OUTRAGED BY COMPENSATION: IMPLICATIONS FOR PUBLIC PENSION PERFORMANCE

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Abstract

Public pension boards fear stakeholder outrage if they were to compensate internal investment managers with market-level salaries. We derive implications theoretically in an agency-portfolio choice model motivated by inequality-aversion. In a global sample, relaxing the effect of outrage on contracting leads to an average annual incremental value-add of $29 million generated through 6.5 bps in higher returns from risky assets, at the cost of $82,000 in additional compensation. Governance reforms that address outrage by reducing political appointees or requiring independent skills-based boards can triple the annual value-add. These findings are orthogonal to costly political distortions from underfunding and pay-to-play schemes.

Keywords: Inequality aversion, public pension funds, pension governance, underfunding, trustees, fund management, politicization, asset allocation, compensation

JEL codes: G11, G23, G30

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1. Introduction

Public pensions and sovereign funds hold $21.5 trillion in assets (Official Monetary and Financial Institutions Forum, 2018). When these public funds fail to manage these assets effectively, public sector workers and taxpayers bear the costs to support promised pension payouts to retirees. This paper follows Romano (1993) and a longstanding literature in examining the potential for politicization of the governance structure of public funds to erode performance. We complement the recent literature, which has focused on distortions arising from politicians' extraction of private-benefits from pension funds' asset management,[1] by focusing on a human capital channel.We examine the impact when politicized pension boards fear outrage if they choose market-level compensation for their investment managers. We model how this political contracting friction affects asset allocation and performance, and then estimate its importance empirically using a global sample of pension plans.

There are good reasons for pension beneficiaries and taxpayers to worry, at least in theory, about costly consequences arising from fears of outrage over the compensation of public pension internal investment managers. The threat of outrage causes trustees that oversee the public funds to hire lower-skilled internal managers and offer sub-optimal incentive contracts. This talent hiring friction affects the fund's asset allocation choices and reduces performance. Public sector funds are particularly prone to outrage concerns because their trustees either are selected by public sector employees or politicians, or are themselves politicians. As a result, trustees have career concerns that are sensitive to information emerging in the public domain. Income inequality aversion fuels outrage, with inequality captured in the difference in the pay of investment managers relative to pension beneficiaries and local taxpayers. Thus, the outrage friction produces an additional loss that *main street* communities face from inequality.

To illustrate the outrage constraint 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:

[1] 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).

> *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…. 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.[2]

Appendix Table 1 provides a sampling of similar anecdotes. What is remarkable about the anecdotes is how similar tensions arise across many different types of pension systems 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 attract the desired skill level and incentivize the optimal risk-taking in the portfolio.

The model incorporates 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 wage area or has trustees from occupations that are sensitive to wage comparisons (budget civil servants, teachers, municipal workers, etc.), the trustees fear private-costs from outrage if they pay market-level salaries to hire talented managers. As a result, they choose instead to hire managers below a skill threshold to avoid compensation breaching the outrage pay constraint. Second, we incorporate the previously-documented effects of politicians' use of public pensions to extract private-benefits from their asset management choices. Third, we incorporate a pressure for public pensions to risk-up when they face unfunded liabilities in their public plans. 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),

[2] "Treasurer looks to reorganize investment division into quasi-public entity," Ed Sickinger, Jan 16, 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 (Andonov, Hochberg and Rauh (2018)). Underfunding affects the risk preferences of boards (Andonov, Bauer and Cremers (2017)), as modelled in swinging-for-the-fences or gambling-for- resurrection models of Ang, Chen and Sundaresan (2013) and Binsbergen and Brandt (2015).

The model produces comparative statics relating board agency to intermediate outcomes (investment manager skill and the riskiness of asset allocations) and then to the ultimate outcomes of portfolio performance. Of particular interest are the predictions arising from tightening the outrage pay constraint. If the outrage constraint 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 exhibits lower returns for two reasons: lower performance in each asset class because of poorer skills, and lower overall risk exposure because of the higher portfolio weights in fixed income securities.

To test the theoretical predictions, we use a global sample of 111 to 164 public pension funds that account for $5.4 trillion in assets at the end of our sample period and that cover the U.S., Canada, Oceania, and Europe for 1995-2014. The average (median) fund has $45 ($14) billion in AUM. We hand collect data on compensation and biographical information as to the occupations of trustees.

Our empirical methodology mimics our model by setting up a system of two equations, estimated by GMM. In the first equation, compensation is a function of outrage, politicization, underfunding, along with fund characteristics and time fixed effects. In the second equation, performance is a function of outrage-predicted compensation along with politicization, underfunding, fund and time characteristics. With a structurally-motivated, linear system of two equations, we can draw inferences concerning the pass-through effect of outrage on compensation. The exogeneity condition for a causal interpretation is that outrage variables are exogeneous to performance conditional on the management compensation contract. By outrage variables, we mean the variables which predict that a fund faces beneficiaries who may be more likely to express outrage if investment manager compensation were to be high.

A plausible source of the outrage for setting market-level compensation for investment managers in public funds is inequality aversion (see e.g. Fehr and Schmidt (1999)), whereby

disutility depends on the extent to which wages exceed reference wages.[3] We measure reference wages with the average income of local citizens and the average wages of those who work in the relevant public sector covered by the pension. We also capture reference wages by classifying pension plan trustees based on their occupation, focusing on those trustees that are municipal workers, teachers and budget civil servants. Budget civil servants, for example, set wages for many public sector officials, and these wages are a natural reference outcome when they consider compensation for investment managers.

The data we collect reveals relevant relationships between these hypothesized outrage determinants and actual compensation. We find that investment managers receive about $90,000 lower compensation in pension funds with a one standard deviation higher level of municipal workers or budget civil servants. Likewise, compensation is $60,000 lower for pensions whose workers or local citizens have 10% lower reference wages. Thus, the average effect of a determinant of outrage is to lower an investment managers' compensation by $82,000.

We then test for a relationship between outrage-predicted compensation and performance, using our structurally-motivated system to measure the pass-through from outrage to outrage-predicted compensation to returns. In these tests, we control separately for the impact of politicization and underfunding on performance. We find on average that the $82,000 reduction in compensation associated with the potential for outrage results in a statistically significant 6.5 basis points lower portfolio net returns, benchmarked at the asset class level. The negative performance associated with outrage at the portfolio level is driven by a strong link between outrage-predicted log compensation and within-asset class returns in two risky asset classes – alternatives and public equities.

According to our theory, the negative relationship between outrage and performance comes from a lower compensated manager having weaker investment skill. Such a manager may be more inclined to use delegated portfolio management, paying fees to external managers to manage their assets rather than investing directly. We test this hypothesis using rich data on the percent of delegation in pensions' portfolios, available for a subset of funds. We find that a one standard deviation increase in one of the determinants of outrage is associated with an increase in delegated

[3] The literature on inequality aversion is vast. It includes additional models, such as Bolton and Ockenfels (2000), and experimental evidence, such as Loewenstein, Thompson and Bazerman (1989). Fehr and Schmidt (2003) summarize the empirical literature.

portfolio management of 6.5 raw percentage points. Using estimates from prior studies, the greater costs associated with delegation may account for 44 percent of the reduced performance.

For an average fund, our estimates suggest that if that fund were to find a way to attenuate outrage factors that constrain management pay (e.g. reduce the role of budget civil servants) by one standard deviation at a cost of approximately $82,000 in greater pay, the fund would benefit by producing additional annual benefits of approximately $29 million (range of $22 to $38 million) in value-add using the method of Berk and van Binsbergen (2015). More comprehensive efforts to tackle outrage constraints, by reducing political appointees or going further to move from a constituency-based to an independent skills-based board, produce even higher estimated returns of $90 to $114 million in annual value-added.

We document that these results are not driven by funds that are insulated from the outrage threat having greater realized net risk. Realized tracking-error is uncorrelated with outrage-predicted compensation in the portfolio as a whole or within asset classes.

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 Andonov, Bauer and Cremers (2017), we find that underfunding leads to increased asset allocation to alternatives. Consistent with Andonov, Hochberg and Rauh (2018) and Hochberg and Rauh (2013), we find that politicization has a direct negative effect on returns in alternatives asset classes. We interpret our results as complementing these papers, showing an important and neglected human capital channel through which political costs from compensation setting can also undermine returns.

In exploring the impact of politicized governance for public fund outcomes, our paper contributes to a large literature. Romano (1993), for example, hypothesized and found that politicization affects fund performance focusing on a sample of 50 public funds in the 1980s. While our results are broadly consistent, our focus on the human capital channel leads to different policy conclusions. Romano identified the key friction being the lack of accountability of appointed/ex officio trustees, and advocated solutions around increasing the proportion of beneficiary-elected trustees. Focusing on human capital, the key policy implication is to insulate trustees from outrage concerns. Increasing the proportion of beneficiary-elected trustees could exaggerate exposure to outrage concerns, absent other steps. Moving to an independent skills-based board, which could be

appointed by beneficiaries and government, has greater potential to limit outrage pressures and improve human capital outcomes. Modifying pension agreements to share risk of underfunding between beneficiaries and government will contribute to such reforms, as both sides will be motivated to avoid the costs of outrage.

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. In section 6 we conclude and consider alternative pension policy remedies.

2. Model of Portfolio Choice with Political Agency Costs

Consider a setup in which beneficiaries of a pension fund 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 manager-contracting choices to maximize beneficiaries' utility subject to manager participation and incentives. In our setting, because the pensions are *public pension fund*s, being in the political domain can affect trustees' incentives and decisions. 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 pay optimally for investment manager skill because of political costs emerging from workers, retirees, and voters in the community. The second political agency cost emerges from politicized boards' preference for investing in political assets. Political assets are defined as investments that generate private benefits for 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 produce 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 asset allocations and pension plan 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:

$$\text{F}ixed\ Income\text{: } E\left[R_f\right] = r_f.$$

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

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

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

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

We assume that $\varphi_P/\sigma_P < \varphi_{MV}/\sigma_{MV}$ so 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 w_{MV}, w_P, and $(1 - w_{MV} - w_P)$, respectively.[4] For tractability, and consistent with Hochberg and Rauh (2013), we 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 the board equals that of beneficiaries if no political agency costs are at work:

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

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. In the typical pension plan, trustees are either beneficiaries or politicians who employ and pay the beneficiaries. Costs arise for trustees if beneficiaries or others in the community who elect politicians become outraged by the compensation of the top executives of the public pension. The prospect of negative media attention and the resulting negative reputation consequences ensures trustees consider potential outrage in setting compensation. [6]

[4] A pension fund not affected by agency problems would invest in a combination of the MV security and fixed income.
[5] See the appendix for the explicit restriction that prevents the portfolio manager from taking short positions in any asset class.
[6] The model abstracts from the fact that there are fees to outside managers that may also generate outrage. It is hard for beneficiaries and taxpayers to discover the compensation level of such outside managers, not least because their compensation usually depends on fees from multiple asset owners and is not subject to public disclosure requirements. Nevertheless, all that really matters is that outrage be more intensely focused against the compensation of internal managers' as opposed to that of external managers.

A basis for outrage of beneficiaries and those in the community is inequality aversion. Fehr and Schmidt (2003) cite voluminous experimental evidence consistent with inequality aversion. This evidence includes examples where subjects make choices to avoid inequality even when they know it will hurt them. See Loewenstein, Thompson, and Bazerman (1989), for example, or Engelmann and Strobel (2004) who find that most people value equality more than efficiency.

If the board were to set compensation sufficiently high such that outrage occurred, it would have to bear some utility cost:

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

If trustees' utility consequences of outrage are sufficiently 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:

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

$$subject\ to:$$

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

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 garnered 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.[7] 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:

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

[7] 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.

Liability-Driven Preference for Risk

Finally, effective board risk aversion, λ_{board}, can be affected by liability obligations of the pension fund. Ang, Chen, and Sundaresan (2013) 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 face a personal reputational cost if they have to go back to legislatures to request funds to cover a down year of returns. The resulting risk-taking behavior is similar to the 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:

$$\lambda_{board} = \frac{\lambda}{\theta}. \tag{5}$$

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:

$$\begin{aligned} &U_{board} = E[R - manager\ pay] - \tfrac{1}{2}\lambda_{board} Var[R - pay] + \kappa w_P. \\ &subject\ to: \\ &(outrage\ constraint):\ s \le s^{outrage} \text{ if reference wages are low.} \end{aligned} \tag{6}$$

2.3. Solving for the Optimal Contract and Manger Skill

We solve the model by considering the 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 the preferred portfolio choice. We derive this optimal contract for any skill level *s*. 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:

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

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 (w_{MV}, w_P) solving the following program:

$$\max_{w_{MV},w_P} U_{manager} = \max_{w_{MV},w_P} \left\{E[manager\ pay] - \frac{1}{2}\lambda Var[manager\ pay]\right\} \tag{8}$$

The board maximizes the expected monetary payoff penalized by the variance, with penalizing factor $\lambda_{board} = \lambda/\theta$, 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 by the MV security, more politicized boards realize smaller utility increments 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 $V_{board}(s)$ of the board when hiring the manager with skill s, is given by:

$$\begin{aligned} V_{board}(s) &\equiv \max_{c,a,T} U_{board} \\ &= E[R - manager\ pay] - \frac{1}{2}\lambda_{board} Var[R - manager\ pay] + \kappa w_P \\ &= (\kappa - b)w_P + aE[R] - c - \frac{1}{2}\lambda_B a^2 Var[R] \end{aligned} \tag{9}$$

subject to:

(participation constraint) $\quad c + (1-a)E[R] + bw_P - \frac{1}{2}\lambda_M (1-a)^2 Var[R] \geq O(s)$

(incentive constraint) $\quad \{w_{MV}, w_P\} = \underset{w_{MV},w_P}{\operatorname{argmax}}\{U_{manager}|c, a, b\}.$

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

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

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:

$$\max_{s} V_{board}(s), \text{ s.t. } s \leq s^{outrage}. \tag{11}$$

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.[8] This first order condition allows for the calculation of the optimal value of s^* in the unconstrained case, which we call s^{free}. If outrage is binding, the public pension fund will hire the best manager they can within the constraints imposed by public outrage. Therefore, the general solution for the manager quality is given by:

$$s^* = \min\{s^{free}, s^{outrage}\}. \tag{12}$$

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2.4. Comparative Statics

The solution (12) illustrates how funds differ in their cost-performance tradeoff when choosing manager skill. For instance, both boards that face high private benefits κ from political investing, as well as boards that face an outrage constraint on compensation, 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 enough returns to cover pension 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 of a binding outrage constraint 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 ($\Delta R_{MV} < 0,\ \Delta R_P < 0$)); 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

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

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 additional returns, but it is above the level of risk desired by 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: in this situation, public boards incentivize a poorly-skilled investment manager to take on more risk, ending up with a riskier portfolio that underperforms in the risky asset classes.

3. Empirical Methodology

Our goal is to estimate how agency affects public pension fund outcomes working through the compensation contract mechanism. Although we are interested in the other political agency issues, 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 employ a linear sytem of two equations, estimated through GMM. We choose a 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 of 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 providing a framwork for exact parameter calibration. 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 linear structural GMM 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 referring 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 we define the *Outrage* variables to 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. 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 potentially explain performance. We estimate this system using GMM 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 variables, described in the data section, either reflect trustee composition or local income levels that should be unrelated to investment performance, except through any effect on management quality. 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. If there is a concern that the extent of politicization could drive returns through channels other than compensation, we have captured this in part with the *Political Chair* variable. We also consider robustness to different normalization of the trustees' role, as described in the next section.

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 search manually for the personal characteristics and compensation of trustees and managers, we limited the sample to funds in North America, Oceania, and Europe. Table 2 defines all variables and their sources. We convert all monetary data to 2010 U.S. dollars.

Table 3 reports statistics about our sample of public pension funds. As Panel A reports, the full sample consists of 164 funds and 1,856 fund-year observations. The mean and median pension fund have $45 billion and $14 billion in assets, respectively. Panel B reports our estimation sample that consists of funds with compensation and trustee data. The cross-section remains large, covering 111 public pension funds, but we only have a short panel, with 463 fund-year observations. Our estimation sample reflects larger funds, with a mean and median of $102 and $30 billion in assets respectively.

On the right-hand side of the table we report gross portfolio returns. The mean gross portfolio returns are similar between the full sample with 4.3% gross return (Panel A) and the estimation sample (Panel B) where the gross return is 4.2%. As both Panels show, although our sample favors U.S. pension funds, over a third of the sample is from Canada, Europe, and Oceania. Our results are not just reflective of a U.S. story.

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 portfolio weights and performance in three primary asset classes: (i) alternatives (hedge funds, private equity and real estate), (ii) public equities, and (iii) fixed income. We order these asset classes in decreasing risk. 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 tilting of portfolios towards local investing.

Table 4 reports portfolio summary statistics, starting with allocations in Panel A. We present two sets of portfolio weights – those for the sample in which we observe portfolio weights in the corresponding asset class, and those restricted to observing all portfolio weight allocations across the portfolio (used in the weight estimations). The mean distribution of allocations is public equities (0.513), fixed income (0.296), and alternatives (0.191). Table 4 also presents statistics on delegation, available for a subset of funds, defined as the fraction of assets managed by external institutions in each asset class. On average, the fractions of assets managed via delegation are 0.500 for fixed income, 0.734 for equities, and 0.747 for alternatives (excluding hedge funds, which are all outsourced).

Panel B of Table 4 reports performance statistics. At the portfolio level, mean gross and net returns are 4.2% and -0.3% respectively. We use the fund selected benchmarks, reported either in the Boston College CRR dataset or by CEM consulting. The trustees of a fund select the benchmarks, not the asset manager. These asset class benchmarks, are a weighted average of the benchmarks across the sub-asset class portfolios, with the weights calculated using the beginning period weights.

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 of 0.030 across 110 funds. Not surprisingly, tracking error is highest in alternatives, then equities, and finally in fixed income.

4.3. Investment Manager Compensation and Skill Data

We hand-collect compensation data for investment managers. For funds with mandated disclosure, we successfully search for compensation in annual reports and public filings. For the other funds, we search for each named manager and public pension fund in newspaper databases. Newspapers are sometimes able to access compensation information based on freedom of information requests. 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 111 public pension funds with a total panel of 463 observations, including all geographies spanned by our sample.[9] We report summary statistics on compensation in our dataset in Table 5. The median total compensation of the investment executives is $537,197 USD, with a mean of $807,416. A quarter of the fund managers make salary of $292,328 or less.[10] These are large numbers, but recall that observability limits our sample to large funds, and these managers control pension funds of $102 billion on average.

Our model refers to manager skill, which induces higher compensation. Although we do not have a quantitative measure of skill, we hand gather the prior professions of all investment managers. Table 6, Panel B, reports the breakdown of the immediately prior job these managers held. 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 budgetary responsibility. But notably for the other third of investment managers, their prior experience was either as a civil servant with no financial expertise (16.4%) or as a non-financial executive in a pension fund (18%).

Figure 1 depicts box plots of the distribution of compensation by prior profession categories. The [red] dashed vertical lines present the quartile cutoffs from the full sample. The non-finance professionals (non-budget civil servants and pension executives) together account for 34.4% of the sample and clearly earn lower compensation. The mean compensation of non-budget 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

[9] 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.

[10] Funds do not consistently break down total compensation into base and performance related pay and provide benchmarks for compensation setting, so we are unable to make use of such data in our analysis.

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 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 to investment managers "unconscionable" in lieu of payments to services for the disabled, college scholarships, etc.

4.4. Outrage Variables

With inequality aversion, disutility depends on the extent to which a wage offered exceeds an individuals' reference wage (see Fehr and Schmidt (1999)). The outrage variables we use to capture such reference points are of two types -- (i) beneficiary-trustee reference wage measures and (ii) trustee occupation variables. Trustees' occupations are relevant because trustees might be outraged by large management compensation compared to their own wages (in the case of teachers and municipal workers) or they might pay attention to outrage triggered by the inequality aversion of beneficiaries and citizens.

The first reference wage measure is the wages of the working beneficiaries. We collect information on the average wages of working beneficiaries either directly from the annual reports 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 $47,811.

The second reference wage we collect is 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 local household income (Table 5) is $55,434. Both measures have a tight and quite symmetric distribution.

We identify trustee occupation variables 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.[11]

Table 6, panel B provides a tabulation and description of professional titles. We split the table into broad categories of Civil Servants and Non-Civil Servants, each representing about half of the mean distribution of trustees. We further break Civil Servants into politicians, budget 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. Budget civil servants (most commonly, treasurer, revenue commissioner, controller, auditor, and finance directors) hold 34.4% of seats. These civil servants are particularly sensitive to pay levels in public service as they are involved in the setting of compensation across multiple government agencies. Other civil servants (clerks, commissioners, public university academics, and legal government officials) hold 13.7% of seats and are not generally involved in pay determination in their regular employment. 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 *Budget Civil Servants*. A trustee is more likely to perceive costs from outrage, and thus be 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 (*Budget Civil*

[11] In addition, we took steps to understand how these particular people arrived to be trustees. We consulted 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 specific as to the stakeholder process in electing, appointing 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 an *ex officio* trustee, implies a stickiness in the biography of who represents a particular trustee seat.

Servants). The exogeniety condition asserts that these trustees do not influence performance except through their role in manager contracting.

One concern with this approach 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 (2018)). We do not think this to be the case because *Municipal Workers*, *Teachers,* and *Budget Civil Servants* do not account for all of the non-politician variation in the other civil servants and not-a-civil-servant categories. Nevertheless, to make sure that the main estimations are not driven by an effect of "one-minus Adonov et al (2018)", we include in the appendix estimations where we define the outrage variables based on professional designation as a fraction of the non-politician board members. Another concern could be that the percentage of budget civil servants might capture a direct impact of politicization on performance, in addition to impacting compensation. To address this possibility, we also run a specification where we exclude budget civil servants from these tests.

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*, which takes a value of one if the chair is appointed by an executive of government (e.g., governor, mayor, finance minister, king, etc.) or a ministry of government. Fifty-one 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 Andonov, Bauer and Cremers (2017), who find 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. Do Outrage and Political Agency Issues Affect Compensation?

In Figures 2a and 2b, we plot the mean and median compensation across terciles of the

outrage variables (*Municipal Workers*, *Teachers*, and *Budget Civil Servants* in 2a and the reference wage variables in 2b). The plots show, with some variation, that compensation is lower with higher outrage occupations percentages and lower reference incomes. The exceptions are in the *Teachers*' and *Worker Wages'* plots, which show non-monotonic patterns across the terciles of the x-variable. These patterns may be due to not controlling for pension fund size in the plots; thus, we turn to multivariate results. Table 7 reports the relationship between compensation and political agency variables. As a baseline, in column (1), we regress log compensation on lagged fund size and year fixed effects. Lagged fund size significantly associates with compensation, but with a limited explanatory power (an R-squared of 0.0365).

In columns (2) to (4), we iteratively add in the outrage and other political agency variables. Column (2) adds the trustee composition outrage variables in addition to the baseline controls. All three trustee composition outrage variables – *Municipal Workers*, *Teachers*, and *Budget Civil Servants* – negatively associate with compensation, but only *Teachers* and *Budget Civil Servants* are statistically significant. Notably, the R-squared increases sharply to 0.115. Column (3) instead includes the reference wages outrage variables and the baseline controls. We find a positive and significant relationship of both *Regional Income* and *Worker Wages* with compensation. The elasticity of manager compensation to reference income is between 0.6 and 0.9. Furthermore, the R-squared in column (3) increases materially relative to column (1) to 0.106.

In column (4), 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 and an insignificant impact of underfunding. The partial R-squared of Political Chair is weaker than outrage, but this in no way contradicts the prior literature (Andonov, Hochberg and Rauh, 2018; Andonov, Bauer and Cremers; 2017), as political influence may work directly in the investment choices.

Finally, in column (5), we include all sets of variables and find that most of the results in the prior columns are independent of each other; the R-squared continues to increase (to 0.153) and most variables remain robustly significant. Controlling for the other effects also adds precision in the estimation, making *Municipal Workers* and *Underfunded* significant.

In Panel B, we evaluate the economic impact of larger agency concerns for all statistically significant political agency variables, using the column (5) estimates. A board of trustees has on average 11 trustees. A one standard deviation higher fraction of *Municipal Workers* or *Budget Civil*

Servants implies a higher fraction of these occupations by 0.087 to 0.144 (i.e., 1 to 1.6 trustee members). For the reference income variables, we study the elasticity effect of a 10 percent change, which maps to about $5,000 higher income for the reference wage group.

We find that a one standard deviation change in the fraction of either *Municipal Workers*, *Budget Civil Servants*, or *Political Chair* implies approximately a $90,000 lower manager compensation (averaging over $76,033, $107,627, and $94,209). A 10% change decrease in either *Regional Income* or *Worker Wages* implies approximately $60,000 less manager compensation. These effects are 7 to 13 percent of the mean compensation in the sample. Underfunding has a positive but lower effect on compensation, consistent with our model that the trustees will want the manager to risk-up, thereby making it desirable to hire a manager who can better capture risk premia. All of these effects are consistent with our model comparative statics and our intuition of how political agency costs affect manager contracting.

5.2. Do Outrage Pay Constraints Affect Performance?

5.2.1. Return Results

Section 3 laid out our empirical methodology as a two-equation, linear sytem of equations to estimate how agency affects public pension fund outcomes working through the compensation contract mechanism. Table 8 reports results from estimating the system using GMM. The first column (Equation I) presents the test of outrage on compensation akin to Table 7, but with additional Equation II control variables[12]. The results are very similar to those in Table 7.

In columns (1) to (4) we estimate the effect of outrage on returns through *Log Compensation*. We refer to this variable as *Outrage-Predicted Log Compensation.* The outcome variable is net returns for: the entire portfolio (column 1), alternatives (column 2), public equities (column 3) and fixed income (column 4).

We find that log compensation explained by outrage has a positive and significant effect on portfolio net returns (column 1). The coefficient is a positive 0.00635. Because this return is already net of the benchmark, this portfolio return sensitivity to *Outrage-Predicted Log Compensation* is likely due to within-asset class outrage-performance sensitivity rather than to the asset class allocations. In columns (2) to (4) we look explicitly at within-asset-class sensitivities. We replace

[12] In our baseline results displayed in table 8 we control for the log of the fund size. Our results are robust to the use of alternative functional forms for fund size, such as including polinomial terms of order four.

portfolio net returns with net returns in alternatives (column 2), public equities (column 3) and fixed income (column 4).[13] Results for the risky asset classes are very consistent with the model. *Outrage-Predicted Log Compensation* positively and significantly predicts net returns in alternatives (coefficient of 0.0209) and equities (0.00689). We find no effect for fixed income. We also note that *Political Chair* has a negative and significant impact in alternatives, consistent with the results in Andonov, Hochberg and Rauh (2017).[14] We discuss the *Political Chair* result in greater length and related evidence in section 5.5 below.

5.2.2. Economic Impact of Outrage-constrained Compensation

To understand the economic impact of outrage on portfolio returns, we first consider a one standard deviation change in either *Municipal Workers*, *Budget Civil Servants* or *Regional Outrage* (iteratively). Table 9 presents each of these pass-through, economic magnitude results.

If one were to constrain outrage through a one standard deviation lower fraction of *Municipal Workers,* this would work through $76,033 more compensation, and would result in 0.06% (6 basis points (bps)) greater net returns. Likewise, a one standard deviation lower fraction of *Budget Civil Servants*, implying $107,627 more compensation, results in 8.5 bps greater returns. A 10% increase in *Regional Income* predicts $63,221 greater compensation and 5 bps greater returns. In summary, all else equal, if a pension fund could unwind just one determinant of outrage by one standard deviation (mimicking about a 10% change in local income or 1-2 trustee member change in the board composition) and hire accordingly a more experienced manager for approximately $82,000 more in pay, the pension would reap a benefit in returns of 6.5 basis points per year (averaged over 5, 8.5 and 6 bps).

Panel B of Table 9 speaks to the dollar-value materiality of these effects. Evaluated at the average estimation sample fund size of $102 billion in AUM, a one standard deviation reduction in one of the outrage determinants would improve returns for that pension of $51-86 million per year. On the right side of the table we also evaluate the dollar-value materiality for a smaller pension fund in the representative sample of pension plans. Recall that our estimation sample

[13] 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.

[14] As noted above, to address concerns that budget civil servants have a direct impact on performance, we also run tests where we exclude them from the analysis. In unreported regressions, we find that this exclusion does not affect our results of the stage II regressions, with even stronger coefficients, although the stage I results are weaker.

focuses on large pension plans for reasons of data observability. A one standard deviation reduction in one of the outrage determinants in a fund that is average in size in the representative sample, increases returns by $22-38 million per year, with an equally weighted average of $29 million. The smallest fund evaluated is the 25th percentile fund of the representative sample. For this small fund, the benefit from unwinding one factor determining outrage is $3.8 to $6.4 million in additional AUM per year.

We also consider the impact of two policy proposals to improve governance of pension plans that would significantly reduce the likelihood of outrage. First, we simulate the impact of reducing political appointees on the board, an idea raised by Romano (1993), by modeling the impact of eliminating all Budget Civil Servants and replacing them with trustees that have no inequality aversion. Second, we consider a move from a constituency-based board towards a skills-based board. We model this by simulating the effect of eliminating all Budget Civil Servants and all Municipal Workers from the board and replacing them with trustees with no inequality aversion.

These more comprehensive reforms are estimated to increase compensation by a greater amount than a one standard deviation change, with an accordingly larger improvement in returns. We estimate that reducing political appointees would increase expected compensation by $257,000. Moving from a constituency to a skills-based board would increase compensation by $324,000. The respective increases in returns would be 20.2 bps and 25.5 bps per year, translating into an annual increase in incremental value-added for the average representative sample pension of $90- $114 million. This is more than three times the estimated benefit of one standard deviation reduction in one outrage constraint.

As we mention in the introduction, the importance of unwinding outrage might be especially important because funds that are most constrained by outrage are located in lower income areas where local economy spillovers from poor pension asset performance might be most severe.

5.2.3. Robustness

Higher net returns do not necessarily reflect a higher Sharpe ratio if the net return performance arises from taking on increased risk. We address this possibility in two ways. First, in Appendix Table AT2 we rerun Table 8 tests while including the weights allocated to the sub-asset class categories.[15] These additional levels of investment focus are: (in alternatives) real estate,

[15] We cannot run sub-asset class return analyses due to sparseness in returns at this level in our data. However, sub-

hedge funds, private equity, and infrastructure; (in equities), domestic versus non-domestic public equities; and (in fixed income), cash versus bonds. We take bonds as the omitted category. We find that inclusion of the portfolio weights in our system does not change our outrage results.

In a more direct test, in Table 10, we study the effect of outrage on realized tracking error. Tracking error can result from higher risk strategies, but also from lower skill. Yet, in the presence of our results from Table 8, our concern would be that any lower returns due to outrage could be attributed to lower risk strategies, which would be associated with lower within-asset class tracking error.

In this cross-sectional setup, fund-level tracking error is the dependent variable in Equation II, and everything else in the system of equations is the same as before, including the compensation equation. With the fewer number of observations, we drop the agency variables without power in the Table 8 estimations. Columns (1) to (4) show that *Outrage-Predicted Log Compensation* has no statistically significant relationship with realized tracking error for any of the asset classes. This counters the concern that our findings from Table 8 result from increased within asset-class risk.

A final robustness concern with our main Table 8 result is the exogeneity of the trustee occupations. One might be concerned that we are picking up the inverse of the politicization result of Hochberg and Rauh (2013) if the lack of politicized board members mechanically implies more teachers, workers, and budget civil servants. Thus, also in Appendix Table AT2, we take our outrage trustee occupation counts and divide by the denominator of the total number of non-political trustees, calculating a fraction relative to non-political trustees. As Table AT2 shows, our results are, if anything, stronger.

5.2.4 Delegation Results

One possible mechanism that could drive the underperformance of outrage-constrained pension funds is differential use of delegation. If plans with less skilled managers delegate larger fractions of their portfolios to external institutions, then this differential use of delegation would result in greater payment of intermediation fees, which may not be offset by correspondingly greater gross returns.

We investigate the potential impact of outrage constraints on delegation in Table 11. We estimate our two-equation system but this time use the fraction of assets managed via delegation

asset class weights are fairly comprehensive due to the application of index benchmarking.

(in each asset class) as the outcome variable of Equation II.[16] 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 delegated institutions by definition. Given that the delegation fraction is a number between 0 and 1, we estimate our model using a Tobit specification in the second stage. The delegation fraction is only available for a subset of funds, reducing the number of observations for these tests.

We find a negative and significant coefficient on *Outrage-Predicted Log Compensation* in all Equation II columns, reported in Table 11. Funds that are able to avoid outrage constraints on compensation are more likely to reduce their use of delegation and manage assets in-house. Looking at the asset class level estimations in columns 2 through 4, the negative impact of *Outrage-Predicted Log Compensation* on delegation is greatest for alternatives (column 2), followed by public equities (column 3), with no significant impact on fixed income (column 4). This shows the effect of outrage constraints on delegation is largest for asset classes with more risk (i.e., more skill required).

To arrive at an estimate of the economic impact of a one standard deviation change in outrage constraints on delegation, we follow our procedure of using the dollar estimates based on Table 7 estimations, as reported in Table 9 Panel A. The economic impact is meaningful: a decrease of one standard deviation in *Municipal Workers*, or *Budget Civil Servants,* is associated with a 6 percentage point, or an 8.5 percentage point, decrease in delegation. An increase of 10% in *Log Regional Income* is followed by a reduction of 5 percentage points in the fraction of assets managed via delegation. On average, a one standard deviation reduction in outrage constraints reduces delegation by 6.5 percentage points.

To make an inference as to the contribution from decreased use of delegation, we use the externally-managed cost estimates from Gerakos, Linnainmaa, and Morse (2018) and the internally-managed cost estimates for pension plans from Dyck and Pomorski (2011). This allows us to decompose the 6.5 bps of gain in net returns from limits to outrage in Panel A of Table 9. We find that 2.9 bps, or 44 percent of the gain from putting limits on outrage, potentially comes from reduced delegation costs. [17]

[16] In our baseline results displayed in table 11 we control for the log of the fund size. Our results are robust to the usage of alternative functional forms for the fund size, such as including polynomial terms of order four.

[17] Gerakos, Linnainmaa and Morse (2018) report for a representative sample of external asset managers that the median external management costs in equities, fixed income and alternatives are 64 bps, 27 bps, and 107 bps respectively. Studies of pension plan costs specifically suggest these costs are representative (e.g. Dyck, Lins and Pomorski (2013)

5.3. Do Outrage Pay Constraints affect Asset Allocations?

Table 12 explores the possibility that outrage pay constraints affect funds' asset allocation according to predictions from our theory; in particular, higher outrage may lead to lower risk-taking, working through reduced compensation and reduced managerial skills. Because asset class weights are jointly determined, we report two sets of standard errors – a fund-clustered standard error and a robust standard error under the seemingly-unrelated-regression assumption (SUR).[18]

The results indicate that funds with compensation *not* constrained by outrage would exhibit higher exposures to the riskiest asset class (alternatives, column 1) in lieu of public equities (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. What is perhaps a bit inconsistent with our theory is that eschewing of public equities for alternatives also implies that the pension increases exposure to fixed income (column 3).

5.4. Other Political Agency Costs

The results in 5.2 speak to the impact of the human capital channel on allocation and performance in public pension funds. Political influence may come through other channels of distortions arising from politicians' payoffs to local investment and distortions arising from underfunding.

Our key variable for exploring any distortions from politicians' payoffs 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 *Underfunded Index*. These variables are introduced in Tables 7-12 in the compensation regressions (Equation I) as well as in the outcome regressions (Equation II). 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.

report external equity costs for pension plans across geographies from 40 to 77bps). Dyck and Pomorski (2011) report that the internal costs of managing equities, fixed income and alternatives for the median pension plan are 29%, 33% and 22% of the externally managed costs. Given the asset allocation in Table 4, the average fund in our sample would have external management costs of 61 bps (.513*64+.296*27+.191*107=61bps), and internally managed costs of 17 bps, with an implied cost savings of internal management of 44 bps. The implied benefit in reduced intermediation costs of a 6.5 percentage point reduction in delegation is thus 2.9 bps (.065*44bps).

[18] Tobit specifications to handle constraints of some funds not participating in an asset class produce similar results.

In Table 7, we find that *Political Chair* significantly explains variation in compensation. In particular, a one standard deviation increase in the likelihood of a Political Chair implies a $94,209 lower manager compensation. Using the language of our model, a large reward for political investments *L* leads to a manager with low skill (*s*). In Table 8, when we include outrage-predicted log compensation, we find a negative and significant direct impact of *Political Chair* on returns in the portfolio as a whole, being driven by lower returns in alternatives and equities. Table 9 reports that a higher likelihood of having a *Political Chair* implies 0.212% lower returns. In Table 10, we find that when we include *Outrage-predicted Log Compensation*, there is no direct impact of *Political Chair* on realized tracking error at the portfolio level or for alternatives, but *Political Chair* is associated with lower realized tracking error for public equities and fixed income. Table 12 reports that the only significant direct impact of *Political Chair* on asset allocation is to weakly increase the allocation to fixed income.

These results suggest that politicization through the board chair reduces risk in areas where politicians are less likely to derive private benefits (outside of alternatives). In alternatives, which includes private equity where prior research has suggested and demonstrated pay-to-play is likely and reduces performance, we find additional negative effects of politicization through the board chair on performance. As a whole, the results support a pay-to-play interpretation consistent with the research of Andonov, Hochberg and Rauh (2018).

Finally, we turn our attention to the role of *Underfunded Index*. The only significant impact is (weakly) on asset class weights. Consistent with prior papers, notably, Andonov, Bauer and Cremers (2017), we find that *Underfunded Index* predicts lower allocations to fixed income.

6. Conclusion

The paper introduces a model in which trustees of public pension funds incorporate the threat of private costs arising from inequality aversion that produces outrage over high compensation. This concern leads to an equilibrium with trustees hiring investment managers with lower skills, which in turn creates distortions in portfolio allocation and weaker performance in the risky asset classes.

We 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 find that outrage pay constraints on compensation induced by public

pension funds' governance structures impact fund performance and hence beneficiary welfare. For an average fund, our estimates suggest that if that fund were to relax outrage, with a cost of approximately $82,000, it would benefit by producing additional benefits of $29 million in annual value-add. More extensive reforms to reduce political appointees or adopt an independent skills-based board, would be associated with higher compensation costs and a higher annual increase in incremental value-added of $90- $114 million.

The costs that the fear of outrage creates for pension performance are particularly important in areas where finance salaries are much larger than the average income of local residents. Such areas may be more readily prone to outrage, but also are areas where the local wage earners have little slack to support faltering pension systems.

Of course it is natural to ask if it possible for funds to change outrage constraints. Funds cannot change the possibility that their disclosures may garner media attention to high finance salaries, resulting in public outrage. They also cannot also change the fact that beneficiaries and governments have a strong interest in trustee choice, as they are required to pay into the plan and suffer in case the fund is unable to fulfill its promises. Yet, although it is beyond our scope to consider all possible ways to insulate the board from outrage pressures, we have a few ideas.

First, the most obvious step is to educate both beneficiaries and governments of the costs of exposure to outrage for plan performance that we document in this paper. Second, a lasting impact could emerge from a refocus of trustee appointment procedures toward an independent skills-based board. In an independent skills-based board, the government and beneficiaries continue to select trustees, but they require that the board members, either individually or as a group, have certain skills. Those skills are often financial skills, rather than political skills, or representing the industry. This raises their reference wage and insulates them in part from a process that exposes them directly to voters' inequality aversion. Likewise, pensions might move from a representative board chair to one based on skills and chosen by the other board members. Third, modifying or clarifying risk and profit-sharing arrangements so that beneficiaries expected benefits become more closely tied to the performance of the fund could increase salience to the importance of quality investment management.

One possible reform that we do not advocate is reducing the transparency of compensation arrangements. While this is a crude way to insulate board members from outrage pressures, it is likely to be imperfect. Board members likely fear that compensation arrangements will be

eventually released or leaked, leading to much of the same behavior. Therefore, as long as the board members remain exposed to outrage concerns, the same problems will emerge. A policy of transparency combined with a skills-based board should insulate trustees from outrage concerns, much as is the case with boards of traded companies. The added advantage of transparency is that it also reduces the likelihood of pay-to-play arrangements and other political frictions.

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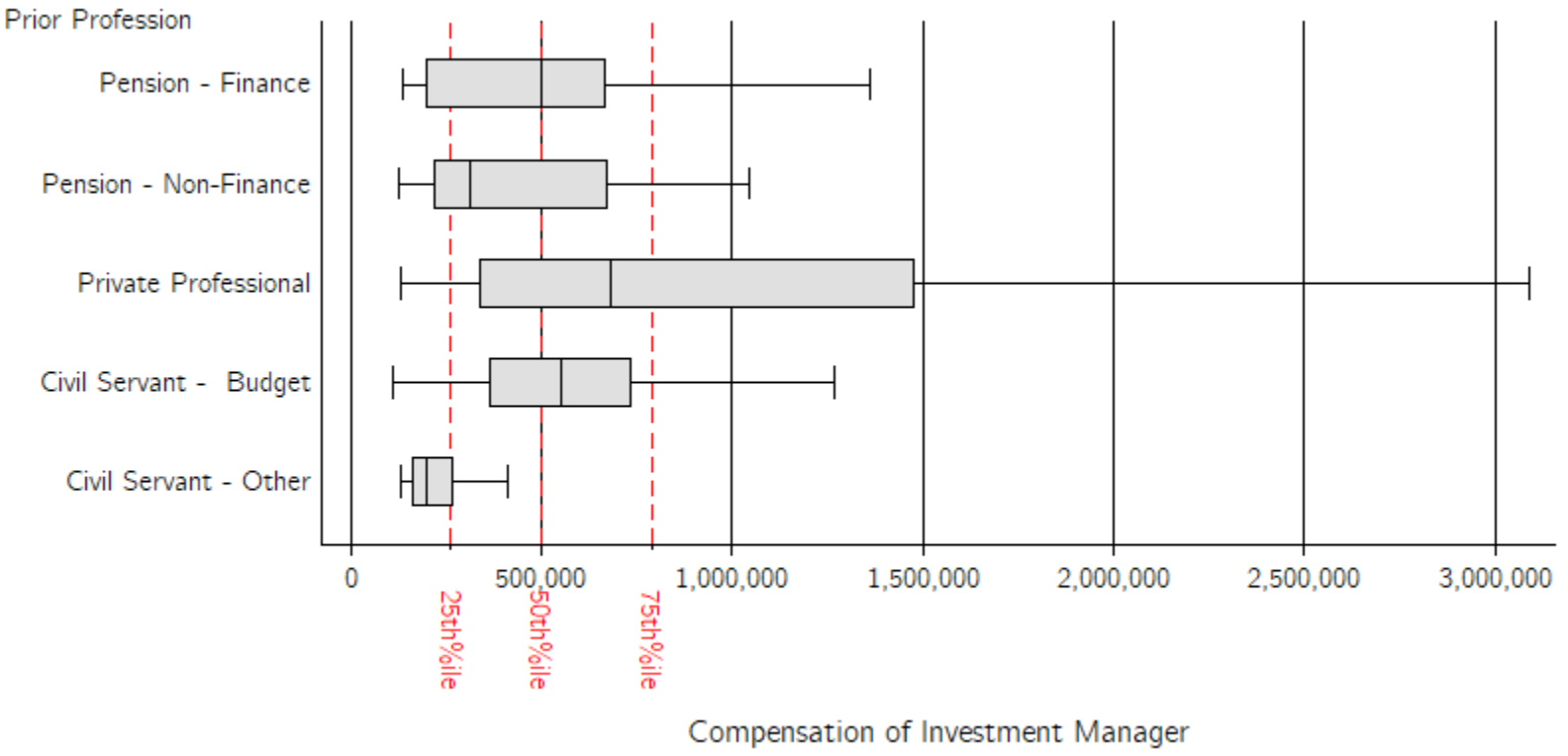

Figure 1: Compensation of Investment Manager by Prior Profession

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%).

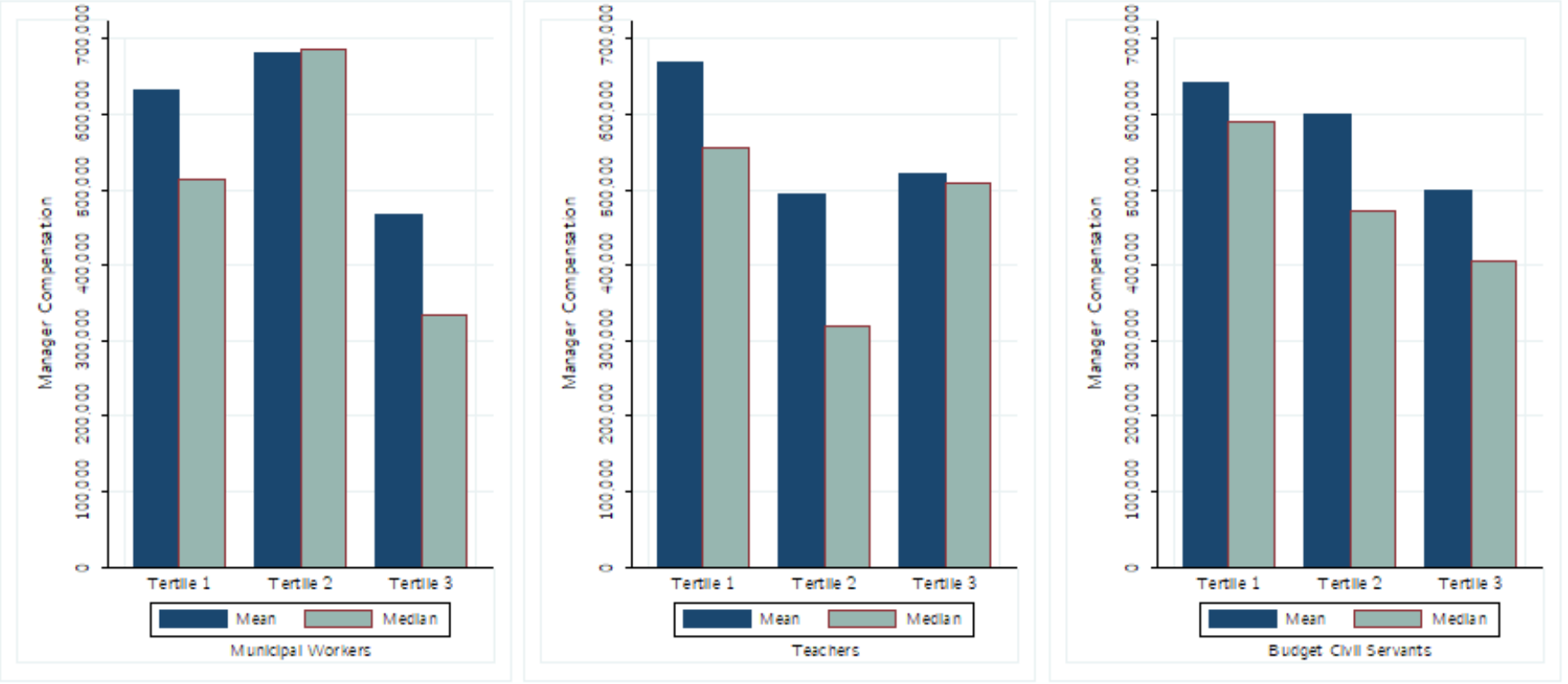

Figure 2a: Compensation by Tertile of Trustee Occupation-Outrage Variables

Plotted are the mean (blue/darker bars) and median (green/lighter bars) manager compensation by tertitles of the trustee occupation variables, which are three of our proxies for outrage. The variables (from left to right plotted) are the percentage *Municipal Workers*, the percentage *Teachers* and the percentage *Budget Civil Servants*.

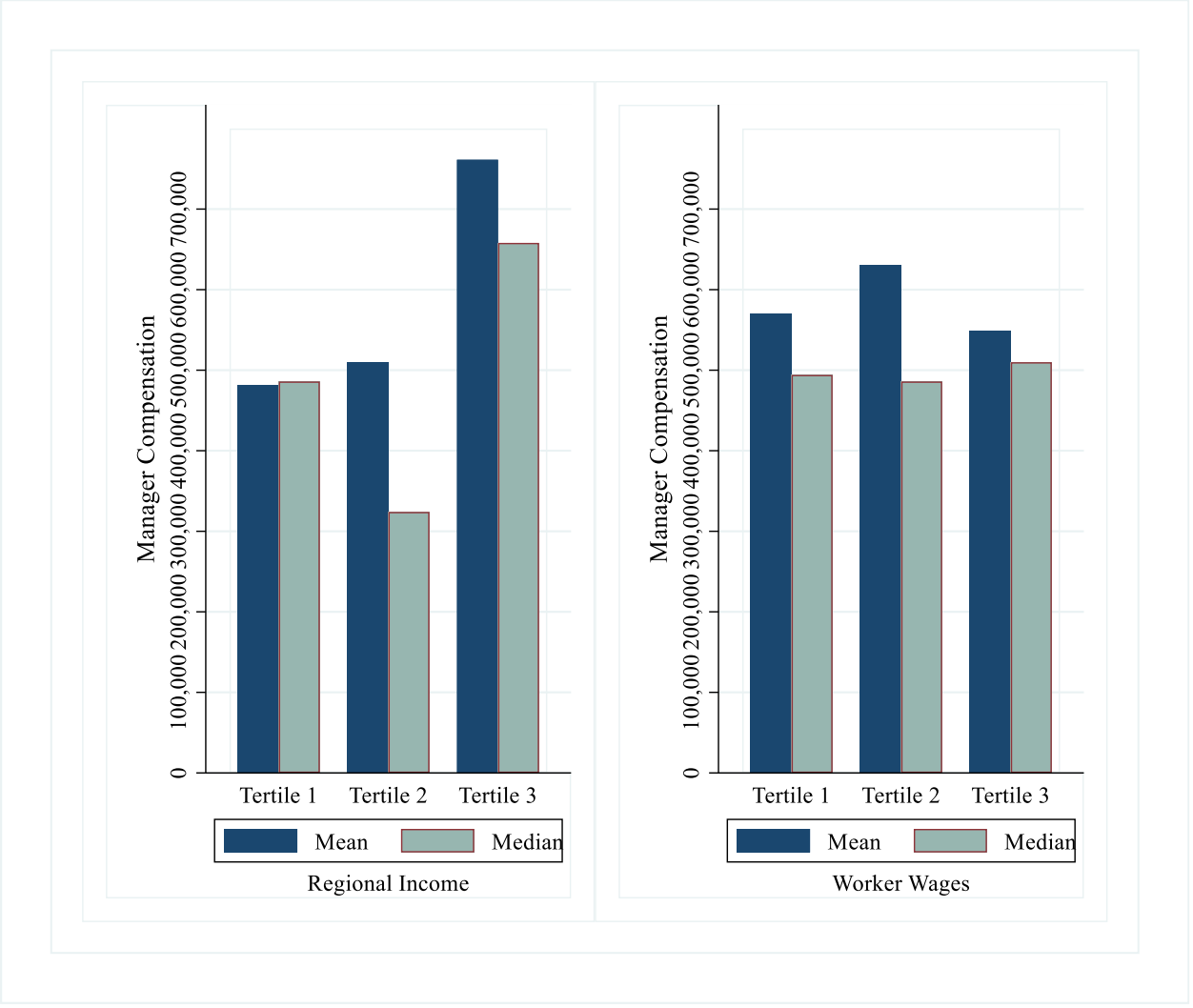

Figure 2b: Compensation by Tertitle of Reference Wage-Outrage Variables

Plotted are the mean (blue/darker bars) and median (green/lighter bars) manager compensation by tertitles of reference income variables, which are two of our proxies for outrage. The variables (from left to right plotted) are the *Regional Income* and the penson *Worker Wages*.

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 comparative statics reflect a discrete 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 statics show the partial 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 Intensifying the Budget Outrage Constraint

Variable	Model Notation	Predicted Change to Row Variable with: ∂ Outrage	Test of Prediction
Manager skill	∂s	≥ 0 (>0 if constraint is binding)	Table 7, 11
Allocations			
Weight on MV security	$\partial(w_{MV})$	≥ 0 (>0 if constraint is binding)	Table 12
Weight on political asset	$\partial(w_P)$	≥ 0 (>0 if constraint is binding)	Table 12
Weight on fixed income	$\partial(1-w_P-w_{MV})$	≤ 0 (<0 if constraint is binding)	Table 12
Weight on all risky	$\partial(w_P+w_{MV})$	≥ 0 (>0 if constraint is binding)	Table 12
Performance			
E[return on MV security]	$\partial(R_{MV})$	≥ 0 (>0 if constraint is binding)	Tables 8,10
E[return on political asset]	$\partial(R_P)$	≥ 0 (>0 if constraint is binding)	Tables 8,10
E[portfolio return]	$\partial(R)$	≥ 0 (>0 if constraint is binding)	Tables 8,10

Panel B: Effect of Other Political Agency Costs

		Partial Derivative of Row Variable with Respect to: $\partial\kappa$	$\partial\Theta$	
Variable	Model Notation	(κ: private benefits of political asset)	(Θ: liability-induced preference for risk)	Test of Prediction
Manager skill	∂s	<0	>0	Table 7, 11
Allocations				
Weight on MV security	$\partial(w_{MV})$	<0	>0	Table 12
Weight on political asset	$\partial(w_P)$	>0	?	Table 12
Weight on fixed income	$\partial(1-w_P-w_{MV})$	?	<0	Table 12
Weight on all risky	$\partial(w_P+w_{MV})$	?	>0	Table 12
Performance				
E[return on MV security]	$\partial(R_{MV})$	<0	>0	Tables 8,10
E[return on political asset]	$\partial(R_P)$	<0	>0	Tables 8,10
E[portfolio return]	$\partial(R)$	<0	>0	Tables 8,10

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 of three asset class -- alternatives (real estate, private equity, hedge funds, infrastrcuture), public equity, and fixed income -- as percentage of total.	Center for Retirement Research (CRR), CEM Benchmarking and annual reports.
Return	Realized returns in each asset class and for the overall portfolio.	Center for Retirement Research (CRR), CEM Benchmarking and annual reports.
Benchmark Return	We use benchmarks as reported by Boston College Centre for Retirement Research or CEM. Benchmarks are chosen by pension trustees. Most funds report for each asset class multiple sub-asset classes. The asset class level benchmark is a weighted sum of these sub-asset class benchmarks with weights set at the beginning of the reporting period. CEM subjects the reported benchmarks to additional checks for validity. A visual inspection of this information indicates the benchmarks capture dimensions of risk differences across and within asset classes.	Center for Retirement Research (CRR), CEM Benchmarking
Tracking Error	A single observation by fund for each asset class and the portfolio, 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.
Teacher	The fraction of trustees that are workers providing basic services to teachers or education administrators.	From annual reports. Professional designation based on biographies and web sources such as LinkedIn.
Budget 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 Income	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).
Worker Wage	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 variable for the chair either being appointed by government executives or ministries or serving in the role ex officio because of his or her executive government position.	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 assets under management and portfolio returns statistics by region of the pension fund. Panel A presents these statistics for the full sample of funds in our sample, and Panel B, for the pension funds for which we have manager compensation of trustee profile data.

Panel A: Full Sample

		Assets under Management ($billion)					Gross Portfolio Returns				
	Number of funds	Fund-Year Observations	Mean	25th Percentile	Median	75th Percentile	Fund-Year Observations	Mean	25th Percentile	Median	75th Percentile
Canada	16	210	37.02	11.45	17.04	59.90	210	0.0548	0.0012	0.0672	0.1160
Europe	39	333	122.70	8.45	17.76	71.33	302	0.0173	0.0004	0.0018	0.0268
Oceania	17	163	15.11	6.61	12.84	19.13	160	0.0312	0.0001	0.0018	0.0960
United States	92	1150	27.65	6.88	12.81	32.03	1130	0.0498	0.0004	0.0323	0.1235
Total	164	1856	44.66	7.59	13.70	35.55	1802	0.0433	0.0004	0.0195	0.1098

Panel B: Sample with Compensation & Trustee Data

		Assets under Management ($billion)					Gross Portfolio Returns				
	Number of funds	Fund-Year Observations	Mean	25th Percentile	Median	75th Percentile	Fund-Year Observations	Mean	25th Percentile	Median	75th Percentile
Canada	10	97	49.68	13.14	33.78	81.30	97	0.0589	0.0009	0.0857	0.1267
Europe	17	115	283.42	19.41	70.39	322.17	115	0.0245	0.0009	0.0114	0.0360
Oceania	11	55	21.48	11.41	16.81	27.74	55	0.0385	-0.0010	0.0212	0.1053
United States	73	196	44.07	11.72	26.00	59.21	196	0.0451	-0.0290	0.0518	0.1331
Total	111	463	102.01	11.99	29.51	72.59	463	0.0421	-0.0005	0.0330	0.1126

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. In Panel A, we present the weights in the main estimation sample (that with compensation and trustee data) plus the sample where we observe all weights such that the weights sum to unity. Also, in Panel A are the fractions of each asset class delegated to outside management. Panel B reports performance in three metrics -- gross returns, net returns over the CEM benchmark, and realized tracking error. The realized tracking error is calculated in the data relative to the benchmark return; thus, there is only one observation per pension fund.

	Count	Mean	Standard Deviation	25th Percentile	Median	75th Percentile
Panel A: Allocations						
Weights: Full Sample						
Alternatives	251	0.229	0.175	0.125	0.197	0.273
Public Equities	304	0.598	0.184	0.485	0.571	0.669
Fixed Income	253	0.323	0.121	0.25	0.305	0.368
Weights: Sample restricted to having data on all weights						
Alternatives	204	0.191	0.096	0.117	0.186	0.252
Public Equities	204	0.513	0.106	0.442	0.525	0.583
Fixed Income	204	0.296	0.075	0.243	0.297	0.350
Delegation Fraction						
Alternatives	214	0.747	0.327	0.484	0.990	1.000
Public Equities	190	0.734	0.360	0.386	1.000	1.000
Fixed Income	180	0.500	0.468	0.000	0.488	1.000
Panel B: Performance						
Gross Returns						
Alternatives	355	0.061	0.119	0.002	0.075	0.135
Public Equities	367	0.053	0.206	-0.107	0.117	0.206
Fixed Income	337	0.061	0.049	0.034	0.055	0.080
Portfolio	463	0.042	0.096	0.000	0.033	0.113
Net Returns						
Alternatives	251	-0.008	0.101	-0.053	-0.004	0.046
Equities	304	0.005	0.020	-0.004	0.003	0.013
Fixed Income	253	0.005	0.031	-0.003	0.003	0.016
Portfolio	351	-0.003	0.054	-0.011	0.001	0.014
Tracking Error Realized						
Alternatives	70	0.069	0.073	0.028	0.055	0.083
Equities	96	0.038	0.054	0.012	0.019	0.035
Fixed Income	92	0.021	0.016	0.009	0.018	0.028
Portfolio	110	0.030	0.023	0.014	0.024	0.045

Table 5: Compensation, Trustee Occupation, Reference Wage and Other Agency 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, hospitals, libraries, and other non-civil servant positions. Budget 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). The two outrage income measures -- Worker Wages and Local Income -- are, respectively the average wages of workers and the municipal income.

Panel A: Statistics

	Count	Mean	Standard Deviation	25th percentile	Median	75th percentile
Manager Compensation						
Manager Compensation ($)	463	807,416	1,018,136	292,328	537,197	819,979
Log Manager Compensation	463	13.20	0.828	12.59	13.19	13.62
Outrage: Reference Wages						
Worker Wages	463	47,811	15,197	38,763	45,345	55,066
Log Worker Wages	463	10.73	0.302	10.57	10.72	10.92
Regional Income	463	55,434	17,955	40,873	50,127	68,228
Log Regional Income	436	10.86	0.315	10.62	10.78	11.11
Outrage: Non-Political Trustee Occucations						
Municipal Workers (% Trustees)	463	0.053	0.087	0.000	0.000	0.100
Teachers (% Trustees)	463	0.109	0.167	0.000	0.077	0.133
Budget Civil Servants (% Trustees)	463	0.102	0.144	0.000	0.083	0.154
Other Agency Variables						
Political Chair	463	0.514	0.586	0.000	0.364	1.000
Underfunded Index	463	0.171	1.303	-0.144	0.000	0.203

Panel B: Correlations

	Compen-sation	Municipal Workers	Fin. Civil Servants	Teachers	Worker Wages	Local Income	Political Chair
Municipal Workers	-0.092						
Budget Civil Servants	-0.150	-0.198					
Teachers	-0.226	-0.111	-0.114				
Worker Wages	0.061	0.106	0.112	0.015			
Local Income	0.364	0.022	-0.176	-0.193	0.250		
Political Chair	-0.120	-0.133	-0.012	0.023	0.000	-0.080	
Underfunded Index	-0.101	0.075	0.082	-0.069	0.052	0.027	-0.030

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 (Budget)	Civil servant with financial experience	Treasurer, Auditor, Accountant, Controller, Budget Officer, Finance Director, Public Institution Professor	29.5%
Civil Servant (Non-Budget)	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%
Budget 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: Effect of Outrage and Political Agency on Manager Compensation

The dependent variable is the log compensation of the investment manager. Municipal Workers is the percent of the board whose career is in the municipal labor force, defined as police, fire department, hospitals, libraries, and other non-civil servant positions. Teachers is the percent of the pension board who are teachers. Budget Civil Servant is the percent of the board whose background is in public sector financial positions (e.g., city controllers, auditors, etc.). Political Chair is a dummy taking value 1 if the chair is appointed by the executives or ministers of the government or is ex officio designated as chair as an 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). Worker Wages and Regional Income are the outrage reference wages, equal to mean pension workers' wages and median local area incomes. Log Size is the log of the fund AUM. All money variables are in 2010 USD. Panel A present an OLS estimation with year fixed effects. Panel B presents the economic magnitude with the change induced as noted. Standard errors are clustered at the fund level. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

Panel A: Estimates

	Dependent Variable: Log Compensation				
	(1)	(2)	(3)	(4)	(5)
Municipal Workers		-0.604			-1.082*
		[0.546]			[0.611]
Teachers		-0.619**			-0.405
		[0.293]			[0.324]
Budget Civil Servants		-1.401***			-0.925**
		[0.284]			[0.374]
Log Regional Income			0.923***		0.783***
			[0.181]		[0.193]
Log Worker Wages			0.618**		0.690**
			[0.285]		[0.293]
Political Chair				-0.212**	-0.199**
				[0.0985]	[0.0971]
Underfunding Index (lag)				0.0204	0.0418*
				[0.0288]	[0.0238]
Log Size (lag)	0.284***	0.279***	0.154*	0.286***	0.164*
	[0.0842]	[0.0830]	[0.0828]	[0.0843]	[0.0836]
Year Fixed Effects	Y	Y	Y	Y	Y
Observations	453	453	426	453	426
Number of Funds	110	110	110	110	110
R-Squared	0.0365	0.115	0.106	0.0498	0.153

Panel B: Economic Magnitude

	Change Evaluated	$ Impact on Compensation	Percentage Change
1 standard deviation change =	0.087 higher fraction of Municipal Workers	-76,033	-9%
1 standard deviation change =	0.144 higher fraction of Budget Civil Servants	-107,627	-13%
10% percentage change =	4781 higher Regional Income ($)	63,221	8%
10% percentage change =	5543 higher Worker Wages ($)	55,712	7%
1 standard deviation change =	0.586 greater likelihood of Political Chair	-94,209	-12%
1 standard deviation change =	1.303 higher Underfunding Index	43,982	5%

Table 8: Effect of Outrage on Returns

Reported in columns (1)-(4) are estimates from a GMM system of two equations. The dependent variable in numbered columns (denoted above Equation II) is the net return over the asset-class benchmark. The far left column presents (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 Equation I (the left column). Municipal Worker, Teachers, and Budget Civil Servant are the trustee composition outrage variables. Worker Wages and Regional Income are the outrage reference wages, equal to mean pension workers' wages and median local area 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. Standard errors are clustered at the fund level. The number of funds per estimation is indicated below the number of observations. The Cragg-Donald F-statistic, and the p-value of its significance, is included as a test of weak identification. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

	Equation I:	Equation II: Net Returns			
	Log Compensation	Portfolio	Alternatives	Public Equities	Fixed Income
Outrage-Predicted Log Compensation		0.00635**	0.0209*	0.00689*	-0.00441
		[0.00291]	[0.0111]	[0.00400]	[0.00370]
Municipal Workers	-0.997**				
	[0.470]				
Teachers	-0.217				
	[0.252]				
Budget Civil Servants	-1.163***				
	[0.279]				
Log Regional Income	1.034***				
	[0.154]				
Log Worker Wages	-0.142				
	[0.156]				
Political Chair	-0.0978	-0.00362**	-0.0155**	-0.00353*	-0.000123
	[0.0705]	[0.00143]	[0.00777]	[0.00187]	[0.00219]
Underfunding (lag)	0.0230	0.000736	-0.00117	-0.000458	0.00297
	[0.0409]	[0.00133]	[0.00544]	[0.00179]	[0.00199]
Log Size (lag)	0.304***	-0.00314***	0.000651	-0.00409**	-0.000433
	[0.0393]	[0.00117]	[0.00552]	[0.00161]	[0.00178]
Observations	303	303	243	285	243
Number of Funds	89	89	71	86	80
Cragg-Donald F-stat	20.31				
F-Stat p-value	0.000				

Table 9: Economic Magnitude Calculations

Panel A: Return Implications

This Table simulates the economic magnitudes associated with reducing the outrage threat, using estimates from Table 8. In the system, the Equation I outrage variables affect compensation, which in turn affects manager compensation. We present this pass-through effect of a change in the outrage variables in Equation I to the return performance implication of column (1), Table 8. We simulate eliminating Budget Civil Servants by a 2 s.d. change in Budget Civil servants (2 s.d.=0.28, % board Budget Civil Servants=0.34 from Table 6. We estimate a move to skills-based board as the combination of eliminating Budget Civil Servants and eliminating Municipal Workers (1 s.d.=0.087, % board that is Municipal Worker=0.077).The interpretation is not necessarily that the outrage variable can be changed, but the extent to which, the political agency that allows outrage to happen could be unwound. Returns are expressed in annual performance. In the final row, we show the effect in Equation II of a change in political chair on returns, following Andonov et al (2017).

Equation I Change Evaluated	Working through Equation II Effect		Resulting Change in Returns
1 s.d. decrease in Municipal Workers =>	$76,033	change in Compensation =>	0.060%
1 s.d. decrease in Budget Civil Servants =>	$107,627	change in Compensation =>	0.085%
10% increase in Regional Income =>	$63,221	change in Compensation =>	0.050%
	1 s.d. increase in Political Chair =>		-0.212%

Panel B: Assets under Management Implications

Building off the calculations in Panel A, below are the implied changes in AUM per year for a pension fund evaluated at different points in the pension fund size distribution. The numbers presented can be interpreted as the inference to the following question: how much in assets' dollar returns might a pension fund gain by reducing outrage by the indicated channel? We repeat the exercise for two pension fund samples (the estimation sample and the representative sample) represented in Table 3, Panels A and B. On the left are the pension funds in our estimation sample, which is biased toward larger funds because of our need to have observability in compensation.

	Annual AUM Change ($Million) for Different Size Pension Funds:							
	Estimation Sample (Table 3, Panel B)				Representative Sample (Table 3, Panel A)			
	Mean	25th Percentile	Median	75th Percentile	Mean	25th Percentile	Median	75th Percentile
1 s.d. decrease in Municipal Workers =>	$61.0	$7.2	$17.6	$43.4	$26.7	$4.5	$8.2	$21.3
1 s.d. decrease in Budget Civil Servants =>	$86.3	$10.1	$25.0	$61.4	$37.8	$6.4	$11.6	$30.1
10% increase in Regional Income =>	$50.7	$6.0	$14.7	$36.1	$22.2	$3.8	$6.8	$17.7

Table 10: Effect of Outrage on 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. 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. The far left column presents 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). Municipal Worker, Teachers, and Budget Civil Servants are the trustee composition outrage variables. Worker Wages and Regional Income are the outrage reference wages, equal to mean pension workers' wages and median local area 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, including null weights. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

		(1)	(2)	(3)	(4)
	Equation I:	Equation II: Tracking Error			
	Log Compensation	Portfolio	Alternatives	Public Equities	Fixed Income
Outrage-Predicted Log		0.00843	-0.0303	0.00179	-0.00626
Compensation		[0.00731]	[0.0275]	[0.0216]	[0.00509]
Municipal Workers	-1.029**				
	[0.507]				
Budget Civil Servants	-0.637*				
	[0.353]				
Log Regional Income	0.519**				
	[0.202]				
Political Chair	-0.0884	0.00474	-0.0135	-0.0174***	-0.00457*
	[0.0967]	[0.00380]	[0.0146]	[0.00674]	[0.00245]
Underfunded Index	-0.0227	0.00205	0.000394	0.00804	0.000375
	[0.0500]	[0.00238]	[0.00678]	[0.00544]	[0.00191]
Log Fund Size	0.0217	0.000484	-0.00298	0.0105**	-0.00208
	[0.0551]	[0.00186]	[0.00861]	[0.00455]	[0.00196]
Weights					
Private Equity	0.242	0.023	0.899**		
	[1.612]	[0.0506]	[0.373]		
Real Estate	-0.243	-0.00857	-0.141*		
	[0.864]	[0.0300]	[0.0745]		
Hedge Funds	-0.183	-0.115**	-0.241		
	[2.374]	[0.0516]	[0.184]		
Domestic Equity	-1.182***	-0.0143		-0.169***	
	[0.425]	[0.0183]		[0.0526]	
Foreign Equity	1.621***	-0.0151		0.0181	
	[0.576]	[0.0317]		[0.0918]	
Cash	-5.742**	0.0463			-0.0442
	[2.696]	[0.0901]			[0.105]
Bonds					0.00897
					[0.0146]
Observations, 1 per fund	112	112	70	97	94
R-Squared	0.337	0.009	0.072	0.38	--
Cragg-Donald F-stat	5.292				
F-Stat	0.00145				

Table 11: Effect of Outrage on Portfolio Delegation

Reported in columns (1)-(3) are marginal effects from Tobit-MLE estimates from a system of two equations. The dependent variable in numbered columns (denoted above Equation II) is the delegation fraction to external managers. (For alternatives, we omit hedge funds, which are all delegated.) The far left column presents (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 Equation I (the left column). Municipal Worker, Teachers, and Budget Civil Servants are the trustee composition outrage variables. Worker Wages and Regional Income are the outrage reference wages, equal to mean pension workers' wages and median local area 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. 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)
	Equation I:	Equation II: Delegation Fraction (Tobit Estimates)			
	Log Compensation	Portfolio	Alternatives	Public Equities	Fixed Income
Model:	Equation I	Equation II	Equation II	Equation II	Equation II
Outrage-Predicted Log Compensation		-0.639***	-0.635***	-0.273*	-0.310
		[0.186]	[0.217]	[0.165]	[0.223]
Municipal	-1.334				
	[1.022]				
Teachers	0.4				
	[0.634]				
Budget Civil Servants	0.459				
	[0.808]				
Log Regional Income	1.829***				
	[0.472]				
Log Worker Wages	0.189				
	[0.158]				
Political Chair	-0.11	-0.198**	0.0653	0.0665	0.3
	[0.164]	[0.0962]	[0.0919]	[0.150]	[0.218]
Underfunded Index	0.0322	-0.0897	0.152	0.241	0.179
	[0.0996]	[0.117]	[0.102]	[0.171]	[0.184]
Log Fund Size	0.362***	0.0684	0.0503	-0.225*	-0.532***
	[0.104]	[0.105]	[0.0967]	[0.126]	[0.169]
Observations	148	148	204	180	169
Pseudo R-squared	0.531				
F-Stat	29.17				

Table 12: Effect of Outrage on Asset Class Weights Results

Reported in columns (1)-(3) are estimates from a GMM system of two equations. The dependent variable in numbered columns (denoted above Equation II) is the asset class weight. The sample is limited to fund-years for which we observe a full (sums to unity) set allocation weights. The far left column presents (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 Equation I (the left column). Municipal Worker, Teachers, and Budget Civil Servants are the trustee composition outrage variables. Worker Wages and Regional Income are the outrage reference wages, equal to mean pension workers' wages and median local area 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. Standard errors are clustered at the fund level. *** 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)
	Equation I:	Equation II: Asset Class Weights		
	Log Compensation	Alternatives	Public Equities	Fixed Income
Outrage-Predicted Log Compensation		0.0355	-0.0666	0.0375
		[0.0144]**	[0.0179]***	[0.0156]**
		[0.0256]	[0.0314]***	[0.0344]
Municipal Workers	-0.801			
	[0.797]			
Teachers	-0.291			
	[0.371]			
Budget Civil Servants	-0.367			
	[0.514]			
Log Regional Income	1.221***			
	[0.320]			
Log Worker Wages	-0.206			
	[0.300]			
Political Chair	-0.0771	0.00009	-0.0169	0.0177
	[0.132]	[0.00962]	[0.0117]	[0.00960]*
		[0.0145]	[0.0184]	[0.0146]
Underfunded Index (lag)	-0.00322	0.00904	0.00126	-0.0101
	[0.0675]	[0.00587]	[0.00712]	[0.00584]*
		[0.00843]	[0.00749]	[0.00673]
Log Size (lag)	0.389***	0.0154	0.0037	-0.0220**
	[0.102]	[0.00884]*	[0.0109]	[0.00923]
		[0.0140]	[0.0216]	[0.0202]
Observations	197	197	197	197
Wald Chi-squared		64.4	50.41	17.9

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 Table 2: Robustness of Return Results

Reported in columns (1)-(4) are estimates from a GMM system of two equations. The dependent variable in numbered columns (denoted above Equation II) is the net return over the asset-class benchmark. The far left column presents (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 Equation I (the left column). Municipal Worker, Teachers, and Budget Civil Servant are the trustee composition outrage variables. Worker Wages and Regional Income are the outrage reference wages, equal to mean pension workers' wages and median local area 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, including null weights. The omitted category is bonds. Standard errors are clustered at the fund level. The number of funds per estimation is indicated below the number of observations. The Cragg-Donald F-statistic, and the p-value of its significance, is included as a test of weak identification. *** denotes p<0.01, ** denotes p<0.05, and * denotes p<0.1.

		(1)	(2)	(3)	(4)
	Equation I:	Equation II: Net Returns			
	Log Compensation	Portfolio	Alternatives	Public Equities	Fixed Income
Outrage-Predicted Log		0.00842**	0.0351***	0.00864**	-0.00292
Compensation		[0.00361]	[0.0133]	[0.00419]	[0.00433]
Occupations as a % of Non-Political Trustees					
Municipal Workers	-0.173				
	[0.186]				
Teachers	0.094				
	[0.102]				
Budget Civil Servants	-0.310**				
	[0.129]				
Log Regional Income	1.104***				
	[0.146]				
Log Worker Wages	-0.033				
	[0.155]				
Political Chair	0.0408	-0.00257	-0.0187**	-0.00419**	-0.00537**
	[0.0669]	[0.00168]	[0.00754]	[0.00207]	[0.00268]
Underfunding (lag)	0.0073	0.000696	-0.0000633	-0.0000498	0.00382
	[0.0399]	[0.00143]	[0.00445]	[0.00164]	[0.00234]
Log Size (lag)	0.243***	-0.00255*	-0.00186	-0.00214	0.00221
	[0.0413]	[0.00152]	[0.00609]	[0.00193]	[0.00190]
Weights					
Private Equity	-1.279**	-0.00227	-0.0647	0.0127	0.018
	[0.564]	[0.0145]	[0.0732]	[0.0206]	[0.0426]
Real Estate	-0.177	0.00495	-0.0378	-0.0628**	-0.139***
	[0.398]	[0.0118]	[0.0346]	[0.0257]	[0.0433]
Hedge Funds	1.294	0.0357	0.156**	0.0669***	0.0212
	[0.924]	[0.0237]	[0.0791]	[0.0237]	[0.0326]
Domestic Equity	-0.709***	0.0197**	0.0896	0.0105	-0.0175
	[0.263]	[0.00972]	[0.0595]	[0.00832]	[0.0162]
Foreign Equity	0.326	0.00191	-0.132*	0.0289***	0.0183
	[0.326]	[0.0153]	[0.0694]	[0.0110]	[0.0184]
Cash	-1.261	0.0165	0.00585	0.0712***	-0.039
	[0.976]	[0.0252]	[0.0986]	[0.0208]	[0.0243]
Observations	299	299	243	281	243
Number of Funds	299	88	71	85	80
Cragg-Donald F-stat	14.61				
F-Stat p-value	0.000				

Appendix A: Model Solution

In this appendix, we prove that the optimal contract for the manager is indeed that provided in equation (10).

A.1. Optimal Contract

First, we assume that the manager with skill $\boldsymbol{s}$ is hired, and then we calculate the optimal contact offered by the board of trustees.

We can clearly assume that $\boldsymbol{b} = (\mathbf{1} - \boldsymbol{a})\boldsymbol{\kappa}$, given that financial and political returns are perfectly exchangeable in our model, which implies that the board would always offer the same fraction of political and of financial returns to the portfolio manager.

To find the optimal value of the risk sharing parameter $\boldsymbol{a}$, note that the objective function of the portfolio manager, given in equation (8), simplifies to:

$$r_f + (1-a)\boldsymbol{w}^{\intercal}B(s) - \frac{1}{2}\lambda(1-a)^2\boldsymbol{w}^{\intercal}\Sigma\boldsymbol{w}, \tag{A.1}$$

where $\boldsymbol{w}$ is the vector of portfolio weights, Σ is the covariance matrix of returns, and $B(s)$ is the vector $B(s) = (s\varphi_{MV}, s\varphi_P + \kappa)^{\intercal}$.

The optimal response that maximizes (A.1) is given by:

$$\boldsymbol{w} = (1-a)^{-1}\lambda^{-1}\Sigma^{-1}B(s). \tag{A.2}$$

Now, we can write the board's objective function, given in equation (6), as follows:

$$r_f + \boldsymbol{w}^{\intercal}aB(s) - c - \frac{1}{2}\lambda_{board}a^2\boldsymbol{w}^{\intercal}\Sigma\boldsymbol{w}. \tag{A.3}$$

Let $\nu = \frac{a}{1-a}$. Basic algebra shows that (A.3) is proportional to

$$\nu - \frac{1}{2}\frac{\lambda_{board}}{\lambda}\nu^2. \tag{A.4}$$

We can then determine the ν that maximizes (A.4), which is $\nu = \frac{\lambda_{board}}{\lambda}$. This implies that the optimal a is given by

$$a^* = \frac{\lambda}{\lambda+\lambda_{board}}. \tag{A.5}$$

A.2. Optimal Manager Quality

By plugging the optimal contract, given in equation (10), into the board objective function, given in equation (6), we find the following indirect utility function:

$$V_{board}(s) = r_f + \frac{1}{2\bar{\lambda}} B(s)^{\intercal}\Sigma^{-1}B(s) - O(s), \tag{A.6}$$

where $\bar{\lambda} = (\lambda^{-1} + \lambda_{board}^{-1})^{-1}$. The underlying first order condition for the choice of the optimal managerial skill is:

$$B(s)^{\intercal}\Sigma^{-1}\boldsymbol{\varphi} = O'(s), \tag{A.7}$$

where $\boldsymbol{\varphi} = (\varphi_{MV}, \varphi_P)^{\intercal}$. It's easy to see that this implies the following condition on the marginal payment to managers:

$$\frac{(\sigma_P^2\varphi_{MV}^2 - 2\rho\sigma_P\sigma_{MV}\varphi_{MV}\varphi_P + \sigma_{MV}^2\varphi_P^2)s + (\sigma_{MV}^2\varphi_P - \rho\sigma_P\sigma_{MV}\varphi_{MV})\kappa}{\bar{\lambda}\sigma_P^2\sigma_{MV}^2(1-\rho^2)} = O'(s) \tag{A.8}$$

Appendix B: Comparative Statics Computations

Table 1 lays out model predictions by showing the comparative statics of how manager skill, portfolio weights, and returns change in the model with changes in political agency variables. In this appendix, we derive these predictions.

First we consider the case when the outrage constraint is not binding, and after that we compare the derivatives of the binding and not-binding cases.

B.1. Partial Derivatives of Manager Skill

If the outrage constraint is not binding, then the optimal manager skill s^* maximizes the ex-ante utility function of the board $V_{board}(s)$, which can be written as:

$$V_{board}(s) = \frac{1}{2\bar{\lambda}} B(s)^{\intercal}\Sigma^{-1}B(s) - O(s), \tag{B.1}$$

where Σ is the covariance matrix of returns, $O(s)$ is the outside option for a manager with quality s, and $B(s)$ is a vector defined by $B(s) = (s\varphi_{MV}, s\varphi_P + \kappa)^{\intercal}$. It's easy to see that we can write the underlying first order condition as

$$\bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}[s\boldsymbol{\varphi} + \kappa\boldsymbol{e}_2] = O'(s), \tag{B.2}$$

where $\boldsymbol{\varphi} = (\varphi_{MV}, \varphi_P)^{\intercal}$ and $\boldsymbol{e}_2 = (0,1)^{\intercal}$. Differentiating (B.2) with respect to the political return κ we get:

$$\left[O''(s^*) - \bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}\boldsymbol{\varphi}\right]\frac{\partial s}{\partial \kappa} = \bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}\boldsymbol{e}_2. \tag{B.3}$$

The term $\left[O''(s^*) - \bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}\boldsymbol{\varphi}\right]$ is positive by the concavity of the objective function at the maximum, while the term $[\lambda^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}\boldsymbol{e}_2]$ is negative if the Sharpe ratio of the mean-variance efficient securities is sufficiently larger than the Sharpe ratio of the political assets. This implies that:

$$\frac{\partial s}{\partial \boldsymbol{\kappa}} < 0. \tag{B.4}$$

Now, differentiating (B.2) with respect to the political return λ, we get:

$$\left[O''(s^*) - \bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}\boldsymbol{\varphi}\right]\frac{\partial s}{\partial \lambda} = -\bar{\lambda}^{-1}O'(s). \tag{B.5}$$

The term $\left[O''(s^*) - \bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}\boldsymbol{\varphi}\right]$ is positive, while the term $\left[-\bar{\lambda}^{-1}O'(s)\right]$ is negative, which implies that:

$$\frac{\partial s}{\partial \bar{\lambda}} < 0. \tag{B.6}$$

B.2. Partial Derivatives of Portfolio Weights

The vector of portfolio weights will be given by:

$$\boldsymbol{w} = \bar{\lambda}^{-1}\Sigma^{-1}[s\boldsymbol{\varphi} + \kappa\boldsymbol{e}_2]. \tag{B.7}$$

Differentiating (B.7) with respect to $\boldsymbol{\kappa}$ we get:

$$\frac{\partial \boldsymbol{w}}{\partial \kappa} = \bar{\lambda}^{-1}\{\det(\Sigma)\}^{-1}\begin{bmatrix}\sigma_{MV}\sigma_P^2\left(\frac{\varphi_{MV}}{\sigma_{MV}} - \frac{\varphi_P}{\sigma_P}\right)\frac{\partial s}{\partial \boldsymbol{\kappa}} - \rho\sigma_{MV}\sigma_P \\ \sigma_{MV}^2 - \sigma_{MV}^2\sigma_P\left(\frac{\varphi_{MV}}{\sigma_{MV}} - \frac{\varphi_P}{\sigma_P}\right)\frac{\partial s}{\partial \boldsymbol{\kappa}}\end{bmatrix},$$

from which it follows that:

$$\frac{\partial w_{MV}}{\partial \kappa} < 0, \ \frac{\partial w_P}{\partial \kappa} > 0. \tag{B.8}$$

Similar algebra shows that (i) the investment in fixed income is increasing in the risk aversion, and (ii) the investment in the mean-variance efficient security is decreasing in the risk aversion.

B.3. Partial Derivatives of Returns

In our model, the asset class expected returns ($E[R_{MV}]$ and $E[R_P]$) are proportional to the manager skill s. This implies that:

$$\frac{\partial E[R_{MV}]}{\partial \kappa} < 0, \frac{\partial E[R_{MV}]}{\partial \bar{\lambda}} < 0, \frac{\partial E[R_{MV}]}{\partial \kappa} < 0, \frac{\partial E[R_{MV}]}{\partial \bar{\lambda}} < 0. \tag{B.9}$$

Now, the total portfolio expected return ($E[R]$) will be given by

$$E[R] = r_f + s\boldsymbol{\varphi}^{\intercal}\boldsymbol{w} = r_f + s\bar{\lambda}^{-1}\boldsymbol{\varphi}^{\intercal}\Sigma^{-1}[s\boldsymbol{\varphi} + \kappa \boldsymbol{e}_2] = r_f + sO'(s). \tag{B.10}$$

Differentiating (B.10) with respect to $\bar{\lambda}$ we arrive at:

$$\frac{\partial E[R^e]}{\partial \bar{\lambda}} = \frac{\partial s}{\partial \bar{\lambda}} O'(s) + s\frac{\partial s}{\partial \bar{\lambda}} O''(s) < 0. \tag{B.11}$$

B.4. Partial Derivatives with Respect to Outrage

If s^{free} denotes the optimal manager skill without outrage constraints, then the optimal manager skill is given by:

$$s = \min\{s^{free}, s^{outrage}\}. \tag{B.12}$$

This implies that

$$\frac{\partial s}{\partial s^{outrage}} = \begin{cases} 0 \text{ if } s < s^{outrage} \\ 1 \text{ if } s > s^{outrage} \end{cases}. \tag{B.13}$$

Therefore,

$$\frac{\partial E[R_{MV}]}{\partial s^{outrage}} = \frac{\partial E[R_{MV}]}{\partial s}\frac{\partial s}{\partial s^{outrage}} \begin{cases} = 0 \text{ if } s < s^{outrage} \\ > 0 \text{ if } s > s^{outrage} \end{cases} \tag{B.14}$$

$$\frac{\partial w_{MV}}{\partial s^{outrage}} = \frac{\partial w_{MV}}{\partial s}\frac{\partial s}{\partial s^{outrage}} \begin{cases} = 0 \text{ if } s < s^{outrage} \\ > 0 \text{ if } s > s^{outrage} \end{cases} \tag{B.15}$$