Pensions for State and Local Government Workers Not Covered by Social Security: Do Benefits Meet Federal Standards?

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

Federal law allows certain state and local governments to exclude employees from Social Security coverage if those employees are provided with a sufficiently generous pension. Because the benefits provided by many public pensions have declined in recent years, this article assesses whether those currently offered by state and local governments satisfy federal standards and whether the standards ensure pension benefits equivalent to those of Social Security. We find that state and local government plans adhere to the standards and provide equivalent benefits at the full retirement age. However, the standards ignore differences between public pensions and Social Security in key provisions that drive lifetime resource levels. Accounting for those differences, a wealth-based generosity test suggests that 43 percent of public pensions fall short of Social Security for a significant minority of noncovered new hires. Equally important, some plans could exhaust their trust funds within 10 years, putting beneficiaries at risk.

Introduction

In 2018, one-quarter of state and local government employees—approximately 6.5 million workers—were not covered by Social Security on their current job. The Social Security Act of 1935 excluded all federal, state, and local government employees from coverage because of constitutional ambiguity over the federal government's authority to impose Federal Insurance Contributions Act payroll taxes on public employers and because these employees were already covered by defined benefit pensions (Internal Revenue Service [IRS] 2014). Beginning in the 1950s, a series of amendments allowed governments to enroll some of their employees in Social Security, so that by 1991 the program covered all federal employees and most state and local government employees. Today, state and local government employers may continue to exclude some employees from Social Security coverage, but only if these employees are enrolled in a retirement plan that meets federal regulations requiring sufficiently generous benefits.

The legal requirements for benefit generosity are specified in IRS regulations known as the Employment Tax Regulations, issued pursuant to Section 3121 of the Internal Revenue Code (IRC). Defined benefit pensions—the dominant type of plan offered by state and local governments—must provide members with an annuity, commencing on or before the Social Security

Selected Abbreviations

AIME	average indexed monthly earnings
AWI	average wage index
COLA	cost-of-living adjustment
CPI	Consumer Price Index
FAS	final average salary
FRA	full retirement age

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Selected Abbreviations—*Continued*

GAO	Government Accountability Office
IRC	Internal Revenue Code
IRS	Internal Revenue Service
NASRA	National Association of State Retirement Administrators
NRA	normal retirement age
OASI	Old-Age and Survivors Insurance
PIA	primary insurance amount
SSA	Social Security Administration
WEP	Windfall Elimination Provision

full retirement age (FRA), which ranges from 65 to 67 depending on the worker's birth year. The annuity must equal the value of the Social Security benefit the member would have received at FRA had he or she participated in the program. To help state and local governments determine whether the benefit formulas they offer comply with the regulations, the federal government has established "Safe Harbor" formulas to calculate annual benefits; the formulas were designed to assure that benefits equal those provided by Social Security for a typical noncovered public employee. Legally, state and local pensions that meet the Safe Harbor requirements comply with the Employment Tax Regulations.

Whether state and local governments currently satisfy the Safe Harbor standards, and whether the standards continue to ensure that the plans provide benefits equal in generosity to Social Security, is unclear. The need to assess whether state and local pensions comply with federal standards has increased since financial downturns in 2001 and 2008 dramatically reduced the assets held by state and local pension funds and triggered a wave of benefit reductions, usually affecting new hires (Aubry and Crawford 2017; Munnell and others 2013; Munnell, Aubry, and Cafarelli 2014). Additionally, some government pension plans could soon exhaust their assets and revert to pay-as-you-go systems, seriously endangering future benefit payments and compromising the retirement security of their members (Monahan 2017).

Given recent benefit cuts and looming reductions for some plans, this article explores the extent to which noncovered public employees receive benefits commensurate with what they would have received under Social Security. We first determine whether the retirement plans for noncovered state and local government employees satisfy the Safe Harbor requirements and whether the requirements provide Social Security–equivalent income at age 67 (the FRA for workers born in 1960 or later). We examine a large sample of benefit formulas for noncovered workers and find that all sampled formulas meet or exceed the Safe Harbor requirements. To determine whether the legislated Safe Harbor parameters produce the required income at age 67, we compare the benefit levels to which a typical employee would be entitled under a public plan that meets the minimum Safe Harbor requirements and under Social Security. Our finding suggests that the Safe Harbor–compliant benefit formulas produce about the same level of income at age 67 as Social Security.

Although the sampled state and local benefit formulas satisfy the letter of the law, noncovered public employees still might not receive Social Security–equivalent resources in retirement for three reasons. First, state and local government pensions often set very long vesting periods and, second, in recent years, they are increasingly unlikely to grant full cost-of-living adjustments (COLAs) after retirement. These shortcomings are partially offset by the third factor: the much younger normal retirement ages (NRAs) established by state and local government pensions. We incorporate the vesting period, COLA, and NRA into a wealth-based generosity test, which requires calculating the present value of lifetime retirement benefits—arguably, a more meaningful measure of retirement resources—for a typical noncovered public employee and for a worker continuously covered by Social Security. That calculation shows that 43 percent of sampled benefit formulas for noncovered workers fall short of Social Security benefit levels, although we note that the calculation is very sensitive to the employment and earnings patterns of the noncovered employees. Additionally, the legal standards for benefit generosity ignore the spousal, survivor, and disability benefits provided by Social Security. These ancillary benefits represent a potentially substantial difference between public plans and Social Security. Such benefits are beyond the scope of this article, but they are valuable to retirees and should be the focus of future work.

Finally, this article grapples with an additional conceptual complication: A number of pension plans for noncovered state and local government employees have low funded ratios, and Social Security likewise faces a projected financial shortfall. A simple projection of pension cash flows using information from the *Public Plans Database*, maintained by the Center for Retirement Research at Boston College (http://publicplansdata.org/), reveals that two plans sponsored

by the City of Chicago could exhaust their assets within 10 years. The article summarizes the ongoing debate over the legal responsibility of state and local governments to provide full benefits after trust funds are exhausted. It also asks how state and local pension assets should be compared with Social Security's Old-Age and Survivors Insurance (OASI) trust fund. The question is pertinent, given that the 2019 *Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and the Federal Disability Insurance Trust Funds* (hereafter, the *Trustees Report*)[1] projects OASI trust fund depletion in 2034, which could trigger an automatic benefit reduction.

The article contains six sections, beginning with this introduction. The next section presents an overview of federal regulations on pension benefit generosity and frames the current analysis within the existing literature on state and local pension finances. The third section compares the various benefit formulas currently offered to noncovered state and local government employees with the Safe Harbor requirements and examines whether the Safe Harbor–compliant designs provide Social Security–equivalent benefits at age 67. The fourth section addresses the differing provisions for vesting periods, COLAs, and NRAs, then calculates lifetime retirement wealth for both a typical noncovered state or local employee and a similar 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. Appendices provide methodological details, assumptions, and supporting materials.

Background

This section outlines the federal standards regulating retirement benefit generosity for state and local government plans, 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 beginning in 1951, allowed state and local governments to enroll some of their employees by establishing job-specific agreements with the Social Security Administration (SSA) under Title II, Section 218 of the act, "Voluntary Agreements for Coverage of State and Local Employees" (42 U.S. Code § 418).[2] The Omnibus Budget Reconciliation Act (OBRA) of 1990 (Public Law 101-508, Section 11332(b)) mandated coverage for all state and local government employees who do not participate in their employer's retirement plan. Because Section 218 at that time did not clarify the definition of an employer "retirement system," OBRA 1990 also amended IRC Section 3121 to help government employers determine whether their employees were exempt from mandatory Social Security coverage. Specifically, IRC Section 3121(b)(7)(F) authorized the Secretary of the Treasury, in coordination with the SSA, to limit the definition of a retirement plan by setting minimum benefit requirements. IRC Section 3121 was meant to ensure that state and local government employees would be covered either by Social Security or by an employer-sponsored pension providing "meaningful" benefits comparable to those of Social Security (IRS 1991).

The minimum benefit requirements described in the IRS regulations issued pursuant to IRC Section 3121 are very specific. As described in the *Code of Federal Regulations,* a government employee's defined benefit plan meets the requirements

> 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.

The regulators' concept of benefit generosity is worth considering. First, it was not sufficient for an employee's benefit to be equivalent to that of Social Security at the time of separation from government employment; instead, the employee's public pension benefits had to accrue *at the exact same rate*, over the course of his or her career, at which Social Security benefits would have accrued. Second, by comparing the public pension benefit to the Social Security primary insurance amount (PIA)—defined as the benefit received by a worker if claimed at FRA—the regulators focused on retirement income adequacy at only one point in time.[3]

Perhaps recognizing that traditional defined benefit pensions might not provide benefits equivalent to the Social Security PIA for every member on every day, the IRS contemporaneously issued Revenue Procedure 91-40, describing the 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 covered by that formula (IRS 1991).[4] Table 1 outlines the acceptable formulas for defined benefit plans. All of the formulas assume an NRA of 65[5] and lack Social Security's guaranteed COLA. The regulations also outline Safe Harbor requirements for defined contribution plans (tax-deferred retirement savings accounts), stipulating that total employer and employee contributions equal at least 7.5 percent of salary annually and that assets be managed according to fiduciary standards.

Table 1.
Safe Harbor minimum benefit factors for defined benefit pension plans, by basis for calculating final average salary

Basis	Benefit factor (%)
Highest—	
3 years	1.50
4 years	1.55
5 years	1.60
6–10 years	1.75
More than 10 years	2.00

SOURCE: IRS Revenue Procedure 91-40.

NOTE: Safe Harbor formulas calculate benefits as final average salary times years of noncovered employment times the benefit factor.

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. To try to alleviate the funding shortfalls, government sponsors have reduced plan benefits (Brown and Wilcox 2009; Novy-Marx and Rauh 2014; Aubry and Crawford 2017). The reduced benefit levels frequently target new hires because state statutes typically protect accrued pension benefits as contractual obligations that cannot be impinged (Munnell and Quinby 2012). These benefit reductions have taken various forms, including a lower COLA, a lower benefit multiplier, a longer period for computing the final average salary (FAS), and tighter retirement eligibility requirements for new hires than for their longer-tenured coworkers (Quinby, Sanzenbacher, and Aubry 2018).[6] Occasionally, governments have also cut the COLA for current workers, arguing in court that only first-year benefits are protected by statute. In the wake of these cutbacks, state and local pensions may not match Social Security for new hires. For example, Kan and Aldeman (2014) demonstrate that Chicago teachers, who are not covered by Social Security, often accrue 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 may be unable to meet (Munnell and Aubry 2016; Warshawsky and Marchand 2016). Under a scenario in which sponsors exhaust the assets in their pension trust funds and convert them to pay-as-you-go systems, legal scholars question whether state legislatures could be forced to pay promised benefits in full (Monahan 2010, 2017; Cloud 2011; Reinke 2011). The federal pension generosity standards make no provision for an asset-exhaustion scenario.

Do Pension Benefits for Newly Hired Noncovered Workers Satisfy the Letter of the Law?

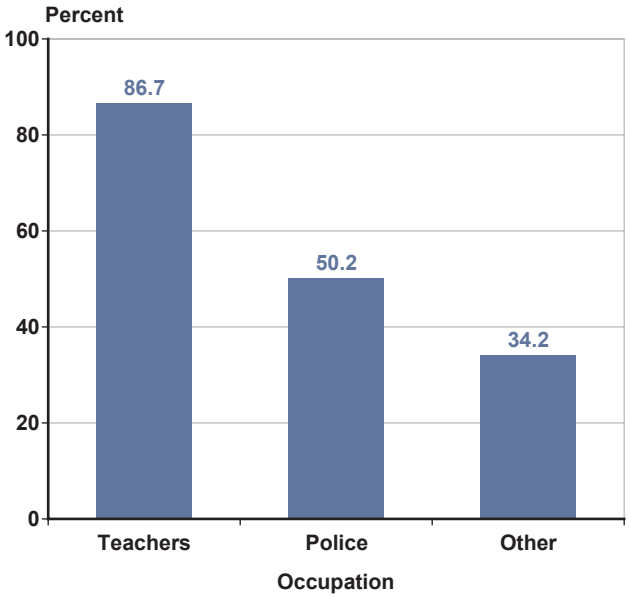
This section assesses the generosity of benefits currently offered to noncovered state and local government employees within the legal framework described above. The analysis has two goals: to determine whether retirement benefits for new hires meet the Safe Harbor requirements and to confirm that the Safe Harbor–required benefits provide Social Security–equivalent income at age 67.

To this end, data on Social Security coverage were gathered using two independent surveys of plan administrators, one conducted by the authors and the other by the National Association of State Retirement Administrators (NASRA). The surveys targeted the 56 largest state-administered retirement systems in 13 states that account for 80 percent of U.S. noncovered state and local payroll (Government Accountability Office [GAO] 2010). We also collected plan membership counts by occupation using the Census Bureau's Annual Survey of Public Employment & Payroll and obtained detailed descriptions of benefit provisions for state and local workers without Social Security coverage from the plans' actuarial valuation reports. The final study sample consists of 38 retirement plans offering 81 benefit formulas for significant numbers of noncovered workers in 12 of those 13 states.[7]

Table 2 shows that the Social Security coverage rates we estimate for state and local government workers in the 13 states are consistent with those reported in GAO (2010). The differences largely reflect the fact that we estimate the noncovered share of employees and GAO estimated the noncovered share of earnings. Because nearly 90 percent of teachers in the 13 sampled states were excluded from Social Security (Chart 1),[8] and teachers tend to be more highly paid than other public employees, an earnings-based estimate of the noncovered share of workers will usually be higher than an employee-based calculation.

Table 2 also shows the variation in the number of retirement systems and the types of benefit formulas offered, by state. Because benefit designs may vary by occupation, the number of formulas exceeds the number of systems in most states. Most of the formulas for noncovered workers are structured as traditional defined benefit pensions, although seven of the 38 systems offer voluntary defined contribution plans and three offer hybrid plans (either mandatory or voluntary) that pair a less-generous defined benefit formula with a defined contribution account. Five systems have a cash-balance structure for at least some members; in this type of defined benefit plan, the employer contributes a set percentage of the participant's salary each year and the account earns interest at a notional rate.

Chart 1.
Percentage of state and local government employees in 13 states who are not covered by Social Security, by selected major occupation



SOURCES: Authors' and NASRA surveys of public plan administrators; Census Bureau Annual Survey of Public Employment & Payroll; and various plan documents, websites, and news articles.

Table 2.
Selected characteristics of the study sample, by state examined

State	Share of employees without Social Security coverage, as estimated in—		Study sample number of offered—	
	This study (percentage of employees)	GAO (2010) (percentage of earnings)	Retirement systems	Benefit formulas
California	42	60	3	12
Colorado	76	70	5	10
Connecticut	64	45	2	2
Georgia	22	25	2	2
Illinois	42	64	7	13
Kentucky	29	33	1	1
Louisiana	87	83	3	4
Massachusetts	100	97	8	22
Missouri	20	35	1	1
Nevada	100	96	1	2
New Jersey	0	9	. . .	. . .
Ohio	100	99	3	9
Texas	35	53	2	3

SOURCES: Authors' and NASRA surveys of public plan administrators; Census Bureau Annual Survey of Public Employment & Payroll; various plan documents, websites, and news articles; and GAO (2010).

NOTE: . . . = not applicable.

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

For defined benefit pensions, the Safe Harbor regulations set a maximum NRA and a formula for calculating annual benefits: FAS times years of state/local tenure times a benefit factor (multiplier). FAS is calculated using the worker's earnings in the final years of employment (that is, the highest earning years); the number of years used in the calculation varies from one benefit formula to another.[9] Table 3 summarizes the NRAs and the benefit factors for our sample of defined benefit formulas for noncovered workers, and compares the results with the Safe Harbor requirements. Although the NRAs set by a couple of formulas are older than the Safe Harbor NRA of 65, no formula's NRA exceeds the Social Security FRA of 67 (for workers born after 1959), and many allow for normal retirement at substantially younger ages: The median NRA is 62. Similarly, the parameters that determine the level of annual benefits are typically more generous than those required by law. For example, among formulas that calculate FAS using the final 3 years, the median benefit factor is 3 percent, whereas the Safe Harbor formula requires a minimum factor of only 1.5 percent. Among defined contribution plans, the median total contribution rate (employer plus employee) is 18 percent of salary and the sample minimum is 10 percent, well above the Safe Harbor minimum requirement of 7.5 percent. In short, the benefits earned by noncovered state and local new hires appear to satisfy the Safe Harbor requirements.

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

The Employment Tax Regulations state that public-plan retirement benefits at age 67 should be equivalent to the Social Security PIA. The Safe Harbor–compliant plans could fall short because final-pay-based defined benefit pensions are back-loaded, providing generous benefits to long-tenure workers, but relatively little to their short- and medium-tenure colleagues (Poterba and others 2007; Diamond and others 2010; Costrell and Podgursky 2009; Beshears and others 2011; Quinby 2020). By contrast, Social Security benefits are front-loaded—a result of the program's progressive benefit formula using wage-indexed earnings.

This phase of the analysis compares the benefits generated by a Safe Harbor–compliant formula with Social Security benefits for a hypothetical worker who enters the labor market in 2018 at age 25 and works part of his or her career in noncovered government employment. The Safe Harbor–compliant defined benefit formula we analyze offers a 1.5 percent benefit factor, a 3-year FAS period, an NRA of 65, and

Table 3.
Characteristics of benefit formulas offered to noncovered state and local government new hires in 2016

Characteristic	Number of benefit formulas	Mean	Median	Minimum	Maximum	Safe Harbor requirement
			Defined benefit formulas			
NRA	. . .	62	62	50	67	65
Benefit factor (%) in formulas that calculate FAS for a period of—						
1 year	1	3	3	3	3	1.50
2 years	1	2	2	2	2	1.50
3 years	22	2	3	1	3	1.50
5 years	33	2	3	2	3	1.60
6–10 years	8	2	2	2	3	1.75
			Defined contribution formulas [a]			
Combined employer and employee contribution rate (%)	10	17.4	18.0	10.0	23.5	7.50

SOURCES: Authors' and NASRA surveys of public plan administrators; and plan actuarial valuation reports.

NOTES: Some complicated plan designs, such as benefit multipliers that vary based on tenure, have been simplified to reflect the experience of most employees.

. . . = not applicable.

a. Includes hybrid and cash-balance plans.

no COLA. Because Safe Harbor regulations do not stipulate a vesting requirement, the analysis assumes immediate vesting. We calculate Safe Harbor formula benefits at age 67 simply as the benefit factor times the FAS in the noncovered job times the total tenure in the noncovered job.

A Social Security benefit calculation is based on a worker's covered earnings. For our analysis, however, we exclude earnings in covered employment and only consider earnings in noncovered employment in calculating the hypothetical Social Security benefit for the noncovered state or local worker. The actual Social Security benefit calculation takes the average indexed monthly earnings (AIME)—the monthly average of the highest 35 years of covered earnings, indexed for wage inflation—then applies three graduated benefit multipliers. The formula applies a 90 percent multiplier to the lowest portion of the AIME, up to a given threshold amount (called a "bend point"); a 32 percent multiplier to any portion of the AIME above the first threshold, up to a second bend point; and a 15 percent multiplier to any portion of the AIME exceeding the second threshold. The AIME calculation omits annual earnings that exceed the maximum taxable amount. Normally, the AIME calculation also omits earnings from noncovered state and local employment, and the multiplier for AIME up to the first bend point is adjusted downward according to the Windfall Elimination Provision (WEP) if a worker receives a pension from noncovered employment (and the worker does not qualify for a WEP exception).[10] However, to compare Social Security and public pension benefits, our hypothetical AIME calculation includes earnings from noncovered public employment and replaces all earnings from covered employment with zeros (that is, as if the worker had no covered employment).[11] The calculation also purposely ignores the standard WEP adjustment.

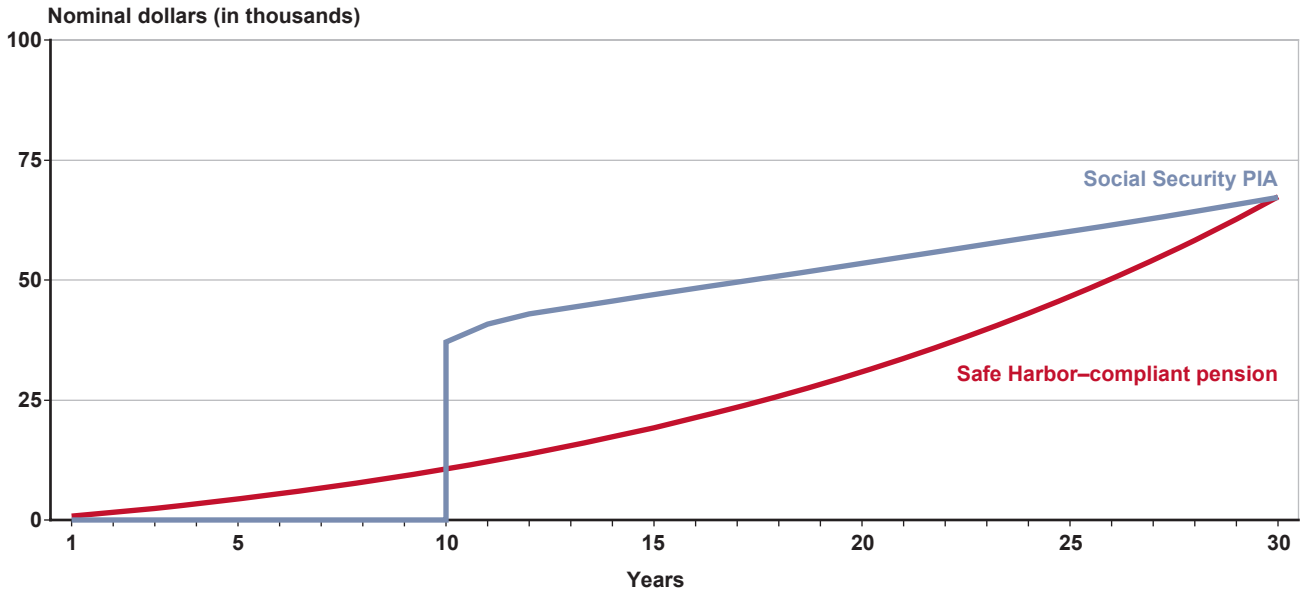
For analytical tractability, and to maintain the spirit of the Employment Tax Regulations, this article considers only individual benefits and ignores spousal and survivor benefits. Because the hypothetical worker will retire many years in the future (in 2058, at age 65), the Social Security benefit calculation requires projections of several annually adjusted program parameters, including the average wage index (AWI), the COLA, the taxable maximum, and the benefit formula's bend points. We assume that the AWI and COLA will increase by the long-run intermediate assumptions in the 2018 *Trustees Report;* the taxable maximum and bend points are projected using legislated formulas that refer to the AWI.[12]

Critical to the calculation is a set of assumptions about the earnings history of the hypothetical worker. The two key variables in the Safe Harbor formula are the worker's FAS and his or her total tenure in the noncovered job. For Social Security, the worker's earnings history determines AIME, on which the benefit calculation is based. We assume the hypothetical worker enters government employment at age 35 (in 2028) with a $50,000 starting salary and that his or her wages rise by 3.8 percent annually.[13] Alternative assumptions about his or her tenure in government range from 1 year to 30 years to reflect the uncertainty of the future tenure of new hires. Forty-five percent of new pension members stay in the system for no more than 5 years, 16 percent stay for 6–10 years, 32 percent stay for 11–30 years, and 7 percent stay for more than 30 years (Munnell and others 2012). The average expected tenure of new hires is 12 years.[14]

Chart 2 presents the results of this analysis.[15] Annual benefits (in nominal age-67 dollars) are plotted against the number of years worked in state or local government. From 1 to 10 years of state or local government tenure, the Safe Harbor–compliant formula provides more income at age 67 than Social Security does because the worker has not yet accrued the 40 quarters of covered earnings necessary to be insured. After 10 years of tenure, the relationship flips, with the Safe Harbor–compliant formula providing an annual average of 42 percent less income than Social Security. By 30 years of tenure, however, the Safe Harbor–compliant formula catches up with Social Security and provides a roughly equivalent benefit.

Although Chart 2 seems to indicate that the Safe Harbor–compliant formula falls short for the one-third of noncovered state and local government employees who separate with 11 to 30 years of tenure, those workers could still have secure retirements if they earn Social Security benefits by working in the private or covered government sectors. To demonstrate this point, Chart 3 plots a more realistic alternative for calculating AIME than the assumption used in Chart 2.[16] In Chart 3, we assume that the worker's Social Security earnings history reflects positive earnings for all of the years he or she worked in covered employment and zero earnings for the years in noncovered employment. We also assume that Social Security benefits are reduced by the WEP. The analysis then estimates total retirement income at age 67 by adding Safe Harbor–compliant plan benefits to the PIA calculated using the more realistic AIME estimate and the WEP adjustment.[17] When periods of covered and noncovered

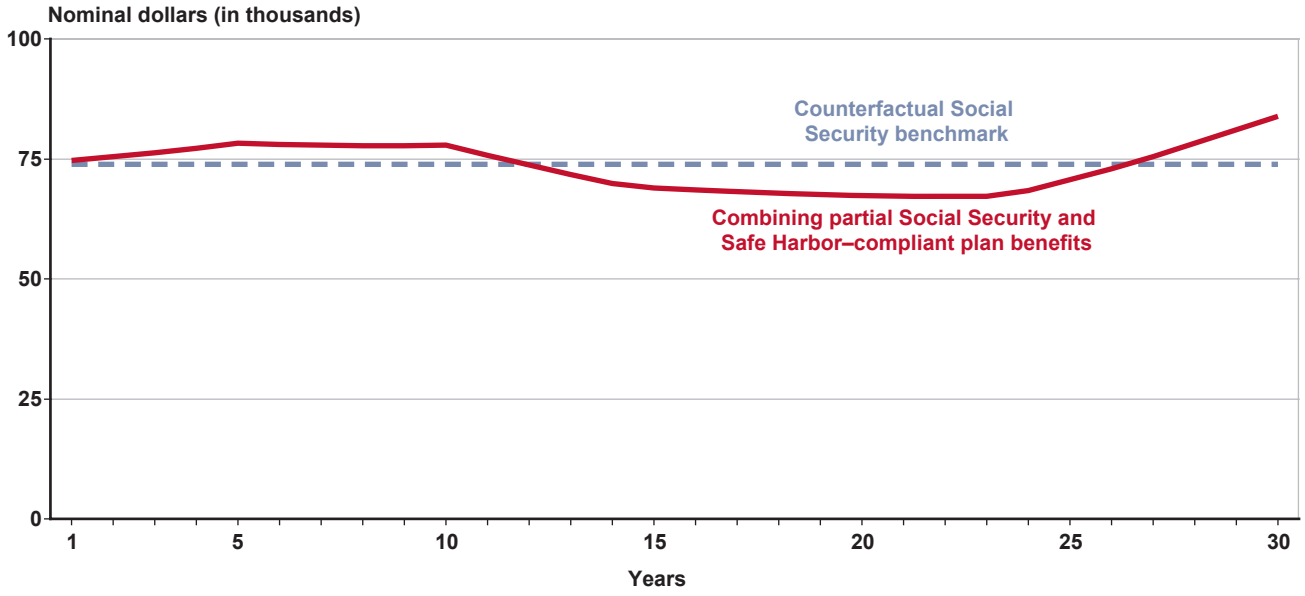
Chart 2.
Estimated annuitized Social Security benefit and Safe Harbor–compliant pension benefit for a hypothetical 2018 labor force entrant aged 25, by number of years worked in noncovered employment



SOURCE: Authors' calculations.

NOTE: Appendix Tables C-1 and C-2 present underlying assumptions and estimated yearly benefit amounts, respectively.

Chart 3.
Estimated annuitized retirement benefit that combines some Social Security and some Safe Harbor–compliant pension coverage for a hypothetical 2018 labor force entrant aged 25, by number of years in noncovered employment



SOURCE: Authors' calculations.

NOTES: Appendix Tables C-1 and C-2 present underlying assumptions and estimated yearly benefit amounts, respectively.

The Social Security component of the combined benefit is WEP-adjusted.

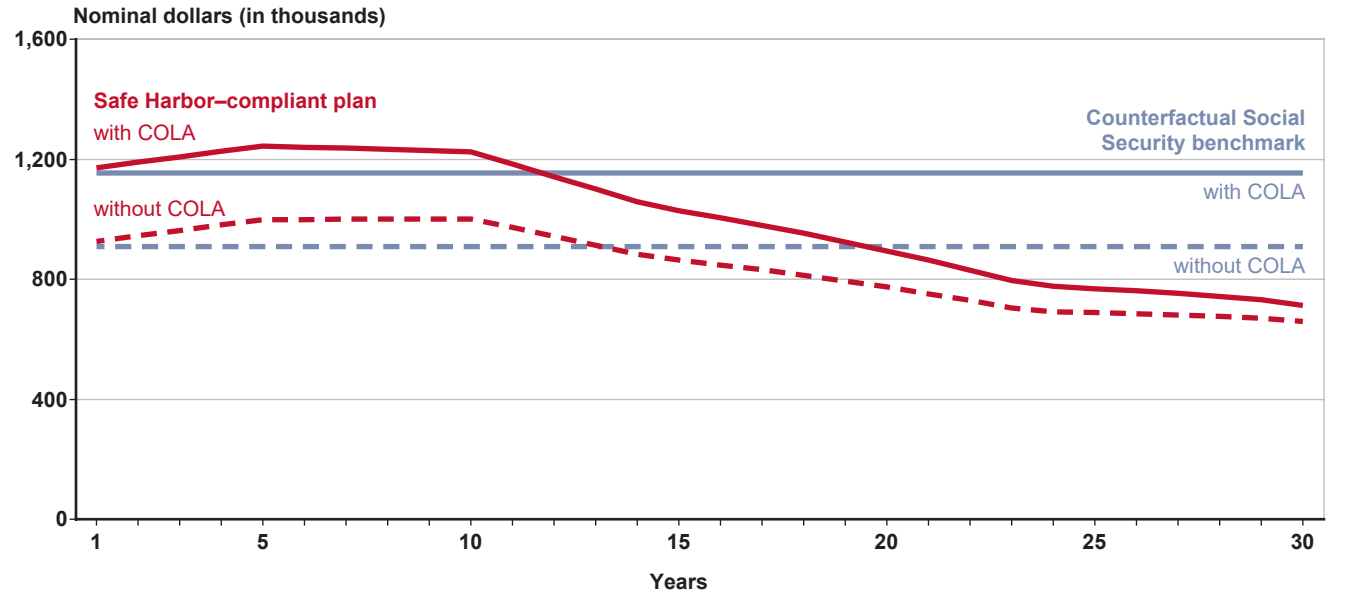
employment are combined, the years worked in noncovered employment have little effect on age-67 income, relative to a counterfactual Social Security benefit that assumes equivalent lifetime earnings in covered employment only. This analysis suggests that the Safe Harbor–compliant defined benefit formulas successfully match Social Security benefits at age 67.

The conclusion is less clear for the Safe Harbor–compliant defined contribution plan, which produces a stock of assets at age 67 rather than an annual benefit. In theory, this stock of assets should generate Social Security–equivalent benefits in retirement. A straightforward comparison measures the plan account balance at age 67 against the present value of lifetime Social Security benefits. To account for time worked in covered employment, this analysis adopts the assumption used for Chart 3, simulating the Safe Harbor–compliant plan account balance and adding its plan assets to Social Security wealth accrued from covered employment.

The analysis assumes that contributions to the Safe Harbor–compliant defined contribution account—7.5 percent of salary—are invested safely and yield a nominal return of 5.3 percent annually.[18] Contributions cease once the hypothetical worker separates from noncovered employment, but assets in the account continue to appreciate 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.[19] For consistency, we set the discount rate as equal to the worker's expected return on assets.

The assumption about COLAs raises an interesting issue. The Safe Harbor formulas for defined benefit plans do not provide a COLA, suggesting that Safe Harbor–compliant defined contribution wealth should be compared with the present value of unadjusted Social Security benefits. Yet, Social Security benefits do have COLAs, 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 (Chart 4).[20] We find similar results in both COLA scenarios. Chart 4 suggests that, unlike the defined benefit formulas, the Safe Harbor–compliant defined contribution plan may not generate enough wealth to compensate noncovered state and local government employees fully for lost Social Security benefits.

Chart 4.
Estimated present-value lifetime wealth from a combination of Social Security and a Safe Harbor–compliant defined contribution plan for a hypothetical 2018 labor force entrant aged 25, by number of years in noncovered employment



SOURCE: Authors' calculations.

NOTES: Appendix Table C-1 presents the underlying assumptions.

The Social Security component of the combined benefit is WEP-adjusted.

Do Pension Benefits for Noncovered New Hires Provide the Same Lifetime Resources as Social Security?

Although the defined benefit formulas currently offered to newly hired noncovered state and local government employees satisfy the Safe Harbor requirements, and the Safe Harbor–compliant defined benefit formulas achieve the goal of the IRS Employment Tax Regulations, it is not clear that noncovered new hires will enjoy Social Security–equivalent resources in retirement. The Safe Harbor formulas 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 have very long vesting periods and are increasingly unlikely to grant full COLAs after retirement.[21] For example, the median vesting period in our sample of benefit formulas for noncovered workers is 10 years (Table 4), and a few plan sponsors recently extended vesting periods from 5 years to 10 years as part of reforms intended to curb rising pension costs.[22] Similarly, 15 percent of plans for noncovered workers award COLAs only periodically or if plan investments perform well, and 20 percent of plans award only simple (noncompounding) COLAs. On the positive side, state and local pensions allow members to collect full benefits at much younger ages than are required to qualify for full Social Security benefits (see Table 3). Many plans also allow members to claim reduced benefits before the normal retirement age with an actuarial adjustment that is more generous than Social Security's.

To account for these factors in testing the generosity of noncovered workers' pension benefits, we turn from estimating age-67 benefits to estimating lifetime retirement wealth. To that end, we calculate the following ratio:

$$\frac{\textit{Noncovered pension wealth} + \textit{Covered Social Security wealth}}{\textit{Counterfactual Social Security wealth}}$$

We define noncovered pension wealth as the present value of future state and local pension benefits from noncovered employment. We define covered Social Security wealth as the present value of future Social Security benefits earned from covered employment (adjusted for the WEP). Counterfactual Social Security wealth equals the present value of the future Social Security benefits that the hypothetical worker *would have received* had he or she never entered the noncovered government position and instead accrued equivalent lifetime earnings entirely in covered employment. We refer to this equation as the "counterfactual wealth ratio." Values equal to or greater than 1 indicate that the noncovered worker is no worse off (and potentially better off) than he or she would have been if he or she never entered noncovered employment.

We evaluate state and local defined benefit formulas using the same hypothetical worker with whom we assessed Safe Harbor compliance.[23] We posit a baseline scenario in which this worker enters the labor market with a private-sector job at age 25. At age 35, the worker takes a noncovered government position with a $50,000 salary. He or she receives 3.8 percent nominal wage increases annually for 12 years, after which he or she returns to private-sector employment until retirement at age 65. Public pension benefits are calculated as in Charts 2 and 3, with the provisions of each state and local formula for noncovered workers substituting for the Safe Harbor parameters. We assume that the hypothetical worker claims his or her public pension benefit at the plan's NRA, after which benefits increase according to the plan's COLA provision.[24] We also assume that the 15 percent of state and local plans that grant only unscheduled COLAs will not grant any future adjustments. For consistency across plans with different NRAs, benefits are discounted to age 25.[25]

By definition, covered Social Security wealth (in the numerator of the equation above) excludes noncovered earnings from state or local government employment. We assume that covered Social Security benefits are claimed at the worker's FRA and are adjusted for the WEP and for cost-of-living increases after claiming. We discount the benefits to age 25, using the same rate as that used for the public pension (the worker's expected return on assets).

Table 4.
Vesting and COLA provisions of defined benefit formulas offered to noncovered state and local government new hires in 2016

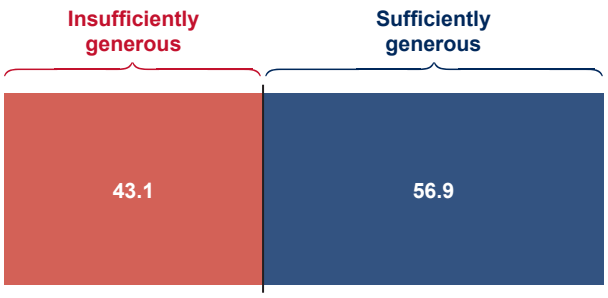
Characteristic	Value
Vesting period (years)	
Mean	8.3
Median	10
Minimum	5
Maximum	15
Percentage of plans with—	
Any COLA	100
A COLA applied only at unscheduled intervals	15
A noncompounding COLA	20

SOURCES: Authors' and NASRA surveys of public plan administrators; and plan actuarial valuation reports.

We calculate counterfactual Social Security wealth (the denominator of the equation above) assuming that the worker never entered noncovered government employment; hence, his or her entire earnings record is in covered employment and provides the basis for his or her benefit calculation. We assume that the worker claims counterfactual Social Security benefits at FRA, that the benefits are not adjusted for the WEP, and that COLAs will be applied after claiming. Counterfactual Social Security benefits are likewise discounted to age 25, with the discount rate set to equal the worker's expected return on assets.

Chart 5 shows that 57 percent of the evaluated formulas have a counterfactual wealth ratio of 1 or more, indicating sufficient generosity. Of course, formulas that "pass" the test with a counterfactual wealth ratio of 1.01 provide substantively equivalent benefits to those that "fail" with a ratio of 0.99. For this reason, Chart 6 plots the full distribution of formulas by counterfactual wealth ratios. Of the 43 percent of formulas that do not pass the test, all provide at least 85 percent of the worker's counterfactual Social Security wealth and most provide 95–99 percent. Among the formulas that pass, 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 amass significant pension wealth over their lifetimes because they tend to retire earlier and receive benefits for many more years than teachers do. Chart 7 compares the counterfactual wealth-ratio distributions for teachers and police officers. Moreover, state and local employers may design their pension formulas not only to replace Social Security as required by statute and regulation but also to attract and retain desirable workers by offering benefits that provide supplemental retirement saving, as many private-sector employers do.

Chart 5.
Sufficiency of state and local government defined benefit plans for new hires as evaluated using the counterfactual wealth ratio (in percent)



SOURCE: Authors' calculations based on plan actuarial valuation reports.

NOTES: "Sufficiency" is indicated by a counterfactual wealth ratio of 1 or more.

Appendix Table C-3 presents the assumptions about the hypothetical worker for whom each plan's counterfactual wealth ratio is calculated.

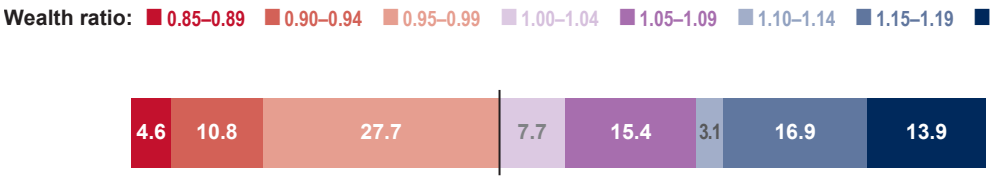
Each formula's counterfactual wealth ratio is sensitive to assumptions about the worker's employment history, particularly about his or her tenure in the noncovered government position. Chart 8 illustrates by contrasting two distributions of counterfactual wealth ratios. It compares the baseline distribution from Chart 6, which assumes 12 years of noncovered tenure, with the distribution for a worker who stays only 5 years in the noncovered government position (recall that 45 percent of new hires remain no longer than 5 years). The 5-year state or local worker always accrues benefits at least as valuable as he or she would have accrued from a career in Social Security–covered work, most often a nearly equal amount. This result is intuitive: Although the public pension provides very little, the worker still has 35 years in which to earn full Social Security benefits in covered employment.

A related analysis considers how the worker's vesting status affects benefit sufficiency. Chart 8 shows that a nonvested worker is at risk of falling short only if he or she accrues more than 5 years in noncovered employment. In practice, around half of the formulas sampled have vesting periods longer than 5 years and, as expected, none of those formulas satisfy the counterfactual wealth test for a worker who separates right before vesting.[26] However, even if those formulas were to shorten their vesting periods, they still might not pass the counterfactual wealth test; very few formulas require more than 10 years to vest, yet Chart 8 shows that many fall short for a worker with 12 years of tenure.

The counterfactual wealth ratio is also sensitive, albeit less so, to the assumed age of entry into noncovered public-sector employment. Chart 9 contrasts the baseline distribution of counterfactual wealth ratios with a new distribution that assumes that the worker begins his or her 12-year government-job tenure at age 25 instead of age 35. The public benefit formulas are less likely to provide Social Security–equivalent benefits to the worker who enters at age 25 because the worker's 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 realistic

Chart 6.
Percentage distribution of state and local government defined benefit plans, by counterfactual wealth ratio

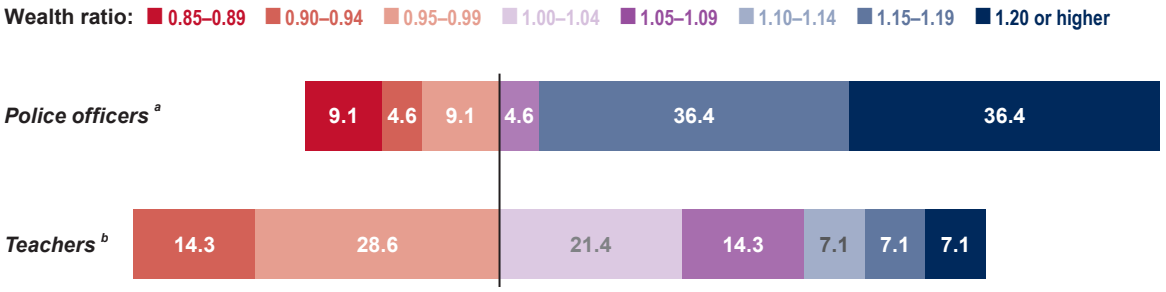


SOURCE: Authors' calculations based on plan actuarial valuation reports.

NOTES: Rounded components of percentage distribution do not sum to 100.0.

Appendix Table C-3 presents the assumptions about the hypothetical worker for whom each plan's counterfactual wealth ratio is calculated.

Chart 7.
Percentage distribution of state and local government defined benefit plans for teachers and police officers, by counterfactual wealth ratio



SOURCE: Authors' calculations based on plan actuarial valuation reports.

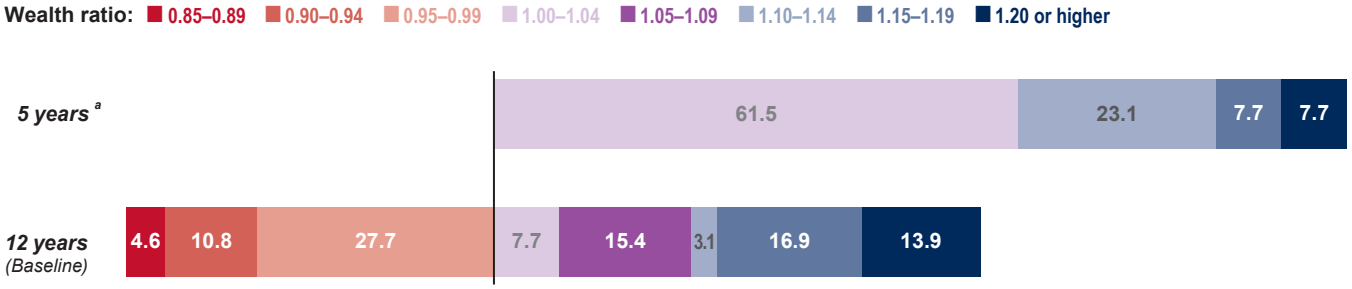
NOTES: Rounded components of percentage distributions do not sum to 100.0.

Appendix Table C-3 presents the assumptions about the hypothetical workers for whom each plan's counterfactual wealth ratio is calculated.

a. No plans in the 1.00–1.04 or 1.10–1.14 ranges.

b. No plans in the 0.85–0.89 range.

Chart 8.
Percentage distribution of state and local government defined benefit plans, by counterfactual wealth ratio and worker's tenure in noncovered employment



SOURCE: Authors' calculations based on plan actuarial valuation reports.

NOTES: Rounded components of percentage distributions do not necessarily sum to 100.0.

Appendix Table C-3 presents the assumptions about the hypothetical workers for whom each plan's counterfactual wealth ratio is calculated.

a. No plans in the 0.85–0.89, 0.90–0.94, 0.95–0.99, or 1.05–1.09 ranges.

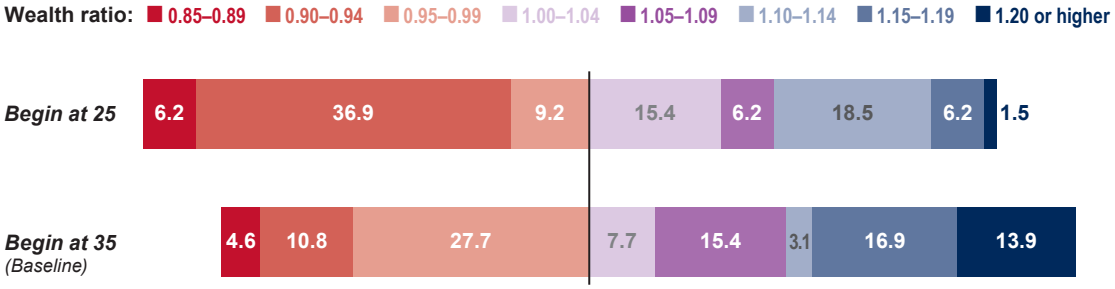
variation in earnings levels. We define a hypothetical high earner as having a $60,000 starting salary in noncovered employment with 4.3 percent annual wage increases and a hypothetical low earner as starting at $40,000 and having annual wage increases of 3.3 percent.[27] For each earner, about 45 percent of formulas generate a counterfactual wealth ratio of less than 1 (Chart 10). However, the story changes for very high earners (not shown). If a worker is assumed to earn the taxable maximum amount each year, then 95 percent of formulas generate counterfactual wealth ratios greater than 1, and most provide benefits considerably greater than the counterfactual Social Security level.

The preceding analysis suggests that a number of state and local pension formulas fall short of providing Social Security–equivalent benefits for some of their members. In practice, of course, the extent of the problem depends on the demographic characteristics of workers earning benefits under the different formulas, particularly their propensity to stay in state or local government for a full career. However, fully accounting for these formula-specific factors would require highly detailed data on plan members and assistance from each plan's actuary.

In summary, although the benefit formulas for noncovered state and local government employees meet the federal Safe Harbor requirements, those requirements do not account for vesting-period, COLA, and retirement-age differences between the public plans and Social Security. As such, some formulas may still fall short of Social Security equivalence for a significant minority of members.

The analysis to this point has assumed that future public pension benefits will be paid as promised. The next section tests that assumption and considers

Chart 9.
Percentage distribution of state and local government defined benefit plans, by counterfactual wealth ratio and worker's age of entry into noncovered employment

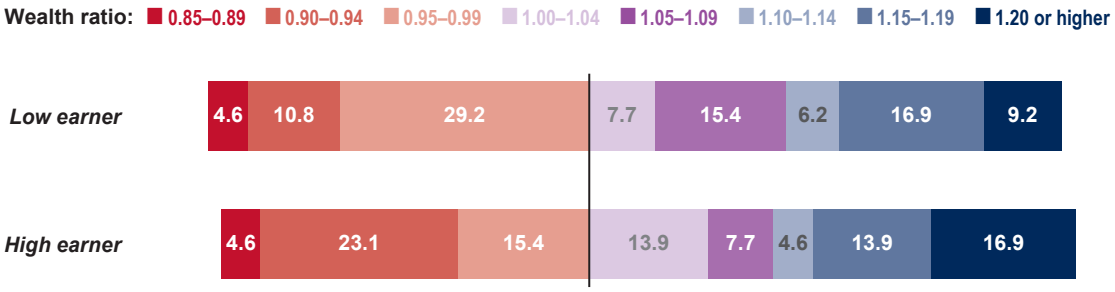


SOURCE: Authors' calculations based on plan actuarial valuation reports.

NOTES: Rounded components of percentage distributions do not sum to 100.0.

Appendix Table C-3 presents the assumptions about the hypothetical workers for whom each plan's counterfactual wealth ratio is calculated.

Chart 10.
Percentage distribution of state and local government defined benefit plans, by counterfactual wealth ratio for low and high earners



SOURCE: Authors' calculations based on plan actuarial valuation reports.

NOTES: Rounded components of percentage distributions do not necessarily sum to 100.0.

Appendix Table C-3 presents the assumptions about the hypothetical workers for whom each plan's counterfactual wealth ratio is calculated.

whether federal regulators may want to account for the financial health of pension funds for noncovered state and local government employees.

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

In the wake of the 2008 financial crisis, the aggregate funded ratio reported by state and local defined benefit plan sponsors declined from 86 percent to 72 percent, and the trust funds have yet to fully recover (Aubry, Crawford, and Wandrei 2018).[28] Additionally, a handful of governments have persistently failed to make the actuarially required contributions 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 status?

The legal scholarship on state and local pension plans notes 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 when they joined the government workforce (Munnell and Quinby 2012). The IRC also discourages government sponsors from dipping into pension trust funds to pay for other services (26 U.S. Code § 401(a)). Monahan (2017) argues that although state and local government retirees have a legal right to disbursements from the trust fund, neither state nor federal courts 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, however, benefit payments depend on the goodwill of the government. This logic also seems to apply in the years preceding trust fund exhaustion. For example, several state and local governments have been able to renege on pension promises by making the case in court that pension costs are crowding out vital public services such as police protection and sanitation (Monahan 2010; Cloud 2011; Reinke 2011). Ancillary features, such as COLAs, have proven particularly vulnerable to default.

Moreover, Monahan (2017) argues that retirees may have little *legal* recourse even in states such as Illinois, where the state constitution grants strong pension rights. Of course, such constitutional protections exert strong *political* pressure on state legislatures to respect pension promises because the legal challenges to pension cuts would likely prove costly.

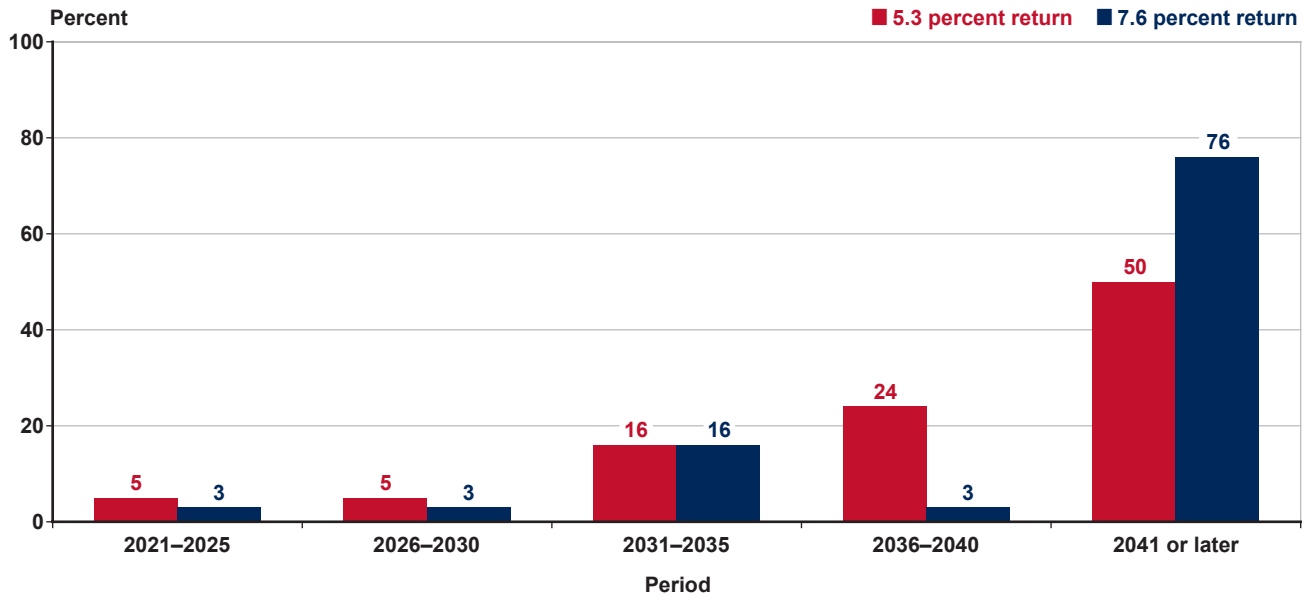
Consequently, the possibility of trust fund exhaustion is an important metric of benefit generosity. This article assesses the likelihood of exhaustion in the near term by projecting cash flows and estimating the date on which each of the pension plans in the sample could run out of assets.[29] For this analysis, we use information from the *Public Plans Database* maintained by the Center for Retirement Research at Boston College. For each trust fund, the database provides the market level of assets, annual expenditures, payroll, and employer and employee contributions. We assume that the future annual growth rates for expenditures and payroll will equal their average growth rates from 2012 to 2016. Future contributions as a percentage of payroll are held at their 2016 level. In each year, the projected balance in the plan's trust fund equals the prior-year balance, plus investment income and contributions, minus expenditures.

A fund's investment return is a key parameter in our asset projection. Munnell and Aubry (2016) note that assumed investment return for state and local pensions in the *Public Plans Database* is 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. Because more than half of the assets were invested in equities, that assumption implies expected stock returns of 9.6 percent. By contrast, eight large investment firms surveyed by Munnell and Aubry projected an average equity return of only 5.5 percent over the next decade. To acknowledge uncertainty around the future performance of equities, we project assets under two portfolio investment-return assumptions: 7.6 percent and 5.3 percent.[30] The outcome of interest is the fund's exhaustion date, defined as the year in which assets decline below zero.

Chart 11 shows the distribution of defined benefit public plans by projected exhaustion dates under the two investment-return assumptions. Under either assumption, two plans for noncovered workers in Chicago—the Municipal Employees' Annuity and Benefit Fund and the Policemen's Annuity and Benefit Fund—are projected to exhaust their assets by 2026 (results by individual plan are not shown). Another six plans are projected to exhaust their trust funds by 2035 under both investment-return assumptions.[31]

This simple projection is an imperfect indicator of a plan's future financial health. Because returns to risky investments do not follow a deterministic path, many

Chart 11.
Percentage distributions of state and local government defined benefit plans by year of projected trust fund exhaustion under alternative rates of return on investment



SOURCE: Authors' calculations based on data for 2012–2016 from the *Public Plans Database*.

NOTE: Rounded components of percentage distributions do not necessarily sum to 100.

studies have simulated pension finances stochastically (for example, 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, as a few have begun to do.[32] Nevertheless, the projection is sufficient for the short run to identify financially precarious plans. For example, in 2010, the Commission to Strengthen Chicago's Pension Funds similarly predicted that pension trust fund assets for the police would exhaust in 2022 and those for municipal workers would exhaust in 2026.[33]

Although the Illinois constitution grants strong pension rights to Chicago's public employees, it is possible that benefits will be cut if the municipal-worker and police plans revert to pay-as-you-go systems. According to the *Public Plans Database*, in 2016, the municipal workers' trust fund paid benefits equal to 53 percent of municipal payroll, while contributions from the city and pension members were each equal to only about 9 percent of payroll. Similarly, the police trust fund paid benefits equal to 62 percent of payroll, whereas total contributions equaled only 25 percent.

Chicago's pension plans all satisfy the federal Safe Harbor requirements. In 2017, the Chicago municipal-worker and police plans each offered two design options to new members. The first is a cash-balance plan in which 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 (50 for police).[34] The second is a defined benefit pension with an NRA of 65 (55 for police), an 8-year period for computing FAS, a 2.4 percent benefit multiplier (2.5 percent for police), a 10-year vesting period, and a noncompounding COLA capped at one-half of the Consumer Price Index (CPI) for All Urban Consumers. For newly hired municipal workers and police, both options currently provide benefits well above those required by law. Trust-fund exhaustion is a separate problem, unrelated to the level of benefits currently promised to new hires.[35]

This looming challenge has important implications for noncovered state and local workers and for federal policymakers. Underscoring the challenge is the uncertainty of how unfunded state and local benefit promises should be valued.[36] A similar problem arises with respect to Social Security, which also faces a

financial shortfall. The 2019 *Trustees Report* estimates that the OASI trust fund will exhaust its assets in 2034. At that point, absent new legislation, OASI will become a pay-as-you-go program, with benefit payments supported entirely by payroll tax revenue. The *Trustees Report* projects that the payroll tax as currently legislated will be sufficient to fund about 80 percent of scheduled benefits in 2035, implying a sharp 20-percent reduction for current and future retirees. Hence, not only are state and local pension promises vulnerable to cuts, but benchmark Social Security benefits also entail risk.

Conclusion

Section 218 of the Social Security Act allows state and local governments to extend Social Security coverage to their employees, and the Omnibus Budget Reconciliation Act of 1990 mandates Social Security coverage for state and local workers unless they participate in a sufficiently generous employer-sponsored retirement system. The requirements for generosity are elaborated in the IRS Employment Tax Regulations, pursuant to IRC Section 3121. Public plans must provide their members, on reaching their Social Security FRA, with a monthly benefit that matches the PIA that the member would have received had he or she been covered by Social Security. Alternatively, a public plan's benefit formula can simply match one of the Safe Harbor formulas established by the IRS's Revenue Procedure 91-40.

State and local plans adhere to the Safe Harbor guidelines, and the Safe Harbor–compliant plans provide Social Security–equivalent benefits at the member's FRA, but the federal standards ignore three key drivers of lifetime resources that often differ between public pensions and Social Security. On one hand, state and local plans often require very long vesting periods and are increasingly unlikely to grant full COLAs. On the other hand, public pensions frequently allow members to claim full benefits at a younger age than that required to claim full Social Security benefits. Incorporating these factors into a wealth-based measure of benefit generosity suggests that 43 percent of benefit formulas for noncovered workers fall short of Social Security equivalence for a significant minority of new hires. Specifically, the public plans fall short for members who stay in their noncovered position for more than a few years but less than a full career. These medium-tenure employees make up about one-third of the state and local government workforce.

Of equal concern is that a few state and local pensions are so poorly funded that their dedicated trust funds may be depleted within the next decade. Once these plans revert to pay-as-you-go status, sponsors and beneficiaries will enter a legal gray zone with an elevated likelihood of future benefit cuts and possible defaults.

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 plan requirements with reasonable vesting periods and full COLAs. Policymakers could also revisit the contribution-rate requirements for defined contribution plans in light of current economic conditions, and develop new Safe Harbor requirements for the hybrid defined benefit/defined contribution plans that are becoming more prevalent in state and local government (IRS 2017).

Alternatively, 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; GAO 2005; National Commission on Fiscal Responsibility and Reform 2010; Munnell 2000; Warshawsky 2016). It would also provide noncovered state and local government employees with important ancillary benefits that they may currently lack, such as spousal and survivor benefits and disability protection (Nuschler, Shelton, and Topoleski 2011; Munnell, Aubry, and Belbase 2014).[37]

However, mandatory Social Security coverage of all future earnings will not protect currently noncovered state and local retirees whose pensions are poorly funded. Of course, Social Security also faces financial challenges, with the 2019 *Trustees Report* predicting exhaustion of the OASI trust fund in 2034. Should the program revert to a pure pay-as-you-go system, the payroll-tax contribution rate as currently legislated is projected to be sufficient to fund about 80 percent of scheduled benefits initially, before declining to 75 percent in the long run. 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. We leave that question to future research.

Appendix A: Retirement Systems Reviewed for This Analysis

Table A-1.
State and local government pension systems included in the analysis sample

State or local retirement system	Source of data on Social Security coverage of plan members
California	
Public Employees' Retirement Fund [a]	NASRA survey
Teachers' Retirement Fund	Authors' survey
University of California Retirement Plan [a]	2016 actuarial valuation report
Colorado	
Fire and Police Pension Association	Authors' survey
Public Employees' Retirement Association—	
Local Government Division	NASRA survey
Police and Fire Division	NASRA survey
School Division	NASRA survey
State Division	NASRA survey
Connecticut	
Municipal Employees' Retirement System [a]	2016 actuarial valuation report
Teachers' Retirement System	NASRA survey
Georgia	
Public School Employees' Retirement System [a]	Authors' survey
Teachers' Retirement System [a]	NASRA survey
Illinois	
City of Chicago—	
Firemen's Annuity and Benefit Fund	Baker (2013); Hicken (2014); other blogs/articles
Municipal Employees' Annuity and Benefit Fund	Baker (2013); Hicken (2014); other blogs/articles
Policemen's Annuity and Benefit Fund	Baker (2013); Hicken (2014); other blogs/articles
Public School Teachers' Pension and Retirement Fund	Chicago Teachers' Union website
State Employees' Retirement System [a]	2016 actuarial valuation report
State Universities Retirement System	NASRA survey
Teachers' Retirement System	NASRA survey
Kentucky	
Teachers' Retirement System	NASRA survey
Louisiana	
Parochial Employees' Retirement System [a]	Authors' survey
State Employees' Retirement System	NASRA survey
Teachers' Retirement System	NASRA survey
Massachusetts	
Barnstable County Retirement Association	Authors' survey
Boston Retirement Board	Authors' survey
Cambridge Retirement System	Authors' survey
Middlesex Regional Retirement Board	Authors' survey
Plymouth County Retirement Board	Authors' survey
State Employees' Retirement System	Authors' survey
Teachers' Retirement System	Authors' survey
Worcester Regional Retirement Board	Authors' survey
Missouri	
Public Schools' Retirement System	2016 actuarial valuation report
Nevada	
Public Employees' Retirement System	NASRA survey

(Continued)

Table A-1.
State and local government pension systems included in the analysis sample—*Continued*

State or local retirement system	Source of data on Social Security coverage of plan members
Ohio	
Police and Fire Pension Fund	NASRA survey
Public Employees' Retirement System	NASRA survey
Teachers' Retirement System	NASRA survey
Texas	
Municipal Retirement System [a]	NASRA survey
Teachers' Retirement System	Texas Classroom Teachers Association website

SOURCE: Authors' research.

NOTE: Except as noted, less than 10 percent of plan members are also covered by Social Security.

a. Between 10 percent and 89 percent of plan members are also covered by Social Security.

Table A-2.
State and local government pension systems studied but omitted from the analysis sample

State or local retirement system	Reason omitted
Colorado	
Denver Employees' Retirement Plan	≥90% of plan members also covered by Social Security
Connecticut	
State Employees' Retirement System	No data on Social Security coverage available
Georgia	
Employees' Retirement System	≥90% of plan members also covered by Social Security
Municipal Employees' Benefit System	No data on Social Security coverage available
Peace Officers' Annuity and Benefit Fund	No data on Social Security coverage available
Illinois	
Municipal Retirement Fund	≥90% of plan members also covered by Social Security
Kentucky	
County Employees Retirement System	≥90% of plan members also covered by Social Security
Employees' Retirement System	≥90% of plan members also covered by Social Security
Louisiana	
Municipal Police Employees' Retirement System	No data on Social Security coverage available
Missouri	
County Employees' Retirement System	No data on Social Security coverage available
Local Government Retirement System	≥90% of plan members also covered by Social Security
Public Education Employee's Retirement System	≥90% of plan members also covered by Social Security
State Employees' Retirement System	≥90% of plan members also covered by Social Security
New Jersey	
Police and Firemen's Retirement System	≥90% of plan members also covered by Social Security
Public Employees' Retirement System	≥90% of plan members also covered by Social Security
Teachers' Retirement System	≥90% of plan members also covered by Social Security
Texas	
County and District Retirement System	≥90% of plan members also covered by Social Security
Employees' Retirement System	≥90% of plan members also covered by Social Security

SOURCE: Authors' research.

Table A-3.
Estimated percentage of state and local government employees who are represented by retirement systems whose administrators provided valid responses

State	Among active defined benefit plan members	Among all 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
Ohio	79	89
Texas	91	83

SOURCES: Authors' and NASRA surveys of public plan administrators; Census Bureau Annual Survey of Public Employment & Payroll; and various plan documents, websites, and news articles.

NOTE: Many part-time, seasonal, and temporary state and local government employees do not participate in an employer-provided retirement system.

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

Our calculations follow the sequence described below.

Calculating State and Local Defined Benefit Pension Benefits

We begin by projecting the worker's nominal earnings from labor-market entry to labor-market exit:

$$Salary_{current\ age} = Salary_{age\ entering\ noncovered\ job} \times \left(1 + wage\ growth\right)^{current\ age - age\ entering\ noncovered\ job} \quad (1)$$

Next, we calculate the FAS depending on the age at which the worker leaves the noncovered job:

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

The nominal pension benefit equation is simply:

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

Calculating State and Local Defined Contribution Wealth

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

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

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

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

Calculating Social Security Benefits According to IRC Section 3121

The first step in this calculation is to alter the worker's earnings history by entering zero covered earnings for the years when the worker was *not* employed in the noncovered state or local job, regardless of actual earnings in those years.

The next step is to cap the altered earnings at the Social Security taxable maximum ("tax max") in any year when it may apply. To do this, the tax max in future years must be projected according to a legislated formula (rounded to the nearest multiple of 300). The tax max formula depends on the Social Security AWI, which must also be projected:

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

where

$$AWI_{current\ age} = AWI_{current\ age-1} \times \left(1 + CPI + Real\ wage\ differential\right) \quad (7)$$

and

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

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

$$Index\ factor_{current\ age} = \begin{cases} \dfrac{AWI_{age\ 60}}{AWI_{current\ age}} & if\ current\ age < 61 \\ 1 & if\ current\ age \geq 61 \end{cases} \tag{9}$$

$$Indexed\ salary_{current\ age} = Capped\ salary_{current\ age} \times Index\ factor_{current\ age} \tag{10}$$

Using the indexed earnings history, we calculate the AIME:

$$AIME_{current\ age} = \frac{\sum Highest\ 35\ indexed\ annual\ earnings\ amounts}{35 \times 12} \tag{11}$$

Then we obtain the worker's PIA by applying the formula:

$$\begin{aligned} PIA_{age\ 62} = & \left(0.9 \times AIME\ up\ to\ the\ first\ bend\ point\right) \\ & + \left(0.32 \times AIME\ between\ the\ first\ and\ second\ bend\ points\right) \\ & + \left(0.15 \times AIME\ above\ second\ bend\ point\right) \end{aligned} \tag{12}$$

SSA revises the bend points each year based on the AWI. The PIA formula uses the bend points in the year when the worker reaches age 62. SSA uses the following formulas to calculate bend points:

$$First\ bend\ point = \frac{180}{9,779.44} \times AWI_{age\ 60} \tag{13}$$

$$Second\ bend\ point = \frac{1,085}{9,779.44} \times AWI_{age\ 60} \tag{14}$$

Lastly, the PIA is adjusted to keep pace with inflation in the years after the worker reaches age 62 until he or she reaches FRA:

$$PIA_{age\ FRA} = PIA_{age\ 62} \times \left(1 + CPI\right)^{age\ FRA - age\ 62} \tag{15}$$

Calculating WEP-Adjusted Social Security Benefits from Private-Sector or Covered Public-Sector Employment

To simulate a more realistic Social Security benefit for the noncovered worker, this phase of the analysis alters the worker's earnings history (equation 1) by entering the positive earnings amounts for the years when the worker was not employed in the noncovered position, and zero earnings for the years when the worker was employed in the noncovered position. The procedure then follows equations (6) through (15) to calculate the worker's PIA.

The next step is to apply the 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 what is called the Old Law Contribution and Benefits Base (that is, what the tax

max would have been if the 1977 Social Security Amendments had not been enacted). The Old Law Contribution and Benefits Base is determined by a legislated formula (rounded to the nearest multiple of 300):

$$Substantial\,threshold_{current\ age} = \frac{45,000 \times AWI_{current\ age-2}}{22,935.42} \times 0.25 \tag{16}$$

Table B-1 shows the WEP multiplier that applies to the PIA formula for each number of years with substantial earnings.

Table B-1.
PIA formula multipliers required under the WEP, by number of years with substantial covered earnings

Years	Multiplier
30 or more	0.90
29	0.85
28	0.80
27	0.75
26	0.70
25	0.65
24	0.60
23	0.55
22	0.50
21	0.45
20 or fewer	0.40

SOURCE: SSA.

Then, the penultimate step in the calculation applies the WEP-adjusted PIA formula to the AIME as described in equation (12). The amount by which the WEP reduces the PIA is capped at one-half of the monthly public pension benefit that the worker receives at FRA:

$$PIA_{age\ 62} = \max\left\{PIA_{WEP}, PIA_{unadjusted} - \frac{monthly\ pension\ benefit}{2}\right\} \tag{17}$$

Finally, as with equation 15, the worker's PIA is adjusted for cost-of-living increases until his or her Social Security FRA:

$$PIA_{age\ FRA} = PIA_{age\ 62} \times \left(1 + CPI\right)^{age\ FRA-62} \tag{18}$$

Transforming Annual Benefits into Lifetime Wealth

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

$$Wealth_{age\ FRA} = Benefit_{age\ FRA} \times \sum_{age=FRA}^{120} \frac{\Pr\left(alive\right)_{age} \times \left(1 + CPI\right)^{age-FRA}}{\left(1 + discount\ rate\right)^{age-FRA}} \tag{19}$$

Appendix C: Economic and Demographic Assumptions About the Hypothetical Worker; and Additional Results

Table C-1.
Economic and demographic assumptions used for benefit comparisons in Charts 2–4

Parameter	Chart 2	Chart 3	Chart 4
Defined benefit plans for noncovered workers			
Vesting period	Immediate	Immediate	. . .
FAS calculation period (years)	3	3	. . .
Benefit factor (multiplier)	1.5	1.5	. . .
Claiming age	65	65	. . .
COLA	None	None	. . .
Defined contribution plans for noncovered workers			
Vesting period	. . .	. . .	Immediate
Total contribution rate (%)	. . .	. . .	7.5
Nominal return on assets (%)	. . .	. . .	5.3
Claiming age	. . .	. . .	67
Social Security			
Credited earnings are from—	Noncovered employment	Covered employment	Covered employment
Nominal AWI growth (%)	3.8	3.8	3.8
Inflation (%)	2.6	2.6	2.6
Claiming age	67	67	67
WEP adjustment	No	Yes	Yes
Worker demographics			
Age at labor force entry	25	25	25
Age at start of noncovered employment	35	35	35
Starting annual salary in noncovered job ($)	50,000	50,000	50,000
Nominal wage growth (%)	3.8	3.8	3.8
Age at retirement	65	65	65

SOURCES: Authors' research based on intermediate assumptions of the 2018 *Trustees Report,* Munnell and others (2012), and plan actuarial valuation reports.

NOTE: . . . = not applicable.

Table C-2.
Nominal benefits received at age 67 by the hypothetical worker in Charts 2 and 3, by years in noncovered employment

	Chart 2		Chart 3			
			Combined-benefit component			
Years	Safe Harbor–compliant pension	Social Security PIA	Safe Harbor–compliant pension	Social Security PIA	Total combined benefit	Counterfactual Social Security benchmark
1	789.51	0.00	789.51	73,865.29	74,654.79	73,865.29
2	1,609.02	0.00	1,609.02	73,865.29	75,474.30	73,865.29
3	2,459.66	0.00	2,459.66	73,865.29	76,324.95	73,865.29
4	3,404.18	0.00	3,404.18	73,865.29	77,269.46	73,865.29
5	4,416.92	0.00	4,416.92	73,865.29	78,282.21	73,865.29
6	5,501.71	0.00	5,501.71	72,544.84	78,046.55	73,865.29
7	6,662.58	0.00	6,662.58	71,224.38	77,886.96	73,865.29
8	7,903.72	0.00	7,903.72	69,903.93	77,807.65	73,865.29
9	9,229.57	0.00	9,229.57	68,583.48	77,813.05	73,865.29
10	10,644.77	37,137.71	10,644.77	67,263.03	77,907.79	73,865.29
11	12,154.19	40,851.48	12,154.19	63,603.93	75,758.13	73,865.29
12	13,762.97	42,973.69	13,762.97	59,944.84	73,707.80	73,865.29
13	15,476.46	44,294.14	15,476.46	56,285.74	71,762.20	73,865.29
14	17,300.30	45,614.59	17,300.30	52,626.65	69,926.94	73,865.29
15	19,240.40	46,935.05	19,240.40	49,723.19	68,963.60	73,865.29
16	21,302.98	48,255.50	21,302.98	47,230.23	68,533.21	73,865.29
17	23,494.52	49,575.95	23,494.52	44,663.96	68,158.48	73,865.29
18	25,821.86	50,896.40	25,821.86	42,020.49	67,842.34	73,865.29
19	28,292.15	52,216.85	28,292.15	39,295.75	67,587.90	73,865.29
20	30,912.90	53,537.30	30,912.90	36,485.49	67,398.38	73,865.29
21	33,691.96	54,857.76	33,691.96	33,585.22	67,277.18	73,865.29
22	36,637.61	56,178.21	36,637.61	30,590.26	67,227.87	73,865.29
23	39,758.46	57,498.66	39,758.46	27,495.70	67,254.16	73,865.29
24	43,063.60	58,819.11	43,063.60	25,390.26	68,453.87	73,865.29
25	46,562.52	60,139.56	46,562.52	24,069.81	70,632.33	73,865.29
26	50,265.17	61,460.02	50,265.17	22,749.36	73,014.53	73,865.29
27	54,181.99	62,830.64	54,181.99	21,378.73	75,560.72	73,865.29
28	58,323.90	64,253.36	58,323.90	19,956.02	78,279.92	73,865.29
29	62,702.36	65,730.13	62,702.36	18,421.77	81,124.12	73,865.29
30	67,329.36	67,263.03	67,329.36	16,505.65	83,835.01	73,865.29

SOURCE: Authors' calculations.

NOTES: The hypothetical worker is assumed to enter the labor market in the private sector in 2018 at age 25, enter noncovered government employment at age 35 with a starting salary of $50,000 and experience 3.8 percent nominal annual wage growth until retiring at age 65.

Appendix Table C-1 summarizes the underlying economic and demographic assumptions.

Table C-3.
Economic and demographic assumptions used for benefit comparisons in Charts 5–10

Parameter	Charts 5–7	Chart 8	Chart 9	Chart 10
Defined benefit plans for noncovered workers				
Vesting period	a	a	a	a
FAS calculation period (years)	a	a	a	a
Benefit factor (multiplier)	a	a	a	a
Claiming age	[a] NRA	[a] NRA	[a] NRA	[a] NRA
COLA	a	a	a	a
Social Security				
Credited earnings	b	b	b	b
Nominal AWI growth (%)	3.8	3.8	3.8	3.8
Inflation (%)	2.6	2.6	2.6	2.6
Claiming age	[c] 67	[c] 67	[c] 67	[c] 67
WEP adjustment	d	d	d	d
Worker demographics				
Year of labor force entry	2018	2018	2018	2018
Age at labor force entry	25	25	25	25
Age at start of noncovered employment	35	35	25 and 35	35
Starting annual salary in noncovered job ($)	50,000	50,000	50,000	[e] 40,000 and 60,000
Nominal wage growth (%)	3.8	3.8	3.8	[e] 3.3 and 4.3
Discount rate (%)	5.3	5.3	5.3	5.3
Age at retirement	65	65	65	65
Years in noncovered employment	12	5 and 12	12	12

SOURCES: Authors' research based on intermediate assumptions of the 2018 *Trustees Report,* Munnell and others (2012), and plan actuarial valuation reports.

NOTE: Cells containing two values indicate the variable(s) that the given chart compares.

a. Varies from plan to plan.

b. In the numerator of the counterfactual wealth ratio equation, lifetime earnings in covered employment are credited; in the denominator, total lifetime earnings from covered and noncovered employment are credited.

c. FRA for the hypothetical worker (born 1993).

d. Adjustment is applied to covered Social Security wealth (in the numerator of the counterfactual wealth ratio equation) but not to the counterfactual Social Security wealth calculation (the denominator of that equation).

e. The "low earner" is assumed to have a $40,000 starting salary and 3.3 percent wage growth; the "high earner" is assumed to have a $60,000 starting salary and 4.3 percent wage growth.

Notes

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[1] This article refers to various recent editions of the *Trustees Report.* Current and previous *Trustees Reports* are available at https://www.ssa.gov/OACT/TR/index.html.

[2] A single government may employ both covered and noncovered workers. Early amendments prohibited many states from enrolling police officers and firefighters, but other employee groups could elect Social Security coverage with a referendum by secret ballot. In 1983, existing and future Section 218 agreements were made irrevocable. Most state and local government employees are covered by Medicare, which became mandatory for new hires in 1986. All states were allowed to enroll police and firefighters beginning in 1994. For detailed information about Section 218 agreements, see https://www.ssa.gov/slge/sect_218_agree.htm.

[3] Further, the regulators focused on old-age benefits for the primary earner, without requiring public pensions to provide spousal, survivor, or disability benefits comparable to Social Security's.

[4] For a detailed introduction to Revenue Procedure 91-40, see https://www.ssa.gov/slge/revenue_procedure_91-40.htm. The formula approach was adopted because the administrative burden of confirming benefit levels for every plan member individually would have been excessive.

[5] Note the distinction between the Social Security FRA and the varying NRAs set by individual state and local government retirement plans.

[6] Many traditional defined benefit pensions calculate benefits with the formula of FAS times the benefit multiplier times years of tenure.

[7] In Appendix A, Table A-1 lists the 38 retirement systems in our final sample and Table A-2 lists the other 18 systems covered by either our survey or the NASRA survey. We found that large state-administered retirement systems are more likely to share information with researchers. Teachers and other state employees typically participate in the large retirement systems administered by their states, whereas local employees—especially police and firefighters—often participate in small, locally administered retirement systems, which are less likely to appear in the final sample. Table A-3 presents the estimated shares of all state and local pension plan participants in each state who are included in our sample. With a few exceptions, we were able to gather information for sizable majorities of state and local defined benefit plan members.

[8] Kan and Aldeman (2014) likewise found that teachers are least likely to be covered.

[9] The longer the period, the lower the FAS.

[10] The WEP reduces the PIA of workers who receive both Social Security benefits and pensions based on their noncovered employment. The WEP aims to counteract the progressivity of the PIA formula for noncovered workers whose AIMEs would understate their full lifetime earnings. See Brown and Weisbenner (2013) for a detailed discussion of the WEP.

[11] This methodology for comparing a Safe Harbor–compliant formula with Social Security is described in IRC Section 3121.

[12] Appendix B presents the calculation methodologies, including the details of these formulas.

[13] The starting salary is consistent with membership data published in pension plan actuarial valuation reports, if projected to 2028. The wage growth assumption is the long-run intermediate assumption of the 2018 *Trustees Report.* Public pension actuaries typically assume nominal annual wage growth between 5 percent and 10 percent during the first 10–15 years of public employment, decreasing to around 4 percent after 20 years. Because that earnings profile is very steep relative to private-sector profiles estimated by the Federal Reserve Bank of Atlanta's *Wage Growth Tracker,* this study adopts wage-growth assumptions consistent with those of the SSA actuaries, which reflect private-sector employment.

[14] This distribution of tenure accounts for workers who switch jobs while remaining in the same retirement system (for example, a teacher who moves to a different school district within the state). It underestimates tenure for workers who move to a public-sector job covered by a different retirement system but are able to transfer their tenure credits to the new system. Although some locally administered pension plans have tenure reciprocity agreements with state-administered plans in the same state, cross-state reciprocity agreements are relatively rare.

[15] In Appendix C, Table C-1 summarizes the underlying economic and demographic assumptions and Table C-2 presents the year-by-year estimated benefits.

[16] Appendix B describes the calculation methodology and Appendix Table C-1 presents the underlying economic and demographic assumptions.

[17] Appendix Table C-2 presents the year-by-year estimated benefits plotted in Chart 3.

[18] This return assumption equals the assumed long-run real Treasury yield from the 2018 *Trustees Report* plus inflation.

[19] The present-value calculations employ a 50-50 male-female split of the cohort mortality tables developed for the

2017 *Trustees Report.* The cohort tables were obtained on request from the SSA's Office of the Chief Actuary. Appendix B describes the present-value formulas.

[20] Appendix Table C-1 presents the underlying economic and demographic assumptions.

[21] Vesting periods in plans for noncovered state and local government workers are long relative to those of private-sector defined contribution plans. The Pension Protection Act of 2006 requires that private-sector employer contributions to defined contribution plans vest after a 3-year cliff or on a 6-year graded schedule. Consequently, around 50 percent of the plans managed by the Vanguard Group investment advisors have vesting periods no longer than 3 years (Vanguard 2018). Like private-sector defined contribution plans, most public-sector defined benefit plans require employees to contribute to prefund benefits. These contributory plans frequently allow nonvested members who separate from the government to withdraw their employee contributions, which have earned a low rate of interest. Consistent with Kan and Aldeman (2014), this analysis does not treat withdrawn contributions as retirement benefits.

[22] The distribution of vesting periods is bimodal, with peaks at 5 years and 10 years. Consequently, small changes in the sample of benefit formulas can produce large shifts in the median vesting period. Although plans do not frequently change their vesting periods, the three plans covering teachers and university faculty in Illinois extended their vesting periods from 5 years to 10 years following the 2008 financial crisis.

[23] Appendix Table C-3 presents the economic and demographic assumptions used to calculate counterfactual wealth ratios for the hypothetical worker.

[24] We assume that the worker claims pension benefits at his or her NRA because incorporating early retirement provisions would require peak wealth calculations (see Coile and Gruber 2007).

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

[26] Relatively few nonvested workers have more than 5 years of tenure. Munnell and others (2012) show that only 16 percent of newly hired state and local government employees stay in their jobs for 6 to 10 years. Moreover, studies have shown that public employees adjust their separation patterns in order to vest in their pensions (Quinby 2020 reviews the literature).

[27] 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.*

[28] 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; Novy-Marx and Rauh 2009). Whereas public plans currently discount liabilities by the assumed return on assets in the trust fund (around 8 percent historically), financial economists recommend discounting liabilities using a rate that reflects the risk of default on the pension debt.

[29] The estimation methodology is similar to those in Rauh (2010) and Munnell and others (2011).

[30] The 5.3-percent return assumption is consistent with the 2018 *Trustees Report.*

[31] The six plans are the Chicago Public School Teachers' Pension and Retirement Fund, the Illinois State Employees' and State Universities Retirement Systems, the Kentucky Teachers' Retirement System, the Louisiana State Employees' Retirement System, and the Ohio Teachers' Retirement System.

[32] For example, the city of Chicago revised its funding policy in 2016 and 2017 (Public Acts 99-0506 and 100-0023, respectively) to raise the funding levels for police and municipal worker pensions to 90 percent by 2058.

[33] The analysis assumed an 8 percent annual return on assets (Commission to Strengthen Chicago's Pension Funds 2010).

[34] The interest rate is not disclosed in the actuarial valuation reports or other publications for members. The contribution rate varies over time, depending on the statutory employer contribution rate.

[35] In general, the exhaustion dates estimated in this analysis are positively correlated with counterfactual wealth ratios—suggesting that plans with robust finances also offer more generous benefits—but the association is very weak (a correlation coefficient of 0.08).

[36] Warshawsky and Marchand (2016) suggest a methodology for valuing underfunded pensions.

[37] Unlike Social Security, state and local government plans do not permit households to receive a separate spousal benefit based on the government employee's work history. Survivor benefits are also typically less generous in nonfederal government plans because they require retirees to purchase a joint-survivor annuity at the cost of reduced monthly income. Most government pensions offer disability insurance, but we are not aware of research establishing whether these benefits are comparable with those from Social Security.

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