Public Pension Plans, the Economy, and Investment Return Assumptions

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Executive summary

- Public pension plans are the retirement plans for employees of state and local governments.
- These plans have assets (such as investments in equities) and liabilities (promised benefits to employees). Unfunded liabilities have grown over time, particularly during past recessions.
- In managing the balance between assets and liabilities, plans must make an assumption about investment returns. There is some concern that assumed (nominal) returns (7.26% on average in 2018) are too high for two reasons. One is that in the current investment environment, plans may not be able to consistently attain their assumed return. The second is that plans use the assumed return to discount future obligations and some think that lower discount rates more accurately reflect future liabilities because of laws protecting a beneficiary's claims on pension benefits.
- Plans may be wary of lowering assumed returns (and thus discount rates) because doing so unambiguously increases the present value of future liabilities. To give an example, lowering the discount rate from 8% (the average in 2001) to 7.26% (the average in 2018) increases the present value of $28,000 (the average annual benefit payment in 2018) due in 20 years by over $800. Multiply this by just half the number of plan participants who are currently working, and this increase grows to over $5.8 billion. This value is the increase for just one year of benefit payments – beneficiaries receive benefits for many years after retirement.
- Increases in liabilities eventually have to be funded, likely through diverted government spending or tax increases or higher employee contributions, all of which affect the economy.
- We look at several factors that might affect assumed returns, and find some evidence that recent market returns, assumptions of other plans, and the political cycle may play a role.

Introduction

This quarter's conference is on the financial and economic outlook for 2020. Why include an examination of the retirement plans for state and local government employees (which we will refer to as public pension plans) in a conference about the outlook? Public pension plans are tied to the macroeconomy, both in the present (through current contributions) and in the future (through promised benefits to retirees). When public pension plan administrators plan for the future, a key consideration is how much money to put aside each year in order to be able to fund the promised benefits. In order to make this determination, plan administrators and actuaries have to make a number of assumptions about current and future employees and about the macroeconomy over a relatively long timeframe. One important macroeconomic assumption is the real rate of return on a plan's investments. Assumptions about investment returns are important because plans rely heavily on investments to meet benefit payments each year and because these assumptions directly effect calculations of a plan's liabilities. Thus, having realistic assumptions about long-term returns is vital to accurately assessing a plan's financial health.

In order to understand the return assumptions public pension plans make, we will first review some facts about public pension plans and discuss how public pension plan funding decisions are linked to the macroeconomy. Then, we seek to understand how plans choose return assumptions by investigating possible mechanisms motivated by behavioral economics and political economy.

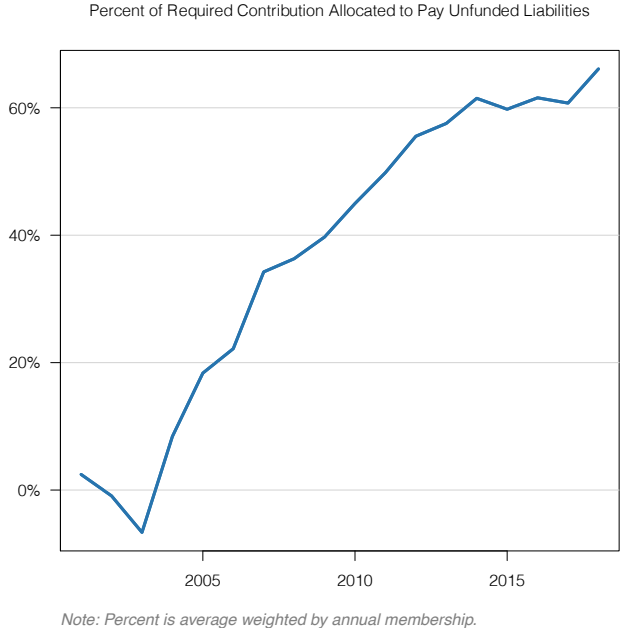
Public pension plan basics

There are thousands of state and local government public pension plans in the U.S. This analysis covers about 200 of those plans, and about 95% of state and local government public pension plan assets and members are part of these 200 plans. The data cover 2001 – 2018 and are provided by the Center for Retirement Research at Boston College.

The purpose of a public pension plan is essentially to collect (from employers and employees), invest, and then distribute (to retirees) money. State and local governments determine the pension plan rules (e.g. benefit formulas), and then given these promises and rules, the professionals who manage the pension plan decide how much the employer (the state or local government) and the employees must contribute to the plan each year and what investments to make in order to meet benefit obligations. Across all plans and years, the majority of assets are in public equities (about 53%), with the next largest allocation (about 26%) to fixed income assets (such as government and corporate bonds). The share of assets in public equities and fixed income assets has been falling over time as these types of assets are being replaced by investments in commodities, hedge funds, private equity, and real estate (about 17% of total assets on average). These averages hide noteworthy trends. From 2001 to 2018, asset allocations to public equities and fixed income assets fell by about 23%, while allocations to commodities, hedge funds, private equity, and real estate more than tripled. One explanation is that plans are shifting towards higher return (and higher risk) assets to meet benefit obligations.

Each year, money flows in and out of public pension plans. The purpose of the inflows is to fund future benefits promised to current employees. Inflows have to cover both benefits current employees earned in that year (called the 'normal cost') and unfunded liabilities (liabilities not covered by existing plan assets) due to inflows insufficient to cover normal costs in prior years. One reason for the existence of unfunded liabilities is that while actuaries tell state and local government employers how much they should contribute each year, governments are not required to follow the actuary's recommendation. Total inflow recommendations (normal cost + unfunded liability cost) have been increasing over time, but largely due to increases in previously unfunded liabilities. Figure 1 shows the percent of total recommended inflows that cover unfunded liabilities, which was over 60% in 2018.

Figure 1



Note: Percent is average weighted by annual membership.

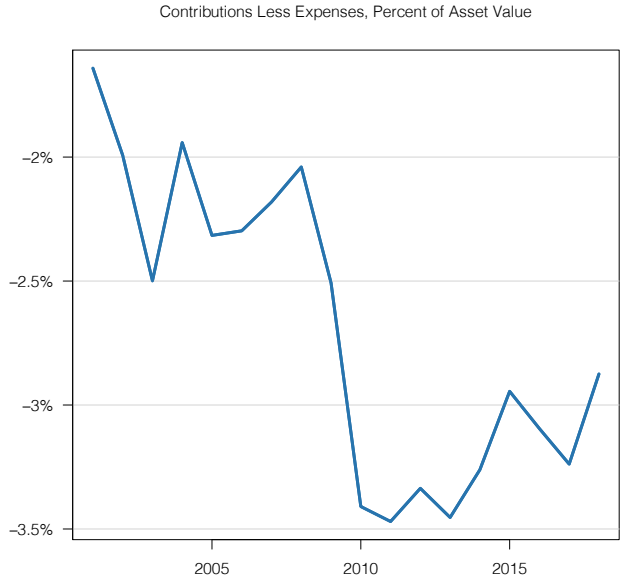
Inflows can be broken up into three basic sources: employer contributions (from state and local governments), employee contributions, and investment returns on past employer and employee contributions. From 2001 until 2018, the median annual percent of revenue generated by the plan's investments was about 70%.[1] This fact highlights why assumed and actual investment returns are critical to a plan's financial health.

While the money flowing into plans comes mainly from three sources, the money flowing out is almost completely (about 96%) comprised of benefit payments (e.g. to retirees or surviving spouses). The total nominal value of benefit payments each year has been steadily rising over time. In 2018, the annual value was over $275 billion.

1. This figure includes both interest and dividends and changes in asset value.

Figure 2 provides one way to put inflows and outflows together. The Figure shows the gap between the plan's current expenses (outflows; mostly benefit payments) and current inflows from employer and employee contributions as a percent of total assets (Pew Charitable Trusts 2019). The percent is always negative because annual outflows exceed annual contributions, but its absolute value can be interpreted as the annual return required to bridge the gap between benefit payments and contributions with investment returns alone. The upward trend (in absolute value) indicates that plans increasingly depend on investment returns to meet obligations to beneficiaries.

Figure 2

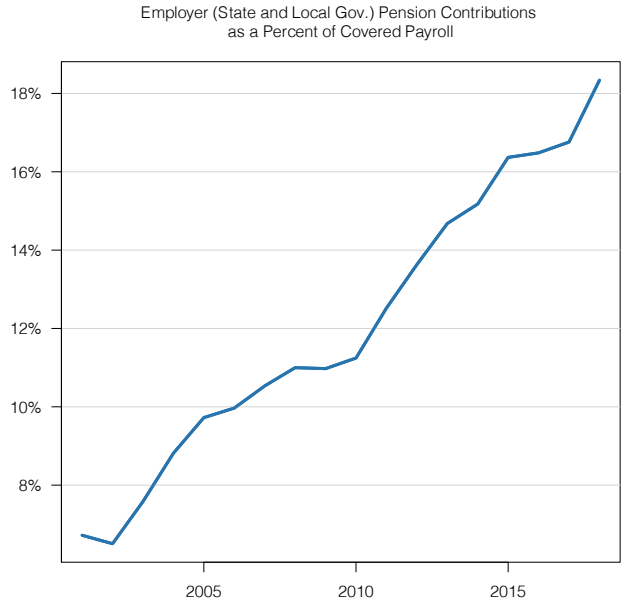


Note: Percent is average weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

Public pension plans and the economy

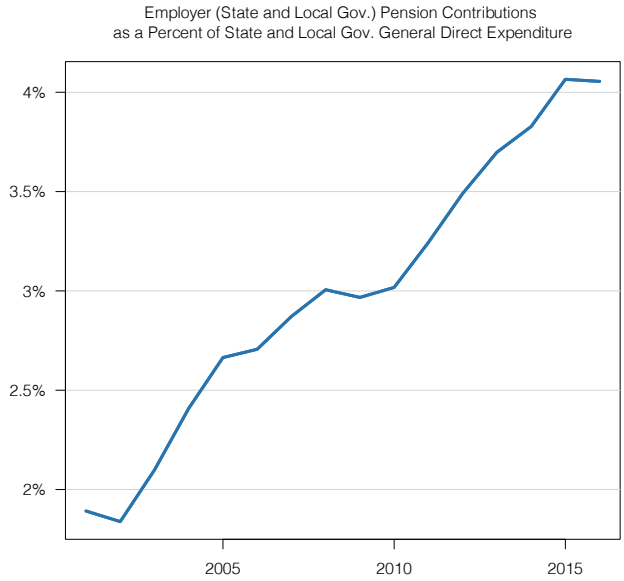
Having reviewed some background about public pension plans, we now turn to how public pension plans are tied to both the present and future macroeconomy. In the present, employer contributions to public pension plans are part of government spending (and thus GDP). As a percent of payroll, these contributions have risen to over 18% (Figure 3), or about 4% of state and local governments' direct general expenditure (Figure 4). The present macroeconomy also affects public pension plans. Actuaries calculate how much state and local governments should contribute each year (based on the plan's promises and on assumptions about the future, called the actuarially required contribution), but governments are not required by law to take the actuary's recommendation. Figure 5 shows the relationship between the macroeconomy and actual contributions on average. (There is a fair amount of variation underneath this average. For comparison, Figure 6 shows the same contribution metric for two large California plans.) There appears to be a negative relationship between the unemployment rate (which

Figure 3



Note: Percent is average weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

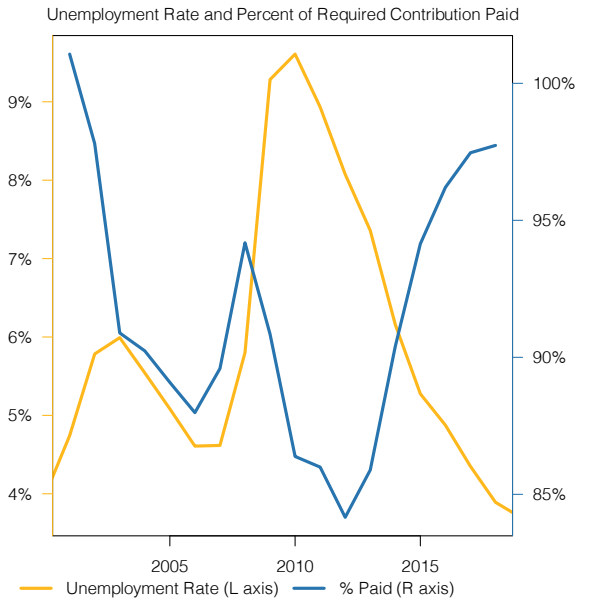
Figure 4



Note: Total contributions (numerator) and total expenditure (denominator).
Source: Center for Retirement Research, Urban Institute, and authors' calculations.

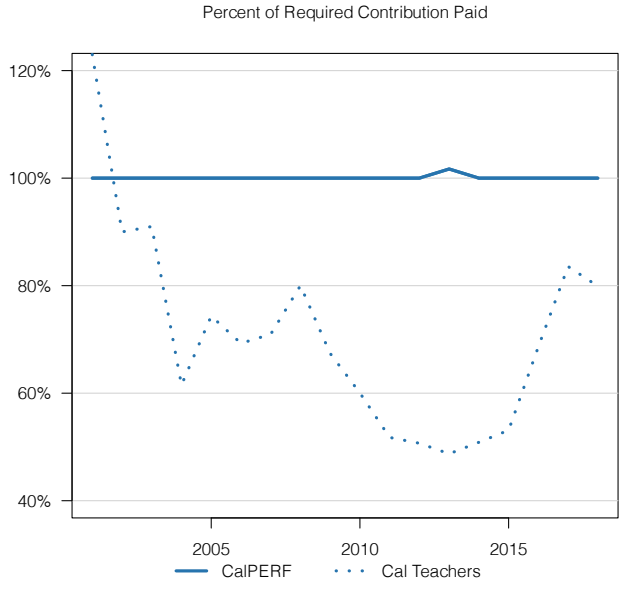
captures the business cycle) and the percent of the actuarial recommendation that state and local governments actually contribute: when the unemployment rate increases, state and local governments contribute relatively less than actuaries recommend. One explanation is that in a recession, government revenues fall, tightening the government's budget constraint. The government might be faced with the decision between paying obligations that are due in the present (e.g. salaries, education funding) and putting money aside to fund obligations that are due (possibly far) in the future (pension obligations) and might give precedent to obligations due in the present, resulting in pension contributions insufficient to reach the actuarially recommended amount.

Figure 5



Note: Percent is average weighted by annual membership.
Source: Center for Retirement Research, BLS, and authors' calculations.

Figure 6

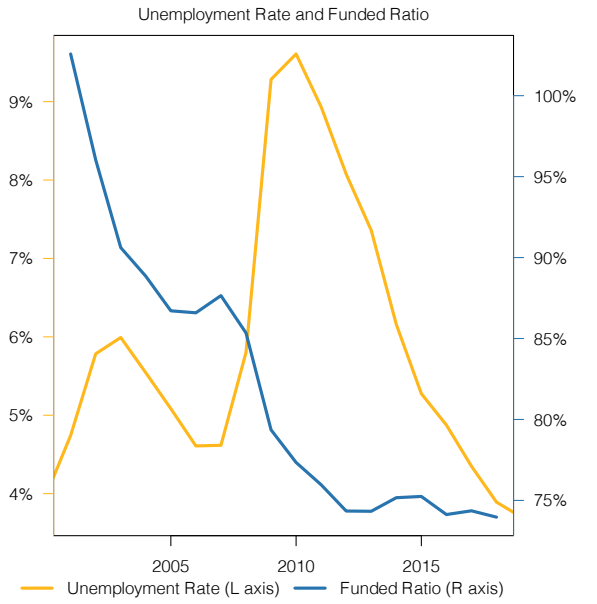


Source: Center for Retirement Research and authors' calculations.

This tradeoff between paying in the present and saving for the future brings us to how public pension plans are tied to the future economy: contributing less than what the actuaries recommend in the present increases what state and local governments have to contribute in the future. By doing so, governments essentially borrow from their future selves, and thus implicitly from future taxpayers. One metric that captures the cumulative results of past contribution decisions is the funded ratio, which is the percent of the plan's liabilities that are covered by the plan's current assets. Figure 7 shows the unemployment rate and the funded ratio, and as before, there is a negative relationship between the two series. (Funded ratios for the same two California plans are in Figure 8 as examples of variation.) Funded ratios tend to fall in recessions for two reasons: the values of the assets plans hold (such as stocks and bonds) decline during recessions and also state and local governments contribute less during recessions (as shown above). After both the recession in the early 2000s and the 2007-2009 recession, funded ratios fell and did not increase much during the recoveries, which is an unsustainable pattern. A possible explanation is that because most plans are now paying out more than they are taking in each year (see the discussion of Figure 2), there is less money to replenish assets that have been depleted by market downturns.

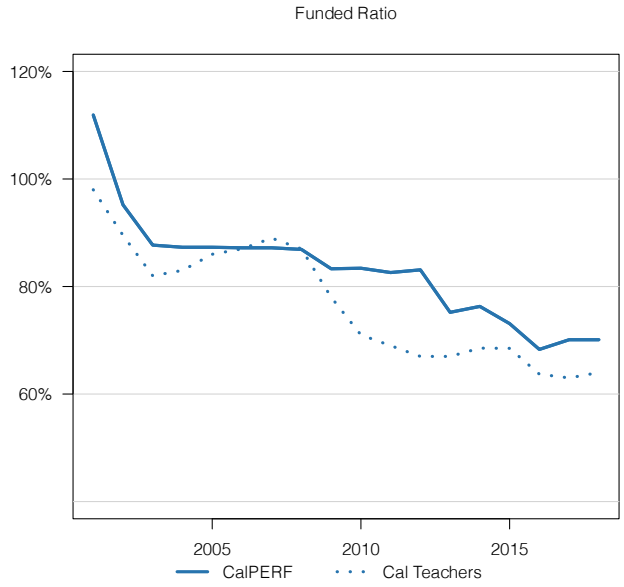
Another way to see how past and present contribution decisions relate to the future is to compare the stock of unfunded liabilities to measures related to income or value generation in the economy. We consider three such measures: U.S. GDP (Figure 9), state and local government receipts (Figure 10), and the civilian labor force age 25 – 54 (Figure 11). All three figures tell the same story: from being fully funded on net (0 in the graphs), the ratio of unfunded liabilities to all three measures has risen substantially from 2001 to 2018. This growth could be due to a number of factors including consistent past underfunding, new assumptions about longer lifespans, and reductions in assumed returns. In the current situation, public pension plans will head into the next recession (whenever it arrives) with a large amount of implicit debt. This implicit debt can be a drag on the economy because the money going towards pension contributions will likely be diverted from spending on other government services, funded with higher taxes, or come from increases in employee contributions, all of which affect GDP.

Figure 7



Note: Percent is average weighted by annual membership.
Source: Center for Retirement Research, BLS, and authors' calculations.

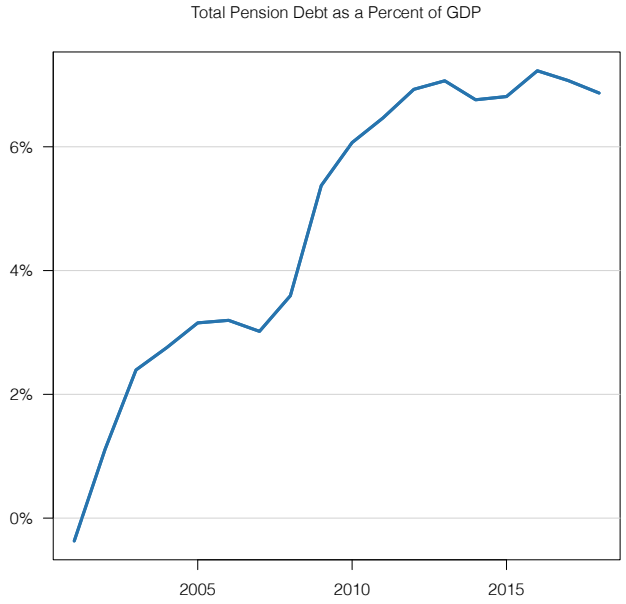
Figure 8



Source: Center for Retirement Research and authors' calculations.

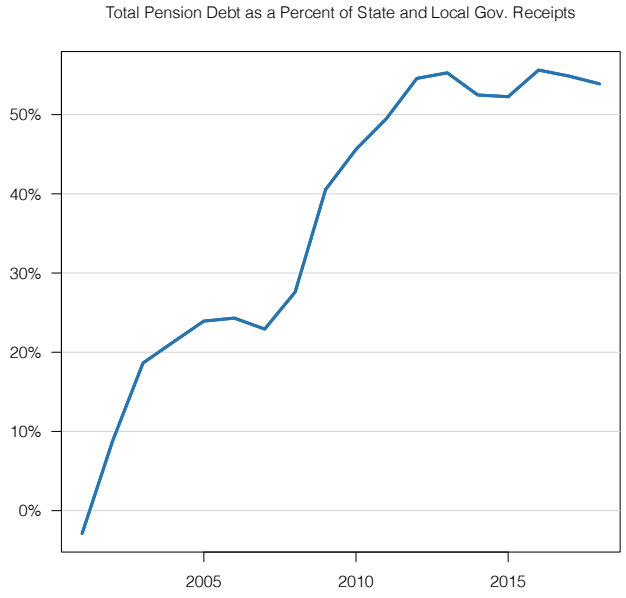
There are certainly other channels through which public pension plans and the economy affect each other (such as the benefits retirees receive and then spend, which contributes to consumption). Rather than an exhaustive documentation, the prior discussion serves to provide evidence that plans and the economy do indeed interact.

Figure 9



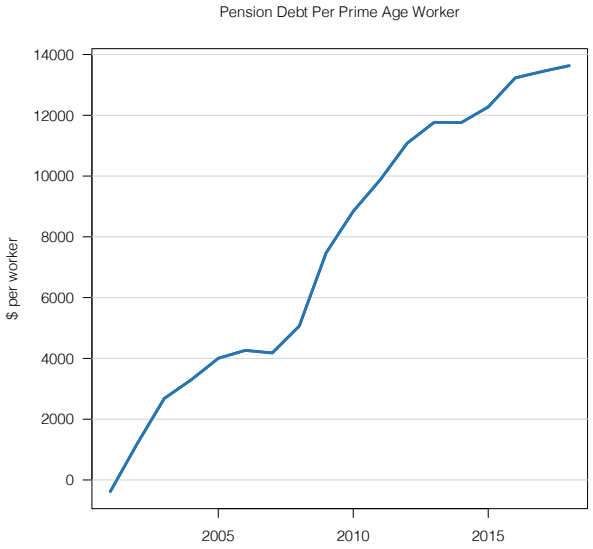
Note: Total debt (numerator) and U.S. GDP (denominator).
Source: Center for Retirement Research, BEA, and authors' calculations.

Figure 10



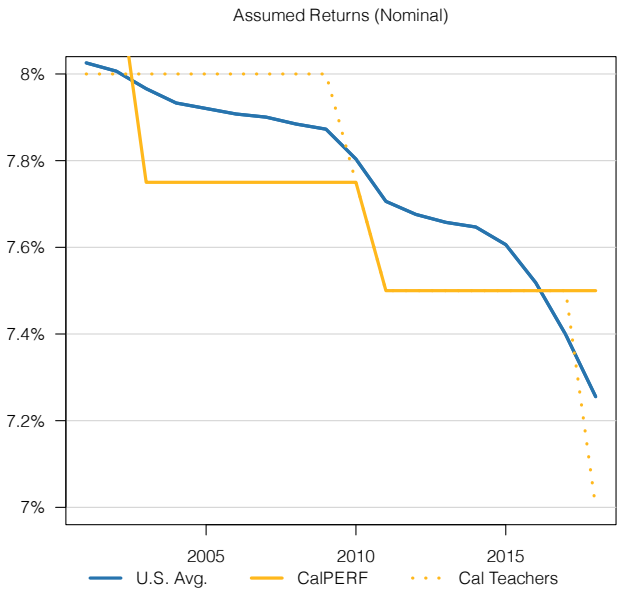
Note: Total debt (numerator) and total receipts (denominator).
Source: Center for Retirement Research, BEA, and authors' calculations.

Figure 11



Note: Total debt (numerator) and civilian labor force age 25 –54 (denominator).
Source: Center for Retirement Research, BLS, and authors' calculations.

Figure 12



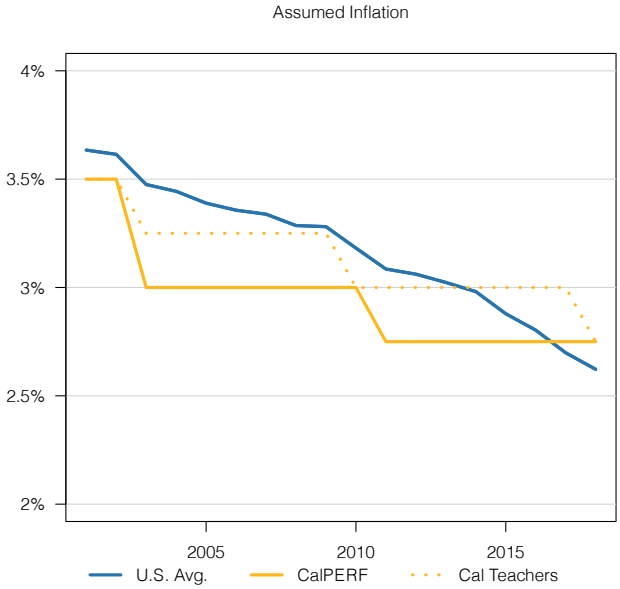
Note: Average percent weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

Changing plan assumptions about investment returns

The metrics we presented above rely on various assumptions about plan participants and the future macroeconomy. Two of these are the assumptions about (nominal) investment returns and inflation over the long run. By subtracting assumed inflation from assumed nominal returns, we can infer the assumed real return. Because small changes to these assumptions have large implications for required inflows and the present value of future liabilities, studying these assumptions and why they change can help understand the outlook for public pension plan finances.

Figure 12 - Figure 14 show return and inflation assumptions on average and for two California plans. Both assumed nominal returns (Figure 12) and inflation (Figure 13) have been steadily declining. Since assumed inflation has fallen more rapidly than assumed nominal returns, implied assumed real returns have actually increased since 2001 (Figure 14). Unsurprisingly, return assumptions are positively correlated with long run stock market trends. We say 'unsurprisingly' because these assumptions are meant to reflect projections of returns and inflation over the long term. The statistical correlation between assumed real returns and real stock market returns is about 0.7.[2] While this correlation is strong and positive, it is not equal to one, which leaves open the possibility that plans' assumptions are not exclusively based on long run trends.

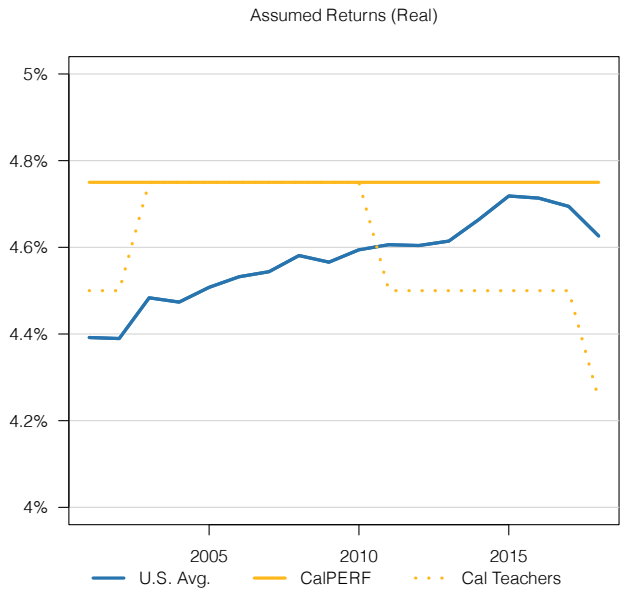
Figure 13



Note: Average percent weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

2. The correlation is between the average annual assumed real return and the real 30-year annualized return on the S&P 500 index.

Figure 14

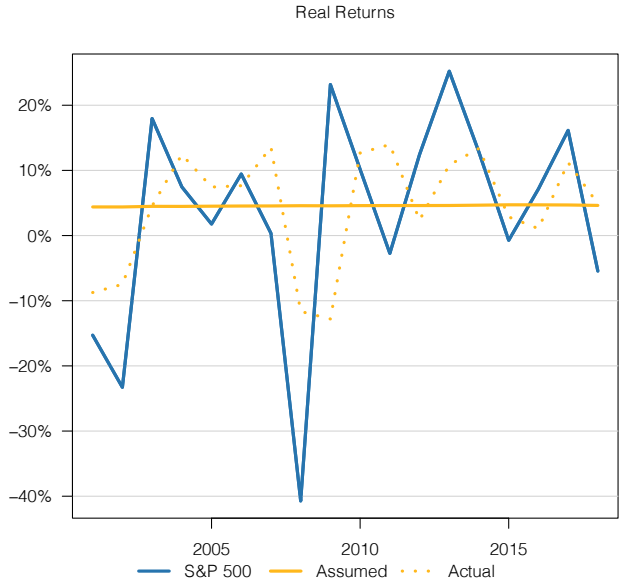


Note: Average percent weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

We explore three possible factors, beyond long-term trends, that could affect how plans form assumptions about returns.[3] The first possibility we explore comes from psychology and behavioral economics. Studies have found that retrospective evaluations are heavily influenced by a few memorable events, particularly the most intense or extreme moment and the most recent moment (Redelmeier and Kahneman 1996, Kahneman et al. 1993), and there is some evidence that individual investors respond to market highs and lows (Malmendier and Nagel 2011). We test this idea in the context of public pension plans by asking whether recent market returns and market highs and lows affect a plan's assumed real return. Formal statistical analysis follows, but Figure 15 provides visual evidence, showing average assumed real returns, average real annual returns plans actually experienced, and the annual real return on the S&P 500 index. Actual plan and S&P 500 index returns are much more volatile than assumed returns, which do not seem to be influenced by recent experiences. We test formally for effects of recent, high, and low market returns on assumed returns with a regression analysis. The equation below summarizes the results of regressing assumed real returns on recent market returns (S&P 500 index real return over the past year and three lags) and on market highs and lows (the highest and the lowest annual real return on the S&P 500 index since the year of the plan's inception).[4] Bold values are statistically significant at the 5% level.

Assumed real return
= **0.040** + **0.074** * S&P 30-yr annualized return
+ 0.003 * S&P 1-yr return
- 0.002 * S&P 1-yr return, 1 month lag
- 0.006 * S&P 1-yr return, 2 month lag
+ 0.005 * S&P 1-yr return, 3 month lag
-0.014 * S&P 1-yr return, min since plan inception
-0.004 * S&P 1-yr return, max since plan inception
[N = 2,990; adjusted R2 = 0.339]

Figure 15



Note: Assumed and actual percent weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

3. The analysis focuses on assumed real returns, but the results are qualitatively similar when using assumed nominal returns.
4. Under the assumption that recent, peak, and trough returns are unrelated to other (unobserved) factors that affect return assumptions and that a plan's actions do not affect market returns, the relationships we identify can be interpreted causally. In this and all subsequent regressions, we also include state fixed effects (to control for unobservable factors at the state level, such as legislation, that could affect assumptions) and the 30-year annualized real S&P 500 index return (because this captures long-term trends that plans reasonably use to form assumptions). We do not report these coefficients for brevity.

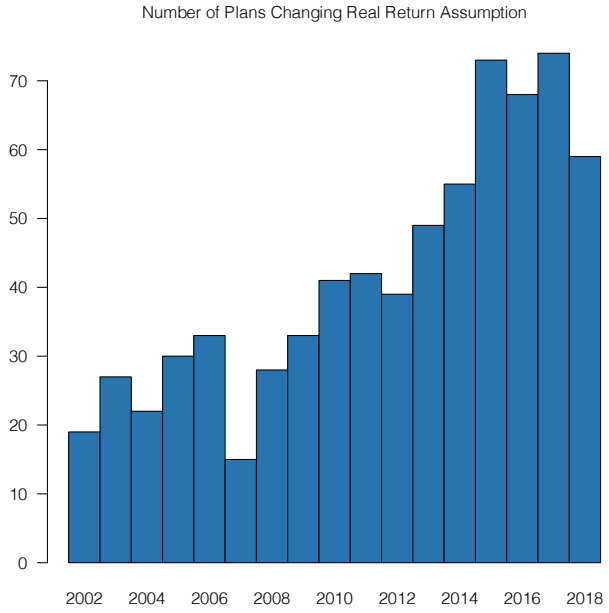
Market peaks and troughs do not appear to affect assumed real returns. There is some mixed evidence of the effect of recent real S&P 500 index returns on assumed real returns: some of the coefficients on annual real S&P 500 index returns and its lags are positive and significant (indicating that higher recent real returns encourage higher assumed real returns), but some of the coefficients are negative and significant (indicating that lower recent real returns encourage higher assumed real returns). In either case, the magnitudes are quite small. A one percentage point increase in recent returns would only change assumed returns by about 0.002 to 0.006 percentage points. The results suggest that plans are not swayed by salient (though likely uninformative) events (market highs and lows), and may be influenced by recent events, though not by much. One interpretation of the stability of plans' assumptions is a reassuring one: long term trends should not be shaken by year to year volatility, and this largely seems to be the case.

Another hypothesis is that peers (that is, other plans) affect a plan's assumptions, and particularly the decision to change assumptions. In testing this hypothesis we assume that information about long run prospects for asset markets evolve slowly – that information learned in any particular year does not drastically and immediately change the long-term outlook. Under this assumption, plans should update their assumptions about returns at roughly a constant rate over time and we should expect to see that the number of plans updating assumptions each year is a smooth series. Figure 16 indicates that this is not the case, showing instead that plan updates tend to come in waves. One interpretation is that plans look to their peers and make changes when peers do. We use the equation below to formally test this idea. (As before, bold values are statistically significant at the 5% level.)

Change in assumed real return
= 0.0004 - 0.014 * S&P 30-yr annualized return
+ 0.308 * Avg. change in peer assumed real return
+ 0.268 * Avg. change in peer assumed real return, lag
[N = 2,955; adjusted R2 = 0.013]

The coefficients of interest are those on the change in the assumed real return of a plan's peers from one year ago to the current year and from two years ago to one year ago. Changes in peers' assumed returns over the past year have a statistically significant effect on changes to real return assumptions a plan makes this year: when peers, on average, increase their assumed real returns by 1 percentage point, a plan responds by raising its assumed return by about 0.3 percentage points. An unsatisfying outcome of this analysis is that the logic is circular: plans may look to their peers, but this analysis cannot determine what induced those peer plans to update their assumptions.

Figure 16



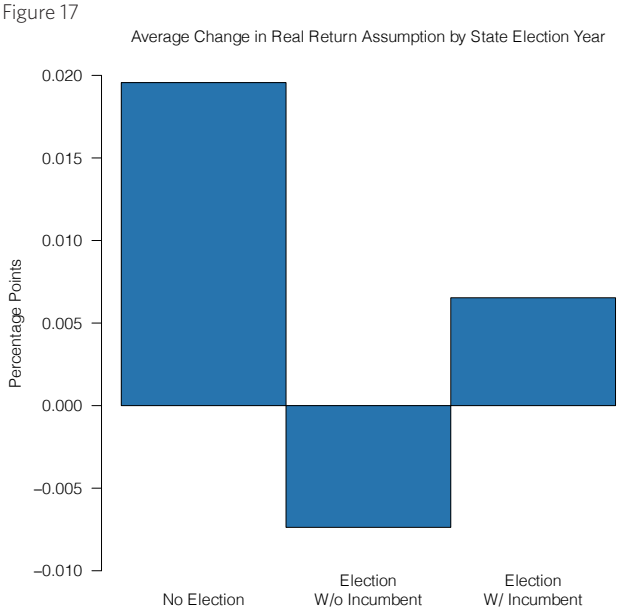
Source: Center for Retirement Research and authors' calculations.

As a last test to understand how plans make return assumptions, we turn to politics. Public pension plans are ultimately funded by taxpayers. In a state gubernatorial election year, governors, especially incumbent governors, may benefit from public perception that public pension plans are in good financial condition. Higher assumed returns increase the present value of a plan's assets and thus reduce the burden of any unfunded liabilities. Some support for this story is in Figure 17. In election years with incumbent governors, the average change in real assumed return is an increase of about 0.006 percentage points, relative to a decrease of about 0.007 percentage points in election years with no incumbents. The figure also indicates that reality is more complicated than our simple story, as changes in real returns are largest in

5. The assumption that allows us to identify causal effects of elections on assumed real return is that the timing of state elections does not change the long-term financial outlook plans face – that the exact years in which state elections happen to fall are unrelated to factors that plans use to make return assumptions. This assumption could be violated if plans consistently expect new regulations that will systematically harm or benefit their long-term outlook following gubernatorial elections. We think the chance that this is the case is minimal.

non-election years (when, following the narrative, governors may be under less pressure to appease tax payers, and thus more willing to support lowering, rather than raising, return assumptions). Regression analysis confirms the pattern in the figure: relative to non-election years, changes in real returns in election years are smaller but only significantly so for elections without incumbents running.[5] Though our simple story does not explain all of the patterns, we interpret the results as there being some evidence that public pension plans are not insulated from the political cycle.

Figure 17



Note: Change is average weighted by annual membership.
Source: Center for Retirement Research and authors' calculations.

The above analysis provides some insights into how plans choose and choose to change assumed real returns. While our analysis does not aim to fully explain this decision process, we do find some evidence that non-standard factors such as recent market returns, peers' decisions, and politics can affect a plan's assumptions.

Conclusion

We want to close by returning to Figure 7, a series that relies on assumed returns. The figure underscores why business cycles and the financial outlook affect public pension plans. The figure suggests that plans have not, on average, recovered from the last two recessions, where 'recovered' means returning to 100% funded. Plans are long-lived and thus have the ability to ride out short-term business cycle swings, but also face the challenge of recovering from downturns while looking decades into the future. The current and projected environment of low bond returns further hampers recovery efforts, potentially putting plans under pressure to further reduce assumed returns, which would then increase both the value of unfunded liabilities and the difficulty of returning to fully funded status.

References

CQ Press Voting and Elections Collection. 2019. [data]

Kahneman, Daniel, Barbara L. Fredrickson, Charles A. Schreiber, and Donald A. Redelmeier. "When more pain is preferred to less: Adding a better end." Psychological Science 4, no. 6 (1993): 401-405.

Pew Charitable Trusts. "The State Pension Funding Gap: 2017." Issue Brief. June 27, 2019.

Public Plans Data. 2001-2018. Center for Retirement Research at Boston College, Center for State and Local Government Excellence, and National Association of State Retirement Administrators. [data]

Malmendier, Ulrike, and Stefan Nagel. "Depression babies: Do macroeconomic experiences affect risk taking?" The Quarterly Journal of Economics 126.1 (2011): 373-416.

National Association of State Retirement Administrators (NASRA). "State and Local Government Spending on Public Employee Retirement Systems." Issue Brief. March 2019.

Redelmeier, Donald A., and Daniel Kahneman. "Patients' memories of painful medical treatments: Real-time and retrospective evaluations of two minimally invasive procedures." Pain 66.1 (1996): 3-8.

Shiller, Robert J. Irrational exuberance: Revised and expanded third edition. Princeton university press, 2015. [data]

Urban Institute. "Data Query System (SLF-DQS)." State and Local Finance Initiative. [data]