DANIEL SHOAG

6 *Past and Present High-Risk Investments by States and Localities*

The years between 1824 and 1841 were a period of enormous public investment by state governments.[1] The Erie Canal, completed in 1825, proved substantially more profitable than projected. New York initially set aside revenues from existing sources to meet the canal's financing costs, but to the state's delight, the canal proved to be self-financing. Spurred by that success, Indiana, Illinois, Maryland, Michigan, New York, Pennsylvania, and Ohio financed new canal projects over the next 15 years. Those projects were generally debt-financed and unaccompanied by revenue-raising measures. The estimated proceeds from the projects and the subsequent growth that the projects were assumed to generate factored prominently into state budgets for repayment.

During that time, state governments also invested massively in state-chartered banks and relied heavily on revenue generated from taxes on bank capital and dividends. From 1835 to 1840, bank-related revenue exceeded 20 percent of total state revenue in Massachusetts, Connecticut, Rhode Island, Maine, New Hampshire, Pennsylvania, Delaware, North Carolina, South Carolina, and Georgia. The profitability of banking investments in other states and the winding down of the Second Bank of the United States after President Andrew Jackson vetoed a bill to renew its charter led to large investments in banking by Alabama, Arkansas, Florida, Illinois, Indiana, Louisiana, Mississippi, Tennessee, and Missouri. As with canal building, state governments relied, in part, on the revenue from those investments to service the debt incurred.

This debt-fueled "era of internal improvement" ended ignominiously with the default of eight states and the territory of Florida in 1841 and 1842. By that

This chapter is based on a paper prepared for the conference *The Political Economy of Federalism in Times of Economic Crisis*, sponsored by the Program on Education Policy and Governance at the Kennedy School of Government, Harvard University (2012). I am grateful for comments from Daniel Nadler, Paul Peterson, the conference participants, and an anonymous referee.

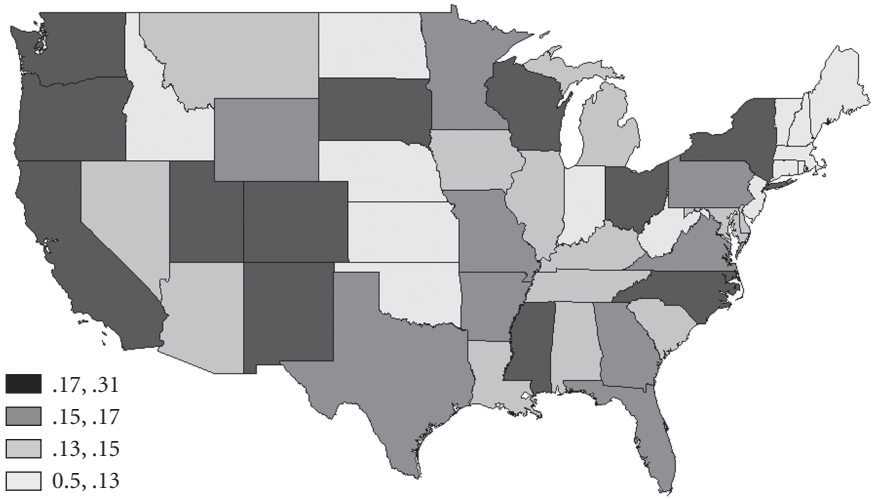
time, the combined debt of state governments had exploded to nearly $200 million from a base of $12.8 million in 1825. Indiana, which had annual revenues of approximately $50,000 in 1836, nevertheless authorized $10 million in bonds at 5 percent interest that year for canal development.[2] When land values fell instead of appreciating and revenues from canal and banking investments failed to materialize, the state defaulted on its obligations.

In the aftermath of the wave of state defaults, nineteen states adopted balanced-budget restrictions.[3] Over the years, adoption of restrictions spread, and today every state except Vermont has some form of balanced-budget requirement. Although the rules differ in their structure and severity, with some states requiring only that the legislature submit a balanced-budget proposal and others forbidding the carrying of a deficit into the next fiscal year, the restrictions have been largely successful at limiting formal debt.[4] Formal state debt as a fraction of gross state product ranged from 7 to 25 percent in 2010, with a median value of 17 percent. In contrast, federal debt is equal to nearly 100 percent of GDP. One shortcoming of balanced-budget laws, however, is that they do not cover the full range of state debt-like commitments; for example, they do not cover future obligations to public employees like pension and health benefits.

The seemingly profitable investment opportunities in infrastructure and banking that were offered to state governments in the early nineteenth century are economically similar to the profitable asset market opportunities offered to governments by public employee pension systems today. State and local government retirement systems manage more than $3 trillion in assets on behalf of more than 19 million members. These systems overwhelmingly provide funded defined benefit plans, in which members are promised a stream of benefits that does not depend on trust fund returns. These state commitments mimic economically the formal debt assumed in the nineteenth century in that governments pledge themselves to meet fixed and unalterable liabilities. To fund their commitments, state and local governments contribute money to retirement trust funds, which are invested in the asset markets. Again, state and local governments, not retirees or debt holders, are the residual claimants on these risky investments. While the liquidity of the investments, the identity of the debt holders, and the type of spending financed may differ, the structure of debt-financed risky investment remains the same. Further, as was the case between 1820 and 1840, state governments are staking large sums on potentially profitable, yet risky, outcomes.

Over the past half-century, states have profited enormously from their pension investments. The U.S. Census Bureau's Annual Survey of Public Employee Retirement Systems, a largely complete annual database going back to 1957, contains only the book or cost value of assets before 2002, so annual returns generally cannot be computed. Total earnings for the funds can be approximated,

Figure 6-1. *Earnings as a Percentage of Total Tax Collections, State and Local Governments, 1958–2008*



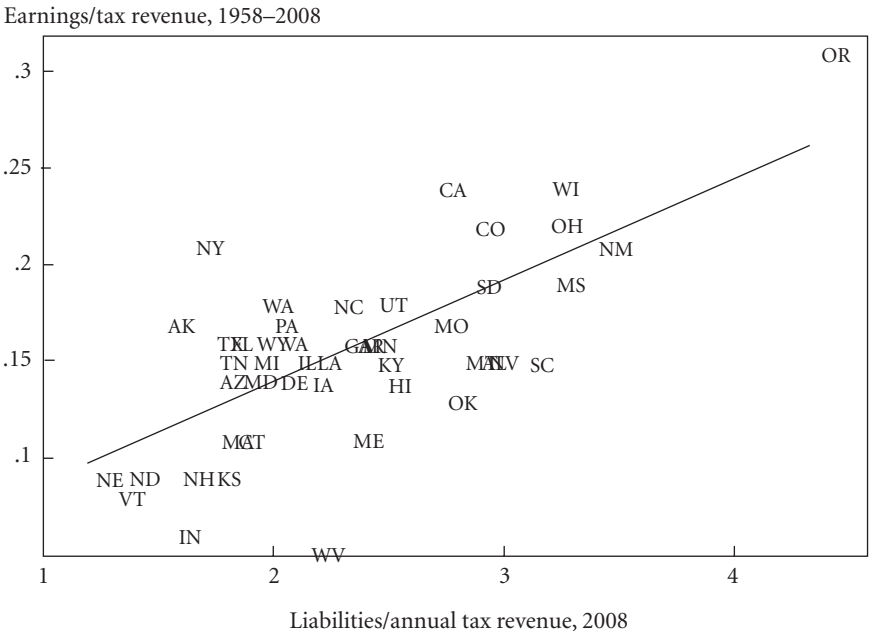
Source: Data are from the U.S. Census Bureau, State and Local Public-Employee Retirement System Survey, various years.

however, by subtracting the initial balance and the sum of contributions to the fund net of payments from the balance today. Specifically, I calculated total earnings as follows:

$$(2)\quad Earnings_{1957,2010} = Balance_{2010} - \sum_{t=1958}^{2010} Contributions_t + \sum_{t=1958}^{2010} Payments_t - Balance_{1957}$$

In total, state and local governments have earned $3.73 *trillion*. State and local governments in California alone have earned $671 billion, and New York has earned $475 billion. To get a better sense of what these figures mean relative to state tax burdens, I divided total earnings by total state tax collections over the 1958–2008 period. The ratios are presented in figure 6-1, which shows that in many states, pension earnings over those fifty years were a major source of revenue. In the average state, pension earnings amounted to 15 percent of total state and local tax revenues; alternatively, public pensions contributed, on average, a full year of tax revenue every 6 years and 8 months. During that period, pension earnings exceeded 10 percent of total revenue, including transfers from the federal government, for state and local governments in Oregon, Wisconsin, New York, California, Colorado, and Ohio.

Figure 6-2. *Pension Earnings Compared with Liabilities*



Source: Data are from the Pew Center on the States, "Trillion Dollar Gap: Underfunded State Retirement Systems and the Roads to Reform," February 2010 (www.pewstates.org/uploadedFiles/PCS_Assets/2010/Trillion_Dollar_Gap_Underfunded_State_Retirement_Systems_and_the_Roads_to_Reform.pdf).

Those significant sums were driven by investments in the asset market, which are indirectly financed by the pension obligations assumed by state and local governments. States that have larger pension and associated liabilities also have larger trust funds and investment earnings (see figure 6-2). Measuring the "true" value of those liabilities is complicated, and the figures reported by the plans themselves depend on their assumptions about discount rates, wage and employment growth, and mortality. Novy-Marx and Rauh, for example, argue that the discount rates commonly used by state and local governments are too high and dramatically understate the cost of future retirement benefits.[5] Fortunately, while changing the discount rate generally has a large impact on the size of pension obligations, switching to a low, uniform rate has only a modest effect on the cross-sectional ranking of obligations.[6] For simplicity, I relied on plan-reported numbers in this analysis. Figure 6-2 takes summary measures for each state from the Pew Center on the States, which surveyed the financial reports of the major pension plans. State-level measures of liabilities suffer from

an additional problem in that many plans are omitted from existing surveys.[7] Despite the problems, the strong relationship between liabilities and investment earnings can be clearly seen.

Risky investments and pension obligations are not, in themselves, threats to the fiscal health of state and local governments. As discussed, in the 1840s states ran into trouble not because they borrowed to invest in infrastructure but because they depended on the broad returns from their investments to finance their debt. In the remainder of this chapter, I explore which states are most at risk from pension commitments and which common factors predict this risk. I explore these questions using both plan-reported measures of underfunding, such as funding ratios, and measures that the nineteenth-century experience suggests capture fiscal capacity risk. I conclude with a discussion of why managing state and local pension liabilities and risky debt-financed investment in general is important for maintaining sustainable fiscal federalism.

Data and Earlier Literature

In addition to the Annual Survey of Public Employee Retirement Systems and the Pew Center data described above, this analysis draws on three other sources of data on state pensions. The first is the Public Plans Database, assembled by the Boston College Center for Retirement Research.[8] Like the Pew Center data, the Center for Retirement Research data are drawn from the comprehensive annual financial reports (CAFRs) published by the largest retirement systems. These data, which are reported at the plan rather than the state level, are much richer than the Pew Center data.

The second source of data is the Comparative Retirement Studies conducted biannually by the Wisconsin state legislature.[9] The Wisconsin data, which date back to 1982, provide invaluable historical information on the evolution of pension funding. Finally, I used a dataset that I constructed on the historical investment returns of the major state-administered systems, obtained from open record requests and audited financial reports. The data in this set go back through the mid-1980s.[10]

A number of earlier studies have looked at aspects of pension funding across states. Mitchell and Smith (1994), Splinter (2010), and Chaney, Copley, and Stone (2002) find that fiscally stressed states reduced their pension contributions.[11] Munnell, Haverstick, and Aubry (2008) finds that some aspects of plan design and plan governance were correlated with funding outcomes.[12] This study builds on this earlier work by analyzing how plan features, economic outcomes, and state politics are related to plan funding status. It also shifts the analysis to focus on fiscal capacity risks in addition to traditional funding measures and discusses the implications of those risks.

The Distribution of Pension Risk

Measures to quantify states' exposure to pension risks must be developed before the distribution of pension risks is analyzed. The assets and liabilities of defined benefit plans evolve over the course of the fiscal year as fund assets earn investment returns and government agencies hire new workers. The value of those changes is determined through an audit (generally including some smoothing procedure), and new values for plan liabilities and assets are calculated. The difference between the values, or the unfunded actuarial accrued liability (UAAL), is then used in determining the actuarially required contribution (ARC).[13] The traditional metric for evaluating the funding status of a public plan focuses on the ratio of actuarial assets to liabilities, or the actuarial funding ratio. While this metric, analyzed below, is informative, the previous discussion suggests that attention also should be paid to risk measures that refer to the fiscal capacity of state and local governments. Moreover, states' previous experience with risky investment recommends consideration of a measure of the ability of governments to finance their liabilities in the absence of investment returns.

To explore these issues, I constructed two additional risk measures: the ratio of states' UAAL to state population or GDP and the ratio of total actuarial liabilities to population or GDP. The first measure is a rescaling of the funding ratio by the size of liabilities relative to GDP, which allows traditional underfunding to be understood in terms of fiscal capacity. It does not, however, change the traditional assumptions about the value of retirement systems' risky assets. The second measure, which is unquestionably extreme, assumes that those assets are valueless; it can best be thought of as a bounding exercise. What this measure does capture, however, is the notion that a state with 1,000 times its GDP in liabilities and assets is more exposed to pension risk than a state with 10 percent of its GDP in liabilities and assets, even though both systems may be fully funded.

Pension Risk Factors

I now explore what factors explain the variation in funding and risk across states. The analysis can be roughly divided into sections analyzing the effects of state and local government size, state economies, plan features, and state politics. I find that while the size of the government sector, state economic growth, and the generosity of public pension schemes have little impact on funding ratios, they are tightly linked to increases in pension risk relative to state fiscal capacity. In contrast, investment returns on retirement trust funds and state government diligence in meeting actuarially required contributions have big effects on traditional funding ratios. They do not, however, correlate with the measures of capacity. Political variables do not seem to be correlated with either measure.

These facts suggest that, from a fiscal capacity perspective, more weight should be given to risk factors such as a large public sector and sluggish economic growth than to traditional measures of funding status.

Size of the Public Sector

State-administered pension plans provide benefits to former public employees, a fact that suggests that pension risk may be correlated with the size of a state's public sector. The distribution of state government spending varies considerably across regions. Total state and local government expenditures are higher in the Northeast (average of $9,933 per capita in 2008) than in the Midwest ($8,616) and South ($8,352). They are dramatically higher in Alaska (average $18,753) than in other states. Total state and local spending per capita is highly correlated with per capita state and local spending on salaries and wages (0.86), and salaries are generally used in determining pension obligations.

Regression analyses using data from the Bureau of Economic Analysis, the U.S. Census Bureau, and the Pew Center on the States demonstrate that the validity of this assumption depends on the risk measure used. States with high state and local expenditures per capita do not have worse funding ratios or fewer assets for a given dollar of liabilities—rather, states with larger total spending have both higher assets and higher liabilities per capita. The regression of funding ratio on spending per capita yields a coefficient of 0.0008—which is statistically insignificant from zero—with a standard error of 0.008. When combined with flat funding ratios, the greater level of liabilities in states with higher spending means that those states do have higher unfunded liabilities per capita. However, with a coefficient of 0.22 and a standard error of 0.11, the relationship is fairly weak and just barely statistically significant at the 10 percent level. The total liability risk measure, in contrast, is tightly linked to public sector size. A one-dollar increase in total spending per capita increases total liabilities per capita by a little more than one dollar, a relationship with an R-squared value of 0.46. These results demonstrate that states with a larger public sector save roughly the same amount per dollar of liabilities as states with lower overall spending. Therefore, traditional funding metrics would not deem these states to be at greater risk. Risk metrics that measure total liabilities relative to fiscal capacity rather than quantity of risky investments do find that high-spending states face considerably greater pension funding risks.

Given that spending is a function of income, one might imagine that these results are driven by the size of the economy rather than the size of the public sector. Repeating the regressions of funding measures with state government spending scaled as a fraction of state GDP, I find that results that are virtually identical in each case. The coefficient for the funding ratio is -0.0002 (0.0006

standard error); unfunded liabilities are no longer significant at the 10 percent level but the magnitude remains the same, 0.22 (0.15 standard error); and the effect of spending on total liabilities when scaled by GDP remains highly significant, with a coefficient of 1.07 and a standard error of 0.24.

Generosity of Benefits

Another factor commonly thought to be correlated with pension risk is the relative generosity of pension benefit payments. There is a significant amount of variation in the generosity of benefits across states and plans. Although benefit formulas often are complicated, the standard benefit measure is determined by the following formula:

(2) *Annual benefit = Benefit factor × Years of service × Final average salary*

Given this basic formula, it is clear that small differences in the benefit factor can generate large differences in the obligations owed to employees. For example, suppose an employee has a final average salary of $60,000 and retires after 30 years of service. A change in the benefit factor of 0.3 percent (1 standard deviation in the Boston College Center for Retirement Research dataset) changes the annual benefits owed to that retiree by $5,400. Compounded across employees over their lifetime, this represents a major change in the state's liabilities. As I noted before, however, higher liabilities do not in themselves imply higher unfunded liabilities.

Unfortunately, the actual benefit formulas used by states are more complicated than the stylized version presented here, and it is difficult to standardize measures across plans. Therefore, I explored this relationship by creating an average monthly benefit variable that I compared with measures of plan funding status. The average benefit is defined as total benefit payments divided by the total number of retirees (the data are for 2008).

The data from the Pew Center for the States and plan data from the Wisconsin Comparative Retirement Study survey show that for every dollar increase in average benefits, the funding ratio decreases by 0.005 percent, although that estimate is not significant. In other words, an increase of 1 standard deviation in average benefits ($4,786) reduces the funding ratio by 2.4 percentage points (for comparison, a standard deviation in funding status is 13 percentage points). There is only a modest negative relationship between plan generosity and savings per dollar of liabilities. Further analyses show that more generous states do have higher liabilities, however, and once again flat funding ratios imply higher unfunded liabilities per capita. These relationships are statistically significant at the 5 percent level—with coefficients and standard errors of 94.30 and 42.65,

respectively, for unfunded liabilities per capita and 267.74 and 66.72 for total liabilities per capita—implying that a dollar increase in average annual benefit increases unfunded liabilities per capita by more than $94 and total liabilities per capita by $268. Similar results hold when scaling by state GDP. As with the total size of the public sector, it does not appear that states with more generous plans save significantly less per dollar of obligations. Their higher overall level of obligations, however, implies that they face more risk relative to their capacity.

The average monthly benefit per retiree is an endogenous variable. Estimates of the benefit may suffer from omitted variable bias if, for example, benefit levels are affected by investment returns or other omitted factors that affect funding rates. To control for this problem, I instrumented for the average monthly benefit payment using the benefit factors of the plans in 1982.[14] Beshears and others (2010) shows that there is a great deal of persistence in benefit levels across plans.[15] I confirmed that finding in my first stage, where the benefit factor in 1982 has an *F* statistic of 13.3, comfortably above the weak-instrument benchmark advocated by Stock and Yogo (2005).[16] The instrumental variable results of comparing levels of plan generosity with funding status and liabilities indicate somewhat larger effects of generosity on liabilities: the coefficient and standard error increase to 235.58 and 100.22, respectively, on unfunded liabilities per capita and to 523.01 and 166.34 for total liabilities per capita, while the impact on funding ratio doubles in magnitude but remains statistically insignificant. That would be consistent with benefits growing more slowly in underfunded systems.

Economic Growth

A third possible factor that might influence the degree of underfunding across plans is the economic growth rate of the administering state. For example, a state that experienced poor growth might find itself unable to pay for benefits promised in the past. If that were the case, one would expect to find changes in the funding status of the plans to be correlated with changes in state-level personal income, employment, or population growth. This argument is made in Johnson (1997).[17] In addition, Splinter (2010) and Chaney, Copley and Stone (2002) find that fiscally stressed states reduced their pension contributions.[18]

This assumption, however, is once again dependent on the pension risk metric being used. Using data from the Bureau of Economic Analysis and controlling for time, I regressed the change in the funding status of the state pension plans from 2006–08 and 2008–10 on the GDP growth rate over those periods. I found no effect of economic growth on state funding ratios (coefficient of –0.002 and standard error of 0.002). In contrast, GDP growth seems to be an important determinant of the ratio of liabilities to GDP, yielding a –1.91 coefficient

(0.256 standard error) significant at the 1 percent level in a regression of the change in the ratio of total liabilities to GDP on the state growth rate. States with faster growth have greater reductions in their ratio of liabilities to GDP. An increase of 1 standard deviation in growth is associated with a reduction of two-thirds of a standard deviation in the ratio of liabilities to GDP.

Of course, economic growth is an endogenous variable. The estimates of the effect of economic growth on funding status may be biased if, for example, better governance leads to both better pension funding and stronger growth. To address these potential issues, I instrumented for state growth rates using Bartik shocks and repeated the tests described above.[19] This procedure, which approximates state-level growth using national industry trends and state industrial composition, yields a first-stage *F* statistic of 42.9. As before, the coefficients estimated for the funding ratio are statistically insignificant and close to zero. The coefficient on the ratio of total liabilities to GDP remains significant at the 1 percent level and increases in magnitude to –2.646 (0.582 standard error), highlighting the distinction between the two risk measures.

Legal Constraints

In most states, pension liabilities are protected either by statute and case law or explicitly by the state constitution. State constitutions are generally difficult to amend; doing so often requires the approval of successive sessions of the legislature and a public vote. Case law can be similarly difficult to undo. Those provisions, then, commit state governments to honor their pension obligations by making it difficult to legally default on or adjust the benefits promised. Table 6-1 outlines the distribution of protection types across states, as catalogued in Munnell and Quimby (2012).[20]

Much of the recent discussion on the issue of state pension funding has assumed that pension provisions will greatly constrain state behavior going forward.[21] One might assume, then, that states with more stringent provisions would have higher pension funding levels and lower unfunded liabilities. However, that does not appear to be the case. States that provide explicit protections for future, unvested benefits have virtually the same funding status and ratio of liabilities to GDP as states without such protections. Having future benefits protected is not a significant predictor of funding ratio, the ratio of unfunded liabilities to GDP, or the ratio of total liabilities to GDP. Regressing these measures of funding status on an indicator of stringent provisions yields near-zero coefficients that are statistically insignificant from zero. The data give the same result for states with explicit constitutional protections of public pension benefits. Therefore, while such restrictions may constrain future behavior, there is little evidence to date that they have had an effect under any risk measure.

Table 6-1. *Accruals Protected*

Legal basis	*Past and future*	*Past/future uncertain*	*Past only*	*None*
State constitution	Alaska, Illinois, New York	Arizona	Hawaii, Louisiana, Michigan	
Contract	Alabama, California, Georgia, Kansas, Massachusetts, Nebraska, Nevada, New Hampshire, North Dakota, Oregon, Pennsylvania, Tennessee, Vermont, Washington, West Virginia	Colorado, Idaho, Maryland, Mississippi, New Jersey, Rhode Island, South Carolina	Arkansas, Delaware, Florida, Iowa, Kentucky, Missouri, Montana, North Carolina, Oklahoma, South Dakota, Utah, Virginia	
Property	Maine, Wyoming	Connecticut, New Mexico, Ohio	Wisconsin	
Promissory estoppel	Minnesota			
Gratuity				Indiana, Texas

Source: Alicia Munnell and Laura Quimby, "Legal Constraints on Changes in State and Local Pensions," Research Brief (Boston College, Center for Retirement Research, 2012).

Political Dimensions: Turnover and Unions

A common theme in the political economy literature is that politicians have shorter time horizons than their electorate. When that is the case, they have incentives to borrow from future taxpayers to finance current government consumption. It is possible, then, that differences in funding levels are related to the planning horizons of state officials.

Although term limits for state legislators do not appear to affect funding status, planning decisions may be made at the party rather than the individual level. If so, term limits may be a poor measure of political longevity. The frequency of

party changes is a better proxy for determining the effect of political horizons, although this measure may suffer from some endogeneity bias. Regressing measures of pension funding status on the number of shifts in party control of state governorships and legislatures between 1959 and 2007 (using data from the U.S. Statistical Abstract) indicates that gubernatorial changes might have a weakly detrimental effect on funding levels. States with more gubernatorial party turnover have pensions that are less adequately funded: for each additional gubernatorial party change in this time period, the ratio of assets to liabilities decreased by 1.4 percent (0.8 percent standard error), significant at the 10 percent level, suggesting that governors might have greater discount rates in those states. This effect is not present for changes in control of state legislatures, where the same analysis yielded a small positive effect (0.5 percent) that is not significant. Using alternate pension risk measures shows no effect of party turnover in the governorship or state legislature. The coefficients of the ratio of total liabilities to GDP regressed on gubernatorial and legislature party changes are 0.007 (0.004 standard error) and -0.0002 (0.002 standard error) respectively. That indicates that evidence in favor of a gubernatorial discount rate should be interpreted with caution.

The last political influence on the funding status of public sector pension plans that I considered is the strength of state-level public sector unions. There is considerable debate over the extent to which unions are responsible for state budgetary woes, as evidenced by recent legislation to curtail union power in Wisconsin, Ohio, and New Hampshire and the large backlash that those moves engendered. To test the hypothesis that states with stronger unions are more underfunded, I regressed measures of pension funding on proxies for union strength in the state—the percent of the public sector that is unionized and the fraction of 2008 political donations made by public sector unions—using data from the Current Population Survey (through UnionStats.com) and from the National Institute on Money in State Politics. First, I tested the hypothesis that states where a greater fraction of public sector employees are unionized differ in the funding status of their pensions by regressing the usual measures of funding status on this measure of union strength. The results for funding ratio and unfunded liabilities scaled by GDP are nearly zero and statistically insignificant. There is a potential weak positive effect of greater unionization in the public sector on the ratio of total liabilities to GDP returning a 0.069 coefficient (0.04 standard error) significant at the 10 percent level. I tested the same outcomes for states in which a higher or lower fraction of political donations were made by public sector unions and found that increases in that measure did not increase a state's unfunded liabilities scaled by GDP, impair its funding status, or have a significant impact on the ratio of total liabilities to GDP. This finding stands in

contrast to the results in Mitchell and Smith (1994), which find that unions do impair public plan funding status.[22]

Investment Returns and Actuarially Required Contributions

More than 73 percent of the receipts for state and local pension funds in 2010 came from investment returns. There is considerable variation in investment returns across plans. Shoag (2010) reports that a within-year standard deviation in returns across plans ranged from 2 to3 percentage points[23] and that the standard deviation in cumulative returns over a 20-year horizon was nearly 100 percent. Farrell and Shoag (2012) documents that investment returns differed across public pension designs as well.[24] Given this large variation, it is reasonable to assume that differences in returns might explain much of the variation in obligations. I tested this hypothesis by regressing the change in state pension risks from 2001 to 2009 on the annualized cumulative investment return over that period. The data on returns are from the Boston College Public Plans Database. I weighted the plan-level returns by assets in 2001 to calculate state-level averages.

The regression of the change in funding status on investment returns implies that increasing the return by 1 percentage point a year for all 10 years would improve a plan's funding ratio by about 4 percent, a result significant at the 5 percent level. This is a sizable effect given that the standard deviation in annualized returns in this period is 1.04 percentage points (in comparison, a standard deviation for changes in funding status is 11.5 percentage points). Similarly significant effects can be seen for the UAAL-to-GDP ratio, with a coefficient of –1.08 and a standard error of 0.36. In contrast, the relationship between changes in total liabilities and investment returns is less clear. Although the estimated coefficient, –0.40 (0.34 standard error), is negative, it is not statistically significant, and this negative slope is significantly attenuated when outliers are dropped.

In summary, it appears that better investment returns do improve traditional measures of pension funding. There are more assets per dollar of liabilities in the retirement trust funds and a lower ratio of unfunded liabilities to GDP. Investment returns do not, however, seem to be significantly slowing the growth of total liabilities.

Finally, using the plan-level Public Plans Database, I explored the effect that fulfilling the actuarially required contributions has on state pension risk measures. I calculated the percent of the total required contributions actually paid by state and local governments between 2002 and 2009. I then used that measure to predict the same state-level outcomes as in the analysis of investment returns (change in funding ratio, change in ratio of UAAL to GDP, and change in ratio of liabilities to GDP), which measure the change in funding status over that time period.

I find that, like investment returns, meeting ARC targets had a large positive effect on pension funding rates, significant at the 1 percent level, with a coefficient of 0.23 (0.09 standard error). An increase of 1 standard deviation in ARC contributions led to an improvement of one-third of a standard deviation in the change in the funding ratio. A significant negative coefficient, –0.06 (0.02 standard error), from the regression of the change in UAAL on the liabilities ratio shows that meeting ARC targets also decreases the ratio of unfunded liabilities to GDP. In contrast, an increase of 1 standard deviation in ARC contributions was associated with an improvement of less than a 0.17 standard deviation in the total liability-to-GDP ratio, a relationship that is not statistically significant.

Analysis

The upshot of the analysis is twofold: political factors are uncorrelated with pension risk, and the factors affecting traditional metrics of pension funding, like the asset-to-liabilities ratio, are very different from the factors that affect pension obligations relative to fiscal capacity. States that met their required contributions and earned large investment returns tended to see improvements in their funding ratios, though those factors were not correlated with a reduction in the ratio of liabilities to GDP. States can see improvements in the funding ratio and fully meet their ARCs without reducing their reliance on risky returns to meet their obligations. In contrast, states with high economic growth and smaller, less generous public sectors may not see improvements in their asset-to-liability ratio. Those states do, however, have smaller obligations relative to their fiscal capacity.

Conclusion: An Important Issue for Fiscal Federalism

The findings presented in this chapter demonstrate that states today, as in the mid-nineteenth century, rely heavily on risky investments to finance themselves. In the past, excessive reliance on risky investments led to state bankruptcy, and there are fears that similar outcomes could occur today. Certain states are more dependent on revenue from such investments, and many of the factors associated with the resulting pension risk are outlined here. Clearly the reliability of such a revenue source is extremely important to those states. However, it is also important to consider why the risk of bankruptcy or pension defaults for certain states is an issue for federalism and the country as a whole.

The risks of state and local pension obligations for fiscal federalism in the United States are difficult to overstate. The primary concern, obviously, is that the debt holders (or in this case, the pensioners) will not receive the payments

that they were promised. Aside from the direct welfare costs, pensioners would likely rely on federal social insurance programs, which are financed in part by taxpayers in other states. Because many members of state and local pension systems are not currently covered by Social Security, these shadow liabilities are rarely considered. Moreover, the utility costs to pensioners might generate political pressure for a bailout by taxpayers outside the defaulting state. In addition to those pressures, the interconnectedness of financial markets opens the door for contagion. Default by one state could lead to a run on the municipal debt market, making it impossible for other states to finance their obligations and forcing them into default as well. The large size of public trust funds (they currently hold roughly 7.5 percent of all U.S. corporate equities) means that a rapid sell-off could force down asset prices, depressing returns and hampering other states. The viability of fiscal federalism depends on the viability of subnational financing and the management of system-wide risk.

Notes

1. Arthur Grinath, Richard Syllas, and John Joseph Wallis, "Sovereign Default and Repudiation: The Emerging-Market Debt Crisis in U.S. States: 1839–1843," Working Paper 10753 (Cambridge, Mass.: National Bureau of Economic Research, 1998).

2. Ibid.

3. James D. Savage, *Balanced Budget and American Politics* (Cornell University Press, 1988).

4. James M. Poterba, "State Responses to Fiscal Crises: The Effects of Budgetary Institutions and Politics," *Journal of Political Economy,* vol. 102, no. 4 (1994), pp. 799–821.

5. Robert Novy-Marx and Josh Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?," *Journal of Finance,* vol. 66, no. 4 (2010), pp. 1207–245.

6. The correlation between plans' reported liabilities and the Novy-Marx and Rauh measure, both in levels and as a fraction of GDP, exceeds 0.99.

7. The Pew Center survey omits the large University of California and state of New York teachers' retirement systems, which I added back in. The Pew survey also omits the large New York City plans for which historical liability data were not available. When the liabilities of these plans are included in the independent variable, New York's earnings better fit the regression line. West Virginia likely underperforms the regression line due to the fact that it was constitutionally prohibited from holding equities until 1997. Data on pension liabilities suffer from yet another complication in that a number of states can transform these liabilities into formal debt through pension obligation bonds. This adds an additional source of noise to the liabilities measure.

8. See Public Plans Database, Boston College, Center for Retirement Research (http://pubplans.bc.edu).

9. See "Comparative Retirement Study, Wisconsin State Legislature, Legislative Council (http://legis.wisconsin.gov/lc/publications/crs.asp).

10. For a detailed description, see Daniel Shoag, "The Impact of Government Spending Shocks: Evidence on the Multiplier from State Pension Plan Returns," unpublished paper, Harvard University Kennedy School of Government, 2010.

11. Olivia S. Mitchell and Robert S. Smith, "Pension Funding in the Public Sector," *Review of Economics and Statistics,* vol. 76, no. 2 (1994), pp. 278–90; David Splinter, "State Pension Contributions and Fiscal Stress," unpublished paper, Rice University, 2010; Barbara A. Chaney, Paul A. Copley, and Mary S. Stone, "The Effect of Fiscal Stress and Balanced Budget Requirements on the Funding and Measurement of State Pension Obligations," *Journal of Accounting and Public Policy,* vol. 21, no. 4-5 (2002), pp. 287–313.

12. Alicia Munnell, Kelly Haverstick, and Jean-Pierre Aubry, "Why Does Funding Status Vary among State and Local Plans?," Research Brief (Boston College, Center for Retirement Research, 2008).

13. This is a misnomer in that governments ultimately have discretion over the amount contributed.

14. Factors are calculated for an individual with 30 years of service prior to retirement.

15. John Beshears and others, "Behavioral Economics Perspectives on Public Sector Pension Plans," *Journal of Pension Economics and Finance,* vol. 10, no. 2 (2011), pp. 315–36.

16. James H. Stock and Motohiro Yogo, "Testing for Weak Instruments in Linear IV Regression," in *Identification and Inference for Econometric Models: Essays in Honor of Thomas J. Rothenberg,* edited by J. H. Stock and D. W. K. Andrews (Cambridge University Press, 2005).

17. Richard Johnson, "Pension Underfunding and Liberal Retirement Benefits among State and Local Government Workers," *National Tax Journal,* vol. 50, no. 1(1997), pp. 113–42.

18. Splinter, "State Pension Contributions and Fiscal Stress"; Chaney, Copley, and Stone,"The Effect of Fiscal Stress and Balanced Budget Requirements on the Funding and Measurement of State Pension Obligations."

19. T. J. Bartik, *Who Benefits from State and Local Economic Development Policies?* (Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research, 1991).

20. Alicia Munnell and Laura Quimby, "Legal Constraints on Changes in State and Local Pensions," Research Brief (Boston College, Center for Retirement Research, 2012).

21. Jeffrey Brown and David Wilcox, "Discounting State and Local Pension Liabilities," *American Economic Review,* vol. 99, no. 2 (2009), pp. 538–42.

22. Mitchell and Smith, "Pension Funding in the Public Sector."

23. Shoag, "The Impact of Government Spending Shocks: Evidence on the Multiplier from State Pension Plan Returns." The variation in return is even larger for 2009, where the standard deviation across plans with June fiscal years was 5.8 percentage points.

24. James Farrell and Daniel Shoag, "Asset Management in Public DB and Non-DB Pension Plans," unpublished paper, Harvard University Kennedy School of Government and Florida Southern College, 2012.