The Uncertainty of Long-Term Budget Projections

Budget projections are inherently uncertain. The projections in this report generally reflect current law and estimates of future economic conditions and demographic trends. If future spending and tax policies differ from what is prescribed in current law, budgetary outcomes will differ from the Congressional Budget Office's (CBO's) extended baseline, as the preceding chapter shows. But even if future policies match what is assumed in the extended baseline, budgetary outcomes will undoubtedly differ from the projections in this report because of unexpected changes in the economy, demographics, and other factors.

To illustrate the uncertainty about long-term budget outcomes, CBO constructed alternate projections showing what would happen to the budget if various underlying factors differed from the values used in most of this report. Specifically, CBO considered the consequences of alternate paths for the following variables:

- The decline in mortality rates;

- The growth rate of total factor productivity (which refers to the efficiency with which labor and capital are used to produce goods and services, and which is often referred to in this chapter simply as "productivity");

- Interest rates on federal debt held by the public; and

- The growth rates of federal spending per beneficiary for Medicare and Medicaid.

Different paths for those four factors would affect the budget in various ways. For example, lower-than-projected mortality rates would mean higher life expectancy, which would increase the number of people receiving benefits from such programs as Social Security,

Medicare, and Medicaid; and faster growth in spending for Medicare and Medicaid would boost outlays for those two programs. Both of those changes would increase deficits and debt—which would lead to lower output and higher interest rates, economic feedback that would further worsen the budgetary outlook.[1] By contrast, faster growth in productivity and lower interest rates on federal debt held by the public would reduce deficits and debt—the first by raising output and increasing revenues, the second by lowering government interest payments.

For CBO's alternate projections, the ranges of variation for the four factors were based on the historical variation in their 25-year averages, as well as on consideration of possible future developments; together, those offer a guide (though admittedly an imperfect one) to the amount of uncertainty that surrounds projections of the factors over the next 25 years. To better capture overall uncertainty, CBO also constructed two projections in which all four factors simultaneously varied from their values under the extended baseline. In one of those cases, all of the factors varied in ways that affected the budget

---

1. In cases incorporating negative economic feedback, output would be lower than projected without that feedback, leading to lower revenues (given current tax law), less spending on Social Security (because lower earnings result in smaller benefits), and less federal spending on health care programs (according to CBO's standard approach for projecting long-term cost growth, which is described in Chapter 2). However, CBO projects that other federal noninterest spending would remain at the amounts in the extended baseline even if output deviated from that baseline because of economic feedback. (Under alternate projections of total factor productivity, output differs from the extended baseline before incorporating economic feedback. In those cases, before incorporating such feedback, other federal spending is projected to be the same share of [the higher or lower] output as in the extended baseline.) [Footnote revised on July 29, 2014]

positively; in the other, all of the factors varied in ways that affected the budget negatively.[2]

The budgetary outcomes under the projections differ widely. The simulated variations in productivity, interest rates, and Medicare and Medicaid spending have large effects on the budget within 25 years, whereas the simulated variation in mortality rates does not. When only one of the factors is changed, CBO's projections of federal debt held by the public in 2039 range from 92 percent of gross domestic product (GDP) to 135 percent, compared with 111 percent under the extended baseline with economic feedback.[3] When all four factors are changed at once, federal debt in 2039 ranges from 75 percent to 159 percent of GDP. Those projected levels of debt are all high by historical standards, and a number of them exceed the peak of 106 percent of GDP that the United States reached in 1946.

The four factors listed above are not the only ones that could differ from CBO's expectations. For example, an increase in the birth rate or in labor force participation could boost the growth of the labor force and thus raise tax revenues. Similarly, a large disruption in the economy, such as an economic depression or a military conflict, could have significant effects on the budget that are not quantified in this analysis.

---

2. An alternative approach to quantifying the uncertainty of budget projections would be to create a distribution of outcomes from a large number of simulations in which such factors as productivity growth, interest rates, and the rate of increase of health care costs varied. CBO generally uses that approach in its reports on the financial outlook for the Social Security trust funds. See Congressional Budget Office, *The 2013 Long-Term Projections for Social Security: Additional Information* (December 2013), www.cbo.gov/publication/44972; and *Quantifying Uncertainty in the Analysis of Long-Term Social Security Projections* (November 2005), www.cbo.gov/publication/17472. However, determining the appropriate variation in those factors and estimating the distribution of outcomes for the federal budget as a whole requires additional modeling tools that CBO has not yet developed.

3. As Chapter 6 explains, that version of the extended baseline incorporates the economic effects of the fiscal policies in the extended baseline and, in turn, the impact of those economic effects on budgetary outcomes. As a result, the economic and budget projections in the extended baseline with economic feedback differ somewhat from those presented in the first five chapters of this report.

Policymakers could address the uncertainty associated with long-term budget projections in various ways. For instance, they might design policies that partly insulated the federal budget from some unanticipated events; however, such policies could have unwanted consequences, such as shifting risk to individuals. Or policymakers might aim for a smaller amount of federal debt, to provide a buffer against the budgetary impact of adverse surprises and give future policymakers more flexibility in responding to unexpected crises.

The Long-Term Budgetary Effects of Differences in Mortality, Productivity, Interest Rates on Federal Debt, and Federal Spending on Health Care

Budgetary outcomes could differ from CBO's projections if mortality rates, the growth rate of productivity, interest rates on government debt, or the growth of federal spending on health care diverged from the paths that underlie the extended baseline projections in this report. Unexpected changes in mortality rates would gradually lead to changes in spending for Social Security, Medicare, and Medicaid. Changes in productivity would lead to changes in economic output, which would affect both revenues and spending. Changes in the interest rates on federal debt would affect the amount of interest paid by the government. And changes in the growth rate of federal health care spending, one of the largest components of the budget, would have significant implications for overall federal spending.

Under the projections of those four factors that are included in CBO's extended baseline, federal debt held by the public would equal 111 percent of GDP in 2039 (including economic feedback). Alternate projections of the factors would lead to the following outcomes:

■ If mortality rates declined, on average, 0.5 percentage points per year more slowly or more quickly than they do in CBO's extended baseline, federal debt held by the public in 2039 would be 110 percent of GDP or 113 percent of GDP, respectively.

■ If productivity grew, on average, 0.5 percentage points per year more quickly or more slowly than it does in CBO's extended baseline, federal debt held by the public in 2039 would be 94 percent of GDP or 130 percent of GDP, respectively.

■ If interest rates on government debt were
0.75 percentage points lower or higher than those
in CBO's extended baseline, federal debt held by the
public in 2039 would be 92 percent of GDP or
135 percent of GDP, respectively.

■ If Medicare and Medicaid spending per beneficiary
grew 0.75 percentage points per year more slowly or
more quickly than it does in CBO's extended baseline,
federal debt held by the public in 2039 would be
93 percent of GDP or 132 percent of GDP,
respectively.

■ If all four factors varied from their baseline values in
ways that positively affected the budget but varied
only half as much as in the previous cases, federal debt
held by the public in 2039 would be 75 percent of
GDP; if all four factors varied in ways that negatively
affected the budget but varied only half as much as in
the previous cases, federal debt held by the public
would be 159 percent of GDP.

Mortality

Mortality rates measure the number of deaths in a given
year per thousand people in a population. Lower-than-
projected mortality rates would mean higher life expec-
tancy, which would increase the number of people who
received benefits from Social Security, Medicare, Medic-
aid, and other mandatory spending programs—and
would therefore increase outlays for those programs.
Changes in mortality rates would also affect the budget
by changing the size of the labor force and thereby chang-
ing tax revenues; specifically, CBO projects that the aver-
age person would work three more months for each addi-
tional year of life expectancy, slightly increasing overall
labor force participation.[4]

Mortality rates have declined steadily over the past half
century, and CBO expects that the decline will continue.
The steepness of the future decline is quite uncertain,
however. CBO therefore constructed projections covering
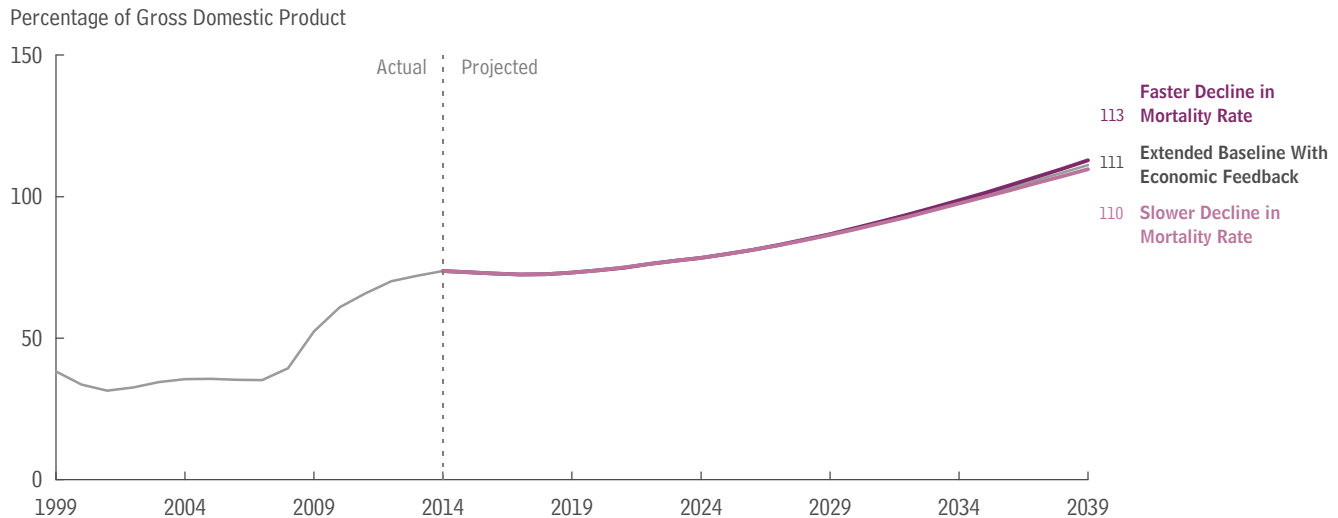a 1 percentage-point range—0.5 percentage points higher

and lower—around the 1.2 percent annual rate of decline
used for the agency's baseline projections. The agency
arrived at that 1 percentage-point range by comparing the
average annual change in mortality rates during the 25-
year periods beginning with the 1942–1966 period and
ending with the 1984–2008 period. The average annual
change varied by about 1 percentage point for men; it
varied by about 1 percentage point for women as well.[5]
Applying that 1 percentage-point range around the
1.2 percent rate used for CBO's extended baseline
resulted in rates of decline ranging from 0.7 percent
per year to 1.7 percent per year. Those two rates of
decline would mean that life expectancy for 65-year-olds
in 2039 would be 85.7 years or 87.9 years, respectively—
compared with 86.8 years in the extended baseline and
84.4 years for 65-year-olds today.

Those alternate projections for the decline in mortality
rates would lead to alternate budgetary projections:

■ If mortality rates declined by 0.7 percent a year—that
is, 0.5 percentage points more slowly than in the
extended baseline—outlays for Social Security,
Medicare, and Medicaid would be lower. That would
lead to less federal debt held by the public—
specifically, a projected 110 percent of GDP in 2039,
rather than the 111 percent that CBO projects under
the extended baseline with economic feedback (see
Figure 7-1). In addition, the estimated changes in
spending or revenues needed to keep federal debt held
by the public at its current percentage of GDP
(74 percent) over the 25-year period—the "fiscal
gap"—would be slightly smaller than CBO projects
under the extended baseline, although they would

---

4. See Congressional Budget Office, *The 2013 Long-Term Budget
   Outlook* (September 2013), Appendix A, www.cbo.gov/
   publication/44521.

5. The rate of decline in *aggregate* mortality—that is, for both men
   and women—exhibited substantially less variation than the
   decline in mortality rates for men and women separately. From
   1950 through 1980, the decline in the mortality rate for women
   was faster than the decline in the mortality rate for men; after
   1980, the decline in the mortality rate for men was faster than
   the decline in the mortality rate for women. (That difference
   resulted in part from differences in how smoking rates evolved
   over time for men and for women.) In CBO's assessment, the
   variations in mortality rate decline of men and women considered
   separately are more representative of the uncertainty in mortality
   rates over the next 25 years.

Figure 7-1.

Federal Debt Given Different Rates of Mortality Decline

Percentage of Gross Domestic Product

Source: Congressional Budget Office.

Notes: The extended baseline generally reflects current law, following CBO's 10-year baseline budget projections through 2024 and then extending the baseline concept for the rest of the long-term projection period.

Federal debt refers to debt held by the public. Estimates for the extended baseline with economic feedback are CBO's central estimates from ranges determined by alternative assessments about how much deficits "crowd out" investment in capital goods such as factories and computers (because a larger portion of people's savings is being used to purchase government securities) and how much people respond to changes in after-tax wages by adjusting the number of hours they work.

The faster decline in the mortality rate is 0.5 percentage points per year higher, and the slower decline in the mortality rate is 0.5 percentage points per year lower, than in the extended baseline with economic feedback.

round to the same 1.2 percent of GDP.[6] Although those differences are relatively small in 2039, they would grow substantially over time as the effect on mortality rates compounded and average life spans fell increasingly below those projected in the baseline.

■ In contrast, if mortality rates declined by 1.7 percent a year, or 0.5 percentage points more quickly than in the extended baseline, outlays for the same three programs would be higher, resulting in federal debt held by the public that reached a projected

113 percent of GDP in 2039. The 25-year fiscal gap would rise to 1.3 percent of GDP.

Productivity

Total factor productivity is an important determinant of economic output. Its growth stems from the introduction and spread of new technological approaches, from increases in workers' education and skill levels, and from the use of new processes that improve the efficiency of organizations.[7] CBO estimates that the growth of total factor productivity, which has averaged 1.4 percent per year since 1950, has accounted for over 40 percent of the increase in real (inflation-adjusted) nonfarm business output over that time. CBO's extended baseline incorporates the projection that such productivity will increase, on average, by 1.3 percent per year in the coming decades.

---

6. For a discussion of how CBO measures the fiscal gap, see Chapter 1. The fiscal gap estimates in this chapter, like those in Chapter 1, are calculated without economic feedback effects. It would not be informative to include the negative economic effects of rising debt (and their feedback effects on the budget) in the fiscal gap calculation because the fiscal gap shows the budgetary changes required to keep debt from rising in the first place; if those budgetary changes were made, the negative economic effects (and their feedback effects on the budget) would not occur.

7. Total factor productivity is different from labor productivity, which measures the amount of goods and services that can be produced per hour of labor.

However, the growth rate of total factor productivity has often varied for extended periods. Periods of rapid growth have generally resulted from major technological innovations. For example, innovations in four critical areas—electricity generation, internal combustion engines, chemicals, and telecommunications—triggered a surge in productivity in the 1920s and 1930s. Another surge occurred in the 1950s and 1960s, spurred by the electrification of homes and workplaces, suburbanization, completion of the nation's highway system, and production of consumer appliances. The latest surge in productivity—a more modest one—began in the 1990s and is attributed to innovations involving computers and other types of information technology.[8]

A different growth rate for productivity would affect the federal budget by changing output and income and also, in CBO's assessment, by changing the interest rates paid by the federal government. Higher total factor productivity means that capital is more productive, which implies a higher rate of return from private capital investment, all else being equal. According to widely used economic models, if productivity grows faster, that rate of return remains higher over time. Because the federal government competes with private borrowers for investors' money, higher returns from private investment should push up interest rates paid by the federal government. Although empirical estimates of the relationship between productivity growth and interest rates are mixed, the theoretical relationship is clear enough for CBO to incorporate an effect on interest rates into this analysis.[9]

The future growth rate of productivity is quite uncertain. The nation could experience faster growth in productivity than is reflected in CBO's extended baseline, either steadily (for example, from ongoing gains from integrating information technology into the economy) or in a burst (for example, from a technological breakthrough, such as the development of a new source of energy). Conversely, the growth of productivity could be slower than in CBO's extended baseline if the rate of increase in workers' education levels declined or if technological innovation or the dispersion of previous technological innovations throughout the economy diminished.

Average productivity growth during recent 25-year periods, beginning in the 1950–1974 period and ending in the 1989–2013 period, varied by about 1 percentage point. CBO therefore projected economic and budgetary outcomes if total factor productivity grew 0.8 percent per year or 1.8 percent per year over the next 25 years—that is, 0.5 percentage points more slowly or more quickly than the 1.3 percent projected in the extended baseline.[10]

Those alternate projections for total factor productivity growth would lead to alternate budgetary projections:

■ If total factor productivity grew by 1.8 percent annually, 0.5 percentage points more quickly than in the baseline, then greater GDP would result in more revenue, smaller budget deficits, and less federal debt. Federal debt held by the public would be projected at 94 percent of GDP in 2039, rather than the 111 percent that CBO projects under the extended baseline with economic feedback (see Figure 7-2). The 25-year fiscal gap would be 0.6 percent of GDP, rather than the 1.2 percent that CBO projects under the extended baseline.

■ If productivity grew by 0.8 percent annually, 0.5 percentage points more slowly than in the baseline, slower economic growth would result in less revenue, bigger budget deficits, and more debt. That debt would be projected at 130 percent of GDP in 2039. The 25-year fiscal gap would rise to 1.9 percent of GDP.

---

8. For further discussion, see Robert Shackleton, *Total Factor Productivity Growth in Historical Perspective*, Working Paper 2013-01 (Congressional Budget Office, March 2013), www.cbo.gov/publication/44002.

9. For example, in the Solow-type growth model that CBO used for this analysis, if productivity grew 0.5 percentage points more quickly than in the extended baseline with economic feedback, the average interest rate on federal debt held by the public in 2039 would be about 1 percentage point higher than the baseline value. For details of that model, see Congressional Budget Office, *CBO's Method for Estimating Potential Output: An Update* (August 2001), www.cbo.gov/publication/13250. In last year's long-term budget outlook, CBO presented two separate estimates of the effects of differences in productivity growth on budget outcomes: one with no accompanying change in interest rates, and the other with an increase in interest rates consistent with CBO's Solow-type growth model. This year's analysis includes only the second approach because CBO has concluded that changes in productivity growth are highly likely to affect interest rates.
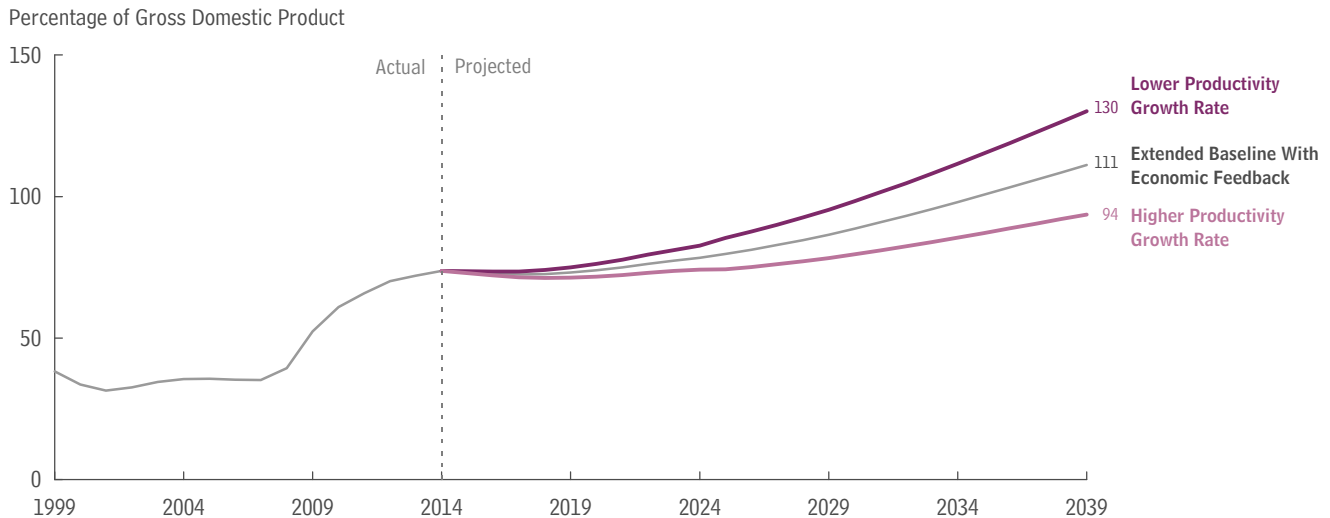
10. For another approach to measuring uncertainty in long-run projections of productivity growth, see Ulrich K. Müller and Mark W. Watson, *Measuring Uncertainty About Long-Run Predictions* (draft, Princeton University, August 2013), http://tinyurl.com/lypfv4h (PDF, 7 MB).

Figure 7-2.

Federal Debt Given Different Rates of Productivity Growth

Percentage of Gross Domestic Product

Source: Congressional Budget Office.

Notes: The extended baseline generally reflects current law, following CBO's 10-year baseline budget projections through 2024 and then extending the baseline concept for the rest of the long-term projection period.

Federal debt refers to debt held by the public. Estimates for the extended baseline with economic feedback are CBO's central estimates from ranges determined by alternative assessments about how much deficits "crowd out" investment in capital goods such as factories and computers (because a larger portion of people's savings is being used to purchase government securities) and how much people respond to changes in after-tax wages by adjusting the number of hours they work.

The lower productivity growth rate is 0.5 percentage points lower, and the higher productivity growth rate is 0.5 percentage points higher, than in the extended baseline with economic feedback.

Faster or slower productivity growth could also affect the budget in ways that are not incorporated in this analysis—for example, by changing the shares of the nation's income received by workers (as wages and salaries, for instance) and by the owners of capital (as corporate profits, for instance). In recent years, technological change appears to have affected productivity in ways that put downward pressure on labor's share (for example, by expanding options for using capital in place of labor), a trend that some economists believe will be long-lasting.[11] In addition, some types of ongoing technological change appear to be intensifying wage inequality.[12] Such shifts in the distribution of income could significantly affect tax

revenues and spending for some programs (such as Social Security); whether they would have a large net impact on the federal budget overall is unclear.

Interest Rates on Federal Debt

Interest rates affect the budget by changing the interest payments that the federal government makes on debt held by the public. Interest rates are at historic lows, but CBO projects that they will rise over the next few years and return to levels closer to their long-run average. As a result, interest payments on federal debt held by the public, which are currently a little over 1 percent of GDP, are projected to grow to over 3 percent of GDP by 2024, even though federal debt is projected to be only slightly larger relative to GDP in that year than it is currently.

However, projections of future interest rates on government debt are very uncertain, given how much those rates have varied in the past. CBO estimates that the real interest rate on 10-year Treasury notes averaged about 3 percent during the 1960s, about 1 percent during the 1970s, about 5 percent during the 1980s, about 4 percent

---

11. For further discussion, see Congressional Budget Office, *How CBO Projects Income* (July 2013), www.cbo.gov/publication/44433.

12. See Erik Brynjolfsson and Andrew McAfee, *Race Against the Machine: How the Digital Revolution Is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy* (Digital Frontier Press, 2012), www.raceagainstthemachine.com.

during the 1990s, about 2 percent between 2000 and 2007, and about 1 percent during the past six years.[13]

CBO's long-term projection of interest rates takes into account economic and financial factors such as the size of federal debt, the rate of growth of the labor force, the rate of growth of productivity, private saving, and the amount of inflows of capital from foreign investors, as Appendix A discusses further. Different projections of those factors would imply different projections of interest rates. For example, as explained above in the analysis of productivity, faster productivity growth implies higher interest rates, all else being equal. But many of the economic and financial factors that affect interest rates also affect the budget in other ways—for instance, faster productivity growth leads to faster income growth and higher revenues—and those additional effects complicate analyzing the relationship between interest rates and the budget.[14]

To isolate the budgetary effect of changes to the interest rate that the federal government pays on debt held by the public, CBO analyzed uncertainty in its projection of the spread between the federal government's borrowing rates and private borrowing rates. For any given level of private borrowing rates, changes to that spread affect the rate at which the federal government borrows but do not usually have significant direct effects on economic conditions or on the federal budget apart from interest payments.

The conditions that have historically determined the spread between government borrowing rates and private borrowing rates include portfolio preferences among U.S. and foreign investors, the perception of the underlying risk of private securities relative to federal debt, the response of financial institutions to regulations that require the holding of low-risk assets, and the liquidity of federal debt relative to that of private securities. For example, the difference between the rates of interest on 10-year Treasury notes and on highly rated corporate bonds rose from the 1990s to the 2000s, as investors became more averse to risk in the wake of the sharp stock market drop of the early 2000s; even after the economy

recovered, the difference remained larger than it had been before the drop.

To find a guide to the uncertainty surrounding the spread between government borrowing rates and private borrowing rates, CBO examined the average spread between the interest rate on 10-year Treasury notes and the interest rate on a large class of corporate debt (specifically, an index of corporate debt with a credit rating of BAA) during recent 25-year periods, beginning with the 1954–1978 period and ending with the 1989–2013 period. That spread varied over those periods by about 1 percentage point. However, the historical averages do not reflect certain sources of uncertainty about spreads in the future. For one thing, estimates of the risk premium—the additional return that investors require to hold assets that are riskier than Treasury securities—have been quite volatile in recent years, so more distant history may be a poor guide to the future premium. Also, private and sovereign foreign investors alike have been eager to invest in risk-free U.S. assets in recent years, but as emerging economies continue to grow and their financial markets develop, those investors may change their preferences. And the effect of regulatory changes enacted in response to the recent financial crisis on investors' demand for corporate and federal debt is very uncertain. To account for those sources of uncertainty and other factors that may not be fully represented by the particular measure of the spread used and the historical time period analyzed, CBO expanded the range of uncertainty used for this analysis from the 1.0 percentage point suggested by the historical data to 1.5 percentage points.[15]
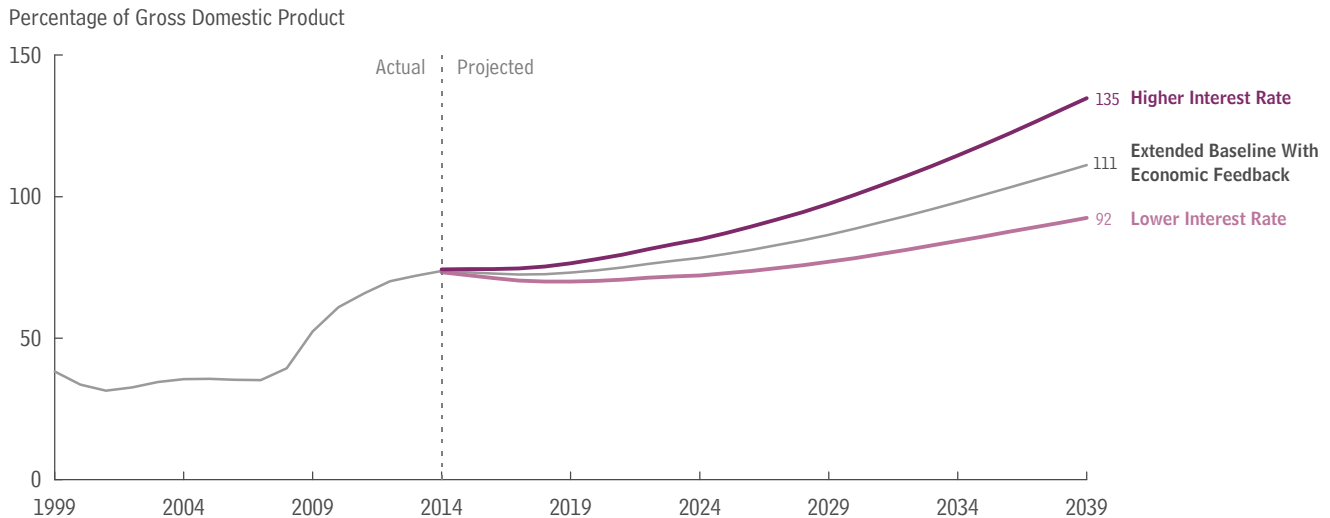
Those alternate projections for the interest rate paid on federal debt held by the public would lead to alternate budgetary projections:

■ If the spread between the government and private borrowing rates was 0.75 percentage points larger than the average projected for the baseline—resulting in a lower government borrowing rate—but the economy was otherwise the same, then net interest would

---

13. For comparisons of historical real interest rates, past values of the consumer price index were adjusted to account for changes over time in how that index measures inflation.

14. In addition, many economic and financial factors that affect the government's borrowing rate also affect interest rates in the private sector, which in turn affect private capital investment and thus income and output.

15. In the extended baseline without economic feedback, CBO projects that the federal government's nominal borrowing rate will average 4.1 percent between 2014 and 2039. The 1.5 percentage-point range of uncertainty about the spread between government and private borrowing rates implies that the government's nominal borrowing rate would be as low as 3.4 percent or as high as 4.9 percent, on average, over the same period.

Figure 7-3.

Federal Debt Given Different Interest Rates

Percentage of Gross Domestic Product

Source: Congressional Budget Office.

Notes: The extended baseline generally reflects current law, following CBO's 10-year baseline budget projections through 2024 and then extending the baseline concept for the rest of the long-term projection period.

Federal debt refers to debt held by the public. Estimates for the extended baseline with economic feedback are CBO's central estimates from ranges determined by alternative assessments about how much deficits "crowd out" investment in capital goods such as factories and computers (because a larger portion of people's savings is being used to purchase government securities) and how much people respond to changes in after-tax wages by adjusting the number of hours they work.

The higher interest rate is an average interest rate on federal debt that is 0.75 percentage points higher relative to the return on capital, and the lower interest rate is a rate that is 0.75 percentage points lower, than in the extended baseline with economic feedback.

account for 3.6 percent of GDP by 2039, compared with 5.2 percent in the extended baseline with economic feedback.[16] Federal debt held by the public would be a projected 92 percent of GDP in 2039, rather than the 111 percent that CBO projected in that baseline (see Figure 7-3). The 25-year fiscal gap would be 0.7 percent of GDP, rather than the 1.2 percent that CBO projects under the extended baseline.[17]

■ If the spread between the government and private borrowing rates was 0.75 percentage points smaller than the average projected for the baseline, but the economy was otherwise the same, then net interest

would make up 7.5 percent of GDP in 2039, and federal debt held by the public would be projected to reach 135 percent of GDP. The 25-year fiscal gap would rise to 1.7 percent of GDP.

Federal Spending on Health Care

The federal government pays for health care through Medicare, Medicaid, subsidies for insurance purchased through the exchanges established under the Affordable Care Act, and other programs, as well as through tax preferences, especially the exclusion for employment-based

---

16. The estimated effects on budget projections of changes in the government's borrowing rates do not incorporate any changes in remittances by the Federal Reserve or in the relative amounts of different types of taxable income (for example, profits and interest income). Such changes would have additional budgetary implications.

17. In estimating the fiscal gap under the alternate projections for interest rates, CBO altered the rate used to discount future taxes, noninterest spending, and debt by the same amount as other interest rates. Therefore, for example, in calculating the fiscal gap under the projection with lower interest rates, future primary deficits (that is, deficits excluding interest payments) and the end-of-period debt are given a greater weight than they are under projections with higher interest rates.

health insurance.[18] In CBO's extended baseline, federal spending on health care per beneficiary increases more slowly in the future than it has, on average, in recent decades, though it still substantially outpaces the growth of potential output per capita.[19] But the future growth of health care costs is quite uncertain, and it is consequently a significant source of budgetary uncertainty.

Many factors will affect federal spending on health care per beneficiary in the long term (for further discussion, see Chapter 2). One of them is the extent to which advances in health care technology raise or lower costs. New medical procedures or treatments may prove more effective in helping patients, which could lower costs. However, such procedures and treatments are often very expensive; and even services that are relatively inexpensive could make spending rise quickly if ever-growing numbers of patients used them.[20] Other factors that could affect health care costs are changes in the structure of payment systems and innovations in the delivery of health care.

In addition, federal spending on health care will be affected by the health of the population. Outlays for Medicare and Medicaid depend in part on the prevalence of certain medical conditions—such as cardiovascular and pulmonary diseases, diabetes, arthritis, and depression—among beneficiaries. The prevalence of those conditions and others could evolve in unexpected ways for various reasons, such as changes in behavior (for example, in smoking rates, participation in physical activity, or dietary patterns); new treatments for various illnesses; new medical interventions that reduced the occurrence or severity of certain conditions or diseases; and the emergence of epidemics.

The measure that CBO examined for this analysis of uncertainty was excess cost growth—that is, the

difference between the growth rate of health care spending per capita and the growth rate of potential output per capita.[21] During various 25-year periods, starting with the 1967–1991 period and ending with the 1988–2012 period, excess cost growth for the health care system as a whole varied by about 1 percentage point. In CBO's view, however, that range understates the uncertainty of future excess cost growth: Patients, health care providers, employers, and insurers may respond in a variety of ways to the changing pressures they will face—as may state and local governments, whose decisions affect federal spending for Medicaid (again, for further discussion, see Chapter 2). To account for uncertainty that may not be fully represented in the historical data, CBO used a larger range of variation—1.5 percentage points—and analyzed the effects of increasing or decreasing the projected rate of excess cost growth for Medicare and Medicaid by 0.75 percentage points, relative to the rate of growth in the extended baseline.[22] (CBO focused on Medicare and Medicaid because the projected size of those programs means that their rates of growth have particularly large effects on the federal budget.)

Those alternate projections for the growth of health care spending would lead to alternate budgetary projections:

- If Medicare and Medicaid spending per beneficiary rose 0.75 percentage points per year more slowly than in the extended baseline, federal debt held by the public would be projected at 93 percent of GDP in 2039, rather than the 111 percent that CBO projects under the extended baseline with economic feedback (see Figure 7-4). The 25-year fiscal gap would be 0.7 percent of GDP, rather than the 1.2 percent that CBO projects under the extended baseline.

---

18. Under that provision of the tax code, most payments that employers and employees make for health insurance coverage are exempt from income and payroll taxes.

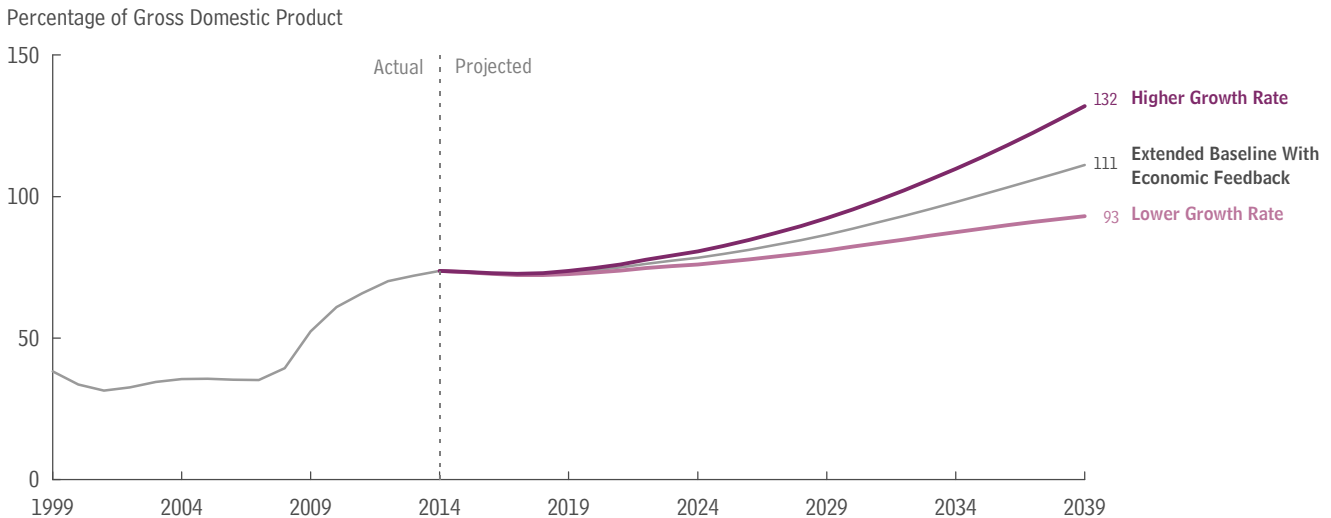19. Potential output is the maximum sustainable output of the economy.

20. See Congressional Budget Office, *Technological Change and the Growth of Health Care Spending* (January 2008), www.cbo.gov/publication/41665.

---

21. The definition and calculation of excess cost growth are discussed in more detail in Chapter 2.

22. In the extended baseline, CBO projects that rates of excess cost growth in Medicare and Medicaid will match the rates in the agency's baseline projections for the next 10 years and will move in the succeeding 15 years toward estimated underlying rates. Those estimated underlying rates begin with the rate of excess cost growth experienced in the health care system in recent decades and are projected to decline gradually as people respond to the pressures of rising costs.

Figure 7-4.

Federal Debt Given Different Rates of Growth of Federal Health Care Spending

Percentage of Gross Domestic Product

Source: Congressional Budget Office.

Notes: The extended baseline generally reflects current law, following CBO's 10-year baseline budget projections through 2024 and then extending the baseline concept for the rest of the long-term projection period.

Federal debt refers to debt held by the public. Estimates for the extended baseline with economic feedback are CBO's central estimates from ranges determined by alternative assessments about how much deficits "crowd out" investment in capital goods such as factories and computers (because a larger portion of people's savings is being used to purchase government securities) and how much people respond to changes in after-tax wages by adjusting the number of hours they work.

The higher growth rate of per-beneficiary federal spending on Medicare and Medicaid is 0.75 percentage points per year higher, and the lower growth rate is 0.75 percentage points per year lower, than in the extended baseline with economic feedback.

■ If Medicare and Medicaid spending per beneficiary rose 0.75 percentage points per year more quickly than in the extended baseline, federal debt held by the public would be projected at 132 percent of GDP. The 25-year fiscal gap would rise to 1.9 percent of GDP.

Multiple Factors

The previous cases illustrated what would happen to the federal budget if a single factor differed from the projections that CBO used in the extended baseline. However, multiple factors will undoubtedly differ from CBO's projections. Estimating the budgetary consequences of that circumstance is more complicated than simply adding together the outcomes of the individual cases. For example, higher-than-projected health care costs would have a larger effect on the budget if interest rates on federal debt were also higher than CBO projects—because the government would have to pay more interest on debt that resulted from the additional health care spending.[23]
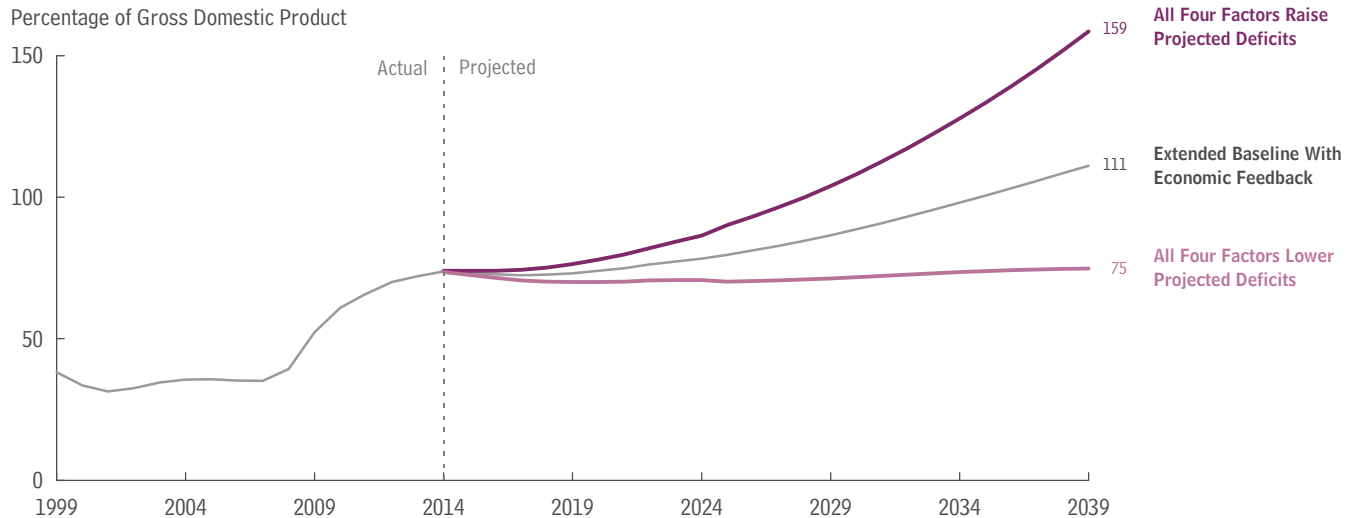
Therefore, CBO examined what would happen if all four factors differed from the extended baseline in ways that

raised projected deficits relative to that baseline and also what would happen if all four factors varied in ways that lowered deficits. However, the likelihood that all four factors would vary from the extended baseline in ways that moved deficits in the same direction *and* that they would be at the ends of the ranges considered above is lower than the likelihood that a single factor would be at the end of its selected range. To make the likelihoods in the current cases closer to those in the earlier cases, CBO used ranges that were only half as large as the ranges used for those earlier cases. For example, in the first two cases above, the range for the rate of productivity growth was 1 percentage point, yielding growth rates that were 0.5 percentage points higher and lower than the values in

23. As another example, some of the factors under consideration may be correlated with each other, so that surprisingly high outcomes for one factor might tend to occur at the same time as surprisingly high—or surprisingly low—outcomes for other factors. However, CBO did not incorporate any correlations of that sort in its analysis except for the relationship between productivity growth and interest rates discussed earlier in the chapter.

Figure 7-5.

Federal Debt Given Different Rates of Mortality Decline, Productivity Growth, Interest, and Growth of Federal Health Care Spending

Percentage of Gross Domestic Product

Source: Congressional Budget Office.

Notes: The extended baseline generally reflects current law, following CBO's 10-year baseline budget projections through 2024 and then extending the baseline concept for the rest of the long-term projection period.

   Federal debt refers to debt held by the public. Estimates for the extended baseline with economic feedback are CBO's central estimates from ranges determined by alternative assessments about how much deficits ''crowd out'' investment in capital goods such as factories and computers (because a larger portion of people's savings is being used to purchase government securities) and how much people respond to changes in after-tax wages by adjusting the number of hours they work.

   For this figure, CBO used ranges for the four factors that are half as large as the ranges used for the individual cases (shown in Figures 7-1 to 7-4).

the extended baseline. For the combined projections here, the range for the rate of productivity growth is 0.5 percentage points, so the rates used in the projections are 0.25 percentage points higher and lower than the values in the extended baseline.

Varying the four factors together would lead to the following budgetary projections:

■ If mortality rates declined 0.25 percentage points per year more slowly, productivity grew 0.25 percentage points per year more quickly, the difference between the average interest rate on government debt and private interest rates was about 0.4 percentage points greater, and federal costs per beneficiary for Medicare and Medicaid grew about 0.4 percentage points per year more slowly than under the extended baseline, federal debt held by the public would be projected

at 75 percent of GDP in 2039, rather than the 111 percent that CBO projects under the extended baseline with economic feedback (see Figure 7-5). The 25-year fiscal gap would be 0.1 percent of GDP, rather than the 1.2 percent that CBO projects under the extended baseline.

■ If mortality rates declined 0.25 percentage points per year more quickly, productivity grew 0.25 percentage points per year more slowly, the difference between the average interest rate on government debt and private interest rates was about 0.4 percentage points smaller, and federal costs per beneficiary for Medicare and Medicaid grew about 0.4 percentage points per year more quickly than under the extended baseline, federal debt held by the public would be projected at 159 percent of GDP in 2039. The 25-year fiscal gap would be 2.5 percent of GDP.

Other Sources of Uncertainty in the Long-Term Budget Outlook

The range of outcomes presented above conveys only part of the uncertainty associated with long-term budget projections. Those outcomes do not incorporate the possibility of other developments that could sharply increase federal debt relative to CBO's projections. Such developments could include an economic depression like the one that occurred in the United States in the 1930s; unexpectedly large losses on federal financial obligations, such as mortgage guarantees; and unpredictable catastrophes, such as a major natural disaster or world war. Similarly, the projections do not incorporate all circumstances that could *reduce* federal debt relative to CBO's projections. For example, a large and prolonged increase in labor force participation could lead to higher-than-expected revenues and lower-than-expected payments for various federal programs.

An Economic Depression

Recessions automatically affect the federal budget by reducing revenues significantly and raising outlays for safety net programs, such as unemployment insurance and nutrition assistance.[24] In addition, economic downturns have historically prompted policymakers to enact legislation that further reduces revenues and increases federal spending—to help people suffering from the weak economy, to bolster the financial condition of state and local governments, and to stimulate additional economic activity and employment. For example, debt as a share of GDP increased from 35 percent at the end of 2007 to 70 percent at the end of 2012, in large part because of the recession and weak recovery and the policy responses enacted to counter that problem.

The long-term projections of output and unemployment in this report reflect economic trends since the end of World War II, a period that includes periodic downturns that were not fully offset by upturns of similar magnitude.[25] But the projections do not incorporate the possibility of an event like the Great Depression of the 1930s. Such events are rare; for that reason and others, their magnitude and timing cannot readily be predicted.

---

24. See Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), Appendix E, www.cbo.gov/publication/45010.

Uncertain Costs of Federal Financial Obligations

The federal government supports a variety of private activities through federal insurance and through federal credit programs that provide loans and loan guarantees.[26] CBO includes the expected losses from those credit and insurance programs in its baseline projections. But significantly greater losses could result from certain unexpected events, such as a major disruption in the financial system or a deep slump in the economy.

Federal insurance and credit programs generate losses when the support provided by the federal government exceeds the money taken in by the programs through fees, loan repayments, interest payments, asset sales, wage garnishment, and other means. For example, in the wake of the recent housing crisis, widespread defaults on guaranteed mortgages led to substantial outlays by the federal government. Widespread defaults on student loans or the bankruptcy of numerous companies with underfunded pension plans could lead to analogous costs for the

---

25. Since the end of World War II, the unemployment rate has been about one-quarter of one percentage point higher, on average, than CBO's estimate of the natural rate of unemployment (the rate arising from all sources except fluctuations in aggregate demand). That difference implies that bouts of significant economic weakness (such as the 2007–2009 recession and its aftermath) have pushed the unemployment rate above CBO's estimate of the natural rate more than periods of significant economic strength have pushed it below that estimate. Consistent with that finding is CBO's projection that the unemployment rate in the long term will be 5.3 percent, which is about one-quarter of one percentage point higher than CBO's estimate of the natural rate of unemployment in the long term. For further discussion, see Appendix A.

26. Federal insurance includes coverage for deposits at financial institutions (provided by the Federal Deposit Insurance Corporation), insurance for workers' pensions (provided by the Pension Benefit Guaranty Corporation), and coverage for property against damage by floods (provided by the National Flood Insurance Program). The largest federal credit programs provide mortgage loan guarantees (through the Federal Housing Administration, Fannie Mae, and Freddie Mac); student loans; and federally backed loans to businesses (through the Small Business Administration, for example). A number of smaller programs include loan guarantees provided by the Department of Energy and terrorism risk insurance administered by the Treasury Department.

federal government in the future.[27] Conversely, long periods of particularly strong economic growth could allow federal insurance and credit programs to collect higher-than-projected repayments and cover lower-than-projected expenses.

Moreover, the federal government may have significant implicit liabilities apart from the liabilities created by formal government programs. In the event of a financial crisis, for example, federal policymakers might decide to provide monetary support to the financial system, as they did during the recent financial crisis. Such support would increase federal outlays relative to the projection in the extended baseline.

Catastrophes

The federal government also faces implicit obligations in the case of catastrophes. Natural and manmade disasters on a small scale occur fairly often in the United States; they may seriously damage local communities and economies, but they have rarely had significant, lasting impacts on the national economy. A catastrophe, by contrast—or an increased frequency of disasters, such as intense hurricanes or drought—could affect budgetary outcomes by reducing economic growth over a number of years, leading to substantial additional federal spending. For example, the nation could experience a massive earthquake, a nuclear meltdown or attack that rendered a significant part of the country uninhabitable, a pandemic, an asteroid strike, or a geomagnetic storm from a large solar flare. Participation in a major war could also have significant economic and budgetary impacts: The ratio of federal debt held by the public to GDP rose by 60 percentage points during World War II, for instance. Because catastrophic events are extremely rare, it is very difficult to estimate the probability of their future occurrence and their effects on the budget.

Changes in Demographics and Labor Force Growth

Demographic factors have significant effects on economic and budgetary outcomes. For instance, GDP depends to a large degree on the size of the labor force, which is related to the number of working-age adults; federal outlays for Medicare, Medicaid, and Social Security are closely linked to the number of people who are at least

65 years old. Higher rates of fertility or immigration would generally cause federal spending to decrease relative to GDP because they would increase the ratio of working-age adults to elderly ones. (Mortality, another demographic factor that affects the economy and the budget, was addressed separately above.) Such demographic factors could diverge relatively quickly from the trends projected in CBO's calculations—for example, because of a medical breakthrough that reduced mortality or because of the spread of a new infectious disease. Alternatively, shifts could occur gradually—for instance, if trends in fertility rates diverged steadily from their projected paths.

The growth of the labor force could also change for reasons other than demographic ones. Projections of the labor force combine estimates of the size of the population with estimates of the rates of participation in the labor force by people in different demographic groups. Those participation rates in turn depend on a number of factors, including economic conditions and public policies (especially those that involve taxes on labor or that directly affect people's incentive to work in some other way).[28] The overall rate of participation in the labor force has varied considerably over time. For example, it averaged 59 percent in the 1950s and 1960s, increased to more than 67 percent by 2000, and averaged a little more than 63 percent in the first half of 2013. The large increase from the 1960s to 2000 was mostly the result of an increasing number of women in the labor force. If the next 25 years saw a cultural shift of a different nature that had a similarly large effect on the overall rate of participation in the labor force, labor force growth could be significantly different from what CBO expects.

Higher or lower labor force growth would produce better or worse budgetary outcomes, all else being equal. If the labor force grew more quickly than projected in the extended baseline, the faster economic growth would result in higher revenues, smaller budget deficits, and a smaller ratio of federal debt to GDP. In contrast, if the labor force grew more slowly than projected in the extended baseline, the slower economic growth would result in lower revenues, larger budget deficits, and a greater ratio of debt to GDP.

---

27. For more discussion, see James D. Hamilton, "Off-Balance-Sheet Federal Liabilities" (paper presented at the Third Annual *Cato Papers on Public Policy* Conference, Washington, D.C., June 6–7, 2013, revised July 17, 2013), http://dss.ucsd.edu/~jhamilto/Cato_paper.pdf (562 KB).

28. The rate of participation in the labor force has also changed over time within demographic groups; see Congressional Budget Office, *CBO's Labor Force Projections Through 2021* (March 2011), www.cbo.gov/publication/22011.

Implications of Uncertainty for the Design of Fiscal Policy

Policymakers could take uncertainty into account in various ways when making fiscal policy choices.[29] For example, they might decide to design policies that reduced the budgetary implications of certain surprises. However, such policies might have consequences that policymakers viewed as undesirable, such as increasing the risk borne by individuals. Policymakers might also decide to provide a buffer against events with negative budgetary implications by aiming for lower debt than they would otherwise.

Reducing the Budgetary Implications of Surprises

Fiscal policy cannot eliminate the risk factors that create uncertainty about budgetary outcomes, but it can reduce the budgetary implications of those factors. Under current law, for example, growth in Medicare and Medicaid outlays per beneficiary depends on the growth of health care costs. Some policymakers have proposed that growth in federal outlays per beneficiary of those programs be linked instead to measures of overall economic growth. Such a change could affect national spending for health care, the federal budget, individuals' costs, and the budgets of state and local governments. It might greatly reduce uncertainty about future federal outlays for Medicare and Medicaid; it might also greatly increase uncertainty about the future costs borne by the programs' beneficiaries and by state and local governments.[30]

Similarly, policymakers could reduce the budgetary implications of uncertainty about future life expectancy by indexing the eligibility age for programs such as Social Security or Medicare to average life spans. Under current law, if longevity increased more than expected, outlays for federal health care and retirement programs would exceed projections. If policies were changed so that the age of eligibility for those programs rose automatically with increases in longevity, the budgetary effects of such increases would be dampened. However, people would

face greater uncertainty about the timing and size of the benefits that they would receive.

In addition, policymakers could reduce the budgetary implications of unexpected rises in interest rates by increasing the share of government borrowing that was done through longer-term securities. Using that approach, the Treasury could lock in interest rates for a considerable period. However, interest rates on longer-term debt are typically higher than rates on shorter-term debt, so that approach would probably raise the interest that the federal government paid. Moreover, if interest rates were locked in for a long period, the federal government would benefit less from unexpected *declines* in interest rates.

Whether or not the federal budget directly bears the risk of uncertain outcomes, all risk is ultimately distributed among individuals—as taxpayers, as beneficiaries of federal programs, or as both. If federal spending for certain programs turned out to be higher than projected, the additional imbalance could be offset only through higher revenues or lower outlays for other programs or activities at some point in the future. If the additional imbalance was not offset, then deficits would be larger, resulting in lower future income. Conversely, if budget imbalances were smaller than expected, then an opportunity would exist to lower taxes or boost spending; it would also be possible to reduce future deficits, which would result in higher income. Which income groups or generations benefited the most from unexpected budgetary imbalances—or bore the largest burden—would depend on the policies that lawmakers enacted to deal with such imbalances.

Reducing Federal Debt

As an alternative or complementary approach, policymakers could improve the federal government's ability to withstand the effects of events that would significantly worsen the budgetary outlook. In particular, reducing the amount of federal debt held by the public would give future policymakers more flexibility in responding to extraordinary events. For example, a financial crisis in the future might have significant negative economic and budgetary implications—just as the recent financial crisis did: The ratio of federal debt held by the public to GDP increased by 35 percentage points between 2007 and 2012. If another financial crisis prompted a similar increase when the ratio of federal debt to GDP was already at a high level (such as its current level of

---

29. See Alan J. Auerbach and Kevin Hassett, "Uncertainty and the Design of Long-Run Fiscal Policy," in Alan J. Auerbach and Ronald D. Lee, eds., *Demographic Change and Fiscal Policy* (Cambridge University Press, 2001), pp. 73–92, http://tinyurl.com/p93enfp.

30. Most proposed policy changes of that sort would affect both the expected federal outlays and uncertainty about those outlays, but those two effects are conceptually distinct.

74 percent), policymakers might be reluctant to accept the initial cost of a desired intervention in the financial system or the economy even if they expected to recoup at least part of that cost over time.

In addition, a high ratio of debt to GDP increases the risk of a fiscal crisis in which investors lose confidence in the government's ability to manage its budget and the government thus loses its ability to borrow at affordable

rates.[31] There is no way to predict the amount of debt that might precipitate such a crisis, but starting from a position of relatively low debt would reduce the risk.

---

31. That sort of crisis might be triggered by an adverse event, such as a depression or a war, that quickly drove up the ratio of debt to GDP. For further discussion, see Congressional Budget Office, *Federal Debt and the Risk of a Fiscal Crisis* (July 2010), www.cbo.gov/publication/21625.