

# The impact of public pension board of trustee composition on state bond ratings

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Received: 18 May 2017 / Accepted: 3 January 2018 / Published online: 16 January 2018  
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**Abstract** The declining financial health of public pension systems is increasingly becoming a budgetary concern for many state and local governments. While the academic literature has identified several factors behind the growth in unfunded state and local public pension liabilities, there is mixed evidence on how the composition of a pension system’s board of trustees affects a pension’s financial health. This article contributes to this literature by measuring how public pension board composition affects fund financial health as measured by state bond ratings. With a panel dataset of state pensions between 2001 and 2014 our results indicate that elected board members are consistently associated with lower bond ratings (and thus higher borrowing costs) while appointed and *ex-officio* board members are associated with higher bond ratings. These results are robust to a number of specifications.

**Keywords** Unfunded liabilities · Public pensions · Pension governance · Board of directors · Bond ratings · Public finance · Corporate governance

**JEL Classification** D78 · G32 · H75 · L22

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The authors would like to thank Connor J. Cosenza for assistance in collecting and compiling much of the data employed in this study.

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## 1 Introduction

State and local public pensions across the U.S. face a looming public pension crisis (Beermann 2013; Coggburn and Kearney 2010; Kiewiet and McCubbins 2014; Peng and Wang 2017; Ricketts and Walker 2012). In total, state and local unfunded pension liabilities are estimated to add several trillion dollars to state and local government debt (Beermann 2013; Brown and Wilcox 2009; Novy-Marx and Rauh 2011; Rauh 2016; Russek 2011; Staman 2011).

Several factors have been identified as contributing to the current pension crisis. These include the use of liberal discount rates (Gold and Latter 2009; Naughton et al. 2015; Novy-Marx and Rauh 2011), inadequate funding (Munnell et al. 2011), and other public choice and political economy factors (Kelley 2014; Mitchell and Smith 1994; Schneider and Damanpour 2002). Additionally, investment decisions, including investment policy, asset allocation, and the assumed rate of return have also played a substantial role (Stalebrink 2014; Lucas and Zeldes 2009; Ryan and Fabozzi 2002).

One issue increasingly receiving more attention is the influence that boards of trustees, entrusted with the oversight of public pensions, have on the variables identified above. Board members can be selected through election by plan participants (as representative active or retired members), be appointed by the executive and/or legislative branch, or serve by statutory or constitutional stipulation (*ex-officio*). More specifically, elected board members are active or retired public employees who are elected by active or retired pension plan members. Oftentimes, these board members are elected by subset of the pension plan members. For instance, retired teachers may have a different elected official represent them on the board than active teachers. Appointed board members represent board members appointed by state governors, or in some cases, state legislatures or ranking legislative members. *Ex-officio* board members serve automatically by constitutional stipulation based upon their holding a public office, such as state treasurer, budget officer, or superintendent of education.

How the members of the board are selected can potentially have an influence on the funding health of a public pension plan, given the potential conflicts of interest, principal-agent problems, and other incentives and constraints involved. The evidence on board composition influence on public pension funding health, however, has been mixed. Previous studies often rely on isolated measures of pension performance, especially investment performance. Yet, the majority of public pension plans give the board of trustees control over investments, benefits, actuarial assumptions, and asset allocation (Mitchell et al. 2001; Mitchell and Hsin 1997; Zorn 1997).<sup>1</sup> These factors under board control tend to have a strong influence on the overall funding health of public pensions (Wang and Peng 2016). While some studies do use overall funding health to measure the influence of board composition, the diverse range of complex actuarial calculations used across state and local pension plans may contribute to the mixed results in the literature (Clark et al. 2006; Easterday and Eaton 2012; Picconi 2006).

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<sup>1</sup> Even board of trustee influence on just investment decisions may also affect other areas that impact funding health. For instance, given that most public pensions discount liabilities using their assumed rate of return, investment policies setting the assumed rate of return will also have an impact on funding health.

Given the inconclusive evidence found in the literature, we use state bond ratings to evaluate how differences in the composition of state pension plan's boards of trustees may influence pension plan financial health. To the extent that board composition influences pension fund health, state bond ratings could provide a more comprehensive measure of the extent of the influence. Importantly, there is evidence that bond rating agencies do take unfunded liabilities, such as retiree healthcare benefits, into consideration (Coggburn and Kearney 2010; Keating and Berman 2007; Wisniewski 2005). For instance, Standard & Poor's (2006) and Fitch Ratings (2005) both issued reports on how Government Accounting Standards Board Statement No. 45, dealing with other post-employment benefits (OPEB), would potentially impact the credit ratings of state and local governments.<sup>2</sup> Since recent estimates of state OPEB obligations put them between \$300 and \$400 billion (Munnell et al. 2016), substantially lower than recent estimates of state public pension liabilities, bond rating agencies likely factor in much larger pension obligations, especially since pension liabilities substantially exceed state bond debt (Novy-Marx and Rauh 2011).<sup>3</sup> Martell et al. (2013), for instance, find that pension obligations do influence state credit ratings. In addition, it is common for credit rating agencies to issue reports when new GASB rules for public pensions are proposed to explain how the rules would potentially impact their state bond ratings (Fitch Ratings 2017; Moody's 2014; 2016).

Unfunded pension obligations are especially a concern for credit rating agencies given that pension obligations will likely take priority over bondholders in the event of default or bankruptcy, as seen in recent municipal bankruptcies (Aneiro 2014; Burns 2012; Dawson 2015; Monahan 2010; Shafroth 2015).<sup>4</sup> This can be evidenced by the varied warnings and calls for reform bond rating agencies have issued, stressing their concern about the accumulation of these substantial obligations and the negative effect they will have on the fiscal outlooks of state and local governments (Chappatta 2014, FitchRatings 2011; Prunty and Sugden 2015).<sup>5</sup>

If a state pension's board of trustees truly does have an economically significant effect on the health of its pension plan, then this should lead to changes in a state's bond rating. Thus, our novel approach provides an appropriate measure to evaluate the significance of pension governance and board composition on the financial health of public pensions. To empirically evaluate our conjecture, we collect data on state public pension systems between 2001 and 2014 along with bond ratings for each state from each of the three bond ratings agencies mentioned above.

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<sup>2</sup> There is also evidence that credit rating agencies have factored in OPEB obligations into corporate bond ratings (Harper et al. 1991; Maher 1996).

<sup>3</sup> There is also evidence suggesting that credit rating agencies and investors factor in private pension obligations in evaluating corporate bond risk (Carroll and Niehaus 1998; Gopalakrishnan 1994; Martin and Henderson 1983).

<sup>4</sup> Even the Treasury Department's recent financial plan for Puerto Rico placed pensioners over bondholders (Walsh 2016).

<sup>5</sup> Investor research groups such as Morningstar (Barkley 2012) and financial service providers such as Citi (Hanif et al. 2016) have also issued reports on the pension crisis faced by state and local governments. In response to the variance in reporting across U.S. state and local pensions and the use of liberal discount rates, Moody's even replaced the Governmental Accounting Standard Board's (GASB) reporting used by public pensions with their own independent evaluation (Moody's 2013).

Our results indicate a negative association between the proportion of outside (elected) board members and bond ratings (meaning higher borrowing costs) for a state. On the other hand, the opposite holds true: as the proportion of inside (appointed and *ex-officio*) board members increases, bond ratings increase (meaning lower borrowing costs). Further, this latter finding is more pronounced when inside members make up a supermajority of the board. In addition to contributing to the literature on public pension financial performance and oversight, this article also adds more broadly to the literature on corporate governance.

The remainder of the paper is structured as follows: Section 2 provides a brief review of the relevant literature as well as some of the theoretical considerations regarding pension plan governance. Sect. 3 describes the dataset employed as well as the model specification to be used in order to analyze how various governance structures impact state bond ratings. Section 4 lays out the results of those model specifications, an interpretation of those results, and a brief discussion of the implications that stem from the findings. Section 5 concludes.

## 2 Board composition and performance

Within the corporate finance literature, a substantial amount of work has examined how the composition of various boards of directors affects different aspects of a corporation. Numerous studies have considered to what extent board composition affects shareholder wealth, returns, and corporate performance in general (Adams et al. 2010; Carter et al. 2003; Cocco and Volpin 2007; Dalton et al. 1998; Ferris et al. 2003; Fich and Shivdasani 2006; Perry and Shivdasani 2005). Much of this research has focused on how board structure and composition influences incentives and the principal-agent problem.

An important strand of this literature has concentrated on how inside, relative to outside, members sitting on the board of a given company influence firm performance. Overall, the empirical findings have been rather mixed. For example, some results have shown that as the number of outside board members increases, the number of shareholder lawsuits decreases (Helland and Sykuta 2005), firm value increases (Petra 2005), board shirking decreases (Ferris et al. 2003), and restructuring of a poorly performing firm occurs more rapidly (Perry and Shivdasani 2005). On the other hand, numerous studies have found little or no correlation between the number of outside board members and firm performance (Bhagat and Black 2002; Hermalin and Weisbach 2003; Finegold et al. 2007).

A related literature examines the performance of elected versus appointed bureaucrats or political agents. For instance, elected officials may have the incentive to cater to their electorate (Choi et al. 2010; Lim 2013). Thus, positions requiring technical decisions may be better off left to appointed officials (Alesina and Tabellini 2007; Maskin and Tirole 2004). Specifically, this theoretical work suggests that where the electorate is relatively poorly informed about an optimal action, and any feedback about the decision is slow to filter to the electorate, then appointed bureaucrats would be preferable to elected bureaucrats. On the other hand, Coate and Besley (2003) argue that political appointment of regulators can cause regulatory issues to be bun-

dled with other items in their agenda rather than be judged independent of a political platform. The result suggests that elected regulators tend to be more pro-consumer while appointed regulators tend to be pro-stakeholder (industry).

An analysis of public pensions, where board members are politically appointed or elected, lies at the intersection of both of these literatures (Carmichael and Palacios 2003; Clark 2004; Kelley 2014). Just as the results are somewhat mixed in these literatures, so too is much of the analysis on public pension governance. There is substantial evidence that the prevalence of more appointed and/or *ex-officio* board members leads to more politically influenced investment decisions (Andonovet al. 2017; Bradley et al. 2016; Iglesias and Palacios 2000; Hess 2005, 2003; Romano 1993, 1995), optimistic accounting assumptions (Eaton and Nofsinger 2004; Stalebrink 2014), and lower rates of return on investment (Bradley et al. 2016; Iglesias and Palacios 2000). There is also evidence that active members or retirees serving as board members may have a strong incentive to closely monitor investments to ensure funding health and investment performance (Useem and Hess 2001; Hess 2005).

Both agency problems and political factors might suggest that a board composed of elected plan members would lead to relatively better returns and more stable long-run pension performance. However, the literature is far from conclusive. There is evidence, for instance, that employees, and especially retirees, serving as board members can interfere with professional managers, reducing performance (Coronado et al. 2003; Mitchell 1988 & Mitchell 1993; Mitchell and Hsin 1997; Munnell and Sunden 2001; Yang and Mitchell 2005). Other studies find mixed results or even no effect, depending on the measure used to evaluate board performance (Harper 2008; Useem and Mitchell 2000). One reason, perhaps, is that survey evidence suggests that many elected board members may face difficulty understanding complex actuarial calculations due to a rudimentary understanding of basic finance concepts (Clark et al. 2006; Easterday and Eaton 2012; Picconi 2006; Mitchell 1988; Starr-McCluer and Sunden 1999).

The conflicting results discussed above suggest that additional empirical work is necessary. This paper adds to this literature by analyzing how bond rating agencies might perceive the pension performance of a given public fund. We do this by evaluating the raw percentage of each type of board member (elected, appointed, or *ex officio*). Second, we evaluate whether a board has a clear (super)majority made up of either elected, appointed, or *ex officio* members, and if so, how this given (super)majority might affect bond ratings. Third, to compare our results to the literature on corporate governance, we examine how “inside” (defined as appointed and *ex-officio*) board members behave relative to “outside” (defined as elected) board members in terms of how they affect bond ratings. Finally, we further decompose this idea to evaluate how a majority and supermajority of participating members of a pension system on the board of trustees affects bond ratings.

Importantly, the conflicting evidence in the existing literature does not indicate any sort of *a priori* conclusions about what type of board composition, if any, would be positively or negatively associated with state bond ratings. Therefore, much of this paper should be viewed as an exploratory empirical exercise meant to add to the debate by better parsing out these empirical effects. Given that bond rating agencies have an incentive to objectively evaluate all aspects of a state’s pension system and how they

affect public finances, evaluating bond ratings may offer a better way to evaluate the empirical effects of board composition.

Given the existing literature, it is not possible to conclusively suggest how a particular board's composition might affect bond ratings. It is possible, however, to make conjectures about the impact that each member type may have. Elected or "outside" members have been shown to have a poor understanding of basic finance and also tend to interfere with professional managerial decisions. While elected board members tend to negatively affect funding status, the evidence also suggests that elected trustees also help secure greater public contributions to the system, especially during times of financial stress (Mitchell and Hsin 1997).

Additionally, while inside board members may also individually and collectively impact a pension system, and thus bond ratings, their *ex-ante* effect is far from certain. As noted, appointed members, bowing to political pressures, may raise discount rates or increase economically targeted incentives in order to relieve short-term fiscal burdens or benefit politically important constituencies at the expense of long-run pension stability and solvency. However, *ex-officio* members, given that they are either constitutionally or, at a minimum, statutorily appointed to the position, should be relatively insulated from such pressures and tend to vote for time-consistent policies, even if these policies are politically controversial. Thus, these individuals should presumably pursue policies that minimize long-run costs potentially borne by the taxpayer. Finally, such members tend to be appointed precisely because they have a better understanding of the intricate issues associated with public pension systems. Countering this effect, however, is the extent to which these *ex-officio* board members concurrently hold public office, which may incentivize voting for politically expedient, though time-inconsistent, pension policies. Thus, depending on the weight that these incentives exert, the effect that these members have on bond ratings could be either positive or negative.

The influence that board composition has on bond ratings depends on how these countervailing forces interact. Furthermore, to the extent that these conjectures hold true, the effect should be augmented if a board is composed of either a majority or supermajority of any of these types of groups due to ideological amplification and conformity (Sunstein 2003). As Groseclose and Snyder (1996) show, supermajorities constitute the most stable voting bloc, though in this case there is nothing to indicate that a supermajority of either group would be optimal. The following section provides a more detailed explanation of all of the variables employed to empirically investigate each of the considerations described above.

### 3 Data

For the analysis, we collect public pension performance and governance data from several sources. The first source comes from the Center for Retirement Research's *Public Plan's Database*.<sup>6</sup> This database provides information on 126 state and local pension plans annually from 2001 to 2014. A second source for pension information

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<sup>6</sup> This information is freely available at <http://crr.bc.edu/data/public-plans-database/>.

comes from the Public Fund Survey,<sup>7</sup> which compiles annual data for 100 pension systems in the U.S., covering over 85% of all pension funds. We also hand collect information for a number of pensions wherever annual data is missing between the above two sources. This information is taken directly from each plan's Comprehensive Annual Financial Report (CAFR). An additional source used is the National Association of State Retirement Administrators, which provides information on pension board of trustee composition.<sup>8</sup> Overall, we construct a comprehensive dataset for 107 state plans covering the period 2001 to 2014.<sup>9</sup>

Further, given that bond ratings are ranked based on letter grades and not numerically, it is necessary to transform these ratings into a quantifiable scale. In order to do this, we normalize each score based on Depken and LaFountain (2006) (utilized by Belasen et al. 2015), Calcagno and Benefield (2013), and Schelker (2012a, b). This method, discussed in greater detail below, has the advantage of actually providing an economically interpretable result, rather than simply creating a numerical scale from low to high or vice versa for each bond rating.

Each rating agency uses a slightly different scale for each individual rating. Specifically, Fitch and S&P apply a high of "AAA" and a low of "C" with "+" and "-" employed through that range, whereas Moody's has a high of "Aaa" and low of "C" with "1", "2", and "3" applied to each generic category. This nets a total of 25 possible scores for S&P, 21 scores for Moody's, and 19 distinct ratings for Fitch. Each of these ratings is then converted into a numerical scale, with the rating for state  $i$  in year  $t$  from rating agency  $j$  is  $R_{ijt} \in \{1, \dots, N_j\}$ , with 1 being the lowest possible rating and being the highest for rating agency  $j$ . Each of these scores is then normalized for a given rating agency by dividing the obtained score by the highest possible score that could be achieved. Finally, the scores are averaged together to derive one score for each state between the range of "0" (low) and "1" (high). Figure 1 breaks down each of these scores by state between 2001 and 2014, indicating the minimum, maximum, and average score.

Because it is not uncommon for a state to receive the highest bond rating from multiple agencies, a state's normalized score may be top-censored at 1.<sup>10</sup> Therefore, we use the following tobit model to specify the effect of board composition on bond rating:

$$\text{Bondrating}_{it} = \alpha + \text{BoardComp}'_{it}\beta + Z'_{it}\gamma + \mu_t + \sigma_i + \varepsilon_{it} \quad (1)$$

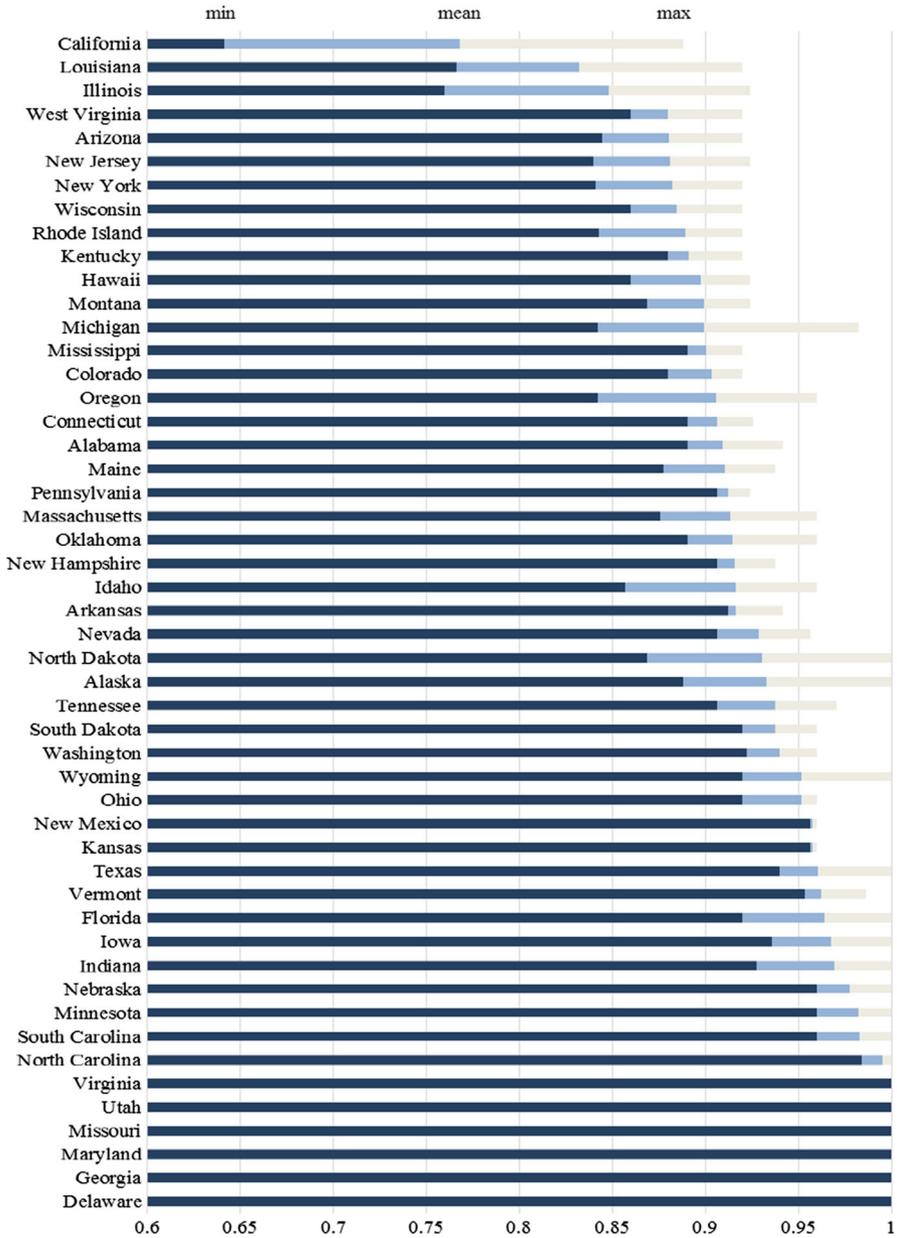
where  $\text{Bondrating}_{it}$  represents the normalized rating for state  $i$  in year  $t$ .  $\text{BoardComp}'_{it}$  is a vector of our main independent variables of interest,  $Z'_{it}$  is a vector of socioeconomic, fiscal health, political, and pension health control vari-

<sup>7</sup> This information is freely available at <http://www.publicfundsurvey.org/publicfundsurvey/index.htm>.

<sup>8</sup> Information is freely available at [www.nasra.org](http://www.nasra.org).

<sup>9</sup> All locally administered plans were excluded from the analysis. Additionally, data on board composition for Washington State and West Virginia were ambiguous and often contradictory across sources, with only *ex-officio* numbers shown for West Virginia. Therefore, these states have been largely excluded from the analysis.

<sup>10</sup> There are a total of 263 observations in the sample with a score of "1".



**Fig. 1** Charts shows normalized bond scores between 0 and 1. Values closer to 1 indicates better ratings. States are sorted based on average bond score across the 2001–2014 period. Chart shows minimum bond score across the time period, mean bond score, and maximum bond score. The following states have bond scores of 1 across the entire period: VA, UT, MO, MD, GA and DE

ables (discussed below),  $\mu_t$  are year dummies, and are  $\sigma_i$  individual pension plan fixed effects to control for any unobserved, time-invariant differences specific to each plan.

Here we include a number of independent variables to be evaluated. We decompose each pension board to determine the number of elected, appointed, *ex-officio*, insider (which is the combination of appointed and *ex-officio*), and total plan members that sit on a given pension board. From these variables we are able to capture how each individual type of trustee affects pension performance. We initially investigate this as a percentage of total board membership. Further, we evaluate pension board composition based on majority and supermajority membership, where a supermajority is defined as 60% or more of the board. In this context, we examine whether a certain type of member might act as the decisive voter or be in a position to act as a decisive voter for a given pension. Each of these variables is represented as a dummy variable, with “1” if the type of board member makes up a clear (super)majority and “0” otherwise.<sup>11</sup>

Along with a number of control variables that are conventional to the literature and may influence bond ratings (See: Liu and Thakor 1984; Schelker 2012a), we also include several fiscal and pension health control variables. The first set of control variables are socioeconomic controls and include population growth, population density, percentage of the population age 65 and over, percentage of the population with a bachelor’s degree, percentage of the population in poverty, annual unemployment rate, homeownership rates, real per capita GDP, a dummy variable for the Great Recession, and finally the rate of public sector unionization.

Population growth and population density are expected to have an ambiguous effect on bond ratings, as both might indicate a larger tax base, but could also be indicative of the need for more publicly provided goods. Percentage of the population over 65 suggests a smaller working-age population and also a population that might be in need of greater social services; thus, this is expected to have a negative effect on bond ratings. This is also true for the unemployment rate in a state. Homeownership rates and real per capita GDP indicate a larger potential tax base and are expected to have a positive effect. Finally, both the Great Recession and increased public sector unionization would be expected to have negative effects on state bond ratings, as both have been shown to increase public expenditures.

The fiscal health variables included are per capita real state revenues and per capita outstanding state debt. As revenue increases bond ratings should increase as well, while debt and bond ratings are expected to be negatively correlated. The final four variables include a pension system’s funded ratio, the annual required contribution (ARC), the assumed discount rate, and a measure of public corruption. This first variable, the funded ratio, divides actuarial assets by actuarial liabilities, providing a measure of the financial health of a pension system based on a variety of actuarial

<sup>11</sup> Importantly, there is significant variation in composition across boards. Specifically, most pensions have a combination of member types and are almost never composed by 100% of a given type. In fact, across the dataset there was only one board made up entirely of elected members, 15 made up entirely of appointed members, and 2 entirely composed of *ex-officio* members. Additionally, there were 21 pension boards with a supermajority of elected members in 2001 and 34 boards that were either composed of a supermajority of *ex-officio* or appointed members. In 2014 these numbers remained at 21 and increased to 39 boards respectively.

assumptions. Higher funded ratios indicate a more financially sound pension. The ARC, calculated using actuarial assumptions set by GASB, sets a minimum state contribution to the pension system to ensure that it will be able to meet newly acquired and previously accrued pension obligations. Importantly, under GASB rules, state governments are only required to report the ARC, and are not actually required to meet its minimum funding requirements. Finally, the discount rate, which is the interest rate at which pension funds discount future liabilities, under GASB rules, can be set to the projected rate of return on plan assets. Thus, a higher assumed rate of return will result in a lower reported value of actuarial liabilities, and therefore a lower necessary state contribution to the pension system. A higher assumed rate of return also means, however, that a pension system must take on higher levels of risk. Not achieving the assumed rate of return puts the pension system, and ultimately the state, at risk.

Finally, we include total state and local officials convicted of corruption (per 100,000 citizens) by year and state, which is compiled by the Department of Justice and reported in the *Report to Congress on the Activities and Operations of the Public Integrity Section*. This measure is consistent with the literature and has been shown to be associated with lower bond ratings overall (Depken and LaFountain 2006). Table 1 presents a breakdown of the summary statistics for all of the variables discussed above.

One potential issue that needs to be addressed is the possibility that pension board composition is endogenously determined. Although this may be an issue, we do not find it to be a serious concern. First, as Andonovet al. (2017) point out, the composition and size of most pension boards were set well before the period under analysis, which should exclude major issues of reverse causality. Additionally, as Barnhart and Rosenstein (1998) show, correcting for simultaneity may be less reliable in relation to board composition given the sensitivity to the specific models being tested. Further, a number of scholars have found no such relationship between changes in board composition and firm performance within the private sector (Bhagat and Black 1999; Hermalin and Weisbach 1988; Weisbach 1988; Klein 1999).

However, to the extent that board composition may be changed statutorily, it could be the case that some omitted variable such as a state's political atmosphere, may be driving the results. Therefore, in order to overcome this problem we include two additional control variables for unified Republican and unified Democrat governments coded as a "1" if a state's government is made up of a Republican governor and legislature or Democratic governor and legislature respectively and a "0" otherwise. The inclusion of these two variables reduces the potential for some omitted variable to be driving the results. In the next section we present and discuss the results and some implications that might stem from those results.

## 4 Results and discussion

This section presents our results and provides a discussion and interpretation of our findings.

**Table 1** Summary statistics

Variable	Observations	Mean	SD	Min	Max
% Elected	1327	32.618	29.2069	0	100
% Appointed	1327	50.339	32.522	0	100
% Ex-officio	1345	17.197	19.390	0	100
% Insider	1327	67.382	29.207	0	100
% Plan members	1417	56.228	23.061	0	100
Majority elected (1 = Yes)	1327	0.292	0.455	0	1
Majority appointed (1 = Yes)	1327	0.412	0.492	0	1
Majority ex-officio (1 = Yes)	1345	0.031	0.174	0	1
Majority insider (1 = Yes)	1327	0.665	0.472	0	1
Majority plan members (1 = Yes)	1417	0.546	0.498	0	1
Supermajority elected (1 = Yes)	1327	0.222	0.415	0	1
Supermajority appointed (1 = Yes)	1327	0.362	0.481	0	1
Supermajority ex-officio (1 = Yes)	1345	0.021	0.143	0	1
Supermajority insider (1 = Yes)	1327	0.528	0.499	0	1
Supermajority plan members (1 = Yes)	1417	0.417	0.493	0	1
Population growth	1466	0.841	0.733	-5.986	4.330
% Bachelor degree	1466	27.311	4.828	15.1	40.3
Age 65 and over	1466	13.013	1.815	5.750	19.10
Population density	1466	203.113	267.331	1.111	1215.417
Unemployment rate	1466	6.284	2.00	2.483	13.80
% in Poverty	1466	12.955	3.236	5.40	23.10
% Homeowners	1466	68.998	5.081	51.90	81.30
Per capita GDP	1466	48061.34	8338.234	30705	77263
Public sector unionization	1466	35.00	18.267	2.70	72.40
Great recession (1 = Yes)	1466	0.143	0.350	0	1
Per capita state revenue (in \$10,000s)	1466	0.664	0.230	0.212	2.486
Per capita state debt (in \$10,000s)	1466	0.368	0.220	0.070	1.234
Unified democrat	1466	0.255	0.436	0	1
Unified republican	1466	0.274	0.446	0	1
Public corruption (per 100,000 citizens)	1466	0.331	0.274	0	2.505
Funding ratio	1429	82.169	20.426	19.10	197.396
Actuarially required contribution	1428	90.420	25.406	0	297
Assumed discount rate	1397	7.901	0.375	6.696	9.00

## 4.1 Results

The results obtained from the above specification reveal a number of interesting outcomes. Along with including our main fixed-effect tobit specification with each of the main independent variables of interest regressed separately (columns 1 through 4). We also include specifications with appointed, *ex-officio*, and plan member regressed

together (columns 5 through 8), thus providing estimates for those variables relative to elected board members.<sup>12</sup> The estimates include the raw percentage of each category of member type (elected, appointed, *ex-officio*, insider, and plan member).<sup>13, 14</sup>

Here column 1 lists the results with no controls included, column 2 includes all of the socioeconomic control variables, column 3 adds the state fiscal and political controls, while column 4 includes the pension health control variables. The remaining specifications in column 5 through 8 follow the same pattern. Further, the control variables in general net the expected sign coefficients. Thus for the sake of space, these results have been excluded from this version of the paper, but are available from the authors upon request. The findings suggest that as the percentage of elected members (*% Elected*) increases, bond ratings decrease, while the remaining main independent variables of interest (*% Appointed*, *% Ex-Officio*, *% Insider*, and *% Plan Members*) are all positive, though only column 1 (with no controls) is statistically significant. Interestingly, columns 5 through 8 indicate that relative to elected members, additional *ex-officio* members are positively and statistically significantly related to increased bond ratings, while appointed members are slightly negative, though insignificant in all specifications.

In order to interpret the coefficients in a meaningful way, we follow Depken and LaFountain (2006) by estimating how much the results from columns 1 through 4 in Table 3 affect borrowing costs. In order to do this we incorporate estimates from Rubinfield (1973), which indicates that a downgrade by Moody's from "AAA" to "AA" increased borrowing costs by roughly 20.6 basis points (where no differentiation between investment grades was made). This meant that Moody's had seven different grades at the time, indicating that a one notch downgrade today by Moody's would translate into a roughly 6.87 basis point decline. Combining this with the results from Table 3, we can determine the magnitude of each coefficient's effect on a state's borrowing cost.

For example, the coefficients for *% Elected* without socioeconomic, political, or pension health controls are  $-0.00147$ . This would translate into a 0.03087 notch decline today.<sup>15</sup> This indicates that a 1% increase in the number of elected members sitting on a pension's board of trustees would increase a state's borrowing costs by \$21.21 per \$1 million in debt at a 5% interest rate.<sup>16</sup> In 2012 average long-term outstanding state debt was about \$22.5 billion. Thus, considering all coefficients for *% elected* from columns 1 through 4 would suggest that increasing the number of elected members by 1 person on a 10 person board increases borrowing costs between

<sup>12</sup> We also evaluated fixed-effect OLS specifications, with the results largely qualitatively and quantitatively similar to those reported for the above model. For the sake of space these estimates are unreported, though are available upon request.

<sup>13</sup> Along with these reported results, we also considered an alternative specification which weighted each observation by the number of pension plans in each state. Neither the coefficients nor statistical significance were materially different and have thus been excluded from the paper for the sake of space. However, they are available upon request.

<sup>14</sup> Additionally, "*% insider*" is clearly just  $(1 - \% \text{ elected})$ . While this variable may not provide much additional information in this specification, results are included for completeness.

<sup>15</sup> Calculated as the coefficient multiplied by the number of current notches Moody's employs.

<sup>16</sup> Calculated as the decline in notches multiplied by 6.87.

**Table 2** Raw percentage of board membership

Measure of board composition	Fixed effects (tobit)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% Elected	-0.00147** (0.000647)	-0.000838 (0.000586)	-0.000754 (0.000617)	-0.000673 (0.000594)				
% Appointed	0.00130* (0.000663)	0.000650 (0.000400)	0.000591 (0.000415)	0.000444 (0.000367)	-0.000616 (0.000940)	-0.000730 (0.000950)	-0.000655 (0.000914)	-0.000866 (0.000827)
% Ex-officio	0.00296** (0.00116)	0.00189 (0.00137)	0.00167 (0.00144)	0.00157 (0.00136)	0.00454* (0.00245)	0.00410* (0.00235)	0.00388* (0.00235)	0.00400* (0.00227)
% Insider	0.00147** (0.000647)	0.000838 (0.000586)	0.000754 (0.000617)	0.000673 (0.000594)				
% Plan members	0.000713** (0.000297)	0.000265 (0.000392)	0.000139 (0.000433)	0.000128 (0.000414)	-0.000565 (0.000712)	-0.000881 (0.000617)	-0.000916 (0.000603)	-0.000972 (0.000646)
State socioeconomic controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Political controls	No	No	Yes	Yes	No	No	Yes	Yes
Pension health controls	No	No	No	Yes	No	No	No	Yes

Each coefficient in columns 1 through 4 represent a separate regression of state bond ratings on board composition. Columns 5 through 8 include “% Appointed”, “% Ex-Officio,” and “% Plan Members” regressed together. Robust standard errors in parentheses; \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Fixed effects regressions include pension plan fixed effects and year dummies. Standard errors for fixed effects regressions are clustered at the state level. Dependent variable is normalized state bond rating. State socioeconomic controls include population growth, percent of the population with a bachelor’s degree, percent of the population age 65 and over, population density, unemployment rate, percent in poverty, homeownership rate, per capita GDP, Great Recession dummy variable, public sector unionization rate. Political controls include unified Democratic and unified Republican governments per capita state revenue, per capita state debt, and public corruption. Pension health controls include funding ratio, actuarially required contribution, and assumed discount rate

**Table 3** Majority of board

Measure of board composition	Fixed effects (tobit)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Majority elected (1 = Yes)	-0.172*** (0.0221)	-0.151*** (0.0198)	-0.145*** (0.0185)	-0.134*** (0.0195)				
Majority appointed (1 = Yes)	0.172*** (0.0221)	0.151*** (0.0198)	0.145*** (0.0185)	0.134*** (0.0195)	0.229*** (0.0376)	0.201*** (0.0389)	0.184*** (0.0386)	0.176*** (0.0385)
Majority ex-officio (1 = Yes)	0.0523*** (0.000742)	0.178 (0.145)	0.109 (0.148)	0.0906 (0.144)	0.319*** (0.0511)	0.410*** (0.119)	0.321** (0.130)	0.297*** (0.126)
Majority insider (1 = Yes)	0.172*** (0.0221)	0.151*** (0.0198)	0.145*** (0.0185)	0.134*** (0.0195)				
Majority plan members (1 = Yes)	0.0398 (0.0246)	0.0265 (0.0240)	0.0243 (0.0263)	0.0265 (0.0266)	0.0597*** (0.0221)	0.0431 (0.0264)	0.0413 (0.0281)	0.0447 (0.0289)
State socioeconomic controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Political controls	No	No	Yes	Yes	No	No	Yes	Yes
Pension health controls	No	No	No	Yes	No	No	No	Yes

Each coefficient in columns 1 through 4 represent a separate regression of state bond ratings on board composition. Columns 5 through 8 include “% Appointed”, “% Ex-Officio,” and “% Plan Members” regressed together  
 Fixed effects regressions include pension plan fixed effects and year dummies. Standard errors for fixed effects regressions are clustered at the state level. Dependent variable is normalized state bond rating. State socioeconomic controls include population growth, percent of the population with a bachelor’s degree, percent of the population age 65 and over, population density, unemployment rate, percent in poverty, homeownership rate, per capita GDP, Great Recession dummy variable, public sector unionization rate. Political controls include unified Democratic and unified Republican governments per capita state revenue, per capita state debt, and public corruption. Pension health controls include funding ratio, actuarially required contribution, and assumed discount rate  
 Robust standard errors in parentheses \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

\$218,461 and \$477,173. Again though, these initial estimates become statistically insignificant after controlling for state socioeconomic controls, as well as controls for pension health and political conditions.

Next, Table 3 includes the results when the main independent variables of interest are recalculated for whether or not a particular group holds a simple majority control of a given pension board (coded as a “1” if yes and “0” otherwise). The layout of this table follows that of Table 2.<sup>17</sup>

Overall, again a board that is controlled by a majority of elected individuals is associated with lower bond ratings with all specifications statistically significant. Further, all remaining specifications indicate a positive correlation between board composition and bond ratings, with boards composed of a majority of appointed, *ex-officio*, and plan members all increasing bond ratings, though for plan members none of the results are significant and only one specification is for *ex-officio*. However, columns 5 through 8 all indicate that relative to a majority elected board, both majority appointed and *ex-officio* boards correlated with higher bond ratings with all results significant.

Finally, Table 4 presents a breakdown of the results when each of the main independent variables of interest are recoded to indicate whether or not that group makes up a supermajority of a particular pension board.

Again focusing on columns 1 through 4, the results indicate that a supermajority of elected members, while positive in 3 of 4 specifications, is consistently statistically insignificant. These results become even weaker in the preceding specifications, with some indicating a negative and statistically significant association. Further, a supermajority of actual members of a given pension who also sit on the board, is positively correlated with bond ratings, and is statistically significant in all specifications.

Interestingly, a supermajority of appointed and *ex-officio* members is also positively correlated with bond ratings, but is generally not statistically significant. Here, the most convincing evidence indicates that a supermajority of insiders is associated with significantly higher bond ratings and is statistically significant in all specifications. The point estimates suggest interest savings on state debt between roughly \$15 million and \$22 million.<sup>18</sup>

Finally, in Table 5 we provide a summary of the dollar amount decrease (increase) in state interest costs for all of the main independent variables of interest at the average state debt level of \$22.5 billion. Included are the dollar amount values for each model incorporating all control variables, as well as the statistical significance of each coeffi-

<sup>17</sup> Once again, “majority inside” is simply (1-“majority elected”) and while it may not provide much additional information, the coefficients are reported for consistency.

<sup>18</sup> For robustness we also considered subsamples based on the median values of each of the three pension health control variables (funding ratio, ARC, and assumed discount rate). These results, which are excluded for the sake of space though available upon request, indicate no significant material divergence from the results initially obtained. The only exception would be the above-median sample for the ARC corresponding to column 4 of Table 2, which nets the same sign coefficients, but now is significant in every specification (suggesting that appointed and *ex-officio* members are associated with higher bond ratings). Further, the sub-sample with an above the median assumed discount rate typically results in an opposite sign coefficient and statistical significance relative to that found in column 4 of Table 2, while the results compared to column 4 of Table 3 are statistically insignificant, and comparisons to column 4 of Table 4 suggest sign coefficients that flip. Overall, then our initial findings do tend to be robust to these alternate specifications, though the assumed discount rate may play a role with at least some of these results.

**Table 4** Supermajority of board

Measure of board composition	Fixed Effects (Tobit)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Supermajority elected (1 = Yes)	-0.00190 (0.00256)	0.122 (0.0910)	0.0886 (0.101)	0.0678 (0.0950)				
Supermajority appointed (1 = Yes)	0.0459*** (0.00981)	0.0168 (0.0146)	0.0129 (0.0163)	0.0102 (0.0147)	0.0447*** (0.00922)	0.0155 (0.0147)	0.0123 (0.0161)	0.00901 (0.0140)
Supermajority ex-officio (1 = Yes)	0.0523*** (0.000742)	0.178 (0.145)	0.109 (0.148)	0.0906 (0.144)	0.0805*** (0.00637)	0.205 (0.132)	0.134 (0.137)	0.115 (0.133)
Supermajority insider (1 = Yes)	0.0669*** (0.0236)	0.0493* (0.0268)	0.0481* (0.0279)	0.0458* (0.0270)				
Supermajority plan members (1 = Yes)	0.0902*** (0.0271)	0.0903*** (0.0195)	0.0859*** (0.0200)	0.107*** (0.0114)	0.0892*** (0.0272)	0.0896*** (0.0200)	0.0851*** (0.0203)	0.107*** (0.0114)
State socioeconomic controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Political controls	No	No	Yes	Yes	No	No	Yes	Yes
Pension health controls	No	No	No	Yes	No	No	No	Yes

Each coefficient in columns 1 through 4 represent a separate regression of state bond ratings on board composition. Columns 5 through 8 include “% Appointed”, “% Ex-Officio,” and “% Plan Members” regressed together

Fixed effects regressions include pension plan fixed effects and year dummies. Standard errors for fixed effects regressions are clustered at the state level. Dependent variable is normalized state bond rating. State socioeconomic controls include population growth, percent of the population with a bachelor’s degree, percent of the population age 65 and over, population density, unemployment rate, percent in poverty, homeownership rate, per capita GDP, Great Recession dummy variable, public sector unionization rate. Political controls include unified Democratic and unified Republican governments per capita state revenue, per capita state debt, and public corruption. Pension health controls include funding ratio, actuarially required contribution, and assumed discount rate

Robust standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 5** Dollar amount effect on state borrowing costs

Measure of Board composition	Fixed effects (tobit)
% Elected	(\$218,461)
% Appointed	\$1,44,126
% Ex-officio	\$5,09,634
% Insider	\$2,18,461
% Plan member	\$41,550
Majority elected	(\$43,497,405)***
Majority appointed	\$43,497,405***
Majority ex-officio	\$2,94,09,440
Majority insider	\$43,497,405***
Majority plan member	\$86,02,100
Supermajority elected	\$22,008,389
Supermajority appointed	\$33,10,997
Supermajority ex-officio	\$2,94,09,440
Supermajority insider	\$14,867,024*
Supermajority plan members	\$34,733,003***
State socioeconomic controls	Yes
Pension health controls	Yes
Political controls	Yes

Each numerical value represents a separate regression of state bond ratings on board composition. Values for the “%” variables (rows 1–5) are based on a 10% change. All variables in parentheses indicate an *increase* in borrowing costs. All other variables indicate a *decrease* in borrowing costs

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ ,

\*  $p < 0.1$

cient where applicable. Again, boards composed largely of inside members indicates significant lower interest costs, while boards composed of elected members almost unanimously increases interest costs.

## 4.2 Discussion

Overall then there are a number of important implications that emerge from these results. First, we provide additional evidence to the literature that has addressed pension governance. As discussed the literature has been quite mixed on the impact that the makeup of a pension’s board of trustees might have on the financial health of a pension system. We find evidence to suggest that while elected members are typically associated with lower state bond ratings, boards consisting of inside members (either appointed or *ex-officio*), and most robustly, a supermajority of inside members is correlated with consistently higher bond ratings, meaning lower borrowing costs to a state.

While teasing out causality is difficult, these findings at least suggest that in the eyes of bond rating agencies, board composition may matter on some margin due to spillover effects on a state’s fiscal health. Boards made up of inside members positively contribute to a state’s fiscal health. Importantly, this suggests that principal-agent problems may not be as particularly problematic as some research has suggested. Further, this may also be indicative of the prevalence of financial illiteracy that elected board members have been found to be associated with. Inside members may have

stronger financial backgrounds, which does tend to be the case for both appointed and *ex-officio* members and appears to provide positive benefits (Andonovet al. 2017; Beasley and Salterio 2001; Harris 2014; McDaniel et al. 2002; Peecher 2002).

To the extent that inside members are more financially capable, this would suggest more prudent investment strategies, resulting in a more financially sound pension system and one that would be less likely to place long-term or short-term strain on a state government. This would result in higher bond ratings and lower borrowing costs for a state government. Further, although appointed members, and to some extent *ex-officio* members, are still selected through the political process, the method of selection tends to impose greater checks and balances on that process than does directly voting for those individuals by plan members. These results are also corroborated theoretically by Maskin and Tirole (2004), who evaluate the costs and benefits of elected versus appointed bureaucrats. This will tend to reduce the variance in the type of member that is selected, which should result in greater stability in the system overall.

Finally, the most robust result is for those pension systems that were composed of a supermajority of insiders. Not only were the results economically significant, they were statistically significant in all specifications. This latter finding may also add to the literature on legislative and group coalition building, where the optimal and most stable voting coalition would be a super rather than simple majority (Groseclose and Snyder 1996). To the extent that this is true, the implication for state pension systems is that a board composed of a supermajority of inside members may create and implement relatively more stable and long-lasting policies.

## 5 Conclusion

Facing a looming pension crisis, state and local governments are seeking ways to reform their pension systems to restore funded health. While many factors contributed to the accumulation of these unfunded pension liabilities, including the use of liberal discount rates, investment policy, and various public choice and political economy factors, the literature has been indeterminate on the role of board of trustee structure and composition. We contribute to this literature by using a novel approach to measure the effect that board composition has on the financial health of pensions using state bond ratings; an important metric for evaluating the health of state public pension systems.

Using data on state public pension systems and bond ratings for each state from each of the three major bond ratings agencies between 2001 and 2014, we find a negative relationship between outside board members and state bond ratings. Having more outside members on a state pension board of trustees results in lower bond ratings and thus higher borrowing costs for the state. More specifically, we find that a 1% increase in the number of elected members on a pension system's board of trustees decreases the state's borrowing costs between \$9.71 and \$21.21 per \$1 million in debt at a 5% interest rate. Future research on the pension crisis and reforming pensions can build on this work by adding to the literature determining what factors influence the governance structure of the board of trustees of public pensions (Thom 2015). In addition, this article also adds more broadly to the literature on corporate governance.

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