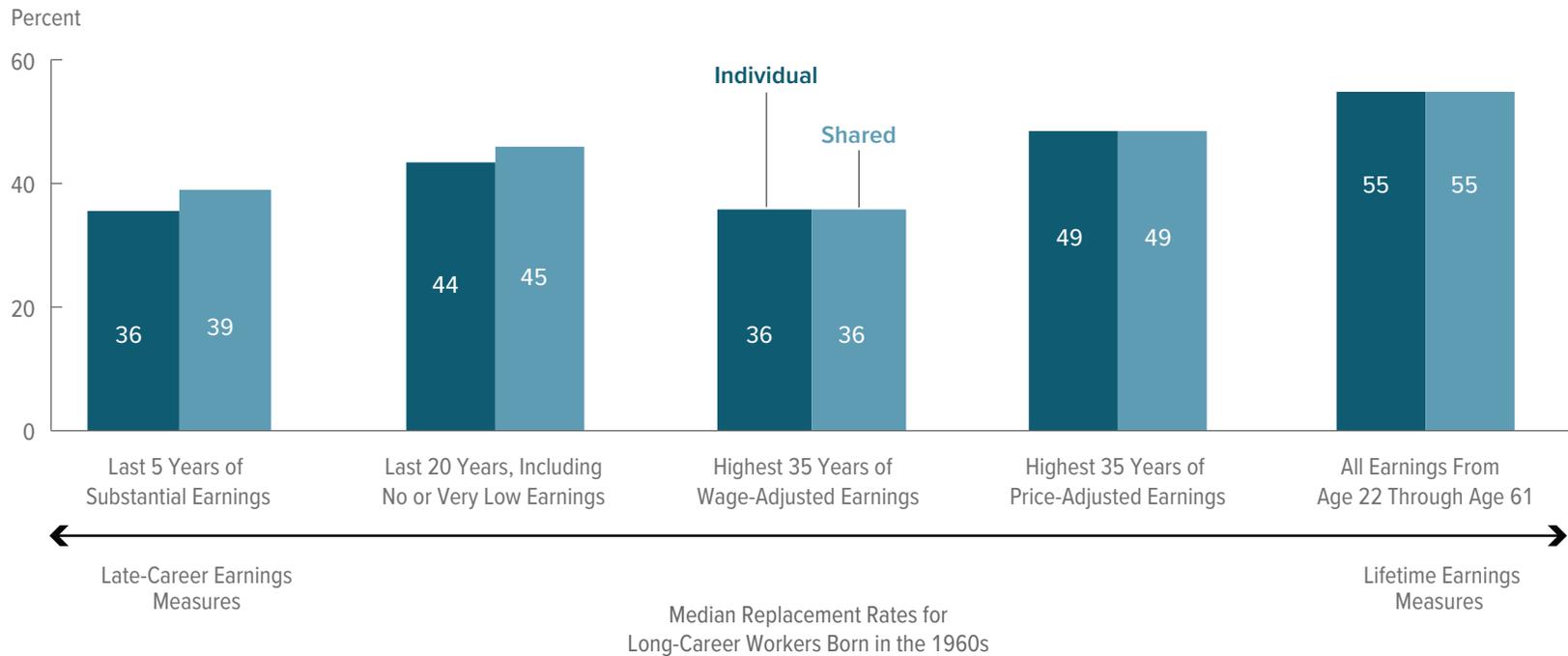


# CBO

## Social Security Replacement Rates and Other Benefit Measures: An In-Depth Analysis

Social Security replacement rates—benefits expressed as a percentage of preretirement earnings—vary substantially depending on how they are measured.



APRIL 2019

---

## Notes

Unless otherwise indicated, all years referred to in this report are calendar years. Similarly, unless otherwise noted, all benefits referred to in this report are scheduled benefits, which are those calculated under current law regardless of the amounts in the Social Security trust funds.

Numbers in the text, tables, figures, and exhibits may not add up to totals because of rounding.

Definitions of various terms appear at the end of this report.

---



# Contents

<b>Summary</b>	1
<b>Background</b>	2
How Did CBO Develop Its Projections?	2
What Population Did CBO Analyze?	3
What Measures of Social Security Benefits Did CBO Examine in Its Analysis?	3
How Do Social Security Benefits Compare With Poverty Thresholds?	5
How Do Benefits Compare With Preretirement Earnings?	6
How Does Taking Taxes Into Account Affect the Results?	7
How Do Benefit Measures Change Over the Course of Retirement?	7
How Does Uncertainty Affect the Projections?	8
How Does This Report Relate to Other Analyses by CBO?	8
<b>Initial Benefits Compared With the Official Federal Poverty Threshold</b>	10
Exhibits 1 through 3	

<b>Initial Individual and Shared Replacement Rates</b>	14
Exhibits 4 through 11	
<b>Numerators and Denominators of Replacement Rates</b>	15
Exhibit 4	
<b>Individual Replacement Rates</b>	17
Exhibits 5 through 7	
<b>Shared Replacement Rates</b>	21
Exhibits 8 through 11	
<b>Multiyear Shared Replacement Rates</b>	26
Exhibits 12 through 14	
<b>Appendix A: CBO’s Analytical Approach</b>	30
<b>Appendix B: Sensitivity of Findings to Certain Analytical Choices</b>	37
<b>Definitions</b>	43
<b>About This Document</b>	45



## List of Exhibits

<b>Initial Benefits Compared With the Official Federal Poverty Threshold</b>	10
1. Percentage of Long-Career Workers With Initial Individual Benefits Below the Poverty Threshold	11
2. Percentage of Long-Career Workers With Benefits Below the Poverty Threshold, Using Different Measures of Benefits	12
3. Comparison Between Long-Career and Short-Career Workers With Initial Benefits Below the Poverty Threshold	13
<b>Initial Individual and Shared Replacement Rates</b>	14
<b>Numerators and Denominators of Replacement Rates</b>	15
4. Median Numerators and Denominators of Replacement Rates for Long-Career Workers Born in the 1960s, Using Individual and Shared Measures	16
<b>Individual Replacement Rates</b>	17
5. Median Replacement Rates for Long-Career Workers, Using Initial Individual Benefits and Two Different Measures of Earnings	18
6. Variations in Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Different Measures of Earnings	19
7. Variations in Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Different Hypothetical Claiming Ages	20

<b>Shared Replacement Rates</b>	21
8. Comparison Between Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Individual and Shared Measures and Different Measures of Earnings	22
9. Median Replacement Rates for Long-Career Workers Born in the 1960s, With Initial Shared Benefits and the Last 20 Years of Shared Earnings, by Household Type	23
10. The Relationship Between Initial Household Benefits, Poverty Thresholds, and Shared Replacement Rates for Long-Career Workers Born in the 1960s	24
11. Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Initial Shared Benefits and the Last 20 Years of Shared Earnings, Adjusted for Taxes	25
<b>Multiyear Shared Replacement Rates</b>	26
12. Median Multiyear Replacement Rates for Long-Career Workers, Using the Average of All Shared Benefits and the Last 20 Years of Shared Earnings	27
13. Median Replacement Rates Before and After Widowhood for Long-Career Workers Born in the 1960s, Using Shared Benefits and the Last 20 Years of Shared Earnings	28
14. Uncertainty Surrounding Shared Multiyear Replacement Rates for Long-Career Workers Born in the 1960s	29



## List of Tables and Figures

### Tables

A-1.	Illustration of Restrictions Used to Produce the Sample for the 1960s Birth Cohort	32
B-1.	Median Initial Replacement Rates for Long-Career Workers, Using Different Numerators and the Last 20 Years of Earnings, Including Years With No or Very Low Earnings	39

### Figures

1.	Median Initial Benefit for Long-Career Workers Born in the 1960s, if Claimed at Age 65	5
A-1.	Sensitivity of Shared After-Tax Replacement Rates for Long-Career Workers Born in the 1960s to Alternative Specifications of Federal Income Taxes	34
A-2.	Comparison of Earnings Levels for Long-Career Workers With OCACT's Hypothetical Scaled Workers in the 1960s Cohort	35
A-3.	Replacement Rates for OCACT's Hypothetical Workers and CBO's Long-Career Workers Born in the 1960s, Using Wage-Adjusted Earnings	36
B-1.	Percentage of Long-Career Workers With Initial Individual Benefits Below 200 Percent of the Poverty Threshold	38
B-2.	Difference in Median Initial Shared Replacement Rates for Long-Career Workers Born in the 1960s Resulting From Adjustments for Economies of Scale Within the Household	42



# Social Security Replacement Rates and Other Benefit Measures: An In-Depth Analysis

## Summary

In this report, the Congressional Budget Office examines whether Social Security benefits enable retired workers to meet their basic needs and the extent to which benefits replace preretirement earnings. Focusing on workers with long careers, who generally have higher average earnings than all workers, CBO finds that those benefits enable most of those workers to cover their essential living expenses as measured by the official federal poverty threshold. However, the extent to which benefits replace preretirement earnings varies substantially, depending on the way benefits and earnings are measured.

To show benefits from different perspectives, CBO presents alternative specifications of basic needs measures and of the Social Security replacement rate—that is, the amount of Social Security benefits received in retirement, expressed as a percentage of preretirement earnings. Among CBO's findings:

- Retired-worker benefits for most long-career workers born in the 1940s exceed the official federal poverty threshold. For workers born in

the 1960s and 1980s, even more are projected to have retired-worker benefits above that threshold.

- Replacement rates that compare benefits with earnings just before retirement show that, across cohorts, benefits replace about two-fifths of substantial late-career earnings, falling short of providing income continuity as workers transition out of the labor force. (Substantial earnings are annual earnings that are at least half of the worker's average indexed earnings.)
- Replacement rates that are designed to capture overall changes in the standard of living between working years and retirement show that Social Security benefits replace a significantly higher percentage of average earnings over a lifetime, adjusted for changes in prices over time.
- Because the Social Security benefit formula is progressive, meaning that benefits replace a larger share of earnings for lower-income workers, replacement rates for workers in the

lowest earnings quintile are about two to three times higher, on average and across cohorts, than replacement rates for workers in the highest quintile.

- If future benefits are limited to the annual revenues credited to Social Security once the program's combined trust funds are exhausted, which is projected to occur in 2031—that is, payable benefits—the fraction of workers with initial benefits below the poverty threshold is projected to increase slightly between the 1940s cohort and the 1960s cohort, and then to increase substantially more for the 1980s cohort. Replacement rates based on payable benefits would be significantly lower than the replacement rates based on scheduled, or full, benefits.

CBO also compares individual measures of benefits with household-based measures and before-tax measures with after-tax measures. In addition, the agency compares replacement rates that are based on a single year of benefits with rates that are based on the receipt of benefits over multiple years. According to CBO's projections:

- Household benefits, counting those available to a retired worker and his or her spouse, fall below the official poverty threshold for only a very small percentage of long-career workers.
- Replacement rates that are based on benefits and earnings shared within a household are similar to replacement rates based on individual benefits and earnings.
- Accounting for payroll taxes and federal income taxes results in after-tax replacement rates that are several percentage points higher than before-tax replacement rates.
- Replacement rates that are based on average benefits received throughout the course of retirement are similar to replacement rates that are based on a single (initial) year of benefits. However, based on benefits and earnings shared within a household, married workers experience a sharp reduction in replacement rates after the death of a spouse.

The analysis in this report focuses on Social Security benefits and does not examine other sources of income that retired workers may have. Therefore, it does not provide an assessment of the adequacy of retirement income overall.

## Background

Social Security is the largest single program in the federal budget.<sup>1</sup> In fiscal year 2018, outlays

1. For an overview of Social Security, see Congressional Budget Office, *Social Security Policy Options, 2015* (December 2015), [www.cbo.gov/publication/51011](http://www.cbo.gov/publication/51011).

for Social Security benefits totaled \$977 billion, accounting for almost one-quarter of all federal spending. Because most of the program's benefits—69 percent (or \$674 billion) in fiscal year 2018—are paid to retired workers, Social Security is often characterized as a retirement program, although it also pays benefits to disabled workers and to their dependents.

Social Security benefits are an important source of income for the nation's elderly. In 2018, the average benefit paid to a retired-worker beneficiary was about \$1,400 per month. However, the total amount paid to the household of a retired worker is typically greater. More than half of people age 65 or older are married, and their spouses and other dependents may also receive Social Security benefits on the basis of their own work history or because they are eligible for spousal or other dependent benefits.

Evaluating the adequacy of those benefits is not a clear-cut task. Some benefit measures, or gauges of benefit generosity, are designed to examine whether Social Security enables retired workers to afford essential living expenses. Such *basic needs measures* include comparisons of benefits with the official federal poverty threshold. Other measures, known as *Social Security replacement rates*, are used to determine the extent to which benefits enable retirees to maintain their preretirement standard of living.

Social Security benefits are just one of several different sources of income available to retirees, and workers may have income other than earnings. Consequently, looking at those benefits alone

cannot answer the question of whether a retired worker has sufficient income in retirement.<sup>2</sup> To determine the adequacy of retirement income, an analysis would need to incorporate all sources of income as well as a definition of what is considered “adequate.”

This report presents results from a wide range of specifications side by side and generally for the same group of workers. (Throughout the report, the unit of analysis is the individual worker.) By doing so, the report enables a straightforward comparison of different measures and sheds light on how the choice of a particular specification affects the results.

## How Did CBO Develop Its Projections?

CBO's analysis is based on the agency's long-term projections of trends in a host of demographic and economic variables, which are the same as those underlying *The 2018 Long-Term Budget Outlook*.<sup>3</sup> For workers born in the 1940s—the first cohort CBO examined—the projections reflect historical earnings data because those workers have nearly completed their careers. For workers in later cohorts—those born in the 1960s and the 1980s—more years of their earnings are projected. Those earnings and other characteristics, includ-

2. For an introduction to the issues surrounding the measurement of retirement income, see Congressional Budget Office, *Measuring the Adequacy of Retirement Income: A Primer* (October 2017), [www.cbo.gov/publication/53191](http://www.cbo.gov/publication/53191).

3. See Congressional Budget Office, *The 2018 Long-Term Budget Outlook* (June 2018), [www.cbo.gov/publication/53919](http://www.cbo.gov/publication/53919).

ing the age at which benefits are claimed, were projected using CBO’s long-term model.<sup>4</sup> That model draws on data from the Social Security Administration’s Continuous Work History Sample and from the Census Bureau’s Survey of Income and Program Participation and Current Population Survey. (See Appendix A for more details about CBO’s analytical method.)

### What Population Did CBO Analyze?

CBO’s analysis focused on workers who, on the basis of their own earnings, are eligible to receive Social Security retired-worker benefits by the time they reach the earliest eligibility age (EEA) of 62. (Those workers are not disabled and are eligible for Old-Age Insurance, or OAI, benefits. They may claim benefits at any age starting with the EEA.) Because workers who are not eligible for benefits generally have lower lifetime earnings than workers who are eligible, workers examined for this report have higher lifetime earnings than workers in the overall population.

In addition, CBO focused primarily on workers with significant attachment to the labor force. Referred to in this report as long-career workers, they are defined as having at least 20 years of significant earnings—that is, earnings above 10 percent of the average wage index (AWI) in each year.<sup>5</sup> (For example, 10 percent of the AWI in

2017, about \$5,000, is comparable to working full time for about a third of the year while earning the federal minimum wage.) Including workers with shorter careers in the computation of individual retired-worker replacement rates would make the analysis less meaningful because those workers often receive spousal or survivor’s benefits that are significantly higher than benefits that are based on their own work record.

### What Measures of Social Security Benefits Did CBO Examine in Its Analysis?

This report focuses on the benefits available to retired workers through the Old-Age and Survivors Insurance (OASI) program, the largest component of Social Security. (Social Security consists of two parts: OASI, which pays benefits to retired workers as well as to eligible dependents and survivors; and Disability Insurance, or DI, which makes payments to disabled workers and to their dependents until those workers reach the age at which they are eligible to receive full retired-worker benefits under OASI.) Because CBO’s analysis focused on nondisabled workers who are eligible for retirement benefits on the basis of their own work history, benefits paid through the DI program were excluded from all measures described in this report.

Benefits for OASI and DI alike are financed from trust funds, which are credited with tax revenues, mainly from payroll taxes, and interest on the

funds’ balances. As long as a trust fund’s balance is sufficient to cover required payments, benefits can be paid without the need for any legislative action. However, according to CBO’s most recent projections, under current law, the balances in the combined OASDI trust funds would be exhausted in 2031.<sup>6</sup> So, in addition to projecting *scheduled* benefits, which are calculated under the Social Security Act without regard to the Social Security trust funds’ balances, CBO projected *payable* benefits—that is, benefits as calculated under current law and reduced as necessary to conform to the limits imposed by the trust funds’ balances. Payable benefits would be less than the scheduled amounts once the trust funds were exhausted because annual outlays would be limited to annual revenues credited to Social Security.

Most important, CBO developed its findings using both individual and household-based measures of benefits. Although individual measures are simpler and more common in studies of retirement income, household-based measures provide a more comprehensive perspective on benefits.

In CBO’s analysis, individual benefit measures were generally constructed using only the retired-worker benefit—which is based on the beneficiary’s own earnings—even though the beneficiary might also be eligible for a benefit on the basis of a spouse’s earnings. If the spouse is alive, that benefit is the spousal benefit; if the spouse is deceased,

4. For a brief summary of CBO’s long-term model, see Congressional Budget Office, *An Overview of CBOLT: The Congressional Budget Office Long-Term Model* (April 2018), [www.cbo.gov/publication/53667](http://www.cbo.gov/publication/53667).

5. In focusing on long-career workers, CBO follows recommendations of the Social Security Advisory

Board’s 2015 Technical Panel on Assumptions and Methods. See 2015 Technical Panel on Assumptions and Methods, *Report to the Social Security Advisory Board* (September 2015), <https://go.usa.gov/xUFa6>.

6. See Congressional Budget Office, *The 2018 Long-Term Budget Outlook* (June 2018), [www.cbo.gov/publication/53919](http://www.cbo.gov/publication/53919).

that benefit is the survivor's benefit.<sup>7</sup> However, generally, beneficiaries can receive spousal benefits only if their own earnings are substantially lower than their spouse's earnings, and they can receive survivor's benefits only if their earnings are lower than those of their deceased spouse. As a result, a typical long-career worker is either ineligible for that benefit or eligible only for a small additional benefit. For example, for long-career workers born in the 1960s, median initial individual benefits, if claimed at age 65, are projected to be about \$20,100 per year, whereas the median initial benefits that also include any spousal or survivor's benefits are projected to be about \$20,300 (see Figure 1). (Initial benefits are defined as benefits received at age 65, if first claimed at that age. Median benefits are those in the middle of the

7. At the full retirement age, the eligible spouse of a retired worker is entitled to benefits that amount to 50 percent of the retired worker's primary insurance amount (PIA) if he or she is not eligible for benefits on the basis of his or her own earnings. If the spouse also has earned benefits but has a PIA that is less than 50 percent of the primary beneficiary's PIA, the spouse's payments are increased to meet the 50 percent threshold. A spouse whose PIA (based on his or her own earnings) is greater than 50 percent of the primary beneficiary's PIA receives no additional amount. (If the spouse claims benefits before his or her full retirement age, the spousal benefits are lower than 50 percent of the primary beneficiary's PIA.)

At the full retirement age, the eligible widow(er) of a retired worker is generally entitled to benefits that amount to 100 percent of the retired worker's PIA, if he or she is not eligible for benefits on the basis of his or her own earnings. If the widow(er) also has earned benefits but has a PIA that is less than 100 percent of the primary beneficiary's PIA, the widow(er)'s payments are generally increased to meet the 100 percent threshold.

distribution for a given group.) For simplicity, the individual benefit measures described in this report generally include only individual retired-worker benefits.

For a more comprehensive analysis, CBO included not only the benefit that the worker is eligible to receive on the basis of his or her own earnings, but also any spousal or survivor's benefit and, most important, any benefit that the worker's spouse is eligible to receive. Because spouses tend to share resources and most retired workers are married, such a household-based measure better accounts for all the Social Security benefits available to a retired worker. (In this report, a household is defined as consisting of a single person or a married couple.)<sup>8</sup>

The household-based measures used for CBO's analysis fall into two categories:

- The first measure—referred to as a *household measure*—reflects the sum of all retired-worker, spousal, and survivor's benefits that the worker and his or her spouse are

8. CBO's long-term model does not project living arrangements. Although defining a household as a single person or a married couple represents a departure from the traditional definition, which characterizes a household as all people who live under the same roof, the definition that CBO uses is consistent with the living arrangements of 72 percent of people age 65 or older. See Loraine A. Wes and others, *65+ in the United States: 2010*, Current Population Reports (Census Bureau, June 2014), <https://go.usa.gov/xUFCc> (PDF, 12 MB).

eligible to receive.<sup>9</sup> This measure is used in the comparison of benefits with poverty thresholds. Because official federal poverty thresholds vary on the basis of household size, CBO compares total household benefits with the corresponding poverty threshold to determine whether benefits fall short of that threshold. (For example, in 2018, the poverty threshold for a single person age 65 or older was \$12,043, and the threshold for two people was \$15,178. Therefore, a single person with a benefit of \$10,000 would have a household benefit below the poverty threshold, but a married couple with a household benefit of \$20,000 would have a benefit above the poverty threshold.)

- The second measure—referred to as a *shared measure*—reflects the amount of benefits attributable to each person in the household. This type of measure is used in the analysis of Social Security replacement rates. The shared measure is defined as the sum of all retired-worker, spousal, and survivor's benefits that the worker and his or her spouse are eligible to receive, adjusted for household size and for economies of scale to be comparable with the individual-based measures. Because household

9. If the worker is married, the household benefit measure is the sum of all retired-worker and spousal benefits that both the worker and his or her spouse are eligible to receive on the basis of their earnings histories. If the worker is not married, the household benefit measure reflects the retired-worker, spousal, and survivor's benefits that the worker is eligible to receive on the basis of his or her earnings or on the basis of the earnings of a divorced or deceased spouse.

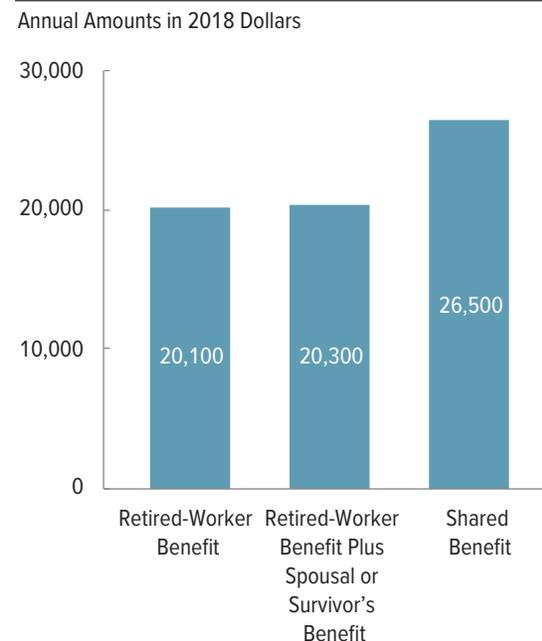
members tend to share expenses for housing, utilities and other items, two spouses generally need less than twice the income that they would need if living separately. Therefore, CBO applied a common economies-of-scale adjustment known as a square-root scale, which implies that a married person would need about 30 percent less income than a single person living alone to maintain the same general standard of living.<sup>10</sup>

Because of that adjustment, the median shared benefit for long-career workers is substantially higher than the median individual benefit. For example, for long-career workers born in the 1960s, the median shared benefit is about one-third higher than the median individual benefit (see Figure 1). (Although CBO presents measures of Social Security benefits for three cohorts—1940s, 1960s, and

1980s—the agency uses the middle cohort, the 1960s, in illustrative examples throughout this report.<sup>11</sup> The specific outcomes differ across cohorts; however, the patterns in findings based on scheduled benefits are roughly similar. Findings based on payable benefits worsen for later cohorts following the exhaustion of the combined Social Security trust funds.)

Although shared benefits are generally larger than individual benefits, CBO finds that shared replacement rates are comparable with individual replacement rates. Accounting for shared resources within a household increases both the benefits (numerators) and the earnings (denominators) used in the calculation of replacement rates for workers who are married, so shared replacement rates are similar to individual replacement rates for men and women combined.<sup>12</sup> That relationship differs for men and women separately, however, because women tend to have lower earnings than men and because the Social Security benefit formula is progressive, meaning that benefits replace a larger share of earnings for lower-income workers. As a result, individual replacement rates for female workers tend to be several percentage

**Figure 1.**  
**Median Initial Benefit for Long-Career Workers Born in the 1960s, if Claimed at Age 65**



Source: Congressional Budget Office.

points higher than their shared replacement rates, whereas the opposite is true for male workers.

**How Do Social Security Benefits Compare With Poverty Thresholds?**

Comparing individual retired-worker benefits with poverty thresholds demonstrates that the majority of long-career workers have initial retired-worker benefits that exceed those thresholds. When the

10. The square-root scale is used in the construction of the equivalence scales for the Supplemental Poverty Measure. See Liana Fox, *The Supplemental Poverty Measure: 2017*, Current Population Reports (Census Bureau, September 2018), <https://go.usa.gov/xEU5C> (PDF, 692 KB). Applying a square-root scale to compute shared benefits differs from the traditional shared-benefit computation, which divides the combined benefits of the worker and his or her spouse by two. In this report, CBO presents the results using the square-root adjustment to better capture the well-being of people in two-person households relative to one-person households. However, most findings using the traditional shared-earnings approach that does not incorporate economies of scale are similar to the findings based on the square-root scale adjustment (see Appendix B for a comparison of replacement rates with and without economies of scale applied).

11. The main findings for all three cohorts are available through an interactive tool that accompanies this report at [www.cbo.gov/publication/55038](http://www.cbo.gov/publication/55038).

12. Shared replacement rates are identical to individual replacement rates for workers who never marry. For workers who marry, the two rates are rarely the same. For example, they would be the same if the two spouses had identical earnings in each year that were counted toward the measures of earnings and benefits.

analysis is expanded to include household benefits, an even larger fraction of workers is projected to have initial benefits above the poverty thresholds. Those findings suggest that Social Security benefits generally enable the vast majority of long-career workers to meet their basic needs, as measured in relation to poverty thresholds, in retirement.

For many workers with shorter careers, however, initial household benefits fall short of meeting basic needs. For example, among OAI-eligible workers born in the 1960s who have fewer than 20 years of significant earnings, about 40 percent are projected to have household benefits below the poverty thresholds. Nevertheless, because short-career workers make up a small percentage of all OAI-eligible workers in that cohort (14 percent), the percentage of all OAI-eligible workers projected to have household benefits above the poverty thresholds is high (90 percent).

It is important to note that comparing Social Security benefits with the poverty thresholds differs from poverty-rate analyses conducted by the Census Bureau for several reasons.<sup>13</sup> First, the sample that CBO analyzed centers on workers who are eligible for retired-worker benefits on the basis of their own earnings, rather than on all people. The household measures include workers' spouses who may not be eligible for retired-worker benefits on the basis of their own earnings; however, they

do not include all ineligible people (for instance, single workers with insufficient work histories), who are counted in the Census measures.

Second, CBO's analysis incorporated the assumption that workers and their spouses both claim benefits at age 65, which generally results in slightly higher estimates of annual benefits than the actual benefits received because more than half of eligible people claim before or at age 65. Social Security benefits are reduced if claimed before the full retirement age (FRA) and increased if claimed afterward. By CBO's estimate, individual first-year benefits at the projected age of claiming are about 5 percent lower, on average and across cohorts, than hypothetical benefits claimed at age 65. (The projected age for claiming benefits is the age at which CBO's long-term model projects a future beneficiary would first claim benefits on the basis of his or her work history and other individual characteristics.)

Third, many people receive income from sources other than Social Security, such as pensions or other retirement income, and earnings.<sup>14</sup> Although CBO's long-term model projects earnings and

Social Security benefits, it does not project income from other sources, which are encompassed by the Census measures.

### How Do Benefits Compare With Preretirement Earnings?

Social Security replacement rates vary substantially depending on how they are measured. On the one hand, replacement rates designed to compare benefits with earnings just before retirement—that is, late-career replacement rates—show that benefits alone are generally insufficient to maintain workers' preretirement income as they leave the labor force. For example, for workers born in the 1960s, median late-career replacement rates that are based on substantial earnings (adjusted for changes in prices over time) in the last five years before the workers reach age 62 amount to less than 40 percent. (Substantial earnings are annual earnings that are at least half of the worker's average indexed earnings—that is, earnings over a person's lifetime, adjusted for changes in average wages over time.)

On the other hand, replacement rates that focus on the overall changes in the standard of living between all working years and retirement show that Social Security benefits replace a significantly higher percentage of average earnings over a lifetime, adjusted for changes in prices over time. For workers born in the 1960s, the median replacement rate based on all earnings from age 22 through age 61, including years with no or very low earnings, is 55 percent. (Throughout this report, earnings refer to all labor earnings that the workers have, not only the earnings under the

13. For recent poverty estimates by the Census Bureau, see Kayla Fontenot, Jessica Semega, and Melissa Kollar, *Income and Poverty in the United States: 2017*, Current Population Reports (Census Bureau, September 2018), <https://go.usa.gov/xEXMV> (PDF, 2.13 MB).

14. Studies that considered multiple income sources available in retirement found that Social Security plays an important role in enabling beneficiaries to avoid poverty. For more information, see Irena Dushi, Howard M. Iams, and Brad Trenkamp, "The Importance of Social Security Benefits to the Income of the Aged Population," *Social Security Bulletin*, vol. 77, no. 2 (2017), <https://go.usa.gov/xEXMG>; and C. Adam Bee and Joshua W. Mitchell, *Do Older Americans Have More Income Than We Think?* Working Paper 2017-39 (Census Bureau, July 2017), <https://go.usa.gov/xRG87>.

taxable maximum.<sup>15</sup> That measure of earnings fully captures the income from workers' wages and salaries.)

### How Does Taking Taxes Into Account Affect the Results?

Accounting for taxation increases replacement rates. In its analysis, CBO accounted for Social Security and Medicare payroll taxes by subtracting the employee's share of such taxes from each year of preretirement earnings. To account for federal income taxes, CBO applied the federal tax law in place in each year of earnings or benefits, subtracting projected taxes from the before-tax amounts. In general, workers face higher average income tax rates than Social Security beneficiaries do. For long-career workers born in the 1960s, accounting for both payroll taxes and federal income taxes increases the median after-tax replacement rate (based on the last 20 years of earnings) by over 5 percentage points, from 45 percent to 51 percent.

### How Do Benefit Measures Change Over the Course of Retirement?

In this report, CBO compares two types of benefit measures: single-year and multiyear measures. The agency defines single-year—or *initial*—benefits as hypothetical benefits received at age 65, if first claimed at that age. Holding the age at which benefits are claimed fixed at 65 enables a more straightforward comparison among different cohorts of retirees by taking out the effect of

15. The taxable maximum is the maximum amount of annual earnings subject to the Social Security payroll tax (\$128,400 in 2018).

changes in average claiming patterns over time. In contrast, *multiyear* benefits capture average benefits from the age at which CBO's long-term model projects a future beneficiary would first claim benefits until death. Comparing findings using those two types of measures can be informative because the benefits that retired workers receive may change over time.

There are two main reasons why real (inflation-adjusted) shared Social Security benefits may change after the initial year in which they are received. First, a worker or his or her spouse could change his or her claiming status over time. For example, a worker might claim benefits as soon as he or she is eligible at age 62, whereas the spouse might continue working and claim benefits a few years later. As a result, the shared benefits in the first few years would consist solely of a single retired-worker benefit, whereas the shared benefits in later years would consist of two retired-worker benefits (divided by the square root of two, about 1.4, to account for economies of scale). Moreover, if claimed at a later date, the spouse's benefit could be substantially higher because of the additional years of work, leading to a recomputation of the retired-worker benefit. In this example, the shared benefits may increase over time.

Second, shared benefits could change over time because of marriage, widowhood, or divorce.<sup>16</sup> For example, after the death of one spouse, the surviving spouse is eligible to receive the higher of his or her own retired-worker benefit or the

16. In this report, widowhood refers to the state of being a widow or widower.

survivor's benefit.<sup>17</sup> However, if the two-person household becomes a single-person household, the surviving spouse is no longer able to share fixed expenses such as housing and utilities. As a result, his or her living standard tends to decline because those fixed expenses consume a larger share of the budget and leave less room for other spending. In this example, the shared benefits would be lower after the death of a spouse than benefits adjusted for economies of scale during the marriage.<sup>18</sup>

Overall, multiyear replacement rates that are based on shared earnings and shared benefits are similar to initial measures. For example, for long-career workers born in the 1960s, the multiyear shared replacement rate is about 1 percentage point higher than the initial shared replacement rate—46 percent rather than 45 percent. However, married workers who become widowed in retirement experience a significant decline in their replacement rates. For married workers born in the 1960s, the median replacement rate declines by 10 percentage points after the death of a spouse, from 53 percent to 43 percent. Because a newly widowed worker can no longer share common household expenses with a spouse, that worker's cost of living increases, reducing the amount of goods and services that can be afforded using the

17. The survivor's benefit paid to a deceased worker's spouse generally equals 100 percent of the worker's PIA, if the survivor claimed at the full retirement age or later.

18. If the traditional shared-earnings approach was used in this example instead of the economies-of-scale adjustment, shared benefits would be generally higher during widowhood. See Appendix B for results that are based on the traditional shared-earnings approach.

recalculated benefit. The lower median replacement rate thus reflects the loss of economies of scale within the household.

### How Does Uncertainty Affect the Projections?

CBO's findings depend critically on its projections of key economic, demographic, and behavioral factors, and all such long-term projections are inherently uncertain. The main demographic factors that affect the results are projections of mortality and fertility. (Projections of mortality affect the number of years that beneficiaries receive benefits. Projections of fertility affect both gross earnings and federal income taxes.) The main economic factors are labor force participation and the growth rate of productivity, which influence earnings trajectories as well as projected benefits. (The labor force participation rate is the percentage of people in the civilian noninstitutionalized population who are age 16 or older and either working or actively seeking work. The growth rate of productivity is calculated as the growth of total factor productivity, which is the growth of real output that is not explained by growth in labor or capital.) The behavioral factors that can affect the results include changes in household formation and dissolution, as well as changes in the average

age for claiming Social Security benefits. Finally, the projections in this report are uncertain because of the inherent methodological challenges associated with projecting outcomes far into the future. (See Appendix A for a description of CBO's analytical method.)

As an illustration of the uncertainty, CBO found that projections of labor force participation that are about 3 percentage points higher or lower than in CBO's 2018 extended baseline would result in replacement rates for workers born in the 1960s that are less than 1 percentage point higher or lower than the replacement rates shown. (The replacement rates in this report are computed using projections of labor force participation and other variables that are the same as those underlying CBO's 2018 extended baseline, which generally reflects current law and spans the period from 2018 through 2048.) Alternative projections of the growth rate of productivity that are 0.5 percentage points higher or lower than those underlying the extended baseline would cause the rates to be about 1 to 2 percentage points higher or lower than shown.

### How Does This Report Relate to Other Analyses by CBO?

This report builds on information presented in *Measuring the Adequacy of Retirement Income: A Primer*, which was published in October 2017.<sup>19</sup> The agency previously published several different measures of Social Security benefits in *CBO's 2016 Long-Term Projections for Social Security: Additional Information*.<sup>20</sup> In that report, CBO showed mean Social Security replacement rates that were based on benefit amounts net of income taxes paid on benefits, reflecting the amounts received by beneficiaries. This report presents both before-tax and after-tax measures of benefits and earnings, as well as a number of new specifications that help address additional questions about benefits. This report also shows median replacement rates, rather than the mean replacement rates presented in the previous report, because median rates are more widespread in the literature on the adequacy of retirement income. (All median replacement rates shown in this report reflect the replacement rate for the person in the middle of the distribution for a given group. That person is not necessarily the person with earnings in the middle of a distribution of shared lifetime earnings for that group.)

19. See Congressional Budget Office, *Measuring the Adequacy of Retirement Income: A Primer* (October 2017), [www.cbo.gov/publication/53191](http://www.cbo.gov/publication/53191).

20. See Congressional Budget Office, *CBO's 2016 Long-Term Projections for Social Security: Additional Information* (December 2016), [www.cbo.gov/publication/52298](http://www.cbo.gov/publication/52298).

The data presented in that report were updated in September 2018 and can be found at [www.cbo.gov/publication/54428](http://www.cbo.gov/publication/54428).



# Initial Benefits Compared With the Official Federal Poverty Threshold

Exhibits 1 through 3 evaluate the extent to which initial (single-year) Social Security benefits, if claimed at age 65, enable beneficiaries to meet their basic living needs in retirement. For those exhibits, CBO used 100 percent of the official federal poverty threshold as the minimum dollar amount needed to meet basic living needs. In 2018, for example, that amount was \$12,043 for a single person age 65 or older; for two people, it was \$15,178. (See Figure B-1 in Appendix B for findings based on 200 percent of the official federal poverty threshold.)

Holding the age at which benefits are claimed fixed at 65 enables an easier comparison among different cohorts of retirees by taking out the effect of changes in average claiming patterns over time. Although that hypothetical benefit measure does not account for variation in the observed or projected timing of retirement, it provides a simple approximation of retired-worker benefits that are

projected to be received in the first year of claiming. (As shown in Table B-1 in Appendix B, that variation would have little effect on the results.)

Exhibit 1 addresses individual benefits. An individual benefit is the retired-worker benefit, which is based on individual earnings through age 61, that the worker could receive if claimed at age 65.

Exhibits 2 and 3 present information about both individual and household benefit measures. A household benefit is the sum of benefits that the worker and his or her spouse could receive on the basis of their earnings through age 61 if each spouse claimed benefits at age 65.

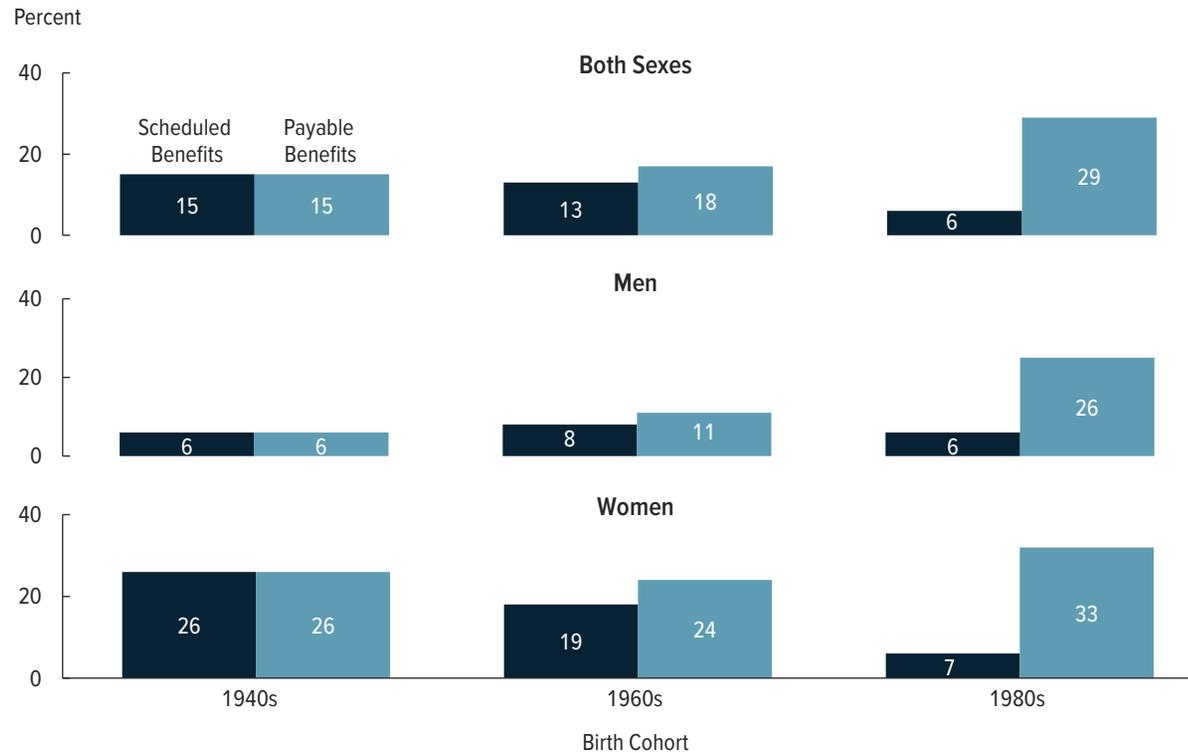
The population analyzed in Exhibits 1 and 2 consists of retired workers who had long careers, who are eligible to receive Old-Age Insurance (OAI) benefits on the basis of their individual earnings, and who are not disabled. (Long-career workers

are workers with 20 or more years of significant earnings—that is, earnings above 10 percent of the average wage index in each year). The household benefit measures also include any OAI benefits received by the spouses of the long-career workers, although the spouses may not be eligible workers themselves.

Exhibit 3 illustrates how benefit measures for that group of workers compare with measures for short-career workers, who are eligible for OAI benefits on the basis of their individual earnings through age 61 but who have fewer than 20 years of significant earnings. Together, the long-career and short-career OAI-eligible workers who are not disabled make up about three-quarters of people who survive through age 62. Of those OAI-eligible workers, more than 80 percent are long-career workers.

## Exhibit 1.

## Percentage of Long-Career Workers With Initial Individual Benefits Below the Poverty Threshold



Source: Congressional Budget Office.

Initial individual benefits are based on the assumption that workers first claim benefits at age 65. Benefits are computed for all people who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. All benefit amounts are before taxes.

Scheduled benefits are benefits as calculated under the Social Security Act, regardless of the balances in the trust funds. Payable benefits are benefits as calculated under the act, reduced as necessary to ensure that outlays do not exceed the Social Security system's revenues once the balances in the combined trust funds are exhausted, which is projected to occur in 2031.

Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

The federal poverty threshold used here is the threshold for one person age 65 or older, adjusted for growth in prices over time.

About 15 percent of long-career workers born in the 1940s receive initial retired-worker benefits that are insufficient to meet basic living needs as measured by the official federal poverty threshold. (Initial benefits are defined as benefits received at age 65, if first claimed at that age.) For workers whose initial benefits are below the poverty threshold, the average shortfall is about one-sixth of the threshold amount.

Because scheduled benefits for subsequent cohorts grow with average wages, but the poverty thresholds generally grow more slowly—with prices—the fraction of retired workers whose initial scheduled benefits are projected to be below the poverty threshold is smaller for later cohorts, falling to 6 percent for the 1980s cohort. However, with payable benefits, that fraction increases to 29 percent for the 1980s cohort, indicating that the reduction in benefits following the projected depletion of the Social Security trust funds would prevent an additional 23 percent of workers in that cohort from meeting their basic needs using benefits alone. (The combined Social Security trust funds are projected to be depleted in 2031.)

Considering workers by sex reveals a large discrepancy in initial benefits for male and female workers. More than a quarter of female workers born in the 1940s have initial benefits below the poverty threshold, whereas the same is true for only 6 percent of male workers in that cohort. That discrepancy is projected to decline over time as women's earnings have grown, and are projected to continue growing, faster than men's, narrowing the gap in benefits. ♦

## Exhibit 2.

### Percentage of Long-Career Workers With Benefits Below the Poverty Threshold, Using Different Measures of Benefits



Source: Congressional Budget Office.

Initial retired-worker benefits are based on the assumption that workers first claim benefits at age 65. Retired-worker benefits plus spousal or survivor's benefits include benefits that workers can receive on the basis of their spouse's earnings. If the worker is married, the initial household benefit is the sum of the worker's and the spouse's benefits, reflecting the assumption that both spouses first claim benefits at age 65. If the worker is not married, the initial household benefit captures the benefit that the worker is eligible to receive on the basis of his or her own earnings and on the basis of the earnings of the worker's divorced or deceased spouse, if the worker was married. Benefits are computed for all people who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. All benefit amounts are before taxes.

Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

The federal poverty threshold used here is the threshold for one person (or two people) age 65 or older, adjusted for growth in prices over time. The household benefit is compared with the poverty threshold in the year that the worker turns age 65.

Expanding the measure of benefits for an individual worker to include any spousal or survivor's benefit that the worker is eligible to receive reduces the percentage of workers with initial benefits below the poverty threshold. Moving from that measure to a household-level measure, which also includes all benefits available to the worker's spouse, provides a more comprehensive perspective on benefits and results in a greater reduction in the percentage of workers with initial benefits below the poverty threshold.

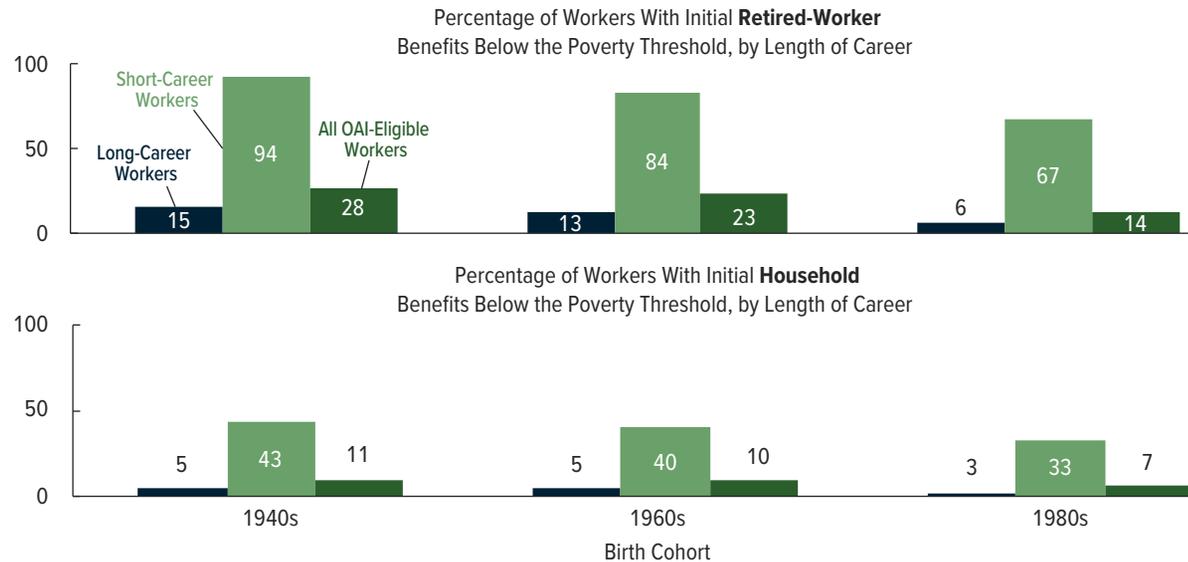
On average, including spousal and survivor's benefits has a relatively small effect on the percentage of long-career workers with individual benefits below the poverty threshold, reducing that percentage from 15 percent to 12 percent for workers born in the 1940s. The reduction is considerably larger for female workers than for male workers. Because women tend to have lower earnings than their spouses, they are more likely to receive a spousal or survivor's benefit.

Moving to a household-level measure, which also accounts for the benefits available to the worker's spouse, yields a significantly smaller fraction of workers who cannot meet their basic needs with benefits alone. On average, only about 5 percent of retired workers born in the 1940s have household benefits that fall below the household poverty threshold. For female workers, that number is 7 percent, which is substantially lower than the 18 percent of women who have retired-worker, spousal, and survivor's benefits below the poverty threshold. On average, men have larger benefits than women because they generally have higher lifetime earnings. Therefore, when the benefits of female workers and their (male) spouses are combined, those benefits are more likely to exceed the household poverty threshold than women's own benefits are to exceed a single-person poverty threshold. ♦

## Exhibit 3.

### Comparison Between Long-Career and Short-Career Workers With Initial Benefits Below the Poverty Threshold

Percent



Source: Congressional Budget Office.

Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. Short-career workers are workers with fewer than 20 years of earnings above 10 percent of the average wage index. Workers who receive Disability Insurance benefits are excluded.

Initial retired-worker benefits are based on the assumption that workers first claim benefits at age 65. If the worker is married, the initial household benefit is the sum of the worker's and the spouse's benefits, reflecting the assumption that both spouses first claim benefits at age 65. If the worker is not married, the initial household benefit captures the benefit that the worker is eligible to receive on the basis of his or her own earnings and on the basis of the earnings of the worker's divorced or deceased spouse, if the worker was married. Benefits are computed for all people who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. All benefit amounts are before taxes.

The federal poverty threshold used here is the threshold for one person (or two people) age 65 or older, adjusted for growth in prices over time. The household benefit is compared with the poverty threshold in the year that the worker turns age 65.

OAI = Old-Age Insurance.

In contrast with the outcomes for long-career workers, which are the focus of this report, the outcomes for short-career workers—that is, workers with fewer than 20 years of significant earnings—look substantially worse. (Those workers make up less than 20 percent of all OAI-eligible workers who survive through age 62.)

When only individual retired-worker benefits are included in the computation, 94 percent of short-career workers born in the 1940s have initial benefits that fall below the poverty threshold. That share is six times larger than the share of long-career workers born in the 1940s with initial benefits below the threshold. Because short-career workers have more years with no or very low earnings, median benefits for that group amount to less than half of the median benefits for long-career workers.

Expanding the measure of benefits to household benefits reduces the percentage of short-career workers who cannot meet their needs using benefits alone; however, that percentage remains high. For instance, 43 percent of short-career workers born in the 1940s have household benefits below the household poverty threshold. For those workers, the differences in the percentages using retired-worker benefits and household benefits are attributable to benefits that those workers receive on the basis of their spouse's earnings, as well as to benefits that their spouses receive. Of short-career workers born in the 1980s, 33 percent are projected to receive household benefits below the poverty threshold, compared with only 3 percent of long-career workers. ♦

# Initial Individual and Shared Replacement Rates

Exhibits 4 through 11 present CBO's projections of initial Social Security replacement rates under different specifications of benefits (numerators) and earnings (denominators). Exhibits 5 through 7 show individual replacement rates; Exhibits 9 through 11 show shared replacement rates; and Exhibits 4 and 8 compare individual and shared measures side by side.

Individual replacement rates are constructed using only the retired-worker benefit in the numerator and the worker's own earnings in the denominator.

Shared replacement rates are constructed to better capture household resources. The numerator for the shared replacement rate is the sum of Old-Age and Survivors Insurance benefits that the worker and his or her spouse are eligible to receive on the basis of their earnings, including spousal and survivor's benefits, if any, divided by the square root of two to account for economies of scale. The denominator for the shared replacement rate is constructed using the sum of the worker's and his or her spouse's earnings in each year of marriage, divided by the square root of two. (In years when the worker is not married, his or her earnings enter the calculation without the adjustment for

economies of scale. For an individual who was never married, no adjustment for economies of scale is applied.)

In all of the exhibits, CBO analyzed the same group of long-career workers who are eligible to receive OAI benefits on the basis of their individual earnings and who do not receive Disability Insurance benefits at age 61 or at any time afterward. (The shared benefit measures also include any OAI benefits received by the spouses of the long-career workers, although the spouses may not be OAI-eligible workers themselves.)

## Numerators and Denominators of Replacement Rates

Exhibit 4 illustrates the extent of variation in both the numerators and denominators of individual and shared replacement rates for workers born in the 1960s. The numerators of the replacement rates—Social Security benefits—vary on the basis of the age at which benefits are claimed, whether they are individual or shared, and whether they are measured in a single year or throughout the course of retirement.

The denominators of the replacement rates—preretirement earnings—vary on the basis of the time span for earnings, what earnings are counted, and whether the earnings are adjusted for overall changes in prices or wages. Price-adjusted earnings account for inflation and reflect the purchasing power of earnings over time. Wage-adjusted earnings account for changes in the average wage index and reflect the increase in the average wage earned by workers in the national economy over time. Price adjustment is generally used to compare the

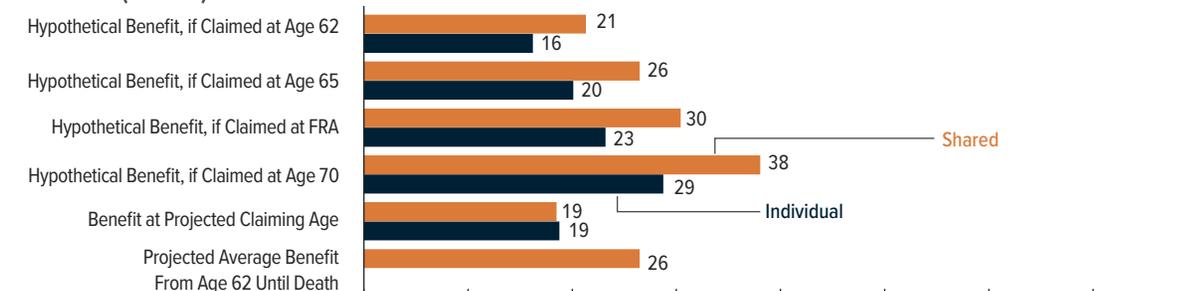
purchasing power of retirees' benefits with the purchasing power of their own earnings when they were still working; wage adjustment is used to compare the purchasing power of retirees' benefits with the purchasing power of earnings of workers who are currently in the labor force. Because wages generally grow faster than prices, using price indexing results in lower indexed earnings and, therefore, a higher replacement rate than does wage indexing.

Exhibit 4.

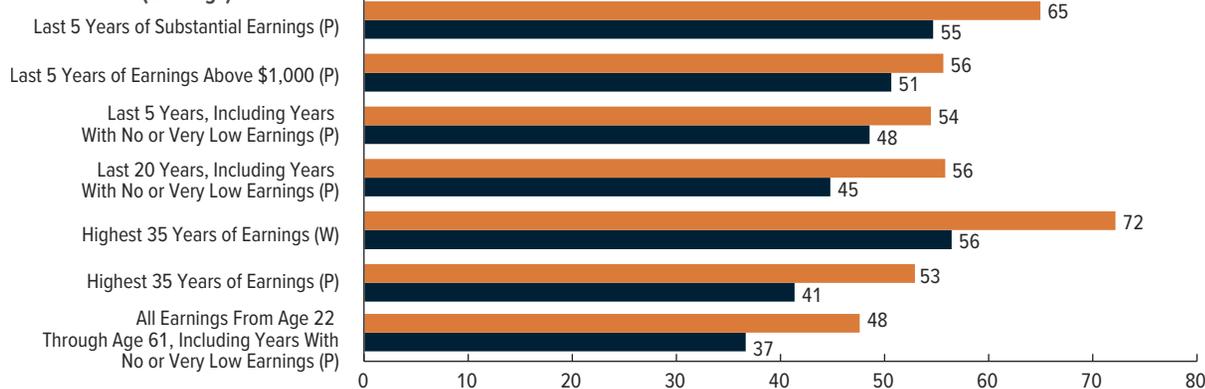
### Median Numerators and Denominators of Replacement Rates for Long-Career Workers Born in the 1960s, Using Individual and Shared Measures

Annual Amounts in Thousands of 2018 Dollars

**Numerators (Benefits)**



**Denominators (Earnings)**



Source: Congressional Budget Office.

Shared measures of benefits and earnings reflect benefits and earnings of both spouses, adjusted for economies of scale. Individual benefits and earnings include only retired-workers’ benefits and those workers’ own earnings. The average benefit from age 62 until death is projected only on a shared basis. For earnings measures (denominators), “P” indicates that the earnings have been adjusted for changes in prices, and “W” denotes that earnings have been adjusted for changes in wages. The last 5 (or last 20) years of earnings, including years with no or very low earnings, are computed starting with the last year with positive earnings before age 62, stepping back through 4 (or 19) adjacent years, and averaging those values, including years with no or very low earnings. (Starting at the last year with positive earnings better captures the final years of work by excluding years when some workers may have already retired.) Substantial earnings are annual earnings that are at least half of the worker’s (individual or shared) average indexed earnings. All values are expressed on an individual-worker basis, are before taxes, and reflect annual amounts. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded. FRA = full retirement age.

Benefits and earnings that can be used in the calculation of replacement rates vary substantially depending on how they are measured. Shared benefits at hypothetical claiming ages are larger than individual retired-worker benefits because of the addition of spousal and survivor’s benefits and of any benefits available to the worker’s spouse, along with the adjustment for economies of scale (see the top four sets of bars in the upper panel). Shared benefits at the projected claiming ages are similar to individual benefits because spouses typically claim benefits in different years (see the fifth set of bars). (The projected shared first-year benefit generally reflects only one spouse’s benefit because most spouses do not claim benefits in the same year. In contrast, the shared benefit at the hypothetical age of claiming is constructed by summing benefits of both spouses using the benefit amounts for that hypothetical age. See Appendix B.)

Projected average annual shared benefits received from age 62 until death—multiyear benefits—are very similar to hypothetical shared benefits claimed at age 65 (both are about \$26,000) because of several offsetting factors, including claiming patterns within households, changes in the composition of households over time, and growth in benefits resulting from cost-of-living adjustments. (Multiyear shared benefits account for all years of benefits received by the household. In some years, only one person in the household receives a benefit—for example, when only one person has claimed benefits or after a spouse has died—and in other years, both household members receive benefits.)

In calculating the denominators, average earnings measured over longer time spans tend to be lower than earnings received in the last five years of work. For earnings measured over longer time spans, adjusting those earnings for changes in wages over time, rather than for changes in prices, results in a substantially higher measure of earnings. ♦

## Individual Replacement Rates

Exhibits 5 through 7 focus on individual replacement rates.

Exhibit 5 shows replacement rates using all earnings from age 22 through age 61 and the last five years of substantial earnings—a measure that CBO has published in the past (see *CBO's 2016 Long-Term Projections for Social Security: Additional*

*Information*, December 2016). Replacement rates using a number of other configurations are shown in Exhibits 6 and 7.

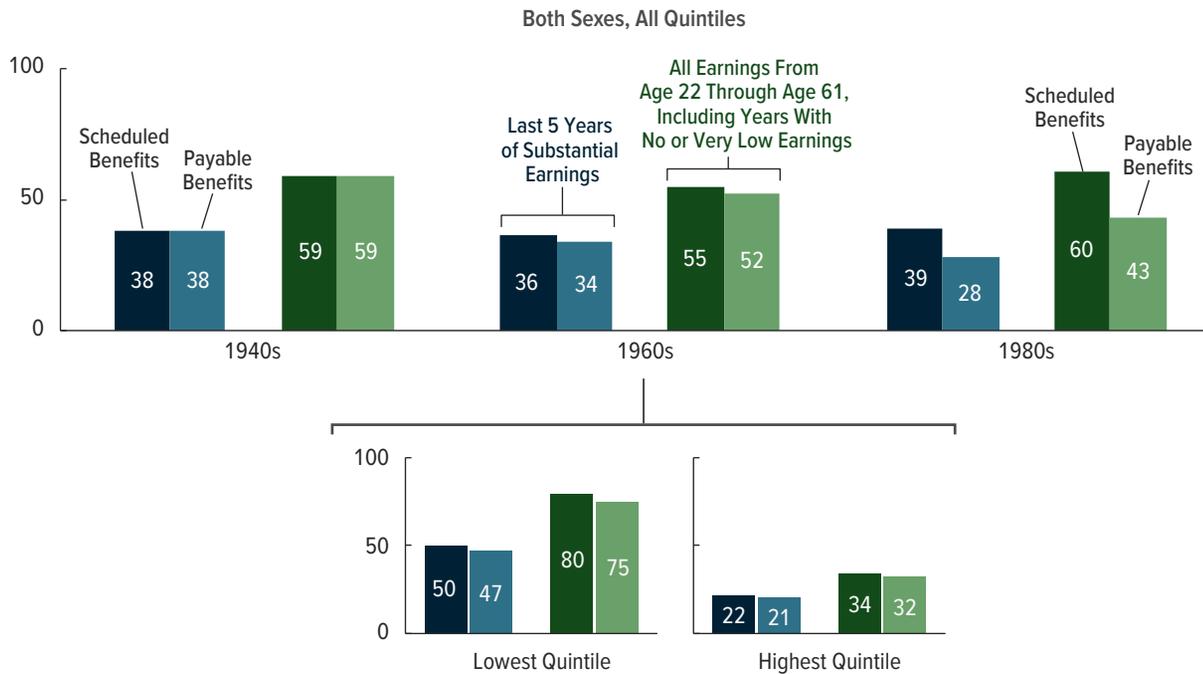
The replacement rates are generally shown for long-career workers born in the 1960s, by sex and for the lowest and highest quintiles of shared lifetime earnings, which are defined as the present

value of price-adjusted shared earnings over a lifetime. (When the sample is divided into five groups that are ranked according to those earnings, a quintile is one of those five groups. A present value is a single number that expresses a flow of current and future income or payments in terms of an equivalent lump sum received or paid at a specific time.)

Exhibit 5.

**Median Replacement Rates for Long-Career Workers, Using Initial Individual Benefits and Two Different Measures of Earnings**

Percent



Source: Congressional Budget Office.

The initial individual benefit (the numerator) is the retired worker’s benefit, if first claimed at age 65. Scheduled benefits are benefits as calculated under the Social Security Act, regardless of the balances in the combined trust funds. Payable benefits are benefits as calculated under the act, reduced as necessary to ensure that outlays do not exceed the Social Security system’s revenues once the balances in the combined trust funds are exhausted, which is projected to occur in 2031.

Two different measures of price-adjusted earnings (denominators) are used in this exhibit. To compute the last 5 years of substantial earnings (annual earnings that are at least half of the worker’s average indexed earnings), CBO started with the last year of substantial earnings before age 62, identified the 4 preceding years with such earnings, and averaged those values. The measure of all earnings from age 22 through age 61, including years with no or very low earnings, captures the worker’s full earnings history up to age 62. All amounts are before taxes. Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

Median replacement rates based on the last five years of substantial price-adjusted earnings are significantly lower than median replacement rates that are based on the last 40 years of any price-adjusted earnings, including years with no or very low earnings. (The former replacement rates are generally used to evaluate the extent to which benefits can provide income continuity from the last several years of work, whereas the latter replacement rates can be used to analyze the extent to which benefits enable workers to maintain the average standard of living experienced during working years.)

Initial replacement rates based on the last 5 years of substantial earnings before age 62 are less than 40 percent for long-career workers of both sexes and across cohorts. Consequently, individual retired-worker benefits alone are not projected to provide income continuity from the late-career earnings. Using a longer measure of earnings (all earnings from age 22 through age 61) but the same measure of benefits (scheduled retired-worker benefits, if initially claimed at age 65), replacement rates are substantially higher—between 55 percent and 60 percent of earnings for long-career workers across cohorts. However, those rates suggest that benefits are still likely to fall short of maintaining the average standard of living experienced during working years. (For the 1960s and 1980s cohorts, replacement rates based on payable benefits are lower than those based on scheduled benefits.)

Because of the progressive nature of Social Security’s benefit formula, replacement rates are much higher for workers with lower earnings (see the bottom panel in the exhibit). For example, the median replacement rate based on all earnings from age 22 through age 61 is 80 percent for workers born in the 1960s whose lifetime earnings fall in the lowest earnings quintile, more than double the 34 percent for workers whose earnings fall in the highest quintile. ♦

Exhibit 6.

**Variations in Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Different Measures of Earnings**

Percent



Source: Congressional Budget Office.

The initial individual benefit (the numerator) is the retired worker’s benefit, if first claimed at age 65.

For earnings measures (denominators), “P” indicates that the earnings have been adjusted for changes in prices, and “W” denotes that earnings have been adjusted for changes in wages. The last 5 (or last 20) years of earnings, including years with no or very low earnings, are computed starting with the last year with positive earnings before age 62, stepping back through 4 (or 19) adjacent years, and averaging those values, including years with no or very low earnings. (Starting at the last year with positive earnings better captures the final years of work by excluding years when some workers may have already retired.) Substantial earnings are annual earnings that are at least half of the worker’s individual average indexed earnings. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

In general, median replacement rates increase considerably as a result of two analytical choices: using a longer period for measuring earnings and adjusting those earnings for changes in prices rather than for changes in wages. (In this exhibit, the numerator for all replacement rates is the initial retired-worker benefit, if first claimed at age 65.)

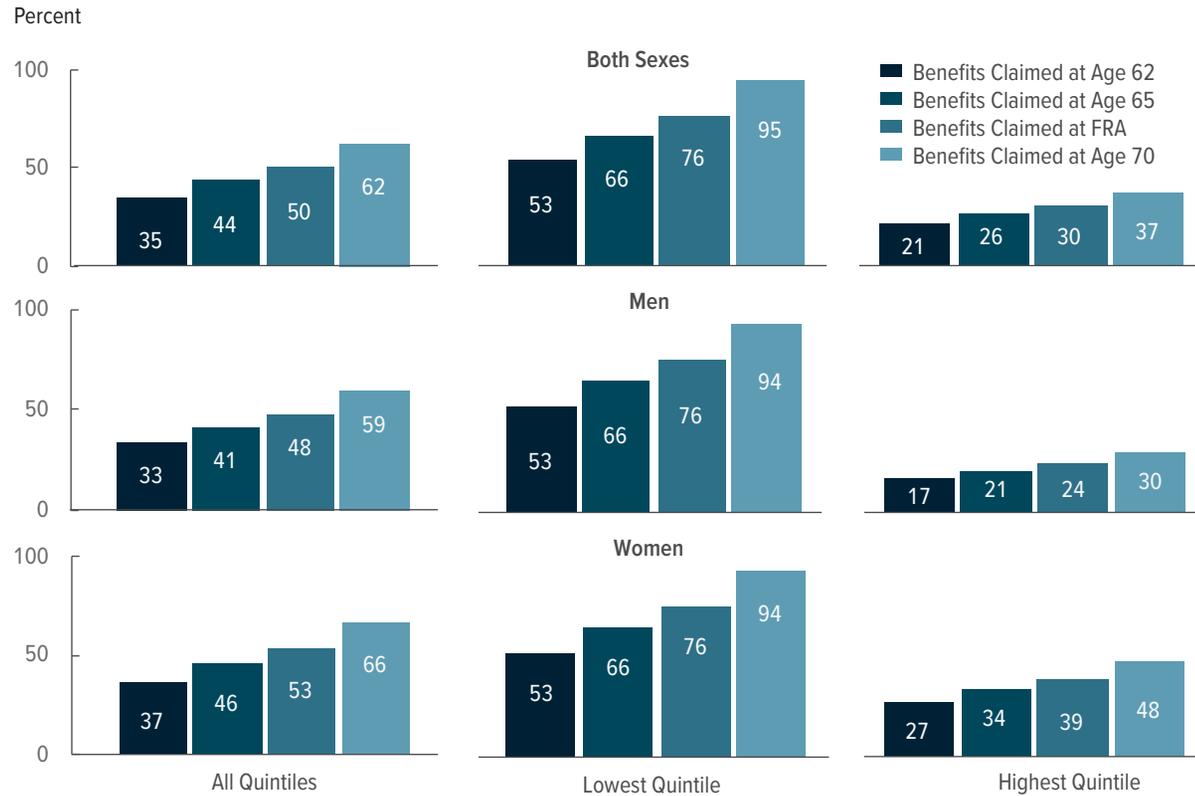
This exhibit focuses on the 1960s cohort as an example of the pattern observed across all cohorts. For that group, median replacement rates across all quintiles increase substantially as the period for measuring earnings expands from 5 years to 40 years. Because workers tend to have at least some years with no or very low earnings during their lifetimes, expanding the period for measuring earnings captures more of those years, leading to lower average earnings (and, therefore, a smaller denominator in the calculation of the replacement rates).

When earnings are adjusted for changes in prices rather than for changes in wages, the median replacement rate for all workers based on the highest 35 years of earnings increases from 36 percent to 49 percent. Because wages typically grow faster than prices, adjusting earnings for changes in prices results in smaller measures of earnings (and, therefore, a smaller denominator in the calculation of the replacement rates).

Of the options analyzed, the denominator based on the last 20 years of price-adjusted earnings, including years with no or very low earnings, results in replacement rate values for both sexes and all quintiles of lifetime earnings that are roughly in the middle of the range. ♦

Exhibit 7.

**Variations in Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Different Hypothetical Claiming Ages**



Median replacement rates are substantially higher for people who claim benefits later. For example, calculated using a single measure of earnings—the last 20 years of any price-adjusted earnings, including years with no or very low earnings—median replacement rates for the 1960s cohort increase by nearly 30 percentage points as the claiming age increases from age 62 to age 70. That increase is observed for both male and female workers and across all quintiles of lifetime earnings.

The findings shown in this exhibit are the result of the actuarial reductions in monthly benefits when they are claimed before the full retirement age (FRA) and increases in monthly benefits due to delayed retirement credits when benefits are claimed after the FRA. (For workers in the 1960s cohort, the FRA is age 67. For those workers, benefits claimed at age 62, for example, are 30 percent lower than benefits claimed at the FRA.)

Although delaying the claiming of benefits significantly increases replacement rates, that delay has comparatively little effect on the value of average lifetime benefits. When people claim benefits earlier, they collect smaller annual benefits for more years. When people claim later, they collect larger annual benefits for fewer years. ♦

Source: Congressional Budget Office.

For this exhibit, CBO computes replacement rates using four measures of benefits (numerators): initial individual benefits, if first claimed at age 62, 65, the FRA, or 70.

The earnings measure (the denominator) is based on the last 20 years of any individual price-adjusted earnings, including years with no or very low earnings. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

FRA = full retirement age.

## Shared Replacement Rates

To provide a more comprehensive view of the Social Security benefits available to retired workers, Exhibits 8 through 11 show replacement rates that take into account the benefits and earnings of the worker's spouse. In this report, shared benefits at a hypothetical claiming age of 65 reflect all retired-worker, spousal, and survivor's benefits that both the worker and his or her spouse are eligible to receive on the basis of either of their earnings histories. Similarly, shared earnings incorporate earnings of both spouses during the marriage.

Shared replacement rates are computed for each long-career worker, keeping the unit of analysis

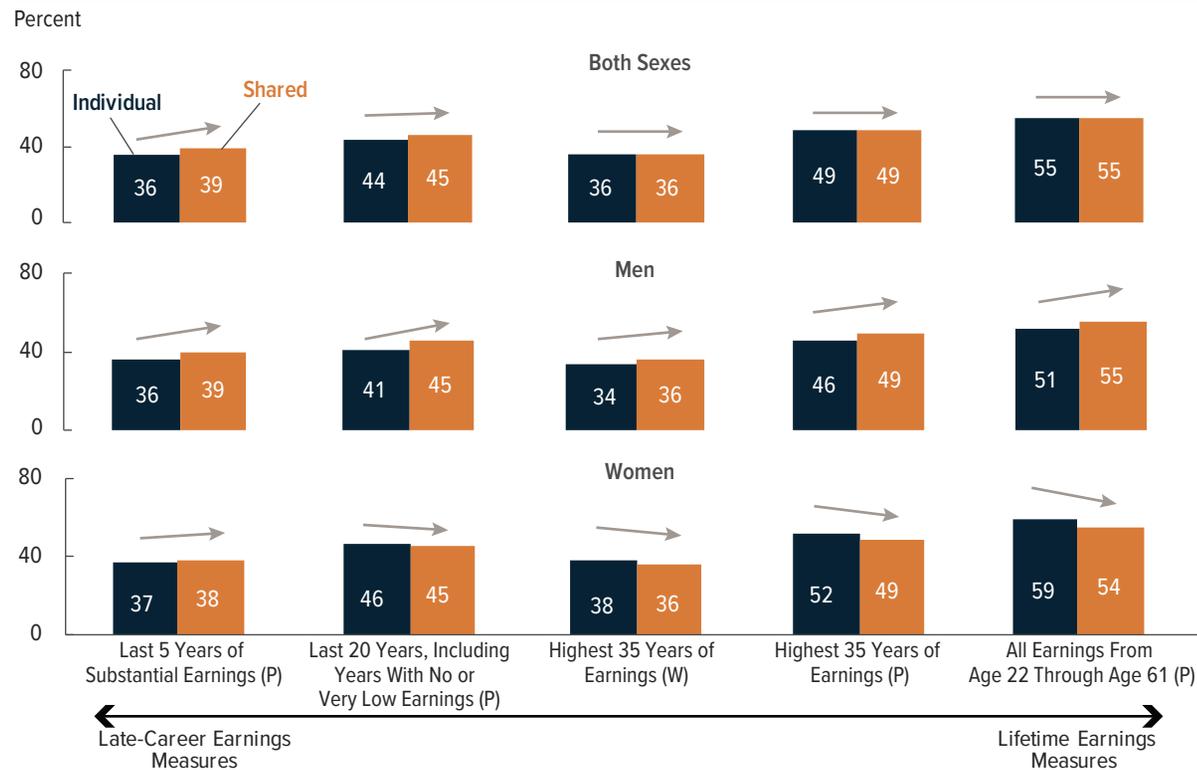
(the individual worker) the same as that used in previous exhibits, thus ensuring that the individual and shared replacement rates are comparable. (As a result, the earnings and benefits of a spouse who is not a long-career worker are included when analyzing the shared earnings and benefits of the long-career worker, but the spouse who has not worked or worked for fewer than 20 years is not included in the analysis on his or her own.)

Because household members tend to share expenses for housing, utilities, and other items, two spouses typically need less than twice the income that either person would need if living

separately. To account for the generally lower per-person living expenses in households with two or more members, CBO adjusts for those economies of scale. Shared benefits and shared earnings are computed as the sum of the worker's and his or her spouse's benefits and earnings in each year during the marriage divided by the square root of two, implying that a married person would need about 30 percent less income than a single person living alone to maintain the same general standard of living.

Exhibit 8.

### Comparison Between Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Individual and Shared Measures and Different Measures of Earnings



Source: Congressional Budget Office.

For this exhibit, CBO computes replacement rates using two measures of benefits (numerators): initial individual benefits and initial shared benefits. The initial individual benefit is the retired worker’s benefit, if first claimed at age 65. The initial shared benefit reflects the sum of the worker’s and spouse’s initial benefits, if claimed age 65, adjusted for economies of scale.

The earnings measures (denominators) are similarly computed either on an individual or a shared basis. CBO computes earnings measures in five different ways, ranging from the last 5 years of substantial earnings (that is, annual earnings that are at least half of the worker’s average indexed earnings) to all earnings from age 22 through age 61, including years with no or very low earnings. “P” indicates that the earnings have been adjusted for changes in prices, and “W” denotes that the earnings have been adjusted for changes in wages. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

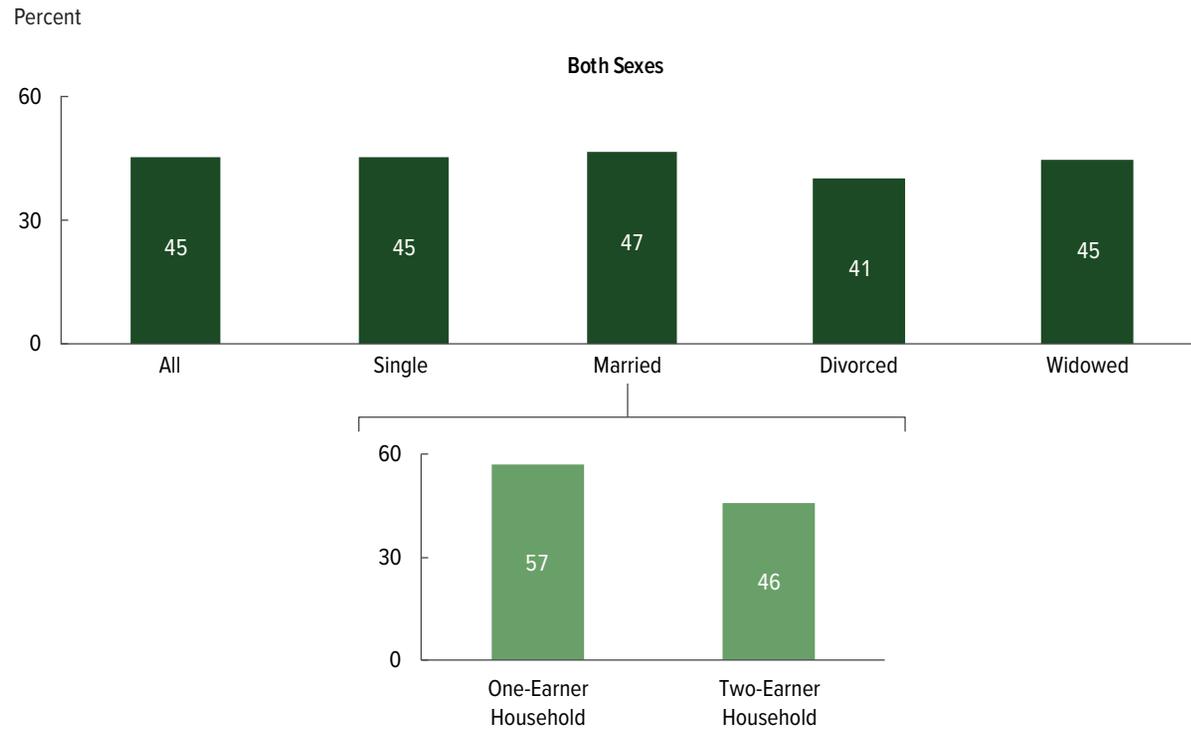
Overall, shared replacement rates are similar to individual replacement rates, and the variation in replacement rates using different denominators is similar for the individual and shared measures. (Shared replacement rates capture not only the retired worker’s own benefits and earnings, but also any spousal and survivor’s benefits and earnings of the worker’s spouse.) However, the relationship between individual and shared replacement rates is different for men and women.

For female workers born in the 1960s, shared replacement rates tend to be lower than individual replacement rates, whereas for male workers, they tend to be higher than individual rates. Because women generally have smaller benefits and lower earnings than men and because Social Security’s benefit formula is progressive, incorporating the larger benefits and earnings of their (male) spouses yields lower overall replacement rates for female workers. For male workers, incorporating the smaller benefits and earnings of their (female) spouses leads to higher overall replacement rates.

Shared replacement rates for male and female workers are much closer together than their individual replacement rates. For two spouses, the shared benefit measures are equal, and the shared earnings measures are generally similar. (However, the shared earnings measures for two spouses typically are not equal because of the individual years of earnings that each spouse has before or after marriage.) ♦

Exhibit 9.

**Median Replacement Rates for Long-Career Workers Born in the 1960s, With Initial Shared Benefits and the Last 20 Years of Shared Earnings, by Household Type**



Source: Congressional Budget Office.

For this exhibit, the marital status of a long-career worker at age 61 was used to determine his or her household type. One-earner households are defined as households in which only one spouse is eligible for Old-Age Insurance benefits using earnings through age 61, whereas two-earner households are those in which two spouses are eligible.

The initial shared benefit (the numerator) reflects the sum of the worker’s and spouse’s initial benefits, if claimed age 65, adjusted for economies of scale. The earnings measure (the denominator) is based on the last 20 years of shared price-adjusted earnings, including years with no or very low earnings. All values are before taxes.

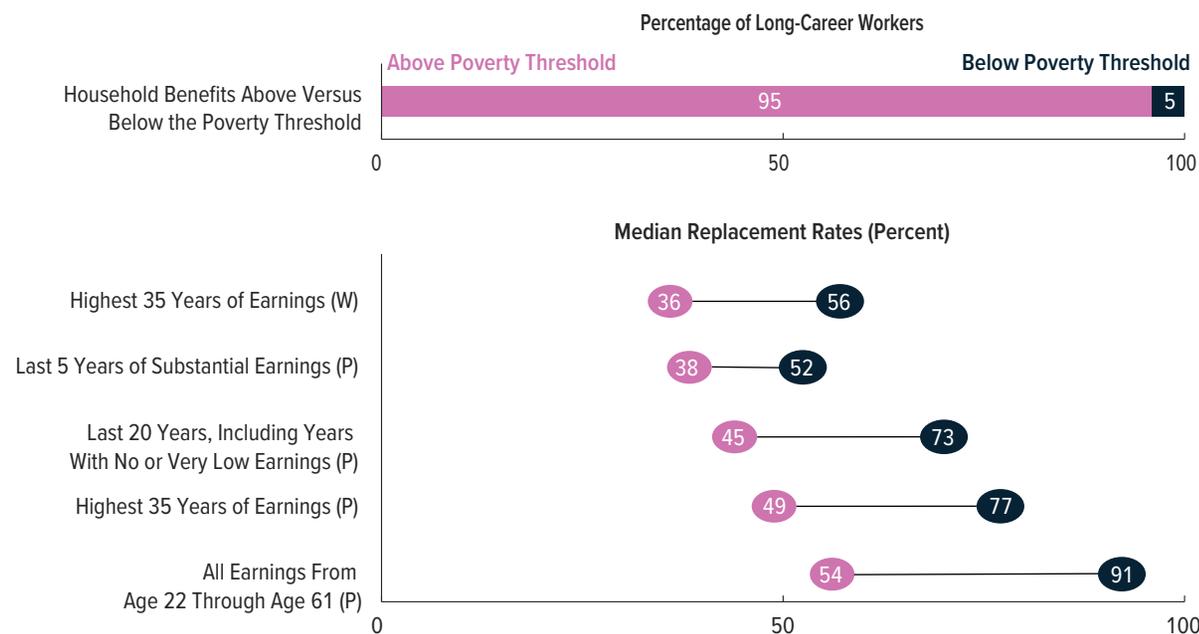
Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

Married workers have higher shared replacement rates than do workers who are divorced or widowed or who are single. (For comparison with some other exhibits, the denominators of the replacement rates are based on the last 20 years of shared earnings, including years with no or very low earnings.) For example, for married workers born in the 1960s, the median shared replacement rate is 47 percent, whereas the median replacement rate for divorced workers is 41 percent. In CBO’s analysis, the shared benefits of married workers are higher than their individual retired-worker benefits because eligible spouses are generally entitled to total individual benefits that are 50 percent of the retired worker’s amount and because of the economies-of-scale adjustment.

In households consisting of a married couple, replacement rates vary on the basis of whether one or both spouses worked. CBO defined one-earner households as those in which only one spouse is eligible for OAI benefits on the basis of his or her own earnings by age 62. Two-earner households are defined as those in which both spouses are eligible for OAI worker benefits. (Among married long-career workers born in the 1960s, fewer than 10 percent belong to one-earner households.) Because of the availability of the spousal benefit, generally the median shared replacement rate in a one-earner household is significantly higher than the median replacement rate in a two-earner household. (The patterns in the replacement rates by marital status and by the number of earners in the household are similar by sex.) ♦

Exhibit 10.

### The Relationship Between Initial Household Benefits, Poverty Thresholds, and Shared Replacement Rates for Long-Career Workers Born in the 1960s



Source: Congressional Budget Office.

For comparison with the official federal poverty threshold, CBO computes household benefits as the sum of the worker’s and spouse’s initial benefits, if claimed at age 65. If the worker is married, initial household benefits are compared with the poverty threshold for two people age 65 or older, adjusted for growth in prices. If the worker is not married, the initial household benefit (the retired-worker benefit plus any spousal or survivor’s benefit that the worker is eligible to receive) is compared with the poverty threshold for one person.

For replacement rates, CBO computes initial shared benefits as the sum of the worker’s and spouse’s initial benefits, if claimed at age 65, adjusted for economies of scale. For the earnings measures, “P” indicates that the earnings have been adjusted for changes in prices, and “W” denotes that earnings have been adjusted for changes in wages. Substantial earnings are annual earnings that are at least half of the worker’s shared average indexed earnings. All values are before taxes. Benefit measures are computed for all people who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

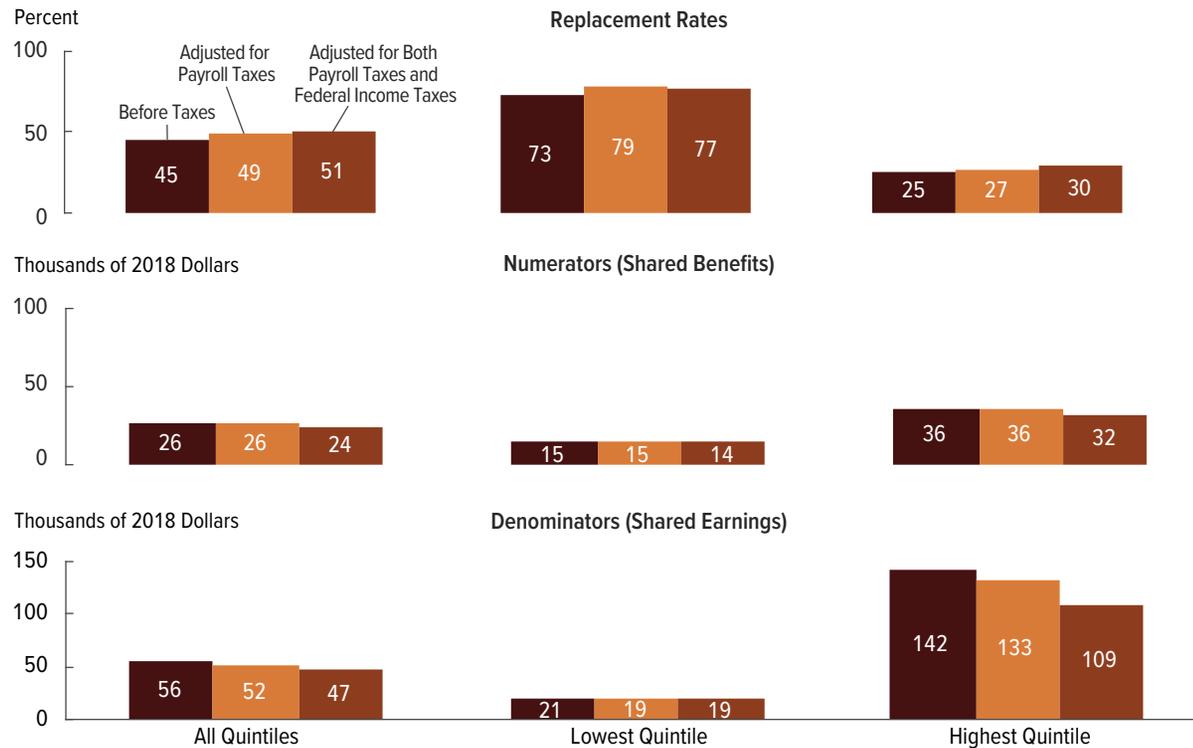
Median shared replacement rates for long-career workers vary considerably depending on whether the worker’s shared benefit falls above or below the federal poverty threshold. For the vast majority of long-career workers, the sum of the worker’s initial benefit and the spouse’s benefit—the household benefit—exceeds the poverty threshold. For those workers, the median shared replacement rates range from 36 percent, using the highest 35 years of wage-adjusted earnings, to 54 percent, using all earnings from age 22 through age 61, adjusted for changes in prices over time.

For the 5 percent of long-career workers whose initial household benefits are below the poverty threshold, median shared replacement rates are substantially higher than for workers whose benefits are above the threshold. Those replacement rates are higher because workers with benefits below the threshold have lower earnings and because the benefit formula is progressive.

The divergence between the two groups of workers is particularly large when replacement rates are based on longer periods of price-adjusted earnings. For example, whereas replacement rates based on the last five years of substantial earnings are about 14 percentage points higher for workers whose household benefits fall below the poverty thresholds, their replacement rates based on all earnings from age 22 through age 61 are about 37 percentage points higher. As the span lengthens, more years with no or very low shared earnings tend to occur for such workers. (The patterns in the replacement rates for the two groups are similar for men and women.) ♦

Exhibit 11.

### Median Replacement Rates for Long-Career Workers Born in the 1960s, Using Initial Shared Benefits and the Last 20 Years of Shared Earnings, Adjusted for Taxes



Source: Congressional Budget Office.

The before-tax replacement rate in each group is computed using before-tax amounts for the initial shared benefit (the numerator) and the last 20 years of shared earnings (the denominator). Adjusting for payroll taxes deducts the employee’s share of taxes under the Federal Insurance Contributions Act from preretirement earnings, including payroll taxes for Old-Age and Survivors Insurance, Disability Insurance, and Medicare. Adjusting for federal income taxes involves deducting income taxes on benefits as well as income taxes on preretirement earnings. (See Appendix A for more information about how estimates of federal income taxes are obtained.)

The earnings measure (the denominator) is based on the last 20 years of shared price-adjusted earnings, including years with no or very low earnings.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

Because taxes are generally lower in retirement than during working years, after-tax replacement rates are generally higher than before-tax replacement rates. To adjust for payroll taxes, CBO deducted the employee’s share of payroll taxes from each year of preretirement earnings. To adjust for federal income taxes, CBO deducted income taxes on earnings from each year of preretirement earnings. Because Social Security benefits are subject to taxation, the agency also deducted income taxes on benefits from initial benefits. (For comparison with previous exhibits, the denominators of the replacement rates are based on the last 20 years of shared earnings, including years with no or very low earnings.)

For workers born in the 1960s, accounting for payroll taxes increases the median shared replacement rate by 4 percentage points, from 45 percent to 49 percent. Accounting for federal income taxes in addition to payroll taxes increases the replacement rate by another one and a half percentage points, resulting in an after-tax rate of 51 percent.

Because federal income taxes are progressive, meaning that average tax rates generally rise as income increases, workers in the highest earnings quintile pay a larger share of their income in taxes than do workers in the lowest quintile. As a result, adjusting shared benefits for federal income taxes lowers the median benefit for workers in the lowest quintile by less than 3 percent, from \$14,900 to \$14,500, while the median benefit for workers in the highest quintile is reduced by about 10 percent, from \$36,000 to \$32,500. Similarly, for workers in the lowest quintile, adjusting for both payroll and federal income taxes lowers the shared earnings by about 8 percent, from about \$20,500 to \$19,000. In contrast, for workers in the highest quintile, adjusting for taxes lowers earnings by about 23 percent, from \$141,500 to \$109,500 (see Appendix A). ♦

# Multiyear Shared Replacement Rates

Exhibits 12 through 14 present results from CBO's multiyear analysis. Unlike the previous exhibits, which generally show hypothetical Social Security benefits at the age of 65, the following exhibits summarize the projected benefits, adjusted for changes in prices over time, that are received from the initial year of claiming until death. The multiyear benefit measure is a simple average of those benefits—that is, all years of benefits are weighted equally.

Multiyear shared benefits reflect all Old-Age and Survivors Insurance benefits received by the worker and his or her spouse from the time the worker is age 62 until the end of life, including spousal benefits and survivor's benefits, if any (see Exhibit 12). The first year of benefits for the multiyear analysis is defined as the first year after the worker reaches age 62 in which either the worker or the spouse is projected to receive any

benefits. For years when both the worker and the spouse receive benefits, CBO applies an adjustment for household size and economies of scale, dividing the sum of their benefits by the square root of two. In years when only one member of the two-person household receives a benefit, there is no adjustment for household size or economies of scale. (Doing otherwise could significantly understate the resources available to the married couple in such a year because the other spouse's ongoing earnings would be omitted while his or her benefit would be zero because it would not have been claimed yet. See Appendix B for the sensitivity of findings to alternative specifications.)

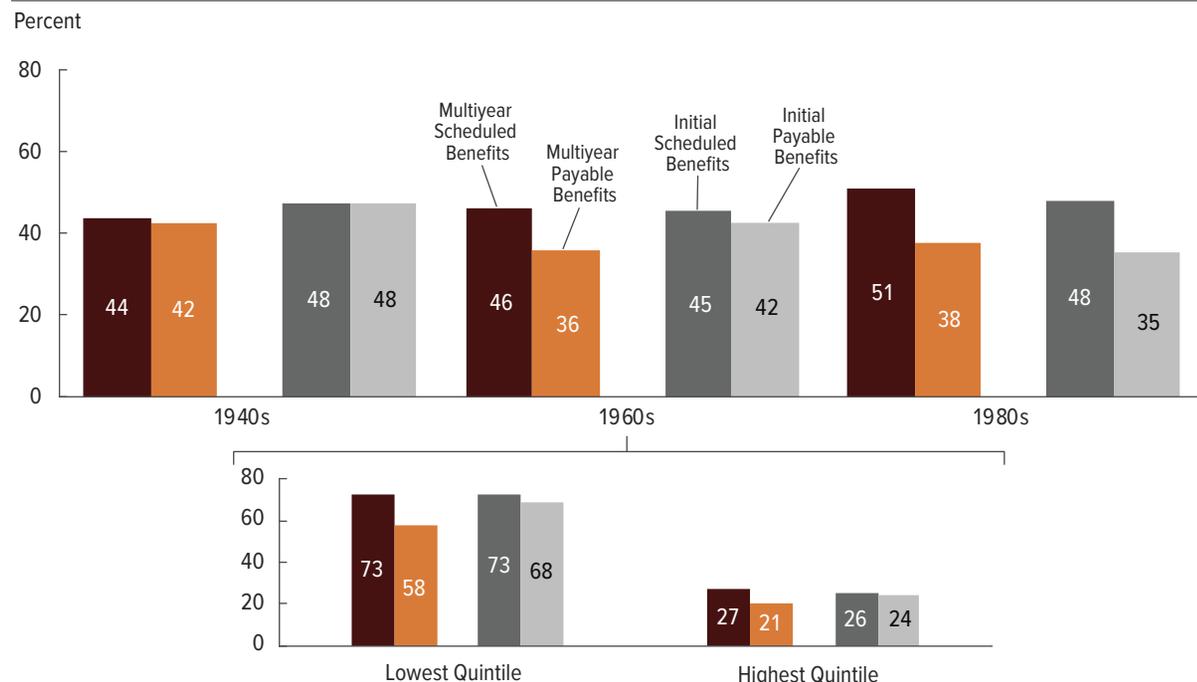
For workers who are projected to die before they or their spouses claim any benefits, multiyear replacement rates equal zero, complicating interpretation of the results. To address that concern, such workers are excluded from the following

analysis, resulting in a sample that is 1 percent to 2 percent smaller, on average and across cohorts, than the sample used in previous exhibits. (Within specific groups, sample sizes are between 0 and 5 percent smaller than the ones used in the previous exhibits.)

The advantage of multiyear analysis is that it allows an examination of the way benefit measures change over the course of retirement. For retired workers who are married, a life event that often results in significant changes to their financial circumstances is the death of a spouse, which triggers an adjustment of the Social Security benefits. Exhibit 13 illustrates the magnitude of a change in shared replacement rates for married workers who become widowed in retirement.

Exhibit 12.

### Median Multiyear Replacement Rates for Long-Career Workers, Using the Average of All Shared Benefits and the Last 20 Years of Shared Earnings



Source: Congressional Budget Office.

In this exhibit, CBO shows replacement rates under different measures of shared benefits (numerators). The multiyear benefits are constructed using the average of all shared benefits received over the course of retirement, from age 62 until death, adjusted for changes in prices. Initial benefits are benefits received at age 65, if first claimed at that age. The earnings measure (the denominator) is based on the last 20 years of shared price-adjusted earnings, including years with no or very low earnings. All values are before taxes.

Scheduled benefits are benefits as calculated under the Social Security Act, regardless of the balances in the trust funds. Payable benefits are benefits as calculated under the act, reduced as necessary to ensure that outlays do not exceed the Social Security system’s revenues once the balances in the combined trust funds are exhausted, which is projected to occur in 2031.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. In addition, the sample shown here for both initial and multiyear replacement rates is restricted to workers who are projected to receive benefits in at least one year between age 62 and death; it is, therefore, 1 percent to 2 percent smaller, on average and across cohorts, than the one used in previous exhibits. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

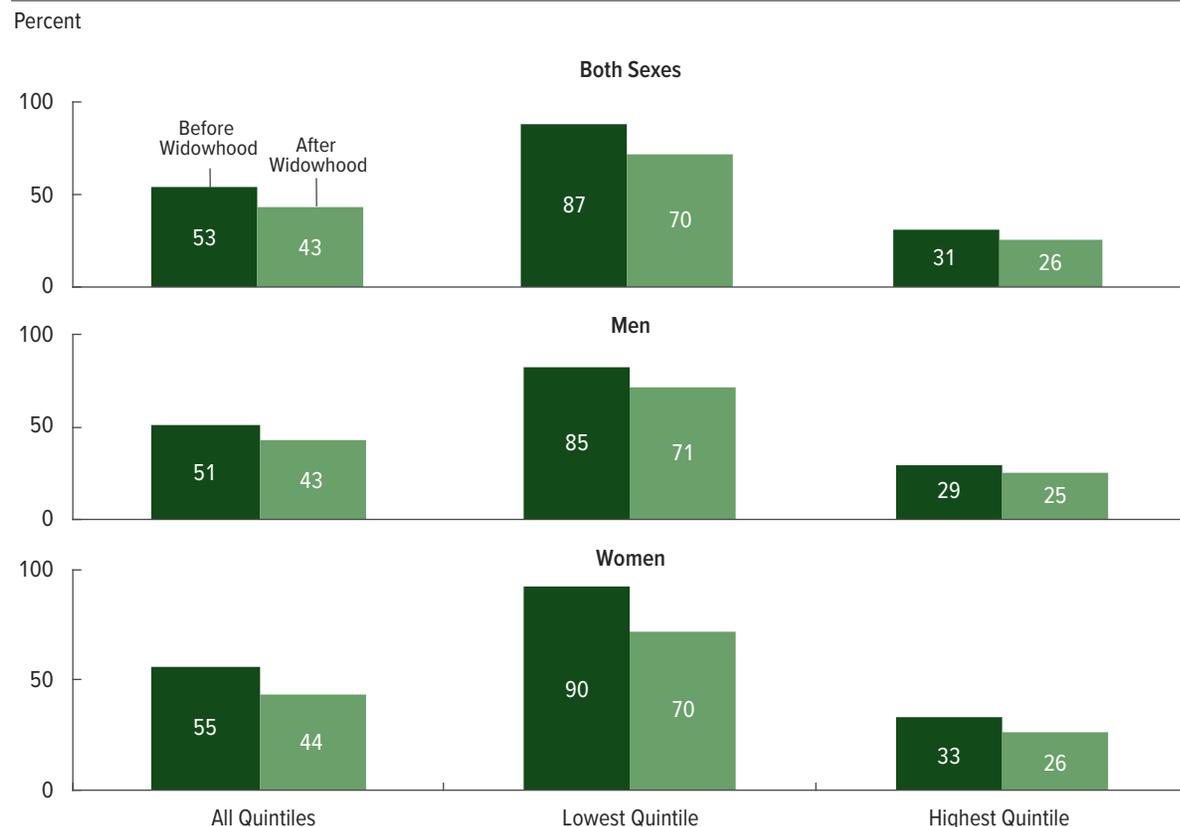
Multiyear replacement rates—computed on the basis of all shared scheduled benefits received from age 62 until death—are roughly comparable with the initial replacement rates calculated under the assumption that benefits are claimed at age 65. (That similarity holds across and within quintiles of shared lifetime earnings.)

Using the last 20 years of earnings as the denominator, the multiyear shared replacement rate based on *scheduled* benefits is 1 percentage point higher than the initial shared replacement rate with scheduled benefits for workers born in the 1960s. However, the multiyear shared replacement rate based on *payable* benefits is substantially lower than the initial replacement rate because benefit reductions following the projected depletion of the Social Security trust funds would affect multiyear benefits for nearly all workers born in the 1960s, whereas they would affect initial benefits for only a fraction of those workers. (The combined trust funds are projected to be depleted in 2031.)

Scheduled multiyear replacement rates increase from 44 percent for workers born in the 1940s to 51 percent for workers born in the 1980s. That finding is, in part, a result of an increase in earnings inequality over time. In contrast, multiyear replacement rates using payable benefits are lower for the later cohorts because of benefit reductions following the projected depletion of the combined Social Security trust funds. ♦

Exhibit 13.

### Median Replacement Rates Before and After Widowhood for Long-Career Workers Born in the 1960s, Using Shared Benefits and the Last 20 Years of Shared Earnings



Source: Congressional Budget Office.

Before-widowhood replacement rates are based on the shared benefits received by both spouses in the last full year before widowhood. After-widowhood replacement rates are based on the benefit received by the surviving spouse in the first full year of widowhood. (In this report, widowhood refers to the state of being a widow or widower.)

The denominator of the replacement rate is the same in both before- and after-widowhood replacement rates and reflects average shared price-adjusted earnings in the last 20 years, including years with no or very low earnings. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62, who are not receiving any benefit at age 61, who survive long enough to receive benefits for at least one year, and who become widowed after the age of 62. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

Median shared replacement rates in widowhood are substantially lower than replacement rates during marriage. For example, for married workers born in the 1960s who become widowed in retirement, the median replacement rate falls by 10 percentage points. (The replacement rates before the loss of the spouse are computed using the shared benefit in the last full year of marriage, when both spouses are receiving benefits. The subsequent replacement rates are computed for the same group of workers on the basis of the benefit in the first full year of widowhood. The last 20 years of shared earnings, including years with no or very low earnings, serve as the denominator for both sets of replacement rates so that only the numerator varies as a result of widowhood.)

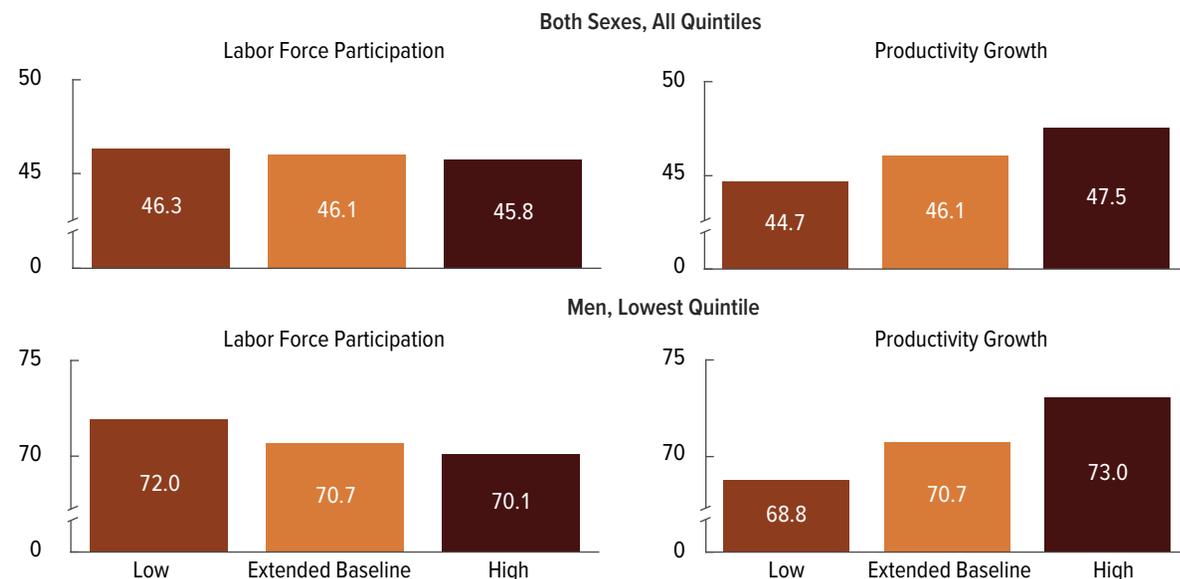
The reduction in replacement rates in widowhood is largely attributable to the loss of economies of scale within the household. Because a newly widowed person can no longer share common household expenses, that person's cost of living increases in widowhood, reducing the amount of goods and services that can be afforded using the recalculated benefit. (The economies-of-scale adjustment used in the calculation of replacement rates implies that a married person would need about 30 percent less income than a person living alone to maintain the same general standard of living.)

Although female workers have higher replacement rates than men before widowhood, they experience a larger reduction after widowhood, ending up with rates that are very similar to those of men. The median replacement rate for women is 11 percentage points lower in widowhood, whereas the median replacement rate for men is 8 percentage points lower. Because of the structure of spousal and survivor's benefits, the reduction is generally greater for households with two earners compared with households with one earner, and female workers are more likely to have a working spouse. ♦

Exhibit 14.

### Uncertainty Surrounding Shared Multiyear Replacement Rates for Long-Career Workers Born in the 1960s

Percent



Source: Congressional Budget Office.

In CBO’s 2018 extended baseline projection, which generally reflects current law, the labor force participation rate is 59.5 percent in 2048, and the growth rate of productivity is about 1.2 percent annually over the next 30 years. In the alternative scenarios, the labor force participation rate in 2048 is projected to be, on average, about 3 percentage points higher or lower than is projected in CBO’s extended baseline; the growth rate of productivity is projected to be about 0.5 percentage points higher or lower than in the extended baseline. (The labor force participation rate is the percentage of the civilian noninstitutionalized population who are age 16 or older and either working or actively seeking work. Productivity growth is calculated as the growth of total factor productivity, which is the growth of real, or inflation-adjusted, output that is not explained by growth in labor or capital.) For more information on how CBO constructed those alternative projections, see Congressional Budget Office, *The 2016 Long-Term Budget Outlook* (July 2016), Chapter 7, [www.cbo.gov/publication/51580](http://www.cbo.gov/publication/51580).

Multiyear replacement rates are constructed using the average of all shared benefits received over the course of retirement, from age 62 until death, and average shared price-adjusted earnings in the last 20 years, including years with no or very low earnings. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. In addition, the sample is restricted to workers who are projected to receive benefits in at least one year between age 62 and death. It is, therefore, 1 percent to 2 percent smaller, on average and across cohorts, than the one used in the analysis based on initial benefits. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

Although long-term projections of Social Security replacement rates are inherently uncertain, changing key economic assumptions does not have a large effect on the findings shown in this report. Specifically, CBO considered two alternative projections of the labor force participation rate—the percentage of people in the civilian noninstitutionalized population who are age 16 or older and either working or actively seeking work—and of the growth rate of productivity. (Productivity growth is calculated as the growth of total factor productivity, which is the growth of real output that is not explained by growth in labor or capital.) Those alternative projections reflect values that are 3 percentage points (for the labor force participation rate) and 0.5 percentage points (for the growth rate of productivity) higher or lower than what currently underlies CBO’s extended baseline. The labor force participation rate and the growth rate of productivity affect the projected earnings that ultimately determine benefits and replacement rates.

For workers born in the 1960s, alternative projections of the labor force participation rate result in multiyear replacement rates that are less than 0.5 percentage point higher or lower than is projected based on CBO’s extended baseline. Alternative projections of the growth rate of productivity result in replacement rates that are 1 to 2 percentage points higher or lower than is projected based on the extended baseline. For specific groups of workers, the difference attributable to alternative projections is somewhat larger. For men in the lowest earnings quintile, for instance, median multiyear replacement rates would change by slightly over 1 percentage point if labor force participation was lower and by slightly over 2 percentage points if productivity growth was higher. (Although alternative economic projections do not have a large effect on the findings, other sources of uncertainty, particularly behavioral factors and alternative methodological approaches, may have considerably larger effects. See Appendix B.) ♦

## CBO's Analytical Approach

The Congressional Budget Office's projections of Social Security replacement rates and other benefit measures are based on its projections of a host of demographic and economic variables. (The projections underlying this report—including projections of labor force participation, wage growth, and mortality—are the same as those underlying *The 2018 Long-Term Budget Outlook*.)<sup>1</sup> In this appendix, CBO provides more detail about its analytical approach and the sources of data that are particularly important to projections of Social Security benefit measures. In addition, the appendix describes how CBO's analytical choices and the resulting findings compare with those of the Office of the Chief Actuary at the Social Security Administration, which has been producing measures of replacement rates for almost 30 years.

1. For a detailed description of demographic and economic projections underlying the analysis in this report, see Congressional Budget Office, *The 2018 Long-Term Budget Outlook* (June 2018), Appendix A, [www.cbo.gov/publication/53919](http://www.cbo.gov/publication/53919).

### How CBO Projects Social Security Benefits and Preretirement Earnings

To develop its projections, CBO uses its long-term microsimulation model.<sup>2</sup> The model starts with data on a 1 in 1,000 sample of the U.S. population and projects demographic and economic outcomes for that sample through time. For each person in the sample, the model simulates birth, death, immigration and emigration, marital status and changes to that status, fertility, labor force participation, hours worked, and earnings from labor. The resulting individual earnings histories are then used to determine the retired-worker (or disabled-worker) benefits for which an individual is eligible.<sup>3</sup> Because the model keeps track of links between individuals and their spouses (current, former, and deceased), it also computes the dependent benefits that the individual or his or her spouse may receive on the basis of either of their

2. See Congressional Budget Office, *An Overview of CBOLT: The Congressional Budget Office Long-Term Model* (April 2018), [www.cbo.gov/publication/53667](http://www.cbo.gov/publication/53667).

3. The long-term model projects labor earnings both above and below the taxable maximum—that is, the maximum amount of annual earnings to which the payroll tax is applied. However, only earnings up to the taxable maximum are used to determine the Social Security benefits. In 2018, the taxable maximum was \$128,400.

work histories, which is necessary for the calculation of shared benefits.

Although the long-term model projects earnings and benefits, it does not currently project pension income, balances in retirement accounts, or other assets that retirees may have. As a result, this report presents measures of Social Security benefits rather than measures of overall retirement income and assets.

### Sources of Data

For each person in the starting sample, CBO uses data from the Continuous Work History Sample (CWHS), an administrative data set provided by the Social Security Administration. Covering the period from 1951 to 2013, those data contain information on individual earnings and Social Security benefit amounts, the types of benefits (for example, retired-worker or spousal benefits), and the dates benefits were claimed. For years beyond 2013, CBO projects those variables on the basis of historical administrative data (which are collected by government agencies) and publicly available survey data.

Because data from the CWHS lack certain demographic components, such as information

on spouses and children, CBO uses public surveys to impute, or fill in, that information for each individual in the sample. For instance, to impute marriage formation and dissolution, CBO uses data from the Survey of Income and Program Participation (SIPP) that are matched to administrative earnings records. To project individual earnings beyond 2013, CBO uses data from the administrative records together with the Current Population Survey (CPS).<sup>4</sup> Information from the public data sources is not merged directly into the individual records in the long-term model. Rather, CBO uses those sources to estimate statistical relationships on the basis of individual characteristics that already exist in its model. Data from the SIPP and CPS are also used to estimate people's annual probabilities of experiencing demographic and economic changes, such as the birth of children and changes in labor force participation.

### Sample Selection

This report presents Social Security benefit measures for a sample of workers with long careers who are projected to survive long enough to be eligible for retired-worker benefits. Specifically, the sample includes only workers who are projected to survive through age 62, who are eligible to receive Old-Age Insurance (OAI) benefits using their individual earnings through age 61, and who

are projected to have at least 20 years of earnings above 10 percent of the average wage index (AWI) in each year. To focus on retired workers, workers who receive Disability Insurance (DI) benefits at age 61 or at any time afterward are excluded.

As an illustration, CBO shows how much a representative sample of the 1960s birth cohort is reduced because of restrictions used in this report (see Table A-1). First, including only workers who survive through age 62 reduces the starting sample by about 15 percent. Second, requiring that workers be eligible for OAI benefits on the basis of their earnings through age 61 reduces the sample by an additional 21 percent. Third, limiting the analysis to workers with long careers reduces the sample by 9 percent. Finally, excluding workers who meet the first three criteria but receive DI benefits after age 61 has a small effect on the sample, reducing it by 2 percent. Overall, the sample used in this report is representative of slightly more than half of the 1960s birth cohort.

Because of the restrictions applied to the sample, the workers that CBO analyzed differ somewhat from OAI-eligible workers in the overall population. For example, for long-career workers born in the 1960s, the highest 35 years of earnings are about 15 percent higher than the average for all OAI-eligible workers. In addition, men are marginally more likely to have at least 20 years of significant earnings than women, with men accounting for about 52 percent of workers in the long-career sample compared with about 50 percent of all OAI-eligible workers.

### Uncertainty in Microsimulation Models

Long-term projections of individual earnings and benefits are inherently uncertain. The findings shown in this report are affected by many sources of uncertainty, including CBO's projections of key economic, demographic, and behavioral factors.

Because the agency uses a microsimulation model—that is, a model that projects outcomes for individual people through time—another important source of uncertainty that could affect the findings is known as Monte Carlo variation.<sup>5</sup> CBO's long-term microsimulation model uses random numbers and probabilities to determine annual outcomes for people in the sample. For example, suppose that on the basis of statistical probabilities, a 25-year-old married woman has a 15 percent probability of having a child in a year. To determine whether a specific 25-year-old married woman in the model will be assigned a child, a random number between zero and 1 is drawn for her, and a child is assigned if the random number is lower than 0.15. Because the model is dynamic, having a child assigned at age 25 affects not only the likelihood of children at each subsequent age but also future earnings and other outcomes for that person, as well as her spouse. Consequently, the effect of random numbers propagates and becomes amplified in the model over time.

4. For more information on CBO's projection of earnings, see Jonathan A. Schwabish and Julie H. Topoleski, *Modeling Individual Earnings in CBO's Long-Term Microsimulation Model*, Working Paper 2013-04 (Congressional Budget Office, June 2013), [www.cbo.gov/publication/44306](http://www.cbo.gov/publication/44306).

5. For more information on Monte Carlo variation, see Michael Simpson, "Investigating Monte Carlo Variation in a Dynamic Microsimulation Model" (presentation to the Fifth World Congress of the International Microsimulation Association, September 2, 2015), [www.cbo.gov/publication/50736](http://www.cbo.gov/publication/50736).

Table A-1.

**Illustration of Restrictions Used to Produce the Sample for the 1960s Birth Cohort**

	Starting Sample	With the Survival Restriction	Plus the OAI-Eligibility Restriction	Plus the Long-Career Worker Restriction	Plus the DI Worker Restriction
Number of Workers (Thousands)					
Both Sexes	50	42	32	27	26
Men	25	21	16	14	14
Women	24	22	16	13	13
Percentage of the Starting Sample					
Both Sexes	100	85	64	55	53
Men	100	82	63	56	54
Women	100	89	65	54	52

Source: Congressional Budget Office.

The starting sample includes all people in CBO's long-term model. "With the Survival Restriction" represents how the sample is reduced if workers are excluded because they did not live through age 62. The "OAI-Eligibility Restriction" shows how the sample is affected if workers are excluded because they were not eligible for OAI benefits on the basis of their earnings through age 61 or because they had already received benefits at age 61. The "Long-Career Worker Restriction" illustrates how the sample is further reduced by excluding workers who had fewer than 20 years of earnings above 10 percent of the average wage index. Finally, the "DI Worker Restriction" shows how the sample is reduced when workers who receive DI benefits after age 61 are excluded.

DI = Disability Insurance; OAI = Old-Age Insurance.

Monte Carlo variation is the change in outcomes that arises from the assignment of random numbers. Each time a model is run using different random numbers, it produces slightly different outcomes. The smaller the sample size for which an outcome is observed, the larger the variation in those outcomes between different runs of the model.

Although most of the estimates shown in this report are not significantly affected by Monte Carlo

variation because of large sample sizes and the relatively short period for which outcomes need to be projected for workers in the 1960s cohort, the estimates that are based on smaller samples show some variation between model runs. Therefore, to obtain more reliable estimates for smaller groups, CBO follows a common technique of running multiple simulations that are based on different random numbers and averaging the values from those simulations. Although that technique does not eliminate the uncertainty that is attributable to

Monte Carlo variation, it mitigates the variation's effect on the findings shown in this report.

### Adjusting for Taxes

CBO computes measures of after-tax replacement rates by adjusting both for payroll taxes on earnings and for income taxes on earnings and benefits. To account for payroll taxes—taxes designated for Social Security and Medicare—CBO deducts the employee's share of payroll taxes from each year of preretirement earnings. For Social Security, that share is 6.2 percent of earnings applied up to a maximum amount of \$128,400 in 2018. For Medicare, that share is 1.45 percent of earnings applied up to \$200,000 (\$250,000 for two-person households) plus an additional 0.9 percent applied to earnings in excess of \$200,000 (\$250,000).

To calculate income taxes on earnings, CBO applies the federal tax law in place in each year a worker had earnings.<sup>6</sup> Those calculations are based on the demographic characteristics and earnings of the worker and his or her spouse. Because the earnings records that form the basis of this analysis do not contain all the information necessary to estimate income taxes, CBO uses several simplifications. To compute income taxes on preretirement earnings, CBO includes only income from labor earnings for each family. In addition, CBO applies the same percentage of tax-deductible

6. Jon Bakija of Williams College created the federal tax calculator that CBO used to model taxes in years prior to 1986. For more details, see Jon Bakija, *Documentation for a Comprehensive Historical U.S. Federal and State Income Tax Calculator Program*, Working Paper (Williams College, August 2009), <http://tinyurl.com/bakija> (PDF, 486 KB).

spending on state and local taxes, charitable contributions, and mortgage interest to all families. (Previously, CBO estimated that percentage to be 19 percent of earnings, using the most recent year of available data from the Internal Revenue Service's Statistics of Income, 2014.)

CBO also accounts for common deductions and credits that workers are projected to receive both before and after retirement. For example, people in eligible households with children would receive the earned income tax credit while working, and elderly tax filers would claim an additional elderly standard deduction.

Up to 85 percent of a recipient's Social Security benefits are subject to income tax.<sup>7</sup> However, the CWSHS data do not contain all the information necessary to compute income taxes on benefits, which are based on total income in retirement. Therefore, CBO imputes unearned income from pensions and other sources before applying federal tax law to total income in each year that benefits are received. (With those imputations, estimated taxes on Social Security benefits approximate the amounts reported in data from the Internal Revenue Service.)<sup>8</sup>

7. For more information on income taxes on benefits, see Congressional Budget Office, "The Taxation of Social Security Benefits," *CBO Blog* (February 12, 2015), [www.cbo.gov/publication/49948](http://www.cbo.gov/publication/49948).

8. To impute pensions and other income sources, CBO used 2015 data from the Internal Revenue Service's Statistics of Income, analogous to the data used in Congressional Budget Office, "The Taxation of Social Security Benefits," *CBO Blog* (February 12, 2015), [www.cbo.gov/publication/49948](http://www.cbo.gov/publication/49948). The patterns in the

To test the sensitivity of the findings to those methodological choices, CBO computes federal income taxes under two alternative specifications: excluding the effect of children on taxes and excluding non-Social Security income sources when calculating income taxes in retirement.<sup>9</sup> The median after-tax replacement rates using those specifications are somewhat higher than the findings shown in this report. For example, for long-career workers born in the 1960s, a median after-tax replacement rate that excludes the effect of children on taxes is 1 percentage point higher than the after-tax rate that includes the effect of children. When federal income taxes are computed without an adjustment for children and without including retirement income

---

taxation of benefits in this report are broadly consistent with the findings in that publication. (Because the findings in that publication are primarily based on cross-sectional data, whereas the analysis in this report is based on panel data, the two sets of results are not directly comparable.)

9. Accounting for children could have a substantial effect on both before-tax and after-tax replacement rates. For simplicity, in this report, CBO does not include children when applying the adjustment for household size to preretirement earnings and does not include child benefits when computing household-level benefits. If, in the computation of preretirement earnings, household size was adjusted for children, the resulting after-tax replacement rates based on initial shared benefits and the last 20 years of shared earnings would be about 5 percentage points higher than the rates that account for children in the computation of taxes but not in the computation of earnings. For a brief discussion of the effect of children on replacement rates, see Congressional Budget Office, *Measuring the Adequacy of Retirement Income: A Primer* (October 2017), [www.cbo.gov/publication/53191](http://www.cbo.gov/publication/53191).

besides Social Security benefits, the resulting after-tax replacement rate is 5 percentage points higher than when those factors are included (see Figure A-1).

### How CBO's Analytical Approach Compares With That of the Office of the Chief Actuary at the Social Security Administration

The Office of the Chief Actuary (OCACT) at the Social Security Administration has been projecting Social Security replacement rates for hypothetical workers since 1989.<sup>10</sup> Although the OCACT's analytical method differs from the approach CBO used for this report, the OCACT's and CBO's replacement rates would be similar if computed for workers with similar average earnings and using the same specifications of numerators (benefits) and denominators (earnings).

The OCACT produces replacement rates for five types of hypothetical workers characterized by their career-average earnings: very low, low, medium, high, and earnings at the taxable maximum level.<sup>11</sup> (Career-average earnings are defined

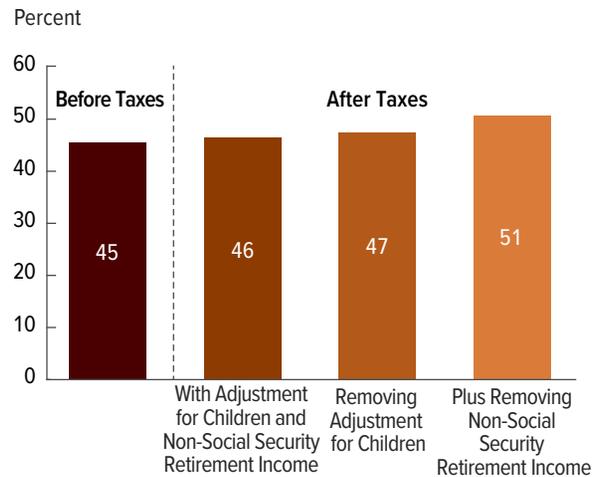
---

10. For the OCACT's most recent projected replacement rates, see Social Security Administration, Office of the Chief Actuary, "Replacement Rates for Hypothetical Retired Workers," Actuarial Note 2018.9 (June 2018), [www.ssa.gov/OACT/NOTES/ran9/an2018-9.pdf](http://www.ssa.gov/OACT/NOTES/ran9/an2018-9.pdf) (137 KB).

11. The taxable maximum is the maximum amount of annual earnings to which the payroll tax is applied (\$128,400 in 2018). The taxable maximum increases annually with average earnings; in years without a cost-of-living adjustment (as in 2010, 2011, and 2016), the taxable maximum does not increase. The taxable maximum does not decrease when average wages decline.

Figure A-1.

### Sensitivity of Shared After-Tax Replacement Rates for Long-Career Workers Born in the 1960s to Alternative Specifications of Federal Income Taxes



Source: Congressional Budget Office.

For this figure, replacement rates were computed using initial shared benefits if claimed at age 65 and the last 20 years of shared price-adjusted earnings, including years with no or very low earnings. The sample used is the same as that used for Exhibit 11.

The after-tax replacement rates shown here account for federal income taxes only. After-tax replacement rates that included a tax adjustment for children and non-Social Security income were computed in the same way as in Exhibit 11: A tax adjustment for children was made when taxes on preretirement earnings were computed, and an imputation of other retirement income was made when income taxes on benefits were computed.

Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

as the average of the highest 35 years of earnings, adjusted for growth in average wages to the year before the worker retires.) The OCACT constructs hypothetical earnings histories using scaled factors that are applied to the average wage index in each year. Those scaled factors are based on the average work and earnings of a sample of actual insured workers. The final earnings patterns are adjusted so that the career-average earnings levels for the hypothetical workers are set at 25 percent, 45 percent, 100 percent, and 160 percent of the AWI for the hypothetical workers with very low, low, medium, and high earnings, respectively. (For the hypothetical worker with earnings at the taxable maximum level, career-average earnings are about 250 percent of the average wage index.)<sup>12</sup>

In this report, CBO shows projected median Social Security replacement rates for a sample of long-career workers. CBO begins its analysis with a sample of real, rather than hypothetical, U.S. workers, uses the earnings histories for those workers until 2013, and simulates their earnings for years beyond 2013 on the basis of various demographic characteristics and projected trends.<sup>13</sup> Using those

earnings, CBO then computes median values for replacement rates for the sample as a whole and by the quintile of shared lifetime earnings to reflect the distribution of replacement rates. (Shared lifetime earnings are defined as the present value of inflation-adjusted shared earnings over a lifetime. A quintile is a division of the sample into one of five groups ranked according to those earnings.)

In this appendix, CBO illustrates how the earnings of the OCACT's hypothetical workers and the sample of long-career workers analyzed in this report compare with the AWI (see Figure A-2). To make the comparison, CBO computes a measure of the highest 35 years of wage-indexed earnings—a measure similar to the OCACT's career-average earnings—for workers born in the 1960s, showing the median findings within each quintile of shared lifetime earnings.<sup>14</sup> (The quintiles used in Figure A-2 are the same as those used throughout the report.)

12. For additional information about the OCACT's scaled factors, see Social Security Administration, Office of the Chief Actuary, "Scaled Factors for Hypothetical Earnings Examples Under the 2018 Trustees Report Assumptions," Actuarial Note 2018.3 (June 2018), [www.ssa.gov/OACT/NOTES/ran3/an2018-3.pdf](http://www.ssa.gov/OACT/NOTES/ran3/an2018-3.pdf) (152 KB).

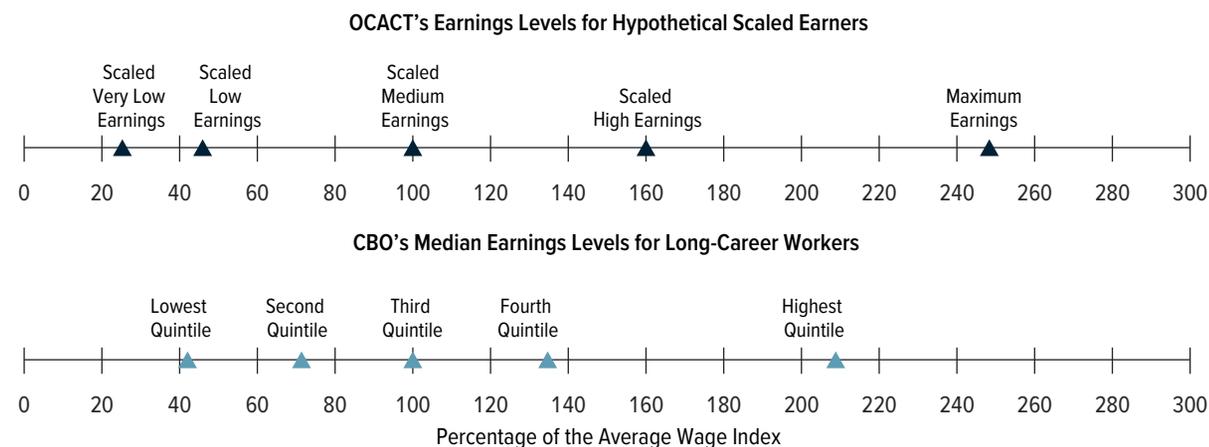
13. Although CBO uses age 65 as the hypothetical age for claiming benefits in the single-year analysis, that choice yields replacement rates that are similar to those based on the projected age of claiming. (The projected age of claiming is the age at which CBO's long-term model projects a future beneficiary would first claim benefits on

the basis of his or her work history and other individual characteristics.) The advantage of holding the age of claiming constant at a hypothetical age is that it takes out the effect of changes in average claiming patterns. See Appendix B for a comparison of replacement rates that are based on the hypothetical and projected ages of claiming.

14. Although CBO's measure of career-average earnings comes close to the OCACT's measure, several small differences remain. For example, the OCACT uses earnings from age 21 through age 64 for its calculation, whereas CBO uses earnings from age 16 through age 61. The OCACT indexes earnings to the year before retirement (the age of retirement is 65 in this example), whereas CBO indexes earnings to age 65.

Figure A-2.

### Comparison of Earnings Levels for Long-Career Workers With OCACT's Hypothetical Scaled Workers in the 1960s Cohort



Source: Congressional Budget Office, using data from Social Security Administration, Office of the Chief Actuary.

The OCACT's earnings levels for hypothetical scaled workers are taken from Social Security Administration, Office of the Chief Actuary, "Replacement Rates for Hypothetical Retired Workers," Actuarial Note 2018.9 (June 2018), <https://www.ssa.gov/OACT/NOTES/ran9/an2018-9.pdf> (137 KB). Scaled workers are hypothetical workers whose annual earnings are obtained by multiplying the average wage index by the scaled factors in corresponding years. Maximum earnings reflect earnings at the taxable maximum amount at each age.

CBO's median earnings levels for long-career workers reflect the highest 35 years of wage-adjusted individual earnings for workers born in the 1960s and the average wage index for 2018. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

OCACT = Office of the Chief Actuary of the Social Security Administration.

Overall, median earnings in CBO's five quintiles of lifetime earnings reflect a tighter range of earnings levels. Nonetheless, that range is roughly comparable with the range of earnings of the OCACT's five types of hypothetical workers. For CBO, the median earnings of the groups range

from approximately 40 percent of the AWI to nearly 210 percent of the AWI. The OCACT's scaled workers reflect a range from 25 percent of the AWI to about 250 percent of the AWI.

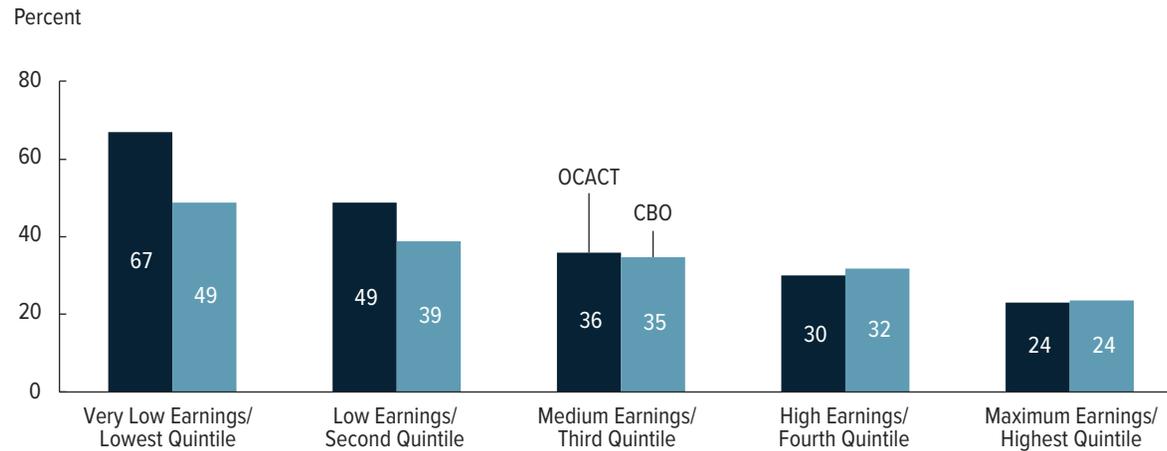
The differences between the earnings levels of the hypothetical workers in the OCACT's analysis and the median values within quintiles of lifetime earnings in CBO's analysis lead to differences in estimated replacement rates. To illustrate those differences, CBO presents findings from a configuration of replacement rates that closely resembles a specification used by the OCACT (see Figure A-3). Specifically, for the numerator, CBO uses a hypothetical retired-worker benefit that is based on the assumption that benefits are claimed at age 65; for the denominator, CBO uses the highest 35 years of wage-adjusted earnings.

Because the long-career workers in CBO's analysis tend to have higher earnings than workers in the overall population, CBO's projections of median earnings in the bottom two quintiles of shared lifetime earnings are higher than the OCACT's earnings levels for hypothetical workers with very low and low earnings. Consequently, CBO's median replacement rates for the bottom two quintiles are lower than the OCACT's replacement rates for hypothetical workers with very low and low earnings because of the progressive nature of the Social Security benefit formula, which means that the ratio of benefits to earnings is lower for people with higher average earnings than for people with lower average earnings.

CBO's median earnings levels for the top two quintiles of lifetime earnings are lower than the OCACT's earnings levels for hypothetical workers with high earnings and earnings at the taxable maximum. Consequently, CBO's median replacement rates are higher than the respective rates produced by the OCACT. (For the top quintile,

Figure A-3.

### Replacement Rates for OCACT's Hypothetical Workers and CBO's Long-Career Workers Born in the 1960s, Using Wage-Adjusted Earnings



Source: Congressional Budget Office, using data from Social Security Administration, Office of the Chief Actuary.

OCACT replacement rates reflect benefits if claimed at age 65 and career-average wage-adjusted earnings for workers born in 1965. Those rates are taken from Social Security Administration, Office of the Chief Actuary, "Replacement Rates for Hypothetical Retired Workers," Actuarial Note 2018.9 (June 2018), <https://www.ssa.gov/OACT/NOTES/ran9/an2018-9.pdf> (137 KB).

CBO's median replacement rates reflect initial benefits, if claimed at age 65, and the average of the highest 35 years of wage-adjusted earnings for workers born in the 1960s. CBO's replacement rates were computed for all individuals who were eligible to claim retirement benefits at age 62 and who were not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded. All values are before taxes.

OCACT = Office of the Chief Actuary of the Social Security Administration.

CBO's median replacement rate is 24.4 percent; the OCACT's replacement rate for a worker with maximum earnings is 23.7 percent.) The earnings for the middle quintile of shared lifetime earnings in CBO's projections are similar to those of the OCACT's hypothetical worker with medium earnings, resulting in similar replacement rates. Despite the differences in the analytical approaches, the OCACT's and CBO's replacement rates are roughly comparable for similar earnings levels and specifications of numerators and denominators.

## Sensitivity of Findings to Certain Analytical Choices

In calculations of Social Security replacement rates, the findings are highly sensitive to the specification of the numerator (benefits) and the denominator (earnings), as demonstrated in Exhibits 6 and 7 of this report. In addition, the measures of Social Security benefits that the Congressional Budget Office developed for the report are sensitive to certain choices the agency made. In this appendix, CBO presents findings using benefit measures that are based on four alternative analytical choices.<sup>1</sup> Those include:

- Using a higher threshold for meeting basic needs in retirement than 100 percent of the official federal poverty threshold,
- Using a projected age for claiming retired-worker benefits in the computation of initial replacement rates rather than a hypothetical age of 65,
- Using alternative methods to account for differences in spouses' projected claiming ages, and

- Using a traditional shared-earnings approach to account for household size rather than adjusting for economies of scale within the household.

In evaluating whether Social Security benefits enable beneficiaries to meet their basic needs in retirement, the findings are highly sensitive to the choice of the basic needs threshold. Initial shared benefit measures are also sensitive to the way in which differences in spouses' projected claiming ages are treated. In contrast, multiyear shared benefit measures are considerably less sensitive to the differences in spouses' claiming ages.

Certain analytical choices do not have a significant impact on the results. Those include whether to use benefit amounts at the hypothetical claiming age of 65 or at the projected claiming age in the computation of retired-worker replacement rates and whether to adjust the findings to reflect economies of scale in the computation of initial shared replacement rates.

### Basic Needs Threshold

To demonstrate the sensitivity of findings to alternative measures of basic needs, CBO projected the percentage of workers with initial retired-worker benefits that are below a specified multiple of

the official federal poverty threshold. (Additional results based on different multiples of the threshold are included in the supplemental data and interactive tool that accompany this report.)

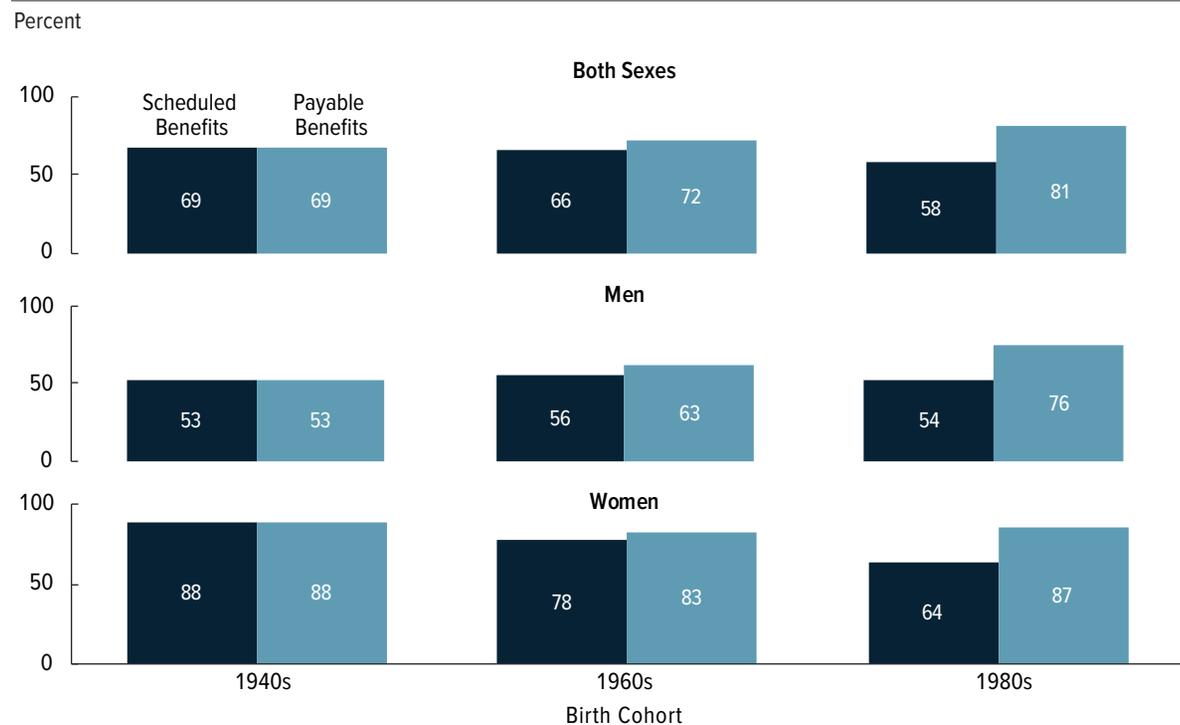
Although the analysis that is based on 100 percent of the federal poverty threshold shows that the vast majority of long-career workers have initial worker benefits that exceed the poverty threshold (as shown in Exhibit 1), increasing that threshold to 200 percent reveals that most of those workers have benefits that are below the higher threshold (see Figure B-1).<sup>2</sup> More than four times as many workers born in the 1940s have benefits that fall below 200 percent of the poverty threshold than 100 percent of the threshold. Among women, nearly 90 percent of workers born in the 1940s have retired-worker benefits that fall below the higher threshold, whereas about 26 percent of those workers have benefits below the lower threshold.

1. Additional alternative specifications are shown in the supplemental data posted on CBO's website along with this report at [www.cbo.gov/publication/55038](http://www.cbo.gov/publication/55038).

2. In 2018—the most recent year for which Census poverty thresholds are available—the poverty threshold for one person age 65 or older was \$12,043, and the threshold for two people was \$15,178.

Figure B-1.

**Percentage of Long-Career Workers With Initial Individual Benefits Below 200 Percent of the Poverty Threshold**



Source: Congressional Budget Office.

The basic needs threshold used in this figure is 200 percent of the official federal poverty threshold for one person age 65 or older, adjusted for growth in prices over time.

Initial individual benefits are based on the assumption that workers first claim benefits at age 65. Benefits are computed for all people who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. All benefit amounts are before taxes. Scheduled benefits are benefits as calculated under the Social Security Act, regardless of the balances in the trust funds. Payable benefits are benefits as calculated under the act, reduced as necessary to ensure that outlays do not exceed the Social Security system’s revenues once the balances in the combined trust funds are exhausted, which is projected to occur in 2031.

Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

**Retired-Worker Benefits at the Hypothetical Claiming Age of 65 Versus the Projected Claiming Age**

The majority of the exhibits in this report show Social Security benefit measures that are based on the assumption that benefits are first claimed at the hypothetical age of 65. However, it is also informative to look at replacement rates that are based on projected claiming patterns. (The projected age for claiming benefits is the age at which CBO’s long-term model projects a future beneficiary would first claim benefits on the basis of his or her work history and other individual characteristics.)

Historically, a substantial share of eligible retired workers has claimed benefits at one of two ages: the earliest eligibility age (EEA) or the full retirement age (FRA). Although the EEA has remained constant at 62 (for people born in 1899 and later), the FRA has been rising over time. Under current law, for workers born before 1938, the FRA is 65. For workers born between 1938 and 1943, the FRA increases by two months for each successive birth year, until it reaches 66 for people born in 1943. The FRA remains at 66 for workers born between 1943 and 1954, and then, starting with people born in 1955, it increases by two months for each successive birth year, until it reaches 67 for people born in or after 1960.

About one-third of eligible workers born in the 1940s are estimated to have claimed benefits at the EEA, and less than one-fifth are estimated to have claimed benefits at the FRA. Historically, however, labor force participation at older ages has been

increasing, and the average age at which benefits are first claimed has been rising.<sup>3</sup> For workers born in the 1980s, CBO projects that less than a quarter of eligible workers will claim benefits at the EEA, whereas about one-third will claim benefits at the FRA.

Consequently, for long-career workers born in the 1940s, replacement rates that are based on benefits being claimed at a projected age (which averages a bit less than 65) are slightly lower than the rates based on benefits being claimed at the hypothetical age of 65. For example, for workers born in the 1940s, median replacement rates based on the last 20 years of earnings and benefits at the projected age of claiming are about 2 percentage points lower than the rates based on benefits claimed at the hypothetical age of 65 (see Table B-1). In contrast, with scheduled benefits, for workers born in the 1980s, the median replacement rate based on a projected claiming age is slightly higher than the replacement rate based on the hypothetical age of 65 but considerably lower than the replacement rate based on hypothetical claiming at the FRA. That finding is a result of workers in the 1980s cohort remaining in the labor force longer and claiming benefits at later ages than those in the 1940s cohort; however, because a substantial share of workers are expected to continue to claim benefits before the FRA, projected replacement

3. For more information, see Alicia H. Munnell and Anqi Chen, *Trends in Social Security Claiming*, Issue Brief 15-8 (Center for Retirement Research at Boston College, May 2015), <http://crr.bc.edu/briefs/trends-in-social-security-claiming/>.

Table B-1.

### Median Initial Replacement Rates for Long-Career Workers, Using Different Numerators and the Last 20 Years of Earnings, Including Years With No or Very Low Earnings

10-Year Birth Cohort	Hypothetical Benefit at FRA		Hypothetical Benefit at Age 65		Benefit at Projected Claiming Age		Hypothetical Benefit at Age 62	
	Scheduled	Payable	Scheduled	Payable	Scheduled	Payable	Scheduled	Payable
	Percent							
Both Sexes								
1940s	48	48	46	46	44	44	37	37
1960s	50	45	44	41	43	40	35	35
1980s	54	39	47	34	48	37	38	27
Men								
1940s	46	46	43	43	41	41	35	35
1960s	48	42	41	39	41	38	33	33
1980s	53	38	46	33	48	37	37	27
Women								
1940s	51	51	49	49	48	48	39	39
1960s	53	48	46	44	45	42	37	37
1980s	55	40	48	34	47	37	39	28

Source: Congressional Budget Office.

For this table, individual replacement rates are computed under four alternative choices for individual benefits (numerators): the hypothetical benefit if claimed at the full retirement age (FRA), the hypothetical benefit if claimed at age 65, the benefit at the projected claiming age, and the hypothetical benefit if claimed at age 62.

Scheduled benefits are benefits as calculated under the Social Security Act, regardless of the balances in the trust funds. Payable benefits are benefits as calculated under the act, reduced as necessary to ensure that outlays do not exceed the Social Security system's revenues once the balances in the combined trust funds are exhausted, which is projected to occur in 2031.

The earnings measure (the denominator) is based on the last 20 years of any individual price-adjusted earnings, including years with no or very low earnings. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

rates do not reach the hypothetical rates based on benefits being claimed at the FRA.

Overall, replacement rates based on benefits being claimed at the hypothetical age of 65 provide a reasonable alternative to replacement rates based on the projected claiming age, while offering the advantage of taking out the effects of changes in average claiming patterns over time.

### Accounting for Differences in Spouses' Projected Claiming Ages When Computing Shared Benefit Measures

Although shared benefits that are based on the hypothetical claiming age of 65 provide a simple approximation for household-level benefits, they do not capture observed benefit-claiming patterns among spouses. For the initial shared benefit measures shown in this report, CBO summed all retired-worker benefits as well as any spousal or survivor's benefits that both the worker and his or her spouse would be eligible to receive at the hypothetical claiming age.<sup>4</sup> However, many married long-career workers do not claim benefits in the same year that their spouses do. In

4. For example, for a married worker, the shared benefit at the hypothetical age of 65 is the sum of retired-worker benefits and any spousal benefits, if applicable, that both the worker and his or her spouse could receive if each claimed at age 65 (adjusted for economies of scale and household size). If the worker is older or younger than the spouse, that measure would sum benefits from different calendar years, applying the appropriate price adjustment to keep benefits in constant dollars. The main advantage of that approach is its conceptual simplicity. However, it is important to note that the resulting benefit amount reflects the hypothetical shared benefit when both the worker and the spouse receive benefits together.

some cases, one person may claim retired-worker benefits while the spouse does not and continues to work or relies on other income sources that are not projected in CBO's long-term model. When the spouse ultimately claims benefits, the person who claimed first can apply for spousal benefits, if eligible, resulting in that person's getting a larger benefit than the retired-worker benefit he or she received when benefits were first claimed. Thus, the total benefit amount received by the worker and his or her spouse can change substantially after the first year in which benefits were received.

For computing multiyear shared benefits in this report, CBO defines shared benefits at the projected claiming age as benefits in the first year in which either the worker or the spouse receives benefits. Considering that the other member of a two-person household often continues to work, applying an adjustment for household size to one person's benefit could significantly understate the resources available to the married couple in that year as the other spouse's ongoing earnings would not be included. Therefore, in CBO's calculations, an adjustment for household size (or economies of scale) is not made when only one member of a two-person household receives a benefit.

Because initial replacement rates that are based on the projected age of claiming are sensitive to the way in which the difference between spouses' projected claiming ages is treated, the results throughout this report are based on the hypothetical claiming age of 65 for both spouses. In contrast, multiyear replacement rates are considerably less sensitive to alternative treatments: Although the single-year shared benefit at the projected age

of claiming enters the multiyear benefit calculation, the period during which both spouses receive benefits together is generally longer than the initial period when only one spouse receives benefits.

To show the sensitivity of findings to the treatment of the difference between spouses' projected claiming ages, CBO has computed both initial and multiyear shared replacement rates using alternative specifications. For initial rates based on the projected claiming age, CBO has assessed the effects of three alternative approaches:

- First, the agency has constructed initial shared benefits using the first year in which *both* the worker and his or her spouse receive a benefit, if married, rather than the first year that *either* person receives a benefit. Because that alternative specification captures both spouses' benefits, it yields a significantly higher shared benefit at the projected claiming age and, consequently, a higher replacement rate—a 49 percent replacement rate compared with the 35 percent rate that is based on the specification of shared benefits used in this report. (The denominators of the replacement rates are based on the last 20 years of shared earnings, including years with no or very low earnings.) It is important to note, however, that the resulting benefit is not the benefit received in the first year of claiming but rather the benefit received in the first year that both spouses are projected to receive benefits.
- To incorporate years of individual benefits before both spouses receive benefits together, the second approach involves computing

initial shared benefits at the projected claiming age by applying the adjustment for household size and economies of scale in all years in which the worker is married and receives a benefit. That approach implicitly assumes that the spouse who did not claim benefits does not work and does not receive any other income that could be used to help pay his or her share of the household expenses. Because that approach understates resources available to the worker's household, the resulting replacement rate—25 percent—is substantially lower than the 35 percent rate based on the CBO's preferred specification.

- To better adjust for the shared resources and lower per capita living expenses within the household, the third approach involves multiplying the initial benefit by the square root of two when only one spouse has claimed benefits. (When both spouses are projected to receive benefits together, the sum of their benefits is divided by the square root of two.) That approach accounts for economies of scale within a two-person household, which enable a married worker's Social Security benefit to cover a larger share of per-person living expenses than an unmarried worker's benefit. However, that approach also assumes that the spouse who did not claim benefits continues to earn wages or to receive nonwage income that is sufficient to pay his or her share of the household expenses, which is not always the case. Accounting for economies of scale in that way results in a shared replacement rate of 42 percent, which is higher than the 35 percent rate based on CBO's preferred specification.

CBO has computed alternative shared benefit measures for multiyear replacement rates by applying the latter two approaches. Because multiyear benefits tend to include a large share of years when both spouses are receiving benefits, the alternative specifications of shared benefits do not make a substantial difference in the multiyear results. Using the average of the last 20 years of shared price-adjusted earnings as the denominator and the average multiyear benefit computed by applying the adjustment for economies of scale in all the years in which the worker is married yields a shared replacement rate for long-career workers born in the 1960s that is only 1 percentage point lower than the multiyear replacement rate shown in this report—45 percent compared with 46 percent. Using the same denominator and a multiyear benefit computed by augmenting individual benefits in years when only one spouse receives a benefit yields a replacement rate of 48 percent, which is only 2 percentage points higher than the multiyear replacement rate shown in this report.

### **Adjustment for Economies of Scale**

When analyzing Social Security replacement rates, CBO computes shared resources while accounting for both household size and economies of scale. The economies-of-scale adjustment reflects the fact that two spouses generally share expenses for housing, utilities, and other items and therefore need less than twice the income that each person would need if living separately. The square-root adjustment used in this report implies that a married person would need about 30 percent less income than a single person living alone to maintain the same general standard of living. Although an economies-of-scale adjustment is widely used

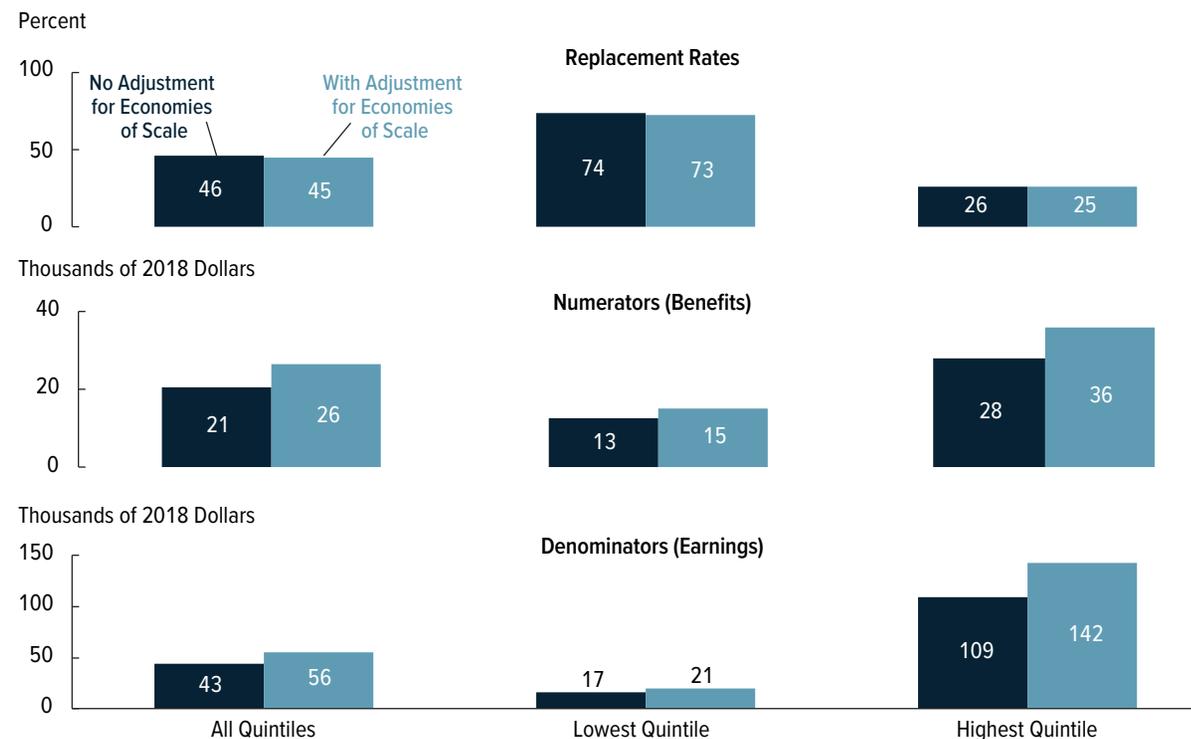
in other settings—to develop the official federal poverty thresholds and the supplemental poverty measure, for instance—a traditional computation of shared resources within a household accounts for household size without adjusting for economies of scale.

The adjustment for economies of scale, while important conceptually, has almost no effect on initial Social Security replacement rates. For example, for workers born in the 1960s, median replacement rates that are based on shared benefits if claimed at age 65 and the last 20 years of shared price-adjusted earnings (including years with no or very low earnings) remain essentially the same with and without the adjustment for economies of scale (see Figure B-2). Removing the adjustment lowers both the numerator and the denominator of the replacement rates, resulting in nearly the same ratio.

For multiyear replacement rates, however, the economies-of-scale adjustment plays a bigger role. When household composition changes over the course of retirement, failing to account for the corresponding changes in economies of scale within the household may produce misleading results. For example, without accounting for economies of scale, median replacement rates for married workers born in the 1960s would increase after widowhood, in contrast with the findings shown in Exhibit 13. Consider a household in which a worker and his or her spouse received a retired-worker benefit of \$1,000 per month and \$800 per month, respectively, resulting in a shared benefit without an economies-of-scale adjustment of \$900. After the spouse dies, the worker would

Figure B-2.

**Difference in Median Initial Shared Replacement Rates for Long-Career Workers Born in the 1960s Resulting From Adjustments for Economies of Scale Within the Household**



Source: Congressional Budget Office.

In this figure, “With Adjustment for Economies of Scale” indicates that a square-root adjustment is applied to account for economies of scale within the household. “No Adjustment for Economies of Scale” indicates that the calculation adjusts for household size by dividing benefits and earnings in each year of marriage by two, rather than the square root of two.

The earnings measure (the denominator) is based on the last 20 years of shared price-adjusted earnings, including years with no or very low earnings. All values are before taxes.

Replacement rates are computed for all individuals who are eligible to claim retirement benefits at age 62 and who are not receiving any benefit at age 61. Long-career workers are workers with 20 or more years of earnings above 10 percent of the average wage index in each year. To limit the focus to individuals with significant attachment to the labor force, workers with fewer than 20 years of earnings are excluded. In addition, workers who receive Disability Insurance benefits are excluded.

receive only his or her own retired-worker benefit of \$1,000. Consequently, the worker’s shared benefit would increase from \$900 before widowhood to \$1,000 after widowhood, causing an increase in his or her replacement rate. In contrast, if the square-root adjustment for economies of scale was applied, the worker’s shared benefits before and after widowhood would be \$1,273 (that is, \$1,800 divided by the square root of two) and \$1,000, respectively, resulting in a decrease in replacement rates in widowhood.



## Definitions

### Types of Benefit Measures Presented in This Report

**Individual Measures:** These measures are generally based on individual earnings and the Social Security benefits that workers can receive on the basis of their own work history. To capture all benefits that retired workers are eligible to receive, the individual measure of benefits can be expanded to include spousal or survivor's benefits that workers can receive on the basis of their spouse's earnings. However, for simplicity, individual measures in this report typically include only retired-worker benefits.

**Shared Measures:** These measures are based on the earnings and Social Security benefits that a worker and his or her spouse can receive, adjusted for economies of scale and household size. In the analysis underlying this report, the Congressional Budget Office applied an economies-of-scale adjustment to account for the lower per-person living expenses in households with two members relative to single-person households and to make the shared benefit measures directly comparable with the individual measures. Specifically, shared earnings are computed as the sum of earnings of both spouses, divided by the square root of two (about 1.4), in each year during the marriage. (In

years when the worker is not married, his or her earnings enter the calculation without the adjustment for economies of scale.) Shared benefits are computed as the sum of all retired-worker, spousal, and survivor's benefits that both the worker and his or her spouse are eligible for on the basis of either of their earnings histories, divided by the square root of two. For example, if the worker is eligible to receive a \$2,000 monthly benefit, and his or her spouse is eligible for a \$1,000 monthly benefit, the worker's shared benefit would equal \$2,121—that is, \$3,000 divided by the square root of two. (Note that the shared benefit credited to the spouse would also be \$2,121, provided that the spouse is an eligible long-career worker who is included in the studied population.) If that worker then becomes a widow or widower, the shared benefit would be reduced to \$2,000.

**Household Measures:** These measures are based on the earnings and Social Security benefits that the worker and his or her spouse are eligible to receive. For this report, household measures differ from shared measures in that the household measures do not include an adjustment for economies of scale or an adjustment for the size of the household. Household measures were used only to compare Social Security benefits of workers with poverty thresholds because those thresholds

already incorporate an adjustment for household size and economies of scale.

**Scheduled Benefits:** Scheduled benefits are benefits as calculated under current law, regardless of the amounts available in the combined Social Security trust funds.

**Payable Benefits:** Social Security benefits are paid from designated Social Security trust funds. Payable benefits are benefits as calculated under current law and reduced as necessary to conform to the limits imposed by the trust funds' balances. If the trust funds' balances declined to zero and current revenues were insufficient to cover benefits specified in law, the Social Security Administration would no longer be permitted to pay full benefits when they were due. The manner in which outlays would be reduced is not specified in law. For this report, CBO assumed that benefits paid to existing and new beneficiaries would be reduced by the percentage necessary to make the program's total annual outlays equal its total available revenues (about a quarter, by CBO's estimate) once the combined trust funds were exhausted. (The combined Social Security trust funds are projected to be exhausted in 2031.)

## Time Spans for Benefit Receipt Used in This Report

**Initial (Single-Year) Measures:** These measures are based on Social Security benefits generally measured at age 65, under the assumption that workers first claim benefits at that age. This is a hypothetical measure of benefits that does not account for variation in the observed timing of retirement and, therefore, does not equal the projected first-year benefit that workers receive. The advantage of holding the age at which benefits are claimed constant at 65 is that it removes the effect of changes in benefit-claiming patterns over time.

**Multiyear Measures:** These measures are based on the average shared benefits received from the first year of projected claiming (which may not be 65) until death, adjusted for changes in prices over time. Although retired-worker benefits remain generally the same over that period, shared measures that incorporate benefits of the workers and their spouses may change. In the construction of multiyear benefit measures, CBO projects all benefits received by retired workers or their spouses from the workers' earliest eligibility age of 62 until death, including spousal and survivor's benefits, if any.

## Benchmarks Used in This Report for Evaluating Benefits

**Official Federal Poverty Threshold:** Researchers who seek to determine how many retirees are able to afford essential living expenses often compare retirement income with the official federal poverty

threshold (or a multiple of the poverty threshold). As defined by the Census Bureau, poverty thresholds vary by family size and composition. If a family's total income is less than the family's corresponding threshold, then that family is considered to be in poverty.<sup>1</sup> In 2018, the poverty threshold for a single person age 65 or older was \$12,043; for two people, it was \$15,178.<sup>2</sup>

**Preretirement Earnings:** Researchers who seek to determine whether retirees would be able to maintain the standard of living they attained before retirement compare retirement income with preretirement earnings, calculating a replacement rate—the amount of income in retirement expressed as a percentage of income before retirement. The analysis described in this report considers only the portion of retirement income that comes from Social Security benefits and the portion of preretirement income that comes from earnings.

## Other Frequently Used Terms

**Social Security Replacement Rate:** The Social Security replacement rate is the amount of Social Security benefits received in retirement, expressed as a percentage of earnings before retirement.

**Shared Lifetime Earnings Quintile:** In this report, CBO describes measures of Social Security

benefits by quintile of shared lifetime earnings, which are defined as the present value of price-adjusted shared earnings over a lifetime. When the sample is divided into five groups that are ranked according to those earnings, a quintile is one of those five groups. (A present value is a single number that expresses a flow of current and future income or payments in terms of an equivalent lump sum received or paid at a specific time. The present value depends on the rate of interest, known as the discount rate, that is used to translate future cash flows into current dollars.)

**Birth Cohort:** A birth cohort is a group of people born in a given period. In this report, CBO projects outcomes for people placed into one of three 10-year birth cohorts: the 1940s cohort (people born between 1940 and 1949); the 1960s cohort (people born between 1960 and 1969); or the 1980s cohort (people born between 1980 and 1989).

**Price-Adjusted Earnings:** Price-adjusted earnings account for inflation and reflect the purchasing power of earnings over time. In this report, CBO uses the price index for personal consumption expenditures as the measure of inflation.

**Wage-Adjusted Earnings:** Wage-adjusted earnings account for changes in the average wage index (AWI) and reflect the increase in workers' average standard of living over time. The AWI is based on compensation subject to federal income taxes and contributions to deferred compensation plans.

1. See Census Bureau, "How the Census Bureau Measures Poverty" (accessed February 22, 2017), <https://go.usa.gov/xRGnv>.

2. See Census Bureau, "Poverty Thresholds" (accessed February 22, 2017), <https://go.usa.gov/xEXMu>.



## About This Document

This Congressional Budget Office report was prepared at the request of the Chairman of the Senate Committee on the Budget. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

Marina Miller of CBO's Health, Retirement, and Long-Term Analysis Division wrote the report with guidance from Julie Topoleski and David Weaver. Ed Harris, Nadia Karamcheva, Noah Meyerson, Kevin Perese, Charles Pineles-Mark, Adam Russell, Kurt Seibert, Michael Simpson (formerly of CBO), John Skeen, and Jeff Werling provided useful comments on various drafts of the report. Jimmy Chin provided fact-checking. In addition, Andrew G. Biggs of the American Enterprise Institute, Peter J. Brady of the Investment Company Institute, Michael D. Clingman and Patrick J. Purcell of the Social Security Administration, and Alicia H. Munnell of the Center for Retirement Research at Boston College provided helpful comments. (The assistance of external reviewers implies no responsibility for the final product, which lies solely with CBO.)

Wendy Edelberg, Mark Hadley, Jeffrey Kling, and Robert Sunshine reviewed the report, Loretta Lettner edited it, and Jorge Salazar prepared it for publication. The report, supplemental data, and an interactive tool are available on CBO's website ([www.cbo.gov/publication/55038](http://www.cbo.gov/publication/55038)).

CBO continually seeks feedback to make its work as useful as possible. Please send any feedback to [communications@cbo.gov](mailto:communications@cbo.gov).

Keith Hall  
Director  
April 2019