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PENSION SIMULATION PROJECT

POLICY BRIEF

How Public Pension Plan Demographic Characteristics Affect Funding And Contribution Risk

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Executive Summary

How do demographic characteristics of public pension plans affect the risks that pension funds and their sponsoring governments face? As pension funds mature, relatively more workers retire, leading to more beneficiaries relative to the number of active workers, greater payments of retirement benefits, and increasing assets relative to payroll of active workers. Approximately two-thirds of public pension funds' $3.7 trillion of assets are in investments other than cash and fixed income, and have volatile investment returns. Investment gains and losses become larger relative to payroll and government contributions, generally calculated as a percentage of payroll, can become more variable, and plan funded ratios can become more volatile.

In this analysis we found that:

- Growing plans with increasing numbers of workers are less susceptible to investment risk than are shrinking plans.
- Very mature plans with high assets relative to payroll and high cash outflows face greater funding risk, all else equal.

Public pension plans are much more mature now than they were ten or twenty years ago, with lower numbers of active workers per beneficiaries, higher net cash outflows, and higher asset-payroll ratios. Many will mature further as the population continues to age, and as government workforces age. This maturation will lead to higher risks of pension plan underfunding, all else equal, unless pension funds invest in less volatile assets.

We summarize our analysis below. For full details, see the companion report on this topic.

Introduction

Public pension funds receive contributions from governments and employees, and invest those funds with the goal of having enough money to pay future benefits when due. Governments and pension funds can't predict the future with certainty, so they adjust contribution requirements to reflect experience — requesting higher contributions if experience has been worse than expected, or reducing requirements if experience has been better than expected. The biggest uncertainty is how well the pension fund's investments will do.

Demographics play an important role in determining pension fund risks in large part through their impact on the ratio of plan assets to payroll. As pension funds mature, relatively more workers retire, leading to more beneficiaries relative to the number of active workers, greater payments of retirement benefits, and increasing assets relative to payroll of active workers.[1] Investment gains and losses become larger relative to payroll and government contributions, which generally are calculated as a percentage of payroll, can become more variable and plan funded ratios can become more volatile.

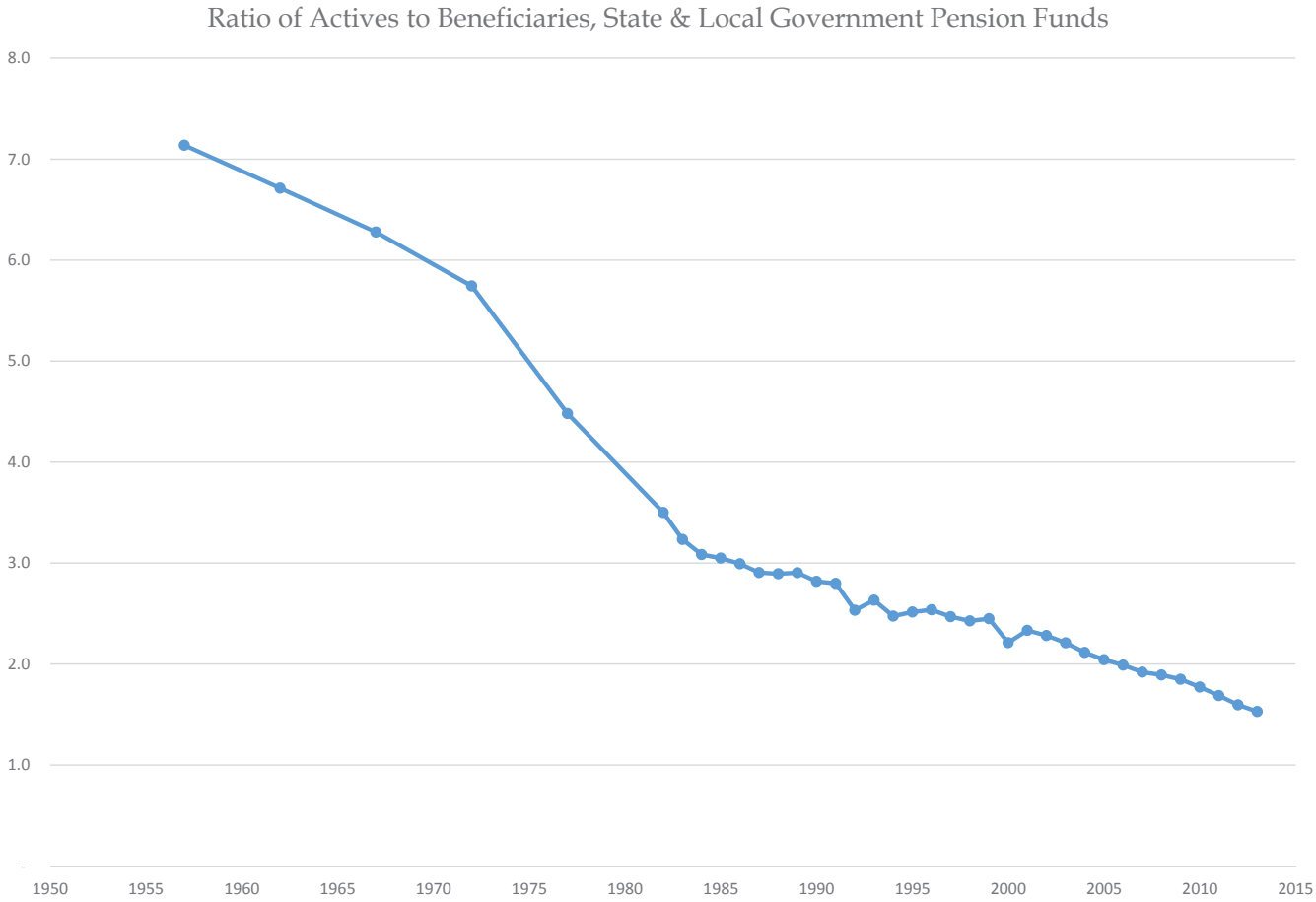
The United States population has been aging, and governmental workforces have been aging along with it, as more governmental workers near or reach retirement age. As a result, most public pension funds are maturing and the ratio of the actives to beneficiaries has been declining for decades (see Figure 1).

As the ratio of actives to beneficiaries declines, the ratio of assets to payroll tends to rise because assets must be built up to provide for beneficiaries and because, with relatively fewer actives, payroll is relatively less. The ratio of assets to payroll for state and local government pension plans has been increasing for decades, although it has fluctuated substantially in recent years due to large swings in investment returns.

In addition, as a plan matures its benefit payments for a growing retiree population often grow more rapidly than cash contributions from a slower-growing population of active workers. Thus, cash flow before investment income (receipts from contributions minus disbursements for benefits) can become increasingly negative. Cash flows before investment income for state and local government pension plans in the United States have been declining for decades and have been negative since 1993. According to the Public Plans Database,[2] in 2013 half of the pension plans had net cash outflows before investment income of 2.8 percent or more, 25 percent had negative net cash outflows of 3.9 percent or more, and 10 percent had negative net cash outflows of 6.2 percent or more.[3] These negative cash flows could affect the funded status and liquidity needs of plans.

One important factor influencing the asset-payroll ratio and the net cash flow of a plan (before considering investment income) is the growth rate of the plan workforce. In general, the faster the workforce grows the lower the ratio of assets to payroll,

Figure 1. The Ratio of the Number of Actives to the Number of Beneficiaries Is Declining for Public Pension Funds



Source: Authors' analysis of the Census Bureau's Annual Survey of Public Pensions (recent years at http://www.census.gov/govs/retire/)

in part because plan payroll is increasing more rapidly. In addition, when the workforce is growing rapidly, net outflows are lower, all else equal, largely because of an influx of new contributions.

The California Public Employees' Retirement System (CalPERS) has expressed concern about increased volatility resulting from a declining ratio of actives to beneficiaries and increasingly negative cash flows before investment earnings. The chief actuary has noted that, "The concern that I have is that the volatility we have built into the funding system is such that it may cause such severe strain on the employers that they may not be able to make the contributions."[4]

How We Analyzed Plan Demographics and Risk

We examined the year-by-year finances of prototypical public pension funds with a model that allows investment returns to vary in plausible ways, rather than meeting actuaries' assumptions every year. We model five plans with distinct demographic characteristics, based on our analysis of variation among plans in the Public Plans Database:[5]

- *Average plan, under three growth scenarios:* This plan has an average workforce, and an initial actives-to-beneficiaries ratio of 2. To investigate the impact of workforce growth on fund risks, we examine this plan under three workforce-growth scenarios: negative 2 percent, 0 percent (constant workforce size), and positive 2 percent.
- *Mature plan:* We examine a mature plan that has an older and shrinking workforce, and a relatively lower actives-to-beneficiaries ratio of 1.7. This plan has a very high initial asset-payroll ratio and high cash outflow before investment income (about 4 percent of assets) due to high retirement benefit payments and a low actives-to-beneficiaries ratio.
- *Immature plan:* This plan has a young and growing workforce, and a high actives-to-beneficiaries ratio of 3.3. It has a low initial cash outflow before investment income, due to low retirement benefit payments and the high actives-to-beneficiaries ratio.

The five plans have the same benefit structure, employer contribution policy, and all start out with a 75 percent funding ratio, which is broadly consistent with the typical plan today. The plans have an expected compound annual return of 7.5 percent with a standard deviation of 12 percent. (The standard deviation is a measure of how much investment returns vary from expected returns in a typical year.[6])

We examine how demographic characteristics affect plan funding risk and contribution risk, focusing on two kinds of risks:

- Extremely low funded ratios, which create a risk to pension plans and their beneficiaries, and create political risks that could lead to benefit cuts; and
- Extremely high employer contributions, or large increases in contributions in short periods of time, which pose direct risks to governments and their stakeholders, and in turn could pose risks to pension plans and their beneficiaries.

There usually are trade-offs between these two kinds of risks. If a pension plan has a contribution policy designed to pay down unfunded liabilities very quickly, it is unlikely to have low funded ratios but it may have high contributions. If a pension plan has a contribution policy designed to keep contributions stable and low, there is greater risk that funded ratios may become very low.

Key Results

Growing plans with increasing numbers of workers are less susceptible to investment risk than are shrinking plans.

A prototypical pension plan with average characteristics that starts out 75 percent funded, with a workforce that grows 2 percent annually, would have a one in eight chance (13 percent) of falling below a 40 percent funded ratio in a thirty-year period — a

funded ratio that has been associated with fiscal crises in several pension systems.

As the growth in the workforce slows or declines, the risk rises to more than one in five (21.4 percent) for a plan with a 2 percent annual decline in the number of workers. The plan with shrinking workforce would have a 27.5 percent chance that actuarially determined contributions will exceed 30 percent of payroll sometime during thirty years, and a 42.4 percent chance that the employer contribution will increase by more than 10 percent of payroll sometime during thirty years, while the plan with growing workforce has little exposure to these risks.

Very mature plans with high assets relative to payroll and high cash outflows face greater funding risk, all else equal.

A prototypical mature plan with the same characteristics as the growing plan described above has a nearly one in three (31 percent) chance of falling below 40 percent funding in a thirty-year period. There would be a fifty-fifty chance of actuarially determined employer contributions exceeding 30 percent of payroll sometime in those thirty years, even though the plan's initial employer contribution is only about 20 percent, and a nearly 60 percent chance that the employer contribution will increase by more than 10 percent of payroll sometime during thirty years. By contrast, a prototypical "immature" plan (with relatively fewer retirees), with a low asset-payroll ratio and low cash outflows before investment returns, has substantially lower exposure to these risks.

Conclusion

Public pension plans are much more mature now than they were ten or twenty years ago, with lower numbers of active workers per beneficiaries, higher net cash outflows, and higher asset-payroll ratios. Many will mature further as the population continues to age, and as government workforces age. This maturation will lead to higher risks of pension plan underfunding, all else equal, unless pension funds invest in less volatile assets.

Endnotes

1 In this report, the term "beneficiaries" refers to all types of inactive plan members who are receiving benefit payments, including service retirees, deferred retirees, disability retirees, and beneficiaries of death benefit and contingent retirement benefits. In the simulation of prototypical plans, only service retirees and deferred retirees are modeled, therefore "beneficiaries" only include these two types in the discussion of simulation results.

2 The Public Plans Data (PPD) website is maintained through a partnership between The Center for Retirement Research (CRR) at Boston College and the Center for State and Local Government Excellence (SLGE). The National Association of State Retirement Administrators (NASRA) supports the partnership by providing review and assistance on the development of data models, validation of data, and development and administration of surveys. See: http://publicplansdata.org/.

3 The median PPD net outflow of 2.8 percent in 2013 is slightly smaller than the aggregate net outflow on the graph of 3.3 percent, suggesting that large plans may have slightly greater net outflows as a percentage of assets than does the median plan.

4 Ed Mendel, "CalPERS Looks at Long-Term Rate Hike to Cut Risk," PublicCEO, June 1, 2015, http://www.publicceo.com/2015/06/calpers-looks-at-long-term-rate-hike-to-cut-risk/.

5 See Public Plans Data, Downloadable Data, http://publicplansdata.org/public-plans-database/download-full-data-set/.

6 Retirement benefits are 2.2 percentage points per year of service multiplied by the average of the final three years of salary, increased by two percent in each retirement year. Plan sponsor contributions are made each year that, when added to a five percent employee contribution, satisfies the actuarially determined contribution. Gains and losses amortized with 30-year open level percent amortization and 5-year asset smoothing, a common set of policies.

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