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Social Security: Future Financial Status and Accuracy of Projections

August 16, 2023

Congressional Research Service
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R47650

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SUMMARY

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Barry F. Huston
Analyst Social Policy

Social Security: Future Financial Status and Accuracy of Projections

The Social Security program is facing a projected financial shortfall. Under the Social Security Board of Trustees' intermediate assumptions—their best guess as to the future experience—the program will be unable to pay full scheduled benefits sometime in 2034. Said differently, trust fund assets, which have been used in 2021 and 2022 to augment continuing tax revenues, are projected to be depleted in 2034. At that time, the trustees estimate that continuing tax revenues will be sufficient to support about 80% of scheduled benefits.

The Social Security program has faced financial shortfalls before. In the 1970s, adverse economic conditions stressed Social Security's finances. Congress responded by passing the Social Security Amendments of 1977 (P.L. 95-216), which, among other things, decreased projected growth in benefit levels and increased revenues. When passed, the 1977 amendments were projected to correct program imbalances between costs and revenues for about 50 years. However, the trustees' 1980 annual report notified Congress that the Old-Age and Survivors Insurance (OASI) program's finances would not be able to support the payment of full scheduled benefits by early 1982. In the 1980s, as the program's financial status worsened, Congress took many steps to address the issue, such as allowing the OASI program to temporarily borrow from other trust funds. Ultimately, Congress passed the Social Security Amendments of 1983 (P.L. 98-21), which, among other things, decreased benefits, increased revenues, and expanded coverage. The trustees' 1983 annual report noted it was the first time in a decade that Social Security was projected to be in actuarial balance for the entire 75-year projection period (1983-2058).

The inability of the 1977 amendments to provide the projected 50 years of adequate program financing created some skepticism with the trustees' assumptions and their projections for future financial status. In order to avoid this experience, the 1983 legislation used pessimistic assumptions for the short-range time period and intermediate (best estimate) assumptions for the long-range time period. Some skepticism on the projections remains, as evidenced by discussion during an April 2023 House Ways and Means Subcommittee hearing on Social Security.

This report first summarizes the trustees' projections for Social Security's financial status before discussing the accuracy of those projections. The trustees project that the combined trusts funds ratio will fall below 100% in the next 10 years and remain below that level. Additional measures used to assess the program's long-range financial adequacy—annual cash-flow measures and actuarial balance—also reinforce the projections of a future financial shortfall.

Projections are inherently inexact. Some likely sources of projection error are discussed in this report. First, data used to develop most demographic and economic assumptions undergo routine revisions. Second, models used to make projections on the future financial status are enhanced over time. Third, the program itself has changed. For instance, one 1986 legislative change allowed cost-of-living adjustments to be paid during periods of relatively low inflation, a situation that was not permitted under prior law. Another source of inaccuracy is the impact of exogenous events. For example, the projections in the trustees' 2000 annual report could not account for the 2007-2009 recession, the pandemic-induced recession in 2020, or legislative responses to each of those events. Given this, the uncertainty for projections for longer time horizons is higher.

Analysis of past projections in this report reinforces the expectation that relatively longer-term projections are more inaccurate than relatively shorter-term projections. That is, a projection two years into the future is likely to be more accurate than a projection 20 years into the future. Thus, under the current situation in which the value of reserve assets held in the combined trust funds is decreasing, as the program moves closer toward the projected date of reserve depletion, the projections are likely becoming *more* accurate. This is important to Congress for two reasons. First, the increased accuracy of the projections will help indicate the magnitude of the projected shortfall and, therefore, the size of potential legislation that would be needed to eliminate the shortfall. And second, the increased accuracy will help indicate the timing of any proposed legislation.

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Introduction

The Social Security Board of Trustees projects the combined trust funds' assets of the program to be depleted in 2034. After this, the program, barring congressional action, would operate as a *strict* pay-as-you go system than can pay out in benefits only what it receives in revenue. Under current law and the trustees' best estimates, continuing program tax revenue will be sufficient to pay about 80% of scheduled benefits after the asset reserves held in the trust funds are depleted.

As discussed later in this report, the trustees' past 12 annual reports have projected the combined trust funds to be depleted at some point during the 2033-2035 time period. The annual projections rely on a wide range of economic, demographic, and program-specific factors. Economic factors include productivity, price inflation, unemployment, and growth in gross domestic product (GDP); demographic factors include fertility, mortality, and immigration; and program-specific factors include covered and taxable earnings, revenues from the taxation of benefits, and average benefits indexed to growth in average national wages. Assumptions across this wide range of factors are used in models to project the program's future financial status for the short-range and long-range time periods. The most recent 2023 annual report projects the program to fail both the short-range and long-range tests for financial adequacy.

Congress has demonstrated that Social Security's financial status is of high concern. Social Security is commonly referred to as the federal government's largest program in terms of both the number of workers covered (about 183 million in 2023) and the number of beneficiaries (over 66 million in June 2023).[1] Monthly Social Security benefits constitute a substantial portion of income for a large segment of recipients.[2] Recognizing this, past Congresses have introduced a variety of bills to address the program's future financial status.

This report first provides background on the program before it presents Social Security's short-range and long-range actuarial estimates. Next, the report discusses uncertainty in those projections and alternative scenarios provided by the trustees to illustrate the uncertainty of future conditions. Lastly, the report analyzes the accuracy of past projections of the future financial status of the combined trust funds.

Background

Social Security is a self-financing program that provides monthly cash benefits to retired or disabled workers and their family members and to the family members of deceased workers.[3] As of June 2023, there were approximately 66.6 million Social Security beneficiaries. Of those, 52.1 million (78.2%) were retired workers and family members, 8.7 million (13.1%) were disabled workers and family members, and 5.8 million (8.8%) were survivors of deceased workers.[4]

Social Security is financed primarily by payroll taxes paid by covered workers and their employers. Employers and employees each pay 6.2% of covered earnings, up to an annual limit, and self-employed individuals pay 12.4% of net self-employment income, up to an annual limit. The annual limit on taxable

[1] The Social Security program fact sheet estimates that 183 million people will work in Social Security–covered employment in 2023. This is about 94% of all workers. See Social Security Administration (SSA), "Social Security Program Fact Sheet," https://www.ssa.gov/OACT/FACTS/.

[2] For more information, see CRS Report R47341, *Income for the Population Aged 65 and Older: Evidence from the Health Retirement Study (HRS)*.

[3] A person may receive retired-worker benefits and continue to have earnings. However, under certain circumstances, earnings may affect the amount of a person's monthly benefit.

[4] SSA, *Monthly Statistical Snapshot, June 2023*, Table 2. See the latest edition of the *Monthly Statistical Snapshot* at http://www.socialsecurity.gov/policy/docs/quickfacts/stat_snapshot/index.html.

earnings is $160,200 in 2023.[5] Social Security is also credited with tax revenues from the federal income taxes paid by some beneficiaries on a portion of their benefits. In addition, Social Security receives interest income from Social Security trust fund investments. Social Security income and cost are accounted for in two separate trust funds authorized under Title II of the Social Security Act: the Federal Old-Age and Survivors Insurance (OASI) Trust Fund and the Federal Disability Insurance (DI) Trust Fund.[6] This report refers to the separate OASI and DI trust funds on a combined basis as the Social Security trust funds.[7] In 2022, the combined Social Security trust funds (OASDI) had total receipts of $1.22 trillion, total expenditures of $1.24 trillion, and accumulated holdings (assets) of $2.83 trillion.[8]

Annual Reports and Projection Periods

The OASI trust fund and the DI trust fund are overseen by a board of trustees. The board is composed of the Secretary of the Treasury (the managing trustee), the Secretary of Labor, the Secretary of Health and Human Services, the commissioner of Social Security, and two public trustees.[9]

The trustees are required by law to report to Congress annually on the financial status of the Social Security trust funds. Among other duties, Section 201(c)(2) of the Social Security Act requires the trustees to

> [r]eport to the Congress not later than the first day of April of each year on the operation and status of the Trust Funds during the preceding fiscal year and on their expected operation and status during the next ensuing five fiscal years.[10]

While the Social Security Act requires the trustees to report on the projected operations of the Social Security trust funds for a five-year period, the trustees currently report 10-year (short-range) and 75-year (long-range) projections of the financial status of the trust funds. Projections covering 75-year periods first appeared in the 1965 Social Security trustees report.[11]

Although current law does not direct the trustees to perform long-range projections for 75-year periods, all annual reports have used 75 years since the practice was first adopted in 1965.[12] Additionally, statute

[5] The annual limit on covered wages and net self-employment income that is subject to the Social Security payroll tax (the taxable wage base) is adjusted annually based on average wage growth if a Social Security cost-of-living adjustment is payable.

[6] 42 U.S.C. §401.

[7] Under current law, the OASI and DI trust funds cannot borrow from each other when faced with a funding shortfall. The shifting of funds between OASI and DI can be done only with authorization from Congress. In the past, Congress has authorized temporary interfund borrowing among the OASI, DI, and Medicare Hospital Insurance trust funds, as well as temporary payroll tax reallocations between OASI and DI, to deal with funding shortfalls. Most recently, under the Bipartisan Budget Act of 2015 (P.L. 114-74), Congress authorized a temporary reallocation of payroll taxes from the OASI fund to the DI fund for calendar years 2016-2018. Because of such actions, the OASI and DI trust funds are discussed on a combined basis. For more information, see CRS Report R43318, *The Social Security Disability Insurance (DI) Trust Fund: Background and Current Status*.

[8] SSA, "Trust Fund Data," https://www.ssa.gov/cgi-bin/ops_period.cgi.

[9] The public trustees are appointed by the President with advice and consent of the Senate. These positions have been vacant since the 2015 annual report. The Social Security trustees also oversee Medicare's trust funds. See Government Accountability Office, *Social Security and Medicare: Improved Schedule Management Needed for More Timely Trust Fund Reports*, GAO-19-596, July 2019, https://www.gao.gov/assets/gao-19-596.pdf. This report only focuses on the Social Security trust funds.

[10] 42 U.S.C. §401(c)(2).

[11] The 1965 Social Security Advisory Council recommended using a 75-year valuation period because it would generally cover the anticipated period of benefit receipt of workers covered by the system. 1965 Advisory Council on Social Security, *The Status of the Social Security Program and Recommendations for Its Improvement*, 1965, pp. 16-17, http://www.socialsecurity.gov/history/reports/65council/65report.html. For more information on the 75-year period used for long-range projections, see CRS In Focus IF11851, *Social Security Long-Range Projections: Why 75 Years?*

[12] The current chief actuary of the SSA wrote: "The 75-year period encompasses essentially the entire future life span of all current workers and beneficiaries, even the youngest current workers, at the beginning of the 75-year period. It also provides a (continued...)

requires the trustees to include a statement of actuarial status and determine if the trust funds are in *close actuarial balance* (as defined by the trustees and discussed in the sections below on short-range and long-range actuarial estimates).[13] Income rates and cost rates for a valuation period are used to calculate the actuarial balance (discussed below). For this calculation, the trustees define the long-term valuation period to be 75 years, which covers approximately the maximum remaining lifetime for virtually all current Social Security participants (i.e., covered workers and beneficiaries).[14]

Assumptions[15]

In each annual report, the trustees present three alternative sets of assumptions for demographic, economic, and program-specific factors.[16] The *low-cost* set of assumptions represents a future experience that is the most advantageous to the program's financial status. The *high-cost* set of assumptions represents a future experience that is the least advantageous to the program's financial status. As the trustees state: "These alternatives are not intended to suggest that all parameters would be likely to differ from the intermediate values in the specified directions, but are intended to illustrate the effect of clearly defined scenarios that are, on balance, very favorable or unfavorable for the program's financial status."[17] In actual experience, it is unlikely that all demographic, economic, and program-specific factors move in a manner that is either favorable or unfavorable to the program's financial status. Thus, the trustees use the *intermediate* set of assumptions to illustrate their best guess as to the future experience. This report, therefore, focuses on the intermediate set of assumptions.

The Trust Funds

In the context of federal program accounting, a trust fund is an accounting mechanism that allows a program to track revenues and expenses. Additionally, a trust fund provides a means for a program (e.g., Social Security) to hold any accumulated assets—that is, money not immediately needed to pay benefits—for the payment of future benefits.[18]

Under current law, there are two separate trust funds for the Social Security program: (1) the OASI trust fund and (2) the DI trust fund. Monies credited to each trust fund cannot be lent or transferred to the other trust fund without authorization from lawmakers. OASI benefits can be paid only from the OASI trust fund, and DI benefits can be paid only from the DI trust fund.

For the purposes of this report, the trust funds—and other program information—will be considered on a combined, hypothetical basis. Essentially, this suggests that data and measures presented illustrate a

projection period long enough to illustrate the complete and mature effects of past amendments and potential future changes to the Social Security Act." Stephen C. Goss, "Measuring Solvency in the Social Security System," in *Prospects for Social Security Reform*, ed. Olivia S. Mitchell, Robert J. Myers, and Howard Young (Philadelphia: University of Pennsylvania Press, 1997), pp. 16-36, https://repository.upenn.edu/entities/publication/a6096f33-efe8-4d09-aac2-5f2f65d1657b.

[13] 42 U.S.C. §401(c). The definition of *close actuarial balance* has changed over time. Under the current-law definition of *close actuarial balance*, a trust fund must meet the short-range test of financial adequacy (see "Short-Range Actuarial Estimates") and have a trust fund ratio expected to remain above zero throughout the 75-year projection period. Prior to the current law definition (established as part of P.L. 101-508), the test of close actuarial balance required that the summarized long-range income rate be between 95% and 105% of the summarized long-range cost rate. The concept of "closeness" was intended to reflect the uncertainty in long-range projections. Goss, "Measuring Solvency in the Social Security System," p. 25.

[14] 2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, March 31, 2023, p. 247, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf.

[15] A glossary for key terms (e.g., *assumptions*) used in this report is provided in the **Appendix**.

[16] In the annual reports, the low-cost set of assumptions is known as alternative I, the intermediate set of assumptions is known as alternative II, and the high-cost set of assumptions is known as alternative III.

[17] 2023 annual report, p. 20.

[18] For more information, see CRS Report RL33028, *Social Security: The Trust Funds.*

weighted averaged of the two separate funds. Naturally, this implies that most data and measures will be more weighted to OASI, as this program is larger in terms of annual costs, annual income, and asset reserves held in its trust fund. At the end of 2022, the combined value of the trust funds was $2.83 trillion. The OASI trust fund accounted for 95.8% of the combined OASDI trust fund value.[19]

The Office of the Chief Actuary (OCACT)

In practice, the trustees do not perform the modelling functions required to make projections for the status of the trust funds. Rather, that function is performed by SSA's Office of the Chief Actuary.[20] OCACT's mission—including its support for the trustees—is outlined on SSA's organization structure website:

> The Office of the Chief Actuary (OCACT) plans and directs a program of actuarial estimates and analyses pertaining to the SSA-administered retirement, survivors and disability insurance programs and supplemental security income program and to projected changes in these programs. Evaluates operations of the Federal Old-Age and Survivors Insurance Trust Fund and the Federal Disability Insurance Trust Fund; estimates future operations of the trust funds; conducts studies of program financing; performs actuarial and demographic research on social insurance and related program issues; and estimates future workloads. Provides technical and consultative services to the Commissioner, the Board of Trustees of those two Trust Funds, and, as requested, congressional committees. Appears before congressional committees to provide expert testimony on the actuarial aspects of Social Security issues.[21]

Specifically, SSA's organizational manual specifies that OCACT's Office of Long-Range Actuarial Estimates is responsible for planning, directing, and coordinating long-range cost estimates for the retirement, survivors, and disability program (i.e., Social Security) both under current provisions and proposed changes in law or regulation.[22] OCACT's website states that its Office of Long-Range Actuarial Estimates is responsible for estimates for up to 75 years in the future.[23]

Short-Range Actuarial Estimates

For the short-range (10-year) period, the trustees measure the program's financial adequacy using the *trust fund ratio*—that is, the trust fund's asset reserves at the beginning of a year expressed as a percentage of the projected total cost for the year. For instance, a trust fund ratio of 200% indicates that two years of projected benefits could be paid with asset reserves absent any additional income.[24] The trustees state that maintaining a trust fund ratio of at least 100% is a good indication that the trust funds can cover most short-range contingencies.[25] A test of the program's short-range financial adequacy is satisfied if (1) the projected trust fund ratio is at least 100% at the beginning of the 10-year period and remains so for the 10-year period or (2) the ratio is below 100% at the beginning of the 10-year period but is projected to reach at least 100% within five years and remain at least 100% for the remainder of the 10-year period.[26]

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[19] SSA, "Trust Fund Data."

[20] 42 U.S.C. §902(c).

[21] See SSA, *Organizational Structure of the Social Security Administration*, https://www.ssa.gov/org/orgOCACT.htm.

[22] See SSA, *Organizational Structure of the Social Security Administration*.

[23] See SSA, *Organization of the Office of the Chief Actuary*, https://www.ssa.gov/oact/actuaries/organization.htm.

[24] The Congressional Budget Office (CBO) states that the trust fund ratio indicates how much of recipients' annual benefit amounts could be paid from the balance at the beginning of a given year. See CBO, *CBO's 2023 Long-Term Projections for Social Security*, June 2023, https://www.cbo.gov/system/files/2023-06/59184-SocialSecurity.pdf.

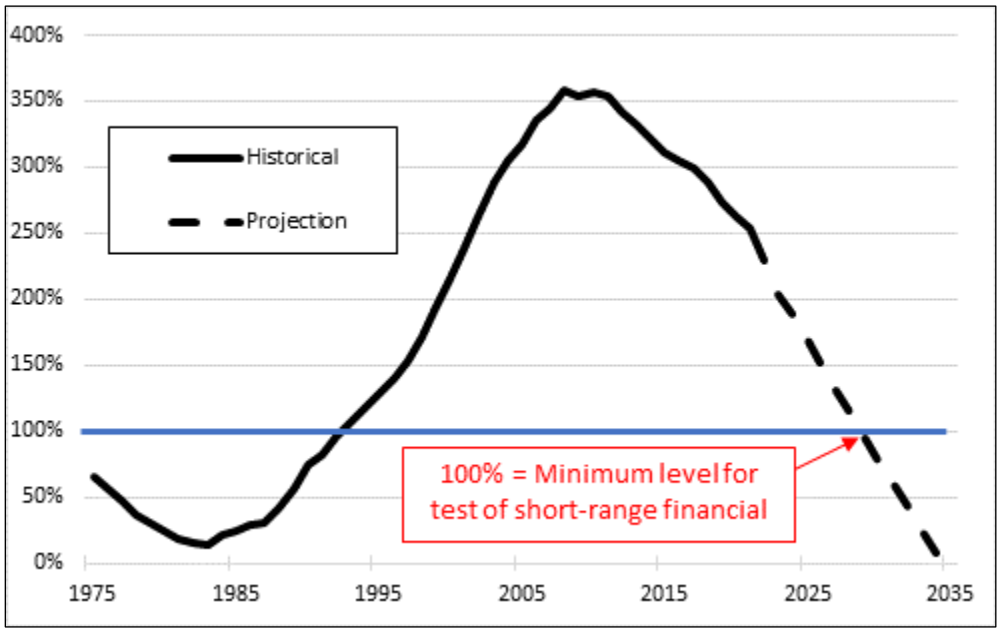
[25] 2023 annual report, p. 11.

[26] 2023 annual report, p. 11.

Figure 1 shows the most recent projections for the trust fund ratio on a combined basis under the intermediate assumptions. The Social Security program does not meet the trustees' criteria for short-range financial adequacy for the current 10-year period. The trust fund ratio is projected to fall below 100% by 2029 and remain below 100% for the remainder of the current 10-year period.[27]

Figure 1. Social Security Trust Fund Ratio, 1975-2035

On a Combined Basis Under the 2023 Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Table IV.A3, pp. 49-50, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and supplemental single-year Table IV.B4, https://www.ssa.gov/OACT/TR/2023/lr4b4.html.

Notes: For comparison purposes, **Figure A-1** includes the Congressional Budget Office's *2023 Long-Term Projection for Social Security*'s estimates for combined trust fund ratios.

Long-Range Actuarial Estimates

For the long-range (75 year) period, the trustees assess the program's financial adequacy using three measures: (1) annual cash-flow measures (i.e., income rates, cost rates, balances); (2) trust fund ratios; and (3) summary measures (i.e., actuarial balances). Cash-flow measures and summary measures are commonly expressed as a percentage of *taxable payroll* or GDP.[28] A test of the program's long-range close actuarial balance is satisfied if (1) the trust fund meets the definition of *short-range financial adequacy* and (2) the trust fund ratio is projected to remain above zero throughout the long-range (75-year) period. As shown in **Figure 1**, the first condition of the test is not satisfied (i.e., the trust fund ratio falls below 100%), nor is the second condition (i.e., the trust fund ratio is projected to remain at 0% throughout the 75-year projection period). The trust fund ratio is projected to fall below 100% in 2029 and fall below 0% (i.e., exhaustion of assets held in the trust funds) in 2034.[29]

[27] 2023 annual report, Table IV.A3, pp. 49-50, and supplemental single-year Table IV.B4, https://www.ssa.gov/OACT/TR/2023/lr4b4.html.

[28] 2023 annual report, p. 12. *Taxable payroll* is a weighted sum of taxable wages and taxable self-employment income.

[29] 2023 annual report, Table IV.A3, pp. 49-50, and supplemental single-year Table IV.B4.

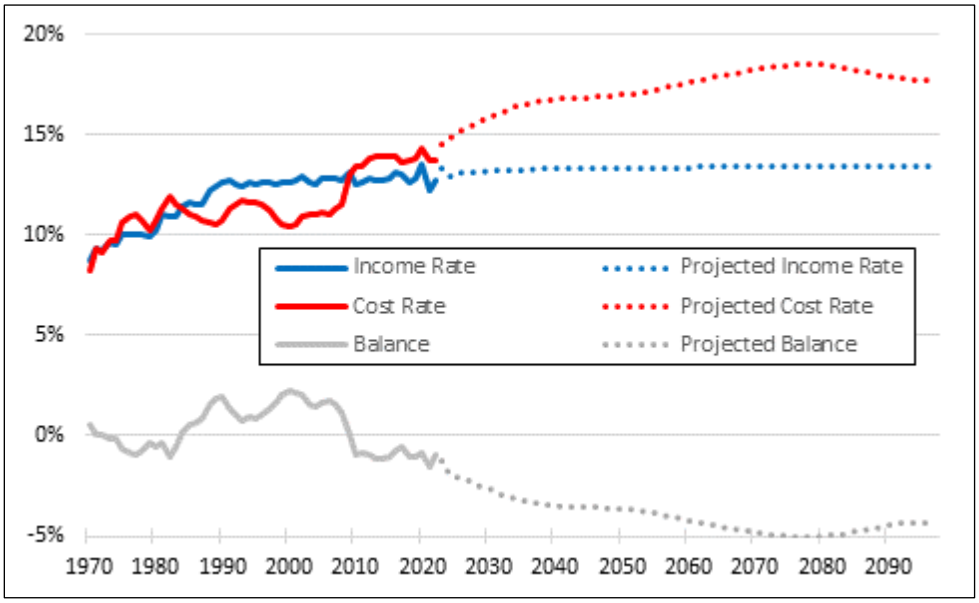
Annual Cash-Flow Measures

Annual cash-flow measures are one set of measures the trustees use to assess the program's long-range financial adequacy. **Figure 2** presents the historical and projected *income rates*, *cost rates*, and *annual balances* as a percentage of taxable payroll under the trustees' intermediate projections.[30] As shown in **Figure 2**, the projected income rate is relatively stable, whereas the projected cost rate is expected to increase until the late 2070s before a relatively small decrease. Although the cost rate is projected to stabilize, and partially decline, for the remainder of the long-range period, it is expected to remain larger than the income rate.

As observed in **Figure 2**, the difference between income and cost rates—or balance—is largely driven by increases in projected costs. The projected income rates, expressed as a percentage of taxable payroll, are relatively more stable than the projected cost rates. Since the income rates are expressed as a percentage of taxable payroll, and the combined Social Security payroll tax is fixed under current law at 12.4% of taxable (i.e., covered) earnings, any remaining variation is caused by assumptions in taxation of benefits. The taxation of benefits is a relatively small portion of income.[31]

Figure 2. Social Security Cash-Flow Measures as a Percentage of Taxable Payroll, 1975-2097

On a Combined Basis Under the 2023 Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 2023, Table IV.B1, p. 56-57, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and supplemental single-year Table IV.B1, https://www.ssa.gov/OACT/TR/2023/lr4b1.html.

Note: For comparison purposes, **Figure A-2** includes the Congressional Budget Office's *2023 Long-Term Projection for Social Security's* estimates for combined income rates, cost rates, and balances.

The trust fund ratio is expected to fall below 0% in 2034. Depletion of the trust fund reserves means that the trust funds could no longer augment continuing income in the payment of scheduled benefits. As shown in **Figure 2**, at the time of projected trust fund depletion, the program's project cost rate exceeds

[30] The *income rate* is the ratio of non-interest income to the taxable payroll for the year, the *cost rate* is the ratio of the cost of the program to the taxable payroll for the year, and the *balance* is the difference between the two rates for the year. 2023 annual report, pp. 241 and 246.

[31] 2023 annual report, p. 59.

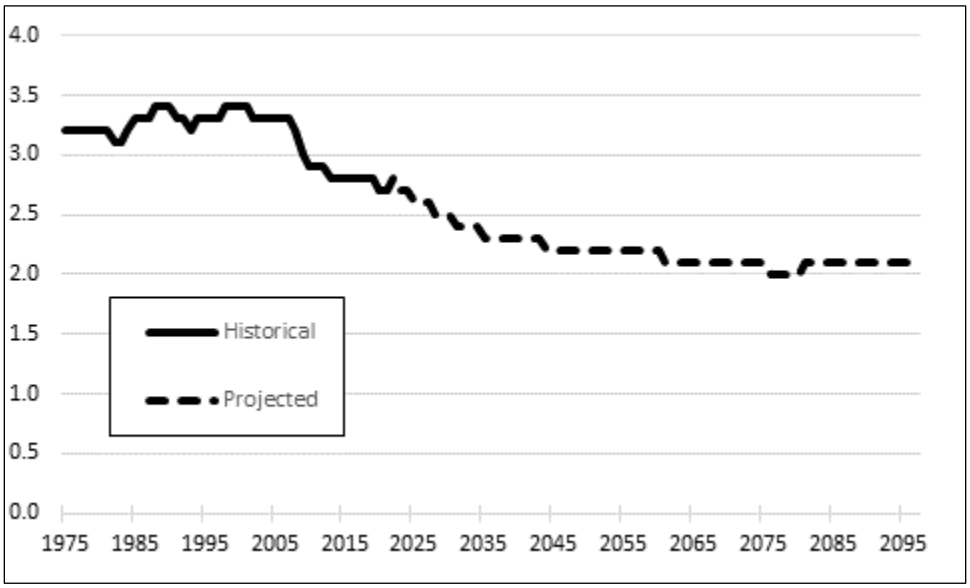
that of its projected income rate. Thus, in 2034, the program is not projected to have sufficient income to support the payment of full scheduled costs (i.e., monthly benefit payments). Under the intermediate assumptions, the trustees project that program income will be sufficient to cover about 80% of scheduled benefits in 2034. (This percentage of payable benefits would fall to 74% by 2097.)[32]

The trustees attribute the projected rising costs to demographic factors: "Under the intermediate assumptions, demographic factors by themselves cause the projected cost rate to rise rapidly for the next two decades."[33] The historical and projected cost rates are, in effect, representative of the age distribution of the Social Security population. As the trustees further state, "The cost rate is essentially the product of the number of beneficiaries and their average benefit, divided by the product of the number of covered workers and their average taxable earnings."[34] To illustrate this relationship, the trustees present the number of covered workers per beneficiary (i.e., the ratio of the number of people paying into Social Security to the number of people getting paid by Social Security).

Figure 3 shows the historical and projected number of covered workers to Social Security beneficiaries under the intermediate assumptions. As can be seen, the decline in this ratio reflects an inverse relationship to the cost rate presented in **Figure 2**. Said differently, the projected increase in the cost rate reflects a projected decrease in the number of covered workers to beneficiaries.

Figure 3. Social Security Covered Workers to Beneficiaries, 1975-2097

On a Combined Basis Under the 2023 Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Table IV.B3, p. 64-65, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and supplemental single-year Table IV.B3, https://www.ssa.gov/OACT/TR/2023/lr4b3.html.

Note: For comparison purposes, **Figure A-3** includes the Congressional Budget Office's *2023 Long-Term Projection for Social Security*'s estimates for the ratio of Social Security–covered workers to beneficiaries.

[32] 2023 annual report, p. 13.

[33] 2023 annual report, p. 13.

[34] 2023 annual report, p. 65.

Summary Measures

The trustees use two summary measures to assess the program's long-range financial adequacy. The first measure is the actuarial balance. The actuarial balance is the difference between the summarized income rate and the summarized cost rate, expressed as a percentage of *taxable payroll*.[35] In this context, the summarized income rate is the ratio of the *present value* of non-interest income to the present value of taxable payroll for the 75-year period.[36] Similarly, the summarized cost rate is the ratio of the present value of cost to the present value of taxable payroll for the 75-year period. Alternatively, the actuarial balance can also be thought of as the summarized balance. That is, the actuarial balance is the sum of the differences between the projected income and projected cost in **Figure 2**, discounted to present values. Or, more simply, it is the difference between the summarized income and cost rates.

Under the 2023 intermediate assumptions, the trustees estimate the actuarial balance to be -3.61 percent of taxable payroll (see **Figure 4**).[37] This measure represents the change in income or cost that would be required to achieve program balance over the 75-year projection period and to achieve a trust fund reserve equal to one year's projected cost by the end of the period (i.e., a trust fund ratio of 100%). For instance, the program being in balance would require program costs to decrease by 3.61% of taxable payroll or program revenues to increase by 3.61% of taxable payroll.

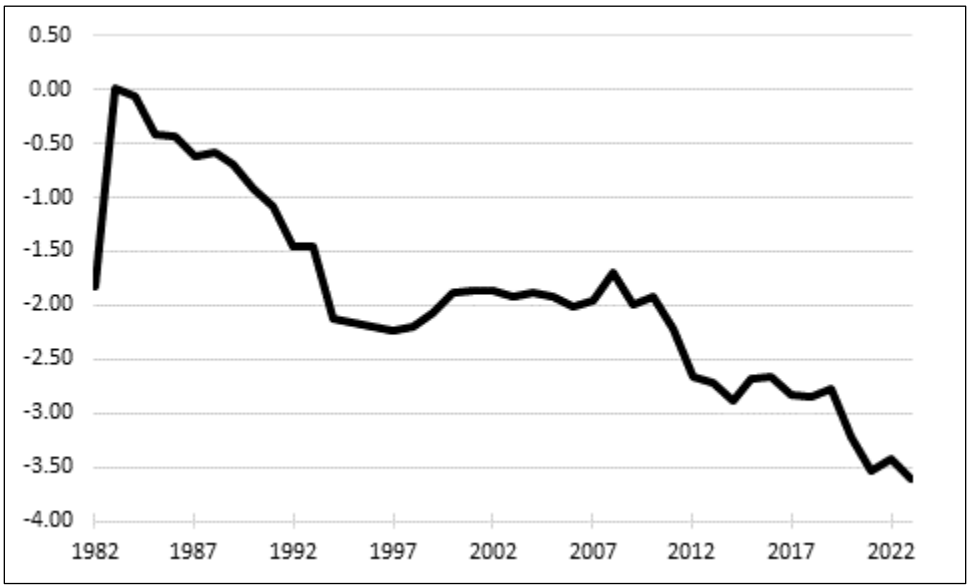
[35] Taxable payroll is the weighted sum of taxable wages and taxable self-employment income. When this sum is multiplied by the OASDI program payroll tax rate, it results in the total amount of payroll taxes. See 2023 annual report, p. 253.

[36] This measure of the cost rate also includes a target trust fund level equal to one year of projected annual cost. The summarized income rate also includes asset reserves on hand at the beginning of a period. The *present value* is the equivalent value, at the present time, of a stream of future values. Present values are discounted using the effective yields on combined trust fund asset reserves. 2023 annual report, pp. 249-252. Alternatively, CBO defines *present value* as a single number that expresses a flow of current and future income (in taxes) or payments (in benefits) in terms of an equivalent lump sum received or paid at a specific time. The value depends on the rate of interest, known as the discount rate, used to translate past and future cash flows into dollars at that time. See CBO, *CBO's 2016 Long-Term Projections for Social Security: Additional Information*, December 2016, https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/52298-socialsecuritychartbook.pdf.

[37] 2023 annual report, p. 17.

Figure 4. Social Security Actuarial Balance as a Percentage of Taxable Payroll, 1982-2023

On a Combined Basis Under the 2023 Intermediate Assumptions



Source: Sharon Chu and Kyle Burkhalter, *Disaggregation of Changes in the Long-Range Actuarial Balance for the Old-Age, Survivors, and Disability Insurance (OASDI) Program Since 1983*, Social Security Administration, Office of the Chief Actuary, March 2023, https://www.ssa.gov/OACT/NOTES/ran8/an2023-8.pdf.

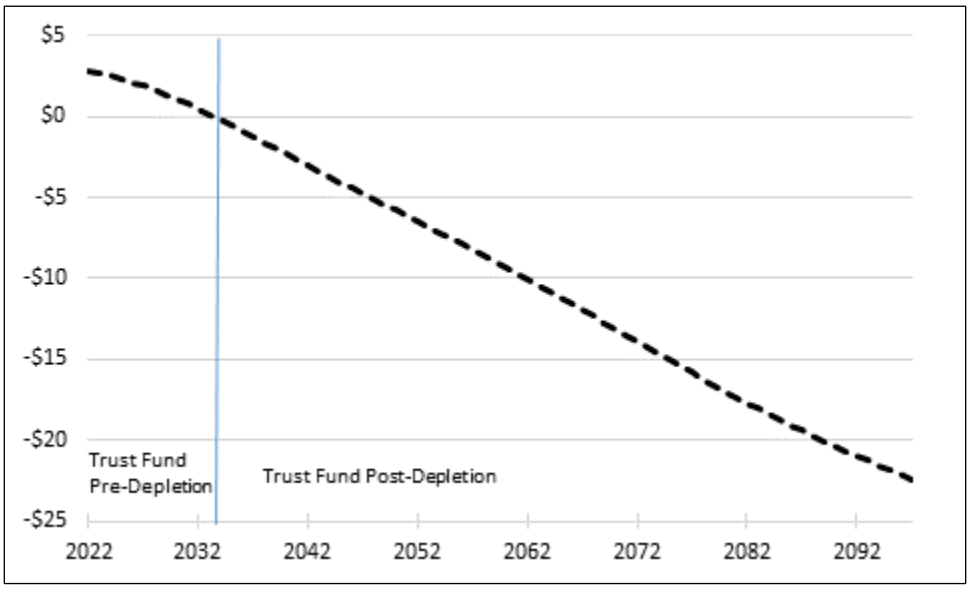
The second measure the trustees use to assess the program's long-range financial adequacy is the cumulative present value of the projected financial shortfall (i.e., program income less cost). A positive measure for this statistic represents a positive trust fund balance, whereas a negative measure for this statistic represents an *unfunded obligation*.[38] As discussed earlier, the value of the trust fund is projected to remain positive through 2033. Under the intermediate assumptions, the trustees project the trust funds to be exhausted sometime in 2034. The trustees state: "Through the end of 2097, the combined funds have a present value unfunded obligation of $22.4 trillion."[39]

[38] The unfunded obligation is a measure of the shortfall of trust fund income to fully cover program cost through a specified date (i.e., 2097) after depletion of trust fund asset reserves. 2023 annual report, p. 254.

[39] 2023 annual report, p. 17.

Figure 5. Cumulative Present Value of the Social Security Projected Financial Shortfall, 2022-2097

Projected on a Combined Basis Under the 2023 Intermediate Assumptions and in Trillions of Dollars



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Figure II.D5, p. 19, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and https://www.ssa.gov/OACT/TR/2023/LD_figIID5.html.

Notes: Present values as of January 1, 2023.

Uncertainty in Projections

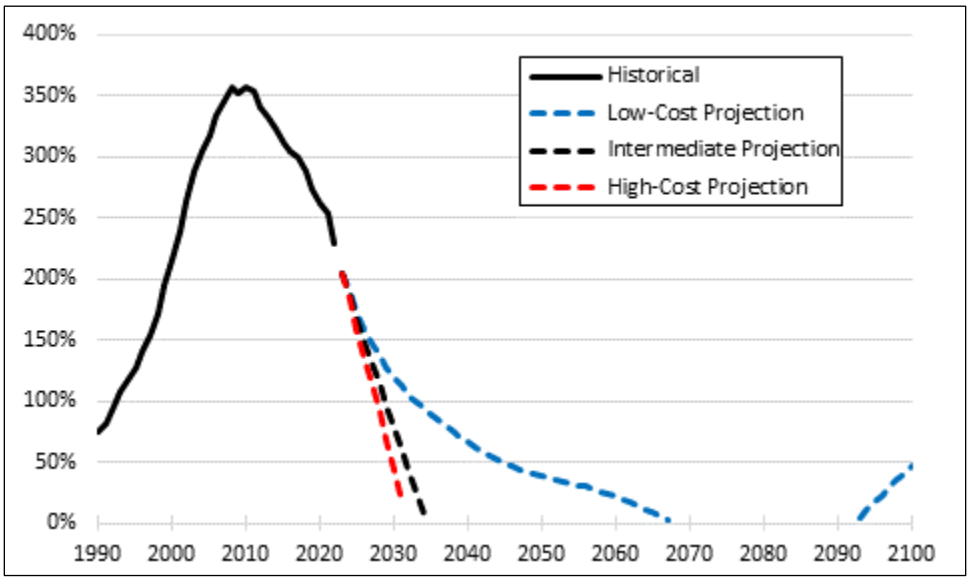
Taken together, **Figure 2**, **Figure 4**, and **Figure 5** show that under the trustees' latest intermediate assumptions, the program's financial adequacy is projected to decline under current law. All projections come with a degree of uncertainty. To help illustrate the uncertainty, the trustees use three different sets of assumptions in their annual reports. For example, **Figure 6** shows the historical trust fund ratio and projected trust fund ratios under the low-cost, intermediate, and high-cost alternative scenarios. As discussed, the intermediate projections represent the trustees' best estimate, while the low-cost and high-cost scenarios help to present a range of possible outcomes. To accomplish this range, assumptions are presumed to all be either advantageous or disadvantageous to the financial position. As the trustees state:

> The low-cost alternative includes a higher ultimate total fertility rate, slower improvement in mortality, higher real wage growth, a higher ultimate real interest rate, a higher ultimate annual change in the CPI [consumer price index], and a lower unemployment rate. The high-cost alternative, in contrast, includes a lower ultimate total fertility rate, more rapid improvement in mortality, lower real wage growth, a lower ultimate real interest rate, a lower ultimate annual change in the CPI, and a higher unemployment rate.[40]

[40] 2023 annual report, p. 19-20. Annual reports do include *sensitivity analyses*. These analyses illustrate the sensitivity to individual assumptions as opposed to the set of assumptions.

Figure 6. Social Security Trust Fund Ratios Under Alternative Scenarios, 1990-2100

On a Combined Basis Under the 2023 Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Figure II.D6, p. 20, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and https://www.ssa.gov/OACT/TR/2023/LD_figIID6.html.

Note: The above figured is replicated on an individual trust fund basis in **Figure A-4**.

While the three sets of long-range projections highlight the uncertainty in these estimates, this approach does not provide any indication of the probability that the future financial status of the trust fund is within or outside the range of these estimates. That is, this deterministic modelling approach does not indicate the likelihood for each set of assumptions.

In order to help assign probabilities to possible outcomes, annual reports include outcomes from 5,000 *stochastic* simulations. The stochastic approach is built on thousands of independent simulations where the values of the assumptions are allowed to vary. The distribution of these simulation outcomes is then used to determine the probability of solvency occurring within a range of years or the probability of key trust fund indicators falling within a particular numerical range. The stochastic results for the combined trust fund ratios are presented in **Figure 7**. The results suggest that, with 95% confidence, the combined trust funds would be exhausted between 2031 and 2040.[41] Furthermore, they suggest that the low-cost and high-cost scenarios are "very unlikely."[42] **Figure 7** shows lines for the 2.5th, 50.0th, and 97.5th percentiles of the estimated annual combined trust fund ratios. For example, the line representing the 2.5th percentile reaches zero in 2031, which indicates that 97.5% of the 5,000 simulations resulted in combined trust fund ratios that remained positive through at least 2031, whereas 2.5% of the 5,000 simulations result in trust fund ratios that reached zero before 2031. Alternatively, the line representing the 97.5th percentile reaches zero in 2040, which indicates that 2.5% of the 5,000 simulations resulted in combined trust fund ratios that remained positive beyond 2040, while 97.5% of the 5,000 simulations resulted in combined trust fund ratios that reached zero before 2040. The line representing the 50th percentile indicates the median combined reserve depletion date (2033). For comparison purposes, the intermediate projection for the

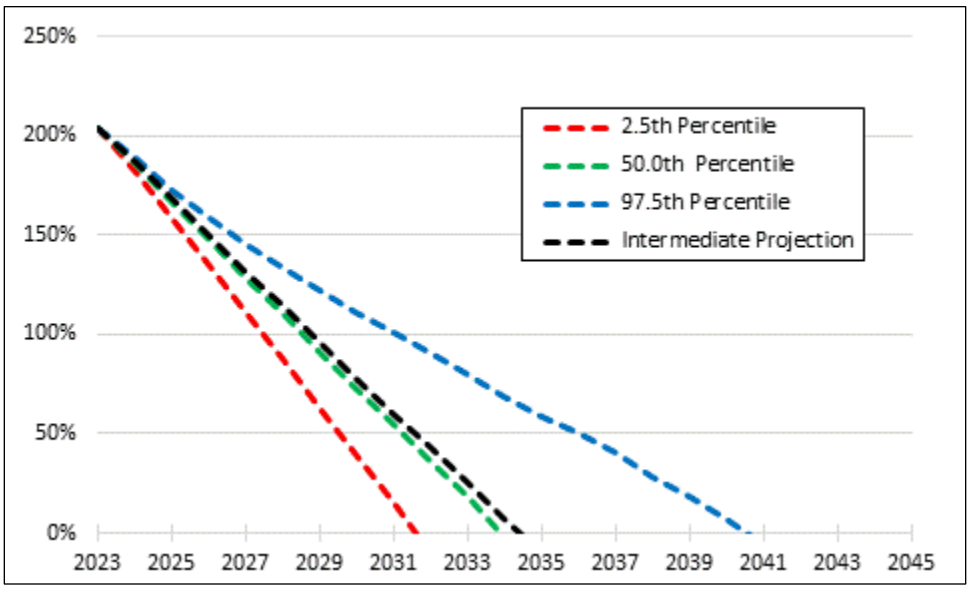
[41] 2023 annual report, Table VI.E1, p. 207.

[42] 2023 annual report, p. 21.

combined trust fund ratio is added to **Figure 7**. Under the intermediate assumptions, the projected date for combined trust fund depletion is "mid-2034."[43]

Figure 7. Projected Social Security Trust Fund Ratios, 2023-2045

Using Stochastic Simulations



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Figure II.D7, p. 22, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and https://www.ssa.gov/OACT/TR/2023/LD_figVIE2.html.

Accuracy of Projections

The accuracy of future projections of Social Security's financial status is unknown. However, the accuracy of some past projections is calculated and presented in this section. For instance, the *actual* trust fund ratio for 2030 is unknown at this point. This value will be published in the eventual 2031 annual report. The actual trust fund ratio for 2020 is known, and (intermediate) projections from prior annual reports can be used to determine how accurately the 2020 trust fund ratio was projected. Moreover, using prior annual reports from 1983 through 2023 allow the projections to be assessed over time. For example, in the 1990 annual report, the intermediate projection for the 2020 trust fund ratio was 30 years in the future, in the 2000 annual report it was 20 years in the future, and in the 2010 annual report it was 10 years in the future. In general, uncertainty increases for projections further in the future. That is, it could be expected that the projections for the 2020 trust fund ratio was more accurate in 2010, less accurate in 2000, and even less accurate in 1990. This report assesses the projection accuracy for selected measures of Social Security's financial status starting with the 1983 annual report.[44]

[43] 2023 annual report, p. 201.

[44] The Social Security Amendments of 1983 (P.L. 98-21) were the last major reforms to the Social Security program. For more information, see CRS Report R47040, *Social Security: Trust Fund Status in the Early 1980s and Today and the 1980s Greenspan Commission*.

Possible Causes of Inaccuracy

This section discusses several, albeit non-exhaustive, possible causes for projection inaccuracy. The annual reports reflect the trustees' understanding at the beginning of a calendar year. For instance, the 2020 annual report was published on April 22, 2020, and the intermediate assumptions reflected the trustees' best guess as to the future experience starting at the beginning of the year. Therefore, the 2020 annual report did not reflect the potential changes from the COVID-19 pandemic (e.g., the pandemic-induced recession).[45] Said differently, the projections reflect a best guess at a specific date. The spectrum of events that may have significant effects on the Social Security program after the specific date of said best guess is unknown. For example, the projections in the 2000 annual report could not account for the 2007-2009 recession, the pandemic-induced recession in 2020, or legislative responses to each of those events. Given this, the uncertainty for projections further into the future is higher.

Although time may be the most obvious source of projection inaccuracy, it is not the only reason. One major source of projection inaccuracy is changes in legislation or regulations. Furthermore, these laws need not change the specific laws and regulations governing Social Security. For instance, the 1991 annual report credits the Immigration Act of 1990 (P.L. 101-649)—a law modifying the general immigration policy—with having a "significant effect" on Social Security.[46] However, there have been changes in law that directly affect Social Security. For instance, as part of the Omnibus Budget Reconciliation Act of 1986 (P.L. 99-509), lawmakers changed the cost-of-living adjustment (COLA) rules to effectively allow COLAs smaller than 3% to be payable. Since then, the change has accounted for 21 annual COLAs that would not have otherwise increased benefits (i.e., program costs).[47] Another source of projection inaccuracy is changes in methods and data collection. For instance, the 2021 annual report highlighted several changes in methods and data that contributed to a change in projected financial status. First, a new fertility model resulted in the ultimate fertility rate being reached 25 years later than projected in the prior year's report. Second, updates to the civilian labor force model to reflect new economic data lowered projected labor force participation rates. Third, updates to the methodology for projecting average benefit levels and Treasury tax information indicated future lower levels of revenue from the taxation of Social Security benefits. In this case, all three changes resulted in a worsening financial status.[48]

Congressional Budget Office and Projection Accuracy

Since 2005, the Congressional Budget Office (CBO) has published its *Long-Term Projections for Social Security*. CBO's estimates use internally developed assumptions and utilize the CBO Long-Term Model,[49] which is used to produce projections for the economy and federal budget that extend beyond CBO's usual 10-year projection period.[50] CBO's assumptions and modeling process generally result in cost projections that are higher than the trustees' annual reports (see **Figure A-2**).[51] This characteristic, among others,

[45] *2020 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, April 22, 2020, p. 1, https://www.ssa.gov/OACT/TR/2020/tr2020.pdf.

[46] *1991 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, May 22, 1991, p. 18, https://www.ssa.gov/OACT/TR/historical/1991TR.pdf.

[47] See SSA, "Cost-of-Living Adjustments," https://www.ssa.gov/oact/cola/colaseries.html.

[48] For more information, see CRS In Focus IF11939, *Social Security: Selected Findings of the 2021 Annual Report*.

[49] For more information on the Congressional Budget Office Long-Term Model, see CBO, *An Overview of CBOLT: The Congressional Budget Office Long-Term Model*, April 2018, https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/53667-cbolt.pdf.

[50] CBO, *An Overview of CBOLT*.

[51] CBO estimates that its assumptions for population (longer life expectancies and higher disability rates), earnings inequality (continued...)

typically results in CBO projecting fewer years until depletion of the asset reserves held in the trust funds (see **Figure A-1**).

The structure of CBO's *Long-Term Projections for Social Security* has changed over time. For instance, many of the measures used to assess short-term and long-term actuarial status of the trust funds (e.g., income and cost rates as a percentage of taxable payroll) did not appear in the annual outlooks until 2015.[52] Given this, CBO's projections are not analyzed in this report. However, in early 2023, CBO evaluated its projections for Social Security outlays and attributed differences between forecasted and experienced costs to "misestimates of future COLAs."[53] Similar to the trustees' estimates, CBO noted that misestimates were generally higher for relatively longer-term projections than for shorter-term projections. Also, the CBO analysis found that their projections were more likely to overestimate than underestimate Social Security outlays.

Measures of Projection Accuracy

For each intermediate projection of income rate, cost rate, worker-to-benefit ratio, and trust fund ratio—the past projections can be measured against historical (actual) values—this report presents and examines three measures of forecast accuracy. The measures are the mean absolute deviation (MAD), mean squared error (MSE), and mean absolute percentage error (MAPE). Although there are many measures of prediction (i.e., projection) error, these three were chosen for their relative simplicity in interpretation.

The MAD is the sum of the absolute differences between the actual value and the projected value, divided by the number of observations. This statistic measures how the projected values have deviated from actual values on average. The lower the MAD, the better the projection accuracy. However, one drawback to using the MAD to assess forecast accuracy is that possible large errors—actual value less projected value—may be averaged out over a larger number of observations.

The MSE helps to add context for this issue. The MSE is the sum of squared differences between actual value and projected value, divided by the number of observations. Because this calculation involves squared error terms, larger differences between actual and projected values have a greater impact than do smaller differences. Similarly, the lower the MSE, the better the projection accuracy. Additionally, the closer the MSE is to the MAD, the less likely relatively large errors were experienced. Conversely, a large difference between MSE and MAD suggests that large errors played a role.

Lastly, the MAPE is calculated as the average of absolute percentage differences between the actual value and projected value. Similarly, a lower MAPE reflects more accurate projections, whereas a higher MAPE reflected less accurate projections. Expressing an error in percentage terms also accounts for the relative size of the projected measure. The formulas for each statistical measure of projection accuracy can be found in **Table 1**.

(lower amount of aggregate covered earnings subject to the payroll tax), lower long-term real interest rates, slower growth in nominal economic output, and differences in analytical approaches account for the difference in the projected actuarial balance as compared to OCACT. For more information see CBO, *CBO's Long-Term Social Security Projections: Changes Since 2017 and Comparisons with the Social Security Trustees' Projections*, December 2018, https://www.cbo.gov/system/files/2018-12/54711-SSProjections-Dec2018.pdf; CBO, *An Overview of CBOLT*; and CBO, *Answers to Questions for the Record*, August 4, 2023, https://www.cbo.gov/system/files/2023-08/59378-soc-sec-qfrs.pdf.

[52] An American Enterprise Institute article contrasted the short-term (three- and five-year) projections of income, cost, and net cash flow for CBO and the trustees' annual reports over the 2011-2021 time period. In this context, the article concludes, "Neither organization is clearly superior in its projection accuracy." Mark Warshawsky, "Trustees v. CBO: Projection Accuracy for Social Security," American Enterprise Institute, August 3, 2023, https://www.aei.org/economics/trustees-v-cbo-projection-accuracy-for-social-security/.

[53] CBO, *An Evaluation of CBO's Projections of Outlays from 1984 to 2021*, April 2023, p. 8, https://www.cbo.gov/system/files/2023-04/58613-Outlays.pdf.

Results

Table 1 shows the three statistical measures—MAD, MSE, and MAPE—for selected intermediate projections for the Social Security financial status. The table includes statistical measures for those where past projections can be measured against actual values: income rate, cost rate, worker-to-beneficiary ratio, and trust fund ratio. Additionally, the statistical measures of projection accuracy are shown by year. That is, accuracy is assessed for projections one year in the future, two years in the future, three years in the future, and so on.

As shown in **Table 1**, the number of observations (i.e., projections) available for analysis decrease further out in the future. This first annual report analyzed is the 1983 annual report, which presented a projected combined trust fund ratio for 2060. However, only that report's projection through 2022 can be assessed with a (now) historical value.[54] The table shows fewer projections for more long-range projections. Also, not all annual reports presented single-year projections. For instance, the 1985 annual report projected a combined trust fund ratio for the next 25-year period and then every five years until projected trust fund exhaustion, whereas the 1986 annual report projected a combined trust fund ratio for the next 10-year period and then every five years until projected trust fund exhaustion. The following discussion will focus on projection accuracy for those projections less than 15 years in the future. (As discussed, the 2023 annual report has projected the combined trust fund depletion in 2034.)

The first set of columns in **Table 1** shows the statistics for the income rate. This report analyzed 40 predictions for income rates one year in the future (e.g., the 1983 annual report's projections for 1984, the 1984 annual report's projections for 1985, etc.). Over these 40 observations, the MAD was 0.10 and the MSE was 0.02. This suggests that the income rate projections one year in the future were relatively close to the actual values and relatively consistent. Since the MSE uses squared error terms, an MSE less than the MAD implies that most of the error terms were less than one. The MAPE for one-year income rate projections was 0.80%. This report analyzed 15 predictions for income rates 14 years in the future (e.g., the 1983 annual report's projections for 1997, the 1984 annual report's projections for 1998, etc.). As one might suspect, the forecast accuracy for the income rate declines the further into the future. Over 15 instances of projections for 14 years into the future, the MAD and MSE were 0.26 and 0.11, respectively. This suggests that income rate projections for 15 years in the future were also relatively close to actual values and relatively consistent (i.e., no large errors). The MAPE for 15-year income rate projections was 2.05%.

The second set of columns in **Table 1** shows the statistics for the cost rate. This report analyzed 40 predictions for cost rates one year in the future. Over these 40 observations, the MAD was 0.17 and the MSE was 0.05. This suggests that the cost rate projections one year in the future were relatively close to the actual values and relatively consistent. The MAPE for one-year cost rate projections was 1.37%. Although this MAPE is relatively higher than the income rate MAPE, it does suggest a relatively high projection accuracy for cost rates one year in the future. As suspected, the forecast accuracy for cost rates declines the further into the future. Over 14 instances of projections for 15 years into the future, the MAD and MSE were 0.63 and 0.49, respectively. This suggests that cost rate projections for 15 years in the future were also relatively close to actual values and relatively consistent (i.e., no large errors). The MAPE for 15-year income rate projections was 4.86%.

Table 1 also shows that the projection errors for the worker-to-beneficiary ratio are relatively small and relatively consistent over time. For instance, over 40 observations for projections one year in the future, the MAD and MSE were 0.03 and 0.00, respectively. As stated previously, a lower MSE than MAD

[54] That year's report did not project a combined trust fund ratio for all years. 1983 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, June 27, 1983, p. 80, at https://www.ssa.gov/OACT/TR/historical/1983TR.pdf.

suggests no large errors. The MAPE for projections one year in the future is also relatively low. As suspected, the projection accuracy is lower for projections 15 years in the future. Over 11 observations for worker-to-beneficiary ratios 15 years in the future, the MAD was 0.12 and the MSE was 0.02. The MAPE for the worker-to-beneficiary ratio 15 years in the future was 4.09%.

Lastly, **Table 1** displays the projection accuracy statistics for the trust fund ratio. Over 40 observations for the ratio one year in the future, the MAD is 3.43 and the MSE is 22.38. For all projection periods, the MSE is larger than the MAD. For the 14 projections for the trust fund ratio 15 years in the future, the MAD is 105.57 and the MSE is 13,402.85. This suggests that for the trust fund ratio projections, the accuracy has been affected by larger errors. Given this, it is not surprising that the MAPE for one year and 15 years in the future is 2.50% and 39.59%, respectively.

Table 1. Statistics of Projection Accuracy for Selected Measures of Social Security Financial Status

Observations (n), Mean Absolute Deviation (MAD), Mean Square Error (MSE), and Mean Absolute Percentage Error (MAPE) for Projections Under Intermediate Projections by Year of Projection

	Social Security Income Rate				Social Security Cost Rate				Social Security Worker-to-Beneficiary Ratio				Social Security Trust Fund Ratio			
Year[a]	n[b]	MAD	MSE	MAPE	n[b]	MAD	MSE	MAPE	n[b]	MAD	MSE	MAPE	n[b]	MAD	MSE	MAPE
1 YR	40	0.10	0.02	0.80%	40	0.17	0.05	1.37%	40	0.03	0.00	0.88%	40	3.43	22.38	2.50%
2 YR	39	0.14	0.04	1.10%	39	0.33	0.21	2.76%	25	0.04	0.00	1.29%	39	7.97	97.61	5.04%
3 YR	38	0.16	0.05	1.23%	38	0.52	0.49	4.29%	24	0.08	0.01	2.67%	38	13.66	260.70	7.94%
4 YR	37	0.15	0.04	1.16%	37	0.67	0.76	5.54%	22	0.08	0.01	2.76%	37	20.27	560.47	10.82%
5 YR	36	0.15	0.04	1.18%	36	0.78	0.96	6.38%	21	0.12	0.02	4.09%	36	27.14	1.027.34	13.45%
6 YR	35	0.15	0.04	1.15%	35	0.86	1.15	6.99%	21	0.13	0.02	4.45%	35	34.80	1.661.21	16.03%
7 YR	34	0.15	0.05	1.21%	34	0.90	1.27	7.33%	20	0.15	0.03	4.98%	34	42.00	2.472.06	18.00%
8 YR	33	0.17	0.05	1.32%	33	0.93	1.33	7.50%	19	0.16	0.03	5.62%	33	49.24	3.391.88	19.81%
9 YR	32	0.18	0.05	1.40%	32	0.92	1.32	7.35%	17	0.18	0.03	6.09%	32	56.31	4.454.03	21.52%
10YR	31	0.19	0.07	1.52%	31	0.91	1.28	7.19%	16	0.18	0.03	6.10%	19	64.16	6.126.33	22.40%
11 YR	18	0.24	0.09	1.88%	18	1.09	1.70	8.16%	16	0.17	0.03	5.88%	18	72.61	8.070.59	25.99%
12 YR	17	0.23	0.09	1.81%	17	0.99	1.44	7.47%	15	0.16	0.03	5.53%	17	81.47	9.194.63	29.57%
13 YR	16	0.23	0.09	1.79%	16	0.91	1.17	6.88%	14	0.14	0.02	4.66%	16	88.56	10.559.40	32.38%
14 YR	15	0.24	0.10	1.91%	15	0.77	0.78	5.87%	12	0.14	0.03	4.85%	15	92.67	12.030.79	34.64%
15 YR	14	0.26	0.11	2.05%	14	0.63	0.49	4.86%	11	0.12	0.02	4.09%	14	105.57	13.402.85	39.59%
16 YR	13	0.26	0.11	2.05%	13	0.59	0.40	4.59%	11	0.11	0.01	3.83%	13	109.38	14.269.08	41.31%
17 YR	12	0.25	0.11	1.96%	12	0.53	0.34	4.20%	10	0.13	0.02	4.57%	12	100.92	13.175.55	39.13%
18 YR	11	0.26	0.12	2.04%	11	0.62	0.54	4.96%	9	0.14	0.02	5.07%	11	100.18	12.632.20	39.46%
19 YR	10	0.24	0.11	1.91%	10	0.77	0.82	6.28%	7	0.20	0.04	7.03%	10	98.70	11.134.67	39.25%
20 YR	9	0.29	0.15	2.26%	9	0.98	1.26	8.00%	6	0.18	0.03	6.53%	9	101.78	9.976.38	40.22%
21 YR	8	0.30	0.15	2.36%	8	1.12	1.58	8.89%	6	0.20	0.03	7.14%	8	98.63	9.162.57	36.88%
22 YR	7	0.20	0.08	1.54%	7	1.24	1.93	9.86%	5	0.20	0.03	7.06%	7	72.57	5,974.50	25.23%

	Social Security Income Rate				Social Security Cost Rate				Social Security Worker-to-Beneficiary Ratio				Social Security Trust Fund Ratio			
Year[a]	n[b]	MAD	MSE	MAPE	n[b]	MAD	MSE	MAPE	n[b]	MAD	MSE	MAPE	n[b]	MAD	MSE	MAPE
23 YR	6	0.18	0.07	1.36%	6	1.34	2.13	10.67%	4	0.15	0.03	5.29%	6	79.83	7,897.50	23.94%
24 YR	6	0.17	0.07	1.32%	6	1.42	2.54	11.28%	3	0.23	0.08	8.47%	6	104.83	11,406.50	31.64%
25 YR	6	0.22	0.08	1.71%	6	1.71	3.55	13.32%	3	0.17	0.04	6.04%	3	118.67	15,926.00	37.57%
26 YR	3	0.33	0.16	2.53%	3	1.67	3.53	12.17%	3	0.17	0.04	6.04%	3	153.33	27,466.00	48.97%
27 YR	3	0.30	0.13	2.28%	3	1.85	4.44	13.52%	3	0.17	0.04	6.04%	3	122.00	22,166.67	37.62%
28 YR	3	0.27	0.10	2.06%	3	1.84	4.76	13.45%	3	0.20	0.05	7.19%	2	136.00	28,100.00	44.87%
29 YR	2	0.27	0.14	2.00%	2	1.13	2.34	8.11%	2	0.35	0.15	12.83%	2	170.00	30,925.00	58.42%
30 YR	2	0.31	0.14	2.27%	2	1.27	2.37	9.05%	2	0.20	0.05	7.34%	2	179.00	32,066.00	62.79%
31 YR	2	0.31	0.14	2.31%	2	1.21	1.98	8.64%	2	0.20	0.05	7.34%	2	238.00	56,669.00	83.83%
32 YR	2	0.31	0.15	2.27%	2	1.51	3.02	10.78%	2	0.20	0.05	7.34%	2	234.00	54,757.00	82.31%
33 YR	2	0.30	0.15	2.23%	2	1.68	3.46	11.98%	2	0.20	0.05	7.34%	1	250.00	62,500.00	95.42%
34 YR	1	0.59	0.35	4.37%	1	0.92	0.85	6.41%	1	0.40	0.16	14.81%	1	231.00	53,361.00	88.17%
35 YR	1	0.53	0.28	3.92%	1	0.95	0.90	6.62%	1	0.40	0.16	14.81%	1	201.00	40,401.00	76.72%
36 YR	1	0.52	0.27	3.85%	1	0.84	0.71	5.85%	1	0.30	0.09	11.11%	1	268.00	71,824.00	102.29%
37 YR	1	0.55	0.30	4.07%	1	1.43	2.04	9.97%	1	0.30	0.09	11.11%	1	276.00	76,176.00	105.34%
38 YR	1	0.56	0.31	4.15%	1	1.59	2.53	11.08%	1	0.30	0.09	11.11%	0	0.00	0.00	0.00%
39 YR	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—
40 YR	0	—	—	—	0	—	—	—	0	—	—	—	0	—	—	—

Source: CRS.

Note: The formulas for the MAD, MSE, and MAPE are shown in the **Appendix**. As shown in the table, the number of projections for each time horizon is not uniform. In some annual reports, projections are shown for individual years over the projection period, in some reports the projections are shown every five years over the projection period, and some reports are mixed (e.g., projections are shown for individual years over the nearest 10-year period and every five years thereafter).

a. This represents the time horizon of the projection.

b. In this analysis, n is used to represent the number of observations analyzed. For instance, since the 1983 annual report, the trustees have made 40 projections for the income rate one year in the future (e.g., the 2000 annual report's projection for 2001). Alternatively, since the 1983 annual report, the trustees have made 15 projections for the income rate 15 years in the future (e.g., the 2000 annual report's projection for 2014).

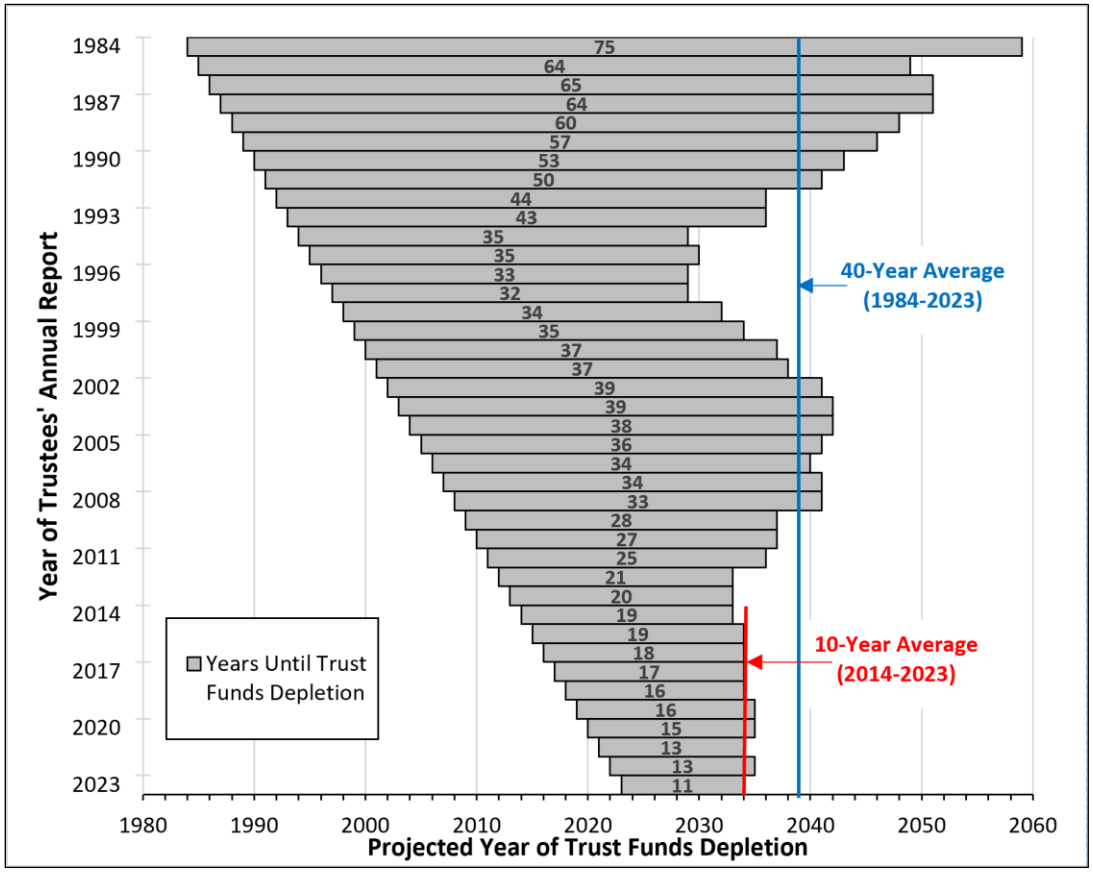
Conclusion

The Social Security system is facing a projected financial shortfall. Under the 2023 intermediate assumptions, the program's financial status fails the trustees' tests for both short-range and long-range financial adequacy. This failure is largely reflective of the program's projected rising costs and the related imbalance between covered workers (i.e., those paying into the system) and beneficiaries (i.e., those receiving payments from the system).

Although uncertainty exists in the magnitude of the projected shortfall, past trustees' projections are shown in this report to be more accurate in the short-run than in the long-run. That is, as the program approaches depletion of the asset reserves held in the trust funds, the projections of the magnitude of the shortfall become more accurate. In the trustees' 2023 annual report, the depletion of trust fund assets results in a *de facto* benefit reduction of about 20%. Additionally, as the program approaches the depletion date, the projections of the date itself become more accurate. As shown in **Figure 8**, the projected year of combined trust fund depletion has become more concentrated on the 2033-2035 window. In the past 10 annual reports, most have projected 2034 as the year for asset depletion.

Figure 8. Projected Years Until Combined Social Security Trust Fund Depletion

Under the Trustees' Intermediate Assumptions, 1984-2023



Source: Congressional Research Service (CRS).

Appendix. Supporting Information

Formulas for Statistical Measures of Projection Accuracy

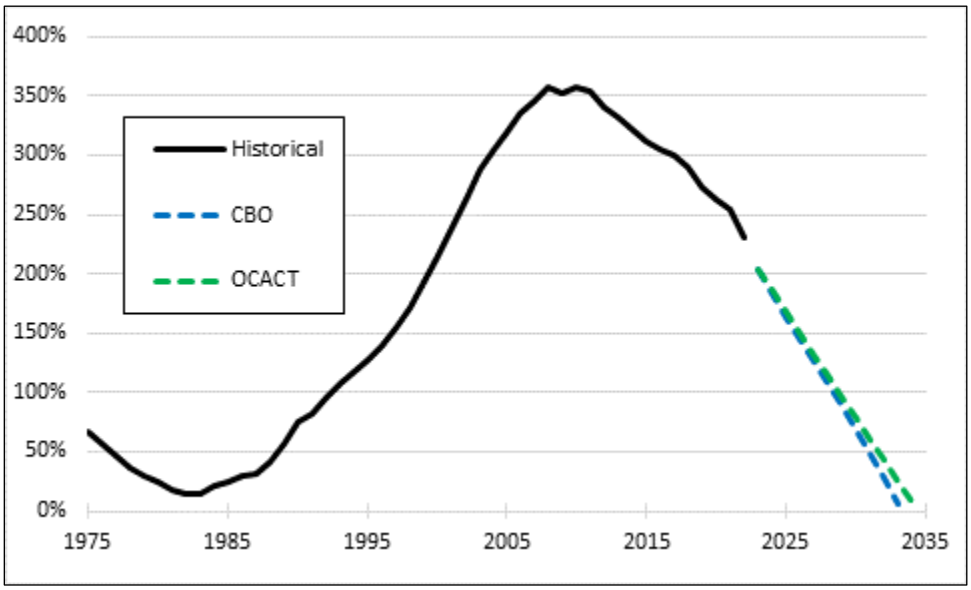
$$Mean\ Absolute\ Deviation\ (MAD) = \frac{\sum |Actual - Projected|}{n}$$

$$Mean\ Squared\ Error\ (MSE) = \frac{\sum (Actual - Projected)^2}{n}$$

$$Mean\ Absolute\ Percentage\ Error\ (MAPE) = \frac{\sum \left| \frac{Actual - Projected}{Projected} \right|}{n} \times 100$$

Figure A-1. Historical and Projected Social Security Trust Fund Ratios, 1975-2035

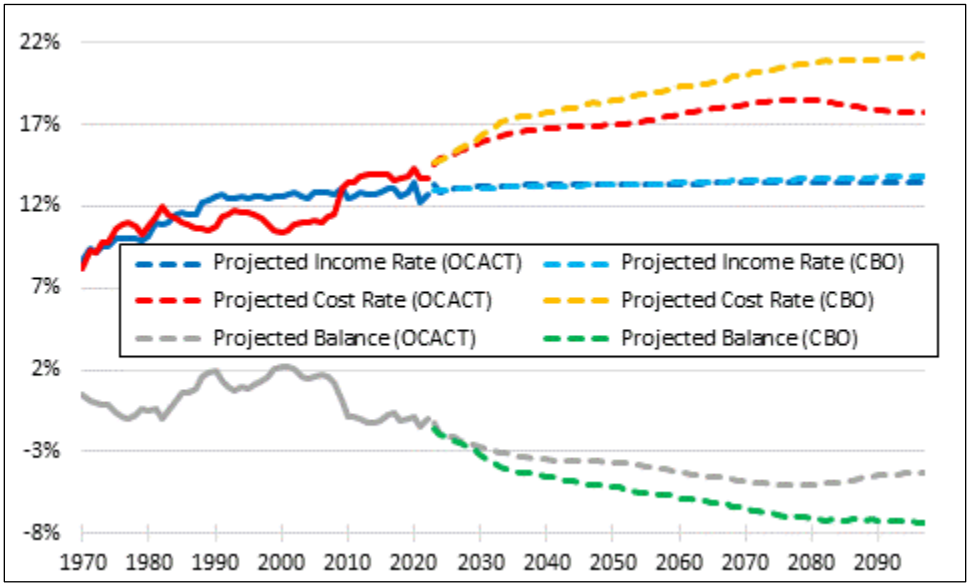
The 2023 Congressional Budget Office (CBO) and Social Security Trustees Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Table IV.A3, pp. 49-50, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and supplemental single-year Table IV.B4, https://www.ssa.gov/OACT/TR/2023/lr4b4.html; and CBO, *CBO's 2023 Long-Term Projections for Social Security*, June 29, 2023, supplemental Information, table 8, https://www.cbo.gov/publication/59184.

Figure A-2. Social Security Cash Flow Measures as a Percent of Taxable Payroll, 1975-2097

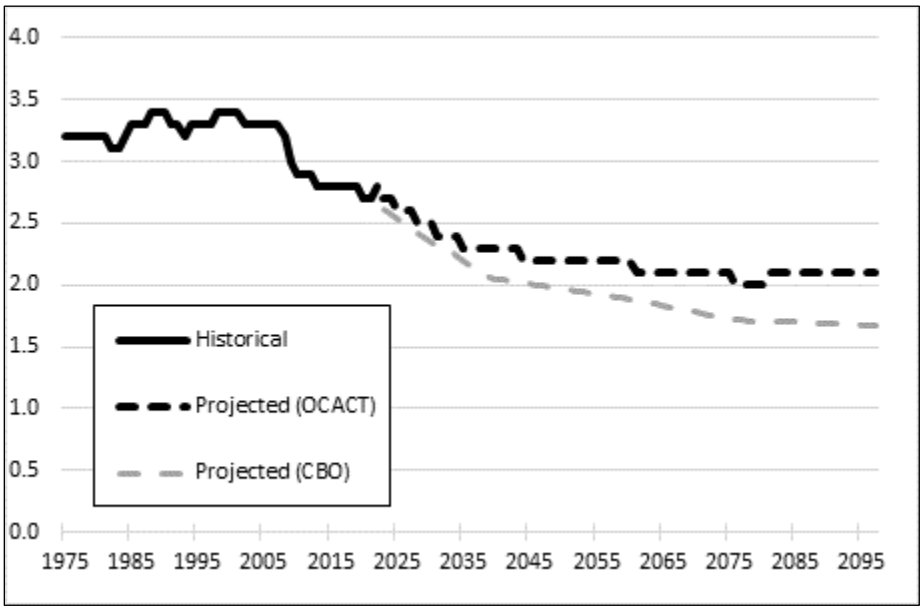
The 2023 Congressional Budget Office (CBO) and Social Security Trustees Intermediate Assumptions



Source: 2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, March 31, 2023, Table IV.B1, pp. 56-57, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and supplemental single-year Table IV.B1, https://www.ssa.gov/OACT/TR/2023/lr4b1.html; and CBO, CBO's 2023 Long-Term Projections for Social Security, June 29, 2023, supplemental Information, table 8, https://www.cbo.gov/publication/59184.

Figure A-3. Social Security Covered Workers to Beneficiaries, 1975-2097

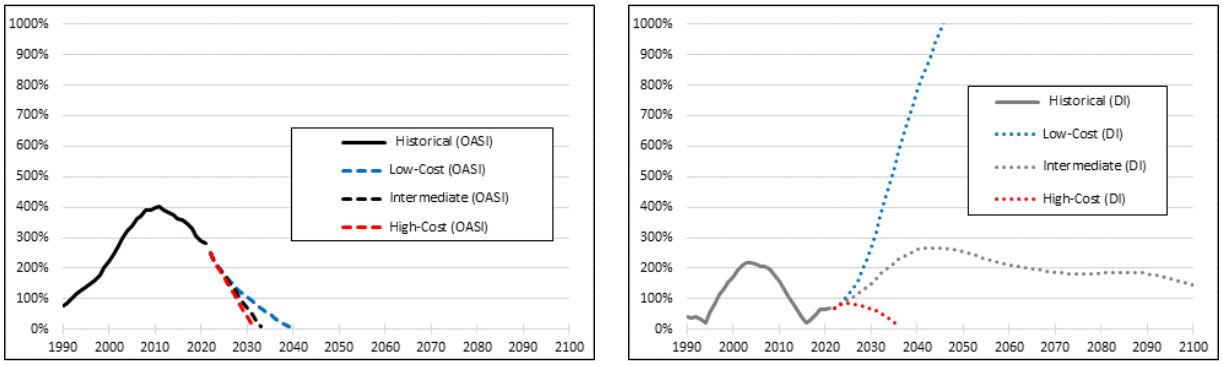
The 2023 Congressional Budget Office (CBO) and Social Security Trustees Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Table IV.B3, pp. 64-65, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf and supplemental single-year Table IV.B3, https://www.ssa.gov/OACT/TR/2023/lr4b3.html; and CBO, *CBO's 2023 Long-Term Projections for Social Security*, June 29, 2023, Projections Underlying Social Security Estimates, https://www.cbo.gov/publication/59184.

Figure A-4. Individual Social Security Trust Fund Ratios Under Alternative Scenarios, 1990-2100

On a Combined Basis Under the 2023 Intermediate Assumptions



Source: *2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*, March 31, 2023, Figure II.D7, p. 21, https://www.ssa.gov/OACT/TR/2023/tr2023.pdf.

Table A-1. Sources of Changes in the Estimated Long-Range OASDI Actuarial Balance Since the 1983 Trustees Report

As a Percentage of Taxable Payroll

Year of Report	Legislation/ Regulation	Valuation Period	Demographic Data and Assumptions	Economic Data and Assumptions	Disability Data and Assumptions	Methods and Programmatic Data	Total (Change from Previous Year)	Long-Range Actuarial Balance (Cumulative Change)
1982								-1.82
1983								0.02
1984	[a]	-0.03	0.04	-0.01	-0.11	0.03	-0.08	-0.06
1985	-0.01	-0.03	-0.02	0.09	-0.04	-0.33	-0.35	-0.41
1986	[a]	-0.04	0.19	-0.1	-0.05	-0.03	-0.03	-0.44
1987	-0.05	-0.04	-0.09	0.02	-0.02	[a]	-0.18	-0.62
1988	[a]	-0.05	0.17	-0.13	0.02	0.03	0.04	-0.58
1989	[a]	-0.04	0.07	-0.11	-0.04	[a]	-0.13	-0.70
1990	-0.01	-0.05	0.03	-0.17	-0.01	[a]	-0.21	-0.91
1991	0.17	-0.05	0.04	-0.11	-0.01	-0.22	-0.17	-1.08
1992	[a]	-0.05	0.17	-0.1	-0.2	-0.19	-0.38	-1.46
1993	[a]	-0.05	0.11	-0.01	-0.08	0.03	[a]	-1.46
1994	[a]	-0.05	[a]	-0.18	-0.11	-0.31	-0.66	-2.13
1995	[a]	-0.07	0.12	0.02	-0.05	-0.07	-0.05	-2.17
1996	0.03	-0.08	-0.03	-0.04	-0.03	0.14	-0.02	-2.19
1997	0.03	-0.08	-0.03	0.06	-0.02	[a]	-0.03	-2.23
1998	[a]	-0.08	-0.05	0.16	0.01	[a]	0.04	-2.19
1999	[a]	-0.08	0.03	0.15	[a]	0.02	0.12	-2.07
2000	[a]	-0.07	-0.07	0.14	[a]	0.17	0.17	-1.89
2001	[a]	-0.07	0.09	0.02	0.02	-0.02	0.03	-1.86

Year of Report	Legislation/ Regulation	Valuation Period	Demographic Data and Assumptions	Economic Data and Assumptions	Disability Data and Assumptions	Methods and Programmatic Data	Total (Change from Previous Year)	Long-Range Actuarial Balance (Cumulative Change)
2002	[a]	-0.07	-0.05	0.12	0.03	-0.04	-0.01	-1.87
2003	[a]	-0.07	-0.04	[a]	[a]	0.06	-0.04	-1.92
2004	[a]	-0.07	0.02	-0.04	0.04	0.08	0.03	-1.89
2005	[a]	-0.07	0.03	-0.06	-0.01	0.07	-0.04	-1.92
2006	[a]	-0.06	0.03	-0.06	-0.04	0.04	-0.09	-2.02
2007	[a]	-0.06	-0.03	0.02	0.06	0.08	0.06	-1.95
2008	[a]	-0.06	[a]	[a]	[a]	0.32	0.26	-1.70
2009	[a]	-0.05	-0.11	-0.15	-0.01	0.03	-0.3	-2.00
2010	0.14	-0.06	-0.05	[a]	-0.02	0.07	0.08	-1.92
2011	[a]	-0.05	-0.14	-0.06	-0.01	-0.05	-0.3	-2.22
2012	[a]	-0.05	-0.05	-0.21	-0.04	-0.08	-0.44	-2.67
2013	-0.15	-0.06	-0.17	-0.03	0.01	0.35	-0.05	-2.72
2014	-0.01	-0.06	0.04	-0.1	0.02	-0.05	-0.16	-2.88
2015	0.02	-0.06	-0.03	0.1	[a]	0.17	0.2	-2.68
2016	0.03	-0.06	[a]	-0.07	[a]	0.11	0.02	-2.66
2017	[a]	-0.05	-0.03	-0.08	0.03	-0.04	-0.17	-2.83
2018	[a]	-0.06	-0.01	-0.01	0.01	0.05	-0.02	-2.84
2019	[a]	-0.05	0.06	-0.04	0.07	0.01	0.06	-2.78
2020	-0.12	-0.05	-0.13	-0.18	0.05	[a]	-0.43	-3.21
2021	-0.01	-0.06	0.07	[a]	[a]	-0.33	-0.32	-3.54
2022	[a]	-0.06	-0.04	0.13	0.07	0.01	0.12	-3.42
2023	[a]	-0.05	-0.03	-0.04	0.01	-0.06	-0.19	-3.61

Year of Report	Legislation/ Regulation	Valuation Period	Demographic Data and Assumptions	Economic Data and Assumptions	Disability Data and Assumptions	Methods and Programmatic Data	Total (Change from Previous Year)	Long-Range Actuarial Balance (Cumulative Change)
Total Since 1983 Report	0.06	-2.32	0.11	-1.07	-0.45	0.05	-3.62	
Percent of Total	-2%	64%	-3%	30%	13%	-1%	100%	

Source: Sharon Chu and Kyle Burkhalter, *Disaggregation of Changes in the Long-Range Actuarial Balance for the Old-Age, Survivors, and Disability Insurance (OASDI) Program Since 1983*, Social Security Administration, Office of the Chief Actuary, March 2023, https://www.ssa.gov/OACT/NOTES/ran8/an2023-8.pdf.

Notes: Each row of data is based on the annual report of that year. Totals may not necessarily equal the sum of rounded components.

a. Value is between -0.005 and 0.005 percent of taxable payroll.

Glossary for Selected Terms as Defined by the Social Security Trustees and the Congressional Budget Office (CBO)

	Trustees	CBO
Actuarial balance	The difference between the summarized income rate and the summarized cost rate as a percentage of taxable payroll over a given valuation period.	The difference between a trust fund's income rate and its cost rate.
Assumptions	Values related to future trends in key factors that affect the trust funds. Demographic assumptions include fertility, mortality, net immigration, marriage, and divorce. Economic assumptions include unemployment rates, average earnings, inflation, interest rates, and productivity. Program-specific assumptions include retirement patterns and disability incidence and termination rates.	
Cash flow	Actual or projected revenue (other than interest paid to the trust funds) and costs reflecting the levels of payroll tax contribution rates and benefits scheduled in the law. Net cash flow is the difference between non-interest income and cost.	
Cost	The cost shown for a year includes benefits scheduled for payment in the year (without regard to the ability to make the payments in full), administrative expenses, financial interchange with the Railroad Retirement program, and payments for vocational rehabilitation services for disabled beneficiaries.	
Cost rate	The cost rate for a year is the ratio of the cost of the program to the taxable payroll for the year.	The present value of outlays for a period, plus the present value of a year's worth of benefits at the end of the period divided by the present value of gross domestic product (GDP) or taxable payroll over the same period.
Income	Income for a given year is the sum of tax revenue on a cash basis (payroll tax contributions and income from the taxation of scheduled benefits), reimbursements from the General Fund of the Treasury, if any, and interest credited to the trust funds.	
Income rate	Ratio of non-interest income to the OASDI taxable payroll for the year.	The present value of tax revenues for a period, plus the trust funds' initial balance, divided by the present value of taxable payroll or GDP over the same period.
Long-range	The first 75 projection years. The trustees make long-range actuarial estimates for this period because it covers approximately the maximum remaining lifetime for virtually all current Social Security participants.	
Present value	The equivalent value, at the present time, of a stream of values (either income or cost, past or future). Present value is used widely in	A single number that expresses a flow of current and future income (in taxes) or payments (in benefits) in terms of an

	Trustees	CBO
	calculations involving financial transactions over long periods of time to account for the time value of money by discounting or accumulating these transactions at the rate of interest. Present-value calculations for this report use the effective yield on combined OASI and DI trust fund asset reserves.	equivalent lump sum received or paid at a specific time. The value depends on the rate of interest, known as the discount rate, used to translate past and future cash flows into dollars at that time.
Short-range	The first 10 projection years. The Social Security Act requires estimates for five years; the trustees prepare estimates for an additional five years to help clarify trends that are only starting to develop in the mandated first five-year period.	
Solvency	A program is solvent at a point in time if it is able to pay scheduled benefits when due with scheduled financing. For example, the OASDI program is solvent over any period for which the trust funds maintain a positive level of asset reserves.	
Summarized balance	The difference between the summarized income rate and the summarized cost rate, expressed as a percentage of GDP. The difference between the summarized income rate and cost rate as a percentage of taxable payroll is referred to as the actuarial balance.	
Summarized cost rate	The ratio of the present value of cost to the present value of the taxable payroll (or GDP) for the years in a given period, expressed as a percentage.	
Summarized income rate	The ratio of the present value of scheduled non-interest income to the present value of taxable payroll (or GDP) for the years in a given period, expressed as a percentage.	
Taxable payroll	A weighted sum of taxable wages and taxable self-employment income. When multiplied by the combined employee-employer payroll tax rate, taxable payroll yields the total amount of payroll taxes incurred by employees, employers, and the self-employed for work during the period.	The total amount of earnings (wages and self-employment income) from employment covered by Social Security that is below the applicable annual taxable maximum.
Trust funds	Separate accounts in the United States Treasury that hold the payroll taxes received under the Federal Insurance Contributions Act and the Self-Employment Contributions Act, payroll taxes resulting from coverage of state and local government employees, any sums received under the financial interchange with the railroad retirement account, voluntary hospital and medical insurance premiums, and reimbursements or payments from the General Fund of the Treasury.	The accounts to which Social Security taxes are credited and from which benefits are paid. Interest on the funds' balances is also credited to the trust funds, and administrative expenses are withdrawn from them.

Trust fund balance	A measure of trust fund adequacy. The asset reserves at the beginning of a year (equal to the reserves at the end of the prior year), which do not include advance tax transfers, expressed as a percentage of the cost for the year. The trust fund ratio represents the proportion of a year's cost that could be paid solely with the reserves at the beginning of the year.	At any given time, the balance in a program's trust fund is an indicator of the historical relationship between receipts and expenditures. Trust funds have an important legal meaning in that their balances are a measure of the amounts that the government is permitted to spend for certain purposes under current law. In a given year, the receipts credited to a trust fund, along with any interest credited on previous balances, minus spending for benefits and administrative costs constitute its surplus or deficit.
Trust fund exhaustion date		The year in which a trust fund's balance will reach zero.
Trust fund ratio		The balance in a trust fund at the beginning of the year divided by projected outlays for that year.
Trust fund reserve	The cumulative excess of trust fund income over trust fund cost over all years to date. These reserves are held by the trust funds in the form of Treasury notes and bonds, other securities guaranteed by the federal government, certain federally sponsored agency obligations, and cash.	
Trust fund reserve depletion	The point at which reserves in a trust fund are insufficient to pay scheduled benefits in full and on time.	

Author Information

Barry F. Huston
Analyst Social Policy

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