

# Pension Obligations: A Threat to Fiscal Stability?

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## Abstract:

Using state pension data from 2001- 2011, this paper explores the relationship between unfunded liabilities and demographic, fiscal, and political variables. Many have blamed the current decline in pension funding on poor market returns during the Great Recession and the “.com” bubble before that. Others claim that pension funds are just poorly managed. While the latter may be true, I show that investment returns cannot fully account for the change in funding ratio. In fact the mean compound return over this time period stands in stark contrast to the decline in the mean funding ratio. I argue that political and legal factors are responsible for inadequate contributions to pension funds. Furthermore, I show that pension funding is correlated with state debt and many categories of state spending.

Keywords: public pensions, unfunded liabilities, state government, politics, debt, finance, investment

## Chapter 1

### Introduction

\$17.5 Trillion. That is approximately the amount of the United States national debt. The U.S. Debt Clock<sup>1</sup> features this number on its website in ever increasing red numbers. As disturbing as the magnitude of this number is, it is not the most disconcerting statistic despite its prominence on the page. All the way at the bottom of the graphic is the U.S. unfunded liabilities which total \$128 trillion. These obligations don't make it on the government's balance sheet as debt, yet the nation is equally required to pay these obligations in the future. Furthermore, the amount is over seven times larger than the national debt, which everyone fixates on, but it goes largely unnoticed. Some of the obligations included in this amount are Social Security, Medicare, and pension liabilities. While the first two are exclusive obligations of the federal government, the latter has become a major concern at the state and local levels as well.

In many cases, pension obligations have become the leading expenditure at the local level. Most notably, the city of Detroit filed for bankruptcy in 2013 because it no longer had the requisite cash flow to meet its financial obligations, much less the services that it promises to its residents<sup>2</sup>. Detroit is one of thirteen municipal bankruptcies that have been filed since 2008 and it is the largest in history. While thirteen is not an alarming number on its own, these only represent the cities that have completely failed to meet their financial commitments. There are many more

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<sup>1</sup> [www.usdebtclock.org](http://www.usdebtclock.org)

<sup>2</sup> "The Detroit police's average response time to calls for the highest-priority crimes this year was 58 minutes" (Davey 2013).

that are not yet at risk of default, but must cut other services in order to pay for employee retirement. Elected officials have sought ways to reduce, or at least slow, the growth of pension costs, but the law generally prevents them from doing so.

Public pension benefits are viewed as contracts under the law, and as such, they are protected either implicitly or explicitly in most states. However, there is variation as to what aspects of these contracts courts protect. Benefits are divided into two categories: accrued and future. All but two states safeguard accrued benefits, but many states' laws are ambiguous about future benefits. As a result, this is an area that most governments target in an attempt to lower pension liabilities, but they rarely succeed. Most recently, San Jose's Measure B was on trial in California. While the entire legislation wasn't struck down, the judge removed all articles that altered benefits of current employees (Mendel 2013). The only option left to most public employers is to move to a defined contribution system for all new employees. In theory, this is a good, although extremely slow, solution to creating a financially sustainable retirement system for public employees. In practice, it is insufficient to address the immediate financial concerns. Municipalities are already paying more than they can afford to their retirement funds. Unlike Social Security, defined benefit programs are designed so that a retired member's benefits are funded by his own contributions, but that assumption only holds in the case where the retirement system is fully funded. In reality, many states are closer to half funded than fully funded. As the baby boomers are entering retirement, more people are receiving benefits from the fund, and fewer workers are contributing to it.

If state retirement systems were already falling behind, how do they intend to make up the difference?

In those states that protect public pension benefits, raising the contributions of current workers is not an option. Raising contributions equates to lowering benefits. Therefore, the only alternative left is for the employers, and by extension the taxpayers, to make up the difference. This puts enormous strain on municipal budgets. However, as aforementioned, Chapter 9 bankruptcy is an option for cities in most states, but there is no such relief available for states themselves. As some state retirement systems dip below 50% funding levels, there is growing concern that rising costs will render state governments insolvent. In analysis I will examine what effects the funding ratio of retirement systems have on other state expenditures and total debt.

In addition to financial and legal hurdles, the problems surrounding public pension shortfalls are also political in nature. The politicians that run state and local governments are sensitive to re-election. Therefore, it is often difficult for lawmakers to make painful, yet necessary decisions. In the case of pensions, the incentive for politicians to take decisive action is further reduced because of the lag between the time the decision is made and when the benefit is realized. Instead, it is most often advantageous to ignore the problem and defer it to the next person in office. Sometimes lawmakers can ignore the issue completely, and sometimes they understate the problem by adjusting the way that pension liabilities are calculated. By changing the actuarial assumptions about investment returns, interest rates, or lifespan even slightly, the compounding nature of the calculation alters the present

value of liabilities in a large way. In other cases, politicians have even destabilized the long-term health of a pension system for immediate financial gains and consequently their own political gain<sup>3</sup>. While this is a rather cynical view of elected officials, the role of special interest groups, especially labor unions, is very important in forming and instituting policy. In my analysis, I will also explore the variation in funding ratios between states using financial, demographic, and political variables.

In chapter 2, I will investigate existing literature on public pensions. Many authors have researched and written about the performance of pension funds. I analyze and relate these arguments to studies in the areas of finance, politics, and law. After setting the foundation for my study, I explain my own dataset and how I constructed it in chapter 3. Then, I describe the three models that I will use to analyze the data that I collected. Finally, I apply the models to the data. In section 4.1, I address the claim that low funding levels are a result of poor market performance. I will show that investment returns cannot be the leading cause of decline. In section 4.2, I explore what other factors can explain the downward trend in funding levels. I provide evidence that there are financial, political, and legal factors that have significant effects on unfunded liabilities. Finally, in section 4.3, I test whether the funding ratio has an effect on debt and other government expenditures. The results show that although funding levels are negatively related

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<sup>3</sup> California substituted investment returns for its required contributions in the late 1990's. Contributions were cut by 90%. The lack of a "holiday" for workers was used to justify a increase from 2% to 2.5% of final pay in benefits (Mendel 2011).

to debt, they also have a significant, negative relationship to other categories of government spending.

## Chapter 2

### Background and Literature Review

In this section, I explore the underlying mechanisms that govern public pensions and how they are managed by the state. First, in order to determine the effects of unfunded pension liabilities on the state budget, we need to examine how the benefit structure, the contribution structure, and liabilities should all be measured. In addition to contributions from both the employees and the employers, pension systems rely on investment revenue to grow the fund. There are equivalent wealth management services in the private sector, but there is some debate whether the public systems should model their investment strategies in a similar manner or adopt more conservative plans. Next I will focus on the legal aspects of public pensions. Most states protect these benefits, but they do not all provide the same degree of security or use the same legal mechanisms. Consequently, these disparities in protection create different incentives for policymakers in different states. States also have varied laws regarding municipal bankruptcy. This can further alter the incentives of a local or state government. Finally, I will look at the relationship between lawmakers and public pension systems. What political incentives do they have to fix, ignore, or hinder underfunded pension systems? The

role of campaigning in modern American politics has changed over the last half decade. The increase in unfunded liabilities may be a product of this change.

### **2.1 Defined Benefit vs. Defined Contribution**

The source of these unfunded liabilities is the structure of a defined benefit (DB) system in which 80% of government employees are enrolled (Novy-Marx and Rauh 2011). New employees sign a contract with their employer saying they will receive a pre-determined annual benefit when they retire according to the number of years worked and final salary. Many programs also include a cost of living adjustment (COLA) that is meant to adjust for inflation over the course of retirement.

$$Benefit_i = Multiplier * Number\ of\ Years\ Worked_i * Final\ Salary_i * COLA$$

Both the employee and the employer contribute a percentage of the worker's salary to the retirement fund each year, but the total contributions don't necessarily add up to the expected benefits. Over the course of the employee's career, the contributions are invested, and these revenues are supposed to make up the difference between lifetime contributions and expected benefits. However, in the event that the investment returns are insufficient, the fund is still obligated to pay the amount agreed upon at the outset of the employee's employment. In contrast, a defined contribution (DC) plan only requires that the employee and his employer make their required yearly contributions. The employee is entitled to any and all returns from investment, but the plan does not guarantee a specific amount of

benefits upon retirement. In expectation, the benefits should be equal, but in a DC plan, the employee owns the risk rather than the pension fund.

## **2.2 How Big Are the Liabilities?**

In order to discuss the effects of unfunded pension liabilities on state finances, we need to know the true magnitude of these obligations. Pension systems report the present value of their expected obligations on their financial statements, but there are many ways to calculate this amount. States are likely to evaluate their obligations in the most favorable manner. Novy-Marx and Rauh (2011) argue that the Government Accounting Standards Board (GASB) incorrectly requires states to discount liabilities at the expected return on assets. Instead, the researchers recalculate liabilities using two different methods. Assuming that pension obligations and general obligation debt have the same priority, then they should have similar yields. Using state bond yields, Novy-Marx and Rauh determine that total state pension liabilities are \$3.20 trillion. Under the assumption that pension benefits are risk free, they calculate \$4.43 trillion, using the Treasury yield curve.

## **2.3 Investment**

Investing plays an important role in the growth and assessment of public pensions, but there are many conflicting opinions on what that role should be. As I will discuss later in this section, most states guarantee public pension benefits by law. This implies that these benefits are at least as senior as general obligation debt. In fact, there is strong evidence that state bond yields are directly related to the funding ratio of pension funds (Novy-Marx and Rauh 2012). Consequently, it stands to reason that the investments should reflect a similar amount of risk and yield.



Instead, the median expected return of state plans is 8% as reported on the financial statements. Whether or not that value actually represents the target expected return of the fund managers is doubtful. Pennacchi and Rastad (2011) argue that since taxpayers essentially own this risk, it is unfair to subject the taxpayers to that amount of risk while the public employees enjoy a relatively risk-free benefit. Furthermore, taxpayers don't capture the upside of this risk because assets above liabilities tend to be distributed to employees through lower contributions or higher benefits rather than used as a hedge against future losses.

Given an underfunded pension plan, investing aggressively is the easiest way to make up the difference, but this introduces substantial risk into the portfolio. Managers of underfunded plans target higher expected returns and allocate more heavily towards equities in order to make up the deficit (Mohan and Zhang 2011). Unfortunately, there is higher risk involved with pursuing higher expected returns, and it becomes increasingly likely that the portfolio will fall short of expectations or experience losses. Consequently, many have advocated that pension portfolios invest more in bonds because they are less risky and offer additional tax advantages (Bader and Gold 2007). Still, others believe that states should forgo investing altogether and fund benefits from current revenues (Bohn 2011). While this would certainly reduce market risk, it is probably not an optimal strategy, and it would be very costly to implement.

#### **2.4 Public Pensions and State Law**

In the discussion about how liabilities should be measured and how assets should be invested, authors often refer to the risk premium of pension benefits. In

the capital asset pricing model, it is assumed that riskier investments should yield higher expected returns. Therefore, pension liabilities should be discounted at rates of investments with similar risk. The protection that most states afford their pension benefits make them relatively low risk, but not all states grant a similar level of protection or use the same mechanism (see Table 1). The fact that some states have more freedom to negotiate benefits could account for some of the variance between states.

## **2.5 The Politics of Pensions**

Since top government officials determine the policies regarding state pension funds and their management, there is an unavoidable political influence on their performance. There is evidence that more liberal institutions are more likely to favor public sector employees (Blais, Blake, and Dion 1997). This is consistent with the notion that labor unions are typically supporters of the Democratic Party. Public firms tend to employ 20 to 30 percent more workers than comparable private firms (Donahue 1989). Shleifer and Vishny construct a model of the interaction between politicians and firms. When the politician has control over the amount of labor in the firm, he derives utility from excess employment, so he hires additional labor up to the point at which the firm's profits equal zero. In the presence of bribery, the politician chooses a level of labor at which his marginal benefit from labor is equal to his marginal political cost of providing the subsidies to employ the labor (Shleifer and Vishny 1994). If we substitute the union as the firm's manager and campaign contributions as bribes, we can see how politicians would be incentivized to partake in behavior that is favorable to the public employees. Furthermore, the marginal

political cost of the policy is not likely to be borne by that particular politician because of the long-term nature of pensions. For instance: “one can imagine a positive political economy model in which short-time-horizon politicians have an incentive to increase pension benefits when funding levels are high, not placing sufficient weight on the fact that they might be unable to reduce them (due to constitutional prohibitions) when funding levels are lower” (Brown, Clark, and Rauh 2011). Alternatively, politicians may not be able to make tough decisions even in non-election years because of the increasingly constant campaign process. The salience of modern media makes it easy for voters to monitor their politicians, and it makes it easier for politicians to spread messages about their competitors (Beland and Wadden 2012). Its hard to make the fiscally responsible choice when doing so gives competitors the ammunition to successfully campaign for a seat that could be defended more easily with inaction.

## **2.6 A Similar Study**

Cogburn and Kearney (2010) conduct a similar study to my own on unfunded pension liability data from 2006 to 2007. The data only covers one year, but they are able to get some significant results. They regress the unfunded pension liability, which is the opposite ratio to the funding ratio that I use, on fiscal, managerial, and political variables. The results showed that income per capita, fiscal constraint, public employee density, and employer contribution all had positive, significant relationship with the unfunded liability. Additionally, higher management scores and greater legislative professionalism were correlated with lower unfunded liabilities. This study is limited by the single time period of the data,

but I will compare my results with this study to see if they are consistent over a longer time horizon.

## Chapter 3

### Methods

#### 3.1 Data

I have collected and merged datasets from many sources to create my own dataset that incorporates pension, demographic, fiscal, and political information. I will discuss my variables in these groupings below. All data are at the state level, and it spans from 2001 to 2011. I would have also liked to perform a similar analysis on local data because I believe that the effects of increasing unfunded liabilities on government finances would be more profound and easily isolated, but such data is not readily available.

**Pensions.** All of my data regarding pension funds themselves comes from the Public Plans Database, courtesy of the Boston College Center for Retirement Research. This dataset is collected from the financial reports of each retirement system. The most important variable in my analysis is the actual funding ratio of each plan. The data for this variable is somewhat biased because of the subjective nature of the actuarial assumptions. While the value current assets is indisputable, the actuarial liabilities are the present value of expected future benefits. This measure is dependent on the mortality tables, discount rate, and other assumptions made by each plan. As I mentioned earlier, there is much dispute about the accuracy of these assumptions, but I use the reported funding ratio because it is the best measurement available,

given that the actuarial assumptions are not always reported in the data. The data also contains a value for the amount of employer contributions that I use to create a ratio of the employer contributions over the total liability. Additionally, the data contains variables for the total number of members per plan and the number of retired member.

Actfundratio

This is the actual funding ratio of a pension plan as defined by the assets divided by the reported value of liabilities. (percent)

Contribution ratio

This is the ratio of actual contributions made by employers as a proportion of the entire plan liability. (percent)

Retired ratio

This is the proportion of retired members of a pension plan to the total number of members. (percent)

**State Finances.** I obtained state level financial data from the U.S Census Bureau. I use total revenues to assess what percentage of the yearly budget certain expenditures are consuming. Among those expenditures are health, education, corrections, highways, and parks. I will test whether changes in the funding ratio have any effect on these types of spending at the state level. I also include total debt and the interest on such debt. I use the interest on the debt to recreate a measure of fiscal constraint from Coggburn and Kearney (2010). Finally, I use the U.S. Bureau of Labor Statistics' measure of CPI to present all of the data in real terms.

Debt per capita

This is the total state debt per capita. (2001 dollars)

Revenues per capita

This is a state's total revenues per capita. (2001 dollars)

Health per capita

This is a state's expenditures on health per capita. (2001 dollars)

Corrections per capita

This is a state's expenditures on corrections per capita. (2001 dollars)

Education per capita

This is a state's expenditures on education per capita. (2001 dollars)

Highway per capita

This is a state's expenditures on highways per capita. (2001 dollars)

Parks per capita

This is a state's expenditures on parks and recreation per capita. (2001 dollars)

CPI

This is the consumer price index. It is normalized to 1 in 2001.

**Demographics.** My data for individual income and population by state comes from the U.S. Bureau of Economic Analysis. In addition to calculating the per capita income, I use this measure of population throughout my dataset to generate per capita values. I also have state GDP per capita as a control from the same source. I collected data on the density of public employees and union density among public employees (Hirsch and Macpherson 2003). These measures might be informative about a state's favor towards labor or its ability to manage pension systems with larger memberships. Additionally, I use dummy variables for the type of protection each state provides for public pension benefits to control for different expectations (Munnell and Quinby 2012).

Income per capita

This is the total individual income per capita. (2001 dollars)

Income per capita 10k

This is the total individual income per capita (2001 tens of thousands of dollars)

GDP per capita

This is the gross domestic product per capita (2001 dollars)

Union membership

This is the total number of public employees who are members of a union (percent).

Employees per capita

This is the number of public employees per capita in each state. (percent)

Constitution

1 = yes, 0 = no

This is a dummy variable for constitutional protection of pension benefits.

Contract

1 = yes, 0 = no

This is a dummy variable for protection of pension benefits under contract law.

Property

1 = yes, 0 = no

This is a dummy variable for protection of pension benefits under property law.

**Politics.** I also want to test what influence politics may have on the funding ratio.

First, I created dummy variables for partisan control. One is for unified Republican control of government. The other is for Democratic unified control, and the category left out is mixed control (Shufeldt and Flavin 2012). I also wanted to create a variable that would measure the political competitiveness in a state, so I calculated the average number of candidates per race per state (Klarner et al. 2013). For years in which there was not an election, I used the data from the previous election. I also interpret the independent investment variable from the Public Plans Database as an indirect political effect. In general, if investment decisions are made by those otherwise removed from the political process, then it is likely that investment performance will be better.

Republican

1 = unified Republican government, 0 = not Republican

This is a dummy variable for unified control of the state government.

Democrat

1 = unified Democrat government, 0 = not Democrat

This is a dummy variable for unified control of the state government.

Ave candidates

This is the average number of candidates per seat per year.

Ind. investment

1 = yes, 0 = no

This is a dummy variable for the presence of an investment team that is independent of the board of directors.

### 3.2 Model

For each of my three experiments, I begin by using a simple ordinary least squares (OLS) regression model. My primary goal is to establish relationships between my dependent variables and independent variables. In order to check the robustness of these results, I run a second regression with year fixed effects. Essentially, that involves adding a dummy variable for each year excluding 2001. For simplicity, I have left these variables out of the equations below. Finally, I run a third regression with an instrument variable to correct for potential endogenous variables in the model. In the first experiment I test the actual funding ration against a number of scalar and binary variables from each category of my data. This equation is given by:

$$\begin{aligned}
 actfndratio_i = & \alpha + \beta_1 income\ per\ capita\ 10k_i + \beta_2 GDP\ per\ capita_i + \beta_3 employees\ per\ capita_i + \\
 & \beta_4 union\ membership_i + \beta_5 fiscal\ constraint_i + \beta_6 revenue\ per\ capita_i + \beta_7 ave.\ candidates_i \\
 & + \beta_8 contribution\ ratio_i + \beta_9 ind.\ investment_i + \beta_{10} retired\ ratio_i + \beta_{11} republican_i + \\
 & \beta_{12} democrat_i + \beta_{13} constitution_i + \beta_{14} contract_i + \beta_{15} property_i + \varepsilon_i
 \end{aligned}$$

(1)



Since the fiscal constraint may also be a function of the actual funding ration, I use a one-year lag of the actual funding ratio as an instrument for fiscal constraint in the third regression. In the second experiment, I want to test the effect of the funding ratio on other parts of the state budget, so I moved the actual funding ratio to the right hand side of the equation and use debt per capita as the dependent variable.

This equation is given by:

$$\begin{aligned}
 \text{debt per capita}_i = & \alpha + \beta_1 \text{actfundratio}_i + \beta_2 \text{corrections per capita}_i + \beta_3 \text{health per capita}_i + \\
 & \beta_4 \text{highway per capita}_i + \beta_5 \text{parks per capita}_i + \beta_6 \text{revenue per capita}_i + \\
 & \beta_7 \text{GDP per capita}_i + \beta_8 \text{income per capita}_i + \beta_9 \text{employee per capita}_i + \beta_{10} \text{republican}_i + \\
 & \beta_{11} \text{democrat}_i + \varepsilon_i
 \end{aligned}
 \tag{2}$$

Similar to the first experiment, I use a one-year lag of debt per capita as an instrument for the actual funding ratio. Finally, I individually test the effect of the funding ratio on five different government expenditures with the following equation:

$$\begin{aligned}
 \text{expenditure per capita}_i = & \alpha + \beta_1 \text{actfundratio}_i + \beta_2 \text{fiscal constraint}_i + \beta_3 \text{contributio ratio}_i + \\
 & \beta_4 \text{revenue per capita}_i + \beta_5 \text{income per capita}_i + \beta_6 \text{GDP per capita}_i + \beta_7 \text{republican}_i + \\
 & \beta_8 \text{democrat}_i + \varepsilon_i
 \end{aligned}
 \tag{3}$$

In the third regression I believe that government expenditure per capita will be endogenous to the fiscal constraint, so I use a one-year lag of the expenditure per capita as an instrument for fiscal constraint. Between these three experiments and

the three regressions within each experiment, I hope to show that there is not only a correlation but also a causal effect of decreasing funding ratios on the state budget.

## Chapter 4

# Analysis

### 4.1 Trends

The data clearly indicates that there has been a downward trend in pension funding from 2001 to 2011. While this was not a surprising observation, I was interested by the relative smoothness of the decline. Many people call attention to poor investing strategies as an explanation for suffering pension plans. This data begins in 2001, which coincides with the “.com” bubble. Continuing along the timeline, there is a boom, followed by the Great Recession in 2007 and 2008. Then, the last few years of the data represent the beginnings of a recovery. If investment returns were responsible for the low funding ratios, then I would expect the funding ratio to mimic the volatility that the market experienced. Instead the data shows that the funding levels were mostly unresponsive to the returns on their assets (see Graph 1).

In Graph 1, I constructed a mean portfolio that is normalized to 100 at the beginning of 2001. The growth rate of this hypothetical fund is the annual average return of all the funds in the dataset. The mean fund actually grows over the time period. The most surprising relationship is the continued decline in funding levels during the boom. Even when I separate the top and bottom ten funds by funding

level, there is only a slight difference in the overall funding trend and almost no difference in investment returns (see Graph 2 and 3). While it may be true that pension funds perform worse than their private sector counterparts, this evidence shows that there must be other factors influencing the funding ratios of these plans.

When I examine the assets and liabilities separately, I notice that the majority of the change in funding levels is from the increase in liabilities. Mean assets plateau going into the Great Recession, and they even have a slight downward trend thereafter. This seems inconsistent with the mean portfolio that I created. However, investment returns are only one input for the change in assets. Beyond future liabilities, each fund has benefits that it must pay each year and contributions from both employees and employers. The stagnant level of assets in the case of positive investment returns is disconcerting. That means that the yearly benefits are exceeding contributions plus returns. Furthermore, total liabilities are continuing to grow (see graph 4). There does seem to be a decrease in liabilities in 2011, but this may be due to the fact that the data does not have an observation for each plan in 2011 because not every plan had produced a financial report yet. This clerical tardiness may in turn correlate to plans with high liabilities. This situation suggests that the benefits promised are more than the contributions are capable of financing. Since each employee cohort is theoretically supposed to fund its own retirement in a DB plan, the ratio of retirees to working members should not matter. Yet, with the baby boomers beginning to retire, the outlook for pension funds is bleak if nothing is changed.

## 4.2 The Fund Ratio

First, it is important to note that I did run a regression using the lag of the funding ratio as an instrument for fiscal constraint, but the results were so distorted that I decided it was not worthwhile to include in this paper. A 1% change in an independent variable corresponded with up to an 84% change in the funding ratio. However, the OLS and fixed effect models provided some interesting results that support the findings in the Coggburn and Kearney paper (see Model 1). The fiscal constraint has a coefficient of -3 and was significant in both regressions. This correlation seems intuitive. States with higher interest payments in proportion to their revenues also have lower funding levels. This might happen because states with higher debt have less money to fund their pension plans. States that keep their debt levels low are also more likely to adequately fund their pension systems. Conversely, the results also suggest states that pay more in contributions relative to the magnitude of the fund are likely to have lower funding levels. I believe that this is a product of GASB's actuarial requirements. As systems become underfunded, GASB requires that employers amortize the difference in addition to contributing their percentage of employee salary. I would expect that employers that contribute more to their funds would have higher funding ratios, but higher funding levels would also mean that they would not need to contribute as much relative to the size of the fund. Income per capita is only significant in the OLS. It seems plausible that states with higher incomes per capita would also have higher revenues and, therefore, the means to fund their public retirement systems. Then again, higher income per capita is also associated with higher cost of living and consequently

higher benefits (Coggburn and Kearney 2012). The negative coefficient on revenues per capita is consistent with this explanation.

The presence of investment managers that are independent of the board of directors correlates to a 4% increase in funding ratio. This either suggests that the board members are not as well suited for the job as an independent manager would be, or it implies that the board members are more apt to make investment decisions based on political influences. There also seems to be some political influence from the state government. Governments in which Republicans control all divisions are likely to have 2% higher funding than a divided government, but there does not seem to be a significant effect for unified Democratic governments. Finally, the type of protection provided to pension benefits by states seems to be correlated with the funding levels. I hypothesized that stricter protections would result in lower funding ratios, but the results suggest the opposite. Benefits protected by either contract law or property law have strong effects on the funding levels. If states know that they will not be able to reduce benefits, then perhaps they have better incentives to keep their systems well funded. Although it is interesting that states with benefits protected by their constitution did not have a significant relationship with funding levels. Even though the state constitution is difficult to amend, it is possible that states feel that it could be done if the fiscal situation required it.

### **4.3 Effect on Debt and Spending**

Beyond proving a relationship, I want to explore any causal effects that funding levels may have on state finances. The results show that there is significant negative effect of funding ratios on state debt. The coefficient on the funding ratio

ranges from -16 in the OLS regression to -276 in the regression with instruments (see Model 2). There are two mechanisms through which this might occur. As unfunded liabilities rise, states are required to pay down part of this difference in addition to normal contributions. In order to address these rising costs, states can either divert cash from other expenditures. Results from the expenditure regression suggest that this is a likely explanation (see Model 5). A decrease in the funding ratio strongly correlates with a decrease in health, corrections, highway, and park spending per capita. For a one-percent decrease in the funding ratio, highway spending per capita falls by seven dollars. This result suggests that states that are able to keep their pension systems funded are more fiscally sound throughout their budget. The second way in which the funding ratio may affect other spending is by increasing the cost of borrowing. Lower funding levels are associated with higher yields on bonds (Novy-Marx and Rauh 2012). Even if states cannot explicitly borrow to raise funding levels, they are indirectly increasing debt by raising their cost of borrowing.

The final variable of interest in the expenditure models is the fiscal constraint in all three expenditure regressions, the fiscal constraint has a significant, positive effect on health, corrections, highway, and park spending (see Models 3,4, and 5). Model 5 shows that a 1% increase in the fiscal constraint corresponds to \$439 in highway spending. One might expect an increase in interest payments relative to total revenues would discourage other forms of spending. However, this relationship may reflect capital expenditures that are financed by new debt.

## Chapter 5

### Conclusion

Pension funds are a financial threat to states. I have shown empirically that declining funding levels are correlated with decreases in per capita expenditures. The fact that investment returns have not been the sole reason for the decline is both good and bad news. First, it shows that eliminating the unfunded liabilities is not subject to a future average return that may or may not be as large as the historical average. Therefore, the solution will have to involve either reducing the liabilities or enforcing stricter required contributions. A feasible solution will probably incorporate both. Either approach requires overcoming the political and legal hurdles that I presented in my model.

I have examined the fiscal implications of declining pension funds on state budgets in this paper, but it is important to note that local governments are not independent in this matter. In many states, local employees are members of state pension systems, but the local government is responsible for making the required contributions. This creates a principal-agent problem. State legislators manage the funds with their own fiscal and political objectives in mind while local governments are required to pay for the unfunded liability. Further research needs to be done on the effects of rising pension costs on local budgets. Unlike states that have the option of depleting the accumulated assets instead of sacrificing alternative spending, pension costs are a current expenditure for municipalities. From my conversations with San Jose Mayor, Chuck Reed, even in cities like San Jose, which is

not in threat of bankruptcy, pension expenditures consume revenues that would normally be used for public services and infrastructure. If this occurrence is a common trend, then economic productivity could be hindered in the long run. Furthermore, if the current trend in funding levels continues, these pension liabilities will eventually find their way onto the state's budget when cities can no longer afford to make the required contributions.



# Appendix

Table 1: Public Pension Benefit Protection by State

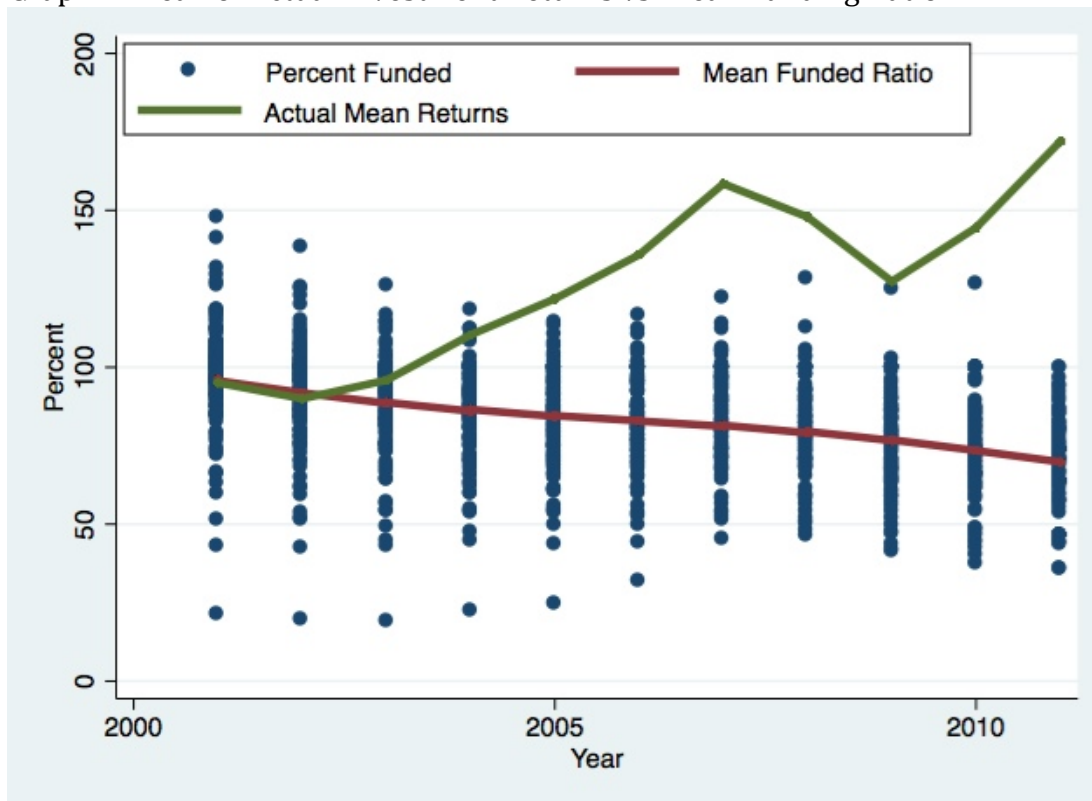
Legal basis	Accruals protected			
	Past and future	Past and maybe future	Past only	None
State constitution	AK, IL, NY	AZ	HI, LA, MI	
Contract	AL, CA, GA, KS, MA, NE, NV, NH, ND, OR, PA, TN, VT, WA, WV	CO, ID, MD, MS, NJ, RI, SC	AR, DE, FL, IA, KY, MO, MT, NC, OK, SD, UT, VA	
Property	ME, WY	CT, NM, OH	WI	
Promissory estoppel <sup>a</sup>	MN			
Gratuity				IN, TX <sup>b</sup>

<sup>a</sup> Promissory estoppel is the protection of a promise even where no contract has been explicitly stated.

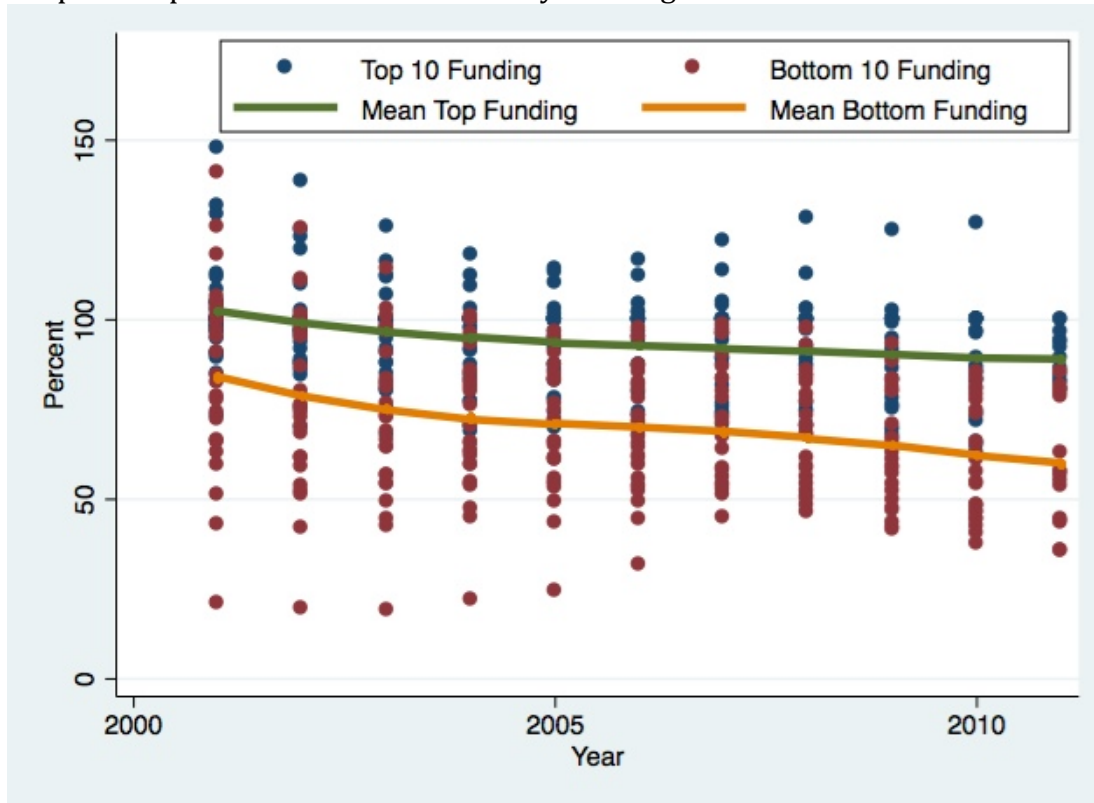
<sup>b</sup> This gratuity approach applies only to state-administered plans. Accruals in many locally-administered plans are protected under the Texas constitution.

source: Munnell and Quinby (2012)

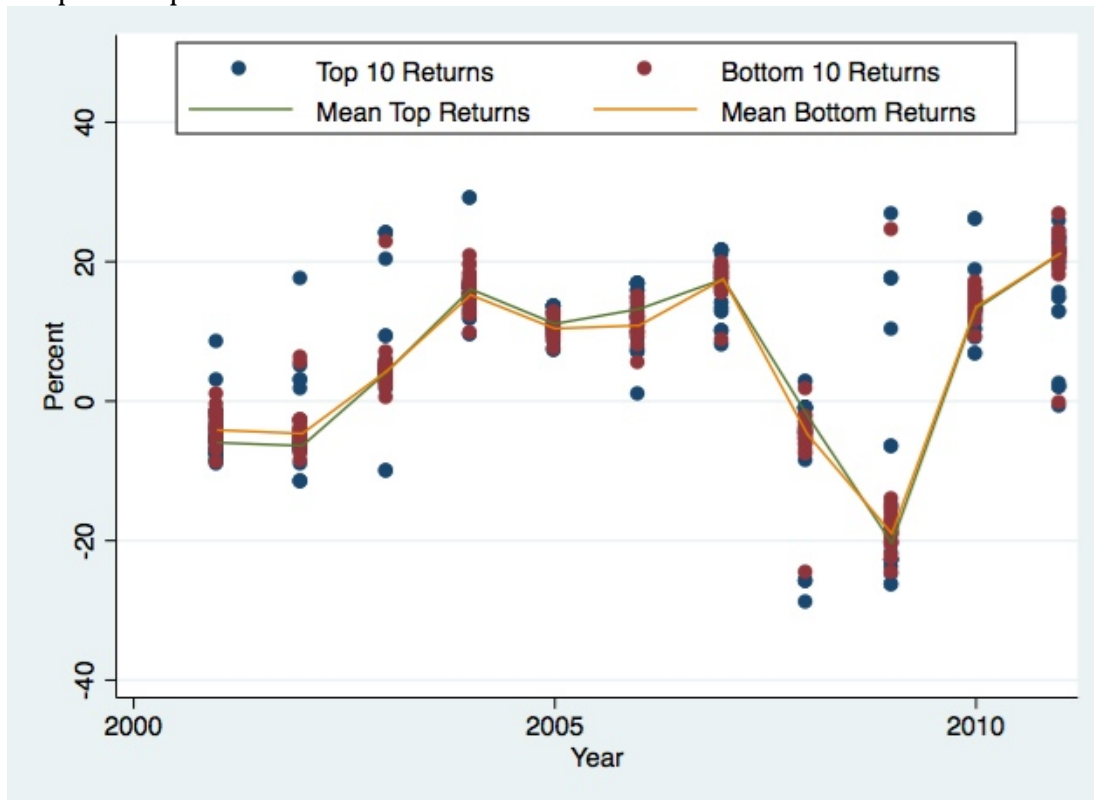
Graph 1: Mean of Actual Investment Returns vs. Mean Funding Ratio



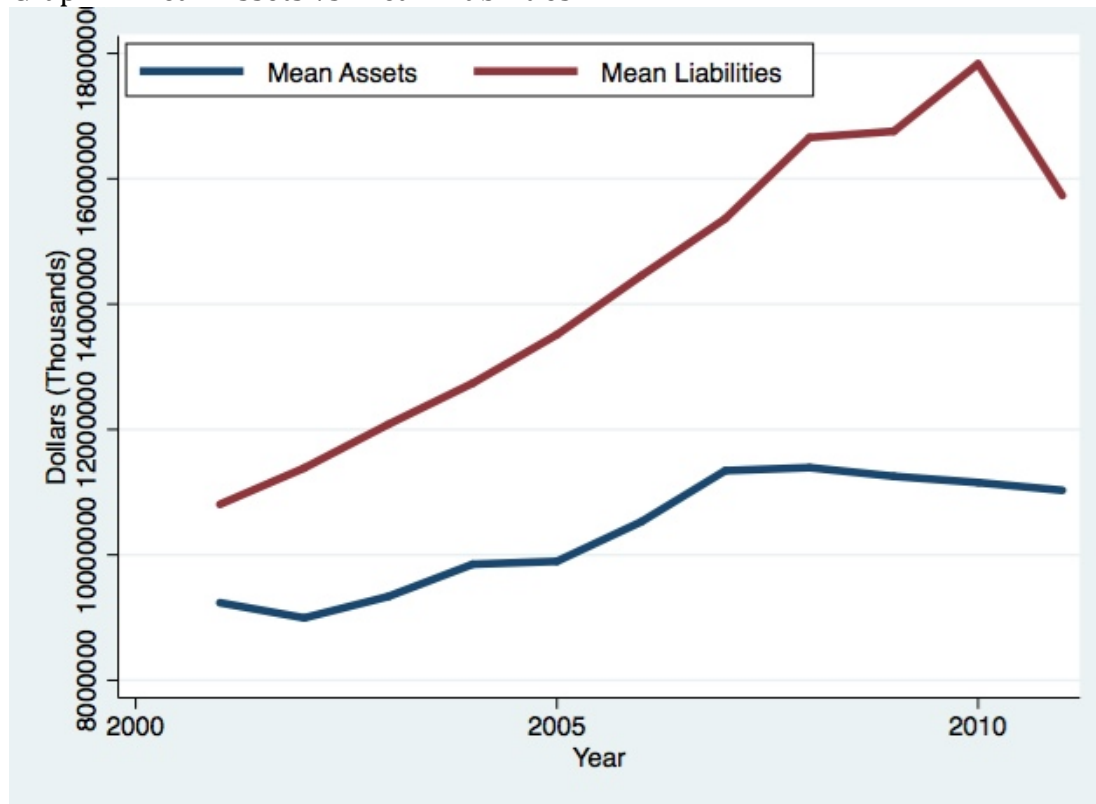
Graph 2: Top 10 vs. Bottom 10 Funds by Funding Ratio



Graph 3: Top 10 vs. Bottom 10 Investment Returns



Graph 4: Mean Assets vs. Mean Liabilities



## Output 1: Actual Funding Ratio

VARIABLES	OLS	FE
	(1)	(2)
	actfundratio	actfundratio
income per capita 10k	-8.833*** (1.944)	1.412 (2.464)
GDP per capita	0.001*** (0.000)	0.000 (0.000)
employees per capita	-0.37529 (0.442)	-0.594 (0.443)
union membership	0.161*** (0.046)	0.069 (0.048)
fiscal constraint	-3.565*** (0.458)	-3.661*** (0.472)
revenues per capita	-2.432*** (0.398)	-1.032* (0.467)
ave. candidates	-0.655 (0.515)	-1.379** (0.510)
contribution ratio	-4.432*** (0.398)	-4.182*** (0.386)
ind. Investment	4.707*** (1.101)	5.202*** (1.056)
retired ratio	-0.135*** (0.0365)	-0.116*** (0.0349)
republican	2.400* (1.217)	3.342** (1.198)
democrat	0.192 (1.164)	0.307 (1.144)
constitution	0.732 (2.109)	-0.114 (2.026)
contract	7.986*** (1.612)	6.034*** (1.581)
property	9.401*** (2.310)	5.887** (2.275)
Observations	973	973
R-squared	0.327	0.392

Standard errors in parentheses

\*\*\* p&lt;0.001, \*\* p&lt;0.01, \* p&lt;0.05

## Output 2: Debt Per Capita

VARIABLES	OLS	FE	Instrument
	(1)	(2)	(3)
	debt per capita	debt per capita	debt per capita
actfundratio	-17.242*** (1.992)	-18.179*** (2.017)	-276.364*** (32.734)
corrections per capita	7.585*** (1.214)	6.415*** (1.185)	3.907 (4.991)
health per capita	1.793** (0.581)	0.585 (0.568)	9.821*** (2.554)
education per capita	-0.333** (0.125)	-0.629*** (0.132)	0.412 (0.516)
highway per capita	1.200*** (0.292)	-0.110 (0.309)	-2.256 (1.239)
parks per capita	9.873*** (2.944)	7.500** (2.838)	-23.655 (12.761)
revenue per capita	295.210*** (31.100)	586.192*** (41.302)	-0.182 (128.150)
GDP per capita	-0.017* (0.007)	-0.036*** (0.009)	0.170*** (0.038)
income per capita	0.155*** (0.011)	0.169*** (0.013)	-0.006 (0.050)
employees per capita	-137.610*** (30.828)	-106.743*** (29.767)	-161.000 (125.156)
republican	51.304 (90.316)	86.120 (89.542)	867.863* (383.701)
democrat	296.485*** (81.046)	306.792*** (79.804)	393.324 (330.151)
Observations	1,123	1,123	1,018
R-squared	0.564	0.606	

Standard errors in parentheses

\*\*\* p&lt;0.001, \*\* p&lt;0.01, \* p&lt;0.05

## Output 3: Expenditures OLS

VARIABLES	(2) health per capita	(3) corrections per capita	(4) education per capita	(5) highway per capita	(6) parks per capita
actfundratio	0.537*** (0.125)	0.094 (0.063)	-0.081 (0.601)	-0.763** (0.250)	-0.028 (0.024)
fiscal constraint	12.801*** (1.588)	5.369*** (0.800)	11.231 (7.632)	26.147*** (3.180)	1.113*** (0.298)
contribution ratio	-1.584 (1.703)	-1.074 (0.858)	-9.447 (8.185)	-10.998** (3.410)	-0.135 (0.320)
revenues per capita	15.599*** (1.205)	9.337*** (0.607)	132.141*** (5.794)	75.122*** (2.414)	1.166*** (0.227)
income per capita	0.002** (0.001)	-0.001** (0.000)	-0.020*** (0.003)	-0.016*** (0.001)	-0.000** (0.000)
GDP per capita	0.001** (0.000)	0.003*** (0.000)	0.009*** (0.002)	0.005*** (0.001)	0.001*** (0.000)
republican	-19.573*** (4.794)	-0.133 (2.416)	-113.339*** (23.047)	50.447*** (9.603)	-6.244*** (0.901)
democrat	4.907 (4.594)	-0.839 (2.315)	0.680 (22.083)	11.404 (9.201)	3.059*** (0.863)
Observations	1,060	1,060	1,060	1,060	1,060
R-squared	0.315	0.465	0.424	0.567	0.218

Standard  
errors in  
parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

## Output 4: Expenditures Fixed Effects

VARIABLES	(1) health per capita	(2) corrections per capita	(3) education per capita	(4) highway per capita	(5) parks per capita
actfundratio	0.582*** (0.131)	0.157* (0.063)	1.284* (0.561)	-0.926*** (0.246)	-0.035 (0.025)
fiscal constraint	9.166*** (1.742)	2.640** (0.847)	-24.179** (7.476)	7.579* (3.273)	0.765* (0.331)
contribution ratio	-0.580 (1.702)	-1.011 (0.827)	-7.194 (7.305)	-8.699** (3.198)	-0.063 (0.324)
revenues per capita	18.154*** (1.350)	10.340*** (0.656)	143.911*** (5.796)	87.695*** (2.538)	1.435*** (0.257)
income per capita	0.002** (0.001)	-0.002*** (0.000)	-0.029*** (0.003)	-0.012*** (0.001)	-0.000 (0.000)
GDP per capita	0.001 (0.000)	0.003*** (0.000)	0.016*** (0.002)	0.003** (0.001)	0.001*** (0.000)
republican	-19.409*** (4.881)	-0.691 (2.373)	133.072*** (20.954)	60.609*** (9.174)	-5.829*** (0.928)
democrat	7.513 (4.670)	0.118 (2.270)	9.762 (20.046)	21.333* (8.777)	3.603*** (0.888)
Observations	1,060	1,060	1,060	1,060	1,060
R-squared	0.340	0.521	0.558	0.633	0.229

Standard errors in parentheses  
 \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Output 5: Expenditures with Instrument Variable  
Instrument

VARIABLES	Instrument				
	(1) health per capita	(2) corrections per capita	(3) education per capita	(4) highway per capita	(5) parks per capita
actfundratio	4.800*** (0.824)	2.538*** (0.515)	95.038 (61.102)	7.418*** (1.587)	1.748** (0.636)
fiscal constraint	222.497*** (31.304)	127.600*** (20.521)	4,760.292 (3,004.027)	439.786*** (59.058)	90.210** (29.832)
contribution ratio	8.551 (7.392)	4.554 (4.309)	212.487 (212.313)	6.018 (14.599)	4.195 (3.327)
revenues per capita	0.058*** (0.008)	0.034*** (0.005)	1.088 (0.618)	0.159*** (0.015)	0.019** (0.006)
income per capita	-0.019*** (0.004)	-0.013*** (0.003)	-0.495 (0.306)	-0.057*** (0.008)	-0.009** (0.003)
GDP per capita	-190.353 (1,585.485)	1,709.747 (921.146)	-19,223.280 (39,379.522)	1,992.985 (3,134.680)	75.588 (682.162)
republican	-17.083 (20.857)	3.930 (12.098)	41.075 (473.523)	68.036 (41.258)	-2.976 (8.764)
democrat	-95.966*** (24.410)	-56.886*** (14.816)	-2,194.375 (1,442.176)	176.551*** (47.534)	-37.536* (15.950)
Observations	963	963	963	963	963

Standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05



## References

- Bader, Lawrence N. and Gold, Jeremy. 2007. "The Case Against Stock in Public Pension Funds," *Financial Analysts Journal*. Jan-Feb 63(1): pp. 55-62.
- Beland, Daniel and Wadden, Alex. 2012. *The Politics of Policy Change*, Washington, D.C., Georgetown University Press.
- Blaise, Andre, Blake, Donald E., and Dion, Stephen. 1997. *Governments, Parties, and Public Sector Employees*. Pittsburg, PA: University of Pittsburg Press.
- Bohn, Hening. 2011. "Should public retirement plans be fully funded?," *Journal of Pension Economics and Finance*, 10(2): 195-219.
- Brown, Jeffrey R., Clark, Robert, and Rauh, Joshua. 2011. "The Economics of State and Local Pensions," *The Journal of Pension Economics and Finance*. April 10(2): pp. 161-172
- Cogburn, Jerrell D. and Kearney, Richard C. 2010. "Trouble Keeping Promise? An Analysis of Underfunding in State Retiree Benefits," *Public Administration Review*, Jan-Feb 70(1): pp. 97-108
- Davey, Monica. 2013. "Financial Crisis Just a Symptom of Detroit's Woes," *New York Times Online*, July 8, <http://www.nytimes.com> [accessed May 7, 2014]
- Donahue, John D. 1989. *The Privatization Decision*. New York, NY: Basic Books.
- Hirsch, Barry T. and Macpherson, David A. 2003. "Union Membership and Coverage Database from the Current Population Survey: Note," *Industrial and Labor Relations Review*, Jan 56(2): pp. 349-54.
- . 2014. "Unionstats.com," <http://www.unionstats.com> [accessed May 4, 2014].
- Klarner, Carl, William Berry, Thomas Carsey, Malcolm Jewell, Richard Niemi, Lynda Powell, and James Snyder. 2013. "State Legislative Election Returns (1967-2010)," *Inter-university Consortium for Political and Social Research*, Ann Arbor, MI: Jan 11. doi:10.3886/ICPSR34297.v1
- Mendel, Ed. 2011. "State Pension Funds: What Went Wrong," *Calpensions*, <http://calpensions.com> [accessed May 7, 2014]
- . 2013. "San Jose pension reforms ruled violation of rights," *Calpensions*, <http://calpensions.com> [accessed May 7, 2014]

- Mohan, Nancy and Zhang, Ting. 2012. "An Analysis of Risk-Taking Behavior for Public Defined Benefit Pension Plans," Upjohn Institute. Working Paper; 12-179
- Munnell, Alicia H. and Quinby, Laura. 2012. "Legal Constraints on Changes in State and Local Pensions," *Boston College Center for Retirement Research*, August 25.
- Novy-Marx, Robert and Rauh, Josh. 2011. "Public Pension Promises: How Big Are They and What Are They Worth?," *The Journal of Finance*, August 66(4): pp. 1211-1249.
- , 2012. "Fiscal Imbalances and Borrowing Costs: Evidence from State Investment Losses," *American Economic Journal: Economic Policy*, 4(2): pp. 182-213.
- Pennacchi, George and Mahdi, Rastad. 2011. "Portfolio allocation for public pension funds," *Journal of Pension Economics and Finance*, 10(2): 221-245.
- Public Plans Database. 2001-2011. "Center for Retirement Research at Boston College and Center for State and Local Government Excellence," <http://pubplans.bc.edu/> [accessed April 18, 2014]
- Shleifer, Andrei and Vishny, Robert W. 1994. "Politicians and Firms," *The Quarterly Journal of Economics*, November 109(4): pp. 995-1025.
- Shufeldt, Gregory and Flavin, Patrick. 2012. "Two Distinct Concepts: Party Competition in Government and Electoral Competition in the American States." *State Politics and Policy Quarterly*, 12(3): pp. 330-342.
- U.S. Bureau of Economic Analysis. "Personal income, per capita personal income, disposable personal income, and population," <http://www.bea.gov> [accessed April 27, 2014].
- U.S. Bureau of Labor Statistics. "All Urban Consumers (Current Series)," <http://www.bls.gov/data> [accessed April 26, 2014].
- U.S. Census Bureau. "State Government Finances," <http://www.census.gov> [accessed April 26, 2014]