How Measuring Replacement Income Can Aid Assessment of Public Pension Plans

Pew evaluates a key predictor of career workers' standard of living in retirement

Overview

The Pew Charitable Trusts uses three retirement security metrics to assist policymakers in evaluating how well their plans are expected to prepare public workers for retirement. This fact sheet focuses on the replacement income ratio, a commonly cited indicator that illustrates whether a worker might expect to maintain his or her standard of living in retirement.[1] This ratio—also referred to as the replacement rate—is the percentage of a worker's pre-retirement income that is paid out by a retirement plan.

Pew's calculation compares a worker's combined income from a state or city pension benefit, plus Social Security, with his or her pre-retirement take-home pay. About three-quarters of state and local employees participate in Social Security.[2] Our research finds that most career workers in state retirement systems with Social Security coverage can expect full or close to full replacement income (a sum that matches their final take-home pay) during retirement. While the level of resources that an individual needs in retirement will vary based on many factors, the replacement income ratio helps assess how well career workers—those who spend the majority of their work lives with the same employer—are set up for retirement. Other retirement metrics used by Pew offer better tools to measure retirement security for short- and medium-tenure workers.[3]

Pew's four-step process for calculating replacement income is outlined below, using a sample plan with benefit provisions based on a typical public sector defined benefit (DB) plan whose members are covered by Social Security.[4] Under a typical DB plan, lifetime benefits are determined based on a formula that takes into account the employee's salary, years of service, and age. In addition, we summarize how the measure is applied for workers in hybrid plans that combine a reduced DB with an individual savings account. This design is the most common alternative to a DB and offered as the default or optional plan in 12 states.

Replacement income calculations

To calculate take-home pay, we subtract from the final salary the employee's contributions to Social Security, Medicare, and the state retirement system. We do not account for taxes on pre- versus post-retirement income because state-level tax policies vary and because the difference in tax exposure typically has an immaterial effect on the replacement rate calculation.[5]

Step 1: Calculate the replacement income ratio of the state-sponsored benefit provided at the time of retirement compared to final salary.

A typical DB plan provides a lifetime benefit based on a formula that multiplies the employee's years of service, final average salary, and benefit multiplier. Our analysis assumes 35 years of service, based on a start age of 30 and the assumption that workers retire once reaching normal retirement eligibility, age 65 under the sample plan.[6] The salary for the final year of employment is assumed to be $75,000, and the final average salary, which averages salaries for the last five years, is $70,756.[7] We assume a benefit multiplier of 1.8%, the national average and within plus or minus 0.2 percentage points of the majority of DB plans that participate in Social Security.

The benefit formula calculates an annual benefit of $44,577, which, compared to the worker's salary in the final year of employment, results in an employer-provided replacement ratio of 59%.

Adjustments to these assumptions all affect the replacement income ratio. For example, an earlier start age would lead to a larger estimated benefit, and a later start would result in a smaller replacement income ratio. Or if the salary were averaged over a smaller number of years, the final average salary, and corresponding benefit, would be larger.

Step 2: Adjust for the impact of inflation throughout a worker's retirement.

Most plans offer a post-retirement benefit increase or cost-of-living adjustment (COLA) to mitigate inflation in retirement, but the adjustments usually aren't sufficient to completely offset it. The adjustments are typically either a fixed percentage increase or tied to the consumer price index (CPI) with a cap. In certain cases, these provisions also include a variable benefit component, which links the adjustment to plan investment returns or funding levels.

Pew uses plan mortality assumptions to estimate how many years an employee will spend in retirement and then uses inflation and COLA assumptions to calculate the average replacement ratio in those years.

This example assumes the sample career employee receives a 1% COLA in retirement (a percentage designed to capture the average level of benefit across states), assumes an inflation rate of 2.2%, and applies the RP-2014 white collar mortality table. Based on these assumptions, the COLA offsets slightly less than half of annual inflation. Accounting for inflation reduces the retirement benefit to $39,266 and the overall replacement income ratio to 52%.

Step 3: Add expected Social Security benefit.

Our Social Security calculations replicate the official Social Security calculator, using inputs for work start and end years, as well as salary and salary growth. Benefits typically range from 30% to 40% of final salary and are estimated to be 33% for the sample career employee in this analysis, or $24,750.[8] Once the Social Security benefit is included in the calculation, the retirement benefit increases to $64,016 and the replacement income ratio increases to 85%. Since Social Security includes a COLA based on increases in the CPI, this portion of the benefit does not need to be adjusted for inflation.

Step 4: Analyze the benefit as a percentage of take-home pay.

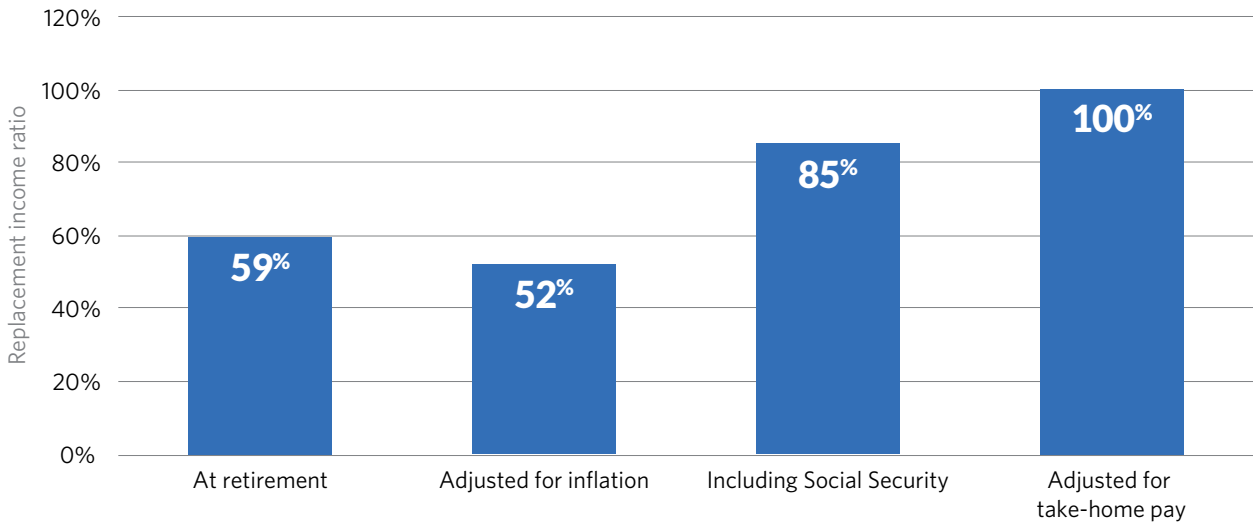
The final adjustment to the replacement income metric is to measure the extent to which retirement benefits replace take-home pay rather than final salary. Comparing retirement income to a worker's take-home pay, which is often substantially less than the actual salary, offers a better assessment of a retiree's ability to maintain a pre-retirement standard of living.

In this example, our model adjusts final salary downward by the employee's 6.2% contribution to Social Security, 1.45% contribution to Medicare, and 7% contribution to the state retirement system, for a total of 14.65% of pay. After accounting for those contributions, the employee's take-home pay is $64,013, compared to the $75,000 final salary. As a result, the replacement income ratio increases from 85% of final salary to 100% of final take-home pay.

Figure 1

Expected Replacement Income for a Career Worker Under a Sample Defined Benefit Plan

Retirement benefit exceeds worker's take-home pay



Notes: Assumes worker with 35 years of service and retirement age of 65 covered by a plan that participates in Social Security. Pew adjusts for inflation assuming a 2.2% inflation rate and 1% COLA. Take-home pay is calculated assuming a 7% employee contribution to the DB and a 7.65% contribution to Medicare and Social Security.

Workers under the sample plan would have a benefit that fully replaces their final take-home pay in retirement. This is similar to what Pew finds for nearly all state and teacher DB plans that participate in Social Security, with more than 90% providing at least a 90% replacement income ratio.

Applying the replacement income ratio to a sample hybrid plan

Pew's analysis finds that most alternative plans also provide full replacement income for career workers. To calculate this ratio for a hybrid plan, we use an example plan in which the DB component has a 1% multiplier and a 3.5% employee contribution, and the defined contribution (DC) component has a 5% employee contribution and 2% employer contribution.[9]

For the DB component, we follow the first step above and estimate a replacement ratio of 33% of a worker's final salary. For the DC component, we determine the DC account balance at retirement, which consists of annual employer and employee contributions of 7% plus accrued annual 5% interest. This balance is then converted into lifetime payments using an annuity rate of 3%, which is based on applicable federal rates.[10] This results in a DC benefit replacement income ratio of 21% of a worker's final salary. Combined, the DB and DC benefits provide a 54% replacement income ratio, or 46% after adjusting for inflation.[11]

Adding the 33% Social Security replacement rate results in a replacement income ratio of 79% of final salary. When we take this as a percentage of take-home pay, we find a final replacement income ratio of 94% of take-home pay.

Conclusion

Replacement income ratio—one of Pew's metrics for retirement security—measures what percentage of the worker's regular income is expected to be replaced in retirement. This research finds that for most career public workers with Social Security coverage, their total retirement benefit will match their pre-retirement take-home pay. While this does not guarantee retirement security for all workers, as needs will vary based on a range of factors, it is a helpful starting point when looking at how well plans set up participants for a secure retirement.

Glossary

Benefit multiplier: The percentage applied to applicable salary to determine the benefit amount under the plan provisions. For example, if the plan has a 2% multiplier, an individual who worked for 30 years with a final average salary of $50,000 would have an annuity starting at $30,000 (or 2% x 30 years x $50,000). If the multiplier is 1%, the annual benefit would be $15,000.

Cost-of-living adjustment (COLA): Post-retirement benefit increases designed to wholly or partly offset the effect of inflation on retirement income.

Defined benefit (DB) plan: A plan in which the employer promises a specific amount of monthly retirement income. The most common type calculates retirement income using a formula that takes into account the employee's final average salary, years of service, and age.

Defined contribution (DC) plan: A plan in which the employer provides employees with an individual retirement account that grows through investment of accumulated employer and employee contributions.

Final average salary: The average of annual salary during a predetermined number of years, typically either at the end of the employee's career or over an employee's highest earning years.

Normal retirement age: The age at which vested employees are entitled to the full calculated level of fixed retirement income.

Replacement income ratio: The percentage of a worker's pre-retirement take-home pay that is expected to be replaced by the benefit provided by the retirement plan, adjusted for inflation, plus the worker's Social Security benefit.

Appendix A: Assumptions

Plan parameters

	Example DB plan	Example hybrid plan
Multiplier	1.8%	1.0%
Number of years used to calculate final average salary	5	5
COLA %	1.0%	1.0%
Employee contribution rate (DB):	7.0%	3.5%
Employee contribution rate (DC):	0.0%	2.0%
Employer contribution rate (DC):	0.0%	5.0%

Financial assumptions

	Example DB plan	Example hybrid plan
Annual inflation rate	2.2%	2.2%
Annual payroll growth rate	3.0%	3.0%
DC annuity rate	n/a	3.0%
DC interest rate	n/a	5.0%

Demographic assumptions

	Example DB plan	Example hybrid plan
Age at exit	65	65
Years of service	35	35
Starting salary	$27,453	$27,453

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Inflation adjustment

	Example DB plan	Example hybrid plan
Expected number of years in retirement	23	23
Inflation adjustment	11.9%	15.3%

Social Security

Assumed Social Security replacement rate	33%[12]

After-tax adjustment

	Example DB plan	Example hybrid plan
Social Security and Medicare contribution rate	7.65%	7.65%
Employee retirement plan contribution rate	7.0%	8.5%

Endnotes

1 Society of Actuaries, "Retirement Adequacy in the United States: Should We Be Concerned?" (2018), https://www.soa.org/resources/research-reports/2018/retire-adequacy-us-concern/.

2 National Association of State Retirement Administrators, "Social Security Coverage," accessed Nov. 18, 2020, https://www.nasra.org/socialsecurity.

3 The Pew Charitable Trusts, "Metrics for Measuring Public Employee Retirement Security" (2020), https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2020/01/metrics-for-measuring-public-employee-retirement-security.

4 When completing this analysis as part of our technical assistance work in the field, we use the plan's specific financial assumptions, demographic assumptions, estimated Social Security replacement rate, and benefit design parameters, including retirement eligibility provisions. For this analysis, we based our assumptions on typical parameters for all state and teacher plans, excluding 17 in which members do not participate in Social Security (six plans that cover state workers and 11 that cover teachers).

5 We expect that accounting for differing tax exposure would result in only a 1 to 3 percentage-point impact on the replacement income ratio.

6 Based on state and teacher plans in which workers participate in Social Security and assuming workers have at least 20 years of service, age 65 is the most common age for normal retirement eligibility. Many plans also offer early retirement provisions, where workers can retire before meeting the normal retirement age and service requirements for a reduced benefit.

7 Most final average salary defined benefit plans in the public sector apply the formula to the average salary over some number of years of a worker's career. In this example, we average the final five years of the hypothetical worker's pay to get the final average salary for the benefit calculation.

8 We use our own calculator to estimate the Social Security benefit. It uses birth year, work start and end ages, starting salary, and salary growth to calculate the benefit for a representative worker in a given plan. The Social Security Administration has a calculator for estimating benefits but assumes no future increases in earnings.

9 Our hybrid plan assumptions are based on public hybrid plans in which employees are covered by Social Security. The most common multiplier is 1% among such plans. The average total defined contribution among hybrid plans with a 1% multiplier is around 7%, which we divide between employers and employees, and we use half of our employee DB contribution to arrive at 3.5% DB employee contributions.

10 Calculating an annuity from accumulated retirement savings requires assumptions about how long the annuity will be in effect and the interest that can be generated from the savings used to fund the annuity through the recipient's retirement. For the former we use available estimates for average mortality from a number of state pension plans, and for the latter we take a 15-year average of 120% of the federal midterm rate.

11 Based on a $75,000 final salary, the combined DB and DC components result in a benefit of $34,498 after adjusting for inflation. Adding in the Social Security benefit increases this overall benefit to $59,248.

12 We use our own calculator to estimate the Social Security benefit. It uses birth year, work start and end ages, starting salary, and salary growth to calculate the benefit for a representative worker in a given plan. The Social Security Administration has a calculator for estimating benefits but assumes no future increases in earnings.

For further information, please visit:

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