Key Methods That CBO Used to Estimate the Effects of Pandemic-Related Legislation on Output

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Abstract

This paper describes key methods that the Congressional Budget Office used to estimate the effects on economic output of the laws enacted in response to the 2020 coronavirus pandemic. To quantify the short-term effects that those laws had on output by means of their influence on overall demand for goods and services, CBO used delayed and reduced estimates of the output multiplier to reflect the effects of social distancing. The agency combined estimates of the effects on overall demand with those on the supply of labor in the economy, when applicable, to examine the short-term effects of enhanced unemployment compensation, the Paycheck Protection Program and related provisions, the Federal Reserve's emergency lending facilities, and other provisions. To estimate the longer-term effects of pandemic-related legislation on output, CBO used its Solow-type growth model to quantify the effect of higher federal deficits on national saving and private investment.

Notes

Unless indicated otherwise, all years referred to in this paper are calendar years.

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

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Introduction

This paper describes key methods that the Congressional Budget Office used to estimate the effects on real (inflation-adjusted) output, or gross domestic product (GDP), of the laws enacted in response to the 2020 coronavirus pandemic.[1] Taken together, that legislation substantially changed policies governing taxes and spending and provided significant financial support to households, businesses, and state and local governments through various channels. In CBO's assessment, the changes in federal fiscal policies offset part of the deterioration in economic conditions brought about by the pandemic, boosting the level of real GDP by 4.7 percent in 2020 and 3.1 percent in 2021 (see Table 1).[2] In the longer term, the agency estimates, higher federal budget deficits as a result of the legislation will reduce national saving, ultimately causing the level of real GDP to be about 0.4 percent lower in 2030 than it otherwise would have been.

To analyze the short-term economic effects of pandemic-related legislation, CBO augmented its existing analytical methods with information from relevant research and developed new approaches to account for the circumstances surrounding the current economic environment.[3] In particular, actions that governments, businesses, and households in the United States and around the world have taken to slow the spread of the coronavirus by limiting in-person interactions—collectively known as social distancing measures—are unique to the current recession.[4] CBO expects that social distancing will delay and reduce fiscal policy's effect on overall demand for goods and services. In addition, some key provisions of the legislation alter individuals' labor supply choices in the economy, whereas others financially support businesses and help cushion the impact of the pandemic and social distancing on the economy's productive capacity. CBO's

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[1] Those estimates are presented in Congressional Budget Office, *The Effects of Pandemic-Related Legislation on Output* (September 2020), www.cbo.gov/publication/56537. The estimates presented in this paper do not include the effects of nonlegislative actions, such as those taken by the Federal Reserve (for example, lowering interest rates and purchasing mortgage-backed and Treasury securities) and the Administration (for example, delaying tax-filing deadlines). The estimates do account for the legislation's funding of lending facilities established by the Federal Reserve to support the flow of credit to businesses, households, and state and local governments. CBO did not analyze the effects of any legislation that was enacted, executive orders that were made, or Federal Reserve actions that were taken after August 4, 2020.

[2] Those effects were incorporated into the agency's most recent economic forecast; see Congressional Budget Office, *An Update to the Economic Outlook: 2020 to 2030* (July 2020), www.cbo.gov/publication/56442. The estimates in this report are presented in relation to an implied projection of real GDP that does not include the effects of the legislation—a projection computed by removing the estimated effects of the legislation from the July forecast. However, CBO did not construct a comprehensive projection of what the economy would have looked like without those legislative effects.

[3] For a general discussion of the methods that CBO uses to analyze the economic effects of fiscal policy changes, see Congressional Budget Office, *How CBO Analyzes the Effects of Changes in Federal Fiscal Policies on the Economy* (November 2014), www.cbo.gov/publication/49494.

[4] Social distancing measures include reducing social activities and travel, curtailing the activity of schools and businesses, prohibiting large gatherings, and working from home. CBO did not estimate effects of the pandemic-related legislation on the trajectory of the pandemic or on social distancing measures because the agency lacked the information to do so.

analytical framework incorporates those effects and other aspects of legislative actions taken in response to the pandemic.

To estimate the longer-term effects of pandemic-related legislation on output, the agency used its Solow-type growth model. CBO expects that pandemic-related legislation will affect output in the longer term primarily by reducing national saving and private investment. Increased federal deficits and borrowing lower output in the longer term by reducing the amount of funds available for private investment, thereby causing the capital stock to be lower than it would be otherwise. CBO used a weighted average of the short-term and longer-term effects to estimate the effect on output over the period from 2020 to 2030.

Short-Term Effects

CBO assesses the short-term effects of changes in fiscal policies on the economy by estimating the impact of those policies on overall demand for goods and services and combining those results with estimates of the policies' impact on the supply of labor and business capital. To incorporate the agency's projections of how the pandemic and social distancing will unfold, the agency made some adjustments to its existing analytical methods to reflect the extent to and pace at which certain sectors of the economy are projected to resume more regular operations. The degree of social distancing tempers any economic effects by reducing the sensitivity of output to changes in fiscal policies. CBO expects that some of the boost to economic activity that is hampered by social distancing measures will be partially recovered in later periods, when those measures recede.

In the short term—that is, from 2020 through 2023—pandemic-related legislation will affect the economy primarily by financially supporting individuals, businesses, and state and local governments, thereby boosting overall demand for goods and services. Some provisions in the pandemic-related legislation—such as enhanced unemployment compensation, the Paycheck Protection Program (PPP), and the Federal Reserve's emergency lending facilities—also affect output by altering the overall supply of labor in the economy, sustaining payrolls, or preserving intangible business capital. Other provisions, such as recovery rebates and direct assistance to state and local governments, chiefly affect output in the short term via their influence on overall demand.

How Changes in Overall Demand for Goods and Services Affect Output
To quantify how output is affected by pandemic-related legislation through its influence on overall demand for goods and services, CBO estimated an output multiplier for each policy (or provision).[5] The output multiplier measures the change in economic output, or real GDP,

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[5] For an example of a previous analysis that the agency prepared using output multipliers, see Congressional Budget Office, *Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2014* (February 2015), www.cbo.gov/publication/49958.

generated by each dollar of the budgetary cost of a change in fiscal policy. The output multiplier is the product of a policy's direct and indirect effects on overall demand for goods and services. The indirect effects of changes in fiscal policies enhance or offset the direct effects as they propagate throughout the economy. The indirect effects of changes in fiscal policies on output can be summarized by a demand multiplier, defined as the total change in output for each dollar of direct effect on demand. Using that approach, the change in output, ΔY, arising from a change in fiscal policy that has budgetary cost Δd can be written in its simplest form as

$$\Delta Y = \Delta d \times \underbrace{(\text{Direct Effects on Demand} \times \text{Demand Multiplier})}_{\text{Output Multiplier}} \tag{1}$$

Direct Effects on Overall Demand. A policy's direct effects on the overall demand for goods and services result from changes in purchases of goods and services by federal agencies and by the people and organizations that receive federal payments or pay federal taxes. For example, if a change in fiscal policy results in a $1 increase in purchases by the federal government, the direct effect on demand is $1. Alternatively, if someone's disposable income increases by $1 from an increase in transfer payments (such as unemployment compensation) and then he or she spends $0.60 (saving the other $0.40) of that additional dollar of disposable income, the direct effect on demand is $0.60.

In CBO's assessment, the direct effects that result from a change in fiscal policy depend on the characteristics of those households, businesses, and governments affected by the policy change and its duration. For example, increases in transfer payments are likely to boost purchases more from lower-income than from higher-income households. That difference arises, at least in part, because lower-income households typically consume a higher fraction of their additional disposable income than higher-income households do. Thus, transfer payments targeted to lower-income households boost the overall demand for goods and services more than do payments to higher-income households. In addition, a onetime transfer payment is likely to have less impact on a household's purchases than is a longer-lasting change to disposable income, because the onetime payment has a smaller effect on total lifetime income.

To account for the differences in the direct effects of different provisions in the pandemic-related legislation, the agency partitioned the legislation into several categories. In CBO's estimation, those categories (such as particular types of tax changes, transfer payments, and government purchases) have different direct effects on demand per dollar of higher spending or lower tax receipts. The direct effect on demand is referred to as the marginal propensity to consume (MPC) and is denoted MPC_i for category i. The parameter MPC_i measures how much of an additional dollar of disposable income provided by the policies included in category i is immediately consumed while the remaining $(1 - MPC_i)$ is saved.

To estimate the MPC for different policies, CBO reviewed research on the responses of households, businesses, and governments to various types of transfer payments and tax cuts. To

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encompass most researchers' views and reflect the uncertainty involved in their estimates, CBO used ranges of estimates of MPC_i for each category.

The Demand Multiplier. The indirect effects of changes in fiscal policies on output are reflected in the demand multiplier. The magnitude of CBO's estimates of demand multipliers varies significantly with economic conditions and, therefore, with the reaction of monetary policy to a change in fiscal policy.[6] Because output is projected to remain well below its potential level and inflation below the Federal Reserve's long-run objective over the next several years as a result of the pandemic, the Federal Reserve would not respond to offset the effects of pandemic-related legislation on output, CBO expects. In the agency's assessment, under those circumstances, the demand multiplier is substantially larger than when interest rates are well above zero, and the Federal Reserve is likely to respond more strongly to counteract the effects of changes in fiscal policies.

Because considerable uncertainty surrounds the estimation of the effects of fiscal policy on demand, CBO's analysis used a range of estimates of the demand multiplier that encompasses a wide array of economists' views about the relevant economic relationships. In particular, CBO used estimates of the demand multiplier—beginning in the first quarter in which the direct effect on demand occurs—that have a cumulative effect on GDP over one year that ranges from 0.5 to 2.5, with a central estimate of 1.5 (see Table 2). In the agency's analysis of pandemic-related legislation, however, social distancing measures attenuate the demand multiplier.

Role of Social Distancing. The estimated response of output to changes in fiscal policies depends on economic conditions and the response of monetary policy. But unlike a typical analysis of changes in fiscal policies, the estimated response also depends on the degree of social distancing. Reflecting the agency's analysis of how the pandemic is expected to unfold, CBO's projection of the economic effects of social distancing reflect the extent to and pace at which certain sectors of the economy are projected to resume more regular operations. In CBO's estimation, the economic effects of social distancing across the country peaked in April 2020 and declined thereafter. In particular, the agency projects that the effects of social distancing will decline by about two-thirds from their April 2020 peak during the second half of this year and diminish further next year. Social distancing will no longer inhibit the short-term economic effects of policies after the first half of 2021, the agency projects.

In CBO's assessment, social distancing affects both the size of the marginal propensity to consume (the direct effect on demand) and the size and timing of the demand multiplier (reflecting the indirect effect on output). Compared with a situation without social distancing

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[6] For more information on multipliers and how they vary with economic conditions, see Charles Whalen and Felix Reichling, *The Fiscal Multiplier and Economic Policy Analysis in the United States*, Working Paper 2015-02 (Congressional Budget Office, February 2015), www.cbo.gov/publication/49925.

measures in place, both the direct and indirect effects on demand will be smaller as people limit their social interactions and as households and businesses spend less of their additional income. In addition, the continued closure of some businesses and the reduction in hours worked mean that the supply of certain goods and services will remain subdued. In the agency's analysis, the lower direct effect on demand and the lower demand multiplier per dollar of budgetary cost as a result of social distancing will result in a contemporaneous output multiplier in the second quarter of 2020—when the economic effects of social distancing peaked—that is roughly 60 percent lower than it would have been otherwise.

CBO accounted for the extent to which social distancing mitigates the economic boost that might otherwise be expected from pandemic-related legislation by using two adjustment factors that attenuate the direct and indirect effects of the policy changes.

■ The first adjustment factor, denoted $a_{MPC,t}$, reduces the direct effect on demand from a policy change at time t. For example, if the direct effect per dollar of increased transfer payments to individuals equals MPC_i under normal conditions, during a period of social distancing that effect becomes $MPC_i \times (1 - a_{MPC,t})$.

■ The second adjustment factor, denoted $a_{M,t}$, reduces the demand multiplier at time t. If the value of the demand multiplier equals M under normal conditions, during a period of social distancing that value equals $M \times (1 - a_{M,t})$.

When the two adjustment factors are incorporated into the definition in equation (1), the output multiplier under social distancing can be expressed as

$$\text{Output Multiplier} \equiv MPC_i \times \left(1 - a_{MPC,t}\right) \times M \times \left(1 - a_{M,t}\right) \qquad (2)$$

The adjustment factors reflect the agency's projections of how the pandemic and the associated social distancing measures are expected to unfold this year and next. In CBO's analysis, $a_{MPC,t}$ and $a_{M,t}$ decrease over time at the same rate as social distancing measures ease. Relative to their peak values of roughly 0.4 in the second quarter of 2020, both adjustment factors will dwindle and then equal zero after the second quarter of 2021. Specifically, starting in the second quarter

of 2020, $a_{MPC,t} = \{0.40, 0.20, 0.15, 0.05, 0.05, 0, 0, \ldots\}$ and $a_{M,t} = \{0.39, 0.19, 0.14, 0.05, 0.05, 0, 0, \ldots\}$.[7]

CBO expects some of the spending by individuals and businesses that is initially hampered by social distancing to recover in later periods as social distancing measures wane. In later periods, individuals and businesses will spend those additional savings as businesses reopen, stay-at-home orders and other interventions are relaxed, and consumers become more comfortable engaging in social activities.

All told, a policy's effect on output t quarters after the second quarter of 2020, denoted ΔY_t, can be calculated by summing the policy's contemporaneous and lagged effects as follows:

$$\Delta Y_t = \sum_{j=0}^{t} [MPC_i \times (1 - a_{MPC,t-j}) \times M_j \times (1 - a_{M,t})] \times \Delta d_{t-j} \qquad (3)$$

$$+ \sum_{k=1}^{4} \sum_{j=0}^{t-k} \gamma_k \times MPC_i \times a_{MPC,t-j-k} \times M_j \times (1 - a_{M,t}) \times \Delta d_{t-j-k}$$

The first row of equation (3) shows the contemporaneous effect on output from the current and past changes in deficits caused by policy i (that is, the policy change indexed by subscript i). The term Δd_{t-j} represents the effect of policy i on the deficit in quarter $t - j$. The demand multiplier, M_j, represents the effect of a \$1 change in demand on output after j quarters, and the term in brackets represents the output multiplier under social distancing defined in equation (2). The product of that term and Δd_{t-j} (for $j = 0, 1, \ldots, t$) gives the change in output in quarter t that results from the policy's effect on deficits through that quarter.

The second row shows the effect on output from the spending disrupted in previous quarters by social distancing measures. The terms γ_k (for $k = 1, \ldots, 4$) represent the fractions of disrupted spending that are recouped in quarter t. CBO projected that a total of 60 percent of the disrupted spending hampered by social distancing would be recouped, and that process would take four quarters after the initial effect of policy i on the deficit (the same amount of time for social distancing measures to mostly dissipate in CBO's projections); that is, $\sum_{k=1}^{4} \gamma_k = 0.6$. In CBO's

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[7] CBO estimated the adjustment factor for the demand multiplier, $a_{M,t}$, by calculating how much the attenuation of the MPCs reduces the effect of an additional dollar of demand on output, which is inversely proportional to the increase in overall saving from an additional dollar of disposable income. That calculation results in a slightly smaller adjustment factor for the demand multiplier than for the MPCs. For some forms of discretionary spending, the MPC was not attenuated because that spending was considered to be direct purchases of goods and services related to the pandemic response.

view, the disrupted spending would be recovered only partially because some of the spending that would have taken place without social distancing—especially on services, such as the disrupted spending on travel, dining out, sporting events, and going to the cinema—will probably never be recovered, CBO projects.[8]

As equation (3) suggests, different provisions of the legislation affect overall demand and output differently because the policies' direct effects on demand—measured by their respective MPC_is—differ. Provisions that increase government purchases of goods and services directly add to overall demand on a dollar-for-dollar basis (that is, they have an $MPC_i = 1$). But for provisions that increase payments to people, reduce taxes, and increase aid to state and local governments, the size of the effect on demand depends on the provision's impact on the behavior of recipients and on how the pandemic and social distancing affect recipients' spending and other economic activities. In CBO's assessment, increases in payments boost spending more among lower-income people than among higher-income people. That is mainly because a greater percentage of lower-income households are constrained in their ability to borrow. Therefore, programs that provide income support to lower-income households will tend to have higher GDP effects per dollar of budgetary cost.

The direct effects on overall demand from $1 of budgetary cost incurred in the second quarter of 2020 would vary for different provisions of the legislation (see Table 3). The direct effect on overall demand without social distancing for provision i only occurs in that quarter and is simply the MPC_i under normal conditions. The range of high and low values reflects some of the underlying uncertainty of those estimates. The direct effect on overall demand with social distancing and partially recovered spending for provision i shows the attenuated MPC_is in the second quarter of 2020, which is $MPC_i \times (1 - a_{MPC,0})$, as well as the recovered spending that leads to additional direct effects on demand over the four subsequent quarters, which is $\gamma_k \times MPC_i \times a_{MPC,0}$ for $k = 1, \ldots, 4$. Combining those direct demand effects with the sequences of attenuated demand multipliers as shown in equation (3) gives the overall effect on output resulting from $1 of budgetary cost incurred in the second quarter of 2020.

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[8] CBO projected that about 40 percent of the disrupted spending would not be recouped. That share roughly corresponds to the ratio of personal consumption expenditures (PCE) in the first quarter of 2020 for which the disrupted boost is unlikely to be recovered after social distancing ends to total PCE excluding some types of expenditures that increased in the second quarter of 2020. The numerator of that ratio includes spending for transportation, recreation, and food services and accommodations as well as certain nondurable goods, such as gasoline and other energy goods. The denominator of the ratio is calculated by subtracting from total PCE the spending for goods and services for which expenditures increased when social distancing measures took effect. CBO excluded those components—including expenditures on food and beverages at home, financial services and insurance, and housing and utilities—from total PCE when calculating the denominator because, in the agency's assessment, the boost to those types of expenditures from the legislation is unlikely to be significantly disrupted by social distancing measures.

How Enhanced Unemployment Compensation Affects Output

The pandemic-related legislation significantly expanded unemployment compensation by temporarily increasing the amount of weekly benefits, expanding eligibility to some unemployed workers who might not otherwise qualify for benefits, and extending the time over which recipients receive benefits. The estimated effects on output are the net result of two opposing factors. Enhanced unemployment compensation tends to boost output through its effects on overall demand, but it also tends to reduce output because it lowers the overall supply of labor in the economy. Taking those two opposing factors together, the agency projects that enhanced unemployment compensation will increase the level of real GDP by 1.1 percent in 2020 and 0.4 percent in 2021.

How Enhanced Unemployment Compensation Affects Overall Demand. Enhanced unemployment compensation boosts the overall demand for goods and services by providing resources to people who have experienced a significant loss in earned income. Those resources allow unemployed people to continue to consume goods and services that they might otherwise be unable to afford. Many unemployed people have little or no savings, and people receiving unemployment benefits tend to spend the additional benefits quickly. CBO estimates that about half of the outlays for enhanced unemployment compensation occurred in the second quarter of 2020 and, when social distancing measures were at their peak, recipients increased their spending by between $0.45 and $0.54 per dollar of additional benefits in that same quarter (see Table 3).[9] That spending spurs the overall demand for goods and services and tends to increase employment. Using the output multiplier approach described above, CBO estimates that spending from enhanced unemployment compensation will contribute to boosting the level of real GDP by 1.5 percent in 2020 and 0.6 percent in 2021.

How Enhanced Unemployment Compensation Affects the Supply of Labor. Enhanced unemployment compensation also reduces the supply of labor in the economy by weakening recipients' incentive to search for and take jobs and by increasing the fraction of unemployed workers eligible for unemployment benefits.[10] The effect on output from changes in the incentives to work are smaller during periods of high unemployment and under social distancing

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[9]Some researchers estimate that recipients of enhanced unemployment compensation increased their spending by 10 percent during the initial months of the pandemic. The researchers report that the increase in spending is probably explained by the additional $600 per week of unemployment benefits. Those results suggest that the MPC out of increased benefit amounts could be around 0.73. See Diana Farrell and others, *Consumption Effects of Unemployment Insurance During the Covid-19 Pandemic* (July 2020), https://tinyurl.com/y2o8jpn3.

[10]Some preliminary evidence—based on data through early July 2020—shows that the increase in unemployment benefits did not increase layoffs at the outset of the pandemic or discourage recipients from returning to work. That evidence suggests that increasing unemployment compensation has not reduced overall employment; its implications for the overall effects of unemployment benefits on GDP are unclear. See Dana Scott and others, *Employment Effects of Unemployment Insurance Generosity During the Pandemic* (July 2020), https://tobin.yale.edu/sites/default/files/files/C-19%20Articles/CARES-UI_identification_vF(1).pdf.

than under normal conditions. CBO modeled how the increased benefit amounts, the eligibility expansion, and the longer duration affected the supply of labor and then combined those results with the estimated response of output to changes in the supply of labor under social distancing. CBO estimates that those effects on the supply of labor will contribute to lowering the level of real GDP by 0.5 percent in 2020 and 0.1 percent in 2021.

How Increased Benefit Amounts Affect the Supply of Labor. CBO modeled the effects of the additional $600 per week of unemployment benefits through July 2020 on the supply of labor by estimating how the transition rate between employment and unemployment—that is, the percentage of people in the labor force moving out of unemployment into employment over a month—responds to changes in such benefits. In CBO's analysis, a 1 percent increase in the ratio of benefits to prior earnings, all else being equal, increases the duration of a spell of unemployment by 0.4 percent when the ratio is below one and by 0.3 percent when the ratio is above one, lowering the transition rate from unemployment to employment. For example, if the average duration of an unemployment spell is 20 weeks and the ratio of benefits to prior earnings is below one, a 1 percent increase in the ratio of benefits to earnings would increase the duration of a typical unemployment spell by about 0.6 days (or slightly more than half a day). The effects on job searches and unemployment spells are smaller when recipients expect to receive an additional benefit for fewer months to come. A 1 percent increase in the ratio of benefits to earnings increased unemployment spells by 0.37 percent in July 2020, the last month for which people received increased benefits, compared with 0.4 percent in April 2020.

CBO used the ratio of benefits to prior earnings because the research literature on which CBO's analysis is based used prior earnings to estimate the effect of benefits to earnings ratios on unemployment spells.[11] However, the ratio of benefits to potential earnings that recipients might receive from a new job would be better for understanding incentives to work.[12] Potential earnings in the next few years for people who have permanently lost their jobs would be lower, on average, than their prior earnings, primarily because some knowledge valuable only to the previous employer is no longer productive.

The increased benefits make up a larger percentage of lower-earning workers' prior earnings. CBO considered the earnings distribution of the unemployed people and estimated that the ratio of benefits to earnings increases, on average, by more than 300 percent for the lower half of that

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[11] Researchers recently found that, as a result of the additional $600 per week of unemployment benefits through July 2020, about three-fourths of eligible unemployed workers can receive unemployment compensation that exceeds their prior earnings. See Peter Ganong, Pascal J. Noel, and Joseph S. Vavra, *U.S. Unemployment Insurance Replacement Rates During the Pandemic*, Working Paper 27216 (National Bureau of Economic Research, May 2020, revised August 2020), www.nber.org/papers/w27216.

[12] For example, see Congressional Budget Office, letter to the Honorable Charles Grassley about the economic effects of additional unemployment benefits of $600 per week (June 4, 2020), www.cbo.gov/publication/56387.

distribution, whereas it increases by about 150 percent for the upper half.[13] Hence, an increase in unemployment compensation decreases employment more for people who expect to have lower earnings than it does for people who expect to have higher earnings.

How Expanded Eligibility and Longer Duration Affect the Supply of Labor. The legislation expanded the eligibility for unemployment compensation and let people receive benefits for a longer time, increasing the fraction of unemployed workers receiving benefits. When fewer job seekers who do not receive unemployment compensation are available for every open job, the adverse effect of increased unemployment compensation on employment and output tends to be larger. That is because for every recipient who might be slower to accept an available job, there are fewer nonrecipients who are more likely to receive a job offer. In CBO's assessment, nonrecipients are 1.7 times more likely to find a job than benefit recipients without the increased benefits and roughly three times more likely, on average, with the increased benefits.

How Changes in the Labor Supply Affect Output. How changes in the supply of labor affect output depends on the degree of social distancing and on economic conditions. In a period of high unemployment and social distancing, the effect of weaker incentives to work on employment and output tends to be smaller than under normal conditions.[14] That is because, with fewer job openings and widespread business closures, a job search is less likely to quickly result in employment, and the reduction in the intensity of a job search arising from enhanced unemployment compensation may matter less. In addition, the incentives to work would respond less to the ratio of benefits to earnings when people limit their social interactions. CBO estimates that the effect on output from weaker incentives to work stemming from the enhanced benefits enacted in pandemic-related legislation was about two-thirds smaller in the second quarter of 2020 than it would be if labor market conditions were similar to those in 2019—with about 70 percent of that estimate stemming from higher unemployment and the remainder from social distancing. The effects of future expansions of benefits would differ from those stemming from the recent legislation. For example, as the unemployment rate falls and as social distancing dissipates, the effect of a given increase in benefit amounts would reduce employment and output by larger amounts.

In CBO's estimation, increased benefit amounts weaken the incentives to work more for people who expect to have lower earnings than for people who expect to have higher earnings because

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[13] Researchers recently found that job losses between March and July 2020 were much larger among low-earning workers and that workers who were previously in the bottom third of the earnings distribution received 49 percent of unemployment compensation benefits. See Guido Matias Cortes and Eliza C. Forsythe, *Impacts of the Covid-19 Pandemic and the CARES Act on Earnings and Inequality*, Upjohn Institute Working Paper 20-332 (September 2020), https://doi.org/10.17848/wp20-332.

[14] For more details about how unemployment insurance benefits affect incentives to work when unemployment is high, see Congressional Budget Office, *Unemployment Insurance in the Wake of the Recent Recession* (November 2012), www.cbo.gov/publication/43734.

the increased benefits are a larger percentage of lower-earning workers' potential earnings. Hence, the reductions in employment stemming from weaker incentives to work would come disproportionately from people who had lower earnings. Whereas the disincentive effect on employment is measured by the number of people, with each worker weighted equally, the disincentive effect on economic output is measured in dollars, with each worker's supply of labor weighted by his or her contribution to that output—that is, his or her earnings. Because the reduced labor supply comes primarily from workers with lower earnings, the disincentive effect on output is estimated to be smaller than that on employment.

The effects of enhanced unemployment compensation on output also depend on how changes in labor inputs affect the utilization of capital. In CBO's assessment, if capital utilization stays the same, the percentage change in output resulting from a 1 percent increase in labor inputs, or the output elasticity with respect to labor, can be approximated by labor income as a fraction of GDP, which has averaged roughly 0.6 over the past decade. However, the ratio of capital and labor in business production is hard to adjust in the short term, and a change in labor inputs would also induce a change in capital utilization, causing the percentage change in output to be higher than 0.6 in response to a 1 percent increase in labor inputs.[15] Therefore, in CBO's analysis, a 1 percent decrease in labor inputs—that is, the weighted average of higher- and lower-earning workers that reflects their relative contributions to output—causes output to fall by 0.8 percent.

To calculate that weighted average, CBO estimated the effects on the supply of labor from enhanced unemployment compensation separately for high earners (people with earnings higher than the median of the benefit recipients) and low earners (people with earnings lower than the median of the benefit recipients). The group of high earners contributes 90 percent of each unit of labor input because about three-fourths of employed workers are high earners, and average earnings for those higher-earning workers are roughly three times larger than average earnings for the remaining one-fourth of lower-earning workers. Thus, in CBO's analysis, a 1 percent decline in the amount of labor supplied by high earners has an effect on output equal to that of a 9 percent decline in the supply of labor by low earners.

All told, CBO estimates that the increased benefit amounts, the eligibility expansion, and the longer duration account for about 64, 25, and 11 percent of the legislation's overall negative effect on output, respectively, through their effects on the overall supply of labor.

How the Paycheck Protection Program and Related Provisions Affect Output
In CBO's assessment, the PPP and related provisions, such as the Economic Injury Disaster Loan program and debt relief for businesses, affect output through three channels. First, the programs

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[15] For further discussion, see Mark Lasky, *CBO's Model for Forecasting Business Investment*, Working Paper 2018-09 (Congressional Budget Office, December 2018), www.cbo.gov/publication/54871.

provide payroll support for jobs that would have been lost without the programs' funding. Second, it supports nonpayroll spending by allowing some expenses to qualify for loan forgiveness and through the fungibility of PPP dollars used to finance jobs that would have persisted without the program's support. Finally, it provides loans for other business-related expenses that require repayment. Taking all those channels into account, the agency projects that the PPP and related provisions will increase the level of real GDP by 0.8 percent in 2020 and 0.3 percent in 2021.

CBO modeled the effect of the PPP on output by determining how the funding is used by the recipients and then used the output multiplier approach described above to estimate the effect on output. The MPCs that apply to PPP funds range from 0.10 to 0.56 depending on the channel through which they are spent. Under social distancing, that approach delivers a range of attenuated MPCs of 0.06 to 0.34 in the second quarter of 2020.

The MPCs tend to be highest when the funds are used to preserve jobs that would have been lost without them, in CBO's assessment. The PPP and related provisions provide liquidity that can be used to pay for, among other things, wages, salaries, and benefits, and they therefore help preserve employment. Those jobs saved and the compensation provided by the PPP and related provisions help limit the loss of income to people, preserve the employer-employee relationship, reduce business closures, and quicken the recovery.[16] CBO estimates that the PPP saved 106 million job-weeks in 2020, where a job-week is defined as the average hours worked by full-time and part-time workers in a typical workweek (see Box 1).[17] Those channels boost overall demand for goods and services and account for 27 percent of the programs' overall effect on output and 11 percent of the programs' budgetary cost, CBO estimates.

The MPCs tend to be lower when businesses use PPP funds to finance their payroll expenses for jobs that would have persisted anyway or use funds for other qualifying expenses. Under the PPP, businesses can use the forgivable loans to support payroll expenses but then redirect funds that they would have used to cover those payroll expenses to cover other operational expenses.

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[16] Some researchers find that PPP loans led to an increase of 14 to 30 percentage points in a business's expected survival. See Alexander W. Bartik and others, *The Targeting and Impact of Paycheck Protection Program Loans to Small Businesses*, Working Paper 27623 (National Bureau of Economic Research, July 2020), www.nber.org/papers/w27623. Those outcomes might be influenced by a firm's characteristics; see Robert P. Bartlett III and Adair Morse, *Small Business Survival Capabilities and Policy Effectiveness: Evidence From Oakland*, Working Paper 27629 (National Bureau of Economic Research, July 2020), www.nber.org/papers/w27629.

[17] Those estimates reflect the effects of the Paycheck Protection Program Flexibility Act of 2020 (P.L. 116-142), which modified the conditions under which PPP loans may be forgiven. Most notably, the period over which borrowers need to spend loan proceeds—in order to qualify for loan forgiveness—increased from 8 weeks to 24 weeks, and the amount permissible for use on nonpayroll expenses increased from 25 percent to 40 percent.

Furthermore, the PPP and related provisions more directly support business spending by providing forgivable funds for qualifying nonpayroll expenses.

In CBO's assessment, those two types of spending have similar effects on output; however, businesses that were more adversely affected by the pandemic—and may not otherwise have been able to finance those expenses—increased their spending more than businesses that could have financed those expenses without the added resources. That is to say, constrained businesses have a higher MPC than unconstrained businesses. Using limited available data, CBO projected that roughly half of businesses that received funds from the PPP and related provisions were constrained; the agency used a range of MPCs of 0.10 to 0.50, which delivers an average attenuated MPC of 0.18 in the second quarter of 2020. CBO estimates that the support for nonpayroll spending by both types of businesses increases overall demand, accounts for 55 percent of the programs' overall effect on output, and accounts for 63 percent of the programs' budgetary cost.

Finally, in CBO's assessment, a portion of the PPP loans will require repayment. Despite having the same average MPC as the portion of the PPP that does not require repayment (0.30), this channel has a smaller effect on output per dollar of budgetary cost. That is because a portion of the funds went to businesses that could have obtained credit elsewhere. For those firms, the spending caused no direct stimulus; however, the interest rate subsidy generated by the PPP's loan terms generated some stimulus at the time of repayment. That stimulus comes from the differential between the interest rate on PPP loans (1.0 percent) and the interest rate on small business loans made by the Small Business Administration, or SBA (6.5 percent, which is similar to rates on loans provided by the SBA's 7(a) business loan program). Conversely, induced spending among firms that could not have obtained credit elsewhere has a direct stimulative effect because the spending would not have occurred otherwise. That immediate stimulus is then gradually offset as firms repay their loans beginning in 2021. CBO estimates that loans provided by the PPP that require repayment increase overall demand, account for 18 percent of the programs' overall effect on output, and account for 26 percent of the programs' budgetary cost.[18]

How the Federal Reserve's Emergency Lending Facilities Affect Output
The Federal Reserve's lending facilities increase the flow of credit to businesses by making loans or stabilizing financial markets. Such credit provides liquidity to businesses that otherwise could not access other credit and reduces financing costs for other businesses as well. As a result, those lending facilities support businesses' spending on investment and intermediate goods and services. CBO estimated the increase in GDP through that demand effect by multiplying the cash

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[18] The budgetary cost of the PPP loans that require repayment includes the effects of defaults and interest payments.

flows associated with the loans by the output multipliers under social distancing described earlier.

In addition to boosting demand, the Federal Reserve's loans are designed to help distressed businesses meet their financial obligations and survive until economic activity recovers. To estimate how business survival affects output, CBO examined the extent to which the credit provided by those facilities helped preserve organizational and other intangible business capital such as employer-employee relationships and ongoing connections between businesses and their customers. In CBO's analysis, for every dollar of benefit to businesses (as either liquidity relief or reduced financing costs), the preserved intangible capital increases business output by $0.25 over three years. Those output effects phase in as the economy expands because reduced production capacity may matter less when demand for goods and services is low.

Use of the lending facilities has been much lower than their capacity, but their existence helped stabilize financial markets, particularly corporate and municipal bond markets. CBO modeled such a backstop role by considering that corporate credit and municipal liquidity facilities were being used to their respective capacities. The agency estimated the economic effect of the corporate credit facilities under the consideration that 10 percent of the capacity went to businesses that would have been unable to access the credit otherwise and that the interest rates for the remaining loans were reduced by 1 percentage point. Similarly, for the municipal liquidity facility, the interest rates on the total capacity of loans was reduced by 1 percentage point. Combining those effects with the facilities' effects on overall demand and businesses' survival, CBO estimates that the Federal Reserve's emergency lending facilities will boost the level of real GDP by 0.1 percent in 2020 and 0.3 percent in 2021.

How Other Provisions Affect Output
CBO expects the remaining provisions in the pandemic-related legislation to chiefly affect output in the short term via their influence on overall demand. The agency used the output multiplier approach described earlier to quantify how those provisions affected real GDP. Recovery rebates to individuals, direct assistance to state and local governments, other spending provisions, and other revenue provisions are expected to boost overall demand and, taken together, increase the level of real GDP by 2.7 percent in 2020 and 2.1 percent in 2021.

Recovery Rebates to Individuals. The legislation provides a refundable tax credit of $1,200 per qualifying adult and $500 per dependent child to taxpayers with income below specified limits. The tax credit begins phasing out once the income of individuals and of married couples filing jointly passes $75,000 and $150,000, respectively. In the agency's analysis, 85 percent of the budgetary cost of the rebates was received by households during the second quarter of 2020. During that quarter, when social distancing was at its peak, CBO estimates that recovery rebates provided to individuals by the pandemic-related legislation increased spending by between $0.48 and $0.54 per dollar of payment for the lower third of the income distribution and by between

$0.14 and $0.20 for the upper third of the distribution. For households in the middle third of the distribution, a dollar of payment increased spending by between $0.25 and $0.31, CBO estimates. The agency also estimates that the households in the lower, middle, and upper thirds of the income distribution received roughly 35 percent, 38 percent, and 27 percent of the payments, respectively. Therefore, in CBO's analysis, the increase in overall spending per dollar of recovery rebates—calculated as the weighted average of the increases in spending per dollar of payment in the three income groups—was between $0.30 and $0.36 in the second quarter of 2020. That range lies within the range of estimates reported in the literature examining the effects of onetime payments on households' spending.[19] Recovery rebates to individuals are projected to increase the level of real GDP by 0.6 percent in 2020 and 0.3 percent in 2021.

Direct Assistance to State and Local Governments. The legislation provides grants to state and local governments—and to tribal and territorial governments as well—for spending related to the pandemic. All of those grants will be disbursed to state and local governments during 2020. CBO expects that direct assistance to state and local governments will prevent some tax increases or spending cuts that would have been required for many state and local governments to balance their budgets. Most of the boost to overall demand from those grants is the result of state and local governments' increasing their direct purchases of goods and services. The agency also expects some of the federal grants to finance some state and local government spending that would have occurred even without the receipt of such assistance; funding used in that way will not boost the economy in the short term. In CBO's analysis, for each additional dollar of federal grants received by state and local governments, overall demand increases by between $0.63 and $0.81. Under social distancing, that delivers a range of attenuated MPCs of 0.38 to 0.49 in the second quarter of 2020. Direct assistance to state and local governments is projected to increase the level of real GDP by 0.5 percent in 2020 and 0.2 percent in 2021.

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[19] Several recent studies have estimated the initial boost to the consumption of goods and services caused by the recovery rebates. One study found that for every dollar of rebate, consumption of goods and services increased by $0.25 to $0.35 during the first 10 days after receiving the rebate; see Scott R. Baker and others, *Income, Liquidity, and the Consumption Response to the 2020 Economic Stimulus Payments*, Working Paper 27097 (National Bureau of Economic Research, May 2020), www.nber.org/papers/w27097. Another study estimated the overall increase in consumption per dollar of rebate as $0.40, noting that the change in consumption varied substantially across households; see Olivier Coibion, Yuriy Gorodnichenko, and Michael Weber, *How Did U.S. Consumers Use Their Stimulus Payments?* Working Paper 27693 (National Bureau of Economic Research, August 2020), www.nber.org/papers/w27693. Similarly, another study found that for every dollar of rebate, consumption increased by $0.48 during the first two weeks and then returned to prior levels. That study also found that households that historically tended to spend most of their income increased their consumption by $0.68 per dollar of rebate, whereas households that tended to save a large portion of their income increased their consumption by $0.23 per rebate dollar. See Ezra Karger and Aastha Rajan, *Heterogeneity in the Marginal Propensity to Consume: Evidence From Covid-19 Stimulus Payments*, Working Paper 2020-15 (Federal Reserve Bank of Chicago, May 2020), www.chicagofed.org/publications/working-papers/2020/2020-15.

Other Spending Provisions. The legislation provides funding to the Department of Health and Human Services, the Department of Defense, the Department of Agriculture, the Department of Housing and Urban Development, the Federal Emergency Management Agency, the Department of Veterans Affairs, and the Department of Transportation. It also increases funding for the Supplemental Nutrition Assistance Program and for public health programs, such as Medicaid and Medicare. Furthermore, it provides aid to people who have student loans (by temporarily suspending their loan payments), credit assistance to airlines and other businesses, and relief to aviation workers. To estimate how those spending provisions affected overall demand, and thus real GDP, the agency used a range of MPCs of 0.36 to 1.00. Under social distancing, that delivers a range of attenuated MPCs of 0.21 to 1.00 in the second quarter of 2020.[20] Taken together, other spending provisions are projected to increase the level of real GDP by 1.1 percent in 2020 and 1.1 percent in 2021.

Other Revenue Provisions. The legislation modifies the rules relating to net operating loss deductions and increases the limits on the losses and on the interest deductions that businesses can use to offset their taxable income. Those changes provide businesses with liquidity by letting them claim certain tax benefits sooner than they otherwise could. The legislation also provides payroll tax credits to employers to encourage them to retain employees, along with refundable credits to compensate them for providing paid sick leave and family and medical leave. It delays payroll tax payments by businesses, further providing temporary liquidity. And it shifts some of the costs of unemployment benefits from state and local governments and nonprofit organizations to the federal government. To estimate how those revenue provisions affected overall demand, and thus real GDP, the agency used a range of MPCs of 0 to 0.58.[21] Under social distancing, that delivers a range of attenuated MPCs of 0 to 0.35 in the second quarter of 2020. Taken together, other revenue provisions are projected to increase the level of real GDP by 0.6 percent in 2020 and 0.5 percent in 2021.

Longer-Term Effects

In the longer term, changes in fiscal policies affect output primarily by altering national saving, people's incentives to work and save, and businesses' incentive to invest, thereby changing

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[20] The value of 1.00 was not attenuated because some forms of discretionary spending were considered to be direct purchases of goods and services related to the pandemic response.

[21] Those values are comparatively small because, in CBO's assessment, changes to business taxes that primarily affect after-tax profits on past investments—as opposed to the return on new investments—have relatively small effects on overall demand. However, such provisions will probably have effects beyond their impact on overall demand and output. For example, one study found that tax refunds to businesses shortly after the 2007–2009 recession improved businesses' financial conditions, reducing bankruptcy risk and the probability of a credit rating downgrade. See Christine L. Dobridge, *Fiscal Stimulus and Firms: A Tale of Two Recessions*, Finance and Economics Discussion Series 2016-013 (Board of Governors of the Federal Reserve System, 2016), https://dx.doi.org/10.17016/FEDS.2016.013.

potential (or maximum sustainable) output. In CBO's latest baseline budget projections, federal budget deficits raise the ratio of federal debt to GDP from 79 percent in fiscal year 2019 to 109 percent in fiscal year 2030. Pandemic-related legislation is responsible for roughly 9 percentage points of that increase (an amount that does not include budgetary changes resulting from the laws' effects on the economy).[22] CBO expects that over the longer term, accumulated debt resulting from the legislation will raise interest rates, increase borrowing costs, and crowd out private investment, reducing the level of real GDP by about 0.4 percent in 2030.

To estimate the longer-term effects on output from pandemic-related legislation, CBO used its Solow-type growth model.[23] In that model, output is determined in the longer term by the number of hours of labor that workers supply, the size and composition of the capital stock, and total factor productivity. CBO expects that pandemic-related legislation will affect output in the longer term primarily by reducing national saving and private investment through increased deficits.[24] For the transitional period between the short term and the longer term, CBO combines estimates of the short-term and long-term effects on output.

How Increased Federal Borrowing Affects Output
Increases in federal budget deficits affect the economy in the longer term by reducing national saving and, hence, the funds available for private investment in capital. When the federal government borrows, it borrows from households and businesses that would otherwise finance private investment. Deficits thus crowd out private investment in the longer term, and less investment leads to a smaller stock of capital and lower potential output. However, households typically offset some of that decline in national saving by increasing their own saving, in part as a result of higher interest rates that result from increased government borrowing. In addition, net inflows of foreign capital (foreign purchases of U.S. assets minus U.S. purchases of foreign

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[22] For the purposes of this analysis, to account for the estimated outlays of P.L. 116-123, CBO used its cost estimate for H.R. 6074, the Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020 (March 4, 2020), www.cbo.gov/publication/56227. In contrast, CBO's baseline budget projections incorporate funding for 2020 provided in P.L. 116-123 and adjust it for inflation for each subsequent year through fiscal year 2030. For more detail about the other laws' provisions and their budgetary effects, see Congressional Budget Office, *An Update to the Budget Outlook: 2020 to 2030* (September 2020), www.cbo.gov/publication/56517.

[23] For a description of the Solow-type growth model, see Congressional Budget Office, *How CBO Analyzes the Effects of Changes in Federal Fiscal Policies on the Economy* (November 2014), www.cbo.gov/publication/49494.

[24] Some research suggests that changes in fiscal policies that affect the demand for goods and services in the short term can sometimes significantly affect potential output in the longer term apart from the impact of the change in government borrowing. For instance, pandemic-related legislation could offset some of the negative longer-term effects of the pandemic by preventing long-term damage to capital formation that would have occurred without any changes in legislation. CBO's current analyses do not incorporate such effects. For a discussion of short-term demand effects on potential output, see Laurence M. Ball, *Long-Term Damage From the Great Recession in OECD Countries*, Working Paper 20185 (National Bureau of Economic Research, November 2014), www.nber.org/papers/w20185.

assets) also typically increase, which lessens the effects of the reduction in national saving on investment. Moreover, during the current crisis the Federal Reserve has increased its holdings of Treasury securities. To the extent that those holdings do not decline in the near future, they can also offset the effects of federal borrowing on private investment. Thus, the amount of crowding out caused by an increase in the federal budget deficit depends on the magnitude of the resulting increases in private saving, the net inflows of foreign capital, and the Federal Reserve's holdings of Treasury securities.

CBO estimates that, in the longer term, every additional dollar of deficit increases private saving by $0.43, leading to a $0.57 reduction in national saving. Moreover, every additional dollar of deficit raises foreign capital inflows by $0.24. Together, those estimates imply that a dollar's increase in the federal deficit results in a $0.43 increase in private saving, a $0.24 increase in net capital inflows, and a $0.33 decline in domestic private investment.[25]

CBO expects that under current conditions, the crowding out of private investment by increased federal deficits will be minimal in the short term, thereby causing the effects of higher deficits on output to be relatively smaller, on average, over the longer term. That is mainly because the economy is expected to operate well below its potential level for several years, resulting in the Federal Reserve's keeping interest rates very low through the middle of the decade. Moreover, to the extent that fiscal stimulus supports greater demand for goods and services in the short term, businesses will increase their demand for equipment, structures, and other capital goods, thereby reducing the effect of higher deficits and debt on private investment.

Another factor mitigating crowding out in the short term is the Federal Reserve's increased holdings of Treasury securities. CBO expects the Federal Reserve to continue purchasing Treasury securities on the secondary market through 2025, a policy that it initiated in response to the economic fallout from the pandemic. In CBO's projections, those purchases initially offset the crowding out of private investment that additional federal borrowing creates. But CBO expects the Federal Reserve's holdings of Treasury securities, measured as a percentage of GDP, to decline gradually beginning in 2025. All else being equal, the consequent boost to interest rates would increase the government's borrowing costs and reduce private investment and output in the longer term.

The Transition Between the Short Term and the Longer Term
For the transitional period between the short term and the longer term, CBO combines estimates of the short-term and long-term effects on output. To estimate the legislation's effect on output during the transitional period, CBO used a weighted average of the estimated short-term effects

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[25] See Jonathan Huntley, *The Long-Run Effects of Federal Budget Deficits on National Saving and Private Domestic Investment*, Working Paper 2014-02 (Congressional Budget Office, February 2014), www.cbo.gov/publication/45140.

of changes in fiscal policies (as derived from the framework described in the first part of this report) and the estimated long-term effects of changes in fiscal policies (as derived from the agency's Solow-type growth model). Estimates for 2020 through 2023 were based entirely on the framework CBO used to estimate the legislation's short-term effects on output. Estimates for 2024, 2025, and 2026 placed weights of 0.75, 0.50, and 0.25, respectively, on the short-term effects on output and the remaining weights (0.25, 0.50, and 0.75, respectively) on the effects on potential output in the Solow-type growth model. Estimates after 2026 were based entirely on the effects on potential output in the Solow-type model. Those weights reflect the agency's assessment that increased federal borrowing owing to the pandemic-related legislation will have a minimal effect on private investment before 2024.

Box 1. How CBO Estimates the Employment Effects of the Paycheck Protection Program

The Paycheck Protection Program (PPP) provided 5.2 million forgivable loans, totaling $525 billion, to small and medium-sized businesses to help maintain existing payrolls. The Congressional Budget Office estimates that the program will finance, or cover, the payroll expenses for 280 million job-weeks in 2020, with the majority of those expenses occurring during the second quarter. As a result, the PPP is estimated to have boosted the measured level of payroll employment by 5.7 million in the second quarter of 2020 and is projected to preserve, or save, 106 million job-weeks in 2020.

To create those projections, the agency first estimated the share of PPP loans that was used toward payroll expenses by industry. CBO then combined those estimates with industry-level data on the payroll cost per worker to determine the total number of jobs covered by the PPP. Finally, the agency assessed the share of the covered jobs that were saved by the PPP by estimating the average job-loss rates among small and medium-sized businesses in each industry that would have occurred without the program.

Using PPP data from the Small Business Administration (SBA) and payroll data from the Census Bureau, CBO estimates that the take-up rate of the PPP—measured by the ratio between the actual borrowed amount and the estimated maximum amount that can be borrowed by eligible businesses—was roughly three-quarters. Participation varies significantly across industries, which probably reflects, among other factors, the relative severity of the impact of the pandemic on each industry and the behavioral responses of businesses and workers to the PPP in relation to other provisions in the pandemic-related legislation (most notably the enhanced unemployment compensation). In CBO's estimation, the PPP's take-up rates were close to or over 90 percent among eligible businesses in many industries hard hit by the pandemic and the ensuing economic crisis, such as construction, manufacturing, retail trade, educational services, and other services. In the case of mining and logging and transportation and warehousing, the estimated PPP take-up rates were close to 100 percent. By comparison, only about half of those eligible in the information and financial activities industries took PPP loans, as those industries were less

negatively impacted by the pandemic. (The utilities industry, for example, lost less than 1 percent of its payroll jobs in April.)

The PPP's take-up rate for the leisure and hospitality industries—which were hit the hardest and lost half of their payroll jobs in April—stayed around two-thirds throughout the summer while about $130 billion of funding was left unclaimed in the program. That relatively low take-up rate among small businesses in the leisure and hospitality industries probably reflects many factors, including the expectations of a weak recovery in the demand for their services as the pandemic continues, the uncertainty surrounding the loan forgiveness rules, and importantly, the decline in the labor supply of low-wage workers owing to the high ratio of benefits to earnings provided by the enhanced unemployment compensation. (Average weekly earnings were just $360 per job in the accommodation and food services industries before the pandemic.) In other words, without the enhanced unemployment compensation, the participation rate in the PPP might have been higher.

For most businesses, the size of the loan is determined by the number of workers reported on the loan applications; however, the number of jobs covered using the PPP funds will depend on how businesses allocate their loans between payroll and nonpayroll expenses. That split varies both between and within industries, depending on industry-firm characteristics (such as how labor intensive or capital intensive an industry is), the loan forgiveness rules announced by the SBA (including the minimum percentage of the loan needed to be used toward payroll expenses for loan forgiveness), and the underlying demand recovery in the specific industry, among other factors. Businesses in an industry that is more labor intensive (such as construction) or that experiences a stronger recovery in the demand for its goods or services (such as retail trade) are projected to spend, on average, a larger portion of the loans on payroll expenses; in contrast, businesses in industries like mining and logging have seen continued deterioration of their economic fundamentals and are therefore projected to spend a smaller portion of their PPP loans on payroll expenses. In addition, some borrowers are expected to default on the loans as their businesses fail; the average portion of those loans spent toward payroll is expected to be very small.

CBO estimates that, on average, about half of the funds from the PPP will be used for payroll expenses. Combining that estimate on loan allocation with industry-level data on the payroll cost per worker yields an estimate of 280 million job-weeks covered by the PPP in 2020, with the majority occurring in the second quarter, covering an average of nearly 20 million payroll jobs in that quarter.

Finally, CBO estimates the employment effects of the PPP by estimating how many jobs (or job-weeks) were "saved" by the program. On the one hand, in the near term, the number of jobs saved is probably only a fraction of the number of jobs covered, as it is CBO's assessment that most of the jobs covered by the program would have been preserved by their employers without

the program. On the other hand, some jobs saved would most likely persist even after the program ends and the number of covered jobs falls to zero. Specifically, to estimate the number of jobs (or job-weeks) saved by the PPP in the second quarter, CBO estimates the average job-loss rates among small and medium-sized businesses in each industry *that would have occurred without the PPP*, which, in turn, is based on the agency's comprehensive assessment of the initial impact of the pandemic on the economy as a whole and on each industry separately. CBO estimates that about a quarter of jobs (or job-weeks) covered by the PPP in the second quarter of 2020 were saved by the program, boosting the measured level of nonfarm payroll employment by an average of 5.7 million in that quarter. For 2020 as a whole, the PPP is projected to save 106 million job-weeks.

Tables

Table 1. The Effects of Pandemic-Related Legislation on Real GDP

Percentage of Real GDP Without the Effects of the Legislation

Policy	2020				2021				Annual			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2020	2021	2022	2023
Paycheck Protection Program and Related Provisions[a]	0	0.9	1.4	1.0	0.7	0.4	0.2	0.1	0.8	0.3	*	*
Enhanced Unemployment Compensation	0	1.1	1.8	1.5	0.8	0.5	0.3	0.1	1.1	0.4	*	*
Recovery Rebates to Individuals[b]	0	1.1	0.8	0.6	0.6	0.3	0.1	0.1	0.6	0.3	*	*
Direct Assistance to State and Local Governments	0	0.3	0.9	0.8	0.4	0.2	0.1	*	0.5	0.2	*	0
Other Spending Provisions[c]	0	1.1	1.9	1.6	1.5	1.3	1.1	0.7	1.1	1.1	0.4	0.1
Other Revenue Provisions[d]	0	0.5	1.1	0.7	0.6	0.9	0.4	0.2	0.6	0.5	-0.1	-0.2
Federal Reserve's Emergency Lending Facilities	0	*	0.2	0.3	0.4	0.3	0.2	0.2	0.1	0.3	*	-0.1
Total	**0**	**5.0**	**8.1**	**6.4**	**5.0**	**4.0**	**2.4**	**1.3**	**4.7**	**3.1**	**0.3**	**-0.1**
Memorandum:												
Real GDP Without the Effects of the Legislation												
Real GDP (Billions of 2012 dollars)	4,744	4,064	4,103	4,250	4,369	4,466	4,596	4,680	17,161	18,112	19,159	19,652
Growth since previous quarter (Percent)	-1.3	-14.3	1.0	3.6	2.8	2.2	2.9	1.8	n.a.	n.a.	n.a.	n.a.
Growth at annualized rates (Percent)	-5.0	-46.2	3.9	15.1	11.7	9.2	12.2	7.5	-10.0	5.5	5.8	2.6
Real GDP in CBO's Current Economic Forecast												
Real GDP (Billions of 2012 dollars)	4,744	4,266	4,436	4,522	4,588	4,646	4,706	4,740	17,968	18,679	19,222	19,631
Growth since previous quarter (Percent)	-1.3	-10.1	4.0	1.9	1.5	1.3	1.3	0.7	n.a.	n.a.	n.a.	n.a.
Growth at annualized rates (Percent)	-5.0	-34.6	17.0	7.9	6.0	5.1	5.3	2.9	-5.8	4.0	2.9	2.1

Source: Congressional Budget Office.

These values are presented as a percentage of an implied projection of real GDP that does not include the effects of pandemic-related legislation—a projection computed by removing the estimated effects of the legislation from CBO's July economic forecast. However, CBO did not construct a comprehensive projection of what the economy would have looked like without those legislative effects. See Congressional Budget Office, *An Update to the Economic Outlook: 2020 to 2030* (July 2020), www.cbo.gov/publication/56442.

GDP = gross domestic product; n.a. = not applicable; * = between zero and 0.05 percent.

a. The provisions related to the Paycheck Protection Program provide funds to the Small Business Administration to support business liquidity through existing lending programs, debt relief, and the Economic Injury Disaster Loan program.

b. Incorporates the effects of the Coronavirus Aid, Relief, and Economic Security (CARES) Act on both outlays and revenues.

c. Includes aid for student loans, credit assistance for airlines and other businesses, relief for aviation workers, health care spending, the education stabilization fund, and increased funding for the Department of Health and Human Services, the Federal Emergency Management Agency, the Department of Veterans Affairs, and the Department of Transportation.

d. Includes payroll tax credits for employers, modifications of the net operating loss and business interest deductions, limitations on the losses that businesses can use to offset tax liability, and a delay of certain payroll taxes.

Table 2. Changes in Output From One Dollar of Direct Effects on Overall Demand When Output Is Well Below Potential and the Federal Reserve's Responses Are Limited

Dollars

Quarter	Low Estimate	High Estimate	Under Social Distancing[a]	
			Low Estimate	High Estimate
1	0.50	1.45	0.31	0.89
2	0	0.60	0	0.48
3	0	0.30	0	0.26
4	0	0.15	0	0.14
Cumulative Effect Over 4 Quarters	0.50	2.50	0.31	1.78

Source: Congressional Budget Office.

a. The effects under social distancing correspond to the changes in output resulting from an additional dollar of direct effects on demand in the second quarter of 2020, when social distancing was at its peak.

There are no effects after four quarters.

Table 3. Direct Effects on Overall Demand From One Dollar of Budgetary Cost Incurred in the Second Quarter of 2020

Dollars

	2020			2021				Total
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Enhanced Unemployment Compensation								
High Estimate								
Without social distancing	0.89	0	0	0	0	0	0	0.89
With social distancing and partially recovered spending	0.54	0.08	0.06	0.04	0.03	0	0	0.75
Low Estimate								
Without social distancing	0.75	0	0	0	0	0	0	0.75
With social distancing and partially recovered spending	0.45	0.06	0.05	0.04	0.03	0	0	0.63
Recovery Rebates to Individuals								
High Estimate								
Without social distancing	0.60	0	0	0	0	0	0	0.60
With social distancing and partially recovered spending	0.36	0.05	0.04	0.03	0.02	0	0	0.51
Low Estimate								
Without social distancing	0.50	0	0	0	0	0	0	0.50
With social distancing and partially recovered spending	0.30	0.04	0.04	0.02	0.02	0	0	0.42
Direct Assistance to State and Local Governments								
High Estimate								
Without social distancing	0.81	0	0	0	0	0	0	0.81
With social distancing and partially recovered spending	0.49	0.07	0.06	0.04	0.03	0	0	0.68
Low Estimate								
Without social distancing	0.63	0	0	0	0	0	0	0.63
With social distancing and partially recovered spending	0.38	0.05	0.05	0.03	0.02	0	0	0.53
Business Tax Provisions Primarily Affecting Cash Flow								
High Estimate								
Without social distancing	0.16	0	0	0	0	0	0	0.16
With social distancing and partially recovered spending	0.10	0.01	0.01	0.01	0.01	0	0	0.13
Low Estimate								
Without social distancing	0	0	0	0	0	0	0	0
With social distancing and partially recovered spending	0	0	0	0	0	0	0	0

Source: Congressional Budget Office.