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Municipal OPEB Contributions: The Roles of Governance Structure, Fiscal, and Socioeconomic Factors During and After the Great Recession

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ABSTRACT

Many governments offer other postemployment benefits (OPEB) to their employees, and discretionary contributions to OPEB plans are important to plan financial well-being. This paper reports a study of municipalities’ actual annual contributions to their OPEB plans from fiscal year 2008 through 2015, a time span encompassing the Great Recession and subsequent gradual recovery. Giving effect to cities’ governance structure (form of organization and extent of employee unionization) and certain fiscal and socioeconomic variables, we estimate a model of plan contributions normalized by the related actuarially required contributions. We find that Mayor-Council (MC) cities are associated with comparatively higher OPEB plan contributions relative to Council-Manager cities. We control for MC cities' discount rates to address the consequences of optimistic rate assumptions. The effect of unionization on contributions is evident directly, but unionization is not noteworthy when conditioned on form of government. This suggests that MC cities manage their OPEB plans in a fiscally accountable manner.

Keywords: other post-employment benefits (OPEB), OPEB contributions, strong-mayor governments.

JEL Classifications: M41, M48.

Data Availability: Data was collected from publicly-available sources.
I. INTRODUCTION

Many municipalities provide post-retirement benefits to their employees, including both pensions and other post-employment benefits (OPEB) such as retiree health care insurance coverage. It is widely known that the costs of such benefits are considerable; Munnell and Aubry (2016, p. 11) note that "the cost of pensions and OPEBs has become a front-burner issue in any discussion of municipal finance." While some determinants of these liabilities are beyond managers' control (e.g., stock market performance, employee mortality rates), administrators can influence the amounts of these liabilities through various means, including varying the underlying actuarial assumptions (e.g., Chaney, Copley, and Stone 2002; Eaton and Nofsinger 2004) and reducing benefits offered (e.g., Matkin and Krivosheev 2012). An important additional means of impacting postemployment liabilities is through annual monetary contributions to benefit plans. Actuarial assumptions for OPEB include all pension assumptions, in addition to the healthcare cost trend rate, effects of taxation, insurance, and Medicare.

Indeed, the Government Finance Officers Association (GFOA) recommends, as a best practice, that governments contribute the full amount of their actuarially determined contribution (previously termed actuarially required contribution or ARC) to their defined benefit pension and OPEB plans each year (GFOA 2016). In reality, however, annual pension and OPEB plan contributions are often a matter of managerial discretion (Coggburn and Kearney 2010). The question thus arises: What factors explain the amounts of such contributions? This paper offers some answers to this important question as it pertains to OPEB plans in Council Manager versus Mayor-Council (also termed strong mayor) forms of government.

We focus on OPEB because pension and OPEB plans differ qualitatively in certain important respects (Peng 2013) and because OPEB plans have received little attention from...
academic researchers compared with pension plans. Our interest in contributions stems from their intrinsic importance to the financial well-being of OPEB plans. It is important to note that a widely used measure of the health of pension plans, the funded ratio, is largely absent for OPEB plans due to the prevailing practice among cities of funding OPEB plans on a pay-as-you-go ("paygo") basis (Keating and Berman 2007; Maher, Park, and Harrold 2016). The paygo practice usually results in cities having no assets held in trust for payment of OPEB obligations, hence funded ratios of zero. Nonetheless, many governments contribute annually to their OPEB plans, and as noted, contributions are an important dimension of OPEB plan financial well-being and thus are a meaningful area for investigation. We consider municipal OPEB plans because approximately two-thirds of governmental OPEB debt, estimated at $862 billion, in the US is held at the local level (Munnell, Aubry, and Crawford 2016).

Our analysis rests on models of the ratio of actual dollar contributions to actuarially required contributions, hereafter referred to as scaled contributions (SCONTRIB). For clarity, hereafter the term “contributions” refers to actual (unscaled) contributions. Our dependent variable is similar to that found in Eaton and Nofsinger (2004), who use the term funding flow, and St. Clair (2013). We examine the impact of a government’s governance characteristics (the form of government and extent of employee unionization) while controlling for fiscal and socioeconomic factors within these models. This study’s results should be of interest to analysts, government employees, government managers, and accounting and public policy researchers.

We find that governance structure and unionization are influences on OPEB scaled contributions. When compared to Manager-Council governments, Mayor-Council municipalities are associated with higher SCONTRIB. Unionization is significant as a main effect and exhibits a positive influence on SCONTRIB when interacted with form of government, albeit a non-
statistically significant effect. We also observe an inverse relationship between SCONTRIB and discount rates in strong-mayor cities, suggesting that optimistic discount rate assumptions for OPEB plans do not drive the finding of higher SCONTRIB for these cities. Taken together, these results indicate that strong-mayor cities are careful in the administration of their OPEB plans.

Our findings are both support and contradict the extant literature. Concerning city government organization, our result of a positive effect of MC on SCONTRIB lends support for Maher et al.'s (2016) prior work on pensions and OPEBs. The extent of unionization is positively related to SCONTRIB in our main effects model similar to the results found in Chaney et al. (2002) and Bonsall, Comprix, and Muller (2019). To assess the robustness of our results, we introduce a pair of interaction terms, strong-mayor x unionization and strong-mayor x discount rate, which do not adversely affect our main effect's results, supporting our hypothesized relationships.

In terms of fiscal factors, we find that our measures of property value, fund balance, and long-term debt have the anticipated signs though none significantly influences SCONTRIB. The result for long-term debt differs from that found in Chaney et al. (2002), which may be due to their use of pensions, which differs from our use of OPEBs. Results for our socioeconomic factors, unemployment rate and the workforce age 55 and older, are comparable to prior pension and OPEB results found in Mitchell and Smith (1994), St. Clair (2013), Maher et al. (2016), and Peng and Wang (2017). Our results for our additional OPEB controls of covered payroll, net OPEB obligation, discount rate, and population are analogous to findings in Coggburn and Kearney (2010), Matkin and Kriyosheyev (2012), and Wang and Peng (2016).

The remainder of this paper is organized as follows. The next section provides background, while the third section reviews pertinent literature and develops our hypotheses.
Section four presents the research method and model development. Section five provides our results, discussion thereof, and conclusions.

II. BACKGROUND

Retirement plans in local government were established during the 1930s, partly because at that time public servants were not eligible for Social Security coverage (ICMA 1996). Health insurance coverage, an important component of OPEB, became prevalent in both the public and private labor markets following the 1965 introduction of Medicare (Lutz and Steiner 2014). Over time, governments began to include other benefits such as life, disability, and long-term care insurance as OPEB.

Authoritative guidance for the accounting and financial reporting for municipal pension plans predates that applying to OPEB plans. The Governmental Accounting Standards Board (GASB) issued its first affirmative pronouncement concerning pension plans with Statement No. 5, Disclosure of Pension Information by Public Employee Retirement Systems and State and Local Governmental Employers (1986). Statement No. 5 mandated the disclosure of the "pension benefit obligation," the actuarial present value of credited projected benefits earned by pension beneficiaries. The first GASB pronouncement pertaining to OPEB-related matters was Statement No. 12, Disclosure of Information on Postemployment Benefits Other Than Pension Benefits by State and Local Governmental Employers (1990). As the name implies, this standard's requirements were limited to disclosure of certain prescribed information items.

The GASB revised its guidance for pensions with Statement No. 27, Accounting for Pensions by State and Local Governmental Employers (1994). Subsequently, the GASB (2004)

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1 The immediately-preceding GASB Statement No. 4, Applicability of FASB Statement No. 87, "Employers’ Accounting for Pensions," to State and Local Governmental Employers, (1986) was a “negative” statement relieving governments of responsibility for implementing FASB Statement No. 87 (Hurtt, Kreuze, and Langsam 2008).
issued very similar guidance for OPEB plans in Statement No. 45 (hereafter GASBS45), *Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pensions*. The requirements of GASBS45 were applicable during the time period covered by this study, 2008–2015.

GASBS45 required municipal governments to measure and disclose an amount for annual OPEB cost on the accrual basis and to disclose three years of information about annual OPEB cost and the net OPEB obligation and information about the amounts of actual contributions made. The actuarial accrued liability, the actuarial value of plan assets, and the actuarial value of assets as a percentage of the actuarial accrued liability (funded ratio) were presented as required supplementary information.²

It is important to consider the scope of OPEB benefits that may be provided and the manner in which they are financed. According to Bonin (2018), the range of potential benefits includes life insurance and various healthcare, medical, dental, and vision coverages. Unmistakably, the cost of furnished OPEB increases with the scope of provided coverage, which affects the amount of necessary contributions. OPEB obligations may be prefunded or met on a pay as you go ("paygo") basis. Prefunding involves setting assets aside for current and future OPEB claims on an actuarial basis. Prefunding is the ideal, and as previously noted, is recommended as best practice (GFOA 2016). Nonetheless, the majority of local governments take a paygo approach. Although paygo governments might self-fund their obligations, it is common for such governments to purchase insurance to meet their commitments. As such, the

² In 2015, the GASB replaced Statement No. 45 with Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions*, which mandates significant changes in such accounting and reporting. Nonetheless, OPEB contributions will remain an important aspect of municipal financial operations, thus, this study has continuing relevance.
conceptual minimum amount of annual OPEB contributions is actual claims incurred for self-funded municipalities and annual premiums for governments electing an insurance option.

Significantly, many governments have paygo funding policies that exceed minimum annual requirements but fall short of actuarially determined prefunding. A survey of 80 state and local governments (Segal Consulting 2016) notes the variability of OPEB funding policies and identifies the following as most common for those governments possessing a policy: (1) contributions toward retiree health benefits are specified in statute; (2) a percentage of the budget is earmarked for retiree health prefunding; (3) the required premiums or more are funded based on the availability of revenues; and (4) administration has full discretion. As such, these policies represent a continuum of funding approaches. At one end, governments fund in accordance with statutory minimums; at the other end of the continuum, governments contribute substantial prefunding amounts that nevertheless may meet, exceed, or fall short of ARC amounts.

Note that under GASBS45, governments that make annual contributions greater than their paygo costs are considered at least partially funded, sometimes enabling them to justify higher discount rate assumptions relative to governments that make minimum paygo-based contributions (Keating and Berman 2007). Higher discount rates, of course, result in lower actuarial liabilities.

III. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Literature Review

Pension and OPEB Studies

Table 1 summarizes the empirical research (since 1994) germane to this paper. Almost all extant research is concerned with pensions. Indeed, only one paper is devoted exclusively to OPEB (two studies address pensions and OPEB). The topics investigated include contributions
and the related area of funded ratios, actuarial liabilities, and actuarial assumptions. Most papers focus on a single research question, the exceptions being Chaney et al. (2002) and Eaton and Nofsinger (2004), which explore multiple facets of pensions.

**Insert table 1 here**

**Contributions**

Mitchell and Smith (1994) study pension funding using a 1989 compilation of data (42 individual pension plans) published by the National Association of State Retirement Administrators and the National Council on Teacher Retirement. Those researchers suggest that the most important determinant of public employers' actual pension contributions might be actuarially recommended contribution (ARC) amounts. They model actual pension contributions per employee. Their independent variables include (1) an estimate of annual required contributions, (2) an approximation of the plans' funded ratios, (3) the unemployment rate, and (4) the percentage of unionized workers in the sponsoring organization. Mitchell and Smith report positive coefficients for the ARC and funded ratio variables and negative coefficients for the unemployment and unionization variables. They suggest the negative sign of unionization may result from higher wages in unionized environments, that is, that there is a tradeoff between pension contributions and salaries.

Using survey data, Eaton and Nofsinger (2004) address pension-related accounting assumptions, funding level, and "funding flow" (actual contributions divided by annual required contributions) in their study of state and local government pension systems. Those researchers find that governments facing "fiscal constraints" (measures of indebtedness) tend to use optimistic assumptions and are associated with higher levels of unfunded pension liabilities. Such governments are only weakly associated with lower funding flows.
St. Clair (2013) examines the effect of budget stabilization funds on states’ pension contributions over the period 1997–2008. St. Clair’s dependent variable is actual contributions scaled by the related actually required contributions. Based on regression analysis, St. Clair reports that budget stabilization funds negatively influence contributions, as does per-capita personal income and the unemployment rate. The percentage of unionized public employees within the total population is not significant. St. Clair (2013) suggests that the negative coefficient for per-capita personal income may mean that states with higher tax bases elect to defer current pension payments because of their greater capacity to increase future taxes.

Peng and Wang (2017) study US state and local government pension contributions using data from 1992–2011. They scale pension contributions by own-source revenues and by gross state product to arrive at "pension burdens." They report that employee contributions and plan investment returns are associated negatively with pension burdens. In contrast, the size of the government workforce and the level of pension benefits offered are positively associated with pension burdens.

**Funded Ratios**

Funded ratio studies address contributions indirectly because contributions (together with employee contributions and earnings on plan investments) increase the funded ratio numerator. Chaney et al. (2002) investigate the extent to which state pension plan funding is influenced by fiscal stress and balanced budget requirements. Their dependent variable is a variation of the funded ratio, termed funded status, defined as the excess or deficit of pension plan assets over the pension benefit obligation. One of their principal findings is a negative association between funded status and balanced budget requirements. Chaney et al. (2002) also report a positive

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3 The pension benefit obligation (PBO), a required disclosure under GASB Statement No. 5, was the actuarial present value of credited projected benefits prorated on service. The requirement to disclose the PBO was replaced by GASB Statement No. 27’s requirement to disclose the funded ratio and its components.
relationship between funded status and the percentage of unionized state employees and a negative relationship between funded status and long-term debt (general obligation debt per capita). The effect of fund balance (unreserved, general fund, per capita) on funded status is not significant in their analysis.

Maher et al. (2016) explore the impact of tax expenditure limits on the funded ratios of both municipal pension and municipal OPEB plans. They report that the form of government is not significant as a main effect; however, when form of government and tax expenditure limits are interacted, they find that Mayor-Council cities have better-funded pension and OPEB plans. Maher et al. (2016) speculate that political pressure to fund post-retirement benefit plans may be greater in Mayor-Council cities. They also report a marginally-significant positive association between median household income and pension funded ratios and a strong positive relationship between an aging population and OPEB funded ratios.

Wang and Peng (2016) study the changes in funded ratios of 84 large state and local government pension plans between 2001 and 2009. They report that funded ratios (1) increase directly with pension contributions and increases in assumed discount rates and (2) decrease with reductions in discount rate assumptions.

To summarize, extant pension contribution-related research links contributions with governments' fiscal constraints, unionization, unemployment, per-capita income, workforce size, discount rate assumptions, employee contributions, plan investment returns, and level of benefits offered. Plan investment return data is sparse since the large majority of OPEB plans are entirely unfunded.
Discount Rate Assumption

There is a stream of research investigating the extent to which government pension discount rate assumptions are "managed" to achieve certain goals. The study of state pension plans by Chaney et al. (2002) previously noted in regard to funded ratios also finds an inverse relationship between fiscal stress as measured by fund balances and pension discount rate assumptions in states with balanced budget requirements. Recall, too, that Eaton and Nofsinger (2004) find a direct association between fiscal constraints and optimistic pension-related accounting assumptions. Vermeer, Styles, and Patton (2010) report a similar finding in their study of actuarial assumptions made for sole-employer pension plans of local governments within Michigan and Pennsylvania. More recently, Bonsall et al. (2019) find that state pension plans with stronger public unions tend to have higher discount rates to improve the reported funded status of those plans.

Hypotheses

We develop our hypotheses around governance structure and unionization while controlling for fiscal and socioeconomic factors. Giroux and McLelland (2003) use the term governance structure to refer to a fundamental aspect of a municipal organization, that is, in either the Mayor-Council (“strong mayor”) form or the Council-Manager form. We extend the use of the term to include the degree to which municipal workforces are unionized. Fiscal factors considered are property values, fund balances, and amounts of long-term debt. Local unemployment rates and the percentage of government workforces age 55 and older comprise the socioeconomic factors we study.
Form of Government

Prior accounting and public administration research considers whether governments are organized in the Mayor-Council (MC) or Council-Manager (CM) form. The MC form of government consists of an elected city council that serves as the legislative body and a separately elected mayor who has administrative authority (frequently called the "strong mayor" form). In the CM form, an elected city council appoints a city manager who holds administrative authority. CM governments are viewed as providing public goods with greater technical efficiency because city managers are trained professionals whose goal is to maximize efficiency. In contrast, when an elected mayor is the city's chief executive officer, the goal of vote-maximization may conflict with the goal of technical efficiency (Coate and Knight 2011; Doern and Ihlanfeldt 2011). A literature review by Carr (2015) suggests that, compared with CM governments, strong-mayor cities are more likely to (1) respond to the policy agendas of politically powerful interests and (2) direct highly visible benefits at politically important interests. Giroux and McLelland (2003, p. 227) offer this blunt summary: "Fundamentally, [strong] mayors are expected to seek reelection and be motivated to please key constituencies." The question that follows is, who are these constituencies?

From the standpoint of a government's contributions to OPEB costs, it is possible that strong mayors consider the municipal workforce as a constituency, the favor of which is to be curried with comparatively generous plan terms and/or larger contributions to OPEB plans. Strong mayors may have other constituents (e.g., those property owners and real estate developers), the interests of whom may not necessarily align with those of municipal employees. For example, a strong mayor might wish to avoid raising property taxes and/or direct expenditures to economic development (Basolo and Huang 2001; Jang and Kwon 2014; Levey
2015; Nunn 1996), and in so doing, forgo additional financial resources that could be used to increase OPEB contributions.

Some researchers (e.g., Giroux and McLelland 2003; Saha 2011; Stumm and Corrigan 1998;) find modest evidence of a positive association between the MC form of organization and government spending in general, while MacDonald (2008) reports weak evidence to the contrary. More recently, Turpin (2016), using government spending data from 2012 and a self-compiled database of direct democracy measures, reports no difference in spending due to the organizational structure of government. Regarding pension and OPEB funding, in particular, Maher et al. (2016) find that in the presence of strict tax expenditure limits (i.e., with an interaction term), MC governments are associated with higher pension and OPEB plan funded ratios.

On balance, there is a reasonable basis for testing whether the form of government impacts OPEB contributions. However, given that (1) our period of study is during and after the Great Recession and (2) the mixed findings of prior research on the relationship between the form of government and government spending, we do not predict the direction for MC in the models. Thus, we state our first hypothesis in the null as follows:

\[ H_1: \text{There is no association between the form of government organization and OPEB contributions.} \]

**Unionization**

The existence of collective bargaining as a form of employee governance is more common in the public sector than in the private sector. US Bureau of Labor Statistics data for 2009 reported that 43 percent of local government employees were represented by unions, with only 8 percent of employees in the private sector (Riccucci 2011). Marlow and Orzechowski (1996) find that public sector unionism is positively related to various types of public spending. It is reasonable
to believe that the influence of unionization might be evident in the matter of OPEB contributions, where union members' self-interest is at stake. Our research could find no prior published studies addressing the influence of unionization on any aspect of OPEB; however, some pension studies have considered the impact of unionization. As noted previously, Mitchell and Smith (1994) report a negative association between the extent of unionization and pension contributions. Those researchers attribute this result to union pressures for higher salaries causing government officials to allocate available financial resources toward wages and away from pensions.

In contrast, Chaney et al. (2002) find a positive association between unionization and the level of pension funding and suggest (p. 307) that "unions act as an alternative to regulation in protecting employee pensions." More recently, Rich and Zhang (2015) observe a positive association between unionization and pension plan funding in performing robustness checks in their study of unfunded public-sector pension liabilities and measures of citizen oversight. It bears mention that Mitchell and Smith (1994) report a negative association using data from 1989. Noting the aging of the American workforce as an ongoing phenomenon, it may be that "changing times" have shifted the emphasis from wages to post-retirement benefits (Coggburn and Kearney 2010), but this is not certain. Thus, we posit a positive relationship between unionization and OPEB contributions. On this basis, we state our second hypothesis in the alternative form:

\( \text{H}_2 \): There is a positive association between the extent of municipal employee unionization and OPEB contributions.

In contrast to pensions, wherein governments typically make payments to retirees from pension plan assets, a significant proportion of OPEB liabilities are met on a pay-as-you-go basis
(Bonin 2018). Based on the discussion, it is reasonable to expect that OPEB contributions are influenced by fiscal factors specific to each government, including property values, fund balances, and long-term debt, and the socioeconomic characteristics of unemployment and workforce age. We identify these controls and use the extant literature to propose their relationship with OPEBs.
**Fiscal Factors**

**Property values**

Hendrick (2006) identifies property values as a measure of municipal taxing power. A significant majority of local governments finance their activities in part with *ad valorem* property taxes. Assessed property values influence the amount of revenue that can be raised from property taxes; tax receipts are financial resources potentially available for OPEB contributions. Additionally, we believe that property values are a surrogate for household income. In many cases, owners of more expensive homes, paying relatively higher property taxes, necessarily will be in upper-income brackets. We predict a positive coefficient for property values given that municipalities with higher property values can increase contributions to OPEBs.

**Fund balance**

Fund balance speaks to the near-term fiscal condition of a city; it measures the governments' financial resources "free and clear" for future use.\(^4\) Compared with government-wide net asset balances, fund balances are considered to be less susceptible to managerial manipulation (Reck and Wilson 2014) and thus preferable for our purpose. To the extent that OPEB contributions are discretionary based on available financial resources, it is reasonable to expect they will vary positively with fund balance amounts.

**Long-term debt**

Long-term debt figures prominently in municipalities' fiscal position. Local governments with relatively higher long-term debt correspondingly face more significant debt-service spending obligations (Coggburn and Kearney 2010). Payment of these obligations likely reduces

\(^4\) Occasionally, one will encounter non-liquid assets accounted for in governmental funds, such as land held for resale. In these cases, the utility of fund balance as a measure of liquidity is reduced.
the financial resources available to support contributions to OPEB plans. Thus, we expect the coefficient of long-term debt to be negative.

**Socioeconomic Factors**

**Unemployment**

Prior research by Mitchell and Smith (1994) and St. Clair (2013), finds a negative relationship between unemployment and pension contributions; there is no reason to suspect a different outcome with OPEB contributions. For example, higher unemployment in a given local government likely reduces (1) consumer spending and thus sales tax collections and (2) the ability of property owners to pay their property tax assessments, thereby reducing financial resources available for OPEB contributions. On this basis, we include unemployment, for which we predict a negative coefficient.

**Workforce Age**

Since OPEB benefits accrue to retirees, it is reasonable to expect population age, in some measure, to bear a relationship with OPEB contributions. Indeed, Maher et al. (2016) find a positive relationship between the percentage of the general population age 65 and above ("aging population") and OPEB funded ratios—but none between the aging population and funded ratios of pension plans. It is not clear that the positive relationship reported by Maher et al. (2016) for funded ratios would necessarily apply to contributions because of the impacts of employee contributions and investment earnings on the numerators of funded ratios. The direction of the relationship between age and contributions might depend on the nature of the benefits provided, for example, as between reimbursing claims for actual health care services provided versus insurance coverage. In the case of the former, it seems reasonable that health care reimbursements might increase with age, but this may not be so in the case of the latter. To this
point, Munnell and Aubry (2016) note that retiree health insurance coverage for those under age 65 is comparatively costly, suggesting that the coefficient of an age variable could be negative. As such, we conclude that the direction of the relationship between age and OPEB contributions is a matter of empirical determination.

IV. RESEARCH METHODS AND EMPIRICAL MODELS

We model government OPEB scaled contributions as a function of governments’ governance oversight and unionization while controlling for fiscal and socioeconomic factors against the recent Great Recession’s backdrop and leaving the Great Recession behind. According to the National Bureau of Economic Research (NBER), the “Great Recession,” as it is termed, ran from December 2007 through July 2009 (Isidore 2010). The subsequent recovery, however, has been long and drawn out (Weinberg 2013). The Great Recession backdrop is a period that includes upheaval in city finances and the resulting period of returning to a normalized funding pattern. We can observe how cities respond to this type of fiscal stress in the provision of OPEB contributions. We consider these responses similar to what is expected with the COVID-19 pandemic, albeit different in federal government support. We nest the cities with each state while clustering the standard errors on the cities. This approach allows us to control both state fixed effects and time fixed effects while allowing the standard errors to vary by city. Our results provide fixed effect coefficients within a state nested set of controls.

Empirical Models

We test $H_1$ with the dummy variable $MC$ set to one for governments having the Mayor-Council ("strong mayor") form of organization, zero otherwise.$^{5,6}$ $H_2$ is tested with the variable

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$^{5}$ Although there are variants, the vast majority of the governments represented by $MC = 0$ have the Council-Manager form of organization.

$^{6}$ See Table 2 for a complete list of variable names, abbreviations, and details.
UNION, representing the percentage of local government workers belonging to unions. We construct the interaction variable $MC \times UNION$ to address the effect of unionization in strong mayor communities. We control for the aging population with our variable WF55PLUS, representing the workforce's percentage by city aged 55 and older. It differs from the "aging population" variable used by Maher et al. (2016). Our variable captures workforce ages as opposed to general population ages, and, of course, we use age 55 as the lower threshold; Maher et al. (2016) set their threshold at age 65. We chose age 55 to capture any effects of early retirements within municipal workforce ranks.

Our additional control variables in the model include covered payroll (CVRPR), the net OPEB obligation (NOO), OPEB plan discount rates (DISCRATE), and population (POP). CVRPR provides a measure of plan size and accounts for wage-rate differentials. We expect CVRPR to bear a positive coefficient. NOO balances are the cumulative shortfalls or excesses (reported as net OPEB assets or NOAs) of actual contributions in relation to annual required contributions since the implementation of GASBS45. We expect a negative coefficient for NOO in the model since higher contributions will decrease NOO balances and increase NOAs.7

The coefficient for DISCRATE should be positive on the basis that governments making larger contributions are likely to be able to justify higher discount rate assumptions because their plans are more likely to be funded, at least partially. It stands to reason that size of a government's population will influence contributions, albeit in an unknown direction. Finally, year dummies for 2009 through 2015 are included as year fixed effects. Given our data are during the Great Recession through the immediate slow recovery, we expect our year dummies

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7 We code NOA amounts as negatives in the NOO data so that increases in NOAs become more negative, supporting the directional expectation.
to positively increase over time as cities regain fiscal composure. We state the SCONTRIB model as

\[
SCONTRIB = \text{Constant} + a_1MC + a_2UNION + a_3PROPVAL + a_4FUNDBAL + a_5LTDEBT + a_6URATE + a_7WF55PLUS + a_8CVRPR + a_9NOO + a_{10}DISCRATE + a_{11}POP + a_{12}YR09 + a_{13}YR10 + a_{14}YR11 + a_{15}YR12 + a_{16}YR13 + a_{17}YR14 + a_{18}YR15 + \varepsilon
\]

We refrain from including actuarial liabilities in the contributions model due to their probable endogeneity. Significant practical difficulties arise in trying to identify the suitable instrumental variable(s) needed for regression with endogenous variables (Larcker and Rusticus 2010).

In our second model, we include the interaction of MC and UNION and the interaction of MC and DISCRATE to address MC forms of government and changes in unionization and discount rates. The model is stated as

\[
SCONTRIB = \text{Constant} + a_1MC + a_2UNION + a_3MC \times UNION + a_4PROPVAL + a_5FUNDBAL + a_6LTDEBT + a_7URATE + a_8WF55PLUS + a_9CVRPR + a_{10}NOO + a_{11}DISCRATE + a_{12}MC \times DISCRATE + a_{13}POP + a_{14}YR09 + a_{15}YR10 + a_{16}YR11 + a_{17}YR12 + a_{18}YR13 + a_{19}YR14 + a_{20}YR15 + \varepsilon
\]

V. RESULTS, DISCUSSION, AND CONCLUSIONS

The data are a panel representing fiscal years 2008 through 2015. As such, the data capture the effects of the economic downturn that started in 2008, now commonly termed the "Great Recession" and continue through a gradual recovery until 2015. We chose these years to observe the behavior of OPEB contributions at the beginning of the Great Recession until about six years after the recession. This provides us the opportunity to discover changes in city's contribution to OPEB during and after the Great Recession. We selected all cities with populations in excess of 100,000 as of July 1, 2015, to which we added a convenience sample of 100 cities with populations between 65,000 and 100,000 as of July 1, 2015. Our convenience sample is all cities
with populations between 65,000 and 100,000 for which data were readily available. Our efforts culminated in observations for three or more years for 278 governments. Table 2 provides descriptions of the dependent and independent variables, data transformations, whether the variables are continuous or dummy variables, and sources. Continuous variables with values all greater than zero are natural log transformed for analysis. Continuous variables having both positive and negative values are cube-root transformed to preserve the signs in the untransformed data.

**Insert tables 2 and 3 here**

Table 3 Panel A presents the distribution of actual observations (2,093) by panel length (three of eight through eight of eight) and by year. As such, our data are an unbalanced panel. Nevertheless, the table shows we have data for eight of eight years for 199 of 278 cities. Table 3 shows that the number of observations for each fiscal year increases somewhat from 2008 to 2009, then remains relatively stable thereafter. The increase in the number of governments seen in 2009 thereafter is due to the phased implementation dates for GASBS45, which were based on government size (larger governments implemented earlier). In Table 3 Panel B, we note a decline in the mean value for actual contributions from $8.845 million for 2008 to $7.272 million for 2009. We surmise that this is consistent with the increase in smaller municipalities entering the sample and potentially influenced by the national economic downturn gaining full force in 2009 after beginning late in 2008. Mean contributions recover beginning with 2011 (to $7.546 million) and continue to rise through 2014, with a slight dip in 2015 to $8.788 million.
Descriptive Statistics

Table 4 panels A and B present summary statistics for the variables in the data. We discuss population first, to facilitate interpretation of the summary statistics of other variables. As smaller governments implemented GASBS45 beginning in 2009, the mean of POP declined between 2008 and 2009 (from 212,172 to 190,366). The mean of POP continues to decline until 2013, when we see a rebound in average city population.

Consistent with population means, the mean value for SCONTRIB decreases from 2009 and 2010 as compared to 2008; however, it then increases in general over the remaining periods. We hypothesize that this drop in 2009 and 2010 is a function of the large economic downturn that began in late 2008. We observe negative minimum scaled contributions and hypothesize that this negative value may be a function of refunding. The variability of SCONTRIB is observable in the large standard deviations.

The descriptive statistics for our variables measuring fiscal factors include estimated taxable property values (PROPVAL), total fund balances (FUNDBAL), and long-term debt (LTDEBT) of the cities within the national economic recession and the subsequent gradual recovery. The mean of PROPVAL declined through 2013 (mean of $20,900 million), climbing back to a mean of $23,000 million (just above the 2009 mean level of $22,800 million). Although the annual mean values of FUNDBAL decline through 2012, by 2015 they are approaching 2008 amounts. The lingering effects of the recession are evident from the minimum values representing large deficits for 2009, 2010, and 2013, respectively. In contrast, the cities in the sample had declining debt levels (LTDEBT) during 2008 (mean of $2.98 trillion) through 2014 (mean of $2.02 trillion). Some of this decline is caused by smaller municipalities entering
the sample in 2009 but thereafter, debt declines modestly through 2014, with a small upturn in 2015.

We measure the socioeconomic environment using the unemployment rate (URATE) and the percentage of the workforce aged 55 and older (WF55PLUS). The mean URATE increases noticeably for 2009 (9.3 percent) and 2010 (10.0 percent) over the 6.1 percent observed for 2008. In 2011, the mean for URATE began to fall, and by 2015 (mean of 5.4 percent), it was below the 2008 rate. The WF55PLUS steadily increased from 2009 (mean of 9.4 percent) to 2015 (mean of 11.7 percent). This increase aligns with an observed delay in retirement of public and private sector workers during and after the recession in response to cuts in workers' pay and local government furloughs and/or layoffs (Jordan 2010; Murray 2009; Weber 2013) but also may reflect the general aging of Baby Boom members of the workforce.

Our final set of variables implement further controls onto the SCONTRIB regressions. The recession-driven layoffs and furloughs experienced by local government workers align with observations for covered payroll (CVRPR). The mean covered payroll for the governments' OPEB commitments declined from 2008 mean of $168 million to its lowest value $144 million in 2011 and 2012. As the national economic recovery gained impetus, the mean CVRPR increased to $159 million in 2015, still below the mean for the 2008 sample of governments (excluding the smaller governments implementing GASBS45 in 2009).

The mean net OPEB obligation (NOO) shows an extraordinary increase for the period from its 2008 mean of $13.7 million to $76.8 million as of 2015 (negative values for NOO represent net OPEB assets). Discount rates (DISCRATE) average 5.22 percent in 2008 and 2009, then diminish modestly in subsequent years to 4.93 percent for 2015. The percentage of the
unionized workforce (UNION) held roughly steady in the mid 30's throughout the period of the study.

Panel B shows that even after smaller governments implemented GASBS45 in 2009, the form of government organization remained stable throughout the period of this study. Thirty-two to 35 percent of the cities in the data have a Mayor-Council (MC=1) form of government.

Insert table 4 here

Table 5 presents the Pearson bivariate correlation coefficients among the independent variables. All but 13 of the correlations are statistically significant. As expected, POP is highly correlated with other size-related variables, PROPVAL (.664), LTDEBT (.530), CVRPR (.611), and NOO (.401). NOO also is correlated with CVRPR (.470). Interestingly, the correlation between URATE and WF55PLUS is negative (-.388), possibly indicating that more senior employees were relatively immune from furloughs brought on by the recession. Finally, Table 5 reveals a positive correlation between URATE and UNION (.349), a phenomenon documented in the economics literature (e.g., Ji, Chang, and Huang 2016). Concerns for possible collinearity in the regression estimates are discussed in the next section.

Insert table 5 here

Results and Discussion

Table 6 (Model 1) presents the main effects of the estimated SCONTRIB model. The estimate on MC is marginally significant and positive (coefficient = 0.085; p = 0.070) indicating the MC city governments have higher scaled contributions than CM governments, all else equal. UNION is statistically significant (coefficient = 0.005) indicating that higher unionization increases scaled contributions. The results of CM and UNION allow us to reject H₁ given the
marginally significant outcome of MC, and support H2 with significant outcome of UNION. We note here that the coefficient on UNION is economically small with a percent increase in UNION leading to a less than one-hundredth of a percent increase in scaled contributions.

Our fiscal control variables all have the correct signs; however, none is statistically significantly different than zero. In our controls for socioeconomic factors, URATE has the anticipated sign and is significant, showing that as unemployment increases, scaled contributions decrease. WF55PLUS is positive and significant, indicating that as the workforce proportion that is 55 and older increases, scaled contributions increase, disclosing the impact of the older working population on the contributions to OPEBs. Our additional control variables are all significantly related to scaled contributions with the expected signs. The coefficients of the year dummies indicate that, compared with year 2008, scaled contributions rose steadily in each following year.

**Insert table 6 here**

Table 7 displays Model 2 which focuses on two interaction, MC and UNION (MC × UNION) and MC and DISCRATE (MC × DISCRATE), testing the robustness\(^8\) of our outcomes for H1 and H2. Inspection shows that MC and UNION retain their positive coefficients (0.590 and .006) when the interaction MC × UNION is included, indicating that overall strong-mayor cities are associated with a relatively higher scaled contribution. Increasing unionization also increases the scaled contributions, but, within strong-mayor cities with increasing unionization, scaled contributions are unaffected, all else equal. All the signs and significance hold for our fiscal and socioeconomic controls, along with our addition OPEB controls.

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\(^8\) At the request of a reviewer, we limit our observations to just the 199 governments that have all eight years of information. In untabulated results, our variables of interest and outcomes are supported with the balanced panel. We thank the reviewer for this insight.
We interact MC x DISCRATE to address the implications on H_1 and H_2 of the role of strong mayor governments and changes in the discount rate. Our results show that strong mayor governments with increasing discount rates bear a negative association with scaled contributions; however, both H_1 and H_2 results are unaffected. Overall, we conclude that the interactions have no significant impact on the robustness of our initial results as presented in Table 6.

Conclusions

This study uses panel nested fixed effects regression analysis to investigate the annual contributions made by municipal governments to their OPEB plans scaled by their ARC, giving effect to factors related to their governance structures and fiscal and socioeconomic characteristics.

We observe that a fundamental consequence of the Great Recession was a large decline in mean covered payrolls between 2008 and 2009 and smaller further declines through 2012. Indeed, covered payrolls as of 2015 remained lower than their 2008 level. As one would expect, the behavior of mean OPEB contributions generally corresponds with that of covered payrolls between 2008 and 2015.

The salient findings with regard to governance structure are as follows: H_1 (null form) is marginally supported in our main effects analysis (Table 6). H_2 (alternate form) is supported; the extent of unionization is positively related to contributions in our main effects model similar to the results found in Chaney et al. (2002) and Bonsall et al. (2019). To assess robustness of our results for H_1 and H_2 we introduce a pair of interaction terms MC x UNION and MC x DISCRATE, which do not adversely affect our initial results, supporting our hypothesized relationships.
In terms of fiscal factors, we find that our measures PROPVAL, FUNDBAL, and LTDEBT have the anticipated signs, but none of these fiscal factors significantly impact scaled contributions. The result for LTDEBT differs from that found in Chaney et al. (2002), which result may be due to their use of pensions instead of OPEBs. Results for our socioeconomic factors, URATE and WF55PLUS, are like pension and OPEB results found in Mitchell and Smith (1994), St. Clair (2013), Maher et al. (2016), and Peng and Wang (2017). Results for our additional OPEB controls of CVRPR, NOO, DISCRATE, and LNPOP are similar to findings in Coggburn and Kearney (2010), Matkin and Kriyosheyev (2012), and Wang and Peng (2016).

Our principal conclusion is that over the period studied, strong mayor cities managed their OPEB plan contributions in a more fiscally responsible manner than their manager-council counterparts using the scaled contributions (SCONTRIB) as an indicator of fiscally responsible OPEB management. It appears that unionization is also associated with scaled contributions while the interaction of MC x UNION plays no statistical role in our robustness check. This is an indicator that the direct effect of management is contributing to our analysis, although our direct effect results are statistically on the margin. We find no evidence that our fiscal measures are influential to the OPEB scaled contributions. That said, we find statistical evidence that our socioeconomic measures impact the OPEB scaled contributions with unemployment having a negative effect and the workforce 55 and older having a positive effect. We note that strong-mayor governments appear to be immune from union pressure for higher contributions for our sample of cities during the time period 2008-2015.

Considered alone, the extent of unionization influences the scaled contributions as a main effect, but when conditioned by form of government, there appears to be no effect. In additional analysis, Model 2 reveals a negative relationship between strong-mayor governments and
discount rates amounts; this finding is consistent with strong-mayor governments managing OPEB contributions.

A limitation of this study is that it includes no municipalities with populations under 65,000. This should be borne in mind if generalizing our results to all US municipalities. We have no data for estimates (e.g., portfolio investment returns) made by government managers as inputs to ARC amounts, a potential effect on our scaling denominator. Data limitations do not enable us to control for differences in levels of OPEB benefits offered. Finally, the study does not account for the effect that pension plans may have on OPEB contributions. It is reasonable to suspect that pension contributions may crowd out OPEB contributions. Our results must be interpreted in light of these limitations.
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| Author(s)                        | Independent Variable(s)                                      | Finding(s)                                                                 |
|---------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------|
| Mitchell and Smith (1994)       | Pension contributions/employee                               | ARC (+); Funded ratio (+); Unionization (-); Unemployment (-)              |
| Chaney, Copley, and Stone (2002)| Funded ratio equivalent; Discount rate                       | Balanced budget requirements (-); Unionization (+); Long-term debt (-);    |
|                                 | Accounting assumptions; Funded ratio equivalent;             | Discount rates vary inversely with fund balances                          |
|                                 | Actual contributions/ARC                                     |                                                                            |
| Eaton and Nofsinger (2004)      |                                                              | Governments facing financial constraints have (1) optimistic accounting   |
|                                 |                                                              | assumptions and (2) lower funded ratio equivalents (3) weak association    |
|                                 |                                                              | (-) with contributions /ARC                                               |
| Coggburn and Kearney (2010)     | Unfunded pension liability                                  | Per capita income (+); fiscal constraints (+); Financial management       |
|                                 |                                                              | capacity (-); Legislative professionalism (-); Public employee density    |
|                                 |                                                              | (+); Employer contributions (+); Per capita income (+); Human resource    |
|                                 |                                                              | management capacity (+); Government ideology (+); Public employee density  |
|                                 |                                                              | (+); Unfunded pension liability (+)                                       |
| Vermeer, Styles, and Patton (2012)| Index of actuarial assumptions= 1 if                        | Governments with greater fiscal constraints are more likely to adopt      |
|                                 | assumptions in the top quartile of the sample, else = 0     | optimistic actuarial methods and assumptions that reduce the ARC; External |
|                                 |                                                              | monitoring negatively associated with optimistic assumptions              |
| Authors                        | Measure                                  | Factors                                                                 |
|-------------------------------|------------------------------------------|------------------------------------------------------------------------|
| Matkin and Kriyosheev (2012)  | Actuarial accrued liability              | Measures of plan size (+); Discount rate (-)                          |
| St. Clair (2013)              | Actual contributions/ARC                 | Budget stabilization funds (-); Per capita income (-); Unemployment (-)|
| Rich and Zhang (2015)         | Funded ratio equivalent                   | Citizen political monitoring mechanisms and plan size vary inversely    |
|                               |                                          | with pension plan underfunding; Unionization positively related to    |
|                               |                                          | funding                                                             |
| Maher, Park, and Harrold (2016) | UAAL funded ratio                       | Strong mayors interacted with tax and expenditure limit index (+);    |
|                               |                                          | Household median income (+); OPEB funding related to aging population  |
| Faulk, Hicks, and Killian (2016) | UAAL per capita                          | Household income per capita (-)                                       |
| Wang and Peng (2016)          | Change in funded ratio                   | Increased contributions (+); Discount rate increase/decrease (+ / -)  |
| Peng and Wang (2017)          | Scaled pension contributions             | Employee contributions (-); Investment return (-); Workforce size (+); |
| Bonsall, Comprix, and Muller (2019) | Discount rate                           | Benefit level (+)                                                     |
|                               |                                          | Unionization percentage (+)                                           |
| Type | Description | Source |
|------|-------------|--------|
| **Dependent Variables** | | |
| **SCONTRIB** | Actual contributions ($) divided by ARC, natural log | Continuous | 1 |
| **Independent Variables** | | |
| **Governance Structure** | | |
| **MC** | Government has a strong mayor form of government | Dummy | 5 |
| **UNION** | Percentage of unionized local government workforce | Continuous | 3 |
| **Fiscal Factors** | | |
| **PROPVAL** | Estimated actual value of a government's taxable property, natural log | Continuous | 1 |
| **FUNDBAL** | Total fund balance, all governmental funds, cube root | Continuous | 1 |
| **LTDEBT** | Direct debt of government, natural log | Continuous | 1 |
| **Socioeconomic Factors** | | |
| **URATE** | Unemployment rate | Continuous | 2 |
| **WF55PLUS** | Percentage of government workforce age 55 and older | Continuous | 4 |
| **Control Variables** | | |
| **CVRPR** | OPEB plan covered payroll, natural log | Continuous | 1 |
| **NOO** | Net OPEB obligation, cube root | Continuous | 1 |
| **DISCRATE** | OPEB plan assumed discount rate | Continuous | 1 |
| **POP** | Government population, natural log | Continuous | 4 |
| **YR09-15** | Indicator variables for fiscal years 2009–2015 | Dummy | n/a |

1 Municipal CAFRs, 2008–2015
2 US Bureau of Labor Statistics, Local Area Unemployment Statistics query tool, [http://data.bls.gov/pdq/querytool.jsp?survey=la](http://data.bls.gov/pdq/querytool.jsp?survey=la)
3 Union Membership and Coverage Database, [http://unionstats.gsu.edu/](http://unionstats.gsu.edu/)
4 US Bureau of the Census, Factfinder, [http://factfinder2.census.gov/faces/nav/jsf/pages/download_center.xhtml?none](http://factfinder2.census.gov/faces/nav/jsf/pages/download_center.xhtml?none)
5 International City/County Managers Association Municipal Year Books, 2008–2011, CAFRs thereafter; MC is set to one if the variable description is true, zero otherwise.
TABLE 3
Sample Descriptives

Panel A: Distribution of Annual Observations

| Governments | Observations |
|-------------|--------------|
| 8/8 annual observations present | 199 | 1,592 |
| 7/8 annual observations present | 54 | 378 |
| 6/8 annual observations present | 11 | 66 |
| 5/8 annual observations present | 6 | 30 |
| 4/8 annual observations present | 3 | 12 |
| 3/8 annual observations present | 5 | 15 |
| Totals | 278 | 2,093 |

The observations are distributed by year as follows:

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
|------|------|------|------|------|------|------|------|------|-------|
|      | 208  | 257  | 265  | 267  | 274  | 274  | 276  | 272  | 2,093 |

Panel B: Actual Annual Contributions*

| Year | N   | Mean   | Std Dev | Minimum | Maximum |
|------|-----|--------|---------|---------|---------|
| Contributions ($) | |       |         |         |         |
| 2008 | 208 | 8,845,339 | 19,700,000 | 19,322 | 183,000,000 |
| 2009 | 257 | 7,272,130 | 16,800,000 | 3,655 | 177,000,000 |
| 2010 | 265 | 7,168,770 | 15,700,000 | 5,776 | 142,000,000 |
| 2011 | 267 | 7,546,288 | 16,500,000 | 3,655 | 146,000,000 |
| 2012 | 274 | 7,638,433 | 16,900,000 | 9,124 | 156,000,000 |
| 2013 | 274 | 8,260,580 | 19,500,000 | 15,756 | 163,000,000 |
| 2014 | 276 | 8,936,859 | 19,600,000 | 18,339 | 167,000,000 |
| 2015 | 272 | 8,788,086 | 19,700,000 | 34,000 | 167,000,000 |

*Actual contributions do not appear as regression variables; they are presented here for informational purposes.
TABLE 4
Descriptive statistics
Untransformed Regression Variables

Panel A: Continuous variables

| Variable | Year | N   | Mean | Std Dev | Minimum | Maximum |
|----------|------|-----|------|---------|---------|---------|
| SCONTRIB (%) | 2008 | 208 | 0.60 | 0.78    | 0.02    | 8.27    |
|           | 2009 | 257 | 0.56 | 0.52    | 0.00    | 5.68    |
|           | 2010 | 265 | 0.58 | 0.86    | -0.27   | 12.23   |
|           | 2011 | 267 | 0.64 | 1.64    | -0.24   | 26.50   |
|           | 2012 | 274 | 0.67 | 1.25    | -0.49   | 17.29   |
|           | 2013 | 274 | 0.60 | 0.42    | 0.02    | 3.66    |
|           | 2014 | 276 | 0.70 | 0.99    | 0.02    | 14.62   |
|           | 2015 | 272 | 0.68 | 0.53    | 0.02    | 5.19    |
| UNION (%) | 2008 | 208 | 37.74| 21.01   | 0.0     | 81.40   |
|           | 2009 | 257 | 37.57| 20.21   | 0.0     | 77.60   |
|           | 2010 | 265 | 36.56| 19.75   | 0.0     | 78.50   |
|           | 2011 | 267 | 37.21| 20.34   | 0.0     | 81.00   |
|           | 2012 | 274 | 36.94| 20.25   | 0.0     | 75.90   |
|           | 2013 | 274 | 36.14| 19.74   | 0.0     | 82.00   |
|           | 2014 | 276 | 36.35| 19.88   | 0.0     | 77.30   |
|           | 2015 | 272 | 35.32| 18.97   | 0.0     | 75.00   |
| PROPVAL ($millions) | 2008 | 208 | 24,200| 31,500  | 21.1    | 239,000 |
|           | 2009 | 257 | 22,800| 30,800  | 22.1    | 238,000 |
|           | 2010 | 265 | 21,700| 29,700  | 22.6    | 211,000 |
|           | 2011 | 267 | 20,500| 27,300  | 22.4    | 184,000 |
|           | 2012 | 274 | 20,300| 27,200  | 22.7    | 180,000 |
|           | 2013 | 274 | 20,900| 27,700  | 22.9    | 184,000 |
|           | 2014 | 276 | 21,400| 28,900  | 23.9    | 191,000 |
|           | 2015 | 272 | 23,000| 31,500  | 24.9    | 206,000 |
| FUNDBAL ($000s) | 2008 | 208 | 248,000| 340,000 | (14,700)| 2,340,000|
|           | 2009 | 257 | 221,000| 305,000 | (36,600)| 2,330,000|
|           | 2010 | 265 | 212,000| 286,000 | (24,900)| 2,010,000|
|           | 2011 | 267 | 210,000| 290,000 | (6,314)| 2,190,000|
|           | 2012 | 274 | 205,000| 276,000 | (14,300)| 1,930,000|
|           | 2013 | 274 | 213,000| 290,000 | (35,800)| 2,470,000|
|           | 2014 | 276 | 217,000| 293,000 | 8,422  | 2,410,000|
|           | 2015 | 272 | 238,000| 336,000 | 14,900 | 2,990,000|
## TABLE 4
Descriptive statistics, continued

**Panel A: Continuous variables**

| Variable         | Year | N     | Mean   | Std Dev | Minimum | Maximum   |
|------------------|------|-------|--------|---------|---------|-----------|
| **LTDEBT ($000s)** |      |       |        |         |         |           |
|                  | 2008 | 208   | 2,980,000 | 39,100,000 | 78      | 564,000,000 |
|                  | 2009 | 257   | 2,550,000 | 36,700,000 | 2,721   | 588,000,000 |
|                  | 2010 | 265   | 2,500,000 | 36,300,000 | 1,685   | 591,000,000 |
|                  | 2011 | 267   | 2,490,000 | 36,400,000 | 2,095   | 595,000,000 |
|                  | 2012 | 274   | 2,200,000 | 32,200,000 | 475     | 533,000,000 |
|                  | 2013 | 274   | 2,180,000 | 31,600,000 | 159     | 524,000,000 |
|                  | 2014 | 276   | 2,020,000 | 28,800,000 | 370     | 478,000,000 |
|                  | 2015 | 272   | 2,140,000 | 30,700,000 | 177     | 506,000,000 |
| **URATE (%)**    |      |       |        |         |         |           |
|                  | 2008 | 208   | 6.08   | 1.85    | 2.80    | 17.50     |
|                  | 2009 | 257   | 9.35   | 2.87    | 3.40    | 25.00     |
|                  | 2010 | 265   | 10.03  | 2.78    | 4.10    | 23.40     |
|                  | 2011 | 267   | 9.38   | 2.64    | 3.90    | 19.50     |
|                  | 2012 | 274   | 8.32   | 2.41    | 3.50    | 17.30     |
|                  | 2013 | 274   | 7.55   | 2.21    | 3.40    | 16.90     |
|                  | 2014 | 276   | 6.33   | 1.86    | 2.90    | 13.90     |
|                  | 2015 | 272   | 5.38   | 1.54    | 2.50    | 11.10     |
| **WF55PLUS (%)** |      |       |        |         |         |           |
|                  | 2008 | 208   | 9.43   | 1.50    | 5.96    | 14.37     |
|                  | 2009 | 257   | 9.42   | 1.55    | 4.55    | 14.37     |
|                  | 2010 | 265   | 9.77   | 1.69    | 4.64    | 15.00     |
|                  | 2011 | 267   | 9.99   | 1.74    | 4.75    | 15.65     |
|                  | 2012 | 274   | 10.26  | 1.75    | 5.23    | 15.61     |
|                  | 2013 | 274   | 10.40  | 1.85    | 0.00    | 15.95     |
|                  | 2014 | 276   | 10.68  | 1.83    | 5.55    | 16.55     |
|                  | 2015 | 272   | 11.70  | 1.94    | 6.02    | 17.64     |
| **CVRPR ($000s)** |      |       |        |         |         |           |
|                  | 2008 | 208   | 168,000 | 319,000  | 434     | 3,180,000 |
|                  | 2009 | 257   | 147,000 | 292,000  | 434     | 3,170,000 |
|                  | 2010 | 265   | 145,000 | 292,000  | 434     | 3,190,000 |
|                  | 2011 | 267   | 144,000 | 295,000  | 434     | 3,260,000 |
|                  | 2012 | 274   | 144,000 | 288,000  | 305     | 3,220,000 |
|                  | 2013 | 274   | 147,000 | 294,000  | 300     | 3,210,000 |
|                  | 2014 | 276   | 149,000 | 304,000  | 110     | 3,340,000 |
|                  | 2015 | 272   | 159,000 | 333,000  | 110     | 3,400,000 |
### TABLE 4
Descriptive statistics, continued

#### Panel A: Continuous variables

| Variable   | Year | N   | Mean  | Std Dev | Minimum | Maximum |
|------------|------|-----|-------|---------|---------|---------|
| NOO ($000s) |      |     |       |         |         |         |
|            | 2008 | 208 | 13,700| 36,000  | (23,100)| 294,000 |
|            | 2009 | 257 | 21,000| 60,300  | (24,400)| 605,000 |
|            | 2010 | 265 | 29,200| 79,800  | (24,300)| 853,000 |
|            | 2011 | 267 | 37,800| 103,000 | (20,900)| 1,100,000|
|            | 2012 | 274 | 47,000| 125,000 | (20,400)| 1,350,000|
|            | 2013 | 274 | 58,000| 152,000 | (20,900)| 1,610,000|
|            | 2014 | 276 | 64,400| 170,000 | (21,100)| 1,790,000|
|            | 2015 | 272 | 76,800| 207,000 | (21,200)| 1,990,000|
| DISCRATE   |      |     |       |         |         |         |
|            | 2008 | 208 | 5.22  | 1.44    | 3.00    | 9.00    |
|            | 2009 | 257 | 5.22  | 1.47    | 3.00    | 9.00    |
|            | 2010 | 265 | 5.11  | 1.44    | 3.00    | 9.00    |
|            | 2011 | 267 | 5.03  | 1.44    | 3.00    | 8.50    |
|            | 2012 | 274 | 5.03  | 1.41    | 1.50    | 8.50    |
|            | 2013 | 274 | 4.99  | 1.41    | 1.50    | 8.50    |
|            | 2014 | 276 | 5.00  | 1.44    | 1.50    | 8.50    |
|            | 2015 | 272 | 4.93  | 1.46    | 1.50    | 8.50    |
| POP        |      |     |       |         |         |         |
|            | 2008 | 208 | 212,172| 255,715| 47,408  | 2,217,157|
|            | 2009 | 257 | 190,366| 235,620| 47,408  | 2,217,157|
|            | 2010 | 265 | 187,816| 226,451| 65,159  | 2,138,877|
|            | 2011 | 267 | 187,645| 225,539| 65,455  | 2,141,619|
|            | 2012 | 274 | 189,992| 227,567| 65,138  | 2,149,198|
|            | 2013 | 274 | 195,236| 231,288| 65,342  | 2,159,678|
|            | 2014 | 276 | 197,031| 233,606| 65,979  | 2,168,489|
|            | 2015 | 272 | 201,017| 238,312| 66,148  | 2,178,338|

#### Panel B: Dummy variable

| Year  | MC = 0 | %   | MC = 1 | %   | Total |
|-------|--------|-----|--------|-----|-------|
| 2008  | 134    | 64.4| 74     | 35.6| 208   |
| 2009  | 174    | 67.7| 83     | 32.3| 257   |
| 2010  | 180    | 67.9| 85     | 32.1| 265   |
| 2011  | 178    | 67.0| 89     | 33.0| 267   |
| 2012  | 185    | 67.9| 89     | 32.1| 274   |
| 2013  | 184    | 67.5| 90     | 32.5| 274   |
| 2014  | 186    | 67.8| 90     | 32.2| 276   |
| 2015  | 185    | 68.4| 87     | 31.6| 272   |
Table 5
Pearson Correlations Coefficients

|       | MC   | UNION | PROP VAL | FUND BAL | LT DEBT | URATE | WF55 PLUS | CVRPR | NOO | DISC RATE |
|-------|------|-------|---------|----------|---------|-------|-----------|-------|-----|-----------|
| MC    | --   |       |         |          |         |       |           |       |     |           |
| UNION | 0.131|       |         |          |         | 0.037 |           |       |     |           |
| PROPVAL| 0.094| -0.068|         |          |         | -0.010|           |       |     |           |
| FUNDBAL| -0.007| -0.051| 0.037   |          |         | 0.317 | -0.010    |       |     |           |
| LTDEBT | 0.290| -0.164| 0.317   | -0.010   |         |       |           |       |     |           |
| URATE | 0.078| 0.349 | -0.092  | -0.224   | -0.051 |       |           |       |     |           |
| WF55PLUS| -0.135| -0.032| 0.003   | 0.125    | -0.040| -0.388 |           |       |     |           |
| CVRPR | 0.195| -0.096| 0.370   | 0.016    | 0.453  | -0.038 | -0.047    |       |     |           |
| NOO | 0.323| 0.052 | 0.210   | 0.045    | 0.354  | 0.038  | -0.079    | 0.470 |     |           |
| DISC RATE| -0.123| 0.045 | -0.002  | -0.010   | -0.065| 0.061  | -0.017    | -0.063| -0.404|           |
| POP | 0.175| -0.125| 0.664   | 0.034    | 0.530  | -0.073| -0.075    | 0.611 | 0.401| -0.059   |

All coefficients are significant at \( \alpha < .05 \) except those in **boldface**.
\[ SCONTRIB = \text{Constant} + a_1MC + a_2\text{UNION} + a_3\text{PROPVAL} + a_4\text{FUNDBAL} + a_5\text{LTDEBT} + a_6\text{URATE} + a_7\text{WF55PLUS} + a_8\text{CVRPR} + a_9\text{NOO} + a_{10}\text{DISCRATE} + a_{11}\text{POP} + a_{12}\text{YR09} + a_{13}\text{YR10} + a_{14}\text{YR11} + a_{15}\text{YR12} + a_{16}\text{YR13} + a_{17}\text{YR14} + a_{18}\text{YR15} + \varepsilon \]

**TABLE 6**

Model of SCONTRIB (Model 1)
Panel Nested Fixed Effects Estimate with Main Effects

| VARIABLE   | Expected sign | Coefficient | S. E. | t    | p    |
|------------|---------------|-------------|-------|------|------|
| Constant   | + / –         | -5.088      | 0.455 | -11.19 | 0.000 |
| MC         | + / –         | 0.085       | 0.047 | 1.81  | 0.070 |
| UNION      | +             | 0.005       | 0.001 | 3.58  | 0.000 |
| PROPVAL    | +             | 0.018       | 0.023 | 0.78  | 0.217 |
| FUNDBAL    | +             | 0.000       | 0.000 | 0.46  | 0.321 |
| LTDEBT     | –             | -0.012      | 0.014 | -0.88 | 0.191 |
| URATE      | –             | 0.019       | 0.009 | -2.13 | 0.017 |
| WF55PLUS   | + / –         | 4.320       | 1.004 | 4.30  | 0.000 |
| CVRPR      | +             | 0.040       | 0.021 | 1.90  | 0.029 |
| NOO        | –             | -0.001      | 0.000 | -14.34 | 0.000 |
| DISCRATE   | +             | 0.174       | 0.013 | 13.87 | 0.000 |
| POP        | + / –         | 0.171       | 0.044 | 3.88  | 0.000 |
| YR09       | + / –         | 0.150       | 0.069 | 2.17  | 0.030 |
| YR10       | + / –         | 0.182       | 0.072 | 2.52  | 0.012 |
| YR11       | + / –         | 0.271       | 0.070 | 3.87  | 0.000 |
| YR12       | + / –         | 0.320       | 0.067 | 4.76  | 0.000 |
| YR13       | + / –         | 0.382       | 0.066 | 5.78  | 0.000 |
| YR14       | + / –         | 0.420       | 0.065 | 6.45  | 0.000 |
| YR15       | + / –         | 0.451       | 0.068 | 6.62  | 0.000 |

F-statistic | 46.790 |
Prob        | 0.000 |
N           | 2,093 |

P-values are based on one-tailed tests for coefficients for which we predict the sign and two-tailed tests for coefficients for which no prediction is made.
### TABLE 7
Model of SCONTRIB (Model 2)
Panel Nested Fixed Effects Estimate with Interaction Terms

\[
S\text{BCONTRIB} = \text{Constant} + a_1MC + a_2\text{UNION} + a_3MC \times \text{UNION} + a_4\text{PROPVAL} + a_5\text{FUNDBAL} + a_6\text{LTDEBT} + a_7\text{URATE} + a_8\text{WF55PLUS} + a_9\text{CVRPR} + a_{10}\text{NOO} + a_{11}\text{DISCRATE} + a_{12}MC \times \text{DISCRATE} + a_{13}\text{POP} + a_{14}\text{YR09} + a_{15}\text{YR10} + a_{16}\text{YR11} + a_{17}\text{YR12} + a_{18}\text{YR13} + a_{19}\text{YR14} + a_{20}\text{YR15} + \varepsilon
\]

| VARIABLE          | Expected sign | Coefficient | S. E. | t    | p    |
|-------------------|---------------|-------------|-------|------|------|
| Constant          | + / –         | -5.203      | 0.455 | -11.42 | 0.000 |
| MC                | + / –         | 0.590       | 0.154 | 3.83  | 0.000 |
| UNION             | +             | 0.006       | 0.002 | 3.75  | 0.000 |
| MC × UNION        | + / –         | -0.003      | 0.002 | -1.52 | 0.128 |
| PROPVAL           | +             | 0.018       | 0.023 | 0.78  | 0.217 |
| FUNDBAL           | +             | 0.000       | 0.000 | 0.53  | 0.297 |
| LTDEBT            | –             | -0.012      | 0.014 | -0.91 | 0.182 |
| URATE             | –             | -0.017      | 0.009 | -1.91 | 0.028 |
| WF55PLUS          | + / –         | 4.429       | 1.003 | 4.42  | 0.000 |
| CVRPR             | +             | 0.040       | 0.021 | 1.86  | 0.031 |
| NOO               | –             | -0.001      | 0.000 | -13.69 | 0.000 |
| DISCRATE          | +             | 0.196       | 0.014 | 13.75 | 0.000 |
| MC × DISCRATE     | + / –         | -0.081      | 0.027 | -3.02 | 0.003 |
| POP               | + / –         | 0.169       | 0.044 | 3.82  | 0.000 |
| YR09              | + / –         | 0.140       | 0.069 | 2.03  | 0.042 |
| YR10              | + / –         | 0.164       | 0.072 | 2.26  | 0.024 |
| YR11              | + / –         | 0.253       | 0.070 | 3.61  | 0.000 |
| YR12              | + / –         | 0.299       | 0.067 | 4.44  | 0.000 |
| YR13              | + / –         | 0.363       | 0.066 | 5.50  | 0.000 |
| YR14              | + / –         | 0.403       | 0.065 | 6.19  | 0.000 |
| YR15              | + / –         | 0.434       | 0.068 | 6.39  | 0.000 |

F-statistic        | 42.842        |
Prob               | 0.000         |
N                  | 2,093         |

P-values are based on one-tailed tests for coefficients for which we predict the sign and two-tailed tests for coefficients for which no prediction is made.