Spillovers from state and local pensions to Social Security: Do benefits for uncovered workers meet federal standards?

Authors: Laura D. Quinby, Jean-Pierre Aubry, Alicia Haydock Munnell

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Laura D. Quinby, Jean-Pierre Aubry, and Alicia H. Munnell

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Center for Retirement Research at Boston College
Hovey House
140 Commonwealth Avenue
Chestnut Hill, MA 02467
Tel: 617-552-1762 Fax: 617-552-0191
http://crr.bc.edu

All of the authors are with the Center for Retirement Research at Boston College. Laura D. Quinby is a research economist. Jean-Pierre Aubry is associate director of state and local research. Alicia H. Munnell is director and the Peter F. Drucker Professor of Management Sciences at Boston College's Carroll School of Management. The research reported herein was performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement Research Consortium. The opinions and conclusions expressed are solely those of the authors and do not represent the opinions or policy of SSA, any agency of the federal government, or Boston College. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of the contents of this report. Reference herein to any specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply endorsement, recommendation or favoring by the United States Government or any agency thereof. The authors thank Richard C. Shea and his team at Covington & Burling, LLP for clarifying the federal statutes; Mark Warshawsky and participants at the SSA-NBER Conference on *Changes and Challenges Facing State Retirement Systems* for helpful suggestions; and Wenliang Hou for excellent research assistance.

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Center for Retirement Research at Boston College
Hovey House
140 Commonwealth Ave
Chestnut Hill, MA 02467
Tel: 617-552-1762 Fax: 617-552-0191
http://crr.bc.edu

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Abstract

Federal law allows certain state and local government employees to be excluded from Social Security coverage if they are covered by an employer pension of sufficient generosity. Public sector retirement systems have grown less generous in recent years, and a couple of plans could exhaust their assets in the next decade, putting benefits at risk. If pension sponsors are inattentive to federal generosity requirements when cutting benefits, current and future initiatives to curb costs may conflict with their obligations to the U.S. Social Security Administration (SSA). This project combines data from a variety of sources to assess whether state and local governments are currently satisfying the federal standards and whether the standards continue to provide benefits of equal generosity to Social Security.

The paper found that:

- Although public plans satisfy the regulations, uncovered state and local government employees do not always receive Social Security-equivalent resources in retirement because the law regulates benefits only at age 67 (rather than lifetime benefits) and allows for long vesting periods.
- State and local pensions often set very long vesting periods and are increasingly unlikely to grant full cost-of-living adjustments (COLA) after retirement. Yet, they also allow members to collect full benefits at much younger ages than Social Security. Incorporating vesting, the COLA, and the normal retirement age into a generosity test based on lifetime pension wealth shows that some plans fall short, but this finding is very sensitive to the employment patterns of the uncovered employees.
- A couple of plans that exclude their members from Social Security could soon exhaust the assets in their trust funds and revert to pay-as-you-go systems, endangering future benefits and putting them in violation of federal generosity standards.

The policy implications of the findings are:

- Federal generosity standards for state and local pensions could be updated to ensure Social Security-equivalent protections.
- Over time, mandatory enrollment of state and local government employees in Social Security would obviate the need for federal monitoring of their pensions.

Introduction

In 2018, one-quarter of all state and local government employees – approximately 5 million workers – were not covered by Social Security on their current job. The Social Security Act of 1935 excluded all state and local government employees from coverage because of constitutional ambiguity over the federal government's authority to impose FICA taxes on public employers and because these employees were already covered by defined benefit pensions (Internal Revenue Service, 2014). Beginning in the 1950s, a series of amendments allowed government employers to enroll certain employees in Social Security, and by 1991, most state and local government employees were covered by the program. Today, government employees are permitted to remain outside of Social Security only if they are enrolled in a retirement plan that meets federal regulations for sufficiently generous benefits.

The legal requirements for benefit generosity are specified in the Employment Tax Regulations. Defined benefit pensions – the dominant benefit structure in the state and local sector – must provide members with an annuity, commencing on or before the Social Security full retirement age (67 for workers born after 1959), of equal value to the Primary Insurance Amount (PIA) that the member would have received at age 67 had he participated in Social Security. To help public plans determine whether they are in compliance with the regulations, the government has established "Safe Harbor" parameters intended to generate a benefit equal to that provided by Social Security for a typical uncovered public employee. Legally, state and local pensions that meet the Safe Harbor requirements comply with the Employment Tax Regulations.

The question is whether state and local governments are currently satisfying these Safe Harbor standards and whether the standards continue to provide benefits equal in generosity to Social Security. The need to assess whether state and local pensions are compliant with government standards has increased, given that financial downturns in 2001 and 2008 dramatically reduced the assets held by state and local funds and triggered a wave of benefit reductions, most often for new hires (Aubry and Crawford, 2017; Aubry, Crawford, and Munnell, 2017; Munnell et al., 2013; and Munnell, Aubry, and Cafarelli, 2014). Additionally, a couple of government plans without Social Security – the Policemen's Annuity and Benefit Fund of Chicago and the Municipal Employees Annuity and Benefit Fund of Chicago – could soon exhaust their assets and revert to pay-as-you-go, seriously endangering future benefit payments and putting them in violation of federal generosity requirements (Monahan, 2017).

Given recent benefit cuts and looming future reductions for some plans, this paper explores the extent to which uncovered public employees are receiving benefits commensurate with what they would have received under Social Security. The first step is to determine whether the retirement plans for uncovered state and local government employees satisfy the Safe Harbor parameters and whether these parameters provide Social Security-equivalent income at age 67. Comparing benefit designs for a large sample of uncovered plans to the legislated parameters of the Safe Harbor plans shows that all meet the Safe Harbor requirements. To determine whether the legislated Safe Harbor parameters produce the required income at age 67 involves calculating benefit accruals over the work life of a typical employee under a Safe Harbor plan and under Social Security. This exercise suggests that participation in the Safe Harbor plan produces about the same level of benefits at age 67 as Social Security.

Although both the public plans and the Safe Harbor plans satisfy the letter of the law, uncovered state and local government employees do not necessarily receive Social Security-equivalent resources in retirement for two reasons. State and local pensions often set very long vesting periods and are increasingly unlikely to grant full cost-of-living adjustments (COLA) after retirement. This lack of generosity is partially offset by much younger normal retirement ages (NRA) in state and local pensions. Incorporating vesting, the COLA, and the normal retirement age into a generosity test requires calculating the present value of lifetime retirement benefits – arguably a more meaningful measure of retirement resources – for a typical uncovered public employee and for a worker continuously covered by Social Security. This calculation shows that 43 percent of plans fall short, although it is very sensitive to the employment and earnings patterns of the uncovered employees.

Finally, the paper grapples with an additional complication caused by very low funded ratios in a number of pensions for uncovered state and local government employees. A simple projection of pension cash flows, using data from the Public Plans Data website (PPD), reveals that two Chicago plans could exhaust their assets within 10 years. The paper summarizes the ongoing debate over the legal responsibility of state and local governments to provide full benefits once trust funds are exhausted.

The paper proceeds as follows. The next section presents an overview of federal regulations around benefit generosity and frames the exercise within the existing literature on state and local pension finances. The third section compares the designs currently offered to uncovered state and local government employees to the Safe Harbor requirements and examines

whether the Safe Harbor designs provide Social Security-equivalent benefits at age 67. The fourth section introduces the differing provisions for vesting, COLAs, and normal retirement ages before calculating lifetime retirement wealth for the typical uncovered state and local employee and for a worker continuously covered by Social Security. The fifth section addresses the issues surrounding the exhaustion of pension trust fund assets. The final section concludes with a discussion of potential policy responses should a public plan violate federal standards. Figures and tables follow the references; methodological details and supporting materials can be found in the Appendices.

Background

This section outlines the federal standards regulating retirement benefit generosity in the state and local government sectors, then briefly discusses prior research on the topic.

An Overview of Federal Generosity Requirements for State and Local Retirement Plans

Until the 1950s, wages in the public sector were not subject to payroll taxes, and employees earned no Social Security credit for their time in government. A series of amendments to the Social Security Act, enacted between 1951 and 1994, allowed state and local governments to enroll some of their employees by establishing job-specific Section 218 agreements with the SSA.[1] The Omnibus Budget Reconciliation Act of 1990 further amended Section 218 to mandate coverage for all state and local government employees who are excluded from their employer's retirement plan. However, the amendment to Section 218 did not clarify the definition of an employer "retirement plan," so the Budget Act also established Section 3121 of the Internal Revenue Code (IRC) to help government employers determine whether their employees were exempt from mandatory Social Security coverage.[2] IRC Section 3121 authorized the Secretary of the Treasury, in coordination with the Social Security Administration, to limit the definition of a retirement plan by setting minimum benefit requirements (Federal Register, 1991). In theory, IRC Section 3121 was designed to ensure that

[1] A single government may employ both covered and uncovered workers. Early amendments prohibited many states from enrolling police officers and firefighters, but other employee groups could elect coverage with a referendum by secret ballot. All states were allowed to enroll police and firefighters beginning in 1994. In 1983, existing and future Section 218 agreements were made irrevocable. The vast majority of state and local government employees are covered by Medicare, which became mandatory for new hires in 1986.

[2] Section 31.3121(b)(7)-2 of the Employment Tax Regulations.

state and local government employees are either covered by Social Security or by an employer-sponsored pension "providing meaningful benefits" that are "comparable" to Social Security (Federal Register, 1991, p. 14488).

The minimum benefit requirements described in IRC Section 3121 are very specific. A defined benefit plan meets the requirements with respect to an employee "if and only if, on that day, the employee has an accrued benefit under the system that entitles the employee to an annual benefit commencing on or before his or her Social Security retirement age that is at least equal to the annual Primary Insurance Amount the employee would have under Social Security."[3] The legislators' conceptual view of benefit generosity is worth considering. First, it is not sufficient for an employee's benefit to be equally generous at the time of separation from government employment; instead, he must accrue public pension benefits *at the exact same rate,* over the course of his career, as he would have accrued Social Security benefits. Second, by comparing the public pension benefit to the Social Security PIA – defined as the benefit that a worker would receive if he claimed at his full retirement age – the legislators focused on retirement income adequacy at only one point in time.[4]

Perhaps recognizing that traditional defined benefit pensions might not provide the Social Security PIA to every member on every day, the Treasury issued a contemporaneous revenue procedure 91-40 describing Safe Harbor formulas for defined benefit plans. The formulas are designed to produce a benefit equal to the Social Security PIA for the "average wage earner," and any plan that adopts one of the formulas satisfies the minimum benefit requirement for all employees in the plan (Federal Register, 1991).[5] Table 1 outlines the acceptable formulas for defined benefit plans. All of the formulas assume an age-65 normal retirement age and lack Social Security's guaranteed COLA. IRC Section 3121 also outlines a Safe Harbor design for defined contribution plans (tax-deferred savings accounts), requiring total contributions to equal at least 7.5 percent of salary annually, and assets to be managed according to fiduciary standards.

[3] 26 CFR Ch. 1 Section 31.3121(b)(7)-2(e)(2). The statute also stipulates that part-time, seasonal, and temporary employees be immediately vested in their retirement plan to enhance portability across employers.
[4] The legislators also focused on base Old-Age benefits for the primary earner, without requiring public pensions to provide spousal, survivor, or disability benefits comparable to Social Security.
[5] A plan-formula approach was adopted because the administrative burden of confirming benefit levels for every plan member would have been too high.

Prior Research

Despite the strong legal link between state and local pension generosity and Social Security coverage, the issue remains largely undiscussed. It is not clear that the benefits earned by newly hired state and local government employees satisfy the Safe Harbor requirements because years of inadequate contributions and two stock market downturns have left many public sector defined benefit plans with insufficient assets to cover their liabilities, and government sponsors have responded by reducing the generosity of benefits (Brown and Wilcox, 2009; Novy-Marx and Rauh, 2014; and Aubry, Crawford, and Munnell, 2017). The cuts frequently target new hires because state statutes typically protect accrued pension benefits as contractual obligations that cannot be impaired (Munnell and Quinby, 2012). These benefit reductions for new hires included cutting the COLA, reducing the benefit multiplier, increasing the final average salary period, and tightening the eligibility requirements for retirement (Quinby, Sanzenbacher, and Aubry, 2018).[6] Occasionally, governments have also cut the COLA for current workers, by arguing in court that only first-year benefits are protected by statute. In the wake of these cutbacks, state and local pensions may not be matching Social Security for new hires. For example, Kan and Aldeman (2014) demonstrate that Chicago teachers, who are not covered by Social Security, often earn less pension wealth than they would have earned under Social Security.

In addition, the legal hurdles to cutting promised benefits have left some state and local governments responsible for legacy liabilities that they will be unable to meet (Munnell and Aubry, 2016). In a scenario in which sponsors exhaust the assets in their pension trust funds and revert to pay-as-you-go, legal scholars question whether state legislatures could be forced to pay promised benefits in full (Monahan, 2010 and 2017; Cloud, 2011; and Reinke, 2011). The federal generosity standards make no provision for an exhaustion scenario.

Do Current Benefits for Uncovered New Hires Satisfy the Letter of the Law?

This section assesses the generosity of benefits currently offered to uncovered state and local government employees within the legal framework described previously. The analysis has two goals: to determine whether retirement benefits for uncovered new hires meet the Safe

[6] Defined benefit pensions calculate benefits as: benefit multiplier * final average salary * years of tenure.

Harbor requirements and to confirm that the Safe Harbor benefits provide Social Security-equivalent income at age 67.

To this end, data on Social Security coverage were gathered from two independent surveys of plan administrators, conducted by the authors and by the National Association of State Retirement Administrators, and detailed descriptions of state and local retirement benefits for plans without Social Security coverage were obtained from plan *Actuarial Valuation Reports*. The surveys focused on large state-administered retirement systems in the 13 states that employ 80 percent of total uncovered state and local payroll (Government Accountability Office, 2010).[7] Ultimately, the sample consists of 81 benefit designs in 38 retirement plans that were found to have uncovered workers in the 13 states of interest.

Table 2 shows that the Social Security coverage rates for these 13 states are consistent with those reported by the Government Accountability Office (2010). The differences that do exist reflect the fact that this paper counts employees, whereas the Government Accountability Office counts earnings. Since nearly 90 percent of teachers in the 13 sampled states were excluded from Social Security (see Figure 1), and teachers tend to be more highly paid than other public employees, an earnings-based calculation will show a larger percentage uncovered than an employee-based calculation.[8]

Figure 2 shows how the number of retirement systems and benefit designs vary geographically. Since benefit designs often vary by occupation, the number of designs in Figure 2 exceeds the number of systems in most states. Most of the designs for uncovered workers are still structured as traditional defined benefit pensions, although seven systems offer voluntary defined contribution plans, and three offer either mandatory or voluntary hybrid plans.[9] Five systems have adopted a cash-balance structure for at least some members.

[7] Appendix Table A1 lists the 56 retirement systems surveyed. Large state-administered retirement systems are more likely to share information with researchers. Teachers and state employees always participate in large retirement systems administered by the state, whereas local employees – especially police and firefighters – often participate in small locally administered retirement systems that do not appear in the sample. Appendix Table A2 calculates total membership in the retirement systems for which coverage data are available, relative to total defined benefit membership in each state. With a couple of exceptions, the survey was able to obtain information on at least 80 percent of total state and local defined benefit membership in each state.

[8] The finding that teachers are most likely to be uncovered is similar to Kan and Aldeman (2014).

[9] Hybrid plans in the public sector add a defined contribution component to a less-generous defined benefit plan.

Do Retirement Benefits for Uncovered New Hires Meet the Safe Harbor Requirements?

Recall that the Safe Harbor provisions require public plans to match or exceed a set of parameters described in the regulations. Table 3 summarizes the relevant parameters for the sample of uncovered defined benefit and defined contribution plans. The normal retirement age in the defined benefit plans never exceeds the Social Security full retirement age of 67 (for workers born after 1959) and is often substantially younger, with a median age of 62. Similarly, benefit multipliers are typically more generous than those required by law. On the defined contribution side, the median total contribution rate is 18 percent of salary and the sample minimum is 10 percent, well above the federal contribution requirement of 7.5 percent. In short, the benefits earned by uncovered state and local new-hires appear to satisfy the Safe Harbor requirements.

Do the Safe Harbor Designs Provide Social Security-Equivalent Benefits at Age 67?

The next step is to determine whether the Safe Harbor parameters still satisfy the guiding legislation in IRC Section 3121, which states that retirement benefits at age 67 should be equivalent to the Social Security PIA. The Safe Harbor plans could fall short because final-pay defined benefit pensions are back-loaded, providing generous benefits to long-tenure workers, but relatively little to their short and medium-tenure colleagues (Poterba et al., 2007; Diamond et al., 2010; Costrell and Podgursky, 2009; Beshears et al., 2011; and Quinby, 2017). In contrast, Social Security benefits accrue linearly because benefits are calculated as a percentage of real, rather than nominal, earnings.

This phase of the analysis compares the Safe Harbor benefits to Social Security for a hypothetical worker who enters the labor market in 2018 at age 25 and spends some of his career in uncovered government employment. The analysis focuses on the Safe Harbor defined benefit parameters outlined in the first row of Table 1 (all of the designs in Table 1 are actuarially equivalent). This design offers a 1.5-percent benefit multiplier, a three-year final average salary period, an age-65 NRA, and no COLA. Since none of the Safe Harbor plans legislate a vesting requirement, the analysis assumes immediate vesting. Safe Harbor benefits at age 67 are simply calculated as: benefit multiplier * final average salary in the uncovered job * total tenure in the uncovered job.

Social Security benefits are calculated without considering any time spent in the private sector, as stipulated by IRC Section 3121. Specifically, the worker's earnings history credits the

years spent in the uncovered public sector and assumes no other covered employment. The Windfall Elimination Provision (WEP) is not applied.[10] For analytical tractability, and to maintain the spirit of IRC Section 3121, the exercise considers only individual benefits. Since the hypothetical worker will retire many years in the future, the calculation of Social Security benefits requires projections of several program parameters, including the Average Wage Index (AWI), the COLA, the Contribution and Benefit Base (maximum taxable earnings), and the PIA bend points. The AWI and COLA are assumed to grow by the long-run intermediate assumptions in the 2018 Social Security Trustees Report; the Contribution and Benefit Base and PIA bend points are projected using legislated formulas that reference the AWI.[11]

Key to the calculation is a set of assumptions about the earnings history of the hypothetical worker. For the Safe Harbor calculation, the worker's earnings history determines his final average salary and total tenure in the uncovered job. For Social Security, the earnings history determines his Average Indexed Monthly Earnings, which is the basis for calculating his annual benefit. The hypothetical worker joins the government at age 35 (in 2028) with a $50,000 starting salary and his wages grow by 3.8 percent annually.[12] His tenure in government is allowed to vary between one and 30 years to reflect the fact that the future tenure of new hires is highly uncertain. Forty-five percent of new hires stay on the job for no more than five years, 16 percent stay for six to 10 years; 32 percent stay for 11 to 30 years, and seven percent stay for more than 30 years (Munnell et al. 2012). The average expected tenure of new hires is 12 years.

Figure 3 presents the results from this exercise. Benefits (in nominal age-67 dollars) are graphed against the number of years spent in the state or local government position. Between one and 10 years of state or local tenure, the Safe Harbor design provides more income at 67 than Social Security because the worker has not yet earned 40 quarters of covered earnings. After 10 years of tenure the relationship flips, with the Safe Harbor plan providing 42 percent

[10] The WEP reduces the PIA of workers who have zeros in their earnings record due to state or local government employment. The provision is intended to counteract the progressivity of the PIA formula, since the AIME of uncovered workers will be low relative to their lifetime earnings. See Brown and Weisbenner (2013) for a detailed discussion of the WEP.

[11] See Appendix B for the details of these formulas.

[12] The starting salary is consistent with membership data published in pension *Actuarial Valuation Reports.* The wage growth assumption is the long-run intermediate assumption of the 2018 Social Security Trustees Report. Public pension actuaries typically assume annual wage growth between five and 10 percent (nominal) during the first 10 to 15 years of public employment, decreasing as the worker ages and flattening to around four percent after 20 years of tenure. Since this earnings profile is very steep relative to the private sector profiles estimated by the Federal Reserve Bank of Atlanta's *Wage Growth Tracker,* this study adopts wage-growth assumptions consistent with the Social Security actuaries, which are reflective of the private sector.

less on average than Social Security. By 30 years of tenure, however, the Safe Harbor plan catches up with Social Security and provides roughly equivalent benefits.

Although Figure 3 seems to indicate that the Safe Harbor falls short for the third of uncovered state and local government employees who separate with 11 to 30 years of tenure, these workers could still end up secure if they earned Social Security benefits in the private sector. To demonstrate this point, the analysis recalculates Social Security benefits with a more realistic earnings history. The worker receives positive earnings for Social Security purposes for all of the years he spent outside of the uncovered state or local sector and zero earnings for the uncovered years. Social Security benefits are reduced according to the WEP. The analysis then creates a measure of total retirement income at age 67 by adding Safe Harbor benefits to the covered PIA. Figure 4 displays the results. Unlike before, time spent in uncovered government employment has little effect on age-67 income. This exercise suggests that the Safe Harbor defined benefit plans successfully match Social Security benefits at age 67.

The conclusion is less clear for the Safe Harbor defined contribution plan, which produces a stock of assets at age 67 rather than an annual benefit. In theory, this stock of assets should be sufficient to generate Social Security-equivalent benefits in retirement. A more straightforward comparison measures the Safe Harbor account balance at age 67 against the present value of lifetime Social Security benefits. In order to account for time spent in the private sector, this analysis adopts the spirit of Figure 4, simulating the Safe Harbor account balance and adding the Safe Harbor assets to Social Security wealth earned in the private sector.

The analysis assumes that contributions to the Safe Harbor account – 7.5 percent of salary – are invested safely and yield a guaranteed nominal return of 5.3 percent annually.[13] Contributions cease once the hypothetical worker separates from his uncovered position, but assets in the account continue to grow until the worker reaches age 67. The present value of lifetime Social Security benefits is calculated by adjusting each future benefit by the COLA, multiplying the projected benefit by the probability that the worker is still alive, and discounting these amounts to age 67.[14] For consistency, the discount rate is set equal to the worker's expected return on assets.

[13] This return assumptions equals the assumed long-run real Treasury yield from the 2018 Social Security Trustees report plus inflation.

[14] The present value calculations employ a 50-50 male-female split of the cohort mortality tables developed for the 2017 Social Security Trustees Report. The cohort tables were obtained through a request to the Social Security Office of the Chief Actuary. The present value formulas are detailed in Appendix B.

The assumption about COLAs raises an interesting issue. The Safe Harbor defined benefit plan does not provide a COLA, suggesting that Safe Harbor defined contribution wealth should be compared to the present value of unadjusted Social Security benefits. Yet, Social Security benefits do have a COLA in practice, and ignoring this adjustment paints an unrealistic picture of the defined contribution plan. As a compromise, the analysis calculates Social Security benefits with and without the COLA and finds that the conclusion does not change. Figure 5 suggests that, unlike the defined benefit plan, the Safe Harbor defined contribution plan may not generate enough wealth to compensate uncovered state and local government employees for lost Social Security benefits.

Do Current Benefits for Uncovered New Hires Provide the Same Lifetime Resources as Social Security?

Although the defined benefit plans for uncovered state and local government employees satisfy the Safe Harbor requirements, and the Safe Harbor defined benefit plans achieve the goal of IRC Section 3121, it is still not clear that the uncovered employees enjoy Social Security-equivalent resources in retirement. The Safe Harbor plans ignore three key contributors to lifetime resources that differ between the public pensions and Social Security. On the negative side, state and local pensions often set very long vesting periods and are increasingly unlikely to grant full COLAs after retirement.[15] For example, the median vesting period is 10 years; and 15 percent of plans for uncovered workers award COLAs only on an ad-hoc basis or when plan investments perform well, while an additional 20 percent of plans award only simple (non-compounding) COLAs (see Table 4). On the positive side, state and local pensions allow members to collect full benefits at much younger ages than they would under Social Security (see Table 3).

Incorporating these factors into the generosity test requires a conceptual transition from age-67 benefits to lifetime retirement wealth. Specifically, the new standard calculates the following ratio:

[15] Most public sector defined benefit plans require employees to contribute to prefund benefits. These contributory plans frequently allow non-vested members who separate from the government to withdraw their employee contributions having earned a low rate of interest. Consistent with Kan and Aldeman (2014), this analysis does not treat withdrawn contributions as retirement benefits.

$$\frac{Uncovered\ Pension\ Wealth + Covered\ Social\ Security\ Wealth}{Counterfactual\ Social\ Security\ Wealth} \quad (1)$$

Uncovered pension wealth is defined as the present value of future state and local pension benefits from uncovered employment; covered Social Security wealth is the present value of Social Security benefits earned from covered employment (adjusted for the WEP); and counterfactual Social Security wealth equals the present value of the Social Security benefits that the worker *would have received* had he never entered the uncovered government position. Throughout the discussion, the ratio in equation (1) will be referred to as the "counterfactual wealth ratio." Values greater than or equal to one indicate that the uncovered worker is no worse off (and potentially better off) than he would have been had he never entered government employment.

State and local defined benefit designs are evaluated for the same hypothetical worker used previously to assess the Safe Harbor designs. In the baseline scenario, this worker enters the labor market at age 25 in a private sector job, takes an uncovered position at age 35 with a $50,000 salary, earns 3.8 percent nominal wage growth annually, and remains in his uncovered job for 12 years, after which point he rejoins the private sector until retirement from the labor force at age 65. Public pension benefits are calculated as in Figures 3 and 4, with the parameters of each uncovered state and local plan substituting for the Safe Harbor parameters. It is assumed that the hypothetical worker claims his public pension benefit at the plan's normal retirement age, after which benefits grow according to the plan's COLA provision. The 15 percent of state and local plans that grant COLAs on an ad-hoc basis, or only when plan investments perform well, are assumed not to grant any future adjustments. For consistency across plans with different normal retirement ages, benefits are discounted to age 25.[16]

Covered Social Security benefits are calculated as in Figure 4 and are claimed by the worker at his full retirement age. Counterfactual Social Security benefits are calculated assuming that the worker incurs no zeros in his earnings record, and are claimed by the worker at his full retirement age. In both instances, the Social Security PIA is adjusted for increases in the cost of living after claiming. The benefits are discounted to age 25, using the same discount rate as for the public pension.

[16] The worker is assumed to live until at least age 25, and then have a positive probability of dying each year subsequently. This mortality assumption rewards state and local plans with early normal retirement ages. The discount rate is the long-run nominal interest rate from the 2018 Social Security Trustees Report.

The results are presented in Figure 6, which shows that 57 percent of the evaluated plans have a counterfactual wealth ratio greater than or equal to one, indicating sufficient generosity. Of course, plans that pass the test with a counterfactual wealth ratio of 1.01 provide substantively equivalent benefits to plans that fail with a ratio of 0.99. For this reason, Figure 7 plots the full distribution of plans by their counterfactual wealth ratios. The 43 percent of plans that do not pass the test provide at least 85 percent of the worker's counterfactual Social Security wealth, and most provide between 95 and 99 percent. A number of designs provide substantially more wealth than the worker would have received from Social Security alone. In particular, police officers and firefighters often earn significant pension wealth because they retire early and receive benefits for many more years than teachers (see Figure 8).

The value of each plan's counterfactual wealth ratio is very sensitive to the assumptions made about the worker's employment history, particularly his tenure in the government position. For example, Figure 9 contrasts two distributions of counterfactual wealth ratios. The first is the baseline distribution assuming 12 years of tenure (shown previously in Figure 7), while the second assumes that the worker stays only five years in the government position (45 percent of new hires). The five-year state or local worker always earns benefits at least as valuable as he would have earned from a private sector career in Social Security, and most often earns about the same as the private sector worker. This result is intuitive because the public pension provides very little, but the worker still has 35 years in which to earn full Social Security benefits in the private sector.

The counterfactual wealth ratio is also sensitive, albeit less so, to the assumption about age of entry into the public sector. Figure 10 contrasts the baseline distribution of counterfactual wealth ratios with a new distribution assuming that the worker enters his government job at age 25, instead of age 35, and stays for 12 years. The public plans are less likely to provide Social Security-equivalent benefits to the worker who enters at age 25 because the worker's public pension benefit, which is based on final salary, erodes with wage inflation for an additional 10 years.

Finally, the distribution of counterfactual wealth ratios does not appear to be sensitive to earnings levels. The high earner is assumed to earn $60,000 and enjoys 4.3 percent annual wage

growth while the low earner starts at 40,000 and sees wage growth of 3.3 percent.[17] In each case about 45 percent of plans have a counterfactual wealth ratio that falls below one (see Figure 11).

In summary, although benefit designs for uncovered state and local government employees meet the federal Safe Harbor requirements, they still fall short of Social Security for a significant minority of members. Throughout, the analysis has assumed that public pension benefits will be paid in the future as promised. The next section tests this assumption and considers whether federal regulators may want to consider the financial health of pensions for uncovered state and local government employees.

Will State and Local Retirement Benefits Be Paid in the Future as Currently Promised?

The 2008 financial crisis reduced the reported funded ratio of state and local defined benefit plans from 86 percent to 72 percent, and the trust funds have yet to fully recover (Aubry et al., 2017; Munnell et al., 2014).[18] Additionally, a handful of governments have persistently failed to make the actuarially required contributions necessary to build a meaningful stock of assets. What might happen if a public pension exhausts the assets in its trust fund and reverts to pay-as-you-go?

The legal scholarship on state and local pension plans notes a tension between strong contractual protections for promised benefits and a state's sovereign power to choose how it collects and allocates revenue. Most state statutes grant retired public employees contractual rights to the benefits that they were promised on the day that they joined the government (Munnell and Quinby, 2012). The Internal Revenue Code also discourages government sponsors from dipping into pension trust funds to pay for other services.[19] In a recent article, Monahan (2017) argues that, although state and local retirees have a legal right to disbursements from the trust fund, neither state nor federal court would grant them the right to general appropriations. Hence, so long as trust funds are well-stocked, state and local retirees can claim a legal right to the benefits that they were promised during their working life. Once trust funds are depleted,

[17] The difference in wage growth is designed to simulate a college-educated worker and a high-school educated worker based on the Federal Reserve Bank of Atlanta's *Wage Growth Tracker*.
[18] Financial economists frequently contend that the funded ratios reported by plan sponsors overstate plan health because the rates used to discount future liabilities are artificially high (Brown and Wilcox, 2009; and Novy-Marx and Rauh, 2009). Whereas public plans currently discount liabilities by the assumed return on assets in the Trust Fund (around eight percent historically), financial economists recommend that liabilities be discounted using a rate that reflects the risk that sponsors default on the pension debt.
[19] 26 U.S.C. Section 401(a).

however, benefit payments become dependent on the goodwill of the government. This logic also seems to apply in the years proceeding trust fund exhaustion. Several state and local governments have been able to renege on pension promises by arguing in court that pension costs are crowding out vital public services such as police protection and sanitation (Monahan, 2010; Cloud, 2011; and Reinke, 2011). Ancillary benefits, such as COLAs, have proven particularly vulnerable to default.

Consequently, the likelihood of trust fund exhaustion is an important metric of benefit generosity. This paper assesses the likelihood of exhaustion in the near term by projecting cash flows to estimate the date on which each of the uncovered pension plans in the sample could run out of assets.[20] The PPD provides the market level of assets in each trust fund, annual expenditures, payroll, and contributions from the employer and the employee. For this exercise, the annual growth rates for expenditures and payroll are assumed to equal their average growth rates between 2012 and 2016 (the latest data available). Future contributions as a percentage of payroll are held at their 2016 level. In each future year, the balance in the plan's trust fund equals the prior-year balance plus investment income and contributions net expenditures.

The fund's investment return is a key parameter in the projection. Munnell and Aubry (2016) note that state and local pensions in the PPD maintain an investment return assumption far higher than the returns assumed by many investment firms. Specifically, in 2016 the public plans reported a 7.6-percent expected annual return on their portfolios. Since more than half of the assets were invested in equities, this return implies expected stock returns of 9.6 percent. In contrast, eight large investment firms surveyed by Munnell and Aubry (2016) projected, on average, an equity return of only 5.5 percent over the next decade. To acknowledge uncertainty around the future performance of equities, assets are projected under two assumptions – the first allows the plans to achieve their assumed 7.6-percent return and the second a 4.6-percent return on the overall portfolio.[21] The outcome of interest is the plan's exhaustion date, defined as the year in which assets decline below zero.

Figure 12 shows the distribution of exhaustion dates under the two investment return assumptions. Regardless of the return, two Chicago plans for uncovered workers – the Municipal Employees' Annuity and Benefit Fund and the Policemen's Annuity and Benefit Fund – are projected to exhaust the assets in their trust funds by 2026. Another six plans are projected

[20] The exercise is conceptually similar to Rauh (2010) and Munnell et al. (2011).
[21] The 4.6-percent return assumption is consistent with the findings in Munnell and Aubry (2016).

to exhaust by 2035 under both return assumptions: the Public School Teachers' Pension and Retirement Fund of Chicago (all members are uncovered by Social Security); the Illinois State Employees' Retirement System (state police are uncovered); the Illinois State Universities Retirement System (all members are uncovered); the Kentucky Teachers' Retirement System (K-12 teachers are uncovered); the Louisiana State Employees' Retirement System (all members are uncovered); and the Ohio Teachers' Retirement System (all members are uncovered).

Of course, this simple projection is a highly imperfect indicator of a plan's future financial health. The returns to risky investments do not follow a deterministic path, leading many studies to simulate pension finances stochastically (for example, see Boyd and Yin, 2017; Farrell and Shoag, 2016; and Munnell, Aubry, and Hurwitz, 2013). Additionally, expenditures are unlikely to grow at historical rates in perpetuity, because the baby boom generation will complete its transition to retirement and be followed by cohorts with less generous benefit packages. Most importantly, plan sponsors could shore up troubled pension systems by infusing their trust funds with new revenue. Nevertheless, the exercise described above is sufficiently precise in the short run to identify plans that are financially precarious. For example, in 2010, the Commission to Strengthen Chicago's Pension Funds similarly predicted that the municipal trust fund would exhaust in 2026 and that the police trust would exhaust in 2022.[22]

The driving factor behind Chicago's pension troubles appears to be an insufficient contribution rate that is set by state statute rather than actuarially determined (Commission to Strengthen Chicago's Pension Funds, 2010). Relative to payrolls, contributions to the municipal and police pensions barely changed between 2001 and 2014, while two financial downturns reduced the municipal funded ratio from 93 percent to 41 percent funded and the police funded ratio from 71 percent to 26 percent funded. The city has increased its contribution in recent years, with little perceptible effect. The report of the Commission to Strengthen Chicago's Pension Funds also highlights several early retirement incentive programs that retroactively enhanced benefits and compounded the problem.

It seems highly likely that benefits for municipal employees and police in Chicago will be cut if the two pensions convert to pay-as-you-go. In 2016 – the most recent data available – the municipal trust fund paid benefits equal to 53 percent of municipal payroll, while the city only made contributions equal to 9 percent of payroll and pension members contributed 8.5 percent.[23]

[22] The Commission's analysis assumed an 8-percent annual return on assets.
[23] Public Plans Data website (2016).

Similarly, the police trust fund paid benefits equal to 62 percent of payroll, whereas total contributions only equaled 25 percent.

From the perspective of federal regulation, the previous analysis, which focused on the adequacy of promised benefits, did not raise any red flags in Chicago. In 2017, the Chicago municipal and police plans each offered two benefit designs to new members. The first is a cash-balance plan where around 20 percent of the employee's salary is deposited into an account that earns interest and is annuitized when the member reaches age 60 (age 50 for police).[24] The second is a defined benefit pension with an age-65 normal retirement age (age 55 for police), eight-year final average salary period, 2.4 percent benefit multiplier (2.5 for police), 10-year vesting, and not-compounded COLA capped at one-half of CPI. Both the municipal and police pensions for new hires currently provide benefits well above the Safe Harbor requirements. Trust-fund exhaustion is a separate problem – unrelated to the level of benefits currently promised to new hires. This looming challenge has important implications for uncovered state and local workers and for federal policymakers.

Conclusion

Section 218 of the Social Security Act allows state and local government employees to be excluded from coverage provided that they participate in a sufficiently generous employer-sponsored retirement system. The requirements for generosity are elaborated in Section 3121 of the Employment Tax Regulations. Public plans must provide a benefit, at the member's Social Security full retirement age, matching the Primary Insurance Amount that the member would have received had he been covered by Social Security. Alternately, public plans can simply match one of the Safe Harbor plans established by a revenue procedure accompanying IRC Section 3121.

This study demonstrates that some newly hired uncovered state and local government employees are in retirement plans that do not meet the spirit of the Employment Tax Regulations. State and local plans adhere to the Safe Harbor guidelines, and the Safe Harbor plans provide Social Security-equivalent benefits at the member's full retirement age, but the federal standards ignore three key drivers of lifetime resources that often differ between public pensions and Social Security. On the one hand, state and local plans often require very long

[24] The interest rate is not disclosed in *Actuarial Valuation Reports* or other publications for members. The contribution rate varies over time, depending on the statutory employer contribution rate.

vesting periods and are increasingly unlikely to grant full cost-of-living adjustments. On the other hand, public pensions frequently allow members to claim full benefits years earlier than Social Security. Incorporating these factors into a wealth-based measure of benefit generosity suggests that 43 percent of retirement plans fall short of Social Security for a significant minority of uncovered new hires. Specifically, the public plans fall short for members who stay in their uncovered position for more than a few years but less than a full career. These medium-tenure employees make up a third of the government workforce.

Of equal concern, a couple of uncovered state and local pensions are so poorly funded that their dedicated trust funds may run out of assets within the next decade. Once these plans revert to pay-as-you-go, sponsors and beneficiaries will enter a legal gray zone with an elevated likelihood of future benefit cuts and possible default on retirement benefits.

How could policymakers ensure Social Security-equivalent protections for all state and local government employees? A practical first step might be to update the Safe Harbor defined benefit requirements to specify reasonable vesting periods and provide full cost-of-living adjustments. Policymakers could also revisit the required contribution rate to the Safe Harbor defined contribution plan in light of current economic conditions, and develop new Safe Harbor requirements for the hybrid defined benefit / defined contribution plans that are increasingly prevalent in the state and local sectors.

Of course, Social Security also faces financial challenges, with the 2018 Trustees Report predicting exhaustion of the OASI trust fund in 2034. Should the program revert to pure pay-as-you-go, the legislated contribution rate is sufficient to fund about 75 percent of scheduled benefits (Goss, 2010). Given the uncertainty over future benefit levels, it is not obvious how public pension benefits should be valued relative to an underfunded Social Security program. This question is left as a challenge for future research.

Alternately, legislators could obviate the need for federal generosity standards by enrolling all state and local government employees in Social Security. Mandatory coverage is already a common feature of proposals to improve Social Security's financial position (Bipartisan Commission on Entitlement and Tax Reform, 1994; Diamond and Orszag, 2005; Domenici and Rivlin, 2012; Gale, Holmes, and John, 2015; Government Accountability Office, 2005; National Commission on Fiscal Responsibility and Reform, 2010; Munnell, 2000; and Warshawsky, 2016). It would also provide uncovered state and local government employees

with important ancillary benefits that they currently lack, such as spousal benefits and disability protection (Nuschler, Shelton, and Topoleski, 2011; and Munnell, Aubry, and Belbase, 2014).

In response to calls for mandatory coverage, the Office of the Chief Actuary of the Social Security System routinely evaluates the cost of enrolling all newly hired government employees. The latest estimates indicate an initial modest improvement in program solvency, with the revenue from new payroll taxes pushing out the trust fund's exhaustion date by about one year. The improvement is followed by an equally modest deterioration when state and local workers retire and claim benefits.[25]

However, mandatory coverage of all future earnings will not protect uncovered state and local retirees whose pensions are poorly funded. The greatest challenge may be to devise a solution for the very few situations where default seems more likely than not.

[25] For details, see: https://www.ssa.gov/oact/solvency/provisions_tr2017/charts/chart_run321.html

References

Aubry, Jean-Pierre and Caroline V. Crawford. 2017. "State and Local Pension Reform Since the Financial Crisis." *State and Local Pension Plans* 54. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Aubry, Jean-Pierre, Caroline V. Crawford, and Alicia H. Munnell. 2017. "State and Local Pension Plan Funding Sputters in FY 2016." *State and Local Pension Plans* 56. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Baker, Dean. 2013. "Chicago's Public Employees Do Not Get Social Security." Beat the Press Blog. Washington, DC: Center for Economic Policy Research.

Bipartisan Commission on Entitlement and Tax Reform. 1994. "Final Report to the President." Available at: https://www.ssa.gov/history/reports/KerreyDanforth/KerreyDanforth.htm

Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. 2018. *The 2018 Annual Report of the Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. Washington, DC: U.S. Government Printing Office.

Boyd, Donald J. and Yimeng Yin. 2017. "How Public Pension Plan Investment Risk Affects Funding and Contribution Risk." *Policy Brief.* Albany, NY: The Nelson A. Rockefeller Institute of Government at the State University of New York.

Brown, Jeffrey R. and David W. Wilcox. 2009. "Discounting State and Local Pension Liabilities." *American Economic Review: Papers and Proceedings* 99(2): 532-42.

Brown, Jeffrey R. and Scott J. Weisbenner. 2013. "The Distributional Effects of the Social Security Windfall Elimination Provision." *Journal of Pension Economics and Finance* 12(4): 415-34.

Cloud, Whitney. 2011. "State Pension Deficits, the Recession, and a Modern View of the Contracts Clause." Comment. *The Yale Law Journal* 120(8): 2199-2212.

CNN Money. 2014. "Chicago Workers to Protest as Pension Crisis Brews." (February 19). Available at: http://money.cnn.com/2014/02/19/retirement/chicago-pensions/index.html

Commission to Strengthen Chicago's Pension Funds. 2010. "Final Report Volume 1: Report and Recommendations." Available at: http://www.chipabf.org/ChicagoPolicePension/PDF/Financials/pension_commission/CSCP_Final_Report_Vol.1_4.30.2010.pdf

Diamond, Peter A. and Peter R. Orszag. 2005. *Saving Social Security: A Balanced Approach.* Washington, DC: The Brookings Institution Press.

Diamond, Peter A., Alicia H. Munnell, Gregory Leiserson, and Jean-Pierre Aubry. 2010. "Problems with State-Local Final Pay Plans and Options for Reform." *State and Local Pension Plans* 12. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Domenici, Peter and Alice Rivlin. 2012. "Debt Reduction Task Force Plan 2.0." Report. Washington, DC: The Bipartisan Policy Center.

Farrell, James and Daniel Shoag. 2016. "Risky Choices: Simulating Public Pension Funding Stress with Realistic Shocks." Working Paper. Cambridge, MA: Harvard University.

Gale, William G., Sarah E. Holmes, and David C. John. 2015. "Social Security Coverage for State and Local Government Workers: A Reconsideration." *The Journal of Retirement* 3(2): 123-135.

Goss, Stephen C. 2010. "The Future Financial Status of the Social Security Program" *Social Security Bulletin* 70(3): 111-125.

Government Accountability Office. 2005. *Social Security: Coverage of Public Employees and Implications for Reform*. Testimony before the Subcommittee on Social Security, Committee on Ways and Means, House of Representatives. Washington, DC: U.S. Government Printing Office.

Government Accountability Office. 2010. *Social Security Administration: Management Oversight Needed to Ensure Accurate Treatment of State and Local Government Employees. Report to Congressional Requesters.* Washington, DC: U.S. Government Printing Office.

Internal Revenue Service. 2014. *Federal-State Reference Guide.* Washington, DC: U.S. Government Printing Office.

Kan, Leslie and Chad Aldeman. 2014. "Uncovered: Social Security, Retirement Uncertainty, and One Million Teachers." Report. Sudbury, MA: Bellwether Education Partners.

Monahan, Amy B. 2010. "Public Pension Plan Reform: The Legal Framework." *Education Finance and Policy* 5(4): 617-646.

Monahan, Amy. 2017. "When a Promise Is Not a Promise: Chicago-Style Pensions." *UCLA Law Review* 64: 356-413.

Munnell, Alicia H. 2000. "The Impact of Mandatory Social Security Coverage of State and Local Workers: A Multi-State Review." *Working Paper* 2000-11. Washington, DC: AARP Public Policy Institute.

Munnell, Alicia H., Jean-Pierre Aubry, Josh Hurwitz, and Laura Quinby. 2011. "Can State and Local Pensions Muddle Through?" *State and Local Pension Plans* 15. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H., Jean-Pierre Aubry, Joshua Hurwitz, and Laura Quinby. 2012. "Public Plans and Short-Term Employees." Working Paper No. 18448. Cambridge, MA: The National Bureau of Economic Research.

Munnell, Alicia H. and Laura Quinby. 2012. "Legal Constraints on Changes in State and Local Pensions." *State and Local Pension Plans* 25. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H., Jean-Pierre Aubry, Anek Belbase, and Joshua Hurwitz. 2013. "State and Local Pension Costs: Pre-Crisis, Post-Crisis, and Post-Reform." *State and Local Pension Plans* 30. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H., Jean-Pierre Aubry, and Josh Hurwitz. 2013. "How Sensitive is Public Pension Funding to Investment Returns?" *State and Local Plans* 34. Chestnut Hill, MA: The Center for Retirement Research at Boston College.

Munnell, Alicia H., Jean-Pierre Aubry, and Anek Belbase. 2014. "The Impact of Mandatory Coverage on State and Local Budgets." Working Paper 2014-9. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H., Jean-Pierre Aubry, and Mark Cafarelli. 2014. "COLA Cuts in State/Local Pensions." *State and Local Pension Plans* 38. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H. and Jean-Pierre Aubry. 2016. "Will Pensions and OPEBs Break State and Local Budgets?" *State and Local Pension Plans* 51. Chestnut Hill, MA: The Center for Retirement Research at Boston College.

National Commission on Fiscal Responsibility and Reform. 2010. "The Moment of Truth." Report. Washington, DC: Committee for a Responsible Federal Budget.

Novy-Marx, Robert, and Joshua Rauh, 2009, "The Liabilities and Risks of State-Sponsored Pension Plans," *Journal of Economic Perspectives* 23(4).

Novy-Marx, Robert and Joshua Rauh. 2014. "The Revenue Demands of Public Employee Pension Promises." *American Economic Journal: Economic Policy* 6(1): 193-229.

Nuschler, Dawn, Alison M. Shelton, and John J. Topoleski. 2011. "Social Security: Mandatory Coverage of New State and Local Government Employees." *CRS Report for Congress.* Washington, DC: Congressional Research Service.

Public Plans Data Website. 2001-2017. Center for Retirement Research at Boston College, Center for State and Local Government Excellence, and National Association of State Retirement Administrators. Available at: http://publicplansdata.org/.

Quinby, Laura D., Geoffrey T. Sanzenbacher, and Jean-Pierre Aubry. 2018. "How Have Pension Cuts Affected Public Sector Competitiveness?" *State and Local Pension Plans* 59. Chestnut Hill, MA: The Center for Retirement Research at Boston College.

Rauh, Joshua D. 2010. "Are State Public Pensions Sustainable? Why the Federal Government Should Worry about State Pension Liabilities." *National Tax Journal* 63(3): 585-601.

Reinke, Gavin. 2011. "When a Promise Isn't a Promise: Public Employers' Ability to Alter Pension Plans of Retired Employees." *Vanderbilt Law Review* 64(5): 1673-1711.

Warshawsky, Mark J. 2016. "Modernizing Social Security." *National Affairs:* 83-96.

Tables and Figures

Table 1. *Safe Harbor Formulas for Final-Salary Defined Benefit Pensions*

Final average salary	Benefit factor
Highest 3 years	1.50%
Highest 4 years	1.55
Highest 5 years	1.60
Highest 6-10 years	1.75
More than 10 years	2.00

Source: Revenue procedure 91-40 issued by the Internal Service.

Table 2. *Percentage of State and Local Government Employees Who Are Uncovered*

State	Authors' estimate (employees)	GAO estimate (earnings)
California	42%	60%
Colorado	76	70
Connecticut	64	45
Georgia	22	25
Illinois	42	64
Kentucky	29	33
Louisiana	87	83
Massachusetts	100	97
Missouri	20	35
Nevada	100	96
New Jersey	0	9
Ohio	100	99
Texas	35	53

Note: GAO references the U.S. Government Accountability Office (2010).
Sources: Authors' survey of public plan administrators; National Association of State Retirement Administrators survey of public plan administrators; U.S. Census Bureau *Annual Survey of Public Pensions* and *Employment & Payroll Database*; various plan documents, websites, and news articles. See Appendix Table A1 for details.

Table 3. *Characteristics of Retirement Plans Offered to Uncovered State and Local Government New Hires, 2016*

	Mean	Median	Min	Max
	Defined benefit plans			
Normal retirement age	62	62	50	67
Benefit multiplier				
FAS period = highest 1 year (1 design)	3%	3%	3%	3%
FAS period = highest 2 years (1 design)	2	2	2	2
FAS period = highest 3 years (22 designs)	2	3	1	3
FAS period = highest 4 years (0 designs)				
FAS period = highest 5 years (33 designs)	2	3	2	3
FAS period = 6+ years (8 designs)	2	2	2	3
	Defined contribution plans (including hybrid and cash-balance plans)			
Total contribution rate	17.4	18	10	23.5

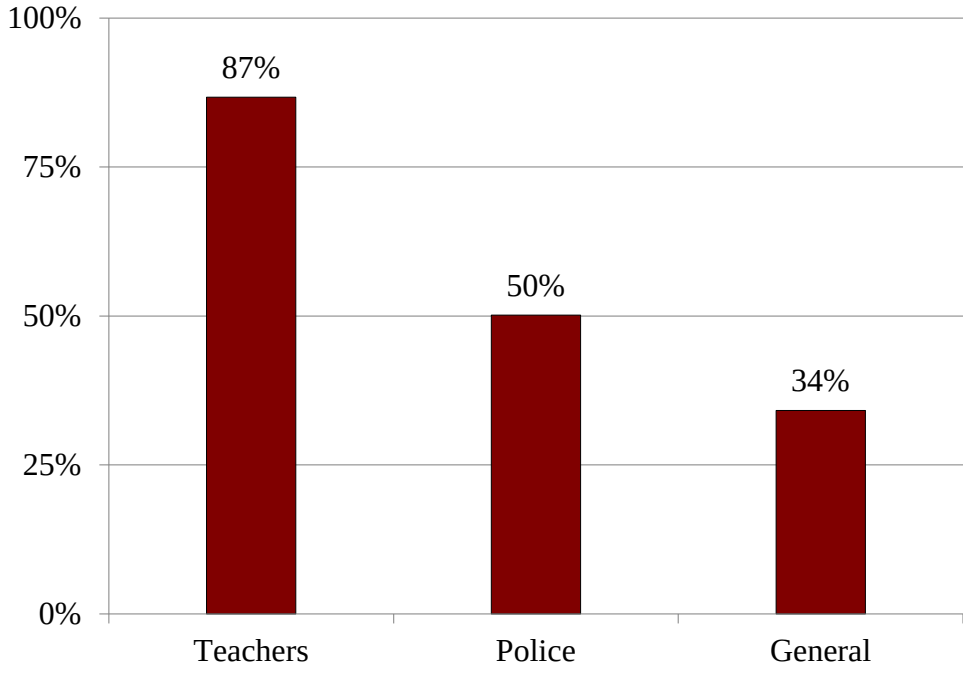
Note: Complicated plan designs, such as benefit multipliers that vary based on tenure, are occasionally simplified to reflect the experience of most employees.
Sources: Authors' survey of retirement system administrators; National Association of State Retirement Administrators' survey of retirement systems; and *Actuarial Valuation Reports.*

Table 4. *Vesting and COLA Provisions in Pensions for Uncovered State and Local Government Employees, 2016*

	Mean	Median	Min	Max
Vesting period (years)	8.30	10	5	15
Plan has a COLA (fraction of plans)	1	1	1	1
COLA is ad-hoc (fraction of plans)	0.15	0	0	1
COLA is not compounding (fraction of plans)	0.20	0	0	1

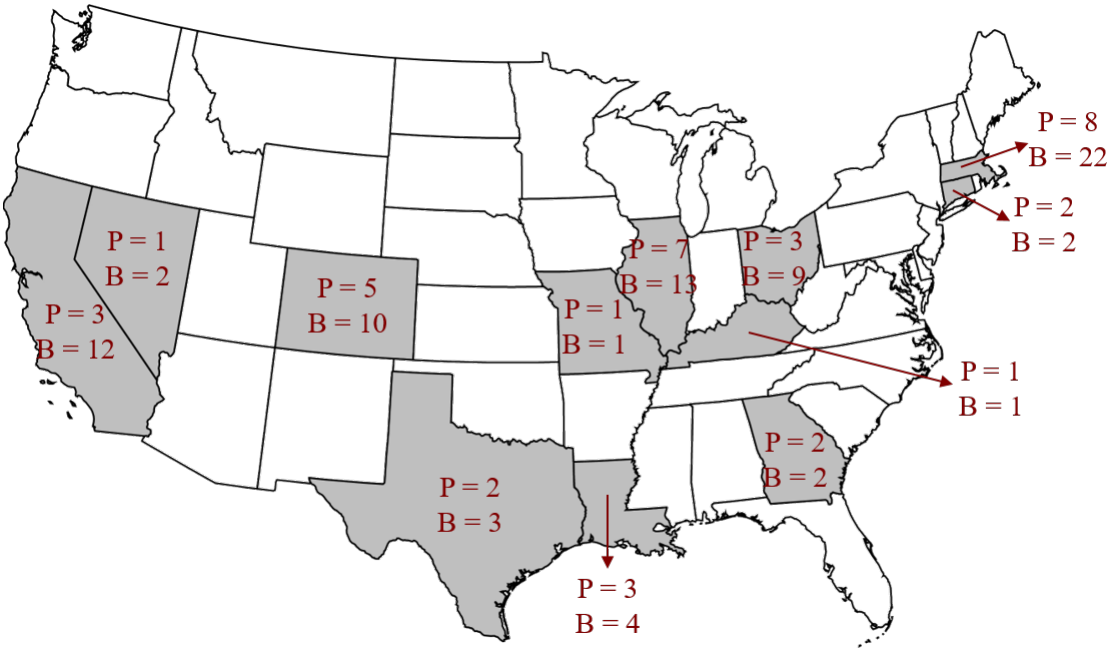
Sources: Authors' survey of retirement system administrators; National Association of State Retirement Administrators' survey of retirement systems; and *Actuarial Valuation Reports.*

Figure 1. *Percentage of State and Local Government Employees Who Are Uncovered in 13 States, by Occupation*



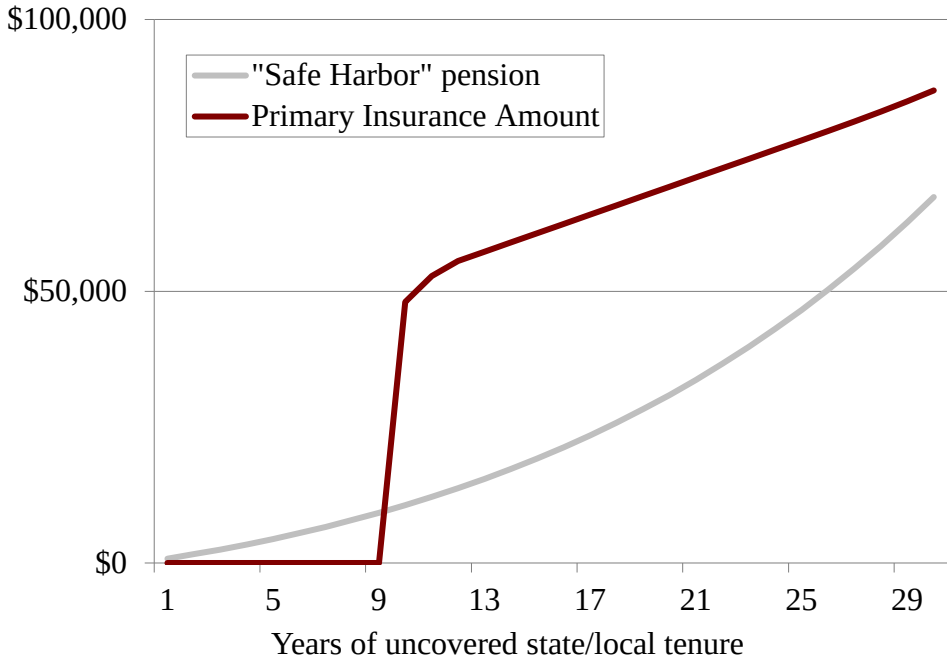
Sources: Authors' survey of public plan administrators; National Association of State Retirement Administrators survey of public plan administrators; U.S. Census Bureau *Annual Survey of Public Pensions* and *Employment & Payroll Database*; various plan documents, websites, and news articles.

Figure 2. *Number of Pension Plans and Benefit Designs Audited by State*



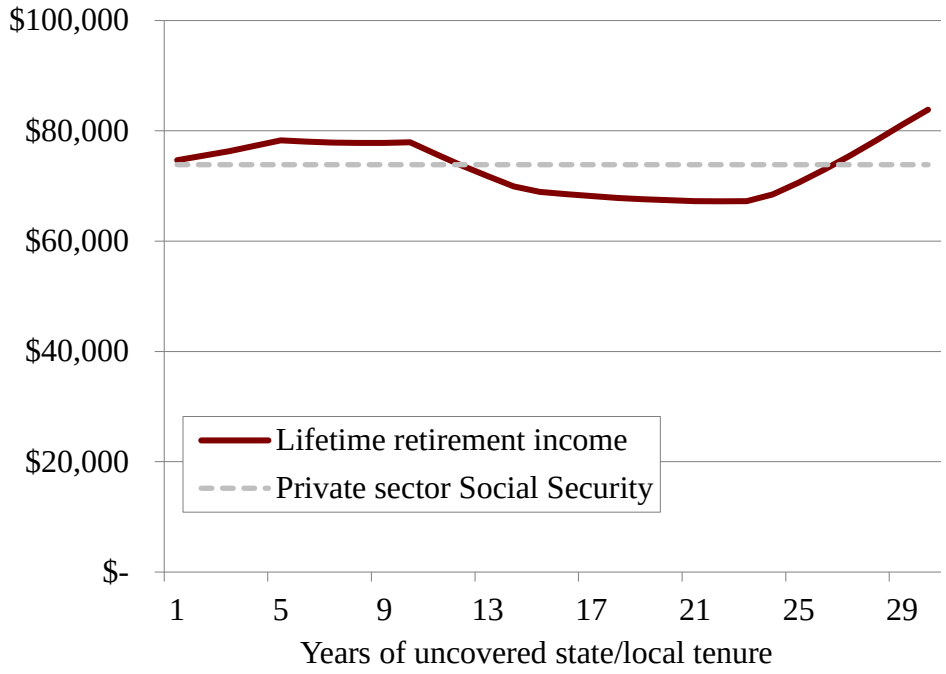
Note: P = number of plans, and B = number of benefit designs.
Source: Authors' survey of plan administrators.

Figure 3. *Nominal Annuity at Age 67 Calculated According to IRC Section 3121*



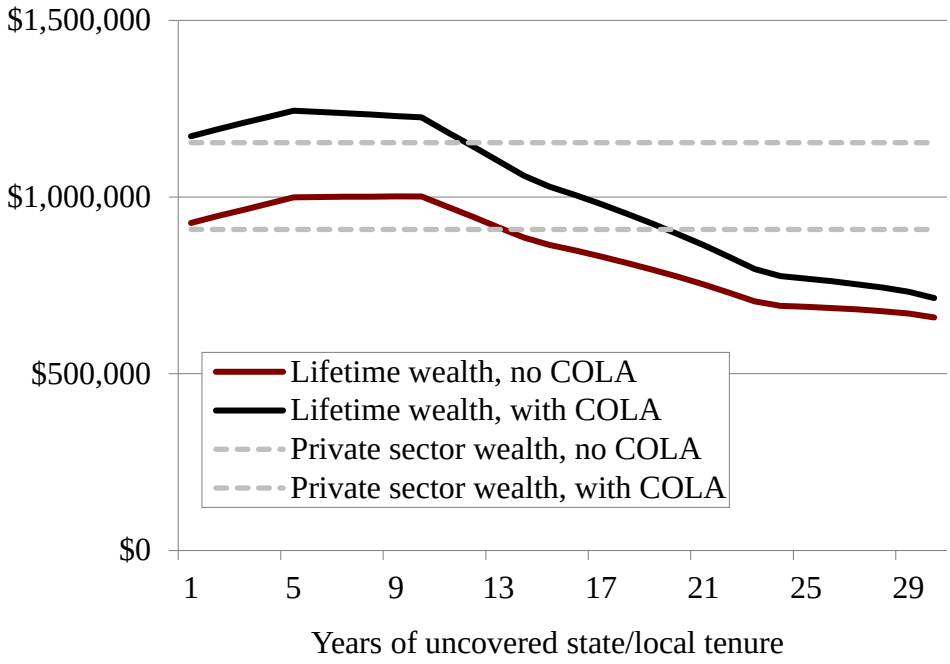
Notes: The calculation assumes that the worker enters the labor market in 2018 at age 25, enters the uncovered government position at age 35 with a $50,000 salary and earns 3.8 percent nominal wage growth.
Source: Authors' calculations.

Figure 4. *Safe Harbor Benefit + Covered Social Security Benefit at Age 67, in Nominal Dollars*



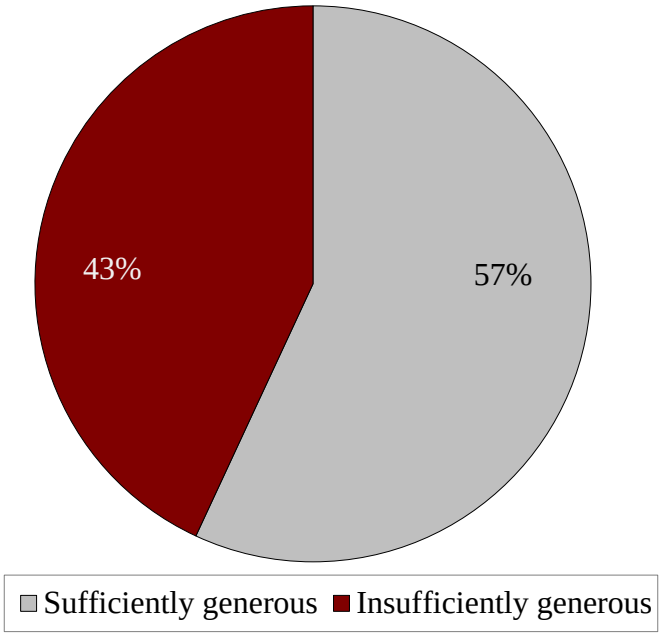
Notes: The dashed gray line is a benchmark that reflects the Social Security benefit earned by a private sector worker with no state or local tenure. The calculation assumes that the worker enters the labor market in 2018 at age 25, enters the uncovered government position at age 35 with a $50,000 salary and earns 3.8 percent wage growth.
Source: Authors' calculations.

Figure 5. *Safe Harbor Defined Contribution Account Balance at Age 67 + Present Value of Lifetime Covered Social Security Benefits, in Nominal Dollars*



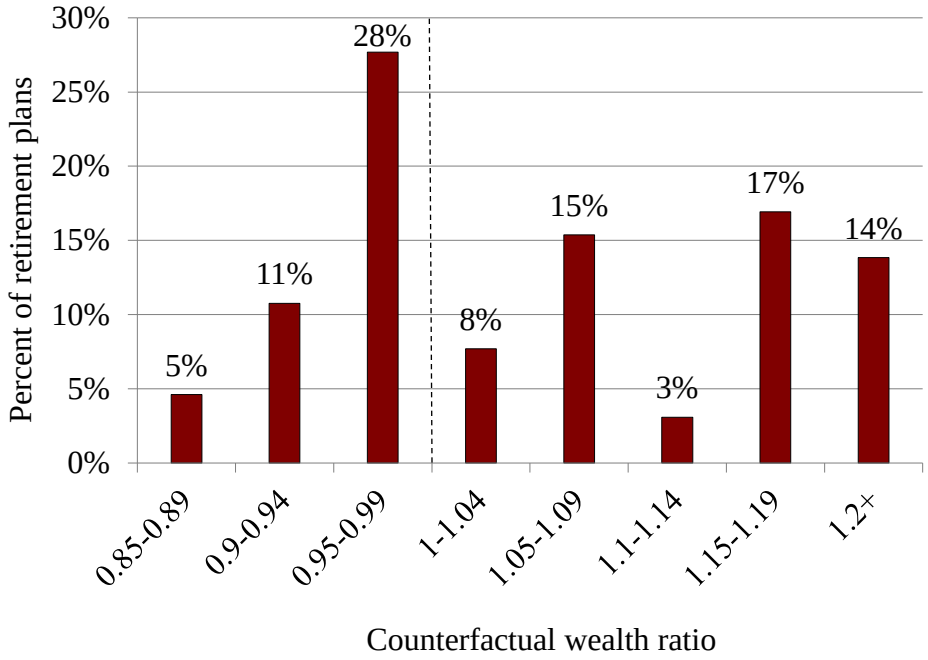
Notes: The dashed gray lines are benchmarks reflecting the Social Security benefits earned by a private sector worker with no state or local tenure. The calculation assumes that the worker enters the labor market in 2018 at age 25, enters the uncovered government position at age 35 with a $50,000 salary and earns 3.8 percent wage growth. Assets in the defined contribution account grow by 5.3 percent annually.
Source: Authors' calculations.

Figure 6. *Retirement Plans for Uncovered State and Local Government Employees by Counterfactual Wealth Ratio*



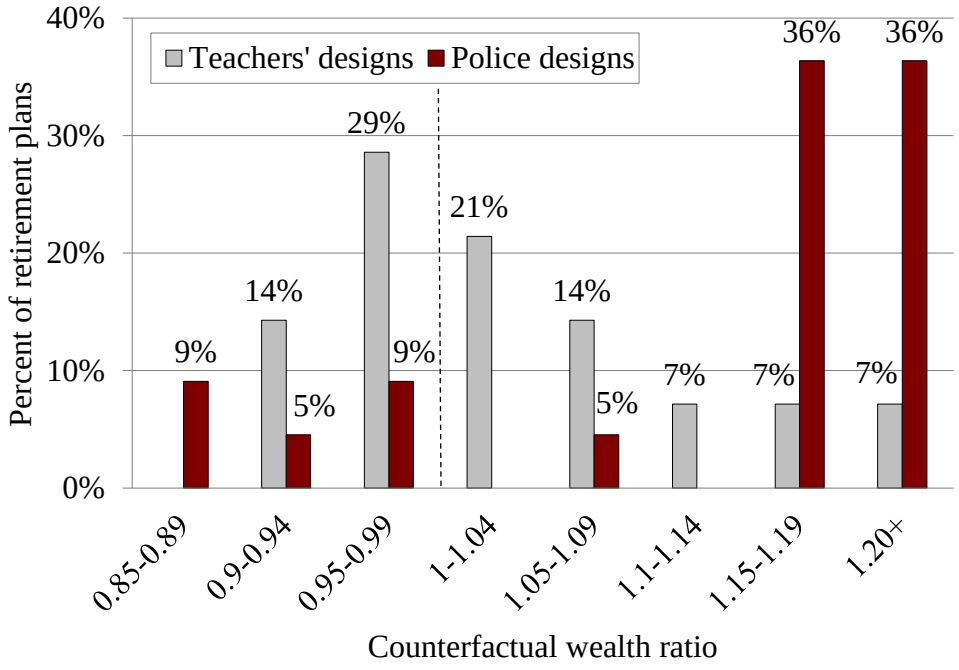
Notes: The worker is assumed to enter the labor market in 2018 at age 25, start the uncovered government position at age 35 with a $50,000 salary and earn 3.8 percent nominal wage growth. The worker remains in the uncovered public sector for 12 years, and then returns to the covered sector until age 65. Public pension benefits are claimed at the plan's normal retirement age; Social Security benefits are claimed at the full retirement age.
Source: Authors' calculations from plan designs presented in various *Actuarial Valuation Reports.*

Figure 7. *Pension + Covered Social Security Relative to Counterfactual Social Security Wealth*



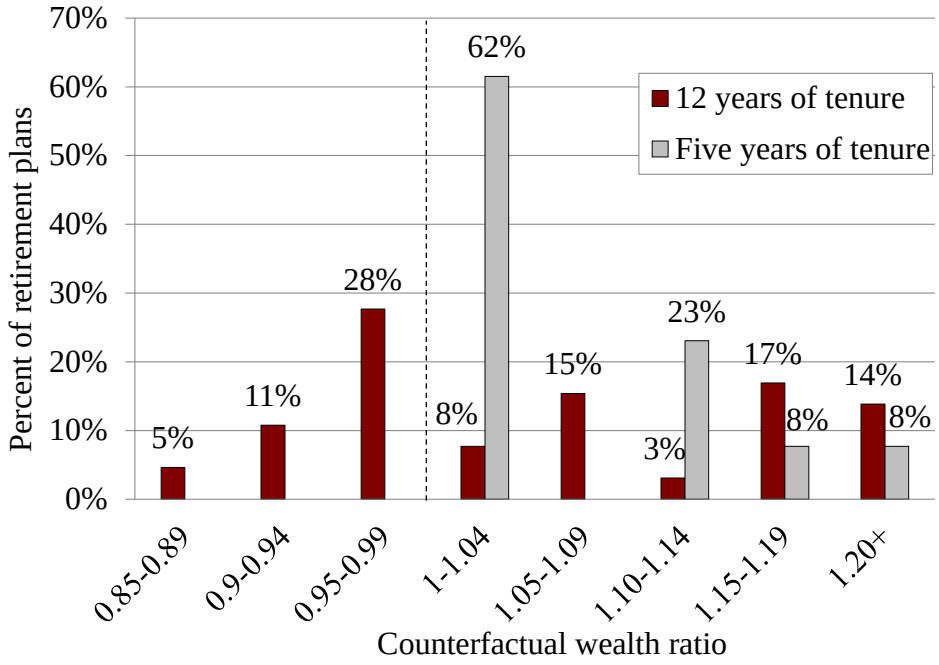
Notes: The percentages in figures 6 and 7 differ slightly due to rounding. The worker is assumed to enter the labor market in 2018 at age 25, start the uncovered government position at age 35 with a $50,000 salary and earn 3.8 percent nominal wage growth. The worker remains in the uncovered public sector for 12 years, and then returns to the covered sector until age 65. Public pension benefits are claimed at the plan's normal retirement age; Social Security benefits are claimed at the full retirement age.
Source: Authors' calculations from plan designs presented in various *Actuarial Valuation Reports.*

Figure 8. *Pension + Covered Social Security Relative to Counterfactual Social Security Wealth, by Occupation*



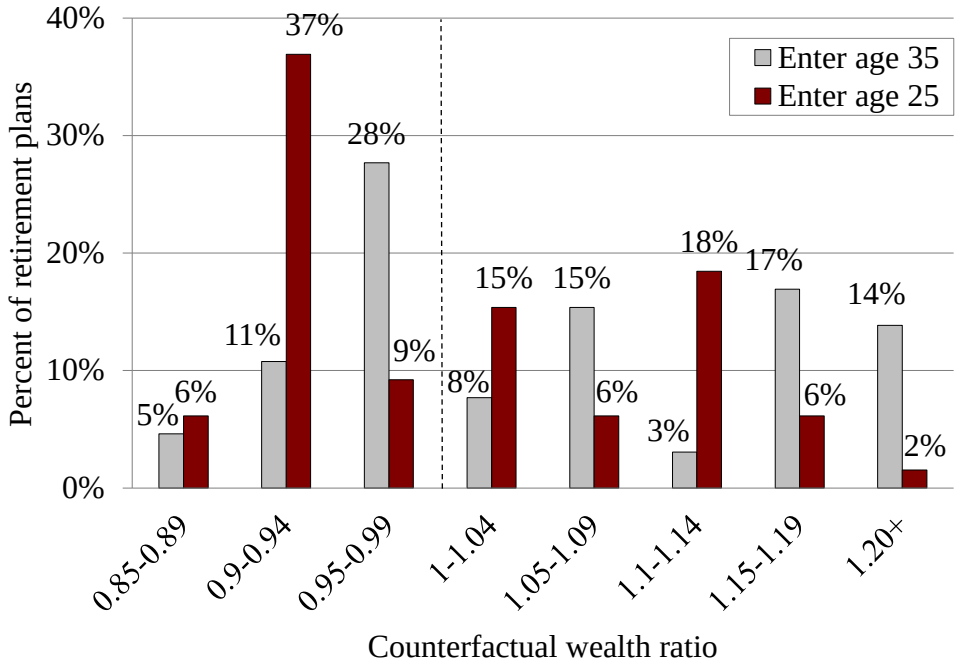
Notes: The worker is assumed to enter the labor market in 2018 at age 25, start the uncovered government position at age 35 with a $50,000 salary and earn 3.8 percent nominal wage growth. The worker remains in the uncovered public sector for 12 years, and then returns to the covered sector until age 65. Public pension benefits are claimed at the plan's normal retirement age; Social Security benefits are claimed at the full retirement age.
Source: Authors' calculations from plan designs presented in various *Actuarial Valuation Reports.*

Figure 9. *Pension + Covered Social Security Relative to Counterfactual Social Security Wealth, by Uncovered Tenure*



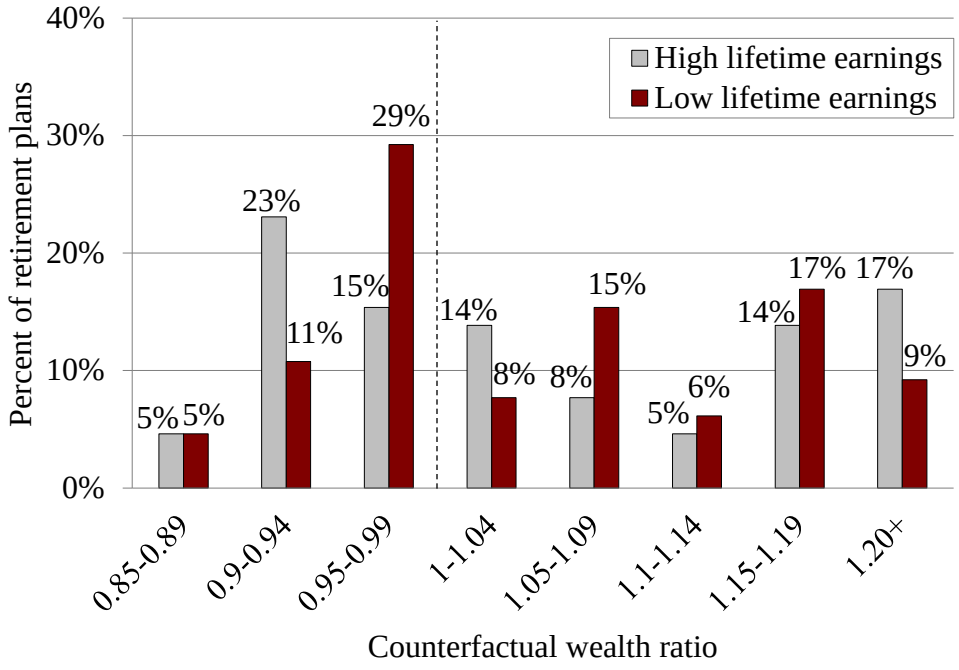
Notes: The distribution only includes final pay defined benefit designs. The calculation assumes that the worker enters the labor market in 2018 at age 25, enters the uncovered government position at age 35 with a $50,000 salary and earns 3.8 percent nominal wage growth. The worker remains in the uncovered public sector for 12 years, and then returns to the covered sector until age 65. Public pension benefits are claimed at the plan's normal retirement age; Social Security benefits are claimed at the full retirement age.
Source: Authors' calculations from plan designs presented in various *Actuarial Valuation Reports.*

Figure 10. *Pension + Covered Social Security Relative to Counterfactual Social Security Wealth, by Age of Entry*



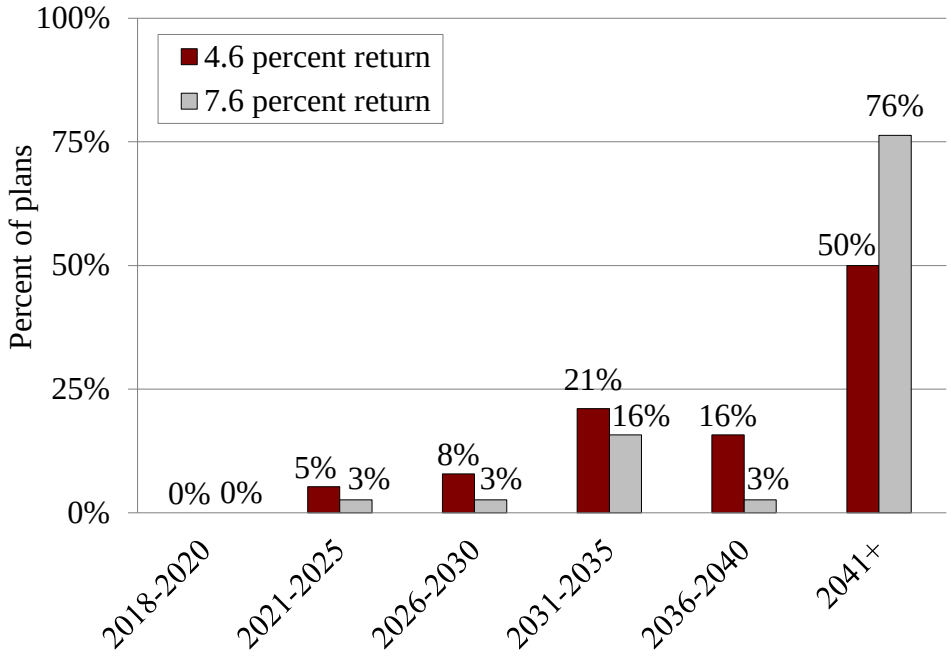
Notes: The distribution only includes final pay defined benefit designs. The calculation assumes that the worker enters the labor market in 2018 at age 25, enters the uncovered government position at age 35 with a $50,000 salary and earns 3.8 percent nominal wage growth. The worker remains in the uncovered public sector for 12 years, and then returns to the covered sector until age 65. Public pension benefits are claimed at the plan's normal retirement age; Social Security benefits are claimed at the full retirement age.
Source: Authors' calculations from plan designs presented in various *Actuarial Valuation Reports.*

Figure 11. *Pension + Covered Social Security Wealth Relative to Counterfactual Social Security, by Lifetime Earnings*



Notes: The distribution only includes final pay defined benefit designs. The calculation assumes that the worker enters the labor market in 2018 at age 25 and enters the uncovered government position at age 35. The "high lifetime earnings" scenario assumes a $60,000 starting salary in the public sector and 4.3 percent wage growth. The "low lifetime earnings" scenario assumes a $40,000 starting salary and 3.3 percent wage growth. The worker remains in the uncovered public sector for 12 years, and then returns to the covered sector until age 65. Public pension benefits are claimed at the plan's normal retirement age; Social Security benefits are claimed at the full retirement age.
Source: Authors' calculations from plan designs presented in various *Actuarial Valuation Reports.*

Figure 12. *Defined Benefit Plans for Uncovered Workers by Year of Trust-Fund Exhaustion*



Source: Authors' estimates from the *Public Plans Data* website (2012-2016).

Appendix A: Retirement Systems Considered in the Analysis

Table A1. *Retirement Systems Surveyed*

State	Retirement System	Data Source	Social Security?
CA	University of CA Retirement Plan	2016 *Actuarial Valuation*	Some
CA	Public Employees' Retirement Fund	NASRA survey	Some
CA	Teachers' Retirement Fund	CRR survey	None
CO	PERA School Division	NASRA survey	None
CO	PERA State Division	NASRA survey	None
CO	PERA Local Government Division	NASRA survey	None
CO	PERA Police and Fire Division	NASRA survey	None
CO	Fire and Police Pension Association	CRR survey	None
CO	Denver Employees' Retirement Plan	Denver Human Resources*	All
CT	Teachers' Retirement System	NASRA survey	None
CT	State Employees' Retirement System	No data available	
CT	Municipal Employees' Retirement System	2016 *Actuarial Valuation*	Some
GA	Teachers' Retirement System	NASRA survey	Some
GA	Employees' Retirement System	NASRA survey	All
GA	Public School Employees' Retirement System	CRR survey	Some
GA	Municipal Employees' Benefit System	No data available	
GA	Peace Officers' Annuity and Benefit Fund	No data available	
IL	Municipal Retirement Fund	NASRA survey	All
IL	Teachers' Retirement System	NASRA survey	None
IL	State Universities Retirement System	NASRA survey	None
IL	State Employees' Retirement System	2016 *Actuarial Valuation*	Some
IL	Public School Teachers' Pension and Retirement Fund of Chicago	Chicago Teachers' Association**	None
IL	Policemen's Annuity and Benefit Fund of Chicago	News articles***	None
IL	Firemen's Annuity and Benefit Fund of Chicago	News articles***	None
IL	Municipal Employees' Annuity and Benefit Fund of Chicago	News articles***	None
KY	County Employees Retirement System	NASRA survey	All
KY	Employees' Retirement System	NASRA survey	All
KY	Teachers' Retirement System	NASRA survey	None
LA	Teachers' Retirement System	NASRA survey	None
LA	State Employees' Retirement System	NASRA survey	None
LA	Parochial Employees' Retirement System	CRR survey	Some
LA	Municipal Police Employees' Retirement System	No data available	

State	Retirement System	Data Source	Social Security?
MA	State Employees' Retirement System	CRR survey	None
MA	Teachers' Retirement System	CRR survey	None
MA	Boston Retirement Board	CRR survey	None
MA	Middlesex Regional Retirement Board	CRR survey	None
MA	Worcester Regional Retirement Board	CRR survey	None
MA	Plymouth County Retirement Board	CRR survey	None
MA	Barnstable County Retirement Association	CRR survey	None
MA	Cambridge Retirement System	CRR survey	None
MO	Public Schools' Retirement System	2016 *Actuarial Valuation*	None
MO	Public Education Employee's Retirement System	Plan website****	All
MO	State Employees' Retirement System	NASRA survey	All
MO	Local Government Retirement System	NASRA survey	All
MO	County Employees' Retirement System	No data available	
NV	Public Employees' Retirement System	NASRA survey	None
NJ	Public Employees' Retirement System	Dept. of the NJ Treasury *Employers' Pensions and Benefits Administration Manual*	All
NJ	Teachers' Retirement System	See above	All
NJ	Police and Firemen's Retirement System	See above	All
OH	Public Employees' Retirement System	NASRA survey	None
OH	Teachers' Retirement System	NASRA survey	None
OH	Police and Fire Pension Fund	NASRA survey	None
TX	Teachers' Retirement System	Classroom Teachers' Association*****	None
TX	Employees' Retirement System	NASRA survey	All
TX	County and District Retirement System	NASRA survey	All
TX	Municipal Retirement System	NASRA survey	Some

* https://www.denvergov.org/content/denvergov/en/office-of-human-resources/employee-resources/benefits/retirement-plans.html
** https://www.ctunet.com/legislative/protect-our-pensions/questions-answers-about-the-chicago-teachers-pension-fund.
*** See for example: Baker (2013) and *CNN Money* (2014).
**** https://www.psrs-peers.org/PEERS/Retirement-Planning/Social-Security-and-Medicare
**** https://tcta.org/node/12214
Note: Plans are considered to have no members in Social Security if fewer than 10 percent of members are covered. Similarly, plans are considered to have full participation if at least 90 percent of members are covered.

Table A2. *Percentage of all State and Local Government Employees in Retirement Systems Providing Valid Survey Responses*

State	Active defined benefit members	Full-time equivalent employees
California	79%	79%
Colorado	91	75
Connecticut	41	33
Georgia	77	61
Illinois	90	85
Kentucky	99	84
Louisiana	70	54
Massachusetts	100	94
Missouri	72	66
Nevada	100	93
New Jersey	99	93
Ohio	79	89
Texas	91	83

Notes: Many part-time, seasonal, and temporary state and local government employees do not participate in an employer retirement system. Participants in Massachusetts' many local plans are all excluded from Social Security.
Sources: Authors' survey of public plan administrators; National Association of State Retirement Administrators survey of public plan administrators; U.S. Census Bureau *Annual Survey of Public Pensions* and *Employment & Payroll Database*; various plan documents, websites, and news articles.

Appendix B: Methodology for Calculating State and Local Retirement Benefits and Social Security Old Age Benefits

Calculating State and Local Pension Benefits

The first step in the calculation of state and local pension benefits projects the worker's nominal earnings history from the age of first entry into the labor market to the age of labor-market exit:

$$Salary_{current\ age} = Salary_{age\ enter\ uncovered\ job} * (1 + wage\ growth)^{current\ age - age\ enter\ uncovered\ job} \quad (1)$$

The next step calculates the final average salary (FAS) were the worker to quit his uncovered job at different ages:

$$FAS_{current\ age} = \frac{\sum_{y=current\ age-FAS\ period}^{current\ age} Salary_y}{FAS\ period} \quad (2)$$

The nominal pension benefit is simply:

$$Benefit_{current\ age} = Benefit\ multiplier * FAS_{current\ age} * Tenure\ in\ uncovered\ job_{current\ age} \quad (3)$$

Calculating State and Local Defined Contribution Wealth

The defined contribution account balance is calculated from the worker's salary history and the assumed return on plan assets. Contributions are made at the end of each year and interest is credited at the beginning of the next year:

$$Balance_{current\ age} = Balance_{end\ of\ prior\ year} * (1 + investment\ return) + (0.075 * Salary_{current\ age}) \quad (4)$$

The account balance continues to earn interest after the worker separates from the uncovered state or local job. The account earns interest until the worker's Social Security FRA:

$$Balance_{FRA} = Balance_{current\ age} * (1 + investment\ return)^{FRA-current\ age} \quad (5)$$

Calculating Social Security Benefits According to Internal Revenue Code Section 3121

The first step in this calculation of Social Security benefits alters the worker's earnings history to reflect zero covered earnings in the years when the worker was *not* employed in the uncovered state or local job.

The next step is to cap the altered earnings history at the Social Security Contribution and Benefit Base ("Tax Max"). To do this, the Tax Max must first be projected into the future according to a legislated formula (rounded to the nearest multiple of 300). The formula for the Tax Max depends on the Social Security Average Wage Index (AWI), which must also be projected into the future:

$$Tax\ Max_{current\ age} = \frac{60{,}600 * AWI_{current\ age-2}}{AWI_{year\ 1992}} \quad (6)$$

Where:

$$AWI_{current\ age} = AWI_{current\ age-1} * (1 + CPIW + Real\ Wage\ Differential) \quad (7)$$

And:

$$Capped\ salary_{current\ age} = min\{Salary_{current\ age}, Tax\ Max_{current\ age}\} \quad (8)$$

The third step in the calculation indexes the capped earnings history to reflect the growth in the AWI:

$$Index\ Factor_{current\ age} = \begin{cases} \frac{AWI_{age\ 60}}{AWI_{current\ age}} & if\ current\ age < 61 \\ 1 & if\ current\ age \geq 61 \end{cases} \quad (9)$$

$$Indexed\ Salary_{current\ age} = Capped\ salary_{current\ age} * Index\ Factor_{current\ age} \quad (10)$$

With the newly indexed earnings history, the Average Indexed Monthly Earnings (AIME) is calculated:

$$AIME_{current\ age} = \frac{\sum Highest\ 35\ indexed\ salaries}{35*12} \quad (11)$$

Then the worker's Primary Insurance Amount (PIA) is obtained by applying the formula:

$$PIA_{age\ 62} = (0.9 * AIME\ up\ to\ the\ first\ bend\ point) + (0.32 * AIME\ between\ the\ first\ and\ second\ bend\ points) + (0.15 * AIME\ after\ second\ bend\ point) \quad (12)$$

The relevant bend points are set by the Social Security Administration in the year that the worker turns age 62 according to the following formulas:

$$First\ bend\ point = \frac{180}{9{,}779.44} * AWI_{age\ 60} \quad (13)$$

$$Second\ bend\ point = \frac{1{,}085}{9{,}779.44} * AWI_{age\ 60} \quad (14)$$

Lastly, the PIA is increased to keep pace with inflation between age 62 and the worker's full retirement age (FRA):

$$PIA_{age\ FRA} = PIA_{age\ 62} * (1 + CPIW)^{age\ FRA - age\ 62} \quad (15)$$

Calculating WEP-Adjusted Social Security Benefits from Private Sector Employment

To calculate a more realistic Social Security benefit for the uncovered worker, this phase of the analysis alters the worker's earnings history (equation 1) to report positive earnings in the years when the worker was *not* employed in the uncovered position, and zero earnings in the

years when the worker was employed in the uncovered position. It then recalculates the worker's PIA as described in equations (6) through (15).

The next step is to apply the Windfall Elimination Provision (WEP) to the PIA. The WEP adjusts the multipliers in the PIA formula (equation 12) based on the number of years with "substantial earnings." A year of earnings is substantial if the worker's salary exceeds one-quarter of the Old Law Contribution and Benefits Base (what the Tax Max would have been had the 1977 Social Security Amendments not been enacted). The Old Law Contribution and Benefits Base is determined by a legislated formula (rounded to the nearest multiple of 300):

$$Substantial\ threshold_{current\ age} = \frac{45{,}000 * AWI_{current\ age-2}}{22{,}935.42} * 0.25 \quad (16)$$

Given the number of years of substantial earnings, the correct WEP adjustment to the PIA formula is identified. The WEP adjustment replaces the 0.9-multiplier in the traditional PIA formula with a lower multiplier before the first bend point, according to Table B1:

Table B1. *WEP Multipliers for the PIA Formula Based on Years of Substantial Earnings*

Years of substantial earnings	Multiplier
30 or more	0.9
29	0.85
28	0.8
27	0.75
26	0.7
25	0.65
24	0.6
23	0.55
22	0. 5
21	0.45
20 or fewer	0.4

Source: https://www.ssa.gov.

The penultimate step in the calculations applies the WEP-adjusted PIA formula to AIME as described in equation (12). The reduction in the PIA due to the WEP is capped at one-half of the monthly public pension benefit that the worker receives at his FRA:

$$PIA_{age\ 62} = \max\{PIA_{WEP}, PIA_{unadjusted} - \frac{monthly\ pension\ benefit}{2}\} \quad (17)$$

As before the worker's PIA is adjusted for cost-of-living until worker's Social Security FRA:

$$PIA_{age\ FRA} = PIA_{age\ 62} * (1 + CPIW)^{FRA-62} \quad (18)$$

Transforming Annual Benefits into Lifetime Wealth

The present discounted value of future benefits from Social Security or a public pension is obtained by multiplying the annual benefit by a factor that accounts for cost-of-living increases, the cumulative probability of survival, and the discount rate:

$$Wealth_{age\ FRA} = Benefit_{age\ FRA} * \sum_{age=FRA}^{120} \frac{\Pr(alive)_{age} * (1+CPIW)^{age-FRA}}{(1+discount\ rate)^{age-FRA}} \quad (19)$$

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