



## How Changes in Economic Conditions Might Affect the Federal Budget

One source of uncertainty in budget projections stems from the fact that the federal budget is highly sensitive to economic conditions, which are difficult to predict. If conditions differed from those in the Congressional Budget Office's economic forecast, budgetary outcomes could diverge from those in the agency's baseline budget projections.<sup>1</sup>

To show how changes in economic conditions might affect the budget, CBO has analyzed what might happen to the budget if the following key economic variables differed from those in the agency's current economic forecast:

- The growth of productivity and, consequently, the growth of real (inflation-adjusted) gross domestic product (GDP);
- Labor force growth and, in turn, real economic growth;
- Interest rates; and
- Inflation.

1. For this analysis, CBO used the economic forecast presented in Congressional Budget Office, *The Budget and Economic Outlook: 2018 to 2028* (April 2018), [www.cbo.gov/publication/53651](http://www.cbo.gov/publication/53651), and the baseline budget projections published in Congressional Budget Office, *An Analysis of the President's 2019 Budget* (May 2018), [www.cbo.gov/publication/53884](http://www.cbo.gov/publication/53884).

CBO created and analyzed four illustrative scenarios to develop “rules of thumb” for those variables. The scenarios are for the following changes from the agency's current economic forecast, all of which would increase deficits above the amounts in CBO's baseline budget projections: slower growth of productivity (in this analysis, total factor productivity, which is real output per unit of combined labor and capital services), slower growth of the labor force, higher interest rates, and higher inflation. Those scenarios were chosen for simplicity, but the variables could be higher or lower than they are in CBO's forecast. The rules of thumb are symmetrical, so if productivity or the labor force increased more quickly than projected, or if interest rates or inflation were lower than projected, deficits would be smaller than they are in the agency's baseline budget projections.

The rules of thumb can be used to analyze other economic scenarios that differ from CBO's forecast, although there are a few caveats that must be kept in mind. Among the most important is that each rule shows the effects of differences in a single key variable, but any factor that caused a change in one such variable would probably have additional direct effects on the economy (and thus on the budget). Those broader effects are not incorporated into the rules of thumb.

### Background

Economic conditions affect federal revenues and outlays in several ways. Revenues depend on the total amount of income that is subject to taxation—including total

labor income, other income received by individuals, and corporate profits. Those types of income generally rise or fall (though not necessarily proportionally) in response to changes in economic growth and inflation. In addition, the Treasury regularly refinances portions of the government's outstanding debt—and issues more debt to finance new deficits—at market interest rates. Thus, the amount that the federal government spends to pay interest on its debt is directly tied to those rates. Spending for many mandatory programs is also affected by economic growth and inflation, either directly through cost-of-living adjustments or indirectly in other ways. Finally, although actual spending for discretionary programs is determined solely by Congressional action, CBO's projections of such spending are affected by changes in inflation when the spending is not constrained by the caps on discretionary budget authority that are in place under current law.<sup>2</sup>

To account for those interactions between the economy and budgetary outcomes, CBO prepares an economic forecast twice a year and uses that forecast to make its baseline budget projections. When economic conditions differ from those in the agency's forecast, actual federal spending and revenues will likely differ from CBO's projections. To illustrate that point, CBO examined four simplified economic scenarios.

### The Economic Variables That CBO Examined

CBO examined how differences in key economic variables would affect the budget projections by analyzing four illustrative economic scenarios; those simplified scenarios underlie the agency's rules of thumb. In each of those scenarios, economic variables differ from those in the agency's forecast by 0.1 percentage point each year starting in January 2019. The first two scenarios—for slower productivity growth and slower labor force growth—incorporate changes to two variables that directly affect real economic growth. Those changes would cause such growth to be slower than it is in CBO's

forecast, thereby affecting other economic variables as well. The third and fourth scenarios—for higher interest rates and for higher inflation—differ from the first two in that they do not incorporate any changes in real economic growth.

CBO chose to use economic variables that differed from those in the agency's forecast by 0.1 percentage point in the direction that would worsen the budget outlook solely for simplicity. The scenarios are not intended to indicate the extent to which, or the direction in which, actual economic conditions might differ from those in CBO's projections. For example, the agency estimates that there is roughly a two-thirds chance that the average annual growth rate of real GDP over the next five years will be within a range of 1.4 percentage points above or below the forecast rate. Similarly, there is about a two-thirds chance that the average annual rate of inflation over the next five years will be within 0.8 percentage points in either direction—and the average interest rate, within 1.1 percentage points—of the rate in CBO's forecast.<sup>3</sup>

**Productivity Growth.** In this scenario, productivity growth is 0.1 percentage point lower each year than it is in CBO's economic forecast, causing real GDP to be about 1.3 percent lower in 2028 than forecast (see Table 1). The slowdown in productivity growth in turn affects other economic variables, such as the labor force, wage rates, and interest rates.

**Labor Force Growth.** In the second scenario, the labor force grows 0.1 percentage point more slowly each year than it does in the agency's economic forecast, causing real GDP to be about 0.7 percent lower in 2028 than it is in CBO's economic forecast. If the population grew at the rate that CBO projects, the slower growth of the labor force would result in a labor force participation rate that dropped below the agency's current estimate by roughly equal amounts each year until it was about 0.6 percentage points lower in 2028 than forecast. As with slower productivity growth, slower labor force growth affects other economic variables as well, though

2. The recently enacted Bipartisan Budget Act of 2018 (Public Law 115-123) increased the limits on discretionary funding that were in place under the Budget Control Act of 2011 (P.L. 112-25), as modified by subsequent legislation: The cap for 2018 was increased by \$143 billion, and the cap for 2019, by \$152 billion. Overall limits on discretionary budget authority now total \$1,208 billion in 2018, rise by 3 percent to \$1,244 billion in 2019, and then fall by 10 percent to an estimated \$1,118 billion in 2020, when limits return to the lower levels set by the Budget Control Act.

3. Those ranges are based on analysis of CBO's forecasting accuracy over the past four decades for GDP and since 1984 for inflation (as measured by the GDP price index) and interest rates (specifically, the real rate on 10-year Treasury notes). For additional information, see Congressional Budget Office, *CBO's Economic Forecasting Record: 2017 Update* (October 2017), [www.cbo.gov/publication/53090](http://www.cbo.gov/publication/53090).

Table 1.

**Differences Between the Illustrative Scenarios and CBO's Economic Forecast in 2028**

	Level of Real GDP (Percent)	Level of Nominal GDP (Percent)	Labor Force (Percent)	Interest Rate on 10-Year Treasury Notes (Percentage points)	Level of the GDP Price Index (Percent)	Level of the Employment Cost Index (Percent) <sup>a</sup>
Slower Productivity Growth	-1.3	-1.3	-0.2	-0.10	0	-1.1
Slower Labor Force Growth	-0.7	-0.7	-0.9 <sup>b</sup>	-0.05	0	0.3
Higher Interest Rates	0	0	0	0.10	0	0
Higher Inflation	0	1.0	0	0.10	1.0	1.0

Source: Congressional Budget Office.

Real values are nominal values that have been adjusted to remove the effects of inflation.

Each rule of thumb is roughly symmetrical. CBO based its rules of thumb on scenarios in which economic variables differed from those in the agency's forecast in the direction that would worsen the budget outlook, but those variables could be higher or lower than forecast. If, for example, productivity growth was faster than CBO projected, real GDP would be higher than it is in the agency's economic forecast rather than lower, as it is in the table.

GDP = gross domestic product.

a. The employment cost index for wages and salaries of workers in private industry.

b. Although CBO used a growth rate of the labor force for this scenario that was 0.1 percentage point lower than it is in the agency's economic forecast each year, the resulting reduction in the size of the labor force in 2028 is only 0.9 percent (rather than 1.0 percent, as might be expected from 10 years of growth that was 0.1 percentage point slower) because the initial decline in the labor force is slightly offset by an increase in the supply of labor resulting from higher wage rates.

the direction and magnitude of the changes are not the same as they are in the first scenario. For example, wage rates (as measured by the employment cost index) would be higher under this scenario than they are in CBO's forecast, but under the scenario with slower productivity growth, they would be lower than forecast (see Table 1).

**Interest Rates.** In the third scenario, interest rates are 0.1 percentage point higher each year than those in CBO's forecast. Inflation is held equal to the forecast rate in this scenario, so the corresponding rule of thumb shows the effects of higher *real* interest rates. Unlike all the other scenarios, this scenario does not include any changes to the amounts of interest payments made or received by individuals or businesses projected in CBO's economic forecast.

**Inflation.** In the fourth scenario, inflation is 0.1 percentage point higher each year than it is in the agency's economic forecast. All economic indicators measured as nominal values, such as taxable income and interest rates, increase in response to higher inflation, but indicators measured as real values, such as real GDP, are the same as in CBO's economic forecast.

### Applying the Rules of Thumb

CBO's rules of thumb provide a rough sense of the budgetary outcomes that might be expected if economic conditions differed from those in the agency's forecast. The rules of thumb can be used to analyze a number of scenarios that differ from those presented here because the rules are both roughly symmetrical and scalable, although there are some caveats. CBO has produced a workbook in which users can create their own alternative scenarios for productivity growth, labor force growth, interest rates, and inflation to see how revenues, outlays, and deficits might differ from those in the agency's baseline budget projections.<sup>4</sup>

**Symmetry.** Each rule of thumb is roughly symmetrical. Thus, if the growth of productivity or the labor force was instead 0.1 percentage point higher than in CBO's baseline, or if interest rates or inflation were 0.1 percentage point lower than in CBO's baseline, the effects would be about the same as those shown here, but with the opposite sign.

4. CBO has published that workbook along with this report at [www.cbo.gov/publication/54052](http://www.cbo.gov/publication/54052).

**Scalability.** In addition to being symmetrical, the rules are also roughly scalable for moderate changes in the economic variables. If productivity growth was 0.2 percentage points lower each year than it is in CBO's economic forecast rather than 0.1 percentage point lower as it is in the scenario discussed here, the change in the deficit would roughly double. Similarly, the rule of thumb for labor force growth could be used to calculate the effect on the deficit of moderate changes in the growth of the labor force.

The scalability of the rules of thumb is limited. When the values of economic variables change significantly from those in CBO's forecast, the estimates produced using the rules of thumb are likely to become increasingly inaccurate. Although two of the illustrative scenarios incorporate a broad set of interactions between several economic variables, all four rules of thumb are nevertheless simplified and thus do not account for the complex interactions between variables—such as those between growth in real GDP, inflation, and the unemployment rate. That limitation becomes more pertinent as the differences between the values of economic variables and those in CBO's forecast increase. Also, certain elements of the tax code and some provisions relating to mandatory outlays make it so that estimates produced by the rules of thumb are likely to be less and less accurate as the differences in variables increase.

Moreover, the rules of thumb are based on scenarios in which the values of variables differ from the values in CBO's economic forecast by the same amount each year. The rules can be applied to scenarios in which the differences vary somewhat from year to year, but the budgetary effects of scenarios with significant variations in those differences over the 10-year period cannot be accurately estimated using the rules. For example, if the rate of labor force growth differed from the value in CBO's forecast by 0.5 percentage points in 2028 but was the same as the forecast value in all other years, the average annual difference would be 5 basis points (that is, 0.05 percentage points). CBO's estimate of the budgetary effect over the decade would not, however, be one-half the amount shown for the scenario for slower labor force growth, nor would the agency's estimate of the budgetary effect in 2028 be five times greater than the value for that year under the illustrative scenario. Both estimates would be considerably smaller.

To assess the scalability of the rules of thumb, CBO compared estimates produced using the simplified calculations in its online workbook with estimates made with the broader set of models that the agency uses to assess the effects of economic changes on the budget. On the basis of those comparisons, CBO found that the four rules of thumb produced approximations of the estimates generated using CBO's economic and budget models for the following ranges of year-by-year differences from the forecast values:

- Differences in productivity growth between –0.5 percentage points and 0.5 percentage points,
- Differences in labor force growth between –0.75 percentage points and 0.75 percentage points,
- Differences in interest rates between –1.0 percentage point and 1.0 percentage point, and
- Differences in inflation between –1.0 percentage point and 1.0 percentage point.

In general, differences outside those ranges in any given year would generate budgetary effects that could not be reasonably approximated by the simple rules of thumb incorporated in the workbook and thus would require a more detailed analysis using CBO's comprehensive models.

**Caveats.** If economic conditions changed in such a way that they reflected the changes incorporated in two or more of the scenarios, the budgetary effects would most likely differ from the sum of the estimates calculated using the individual rules of thumb. For example, if rates of productivity growth and labor force growth were both lower than they are in CBO's economic forecast, the two effects would interact and lower output growth by more than the growth that would be suggested by simply adding the two effects together.

The rules of thumb capture the budgetary effects of specified changes in the economy, but they do not account for the source of those changes, which may or may not be changes in fiscal policy. They can be used to make estimates that are a good approximation of the results produced by the full set of models that CBO uses to calculate feedback to the budget from changes

in the economy. Such estimates of macroeconomic feedback are one component of the “dynamic analyses” that the agency undertakes for certain legislative proposals. The rules of thumb do not, however, include the direct budgetary effects of any change in fiscal policy. In addition, such a change in fiscal policy would probably have broader economic effects than those included in the simplified scenarios considered here. For example, a proposal might call for a change in government spending that would affect inflation. CBO’s dynamic analysis of such a proposal would include estimates of changes in inflation that could be reasonably approximated by using the rule of thumb for inflation. Nonetheless, such a policy change to government spending would have direct budgetary effects, as well as additional effects on the economy, that are not captured by that rule of thumb. A new tax policy that changed effective tax rates would likely alter the relationship between changes in the economy and revenues, so the budgetary effects of such a policy would differ from those that would be estimated using the rules of thumb.

### Changes in Productivity and Labor Force Growth

The growth of productivity and the growth of the labor force are important determinants of real economic growth. All else being equal, faster productivity growth and faster labor force growth both lead to greater economic growth and thus reduce budget deficits. Slower productivity growth and slower labor force growth both reduce the growth of GDP, thereby worsening the budget outlook.<sup>5</sup>

#### Slower Growth of Productivity

The first rule of thumb describes the budgetary effects of growth in productivity that is slightly weaker than CBO currently anticipates. Specifically, if productivity grew at a rate that was 0.1 percentage point lower each year than the rate in the agency’s economic forecast, annual deficits would be larger than projected by amounts that would climb from \$2 billion in 2019 to \$52 billion by 2028, CBO estimates. The cumulative deficit for 2019 to 2028 would be \$228 billion higher than it is in CBO’s baseline projections (see Table 2).

5. For further discussion of how changes in the labor force participation rate (which lead to changes in labor force growth) and changes in productivity affect GDP, as well as of the uncertainty of such projections, see Congressional Budget Office, *The 2016 Long-Term Budget Outlook* (July 2016), Chapter 7, [www.cbo.gov/publication/51580](http://www.cbo.gov/publication/51580).

To arrive at that rule, CBO examined how the slower growth of productivity in the illustrative scenario might affect GDP, income, and interest rates. The agency found that productivity growth that was slower than anticipated would lead to slower growth in GDP because both labor and capital would be producing less than they are projected to produce in CBO’s current economic forecast. If workers produced less, the hourly wage rate would be lower, and thus, the supply of labor would also decline. As a result, total labor income would be lower. Meanwhile, if capital produced less output, the returns on that capital would also decline, further decreasing total taxable income. Lower returns on capital would also cause private investment to be lower. Treasury securities compete with other investments for investors’ money, so those lower rates of return on private investments imply that rates on Treasury securities would also be lower. Other variables, such as the unemployment rate and inflation, could be affected as well; however, this simplified scenario does not include the effects of changes in those variables.

If actual productivity growth was 0.1 percentage point lower each year than it is projected to be, GDP growth and income growth would also be lower each year, CBO estimates. Meanwhile, interest rates would be about 1 basis point below those in the agency’s forecast for 2019, and that difference would increase by roughly 1 additional basis point in each subsequent year. By the end of the 10-year projection period, GDP and total income would be about 1.3 percent lower than they are in CBO’s forecast, and interest rates would be about 10 basis points lower.

If economic growth slowed in each year as a result of that lower productivity growth, taxable income would also grow more slowly than projected, and tax revenues would be lower—\$3 billion less than in the baseline in 2019 and \$72 billion less in 2028. Over the 2019–2028 period, the drop in revenues stemming from the slower growth in income would increase deficits by a total of \$323 billion. Slower growth in income would also lead to a decrease in mandatory outlays of \$29 billion: Reductions to Medicare, Medicaid, unemployment insurance, and Social Security payments that resulted from lower earnings would reduce mandatory spending by \$34 billion, but \$5 billion of that amount would be offset by an increase in outlays for the refundable

Table 2.

**How Changes in Productivity and Labor Force Growth Might Affect the Federal Budget**

Billions of Dollars

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total	
											2019–2023	2019–2028
<b>Productivity Growth Is 0.1 Percentage Point Slower Each Year</b>												
Changes in Revenues	-3	-7	-13	-18	-25	-32	-40	-51	-61	-72	-66	-323
Changes in Outlays												
Mandatory outlays	*	-1	-1	-2	-3	-3	-4	-4	-5	-6	-7	-29
Net interest												
Lower interest rates	*	-1	-3	-4	-7	-9	-12	-14	-17	-21	-15	-88
Debt service	*	*	*	1	1	2	3	4	5	6	3	22
Subtotal, net interest	*	-1	-2	-4	-5	-7	-9	-11	-13	-14	-12	-66
Total Change in Outlays	-1	-2	-3	-5	-8	-10	-13	-15	-18	-21	-19	-95
<b>Increase (-) in the Deficit Relative to CBO's Baseline</b>	<b>-2</b>	<b>-5</b>	<b>-9</b>	<b>-13</b>	<b>-17</b>	<b>-22</b>	<b>-28</b>	<b>-35</b>	<b>-43</b>	<b>-52</b>	<b>-47</b>	<b>-228</b>
<b>Labor Force Growth Is 0.1 Percentage Point Slower Each Year</b>												
Changes in Revenues	-1	-3	-6	-8	-11	-14	-18	-23	-27	-33	-29	-144
Changes in Outlays												
Mandatory outlays	*	*	*	*	*	1	1	1	2	2	*	7
Net interest												
Lower interest rates	*	-1	-1	-2	-3	-5	-6	-8	-9	-11	-8	-46
Debt service	*	*	*	*	1	1	1	2	2	3	1	11
Subtotal, net interest	*	-1	-1	-2	-3	-4	-5	-6	-7	-8	-6	-35
Total Change in Outlays	*	*	-1	-2	-3	-3	-4	-4	-5	-5	-6	-27
<b>Increase (-) in the Deficit Relative to CBO's Baseline</b>	<b>-1</b>	<b>-3</b>	<b>-5</b>	<b>-6</b>	<b>-8</b>	<b>-11</b>	<b>-14</b>	<b>-18</b>	<b>-23</b>	<b>-27</b>	<b>-23</b>	<b>-117</b>

Source: Congressional Budget Office.

For this analysis, CBO used the economic forecast presented in Congressional Budget Office, *The Budget and Economic Outlook: 2018 to 2028* (April 2018), [www.cbo.gov/publication/53651](http://www.cbo.gov/publication/53651), and the baseline budget projections published in Congressional Budget Office, *An Analysis of the President's 2019 Budget* (May 2018), [www.cbo.gov/publication/53884](http://www.cbo.gov/publication/53884).

The rules of thumb capture the budgetary effects of specified changes in the economy, but they do not account for the source of those changes. The source may or may not be a change in fiscal policy, which would have additional budgetary effects. In addition, such a change in fiscal policy would probably have broader economic effects than those underlying the budgetary estimates shown here.

Each rule of thumb is roughly symmetrical. If, for example, productivity growth was 0.1 percentage point faster each year than it is in CBO's economic forecast, deficits would be reduced by about the same amount that they are increased each year in the table above.

\* = between -\$500 million and \$500 million.

portions of tax credits, such as the earned income and child tax credits.<sup>6</sup>

Because slower productivity growth would push interest rates down, the amount of interest that the federal

government would pay over the 2019–2028 period on the debt projected in CBO's baseline would decrease by \$88 billion. However, if revenues were reduced by the amounts indicated above, the federal government would need to borrow more than projected to finance the resulting net increase in the deficit. That additional borrowing would add \$22 billion to interest payments over the period. Together, those effects would result in total net interest outlays for the 10-year period that were

6. Tax credits reduce a taxpayer's income tax liability. If a refundable credit exceeds a taxpayer's liability, all or a portion of the excess is refunded to the taxpayer and recorded as an outlay in the budget.

about \$66 billion less than the amount in the agency's baseline projections.

### **Slower Growth of the Labor Force**

The second rule of thumb illustrates the budgetary effects of the labor force's growing slightly more slowly than CBO anticipates. Specifically, if the unemployment rate remained unchanged and the labor force grew 0.1 percentage point more slowly than it does in CBO's economic forecast, annual deficits would be larger than those in the agency's baseline budget projections by amounts that would grow each year and reach \$27 billion by 2028, CBO estimates. The cumulative deficit for the 2019–2028 period would be \$117 billion higher than it is in the agency's baseline budget projections (see Table 2). The budgetary effects under this scenario are considerably smaller than those under the scenario for slower productivity growth because the effects on real GDP are much smaller under this scenario (see Table 1 on page 3).

To arrive at this rule of thumb, CBO began by analyzing how the slower growth of the labor force under the illustrative scenario might affect GDP, income, and interest rates. Slower-than-projected growth in the labor force would push the wage rate above CBO's current estimate. Those higher wage rates would bring about a small boost in labor income and in the supply of labor that would partially offset the effects of the initial decline in the labor force. Despite those effects, total labor income would be lower than it is in CBO's baseline. Meanwhile, the number of workers using a given amount of capital would decline, so the returns on that capital would decline as well. As already noted, the resulting decline in the rates of return on private investment imply that interest rates on Treasury securities would be lower than they are in CBO's economic forecast. Although other variables—including the unemployment rate, inflation, the distribution of labor income, and rates of retirement—could also be affected by the labor force's growing more slowly than projected, this rule of thumb does not incorporate any changes to those variables.

CBO concluded that if the labor force grew 0.1 percentage point more slowly than anticipated, GDP growth would also be slower each year. Meanwhile, interest rates would be slightly lower than forecast for 2019, and that difference would increase in each subsequent year. By the end of 2028, GDP and labor income would be 0.7 percent lower than they are in CBO's forecast, and interest rates would be about 5 basis points lower.

The slower economic growth would cause taxable labor income and profits to grow more slowly than projected, resulting in tax revenues that were less than the amounts in CBO's baseline projections—\$1 billion less in 2019 and \$33 billion less in 2028. Also, the higher-than-projected wage rates and the smaller-than-projected number of workers would, on net, add a total of \$7 billion to mandatory outlays over the 2019–2028 period. Specifically, Medicare, Medicaid, and Social Security benefits would increase, boosting mandatory spending by about \$10 billion, but a little less than \$3 billion of that amount would be offset by a decrease in outlays for unemployment insurance benefits and the refundable portions of the earned income and child tax credits.

The lower interest rates that resulted from the slower growth of the labor force would reduce the amount of interest that the federal government would pay over the 2019–2028 period on the debt projected in CBO's baseline by \$46 billion. However, the reduction in revenues and slight increase in mandatory spending would increase the deficit, requiring the federal government to borrow more than CBO projected. That additional borrowing would add a total of \$11 billion to interest payments over the period. Overall, CBO estimates, net interest outlays over the 10-year period would be \$35 billion less than they are in the agency's baseline projections.

### **Changes in Interest Rates and Inflation**

Changes in interest rates and inflation affect the federal budget. Higher interest rates would increase the flow of interest payments to and from the federal government, and higher inflation rates would raise both revenues and outlays, though the effect on outlays would be larger. Lower interest rates and inflation would have the opposite effects.

#### **Higher Interest Rates**

The third rule of thumb illustrates the sensitivity of the budget to an increase in interest rates when all other economic variables are left unchanged. In the illustrative scenario, all interest rates—including both the rate on 3-month Treasury bills and the rate on 10-year Treasury notes—are 0.1 percentage point higher each year than they are in CBO's economic forecast. After analyzing that scenario, CBO concluded that if interest rates were 0.1 percentage point higher than projected and all other economic variables were unchanged, deficits would increase progressively over the projection period by amounts that rose from \$4 billion in 2019

Table 3.

**How Changes in Interest Rates and Inflation Might Affect the Federal Budget**

Billions of Dollars

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total	
											2019–2023	2019–2028
<b>Interest Rates Are 0.1 Percentage Point Higher Each Year</b>												
Changes in Revenues	-1	-1	-1	*	*	*	1	1	1	1	-4	1
Changes in Outlays												
Higher interest rates	2	6	9	11	14	16	18	21	22	24	42	144
Debt service	*	*	1	1	2	2	3	3	4	5	4	20
Total Change in Outlays	2	6	9	13	16	18	21	24	26	29	46	165
<b>Increase (-) in the Deficit Relative to CBO's Baseline</b>	<b>-4</b>	<b>-7</b>	<b>-10</b>	<b>-13</b>	<b>-15</b>	<b>-18</b>	<b>-20</b>	<b>-23</b>	<b>-25</b>	<b>-28</b>	<b>-50</b>	<b>-164</b>
<b>Inflation Is 0.1 Percentage Point Higher Each Year</b>												
Changes in Revenues	2	6	10	14	19	24	29	36	43	50	50	231
Changes in Outlays												
Mandatory outlays	*	2	4	7	10	13	16	20	24	29	22	125
Discretionary outlays <sup>a</sup>	*	*	1	1	3	4	5	7	8	10	5	38
Net interest												
Higher interest rates <sup>b</sup>	4	7	10	13	15	18	20	22	24	25	49	157
Debt service	*	*	*	1	1	1	2	2	2	3	2	12
Subtotal, net interest	4	7	10	13	16	19	21	24	26	28	51	169
Total Change in Outlays	4	9	15	22	29	35	43	50	58	67	79	332
<b>Increase (-) in the Deficit Relative to CBO's Baseline</b>	<b>-2</b>	<b>-4</b>	<b>-5</b>	<b>-8</b>	<b>-10</b>	<b>-11</b>	<b>-13</b>	<b>-14</b>	<b>-16</b>	<b>-18</b>	<b>-29</b>	<b>-101</b>

Source: Congressional Budget Office.

For this analysis, CBO used the economic forecast presented in Congressional Budget Office, *The Budget and Economic Outlook: 2018 to 2028* (April 2018), [www.cbo.gov/publication/53651](http://www.cbo.gov/publication/53651), and the baseline budget projections published in Congressional Budget Office, *An Analysis of the President's 2019 Budget* (May 2018), [www.cbo.gov/publication/53884](http://www.cbo.gov/publication/53884).

The rules of thumb capture the budgetary effects of specified changes in the economy, but they do not account for the source of those changes. The source may or may not be a change in fiscal policy, which would have additional budgetary effects. In addition, such a change in fiscal policy would probably have broader economic effects than those underlying the budgetary estimates shown here.

Each rule of thumb is roughly symmetrical. If, for example, interest rates were 0.1 percentage point lower each year than they are in CBO's economic forecast, deficits would be reduced by about the same amount that they are increased each year in the table above.

\* = between -\$500 million and \$500 million.

- Most discretionary spending through 2021 is governed by caps established by the Budget Control Act of 2011. In CBO's baseline, that spending would not be affected by changes in projected inflation.
- The change in outlays attributable to higher interest rates in this scenario differs from the estimate in the rule of thumb for interest rates because the principal of inflation-protected securities issued by the Treasury grows with inflation.

to \$28 billion in 2028. The cumulative deficit for the 2019–2028 period would be \$164 billion higher than it is in the agency's baseline projections (see Table 3).

Most of that difference would arise because the government's interest costs would be larger. The difference in

interest costs in 2019 would amount to only \$2 billion because most marketable government debt is in the form of securities that have maturities greater than one year. As the Treasury replaced maturing securities and increased its borrowing to cover future deficits, however, the budgetary effects of higher interest rates would



mount. Under this scenario, the added costs of higher interest rates on the debt projected in CBO's baseline would reach \$24 billion in 2028 and would total \$144 billion over the 2019–2028 period.

In conducting monetary policy, the Federal Reserve buys and sells Treasury and other securities. The Federal Reserve also pays interest on reserves (deposits that banks hold at the central bank). The interest that the Federal Reserve earns on its portfolio of securities and the interest that it pays on reserves affect its remittances to the Treasury, which are counted as revenues. If over the next 10 years all interest rates were 0.1 percentage point higher than CBO projects, the Federal Reserve's remittances in the next few years would be smaller than projected because higher interest payments on reserves would outstrip the additional interest earnings on its portfolio. Over time, however, the current holdings in the portfolio would mature and be replaced with higher-yielding investments; CBO projects that by 2023, the Federal Reserve's remittances would be larger if interest rates were higher than projected. Overall, rates that were 0.1 percentage point higher than those in CBO's economic forecast (all else being equal) would cause revenues from the Federal Reserve's remittances over the 2019–2028 period to be \$1 billion more than projected.

The larger deficits generated by the increase in interest rates would require the Treasury to borrow more than it is projected to borrow in CBO's baseline. That additional borrowing would raise the cost of servicing the debt by amounts that increased each year and reached \$5 billion in 2028. Over the 2019–2028 period, that additional borrowing would add a total \$20 billion to the cost of servicing the federal debt.

### Higher Inflation

The fourth rule of thumb shows the budgetary effects of inflation that is 0.1 percentage point higher each year than it is in CBO's baseline when all other economic variables—except for interest rates, which are addressed below—are left unchanged. In this stylized scenario, all wage and price indexes, including the GDP price index, the consumer price index for all urban consumers (CPI-U), the chained CPI-U, and the employment cost index (ECI) for wages and salaries of workers in private industry, would grow 0.1 percentage point more each year than they do in CBO's economic forecast. Although higher inflation would increase both revenues and outlays, the impact on outlays would be greater, resulting in larger budget deficits on net. Changes in inflation

could also lead to changes in real economic growth and unemployment; however, this rule does not account for the effects of such changes.

If inflation was 0.1 percentage point higher each year than the rate in CBO's economic forecast, total revenues over the 10-year period would be \$231 billion higher than they are in the agency's baseline budget projections, and total outlays would be \$332 billion higher, CBO estimates. The cumulative deficit for the 2019–2028 period would be \$101 billion higher than projected (see Table 3).

**Effects on Revenues.** Larger increases in wage rates and prices generally lead to greater labor income, profits, and other income, which in turn generate larger collections of individual income taxes, payroll taxes, and corporate income taxes. The parameters in the individual income tax system—including the income thresholds for the tax brackets—are indexed for inflation. Therefore, the share of taxpayers' income that is taxed at certain rates does not change very much when income increases because of higher inflation, so tax collections tend to rise roughly proportionally with income under those circumstances. But not all parameters of the individual income tax system are indexed for inflation. For example, the income thresholds for the surtax on investment income are fixed in nominal dollars, so if income rose because of higher inflation, the surtax would apply to a larger share of taxpayers' income.

For the payroll tax, rates are mostly the same for all income levels, and the maximum amount of earnings subject to the Social Security tax rises (after a lag) with average wages in the economy. Higher wage inflation therefore leads to a roughly proportional increase in payroll tax revenues. Similarly, all corporate profits are taxed at a single 21 percent statutory rate. Consequently, an increase in profits resulting from higher inflation generates a roughly proportional increase in corporate tax revenues. All told, inflation that was 0.1 percentage point higher each year than the rates in CBO's forecast would add an estimated total of \$231 billion in revenues to the amounts in the agency's baseline budget projections between 2019 and 2028.

**Effects on Mandatory Spending.** Higher inflation would also increase the cost of a number of mandatory spending programs, adding \$125 billion to projected spending, CBO estimates. Benefits for many mandatory programs are automatically adjusted each year to reflect

increases in prices. Specifically, benefits paid for Social Security, federal employees' retirement programs, disability compensation for veterans, the Supplemental Nutrition Assistance Program, Supplemental Security Income, the refundable portion of the earned income tax credit, and the child nutrition programs, among others, are adjusted (with a lag) for changes in the consumer price index, one of its components, or another measure of inflation. Many of Medicare's payment rates are also adjusted annually for inflation. Spending for some other programs, such as Medicaid, is not formally indexed to price changes but nevertheless tends to grow with inflation because the costs of providing benefits under those programs increase as nominal wages and prices rise. In addition, to the extent that initial benefit payments to participants in retirement and disability programs are linked to wages, increases in nominal wages resulting from higher wage inflation boost future outlays for those programs.

**Effects on Discretionary Spending.** Higher inflation would raise CBO's baseline projections of spending for discretionary programs in two main ways. First, higher inflation would increase CBO's baseline projections of outlays for most discretionary programs after 2021. The Budget Control Act of 2011 (Public Law 112-25), as modified by subsequent legislation, imposed caps on most discretionary budget authority through 2021, and CBO's baseline incorporates the assumption that appropriations for most purposes will equal those caps. Higher inflation would not alter the statutory caps and thus would have no effect on CBO's projections of spending that is constrained by those limits. However, for the years after 2021—when, under current law, caps will no longer be in place—CBO's baseline projections incorporate the assumption that the discretionary funding currently subject to the caps will increase with inflation from the 2021 amount. As a result, inflation that was 0.1 percentage point higher each year than the rates underlying CBO's economic forecast would boost projected outlays for the 2022–2028 period by a total of \$29 billion.

Although the caps on discretionary appropriations are not indexed for inflation, higher inflation would diminish the amount of goods that could be acquired and the benefits and services that could be provided under those fixed caps.<sup>7</sup> If, over time, higher inflation led lawmakers

to adjust the discretionary caps, the effect on spending and on deficits would be greater.

The second way in which higher inflation would increase CBO's projections of discretionary outlays for the 2019–2028 period is through the adjustments to the caps on appropriations for certain purposes that are permissible under current law. In CBO's projections for 2019, those adjustments include \$111 billion in funding for emergencies, \$81 billion designated for overseas contingency operations (war-related activities, primarily in Afghanistan), \$8 billion in funding for disaster relief, and \$2 billion for initiatives aimed at enhancing program integrity by reducing improper payments from certain benefit programs. When constructing its current baseline, CBO extrapolated the funding provided for those purposes in future years on the basis of amounts appropriated for 2018 by adjusting those amounts to account for inflation.<sup>8</sup> If inflation was 0.1 percentage point higher each year than forecast, CBO's projections of such outlays for the 2019–2028 period would increase by a total of \$9 billion.

All told, CBO's projections of discretionary outlays for the 10-year period would be \$38 billion greater than the amounts in the agency's current baseline budget projections.

**Effects on Net Interest Costs.** Inflation also has an impact on outlays for net interest because it is estimated to affect interest rates. If inflation was 0.1 percentage point higher than CBO projects, then interest rates would be 0.1 percentage point higher (all else being equal). As a result, new federal borrowing would incur higher interest costs, and outstanding inflation-indexed securities would be more costly for the federal government. In addition, higher interest rates would, as already noted, first reduce and then increase revenues from the Federal Reserve's remittances to the Treasury. The direct effect of such higher rates would be to add \$157 billion in interest costs to CBO's baseline projections of outlays. Moreover, the effects of higher inflation would increase debt over the 10-year period, boosting interest costs by an additional \$12 billion.

7. In CBO's baseline, the caps on discretionary spending for 2020 and 2021 are about 10 percent lower and 8 percent lower, respectively, than the cap for 2019.

8. The extent to which the discretionary caps for funding of program integrity initiatives can be adjusted is limited by other statutory provisions.

## Comparison With CBO's Previous Rules of Thumb

CBO's rules of thumb change somewhat from year to year because the agency updates the rules each year to reflect its latest economic forecast and current law.<sup>9</sup> But differences between the rules of thumb presented in this report and those that CBO has published in the past are greater than they typically are for several reasons:

- In the scenarios for inflation and interest rates in this report, the variables are 0.1 percentage point higher each year than they are in CBO's economic forecast. In the past, CBO used interest rates and inflation that were 1 percentage point higher each year.
- The time period covered by the scenarios underlying the rules of thumb is 10 years this year (from January 2019 through December 2028), whereas in the past, the scenarios spanned an 11-year period. Last year, for example, the scenarios covered the period January 2017 through December 2027.
- The scenario for slower productivity growth in this year's report reflects the reduction in the supply of labor that would result from lower productivity growth and wage rates. CBO did not account for that effect in the past.
- CBO relied on a more detailed method than it has relied on in the past to estimate how the prices of inputs used in the calculation of payment rates for Medicare and Medicaid would respond to slower productivity and labor force growth.
- Recent major legislation, particularly Public Law 115-97 (originally called the Tax Cuts and Jobs Act), the Bipartisan Budget Act of 2018 (P.L. 115-123), and the Consolidated Appropriations Act, 2018 (P.L. 115-141), affected some of the parameters that underlie CBO's economic and budget models, including changes in tax rates and the rates at which discretionary funding is spent.

9. For CBO's rules of thumb from 2017, see Dan Ready, "How Economic Changes Affect CBO's Budget Projections," *CBO Blog* (April 24, 2017), [www.cbo.gov/publication/52524](http://www.cbo.gov/publication/52524), and the accompanying table. See also Congressional Budget Office, *The Budget and Economic Outlook: 2017 to 2027* (January 2017), Appendix B, [www.cbo.gov/publication/52370](http://www.cbo.gov/publication/52370).

This report supplements the series of reports on the state of the budget and the economy that the Congressional Budget Office issues every year. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

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