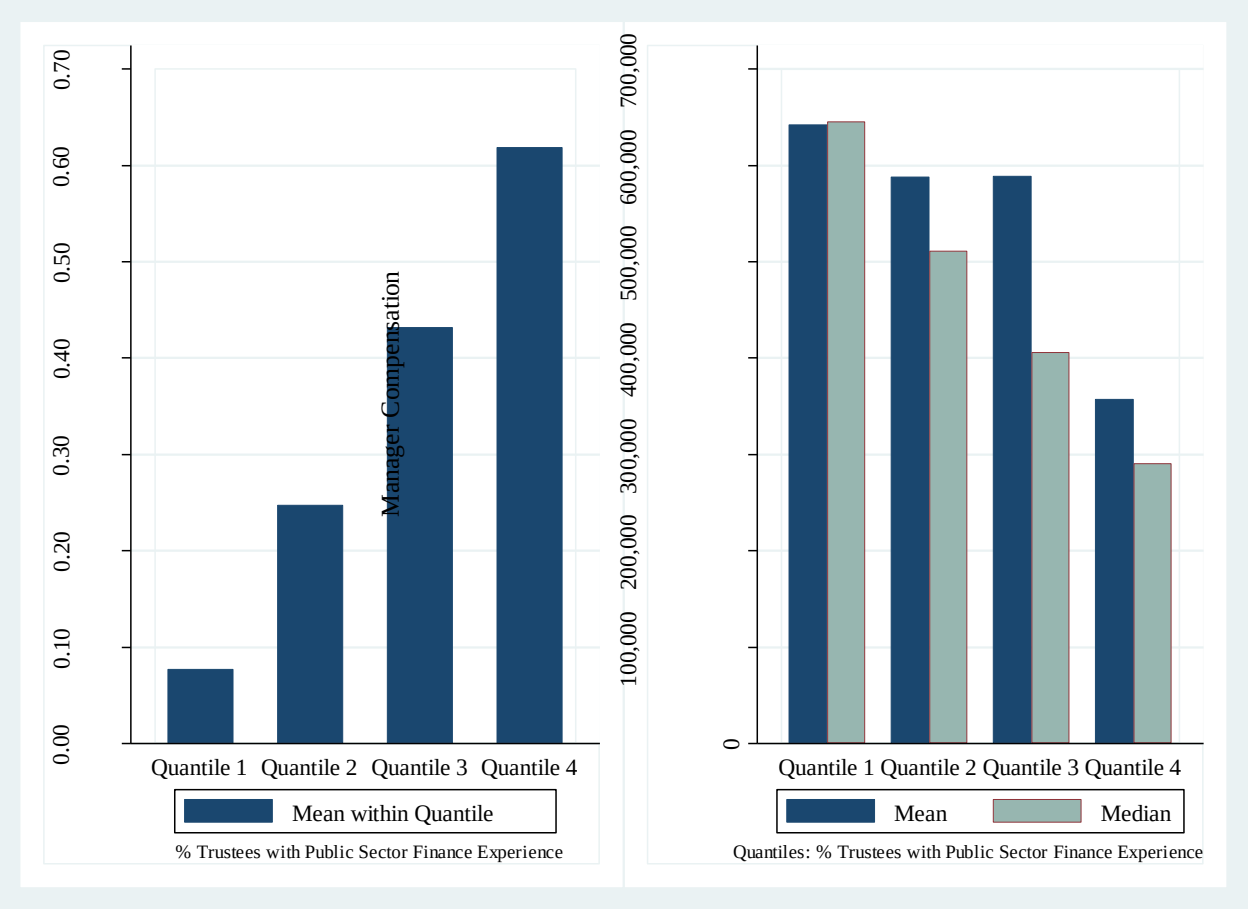

Figure 5: Percentage of Trustees who have Public Sector Finance Experience & Relationship to Compensation

The left panel presents the quantiles of the percentage of trustees who have experience in finance in the public sector. This panel simply displays the average percent of trustees (the y-axis) for each quantile to summarize the quantile used in the right panel. The right panel plots the mean (blue/darker bars) and median (green/lighter bars) manager compensation of the pension fund per quantile of percentage public sector finance experience. Manager compensation is defined as the higher of the CEO or CIO compensation for a pension fund. Data are collapsed to a single average observation per pension.

Table 1: Comparative Statics: Political Agency Variables Role

This table lays out model predictions. showing the comparative statics of how manager skill, portfolio choice, and returns change in the model with changes in political agency variables. The political agency issue of outrage is considered in Panel A. Because outrage is a binding-or-not constraint, the comparaitive statics reflect a discret change from not binding to binding. In panel B, the political agency issues of private benefits of political assets and the underfunding are considered. In Panel B, the comparative staics show the partical derivatives of a change in either manager skill, allocations and performance with respect to a change in agency -- private benefits of political asset investing (κ) and the board preference for risk, driven by pension liabilities (Θ). The right column relates the prediction to the table of reference for empirical results

Panel A: Effect of a Binding Outrage Constraint

Variable	Model Notation	Predicted Change With: Δ Outrage	Test of Prediction
Manager skill	Δs	<0	Table 7
Allocations			
Weight on MV security	$\Delta(w_{MV})$	<0	Table 10
Weight on political asset	$\Delta(w_P)$	<0	Table 10
Weight on fixed income	$\Delta(1-w_P-w_{MV})$	>0	Table 10
Weight on all risky	$\Delta(w_P+w_{MV})$	<0	Table 10
Performance			
E[return on MV security]	$\Delta(R_{MV})$	<0	Tables 8,9
E[return on political asset]	$\Delta(R_P)$	<0	Tables 8,9
E[portfolio return]	$\Delta(R)$	<0	Tables 8,9

Panel B: Effect of Other Political Agency Costs

Variable	Model Notation	Partial Derivative of Row Variable With Respect to: $\partial\kappa$ (κ: private benefits of political asset)	$\partial\Theta$ (Θ: liability-induced preference for risk)	Test of Prediction
Manager skill	∂s	<0	>0	Table 7
Allocations				
Weight on MV security	$\partial(w_{MV})$	<0	>0	Table 10
Weight on political asset	$\partial(w_P)$	>0	?	Table 10
Weight on fixed income	$\partial(1-w_P-w_{MV})$	?	<0	Table 10
Weight on all risky	$\partial(w_P+w_{MV})$	?	>0	Table 10
Performance				
E[return on MV security]	$\partial(R_{MV})$	<0	>0	Tables 8,9
E[return on political asset]	$\partial(R_P)$	<0	>0	Tables 8,9
E[portfolio return]	$\partial(R)$	<0	>0	Tables 8,9

Table 2: Variable Definitions

This Table reports the definitions and the data sources for the main variables used in this paper.

Variable	Definition	Source
	Compensation, Portfolio Choice, and Performance variables	
Investment Manager Compensation	The maximum compensation of the fund's investment managers, including CEO and CIO.	Hand-collected from annual reports, public filings, newspapers, and Freedom of Information requests.
Portfolio Allocation	Portfolio weights in each asset class, defined as the ratio between the assets in each class to total assets.	Center for Retirement Research (CRR), CEM Benchmarking and annual reports.
Returns	Realized returns of the overall portfolio, and also within each asset class relative to fund-disclosed index.	Center for Retirement Research (CRR), CEM Benchmarking and annual reports.
Tracking Error	A single observation by fund, calculated as the time-series average of the squared residuals from a regression of the pension fund returns on the benchmark returns, with no constant.	Center for Retirement Research (CRR), CEM Benchmarking and annual reports.
Portfolio Delegation	Fraction of assets managed via delegation in each asset class.	CEM Benchmarking.
	Political Agency Variables	
Municipal Workers	The fraction of trustees that are workers providing basic services to city residents, usually through city government.	From annual reports. Professional designation based on biographies and web sources such as LinkedIn.
Finance Civil Servant	The fraction of trustees that are civil servant in finance service to the government.	From annual reports. Professional designation based on biographies and web sources such as LinkedIn.
Regional Outrage	The negative of the logarithm of the local household income within the smallest region available (MSAs for the US).	Regional income reported by National statistical offices (Census Bureau in the US).
Constituent Outrage	The negative of the logarithm of the average wage of the constituents of the pension fund.	Hand-collected from annual reports. If not reported, we estimate based on working employee contributions and reported contribution rates as a percentage of salary.
Political Board	A dummy that receives a value of 1 if the chair is appointed by government executives or ministries.	Collected from pension fund charters and annual reports.
Underfunded Index	The negative of the standardized funded ratio plus the standardized age variable.	Center for Retirement Research (CRR), CEM Benchmarking, annual reports, funds' current and cached websites, direct requests to the funds.

Table 3: Pension Fund Profile Statistics

This Table reports the distribution of the years and geographies for the pension funds in our sample. The first two columns of panel A provide the maximum number of unique pension funds for five geographies and the average number of observations from each region. The last four columns of panel A provide summary statistics of the total assets under management (AUM) for each region. Panel B reports the number of funds in each region and in each year.

Panel A: Assets under Management by Region

			Assets under Management ($billion)			
	Number of funds	Fund-Year Observations	Mean	25th Percentile	Median	75th Percentile
Canada	16	203	36.01	11.45	17.01	55.60
Continental Europe	18	133	25.56	9.14	13.12	22.37
Oceania	17	146	15.97	7.99	13.09	19.65
Scandanavia and UK	21	168	217.94	8.95	56.86	235.19
United States	104	1038	25.39	6.36	12.23	29.83
Total	176	1688	45.03	7.59	13.76	34.95

Panel B: Counts of Funds by Geography and Year

	Canada	Continental Europe	Oceania	Scandinavia and UK	United States	Total
1995	3	0	0	1	10	14
1996	4	0	1	1	16	22
1997	5	0	2	1	22	30
1998	5	0	2	3	28	38
1999	6	0	2	4	37	49
2000	11	3	4	4	49	71
2001	15	4	4	4	58	85
2002	15	8	6	7	64	100
2003	15	8	9	8	66	106
2004	15	10	9	12	73	119
2005	15	10	11	12	79	127
2006	16	12	14	16	82	140
2007	16	14	16	19	85	150
2008	16	17	16	19	91	159
2009	16	18	17	19	93	163
2010	16	18	17	20	93	164
2011	14	11	16	18	92	151
Total	203	133	146	168	1038	1688

Table 4: Performance and Allocation Statistics

This Table reports summary statistics of the portfolio weights and performance, at the portfolio level and by asset classes. Asset classes are: (i) alternatives, defined as hedge funds, real estate, private equity, and infrastructure, (ii) public equities, and (iii) fixed income. The weighted sum of the weights times performance do not necessarily equal the portfolio returns because some pension funds in the sample only report aggregate performance.

	Count	Mean	Standard Deviation	25th percentile	Median	75th percentile
Portfolio Performance						
Raw Portfolio Return	1801	0.034	0.095	0.000	0.001	0.101
Excess Portfolio Return	1201	-0.024	0.119	-0.105	-0.013	0.022
Fund-Level Realized Tracking Error	117	0.065	0.060	0.0003	0.059	0.119
Asset-Class Metrics						
Portfolio Weights						
Alternatives	1602	0.126	0.099	0.056	0.110	0.175
Public Equities	1602	0.513	0.144	0.428	0.549	0.613
Fixed Income	1602	0.346	0.143	0.261	0.320	0.390
Raw Returns by Asset Class						
Alternatives	1439	0.058	0.107	0.000	0.050	0.122
Equities	1029	0.048	0.142	-0.068	0.088	0.152
Fixed Income	1124	0.020	0.019	0.009	0.017	0.028
Excess Returns by Asset Class						
Alternatives	1442	-0.003	0.068	-0.003	0.000	0.001
Equities	1599	0.002	0.039	0.000	0.000	0.005
Fixed Income	892	0.005	0.031	-0.003	0.003	0.012
Fraction of Assets Managed via Delegation						
Alternatives	1370	0.830	0.315	0.807	1.000	1.000
Equities	1268	0.819	0.348	0.883	1.000	1.000
Fixed Income	1338	0.668	0.447	0.043	1.000	1.000

Table 5: Board and Manager Variables: Summary Statistics

Panel A reports the summary statistics, and Panel B reports the correlations of the main variables characterizing the governance of pension funds in our sample. *Manager Compensation* is defined as the highest paid executive (CEO or CIO) for the public fund. *Municipal Workers* is the percent of the board whose career is in the municipal labor force, defined as police, fire department, hosptials, libararies, and other non-civil servant positions. *Finance Civil Servan* t is the percent of the board whose background is in public sector financial positions (e.g., city controllers, auditors, etc.).*Teachers* is the percent of the pension board who are teachers. *Political Chair* is a dummy taking value 1 if the chair is appointed by the executives or ministers of the government. *Underfunded Index* is an index constructed by taking the mean across the standardized value of (1- the funded ratio) and age following Rauh (2008). The two outrage income measures -- *Constituent Outrage* and *Regional Outrage* -- are, repectively, equal to -1* the log of the weighted average wages of workers and retirees, and -1* the log of municipal income.

Panel A: Statistics

	Count	Mean	Standard Deviation	25th percentile	Median	75th percentile
Manager Compensation						
Manager Compensation ($, 2010)	525	766,178	988,161	262,112	500,271	790,351
Log Manager Compensation	525	13.131	0.840	12.477	13.123	13.580
Outrage: Reference Wages						
Constitutent Income	1594	46,045	11,603	43,608	53,637	67,306
Regional Household Income	1624	50,035	13,928	41,191	46,509	53,682
Constituents Outrage =-1*Log(Constituent Income)	1594	-10.909	0.332	-11.117	-10.890	-10.683
Regional Outrage=-1*Log(Regional Income)	1624	-10.788	0.246	-10.891	-10.747	-10.626
Outrage: Trustee Occucation Composition						
Municipal Workers (% Trustees)	1877	0.077	0.130	0.000	0.000	0.118
Teachers (% Trustees)	1877	0.147	0.207	0.000	0.083	0.182
Finance Civil Servants (% Trustees)	1532	0.344	0.212	0.167	0.364	0.500
Other Agency Variables						
Political Chair	1844	0.137	0.344	0.000	0.000	0.000
Underfunded Index	2133	-0.001	1.165	-0.501	0.000	0.307

Panel B: Correlations

	Compen-sation	Municipa l Workers	Civil Servants	Teachers	Constituent Outrage	Regional Outrage	Political Chair
Municipal Workers	-0.096**	1					
Finance Civil Servants	-0.099*	-0.008	1				
Teachers	-0.138***	-0.188***	-0.035	1			
Constituent Outrage	-0.053	-0.143***	-0.102***	-0.193***	1		
Regional Outrage	-0.304***	-0.014	-0.115***	0.186***	0.163***	1	
Political Chair	-0.158***	-0.090***	0.395***	0.019	-0.048*	0.089***	1
Underfunded Index	-0.054	0.075***	-0.039	0.100***	0.055**	0.067***	0.016

Table 6: Professions of Investment Managers and Trustees

This table reports the immediate prior profession of investment managers (Panel A) and the current professions of trustees (Panel B). The data are collapsed to the cross section of public funds. All data are hand collected.

Panel A: Investment Managers' Professions

Occupation	Description	Professions Represented	%
		Prior Pension Executives	
Pension - Investment Executive	Investment manager from another pension fund	Director of Investment, CEO, CIO	4.9%
Pension - Other Executive	Other executive position in another pension fund	Assistant General Counsel, Assistant Executive Director, Deputy Executive Director, Chief of Staff, COO	18.0%
		Prior Private Firm Finance Professionals or Executives	
Private Firm Professional	Financial position from privately firm	CEO, CIO, Director, Managing Partner, Accountant, Actuary, Auditor, Consultant, CRO	31.1%
		Civil Servants	
Civil Servant (Finance)	Civil servant with financial experience	Treasurer, Auditor, Accountant, Controller, Budget Officer, Finance Director, Public Institution Professor	29.5%
Civil Servant (Non-Finance)	Civil servant without financial experience	City Council CEO, City Manager, Executive Director, Department of Correction Administrator, Deputy Chief of Staff, Director, Executive Commissioner, Natural Resource Advisor, Teacher, Senator	16.4%

Panel B: Trustees' Professions

Occupation	Description	Professions Represented	%
		Civil Servants	
Politician	Includes any representative or elected official of municipal, state or federal government	Senator, House Representative, Mayor, Governor, Lieutenant Governor, Secretary of State, Attorney General, Assembly Speaker, State Representative, Secretary, Minister, Borough President, City Manager, Assistant Deputy Minister, Deputy Governor, Premier Deputy Chief of Staff, Deputy Minister, , City Council, County Commissioner, Deputy City Manager, Deputy General Counsel,	6.4%
Finance Civil Servant	Civil servant with financial experience	Treasurer, Auditor, Accountant, Controller, Budget Officer, State Finance Director	34.4%
Other Civil Servant	Civil servant without financial experience	Judge, Prosecutor, Clerk, Commissioner, Assistant Commissioner, Professor, Dean	13.7%
		Non-Civil Servants	
Teacher	Teachers	Teachers	14.7%
Municipal Worker	Workers providing services to city residents, union labor	Police Officer, Fire Officer, Jail Worker, Railway , Steel , Construction, Electrician, Mail Employee, Librarian, Miner, Bus Driver, Chimney Sweep, Food Worker, Manufacturing Worker, Telecommunications	7.7%
Professionals	Local private sector professionals and NGO executives	Financial Sector Expert, Doctor, Nurse, Dentist, Private Firm CEO, CIO, Chairman, Pharmacist, Journalist, Media Professional, Architect, NGO Chairman, Owner of Private Firm	23.1%

Table 7: Estimating the Effect of Outrage on Manager Compensation

The dependent variable is the log compensation of the pension fund highest paid investment executive. Present are OLS estimates of the effect of outrage, other agency issues, and and controls on compensation. *Municipal Workers* is the percent of the board whose career is in the municipal labor force, defined as police, fire department, hosptials, libararies, and other non-civil servant positions. *Finance Civil Servant* is the percent of the board whose background is in public sector financial positions (e.g., city controllers, auditors, etc.).*Teachers* is the percent of the pension board who are teachers. *Political Chair* is a dummy taking value 1 if the chair is appointed by the executives or ministers of the government. *Underfunded Index* is an index constructed by taking the mean across the standardized value of (1- the funded ratio) and age following Rauh (2008). We take lagged values to avoid contemporaneous returns. *Constituent Outrage* and *Regional Outrage* are the outrage relative wage measures, repectively, equal to -1*log (constituent workers) and -1*log(municipal household income). *Log Size* is the log of the lagged fund AUM. All money variables are in 2010 USD. Year fixed effects are included. Standard errors are clustered at the fund level. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Log Compensation					
Municipal			-1.078*	-1.167**		-1.383***
			[0.576]	[0.524]		[0.514]
Teachers			-0.481*	-0.289		-0.393
			[0.259]	[0.264]		[0.269]
Finance Civil Servants			-1.497***	-1.450***		-1.263***
			[0.313]	[0.292]		[0.315]
Regional Outrage		-0.531**		-0.510**		-0.455*
		[0.236]		[0.250]		[0.241]
Constituent Outrage		0.0832		-0.101		-0.131
		[0.155]		[0.159]		[0.159]
Political Chair					-0.534***	-0.325**
					[0.139]	[0.149]
Underfunding Index (lag)					0.0262	0.0385
					[0.0405]	[0.0417]
Log Size (lag)	0.123**	0.0980*	0.189***	0.162***	0.136**	0.165***
	[0.0576]	[0.0577]	[0.0532]	[0.0534]	[0.0579]	[0.0540]
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	338	338	338	338	338	338
Number of Funds	93	93	93	93	93	93
R-Squared	0.0609	0.196	0.173	0.306	0.125	0.322

Table 8: Performance Results -- Excess Returns

Reported in columns (1)-(4) are return 2SLS estimate from the system of two equations. The dependent variable in numbered columns is excess return over column-indicated asset-class benchmark. (Columns (5)-(8) present OLS estimates of returns for comparison.) The far left column presents System Equation I estimates of the effect of political agency on compensation for the sample in column (1). A similar estimate (unreported) is used for each of columns (2)-(4). In columns (1)-(4), the log compensation variable is the outrage-predicted compensation, from system equation 1 (the left column). *Municipal Worker*, *Teachers*, and *Finance Civil Servant* are the trustee composition outrage variables. *Constituent Outrage* and *Regional Outrage* are the outrage relative wage measures, repectively, equal to -1*log (constituent workers) and -1*log(municipal household income). *Political Chair* is equal to one for funds whose chair is appointed by the government. *Underfunded Index* is an index constructed by taking the mean across the standardized value of (1- the funded ratio) and age following Rauh (2008). Log Size is the log of the lagged fund AUM. *Weight* variables are asset allocation weights, and the choice of weights correspond to the finest subset of allocations we consistently have for the columns. Standard errors are clustered at the fund level. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	Log Compen-sation	Log Excess Returns in: Portfolio	Alterna-tives	Public Equities	Fixed Income	Log Excess Returns in: Portfolio	Alterna-tives	Public Equities	Fixed Income
Model:	1st Equation	2nd Equation	2nd Equation	2nd Equation	2nd Equation	OLS	OLS	OLS	OLS
LogCompensation(*Outrage-Predicted)*		0.0185*	0.0131*	0.0069**	-0.0074**	0.0117	0.00686	3.82E-06	-0.000481
		[0.01077]	[0.00767]	[0.00312]	[0.00294]	[0.00801]	[0.00425]	[0.00209]	[0.00196]
Municipal	-0.955**								
	[0.484]								
Teachers	-0.0841								
	[0.223]								
Finance Civil Servants	-0.829***								
	[0.246]								
Regional Outrage	-1.084***								
	[0.150]								
Constituent Outrage	-0.0598								
	[0.152]								
Political Chair	-0.330***	0.0219	-0.0367*	0.00275	-0.00539	0.0174	-0.0414**	-0.0007	-0.00126
	[0.111]	[0.0159]	[0.0202]	[0.00298]	[0.00417]	[0.0137]	[0.0190]	[0.00323]	[0.00374]
Underfunding (lag)	0.00697	0.00468	0.000562	0.00164	0.000729	0.00465	0.000391	0.00186	0.000571
	[0.0425]	[0.00641]	[0.00576]	[0.00195]	[0.00225]	[0.00640]	[0.00569]	[0.00200]	[0.00224]
Log Size (lag)	0.273***	0.0114**	-0.00471	-0.000673	0.00328	0.0131**	-0.00329	0.000283	0.000869
	[0.0469]	[0.00553]	[0.00374]	[0.00166]	[0.00250]	[0.00566]	[0.00380]	[0.00185]	[0.00285]
Weight Hedge Funds	0.760	0.180	0.103			0.172	0.109		
	[1.009]	[0.150]	[0.162]			[0.147]	[0.161]		
Weight Private Equity	1.722*	-0.0198	0.0683			-0.0126	0.0729		
	[0.895]	[0.126]	[0.0891]			[0.119]	[0.0896]		
Weight Bonds	-3.985***	0.134	0.0251			0.0964	-0.00095		
	[0.976]	[0.117]	[0.0783]			[0.119]	[0.0767]		
Weight Domestic Stocks	-0.0973	0.116**		0.0194		0.100*		0.0148	
	[0.559]	[0.0564]		[0.0144]		[0.0553]		[0.0138]	
Weight Global Stocks	1.289**	0.126**		0.0151		0.126**		0.0174	
	[0.587]	[0.0634]		[0.0173]		[0.0636]		[0.0162]	
Weight Bonds	-0.655	0.119			-0.0277	0.106			-0.0325
	[0.598]	[0.0884]			[0.0210]	[0.0916]			[0.0244]
Weight Cash					-0.0845				-0.0965
					[0.0542]				[0.0634]
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	290	290	311	327	256	290	311	327	256
Number of Funds	86	86	89	93	80	86	89	93	80
R-Squared	0.517	0.445	0.137	0.123	0.176	0.446	0.140	0.123	0.190
F-Stat	15.81								

Table 9: Results - Realized Tracking Error

Observations in this Table are limited to one observation per fund, collapsed to funds who have at least 3 years of portfolio returns for which tracking errors can be calculated. Reported in columns (1)-(3) are return 2SLS estimate from the system of two equations. The dependent variable in numbered columns is the realized tracking error for the fund, calculated by regressing portfolio returns on benchmark returns with no constant for each pension fund. The residuals are squared, and we take the standard deviation of the mean squared error across time. (Columns (4)-(6) present OLS estimates of returns for comparison.) Columns (2) and (5) (Low Risk) limit the sample to those with below average portfolio weights in alterntives; columns (3) and (6), to above average weights in alternatives (High Risk).The far left column presents System Equation I estimates of the effect of political agency on compensation for the sample in column (1). A similar estimate (unreported) is used for each of columns (2)-(3). In columns (1)-(3), the log compensation variable is the outrage-predicted compensation, from system equation 1 (the left column). *Municipal Worker* and *Finance Civil Servants* are the trustee composition outrage variables. *Regional Outrage* is the outrage relative wage measure equal to -1*log(municipal household income). *Political Chair* is equal to one for funds whose chair is appointed by the government. *Log Size* is the log of the lagged fund AUM. Weight variables are asset allocation weights, and the choice of weights correspond to the finest subset of allocations we consistently have for the columns. Standard errors are clustered at the fund level. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

		(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Log Compensation	Portfolio Tracking Error			Portfolio Tracking Error		
Sample:		All	Low Risk	High Risk	All	Low Risk	High Risk
	1st Equation	2nd Equation	2nd Equation	2nd Equation	OLS	OLS	OLS
LogCompensation(*Outrage-Predicted)*		-0.0515**	0.0265	-0.104**	-0.00658	-0.0106	-0.0083
		[0.0252]	[0.0264]	[0.0503]	[0.00883]	[0.0116]	[0.0144]
Municipal	-0.861						
	[0.596]						
Finance Civil Servants	-1.295***						
	[0.398]						
Regional Outrage	-0.993***						
	[0.274]						
Political Chair	-0.240	-0.0470**	-0.017	-0.0972**	-0.0153	-0.0176	-0.0206
	[0.181]	[0.0232]	[0.0300]	[0.0476]	[0.0156]	[0.0247]	[0.0203]
Underfunded Index	-0.0056	-0.0108	-0.0043	-0.0132	-0.00706	-0.00208	-0.0153
	[0.0647]	[0.00732]	[0.00938]	[0.0171]	[0.00554]	[0.00746]	[0.00966]
Log Size (lag)	0.159**	0.013	0.0166	0.0246	0.0110*	0.0155	0.0069
	[0.0766]	[0.00786]	[0.0126]	[0.0154]	[0.00577]	[0.0103]	[0.00772]
Weight_Alternatives	0.0563	0.154			0.0916		
	[0.967]	[0.111]			[0.0776]		
Weight_Public Equities	0.609	0.118			0.171***		
	[0.741]	[0.0830]			[0.0442]		
Observations, 1 per fund	80	80	40	40	91	47	44
R-Squared							
F-Stat	9.39						

Table 10: Asset Class Weights Results

The far left column presents the first stage estimate, where log manager compensation is instrumented with `% Trustees who are Municipal Workers', `% Trustees with Public Sector Finance Experiences,`% Trustees who are Teachers', `Constituent Outrage' (=-log(average wages of constitutuents)), and `Regional Outrage' (=-log(median local income)). The dependent variable in numbered columns is fund portfolio weight allocated to the asset class noted in the column. Columns (1)-(3) present the second stage results, and columns (4) - (6) present the corresponding OLS results for comparison. `Political Board' is equal to one for funds whose chair is appointed by the government. `Underfunded Index' is the funded ratio and age index of underfunding pressures. `Log Size' is the log of the lagged fund AUM. All money variables are in 2010 USD. Year fixed effects are included. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1. Two sets of standard errors are presented beneath the coefficient - standard errors clustered at the fund level (top) and robust standard errors under the seemingly unrelated assumption (bottom), inlcuded because of the joint determination of allocation weights.

		(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Log Compen-sation	Asset Class Weight in: Alternatives	Public Equities	Fixed Income	Asset Class Weight in: Alternatives	Public Equities	Fixed Income
Model:	1st Equation	Tobit 2nd Equation	Tobit 2nd Equation	Tobit 2nd Equation	Tobit Single Equation	Tobit Single Equation	Tobit Single Equation
Log Compensation		0.0499	-0.116	0.0517	0.0117	-0.0198	0.00798
		[0.0162]***	[0.0201]***	[0.0162]***	[0.00700]*	[0.00862]**	[0.00783]
		[0.0314]	[0.0451]***	[0.0323]	[0.00979]	[0.0131]	[0.0132]
Municipal	-1.294						
	[0.455]***						
Teachers	-0.00405						
	[0.210]						
Finance Civil Servants	-1.054						
	[0.207]***						
Regional Outrage	-1.040						
	[0.128]***						
Constituent Outrage	0.036						
	[0.139]						
Political Chair	-0.236	0.0238	-0.0658	0.0241	0.0012	-0.00865	-0.0018
	[0.103]**	[0.0173]	[0.0231]***	[0.0187]	[0.0144]	[0.0176]	[0.0160]
		[0.0328]	[0.0397]*	[0.0275]	[0.0286]	[0.0288]	[0.0214]
Underfunded Index (lag)	0.0194	0.0194	-0.00701	-0.0132	0.0195	-0.00738	-0.013
	[0.0402]	[0.00588]***	[0.00812]	[0.00658]**	[0.00563]***	[0.00692]	[0.00629]**
		[0.00882]**	[0.00891]	[0.00656]**	[0.00868]**	[0.00769]	[0.00639]**
Log Size (lag)	0.280	0.00467	0.0164	-0.0139	0.0142	-0.00773	-0.00298
	[0.0397]***	[0.00669]	[0.00892]*	[0.00722]*	[0.00540]***	[0.00664]	[0.00603]
		[0.0116]	[0.0193]	[0.0124]	[0.00777]*	[0.0102]	[0.00822]
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y
Observations	334	334	334	334	334	334	334
Pseudo R-squared	0.423				-0.135	-0.054	-0.054
F-Stat	23.21						

Table 11: Portfolio Delegation Results

The far left column presents the first stage estimate, where log manager compensation is instrumented with `% Trustees who are Municipal Workers', `% Trustees with Public Sector Finance Experiences,`% Trustees who are Teachers', `Constituent Outrage' (=-log(average wages of constitutuents)), and `Regional Outrage' (=-log(median local income)). The dependent variable in numbered columns is the fraction of assets managed via delegation the asset class noted in the column. Columns (1)-(3) present the second equation results, and columns (4) - (6) present the corresponding OLS results for comparison. `Political Board' is equal to one for funds whose chair is appointed by the government. `Underfunded Index' is the funded ratio and age index of underfunding pressures. `Log Size' is the log of the lagged fund AUM. All money variables are in 2010 USD. Year fixed effects are included.The final row presents the F-stat for the relevance of the instruments. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1. Two sets of standard errors are presented beneath the coefficient - standard errors clustered at the fund level (top) and robust standard errors under the seemingly unrelated assumption (bottom), included because of the joint determination of allocation weights.

		(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Log Compen-sation	Delegated Fraction in: Alternatives	Public Equities	Fixed Income	Delegated Fraction in: Alternatives	Public Equities	Fixed Income
Model:	1st Equation	Tobit 2nd Equation	Tobit 2nd Equation	Tobit 2nd Equation	Tobit Single Equation	Tobit Single Equation	Tobit Single Equation
Log Compensation		-0.518	-0.077	-0.511	-0.242	-0.292	-0.388
		[0.0821]***	[0.121]	[0.148]***	[0.0458]***	[0.0722]***	[0.0893]***
		[0.181]***	[0.255]	[0.296]*	[0.0680]***	[0.113]***	[0.186]**
Municipal	-1.447						
	[0.491]***						
Teachers	0.00855						
	[0.232]						
Finance Civil Servants	-1.596						
	[0.254]***						
Regional Outrage	-1.314						
	[0.145]***						
Constituent Outrage	-0.189						
	[0.158]						
Political Chair	-0.130	0.120	0.129	0.439	0.345	-0.0131	0.512
	[0.118]	[0.128]	[0.182]	[0.209]**	[0.116]***	[0.165]	[0.197]***
		[0.182]	[0.268]	[0.418]	[0.208]*	[0.216]	[0.410]
Underfunding Index (lag)	0.00543	0.0697	0.0792	0.132	0.0812	0.0731	0.126
	[0.0517]	[0.0509]	[0.0762]	[0.0852]	[0.0488]*	[0.0741]	[0.0840]
		[0.0823]	[0.198]	[0.187]	[0.0801]	[0.198]	[0.185]
Log Size (lag)	0.307	-0.0522	-0.275	-0.469	-0.11	-0.221	-0.496
	[0.0458]***	[0.0419]	[0.0719]***	[0.0827]***	[0.0376]***	[0.0639]***	[0.0792]***
		[0.0928]	[0.113]**	[0.150]***	[0.0723]	[0.103]**	[0.136]***
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y
Observations	245	258	245	251	258	245	251
Pseudo R-squared	0.531				0.258	0.149	0.247
F-Stat	29.17						

Appendix Table 1: Compensation Outrage Anecdotes in the Media

Presented are nine anecdotes of media outrage concerning compensation of public fund investment managers

1. Oregon	"Unspoken, but also politically inconvenient is the compensation to attract talent from the private sector. The state's existing investment officers are some of the best paid public employees, making an average of $200,000 a year. But Treasury officials quietly complain that staff is underpaid by industry standards, and bristle about having to explain and get approval from the Legislature to release performance-based pay each year." Source: *The Oregonian*, Ed Sickinger, "Treasurer looks to reorganize investment division into quasi-public entity," Jan 16, 2013
2. CalPERS	"Our compensation is just too low," board member Richard Costigan said in May. "We're not attracting quality candidates. The quality candidates who want to come here are negatively impacted by the salary levels." Source: *Sacramento Bee* , Adam Ashton, 'Pay for CalPERS' next Chief investment officer can reach $1.77 million,' June 20, 2018
3. Kentucky Retirement System	"We've got our issues here and it's hard enough attracting applicants," Thielen said, referencing KRS's status as one of the worst-funded pensions in the country.Thielen, who announced his intention to retire last year, has already had to stay on longer than planned due to a lack of qualified applicants for his position. ... As for the provisions regarding fund personnel and their compensation, Thielen said the bill would "create significant problems for us attracting and retaining staff." While KRS links employee compensation to performance, the bill would require adoption of the government's tenure-based pay structure. Source: *AiCIO* , Amy White, "Kentucky Pension Fights to Retain Control of Governance", February 25, 2016
4. New York Teachers' Retirement Sytstem	Depoliticizing, professionalizing, and streamlining the management of our pension funds will enhance investment returns and reduce pension costs....The proposal calls for the investment entity to be staffed by experienced industry professionals and for compensation packages to attract those investment professionals....* A Chief Investment Officer will lead the new investment management entity. Source: *Targeted News Service* , 'Comptroller Liu, Mayor Bloomberg and Labor Leaders Announce Agreement in Principle to Reform Pension Investment Governance and Management,' Oct 27, 2011
5. Missouri State Employees Retirement System	Dahl, chief investment officer for the Missouri State Employees Retirement System, will receive a $125,155 cash bonus this summer and up to that amount in deferred compensation, payable in two years. In effect, he could double his $250,309 salary.... The payments, originally scheduled for February, are slated to go out in June, a delay designed to avoid public scrutiny amid legislative budget-cutting. It's a politically sticky subject, because Gov. Jay Nixon and legislators are considering cutting thousands of government jobs, services for the disabled and college scholarships among many other things. Senate Appropriations Committee Vice Chairman Kurt Schaefer, R-Columbia, was surprised Thursday to learn of the bonuses. "Now is not the time for anyone to be getting a state-funded bonus," said Schaefer.... Nixon, who last year called MOSERS bonuses "unconscionable," said Thursday that the bonus system is on the way out, thanks to his appointees to the board of trustees. Source: *St. Louis Post-Dispatch* , Virginia Young, 'Bonuses for pension staff raise eyebrows in Missouri Top investment officer due to get $125,155 amid big cuts,' April 2, 2010,

Appendix Table 1 (continued)

6. Florida SBA	The Florida State Board of Administration (SBA) has bumped the annual paycheck of CIO Ash Williams up to $367,500 from $325,000. Williams, who oversees a team managing $176.4 billion in pension and endowment assets, has not had a pay raise since 2008, and in line with SBA rules, does not receive incentives, Dennis Mackee, a spokesman for the fund, told MMI. Public CIO compensation has been a hot-button topic in the industry. According to industry insiders, a freshly-minted MBA graduate starts out in the private sector earning at least $300,000 a year. The typical public fund cio earns about $200,000-350,000 annually. Source: *Money Management Letter* , Dawn Lim, Feb 28, 2014, 'Florida SBA CIO Gets First Pay Raise In Five Years'
7. New Mexico SIC	The New Mexico SIC has been in the market for a fixed-income director to oversee a $4 billion credit portfolio ... "The council is seeking to find a qualified credit portfolio manager, which is difficult under the current budgetary constraints.... New Mexico's portfolio managers currently command approximately $100,000-120,000 in annual compensation. Market practitioners estimate that the state needs to offer at least $150,000 to fill the position... New Mexico's compensatory challenge highlights a tricky dance public funds must perform to persuade state legislatures to grant investment staff compensation levels that are higher than other public employees. "Pay scales in public plans tend to reflect the pay scales for the state bureaucracy. A public plan is looked at as just another state agency," said Charles Skorina of recruitment firm Skorina & Co., which specializes in recruiting for asset management firms and endowments and foundations. Asset management and E&F executives generally command two to four times more compensation than public pension peers in similar positions. Source: *Money Management Letter* , Dawn Lim, May 14, 2013, 'Hiriing woes Confound Large Public Funds
8. Qsuper, Australia	Brad Holzberger, chief investment officer of the $54 billion QSuper -retirement fund was the highest paid executive in the not-for-profit -superannuation sector last year, taking home $1.2 million. .... Mark Delaney, who oversees the investment portfolio of the $78 billion AustralianSuper fund.... was paid $971,000. Ian Silk, the boss of AustralianSuper, the largest not-for-profit fund in the country, was paid $700,000. The salaries are modest compared with the remuneration packages of fund managers, whose services are bought by super funds. The highest paid executive director at Platinum Asset Management, which has $24 billion under management, is Philip Howard, the finance director, who was paid $3.6 million last year. Fund managers can earn up to $10 million a year. Source: *Financial Review* , Sally Patten, 'Salaries for industry fund bosses not as super as fundie pay,' Nov 6, 2014
9. Qsuper, Australia	SUPERANNUATION chiefs managing the nest eggs of Queensland public servants are receiving fat-cat bonuses while members are facing delays in getting advice. Source: *Courier Mail* , Renee Viellaris, 'QSuper fat cats take the cream,' Spetember 21, 2014

Appendix C Table 1: Returns Results Robustness Check

The far left column presents the first stage estimate, where log manager compensation is instrumented with `% Trustees who are Municipal Workers', `% Trustees with Public Sector Finance Experiences,`% Trustees who are Teachers', `Constituent Outrage' (=-log(average wages of constitutuents)), and `Regional Outrage' (=-log(median local income)). The final row presents the F-stat for the relevance of these instruments. The dependent variable in numbered columns is the excess return over benchmark, with the asset class noted in the column. Columns (1)-(4) present the second equation results, and columns (5) - (8) present the corresponding OLS results for comparison. Weights are asset allocation weights, and the choice of weights correspond to the finest subset of allocatitons we consistently have for the columns. `Political Board' is equal to one for funds whose chair is appointed by the government. `Underfunded Index' is the funded ratio and age index of underfunding pressures. `Log Size' is the log of the lagged fund AUM. All money variables are in 2010 USD. Year fixed effects are included. Standard errors are clustered at the fund level. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	Log Compen-sation	Log Excess Returns for Allocations in: Portfolio	Alterna-tives	Public Equities	Fixed Income	Log Excess Returns for Allocations in: Portfolio	Alterna-tives	Public Equities	Fixed Income
Model:	1st Equation	2nd Equation	2nd Equation	2nd Equation	2nd Equation	OLS	OLS	OLS	OLS
Log Compensation		0.0217*	0.0116	0.00610*	-0.00643**	0.0117	0.00686	3.82E-06	-0.000481
		[0.0117]	[0.00728]	[0.00325]	[0.00280]	[0.00801]	[0.00425]	[0.00209]	[0.00196]
% Trustees who are Municipal Workers	-1.334***								
	[0.471]								
% Trustees who are Teachers	-0.269								
	[0.220]								
% Trustees with Public Sect. Fin Exp.	-0.654***								
	[0.170]								
Regional Outrage (= -log municipal income)	-1.029***								
	[0.150]								
Constituent Outrage (= -log beneficiarys wage)	-0.0298								
	[0.146]								
Political Board	-0.389***	0.0239	-0.0379*	0.00218	-0.00479	0.0174	-0.0414**	-0.0007	-0.00126
	[0.105]	[0.0162]	[0.0198]	[0.00292]	[0.00415]	[0.0137]	[0.0190]	[0.00323]	[0.00374]
UnderfundedIndex(lag)	0.00325	0.00469	0.000521	0.00153	0.000706	0.00465	0.000391	0.00186	0.000571
	[0.0418]	[0.00643]	[0.00575]	[0.00186]	[0.00224]	[0.00640]	[0.00569]	[0.00200]	[0.00224]
Log Size (lag)	0.277***	0.0106*	-0.00437	-0.000547	0.00293	0.0131**	-0.00329	0.000283	0.000869
	[0.0461]	[0.00563]	[0.00375]	[0.00163]	[0.00245]	[0.00566]	[0.00380]	[0.00185]	[0.00285]
Weight_H.F.	0.842	0.184	0.104			0.172	0.109		
	[0.996]	[0.151]	[0.162]			[0.147]	[0.161]		
Weight_P.E.	1.662*	-0.0231	0.0694			-0.0126	0.0729		
	[0.897]	[0.129]	[0.0890]			[0.119]	[0.0896]		
Weight_ R.E.	-4.145***	0.152	0.0188			0.0964	-0.00095		
	[0.968]	[0.115]	[0.0745]			[0.119]	[0.0767]		
Weight_Stocks (Domestic)	0.0185	0.123**		0.0178		0.100*		0.0148	
	[0.555]	[0.0582]		[0.0142]		[0.0553]		[0.0138]	
Weight_Stocks (Non-Domestic)	1.092*	0.126**		0.0149		0.126**		0.0174	
	[0.578]	[0.0636]		[0.0172]		[0.0636]		[0.0162]	
Weight_Fixed Income	-0.645	0.125			-0.0284	0.106			-0.0325
	[0.592]	[0.0874]			[0.0213]	[0.0916]			[0.0244]
Weight _Cash					-0.0863				-0.0965
					[0.0551]				[0.0634]
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	290	290	311	327	256	290	311	327	256
Number of Funds	86	86	89	93	80	86	89	93	80
R-Squared	0.526	0.444	0.138	0.129	0.18	0.446	0.140	0.123	0.190
F-Stat	17.21								

Appendix C Table 2: Tracking Error Robustness Check

Observations in this Table are limited to one observation per fund, collapsed to funds who have at least 3 years of portfolio returns for which tracking errors can be calculated. The far left column presents the first stage estimate, where log manager compensation is instrumented with `% Trustees who are Municipal Workers', `% Trustees with Public Sector Finance Experiences', and `Regional Outrage' (=-log(median local income)) (We are limited to three instruments because of the smaller sample.) The final row presents the F-stat for the relevance of these instruments. The dependent variable in numbered columns is the realized tracking error for the fund, calculated by regressing portfolio returns on benchmark returns with no constant for each pension fund. The residuals are squared, and we take the standard deviation of the mean squared error across time. Columns (1)-(3) present the second equation results, and columns (4) - (6) present the corresponding OLS results for comparison. Columns (1) and (4) present the result for the full sample. Columns (2) and (5) (Low Risk) limit the sample to those with below average portfolio weights in alterntives; columns (3) and (6), to above average weights in alternatives (high Risk). Weight_alterntives and weight_publi equities are asset allocation weights, leaving fixed income excluded. `Political Board' is equal to one for funds whose chair is appointed by the government. `Underfunded Index' is the funded ratio and age index of underfunding pressures. `Log Size' is the log of the lagged fund AUM. All money variables are in 2010 USD. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

		(1)	(2)	(3)	(4)	(5)	(6)
Dependent Var:	Log Compen-sation	Portfolio Tracking Error			Portfolio Tracking Error		
Sample:		All	Low Risk	High Risk	All	Low Risk	High Risk
	1st Equation	2nd Equation	2nd Equation	2nd Equation	OLS	OLS	OLS
Log Compensation		-0.0579**	0.0114	-0.103**	-0.00658	-0.0106	-0.0083
		[0.0264]	[0.0331]	[0.0504]	[0.00883]	[0.0116]	[0.0144]
% Trustees who are Municipal Workers	-1.161*						
	[0.584]						
% Trustees with Public Sect. Fin Exp.	-0.802***						
	[0.284]						
Regional Outrage (= -log municipal income)	-0.958***						
	[0.278]						
Political Board	-0.309*	-0.0506**	-0.0212	-0.0965*	-0.0153	-0.0176	-0.0206
	[0.179]	[0.0241]	[0.0296]	[0.0476]	[0.0156]	[0.0247]	[0.0203]
Underfunded Index	-0.0209	-0.0109	-0.00542	-0.0132	-0.00706	-0.00208	-0.0153
	[0.0650]	[0.00755]	[0.00921]	[0.0170]	[0.00554]	[0.00746]	[0.00966]
Log Size (lag)	0.129*	0.0136*	0.0153	0.0244	0.0110*	0.0155	0.0069
	[0.0752]	[0.00812]	[0.0124]	[0.0153]	[0.00577]	[0.0103]	[0.00772]
Weight_Alternatives	-0.145	0.157			0.0916		
	[0.991]	[0.114]			[0.0776]		
Weight_Public Equities	0.371	0.117			0.171***		
	[0.753]	[0.0856]			[0.0442]		
Constant	0.655	0.522	-0.32	1.032*	-0.126	-0.0498	0.0742
	[3.175]	[0.328]	[0.515]	[0.530]	[0.116]	[0.186]	[0.202]
Observations	80	80	40	40	91	47	44
F-Stat	8.596						