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# The Impact of Employee Pension Promises on State and Local Public Finance

Joshua Rauh\*

Most U.S. state and local governments face legal restrictions on the extent to which they can run deficits and issue debt. However, like the U.S. federal government, state and local governments have substantial off-balance-sheet liabilities in the form of pension promises. At the state and local level, these liabilities arise primarily from defined benefit (DB) pension promises made to government employees, including teachers, public safety officials, and other employees of states, cities, and counties. An underfunded pension promise can be thought of as an alternative form of government debt: the government is borrowing from public employees through promises to pay them pensions when they retire.

Robert Novy-Marx and I have written a series of papers in which we investigate the issues in public finance and financial markets that have arisen as a result of this substantial form of off-balance-sheet borrowing at the state and local level. These papers focus on measuring the present value of public pension promises, examining the potential effects of different policy measures on the value of pension promises, and asking whether municipal bond markets have reacted to unfunded pension liabilities. This line of inquiry is related to my previous work on corporate defined benefit pension plans and the issues they pose for firms' investment and capital structure decisions.

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## What is the Present Value of Public Pension Promises?

Most U.S. state governments offer their employees DB pension plans. This arrangement contrasts with the defined contribution (DC) plans that now prevail outside the public sector, such as 401(k) or 403(b) plans in which employees save for their own retirement and manage their own investments. In a DB plan, the employer promises the employee an annual payment that begins when the employee retires, and that payment depends on the employee's age, tenure, and late-career salary.

When a state government promises a future payment to a worker, it creates a financial liability for its taxpayers. When the worker retires, the state must make the benefit payments. To prepare for this, states typically contribute to and manage their own pension funds, pools of money dedicated to providing retirement benefits to state employees. If these pools do not have sufficient funds when the worker retires, then the states will have to raise taxes or cut spending at that time, or default on their obligations to retired employees.

State governments have approximately \$2 trillion set aside in pension funds. Yet we do not know how the value of these assets compares to the present value of states' pension liabilities. Just as future Social Security and Medicare liabilities do not appear in the headline numbers of the U.S. federal debt, the financial liability from underfunded public pensions does not appear in the headline numbers of state debt. If pensions are underfunded, then the gap between pension assets and liabilities is off-balance-sheet government debt.

In fact, government accounting standards require states to use procedures that

severely understate their liabilities.<sup>1</sup> In particular, government accounting standards require states to discount their liabilities at the expected return on their assets. In practice, this usually amounts to discounting pension liabilities at an approximately 8 percent rate. The government pension accounting approach also presents analytical problems: the magnitude of pension liabilities, and how a pension's funds are invested, are two separate issues to be considered independently. In practice, however, the accounting standard being used sets up a false equivalence between pension payments, which are extremely likely to be made, and the much less certain outcome of a risky investment portfolio.

Our work on liability measurement begins by focusing only on payments that already have been promised and accrued. In other words, even if the pension plans could be frozen completely, states would contractually owe these benefits. This quantity is known as an Accumulated Benefit Obligation (ABO) or termination liability. The ABO is a narrow measure, and is not affected by uncertainty about future wages and service.

According to the principles of financial economics, the present value of a stream of cash flows is calculated using discount rates that reflect the risk of the payments. We collect a unique database of 116 pension plans sponsored by the 50 states to perform these calculations. The calculations require us to model the prospective stream of payments from state pension promises using each state's stated liability, discount rate, and actuarial cost method, as well as information on benefit formulas, the numbers and average wages of state employees by age and service, salary growth assumptions by age, mortality assumptions, cost of living adjustments (COLAs), and separation (job leaving) probabilities by age.

If benefits have the same default and recovery characteristics as state general obligation debt, then the national total of promised liabilities based on current salary and service is \$3.20 trillion as of June 1999.<sup>2</sup> If pensions have higher priority than state debt, then the present value of liabilities is much larger. Using zero-coupon Treasury yields, which are default-free but contain other priced risks, promised liabilities are \$4.43 trillion. Liabilities are even larger under broader concepts that account for projected salary growth and future service.

There are important caveats about using the Treasury yield curve as a measure of risk in a default-free pension liability. Although the Treasury yield curve is generally viewed as default-free, it reflects other risks that may not be present in the pension liability. State employee pensions typically contain cost of living adjustments (COLAs). If inflation risk is priced, then an appropriate default-free pension discount rate would involve a downward adjustment of nominal yields to remove the inflation risk premium. This adjustment would further increase the present value of ABO liabilities. A countervailing factor is the fact that Treasuries trade at a premium because of their liquidity. Pension obligations are nowhere near as liquid as Treasuries. Therefore, ideally a liquidity price premium should be removed from Treasury rates before using them to discount default-free but illiquid obligations.

The \$4.43 trillion in state pension liabilities compares to assets in state pension funds worth around \$2 trillion, so there is an unfunded liability under the Treasury rate measure of around \$2.5 trillion at the state level. For comparison, total state non-pension debt was \$1 trillion and total state tax revenues were \$0.8 trillion in 2008. It is worth emphasizing that the optimal level of pension underfunding may not be zero, just as the optimal level of public debt may not be zero.

We also estimate unfunded liabilities at the local level<sup>3</sup> by examining 77 local plans sponsored by 50 major U.S. cities and counties, and we perform the same calculations as in the case of the states.

If on a per-member basis the unfunded liability is the same for the one-third of workers covered by municipal plans that are not in our sample, then the total unfunded ABO liability for all municipal plans in the U.S. is \$574 billion. It is worth emphasizing that, while teachers are hired at the local level, their pension systems are sponsored at the state level and hence count as part of the state total.

One question related to the funding status of public pensions is whether taxpayers should be concerned about the fact that state pension funds are invested in risky assets. Under current pension fund investment policy, there is a wide distribution of possible future funding outcomes. The outcomes are skewed in such a way that there is a small probability of an extremely good outcome and a large probability of poor outcomes. There are some theoretically plausible reasons why current taxpayers might not care about this distribution. Equity investing inside of public pension funds can be viewed as equivalent to matching liabilities with bonds, and making side bets that entail borrowing money from the states' employees and investing in the stock market. In terms of the intergenerational consequences of pension fund asset allocation, a starting point is the idea that citizens may be able to undo government actions. Equity exposure in pension plans passes through to the taxpayers of the state. If the state increases its pension fund exposure to equities, households can rebalance their own portfolios away from equities. Of course, in order for the public to unwind the government's position, it must be aware of the full extent of the government's net equity position.

It is possible to calculate a distribution of outcomes so that taxpayers can decide for themselves whether the state is taking an acceptable level of risk on their behalf.<sup>4</sup> We estimate that as of September 2008, the median 15-year outcome under the investment strategies used by states was a shortfall of \$2.8 trillion. The 25<sup>th</sup> percentile outcome is a shortfall of \$3.4 trillion, the 10<sup>th</sup> percentile is a shortfall of \$3.8 trillion, and the 5<sup>th</sup> percentile is a shortfall of \$4.0 trillion. There is a less

than a 5 percent chance that the current pattern of pension fund investments will meet the needs of retirees in 15 years. Under state accounting rules, however, this distribution was deemed to be underfunded by only \$1 trillion.

It is important to emphasize that state DB pension plans and individual DC pension plans have different objectives. An individual 401(k) or 403(b) plan is a savings vehicle for an individual. Optimal asset allocation in such plans is governed by the maximization of individual lifetime utility. A state DB pension plan serves to deliver a contractually pre-specified annuity for the state employees, with taxpayers responsible for shortfalls.

## Effects of Policy Measures on Pension Liabilities

A number of states have enacted changes designed to reduce the liabilities associated with their pension systems. Most of these changes affect new employees only, and hence have no impact on standard liability measures, which do not consider future employees. However, some changes, such as the reductions in the cost of living adjustments (COLAs) passed by Colorado and Minnesota this year, do affect existing plan members and hence the economic present value of current state pension liabilities.

Motivated by these changes, we examine the present value of state pension liabilities under existing policies and then under several sets of hypothetical policy measures.<sup>5</sup> In particular, we consider changes to COLAs, full retirement ages, early retirement ages, and buyout rates for early retirement.

A single percentage point reduction in COLAs would lower total liabilities by 9–11 percent; implementing actuarially fair early retirement would reduce them by 2–5 percent; and increasing the retirement age by one year would reduce them by 2–4 percent. Dramatic policy changes, such as the elimination of COLAs or the implementation of Social Security retirement age parameters, would leave liabilities around \$1.5 trillion more than plan assets.

## Reaction of Municipal Bond Markets

To what extent do the markets for state and local government debt provide discipline to states with unfunded pension liabilities?<sup>6</sup> Public employee pension obligations generally enjoy high levels of legal protection in state constitutions and statutes. As a result, increases in unfunded pension liabilities are a serious concern for municipal bond investors. In the final three months of 2008, there was great variation in pension funding. In the aggregate, a new unfunded liability of around 42 percent of the total amount of existing municipal bond debt appeared in the capital structure of state governments. In the quarter ending December 2008, losses in state pension funds amounted to between 1 percent and 6 percent of annual gross state product, and between 9 percent and 48 percent of annual state revenue, depending on the state.

Using this cross-sectional variation, we estimate that tax-adjusted municipal bond spreads rose by 10–20 basis points for each 1 percent of annual gross state product lost in pension funds by states in the lower half of the credit quality spectrum. A similar result holds for each 10 percent of annual state revenues lost. The effect is approximately constant over the yield curve, suggesting a constant upward shift in annual risk-neutral default probabilities. These results are robust to controls for credit ratings and other measures of the state's fiscal strength. They hold within credit rating categories and are strongest among states with the weakest ratings.

Furthermore, a number of systems in the United States face the possibility of a squeeze in liquidity if asset returns and contributions to the funds are not very strong.<sup>7</sup> For several major states, including Illinois and New Jersey, the assets in pension funds are insufficient to pay for today's already-promised benefits through the end of this decade, even if the assets do earn an 8 percent return. Local governments in Philadelphia, Boston, and Chicago face similarly precarious funding situations.

## Comparison to Regulatory Framework for Corporate DB Sponsors

Corporate DB pension systems face an entirely different regulatory structure than do the states. While states regulate themselves in consideration of rules set by the Government Accounting Standards Board, corporate DB sponsors are directly regulated by the federal government. This regulation stems from the 1974 ERISA legislation and the creation of the Pension Benefit Guaranty Corporation (PBGC). Because they receive PBGC insurance, companies must pay premiums to the government, make contributions to remedy funding shortfalls on certain specified schedules, and discount liabilities for funding purposes using segment rates calculated by the IRS based on the yields on high-quality corporate bonds.

Companies also prepare liability calculations for the purposes of their accounting statements. In statements to investors, they follow prescriptions of the Financial Accounting Standards Board. Since 2006, the balance sheet of firms must reflect unfunded liabilities, although firms still book as income an expected return on their plan assets. There is some evidence that the ability to manage earnings with pension assumptions may have been used opportunistically by corporate managers during the 1990s.<sup>8</sup>

Using nonlinearities in the schedule of mandatory pension contributions, we can show that when firms face binding contribution requirements, there is a significant and negative impact on firm-level capital expenditures.<sup>9</sup> This is one possible explanation for why firms do not seem to follow the risk-shifting hypothesis in their investment strategies, but rather allocate their pension assets to safer securities when they are closer to financial distress.<sup>10</sup> Because of these different regulatory structures, state and local governments face very different incentives from corporations in managing their pension systems. Actuarially required contributions for government pension systems are not legally binding in many states, and in any case are based on liability calculations that are a function of

expected returns on assets. Especially given the recent introduction of legislation in Congress that might begin to regulate state and local pension disclosure at the federal level, the differential effect that these accounting systems have on pension funding and investment policy is an important avenue for future research.

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<sup>1</sup> R. Novy-Marx and J. Rauh, "The Intergenerational Transfer of Public Pension Promises," NBER Working Paper 14343, September 2008.

<sup>2</sup> R. Novy-Marx and J. Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?" forthcoming in *Journal of Finance*.

<sup>3</sup> R. Novy-Marx and J. Rauh, "The Crisis in Local Government Pensions in the United States," forthcoming in *Growing Old*, Brookings Institution: Washington D.C.

<sup>4</sup> R. Novy-Marx and J. Rauh, "The Liabilities and Risks of State-Sponsored Pension Plans," *Journal of Economic Perspectives* 23(4), 2009, pp. 191–210.

<sup>5</sup> R. Novy-Marx and J. Rauh, "Policy Options for State Pension Systems and Their Impact on Plan Liabilities," NBER Working Paper 16453, October 2010, forthcoming in *Journal of Pension Economics and Finance*.

<sup>6</sup> R. Novy-Marx and J. Rauh, "Fiscal Imbalances and Borrowing Costs: Evidence from State Investment Losses," working paper, 2010.

<sup>7</sup> J. Rauh, "Are State Public Pensions Sustainable? Why the Federal Government Should Worry About State Pension Liabilities," *National Tax Journal* 63(3) *Forum*, 2010.

<sup>8</sup> D. Bergstresser, M. Desai, and J. Rauh, "Earnings Manipulation, Pension Assumptions, and Managerial Investment Decisions," NBER Working Paper No. 10543, June 2004, and *Quarterly Journal of Economics* 121(1), 2006, pp. 157–95.

<sup>9</sup> J. Rauh, "Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans," *Journal of Finance* 61(1), 2006, pp. 33–71.

<sup>10</sup> J. Rauh, "Risk Shifting versus Risk Management: Investment Policy in Corporate Pension Plans," *Review of Financial Studies* 22(7), 2009, pp. 2687–734.