



How Changes in Economic Conditions Might Affect the Federal Budget: 2020 to 2030

Some of the 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.¹

To show how variations in economic conditions might affect the budget, CBO analyzed how the budget might change if values of the following key economic variables differed from those in the agency's forecast:

- The growth of productivity and, consequently, the growth of real (inflation-adjusted) gross domestic product (GDP);
- Labor force growth, which would also affect real GDP growth;
- Interest rates; and
- Inflation.

1. See Congressional Budget Office, *The Budget and Economic Outlook: 2020 to 2030* (January 2020), www.cbo.gov/publication/56020. In the past, the analysis included in this report has appeared as an appendix in the annual *Budget and Economic Outlook*. This year, however, it is published separately because the timing of recent legislation did not allow enough time to include it in that report.

To illustrate the budgetary effects of economic changes, CBO created and analyzed four scenarios to develop “rules of thumb” for those variables. The scenarios reflect the following changes from the agency's current economic forecast: slower productivity growth, slower labor force growth, higher interest rates, and higher inflation. Each of those changes would increase deficits above the amounts in CBO's baseline budget projections; however, the values of any of the variables could be higher or lower than they are in CBO's forecast. Because the rules of thumb are roughly symmetrical, if productivity or the labor force instead 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.

Specifically, CBO's analysis yielded the following results:

- If productivity grew at a rate that was 0.1 percentage point slower each year than it is in the agency's economic forecast, annual deficits would be larger than projected by amounts that would climb to \$63 billion by 2030, CBO estimates. Over the 2021–2030 period, the cumulative deficit would be \$306 billion larger than it is in CBO's baseline projections.
- If the labor force grew at a rate that was 0.1 percentage point slower each year than it is in CBO's economic forecast and the unemployment rate

Notes: All years referred to in describing the budgetary effects of changes in the economy are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end. Years referred to in describing estimated changes to the economy are calendar years. Numbers in the text and tables may not add up to totals because of rounding.

remained unchanged, annual deficits would be larger than those in the agency's baseline budget projections by amounts that would grow each year and reach \$35 billion by 2030, CBO estimates. The cumulative deficit for 2021 to 2030 would be \$162 billion larger than it is in the agency's baseline budget projections.

- If all interest rates—including both the rate on 3-month Treasury bills and the rate on 10-year Treasury notes—were 0.1 percentage point higher each year than they are in CBO's economic forecast, deficits would increase progressively over the projection period by amounts that would rise to \$31 billion in 2030. The cumulative deficit for 2021 to 2030 would be \$185 billion larger than it is in the agency's baseline projections.
- If 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 for wages and salaries of workers in private industry—rose by 0.1 percentage point more each year than they do in CBO's economic forecast, annual deficits would be larger than projected by amounts that would climb to \$28 billion by 2030. The cumulative deficit for the 2021–2030 period would be \$148 billion larger than projected.

Background

When economic conditions differ from those in the agency's forecast, actual federal spending and revenues are likely to differ from CBO's projections because economic conditions affect federal revenues and outlays in several ways. Revenues depend on the total amount of income that is subject to taxation, including wages and salaries, 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 explicitly (for example, through cost-of-living adjustments), or indirectly. 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 such spending is not constrained by the caps on discretionary budget authority that are in place under current law.²

Economic conditions could differ from those in CBO's forecast for a variety of reasons. Shifts in economic trends are difficult to identify, and until forecasters can identify those shifts, they may make incorrect inferences about the future trajectory of the economy. For example, CBO and other forecasters were slow to appreciate recent shifts in trends in interest rates. Changes in policy can also cause economic outcomes to differ from CBO's projections. As one of many examples, future changes in immigration policy could have significant implications for the growth of the labor force. Furthermore, the full effect of specific policy changes may not be immediately apparent, so actual conditions may diverge from CBO's projections even if the projections are intended to account for those policy changes. Finally, sometimes changes in economic conditions, such as turning points in the business cycle, simply cannot be predicted on the basis of available information.

The estimates in this report are used to calibrate CBO's budgetary feedback model. The budgetary feedback model, like the rules of thumb, was built to approximate how the federal budget would respond to changes in the economy. However, the budgetary feedback model provides a unified framework to quantify such changes, whereas the rules of thumb instead depend on a wider array of models specific to individual federal programs to generate estimates.³

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

2. The Bipartisan Budget Act of 2019 (Public Law 116-37) increased the limits on most discretionary funding that were in place under the Budget Control Act of 2011 (P.L. 112-25) for 2020 and 2021. After 2021, funding that is currently constrained by the caps is, by law, projected to grow with inflation. The relatively small amount of discretionary funding that is not constrained by the caps is projected to grow with inflation starting in 2021.
3. See Nathaniel Frentz, Jaeger Nelson, Dan Ready, and John Seliski, *A Simplified Model of How Macroeconomic Changes Affect the Federal Budget*, Working Paper 2020-01 (Congressional Budget Office, January 2020), www.cbo.gov/publication/55884.

scenarios underlie the agency's rules of thumb. In each of those scenarios, the values of economic variables differ from those in the agency's forecast by 0.1 percentage point each year starting in January 2020. The first two scenarios—involving slower productivity growth and slower labor force growth—incorporate changes to variables that directly affect real GDP growth. Those changes would cause the economy to grow more slowly than it does in CBO's forecast, thereby affecting other economic variables as well. The third and fourth scenarios—involving higher interest rates and higher inflation—differ from the first two in that they do not incorporate any changes in real GDP growth. CBO has produced an interactive 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 CBO's baseline budget projections.⁴

For simplicity, CBO constructed the scenarios so that the values for the four economic variables differ from those in the agency's forecast by 0.1 percentage point in the direction that would worsen the budget outlook. The scenarios are not intended to indicate how 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 1.3 percentage points above or below the projected rate. Similarly, there is about a two-thirds chance that the average annual rate of inflation (as measured by the GDP price index) over the next five years will be within 0.8 percentage points of the rate in CBO's forecast in either direction, and the probability is the same that the average interest rate (on 10-year Treasury notes, in real terms) will be within 0.9 percentage points of the forecast rate in either direction.⁵

Productivity Growth. In this scenario, productivity growth is 0.1 percentage point slower each year than

4. Congressional Budget Office, *Workbook for How Changes in Economic Conditions Might Affect the Federal Budget: 2020 to 2030* (interactive tool, February 2020), www.cbo.gov/publication/56097.

5. CBO estimated those ranges on the basis of an analysis of its forecasting accuracy over the past four decades for GDP and since 1984 for inflation and interest rates. For more on the uncertainty underlying economic forecasts, see Congressional Budget Office, *CBO's Economic Forecasting Record: 2019 Update* (October 2019), www.cbo.gov/publication/55505.

it is in CBO's economic forecast, causing real GDP to be about 1.4 percent lower in 2030 than forecast (see Table 1). Slower productivity growth, in turn, would affect other economic variables, such as the size of the labor force, wage rates, and interest rates.

Labor Force Growth. In the second scenario, the labor force's rate of growth is 0.1 percentage point slower each year than the rate in the agency's economic forecast, causing real GDP to be about 0.7 percent lower than forecast in 2030. If the population grew at the rate that CBO projects, the slower growth of the labor force would cause the labor force participation rate to fall below the agency's current estimates. That difference would grow by a roughly equal amount each year until the labor force participation rate was about 0.6 percentage points lower in 2030 than forecast. Like slower productivity growth, slower labor force growth would affect other economic variables.

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 the other scenarios, this scenario does not include any changes to the projected amounts of interest payments made or received by individuals or businesses.

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 that are measured as nominal values, such as GDP, taxable income, and interest rates, increase in response to higher inflation, but indicators that are measured as real values, such as real GDP, are the same as they are in CBO's economic forecast.

Applying the Rules of Thumb

CBO's rules of thumb provide a rough sense of how changes in those economic variables would affect the federal government's revenues and outlays. The rules of thumb are roughly symmetrical and scalable, which means that they can be used to analyze a number of scenarios in which values for those variables differ from the ones presented here, although there are some caveats.

Symmetry. Each rule of thumb is roughly symmetrical. Thus, if the growth of productivity or the labor force was instead 0.1 percentage point faster than in CBO's

Table 1.

Differences Between the Illustrative Scenarios and CBO's Economic Forecast in 2030

Percent

	Level of Real GDP	Level of Nominal GDP	Labor Force	Interest Rate on 10-Year Treasury Notes (Percentage points)	Level of the GDP Price Index	Level of the Employment Cost Index ^a
Slower Productivity Growth	-1.4	-1.4	-0.2	-0.10	0	-1.2
Slower Labor Force Growth	-0.7	-0.7	-1.0 ^b	-0.05	0	0.4
Higher Interest Rates	0	0	0	0.10	0	0
Higher Inflation	0	1.1	0	0.10	1.1	1.1

Source: Congressional Budget Office.

In the scenario for each rule of thumb, economic variables differ by 0.1 percentage point from those in CBO's economic forecast in the direction that would worsen the budget outlook, but those variables could be higher or lower than forecast. Each rule of thumb is roughly symmetrical. If, for example, the rate of productivity growth was 0.1 percentage point 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 the growth of the labor force in this scenario is 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 2030 is only 1.0 percent (rather than 1.1 percent, as might be expected from 11 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.

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.

Scalability. In addition to being symmetrical, the rules of thumb are roughly scalable—that is, an increase or decrease in the value of a given economic variable will produce a roughly proportional increase or decrease in the resulting budgetary effects. For example, if productivity growth was 0.2 percentage points slower each year than it is in CBO's economic forecast rather than 0.1 percentage point slower as it is in the scenario discussed here, the increase in the deficit would roughly double.

However, the scalability of the rules of thumb is limited. The more the values of economic variables differ from those in CBO's forecast, the less accurate the estimates produced using the rules of thumb are likely to be. Although two of the illustrative scenarios incorporate a broad set of interactions among several economic variables, all four rules of thumb are nevertheless simplified and do not account for more complex interactions

among variables—such as those among growth in real GDP, inflation, and the unemployment rate. That limitation becomes more pertinent as the difference between the value of an economic variable in a given scenario and in CBO's forecast increases. Certain elements of the tax code and some provisions relating to mandatory outlays also make it likely that as such differences increase, estimates produced using the rules of thumb will become less and less accurate.

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 of thumb can be applied to scenarios in which the differences vary somewhat from year to year, but they cannot be used to accurately estimate the budgetary effects of significant variations in those differences over the 10-year period. For example, if the rate of labor force growth differed from the value in CBO's forecast by 0.5 percentage points in 2030 but was the same as the forecast value in all other years, the average annual difference would be a little less than 5 basis points (that

is, 0.05 percentage points).⁶ 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 (a difference of 0.1 percentage point each year), nor would the agency's estimate of the budgetary effect in 2030 be five times greater than the value for that year under the illustrative scenario. Both estimates would be considerably smaller than those ratios.

To assess the scalability of the rules of thumb, CBO compared estimates produced by means of the simplified calculations in its online workbook with estimates made by means of a broader set of models that the agency uses to assess the effects of economic changes on the budget. CBO found that the four rules of thumb produced approximations of the estimates generated using CBO's economic and budget models as long as the values for each of the variables did not differ from the forecast values by more than a certain amount. Specifically, the rules of thumb were scalable as long as the annual differences from the forecast values were within the following ranges:

- For productivity growth, between -0.5 percentage points and 0.5 percentage points;
- For labor force growth, between -0.75 percentage points and 0.75 percentage points;
- For interest rates, between -1.0 percentage point and 1.0 percentage point; and
- For 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 rules of thumb and therefore would require a more detailed analysis.

Caveats. If economic conditions changed in such a way that they reflected the changes incorporated in two or more of the simplified 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 slower than they are in CBO's

economic forecast, the two effects would interact and lower output growth by more than would be suggested by simply adding those effects.

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 could include changes in policy. For example, a proposal might call for an increase in government spending that would affect inflation. The rule of thumb regarding inflation approximates the budgetary effects that would result from the estimated changes in inflation—but it does not incorporate the budgetary effects of the increased spending itself, nor does it encompass other effects on the economy besides a change in inflation.

In addition, some changes in policy could alter how changes in the economy affect the federal budget. For example, a new tax policy that changed effective tax rates would probably affect the relationship between changes in the economy and revenues. Changes to that relationship would cause the budgetary effects resulting from changes in the economy to differ from those that would be estimated using the rules of thumb.

Changes in Productivity Growth and Labor Force Growth

The growth of productivity and the growth of the labor force are important determinants of real GDP 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.⁷

Slower Productivity Growth

The first rule of thumb illustrates the budgetary effects of productivity growth 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 to \$63 billion by 2030, CBO estimates. In the 2021–2030 period, the cumulative deficit would be

6. One basis point is equivalent to one one-hundredth of a percentage point, or 0.01 percentage point. Basis points are commonly used as a unit of measure for differences of less than 1 percentage point.

7. 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.

\$306 billion larger than it is in CBO's baseline projections (see Table 2).

In this analysis, CBO examined how the slower growth of total factor productivity (that is, real output per unit of combined labor and capital services) might affect GDP, income, and interest rates. The agency found that slower-than-anticipated productivity growth would lead to slower growth in GDP because both labor and capital would be producing less than projected in CBO's current economic forecast. If workers produced less, the average hourly wage rate would be lower; therefore, 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 and total income would be about 1.4 percent lower by 2030 than they are in the current forecast, CBO estimates. Meanwhile, interest rates would be about 1 basis point below those in the agency's forecast for 2020, and that difference would increase by roughly 1 additional basis point in each subsequent year. By 2030, interest rates would be about 10 basis points lower than in the forecast (see Table 1 on page 4).

If economic growth slowed in each year as a result of lower productivity growth, taxable income would also grow more slowly than projected, and tax revenues would fall below CBO's baseline projections by increasing amounts over time, resulting in a shortfall of \$85 billion in 2030. Between 2021 and 2030, the drop in revenues stemming from the slower growth in income would increase deficits by a total of \$414 billion.

Over that 10-year period, slower income growth would also lead to a \$26 billion net decrease in mandatory outlays for programs whose spending is either explicitly or implicitly linked to wage growth. Outlays for Medicare, Medicaid, unemployment insurance, and Social Security

would decrease by nearly \$33 billion; that decrease would be partially offset by an increase of over \$6 billion in outlays for the refundable portions of the earned income tax credit, the child tax credit, and the American Opportunity Tax Credit.⁸

Because slower productivity growth would push interest rates down, the amount of interest that the federal government would pay on the debt projected in CBO's baseline between 2021 and 2030 would decrease by \$107 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 \$25 billion to interest payments between 2021 and 2030. Together, those effects would result in net interest outlays that were \$82 billion less than the amount in the agency's baseline projections over the 2021–2030 period.

Slower Labor Force Growth

The second rule of thumb illustrates the budgetary effects of the labor force's growing more slowly than CBO anticipates. Specifically, if annual growth in the labor force was 0.1 percentage point slower than it is in CBO's economic forecast and the unemployment rate remained unchanged, annual deficits would be larger than those in the agency's baseline budget projections by amounts that would grow each year and reach \$35 billion by 2030, CBO estimates. The cumulative deficit for 2021 to 2030 would be \$162 billion larger 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 involving slower productivity growth because the resulting economic effects are smaller (see Table 1 on page 4).

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 average 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, which would partially offset the effects of the initial decline in labor force growth. Despite those effects, total labor income would be less than it is in CBO's

8. 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.

Table 2.

How Changes in Productivity Growth and Labor Force Growth Might Affect CBO's Baseline Budget Projections

Billions of Dollars

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total	
												2021–2025	2021–2030
Productivity Growth Is 0.1 Percentage Point Lower per Year													
Changes in Revenues	-3	-8	-13	-19	-26	-33	-42	-52	-62	-73	-85	-100	-414
Changes in Outlays													
Mandatory outlays	*	*	-1	-1	-1	-2	-2	-3	-5	-5	-7	-4	-26
Net interest													
Lower rates	-1	-2	-3	-5	-7	-9	-11	-13	-16	-19	-22	-26	-107
Debt service	*	*	*	1	1	1	2	3	4	6	7	3	25
Subtotal, net interest	-1	-2	-3	-4	-6	-7	-9	-10	-12	-13	-15	-23	-82
Total Change in Outlays	-1	-2	-4	-5	-7	-9	-11	-14	-16	-19	-21	-27	-108
Increase (-) in the Deficit	-2	-6	-10	-14	-19	-24	-31	-39	-46	-54	-63	-72	-306
Labor Force Growth Is 0.1 Percentage Point Lower per Year													
Changes in Revenues	-1	-3	-6	-8	-11	-14	-17	-21	-25	-30	-35	-41	-170
Changes in Outlays													
Mandatory outlays	*	1	1	2	2	3	4	4	5	6	7	8	35
Net interest													
Lower rates	-1	-2	-2	-3	-4	-5	-6	-7	-8	-9	-11	-16	-56
Debt service	*	*	*	*	*	1	1	2	2	3	4	2	13
Subtotal, net interest	-1	-2	-2	-3	-4	-4	-5	-5	-6	-7	-7	-14	-43
Total Change in Outlays	*	-1	-1	-1	-1	-1	-1	-1	-1	*	*	-6	-8
Increase (-) in the Deficit	-1	-3	-5	-7	-9	-12	-16	-20	-25	-30	-35	-36	-162

Source: Congressional Budget Office.

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 policy, which would have additional budgetary effects. In addition, such a change in 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 higher 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.

baseline. Meanwhile, the number of workers using a given amount of capital would fall below the number projected in CBO's economic forecast, so the returns on that capital would decline as well. As described above, the resulting decline in the rates of return on private investment would 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 the effects of such changes.

In CBO's estimation, if the rate of growth in the labor force was 0.1 percentage point slower than anticipated, GDP growth would also be slower each year. Meanwhile, interest rates would be slightly lower than forecast for 2020, and that difference would increase in each subsequent year. By 2030, 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 (see Table 1 on page 4).

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. The shortfall

would increase over time, reaching \$35 billion in 2030. Also, the higher-than-projected wage rates and the smaller-than-projected number of workers would, on net, add a total of \$35 billion to mandatory outlays between 2021 and 2030. Specifically, because outlays for Medicare, Medicaid, and Social Security are linked to wage growth, mandatory spending for those programs would increase by a little less than \$39 billion. But because there would be fewer workers and higher wages, over \$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 tax credit, the child tax credit, and the American Opportunity Tax Credit.

Between 2021 and 2030, 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 on the debt projected in CBO's baseline by about \$56 billion. However, the reduction in revenues and slight increase in mandatory spending would increase the deficit, requiring the federal government to borrow more than projected. That additional borrowing would add \$13 billion to interest payments. Overall, CBO estimates that net interest outlays between 2021 and 2030 would be \$43 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 budget's sensitivity 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. Under that scenario, in CBO's estimation, deficits would exceed those in CBO's baseline projections by amounts that would rise to \$31 billion in 2030. The cumulative deficit for 2021 to 2030 would be \$185 billion larger 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. As the Treasury replaced maturing securities and increased its borrowing to cover future deficits, 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 \$28 billion in 2030 and would total \$175 billion for the 2021–2030 period, after accounting for a small increase in additional interest payments received by the government.

As part of 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 over the next few years would be smaller than projected because higher interest payments on reserves would outstrip the additional earnings from interest on its portfolio. Over time, however, the current holdings in the portfolio would mature and be replaced with higher-yielding investments; as a result, by 2023, the Federal Reserve's remittances would be larger. Overall, rates that were 0.1 percentage point higher than those in CBO's economic forecast would (all else being equal) cause revenues from the Federal Reserve's remittances over the 2021–2030 period to be \$9 billion more than projected.

The larger deficits generated by an 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 2030. Between 2021 and 2030, the additional borrowing would add a total of \$19 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—are left unchanged. All wage and price indexes, including the GDP price index, the CPI-U, the chained CPI-U, and the employment cost index for wages and salaries of workers in private industry, would rise by 0.1 percentage point more

Table 3.

How Changes in Interest Rates and Inflation Might Affect CBO's Baseline Budget Projections

Billions of Dollars

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total	
												2021–2025	2021–2030
Interest Rates Are 0.1 Percentage Point Higher per Year													
Changes in Revenues	-1	-1	*	*	1	1	1	1	2	2	2	1	9
Changes in Outlays													
Higher rates	2	5	9	12	14	17	19	21	24	26	28	56	175
Debt service	*	*	*	1	1	1	2	2	3	4	5	3	19
Total Change in Outlays	2	6	9	12	15	18	21	24	27	30	33	60	194
Increase (-) in the Deficit	-3	-6	-9	-12	-14	-17	-20	-22	-25	-28	-31	-59	-185
Inflation Is 0.1 Percentage Point Higher per Year													
Changes in Revenues	2	6	10	15	20	25	31	37	44	51	58	75	296
Changes in Outlays													
Mandatory spending	*	2	5	8	11	15	19	23	28	32	39	40	180
Discretionary spending ^a	0	*	1	2	3	5	6	8	10	12	13	11	61
Net interest													
Higher rates ^b	3	7	10	13	16	18	21	23	25	27	30	64	189
Debt service	*	*	*	*	1	1	1	2	2	3	4	2	14
Subtotal, net interest	3	7	10	14	16	19	22	24	27	30	33	66	203
Total Change in Outlays	3	9	16	23	31	39	47	55	65	74	85	117	444
Increase (-) in the Deficit	-1	-3	-6	-9	-11	-14	-16	-18	-21	-23	-28	-42	-148

Source: Congressional Budget Office.

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 policy, which would have additional budgetary effects. In addition, such a change in 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.

a. 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.

b. 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.

each year than they do in CBO's economic forecast. All economic indicators that are measured as nominal values, such as GDP, taxable income, and interest rates, increase in response to higher inflation, whereas those that are measured as real values, such as real GDP, remain unchanged. As a result, higher inflation would increase both revenues and outlays, although the impact on outlays would be greater, resulting in larger budget deficits, on net.

Under this scenario, total revenues between 2021 and 2030 would be \$296 billion more than they are in the agency's baseline budget projections, and total outlays

would be \$444 billion more, CBO estimates. The cumulative deficit for the 2021–2030 period would be \$148 billion larger 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. Many provisions in the individual income tax system—including the income thresholds for the tax brackets—are adjusted, or 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. However, 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 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, nearly all corporate profits are taxed at a single statutory rate of 21 percent. Consequently, an increase in profits resulting from higher inflation generates a roughly proportional increase in corporate tax revenues. Finally, higher nominal interest rates would first reduce and then increase revenues from the Federal Reserve's remittances to the Treasury. All told, inflation that was 0.1 percentage point higher than forecast each year would add \$296 billion in revenues to the amounts in the agency's baseline budget projections between 2021 and 2030.

Effects on Mandatory Spending. Higher inflation would also increase the cost of a number of mandatory spending programs, adding \$180 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, child nutrition programs, and the refundable portion of the earned income tax credit, 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 changes in prices 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 benefit payments in retirement and disability programs are linked to participants' preenrollment wages, increases in nominal wages resulting from higher wage inflation would boost future outlays for those programs.

Effects on Discretionary Spending. Higher inflation would raise CBO's projections of spending for discretionary programs in two main ways. First, higher inflation would increase projected outlays for most discretionary programs after 2021. The Budget Control Act of 2011, as modified by subsequent legislation, imposed caps on most discretionary budget authority through 2021, and CBO's baseline incorporates the assumption that total 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, the 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 2022–2030 period by a total of \$56 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 caps. If 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 2021–2030 period is through its effect on spending that is not constrained by the caps. By law, adjustments to the caps are made to accommodate appropriations for certain purposes. For 2020, CBO's baseline incorporates adjustments of \$80 billion designated for overseas contingency operations (war-related activities, primarily in Afghanistan), \$18 billion for disaster relief, \$9 billion for emergency requirements, \$2 billion for wildfire suppression efforts, and \$2 billion for initiatives aimed at enhancing program integrity by reducing improper payments from certain benefit programs.⁹ Because the funding for those activities is not constrained by the caps in 2021, it is projected to increase with inflation starting in that

9. The extent to which the discretionary caps can be adjusted for the funding of disaster relief, wildfire suppression, and program integrity efforts is limited by other statutory provisions. For 2020, the caps will also be adjusted to account for \$2.5 billion in additional funding for the 2020 census, but that funding will be constrained by the caps again in 2021.

year. As a result, if inflation was 0.1 percentage point higher each year than forecast, CBO's projections of such outlays for the 2021–2030 period would increase by a total of \$5 billion.

All told, CBO's projections of discretionary outlays through 2030 would be \$61 billion greater than the amounts in the agency's current baseline budget projections.

Effects on Net Interest Costs. Inflation also has an impact on net outlays for interest because of higher nominal interest rates. New federal borrowing would incur higher interest costs, and outstanding inflation-indexed securities would be more costly for the federal government. The direct effect of such higher rates would be to add \$189 billion in interest costs to CBO's baseline projections of outlays. Moreover, the effects of higher inflation would increase federal debt between 2021 and 2030, boosting interest costs by an additional \$14 billion.

This report supplements *The Budget and Economic Outlook: 2020 to 2030*, which is available on CBO's website (www.cbo.gov/publication/56020). In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

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CBO continually seeks feedback to make its work as useful as possible. Please send any comments to communications@cbo.gov.



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