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Appropriateness of Risk-Taking by Public Pension Plans, Part II

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This is the second part of a two-part series. The first part of this series appeared in the August 2017 issue of *In The Public Interest*.

Insights about risk taking from academic research

Preliminaries: Investing assets with an eye on the liabilities they must fund

Several academic researchers have examined questions of how pension funds should invest, and questions about risk-taking by governments more generally.¹ Before we examine lessons from these papers, we discuss briefly an important topic that arises in several papers.

The idea is this: pension fund liabilities depend upon investment market conditions in several ways. First, liabilities vary with interest rates: the higher that market interest rates are, the higher the discount rate used to value liabilities should be, with higher rates leading to lower estimates of liability and vice versa. Second, pension liabilities generally vary with the growth rates of worker wages: when state and local government workers' wages rise more rapidly, pension benefits based upon final pay will be greater, and vice versa. Third, pension liabilities often vary with overall price inflation: not only can higher inflation work its way into higher growth rates of wages, but many public-sector pensions are indexed for inflation so that higher inflation will lead to higher liabilities, and vice versa.

As pension fund liabilities move up and down with financial market conditions, if assets do not move in the same way then economic measures of pension funding—assets as a percentage of liabilities—will rise and fall. And if contributions are tied to



these measures they, too, will rise and fall.² This creates several related risks:

- Future taxpayers may have to pay for past pension promises—a form of intergenerational inequity.
- Pension contributions may rise substantially, crowding out current services or requiring large tax increases. Alternatively, politicians may balk at requested contribution increases, and instead will try to cut pension benefits, putting workers and retirees at risk.

Public pension funds generally appear to focus on investment returns rather than on investing assets with an eye on liabilities. By contrast, other entities with well-defined liabilities that they must fund, including banks, insurance companies, and more recently private pension funds, commonly invest in a way designed to ensure that liabilities will be paid. This approach, often referred to as liability driven investing or asset-liability management, focuses not on the risk-return investing tradeoff in isolation, but on how it relates to the liabilities that must be paid.³ By contrast, pension funds generally try to minimize risk for a given level of investment return.

Liability-driven investing can take several forms. In its early days private pension plans often tried to match the annual or monthly cash flows of their benefit payments to cash flows from a set of bond investments, but this is can be difficult in practice and has other shortcomings, and is not as commonly used.⁴ A more-flexible approach is to invest in assets that have the same present value and same interest-rate sensitivity as the pension liabilities, even if cash flows are not identical, so that assets and liabilities rise and fall similarly with interest rate

changes, keeping the pension plan funded as markets change. This approach generally includes bonds as investments as well as other assets. A portfolio that has the same interest-rate sensitivity as the liability it is matched to is said to be an immunizing portfolio because it immunizes (protects) the finances of the sponsor from interest rate changes. This can be extended in concept to the government employee wage growth and inflation risks discussed above, although it can be more difficult to find assets that match wage-growth risks.⁵

One important feature of liability-driven investing for a plan that is fully funded is that political risks are reduced significantly. The plan does not oscillate between overfunding and underfunding as will happen with plans in which assets do not match liabilities. Thus, there is less opportunity to enhance benefits when the plan is overfunded and to cut benefits (where law allows) when the plan is underfunded. The appendix uses results from our stochastic pension fund simulation model to illustrate how large swings in plan funding and contributions can be, even when a plan hits its assumed rate of return over the long run.

TWO IMPORTANT PAPERS

Important papers by economists Deborah Lucas and Stephen Zeldes analyzed a simple theoretical model that incorporated several important concepts:^{6,7}

- The taxes needed to pay pension contributions will distort economic behavior, causing what economists call “welfare loss” (a decrease in economic well-being for society).
- Riskier assets tend to have higher expected returns, so expected pension contributions and taxes will be lower if pension funds hold risky assets.
- A potentially competing force is that the welfare loss from taxes can rise disproportionately as tax rates rise, under certain common assumptions. That is, a doubling of taxes causes a more-than-doubling of the cost to society from taxes. This means that stable taxes will be less costly to society than volatile taxes that raise the same amount of revenue over the long run.

Lucas and Zeldes then asked what kind of pension fund portfolio would minimize the distortion from taxation, taking these competing forces into account. Based on their theoretical model and its assumptions, they concluded that the share of assets held in stocks (i.e., risky assets) should depend upon:

- **The expected gains from risk-taking:** When the equity premium is higher, the share of assets held in stocks should be higher, all else equal. (The equity premium is a measure of expected gains from investing in stocks as opposed to risk-free assets.)

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- **The volatility of stock returns:** In periods when stock market returns are more volatile, the corresponding swings in contributions and taxes will be greater, leading to greater distorting effects. Thus, in periods when stock market volatility is higher, less stock is appropriate.
- **The relationship between pension liabilities and stock returns:** If pension liabilities are higher when stock returns are higher, then all else equal the share of assets held in stocks should be higher. Pension liabilities and stock returns could be correlated in this way if liabilities depend partly on wage growth, as they generally do (higher wages lead to higher pensions), and IF wages tend to be higher when stock returns are higher. If these conditions hold, then investing in stocks can help to hedge pension liabilities. However, there is empirical debate over the extent to which stock returns and wages are, or are not, correlated in this way.⁸
- **The relationship between stock returns and government fiscal conditions:** If stock market returns are low when government fiscal conditions are poor, as could happen if recessions drive down stock prices as well as state tax revenue, then the share of assets held in stocks should be lower than otherwise. (This is particularly true for governments that rely heavily on personal income taxes.⁹) In this case a given tax rate will raise less revenue when revenue is needed most, and even higher rates will be needed to finance pension contribution increases than otherwise would be required. This increases the cost to society of raising taxes to pay contributions.

Lucas and Zeldes conclude that under the assumptions of their model, pension plans generally should hold at least some stock, but the authors do not attempt to quantify how much. They also discuss factors outside of their model. One important factor is the possibility that taxpayers will face a one-sided risk – the risk that they will bear all investment return shortfalls, but that politicians may share pension fund surpluses with workers and retirees in the form of higher pension benefits.¹⁰ The authors conclude that the combination of these other factors “seem to point toward a policy of matching assets and liabilities, even if it means forgoing the equity premium.” In other words, these

other factors suggest that assets should be similar in duration and risk to pension liabilities (discussed further below), partly countering the reasons to hold stock in a pension portfolio.

In another important paper, economists George Pennacchi and Mahdi Rastad built a theoretical model of pension fund portfolio management and examined it under two scenarios, one in which the pension fund manager has the interests of taxpayers in mind, and one in which the pension fund managers have their own interests at heart.¹¹ (In the taxpayer-oriented analysis, the pension fund manager tries to “maximize the utility of wealth of a representative taxpayer.” In the fund-manager-oriented analysis, the model maximizes the managers’ “own utility of compensation,” where their compensation is based on their performance relative to their peers.)

The taxpayer-oriented version of the model suggested that the pension fund generally should choose a portfolio that matched the characteristics of the pension liabilities, assuming the taxpayer doesn’t have the information and flexibility needed to adjust his or her personal portfolio to offset unwanted risk taken by the pension fund.¹² Under such a liability-matching strategy, pension fund liabilities and assets would move together in different market conditions, leaving taxpayers free to choose whatever level of risk they want to bear in their personal portfolios without worrying about the pension fund.

In the pension-fund-manager-oriented version of the model, where the manager’s compensation depends on how well the pension fund performs against peers, the model suggests that the pension fund is likely to take on more risk when performance lags against peers.¹³

Pennacchi and Rastad then tested the predictions of their model empirically against portfolio choices made by 125 large public plans over the 2001–2009 period. They found generally that public pension funds’ assets were invested in a manner more consistent with the goal of matching the performance of peers than with the goal of matching assets to liability characteristics. In other words, their investments were more consistent with the fund-manager-oriented version of the model than with the taxpayer-oriented version.

Penacchi and Rastad concluded that a portfolio that matches its liability characteristics can fully fund pension obligations as they accrue, minimizing uncertainty to taxpayers. They believe this is the best objective.¹⁴ They conclude that a typical plan in which benefits have cost of living adjustments (COLAs), as is common in public plans, would invest a liability-matching portfolio heavily in inflation-protected fixed-income securities and other fixed-income securities, assuming it is not allowed to bet against equities or other asset classes (i.e., it cannot have short positions).¹⁵

Public plans do not generally invest in liability-matching portfolios. They tend to allocate assets based on performance of peer funds, consistent with the idea that investment managers have objectives than minimizing uncertainty to taxpayers, such as maintaining their reputation among peers.

SUMMARY OF KEY CONCLUSIONS FROM RESEARCH

Academic research suggests that there are strong arguments in favor of choosing investment assets that roughly match the bond-like characteristics of pension liabilities, sometimes referred to as asset-liability matching or, more generally, liability driven investing. Among other things, this approach minimizes funding risk and avoids the intergenerational inequity that results from shifting current costs to future taxpayers. In addition, it can avoid the asymmetric political choices that can arise when plans episodically become overfunded—as they must when there are volatile investments—choices that can result in gains going to employees and retirees in the form of higher benefits, and losses going to taxpayers and other stakeholders in government in the form of higher taxes or lower services.

Asset-liability matching generally suggests that pension funds should invest very heavily in inflation-protected fixed-income securities and other fixed income securities, with relatively little equity assets. Thus, pension funds would take far less risk than they are taking now, and would forego most of the equity risk premium they currently assume they will achieve (but that they cannot count on achieving). This would require them to request higher contributions from governments now, which may help to explain why they have not done this.

CONCLUSION

Public pension funds invest in stocks, bonds and other assets with the goal of accumulating sufficient funds, in combination with employer and employee contributions, to pay benefits when due. Investments can entail risk, and contributions may have to be adjusted to ensure that assets are sufficient to pay benefits. State and local governments generally backstop public pension funds, paying higher contributions when investment returns are below expectations, or lower contributions when investment returns are above expectations. Thus, taxpayers and those who benefit from government services and investments bear the consequences of this investment risk. The Rockefeller Institute of Government’s Pension Simulation Project is examining the potential consequences of investment-return risk for public pension plans, governments, taxpayers, and other stakeholders in government.

Most public pension funds are in a precarious situation. It is much more difficult to achieve assumed returns in the current low-interest-rate environment than it was in the 1990s and previous decades. If the funds’ primary goal had been to ensure that benefits are securely funded, they would have lowered earnings

assumptions to reflect the decline in interest rates, much as private pension funds in the United States, and public and private plans in Canada and the Netherlands, did. This would have required them to request much higher contributions from state and local governments and would have allowed them to remain invested in relatively lower risk assets. But higher contributions might have generated vociferous opposition from politicians leading these governments, who would have had to raise taxes or cut services. And it could have led to increased public opposition to pension benefits provided to state and local government workers.

Instead of lowering earnings assumptions and making higher contributions, U.S. public pension funds increased their allocation to risky assets. They did this in part because the regulatory environment allows it and encourages it. Now, as one group of researchers put it, “gradually, U.S. public funds have become the biggest risk-takers among pension funds internationally.” The potential consequence of investment shortfalls, relative to state and local government tax revenue, is now more than three times as large as it was in 1995, and about 10 times as large as in 1985.

Even though contributions paid by state and local governments have gone up considerably, they are much lower than they would be if plans had lowered earnings assumptions and maintained their previous level of risk. Contributions are lower than they would be if plans had lowered earnings assumptions substantially, but are far more uncertain, and could rise much further still, or fall to lower levels, depending on the performance of pension funds’ portfolios, which are about two-thirds invested in equity-like assets.

Are the pension fund investment risks that state and local governments and their stakeholders face too great or too small? There is no golden rule but research offers insights:

- If the goal is to minimize the distorting effects of taxes on economic behavior, public pension funds should hold at least some stock, because the equity premium, if achieved, can help keep taxes low. All else equal, higher equity premiums suggest more stock is appropriate.
- In periods when stock market returns are more volatile, corresponding swings in contributions and taxes will be greater, leading to greater economic distortions. Thus, in periods when stock market volatility is higher, less stock is appropriate.
- There are strong arguments for investing pension funds so that the assets roughly match the bond-like characteristics of pension liabilities. This is sometimes referred to as asset-liability matching or, more generally, liability-driven investing. In this approach, assets rise when liabilities rise, and fall when liabilities fall, which minimizes funding risk and avoids



shifting current costs to future taxpayers. This also avoids the asymmetry that arises when pension plans with volatile assets swing from overfunding to underfunding and back: plans and politicians can face incentives to increase benefits or reduce contributions when a plan is overfunded, but cannot reduce benefits in periods of underfunding.

These insights about risk-taking suggest that public pension funds should hold more of their assets in fixed income and less in equities. But this would require lowering earnings assumptions, and increasing contributions from governments, in turn leading to higher taxes, cuts in spending, and possibly pressure to cut benefits where law allows. It would also lead to more secure funding of pensions.

Many public pension funds have begun to lower their earnings assumptions and reduce investment risk, albeit nowhere near as much as the asset-liability matching approach would suggest, and the risk of large investment shortfalls remains. Further reductions in risk and increases in government contributions are likely.

This is a difficult and unsustainable position to be in. It would have been much better to avoid it in the first place. There are two things that policymakers can do that would be important steps toward confronting the situation. First, policymakers should explore ways to change and counter the incentives and institutions that encourage U.S. public pension funds to take risk. Second, public pension funds should ensure that they analyze and communicate the risk they are taking, in ways that can be understood not just by their boards, but by the governments that contribute to their funds, and by the public that ultimately bears the risks they take.

APPENDIX

The inevitable swings in funding for plans with risky assets

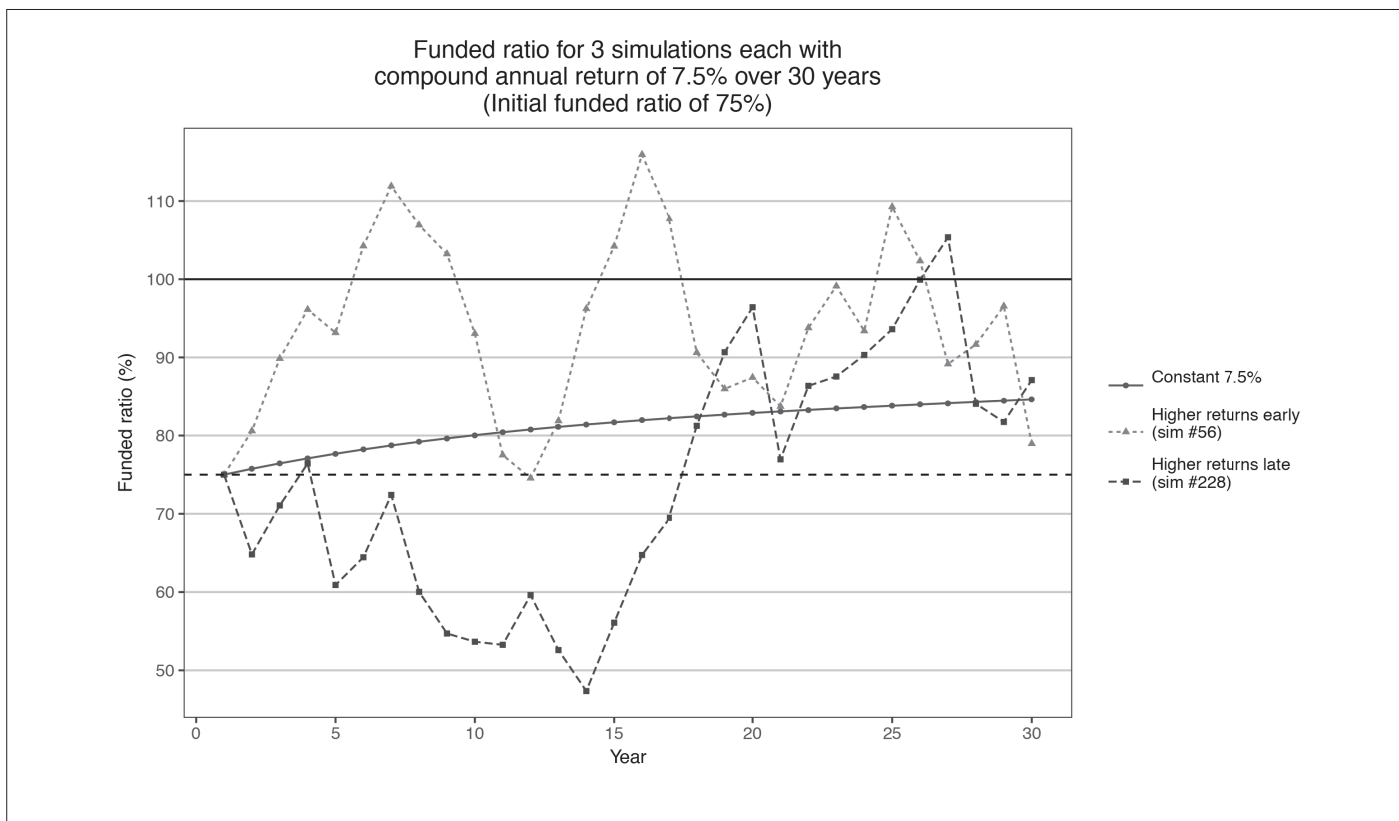
Plan beneficiaries are at risk when investment risk becomes great. Even if a plan hits its investment return assumptions over the long run, when volatility is great, the plan and its sponsor will be on a roller coaster ride. The plan funded ratio can vary greatly over the span of a few years. Employer contributions may be more stable in the short run because of contribution-smoothing policies that plans and governments use, but these methods cannot prevent large swings in contributions over the longer term.

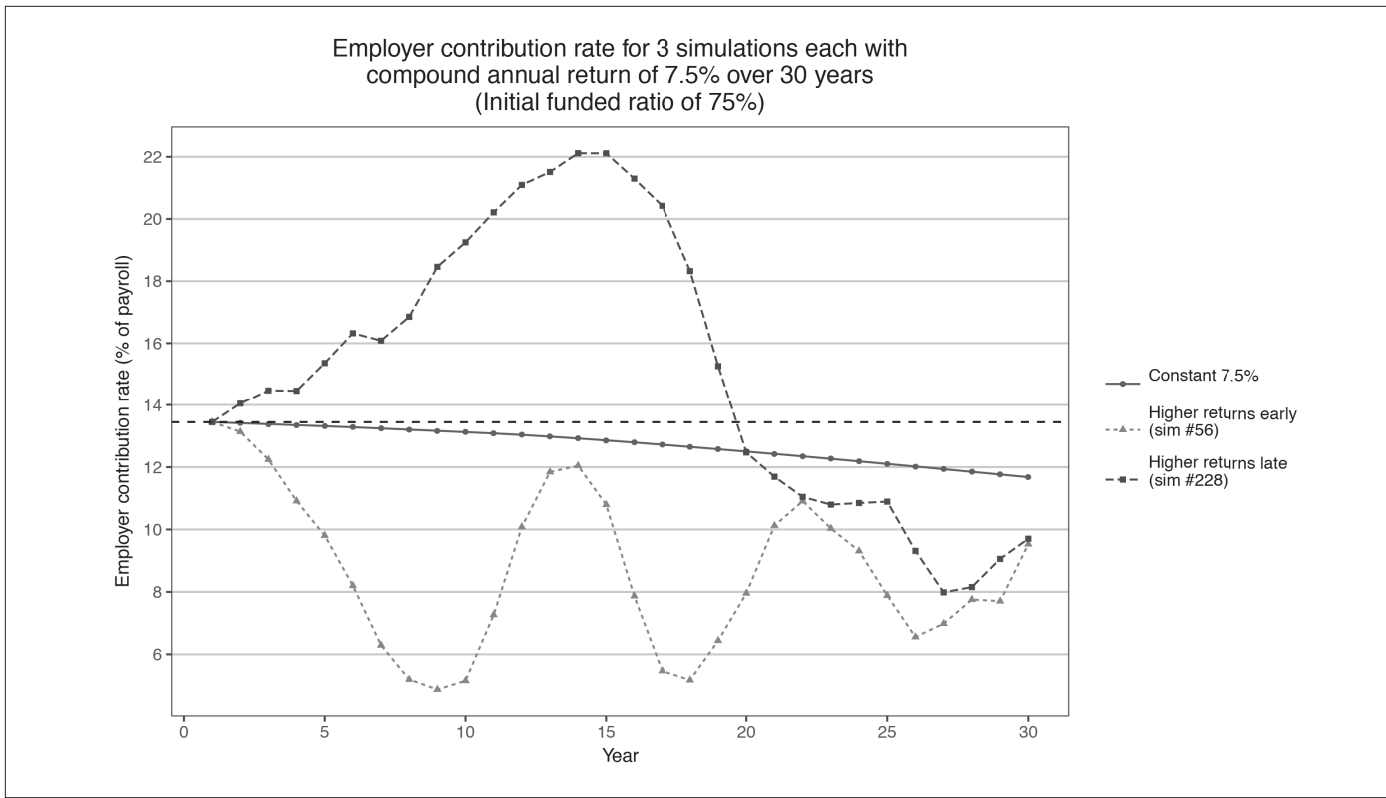
Figure 6 illustrates this roller coaster ride using our stochastic model of pension funds. We model a plan with average demographic characteristics, a 75 percent initial funded ratio, a 7.5 percent earnings assumption with a 12 percent standard deviation, and a fairly stretched out funding policy (30-year level percent open) over a 30-year simulation period.¹⁶ The top panel shows the plan funded ratio, and the bottom panel shows the employer contribution as a percentage of payroll.

Each panel shows three individual simulations from the model, where a simulation is a single lifetime of the pension fund. The red line shows what happens if the pension fund earns exactly 7.5 percent each and every year. The green line is one specific simulation that achieves a 7.5 percent compound annual return at the end of 30 years, but in which returns generally are better in the early years and worse in the later years. The blue line shows the opposite: returns tend to be lower in the early years and better in the later years, but the compound return at 30 years is 7.5 percent. The green and blue simulations were chosen out of a thousand simulations precisely because they achieve plan assumptions at the end of 30 years and because they are representative of the volatility we can expect. Many other simulations out of the thousand we ran present greater risks in the sense that they have average compound returns at 30 years that are either higher or lower than 7.5 percent. (Furthermore, a 7.5 percent compound return may be unrealistic to expect in the current low-interest-rate environment, making these simulations optimistic.)

Figure 6.

Even if a plan hits its assumptions on average, its funded ratio and employer contributions are likely to be on a roller coaster





This wild ride might be fine in a technical system without people: investment returns fall short, the funded ratio falls, contributions rise, and the funded ratio gets back on a path to full funding. But pensions are funded by people. In the example above, will elected officials be willing to pay contributions in year 15 that are nearly double what they were in year 1, as is required in the blue line (bottom panel)? If the funded ratio rises above 110 percent, as it does in the green line (top panel), will politicians go on a contribution holiday, using savings to cut taxes or raise education spending? These are real-world risks. In addition, the blue and green simulations were chosen because they hit the actuarial assumption on average. Most simulations will not, so contributions easily may rise higher and fall further than in the illustration, as may the funded ratio. ■



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ENDNOTES

- 1 For good summaries of some of the most important research, see Munnell, *State and Local Pensions*, pp. 65-67 and Brown, Clark, and Rauh, "The Economics of State and Local Pensions," pp. 165-166.
- 2 Public pension funds' published estimates of liability generally do not change as rapidly as market conditions change – their economic assumptions such as discount rates, wage growth rates, and general price inflation tend to change very slowly.
- 3 For a good discussion of the historical development of this approach, see Ronald J. Ryan, "The Evolution of Asset/Liability Management," *Research Foundation Literature Reviews*, Research Foundation of CFA Institute, 8, no. 2 (2013): 1-25, <http://www.cfa-pubs.org/doi/full/10.2470/rflr.v8.n2.1>.
- 4 Ibid.
- 5 As noted earlier, Lucas and Zeldes hypothesized that stocks could play this role, but it likely would not be a large part of the investment portfolio. Lucas and Zeldes, "How Should Public Pension Plans Invest?" (And others have concluded that stocks may not be sufficiently correlated with wage growth to play this role.)
- 6 Ibid.
- 7 Deborah Lucas and Stephen P. Zeldes, "Valuing and Hedging Defined Benefit Pension obligations—The Role of Stocks Revisited," Northwestern University and Columbia University, Working Paper, September, 2006, <http://repec.org/mmf2006/up.11388.1159529601.pdf>.
- 8 For example, Pennacchi and Rastad (pp.232-234) find that state and local government employee wage growth and equities are negatively correlated over most time periods that would be relevant to public pension funds, not positively correlated. Pennacchi and Rastad, "Portfolio Allocation for Public Pension Funds."
- 9 The Rockefeller Institute has written about this extensively. See the section, "Capital Gains, the Stock Market, and April Tax Returns" in Donald J. Boyd and Lucy Dadayan, "State Revenue Report #79: Revenue Declines Less Severe, But States' Fiscal Crisis Is Far From Over," *State Revenue Report* (Rockefeller Institute of Government, April 2010).
- 10 Discussed at length in Michael Peskin, "Asset/Liability Management in the Public Sector," in *Pensions in the Public Sector*, ed. Olivia S. Mitchell, Edwin C. Husted, and Wharton School (Philadelphia: University of Pennsylvania Press, 2001).
- 11 Pennacchi and Rastad, "Portfolio Allocation for Public Pension Funds."
- 12 There are exceptions to this general conclusion. For example, if taxpayers want to take risk but are unable to do so because they don't have low-cost access to risky assets, it could be in their interest for the pension fund to take risk on their behalf.
- 13 The incentive to take more risk in the portfolio means, in this context, to have a greater mismatch between pension fund assets and the characteristics of pension fund liabilities. The conclusion that the fund manager will take more risk when performance lags does not hold if the pension fund manager's personal wealth is less than his or her allocated share of total pension fund liabilities.
- 14 Pennacchi and Rastad, "Portfolio Allocation for Public Pension Funds."
- 15 Assuming that benefits are inflation-indexed and that the pension fund is restricted from taking short positions in a significant way is probably the most realistic scenario. The paper also shows optimal investment allocations under scenarios in which benefits are not indexed for inflation, which drive investments toward non-inflation-protected fixed-income securities, and scenarios in which short positions are allowed, which can lead the fund to bet against equities and other assets.
- 16 While many plans use funding policies that pay down shortfalls more quickly, our analysis of the Public Plans Database from the Center for Retirement Research shows that this is a fairly typical policy for plans with large unfunded liabilities.