ALAN J. AUERBACH
University of California, Berkeley

BYRON LUTZ
Federal Reserve Board

WILLIAM G. GALE
Brookings Institution

LOUISE SHEINER
Brookings Institution

Effects of COVID-19 on Federal, State, and Local Government Budgets

ABSTRACT This paper examines how the COVID-19 pandemic and the associated policy responses affected federal, state, and local government budgets. The pandemic raised federal deficits temporarily but has had a modest effect on long-term budget projections, in part because of sharply lower projections of interest rates. With low interest rates and the economy in recession, the debt accumulation resulting from the pandemic does not require immediate offsetting policies. For state and local governments, we note the unusual nature of the current recession: the concentration of job losses among low-wage workers; the unprecedented increases and expansions of unemployment insurance benefits and business loans; and strong performance by the stock market. To address these issues, we use a bottom-up approach that accounts for the geographic variation in economic outcomes. Relative to analyses based on the historical relation between revenues and the unemployment rate, we estimate notably smaller revenue losses. We further estimate that federal aid has been large relative to these revenue losses, but not necessarily relative to need—for public health, remedial schooling, services for the elderly, and others—especially if the pandemic persists and especially in certain hard-hit states.

The COVID-19 pandemic and the associated policy responses have had a significant impact on government budgets. Federal spending has skyrocketed. State and local governments, almost all of which face some form of annual balanced budget rule, confront fiscal shocks on both the revenue

Conflict of Interest Disclosure: Byron Lutz is on the board of the National Tax Association. The authors did not receive financial support from any firm or person for this paper or from any firm or person with a financial or political interest in this paper. Other than the aforementioned and positions listed on Brookings expert profiles, none of the authors are currently officers, directors, or board members of any organization with an interest in this paper.

and spending sides that threaten to make the recession deeper and slow the recovery. This paper examines the impact of COVID-19 on the fiscal status of the federal government and the states.[1]

Section I provides new projections of the federal budget outlook, with five main results. First, we document that the pandemic and the policy responses to it rapidly and substantially raised federal deficits, but only on a temporary basis. Spending and revenue are projected to return to pre-COVID-19 baseline values relatively quickly.

Second, the long-term fiscal outlook through 2050 has deteriorated somewhat. Under the Congressional Budget Office's (CBO 2020a) assumptions for GDP growth and interest rates, we project that the debt-to-GDP ratio, currently 98 percent, will rise to almost 190 percent in 2050 under current law, compared to a pre-COVID-19 baseline projection of 180 percent. CBO (2020a) obtains a similar projection—195 percent—using a slightly different set of assumptions.

Third, although the economic downturn and COVID-19-related legislation raise debt permanently, sharply lower projections of interest rates for the next dozen years help moderate future debt accumulation. Nevertheless, even during the period when interest rates are expected to be low, the projected debt-to-GDP ratio rises steadily due to substantial and rising primary deficits, driven largely by rising outlays on health-related programs and Social Security. As the economy grows and debt accumulates, the average interest rate on government debt is projected to rise and to exceed the nominal GDP growth rate by increasing amounts starting in the early 2040s.

Fourth, under a current policy projection that allows temporary tax provisions—such as those in the Tax Cuts and Jobs Act of 2017—to be made permanent, the debt-to-GDP ratio would rise to 222 percent by 2050 and would continue rising thereafter.

Fifth, the long-term projections are sensitive to interest rates. If interest rates remain very low (that is, at their projected level for 2025), rather than rising as in the CBO projections, the debt-to-GDP ratio would equal 157 percent in 2050 under current policy.

We discuss several aspects of these results, including how the current episode compares to past debt changes, the role of historically low interest

1. Other countries are facing similar fiscal issues. The International Monetary Fund (2020) estimated that, as of July, the effects of COVID-19-related automatic and discretionary policy changes have increased cumulative deficits by 13.6 percent of GDP in advanced countries.

rates, and recent Federal Reserve Board policies. Because of the macrostabilization effects of fiscal tightening, and because low interest rates create "breathing room" for fiscal policy (Elmendorf and Sheiner 2017; Blanchard 2019a, 2019b), we do not see the large, short-run debt accumulation resulting from the current pandemic as necessitating any immediate offsetting response. But the long-term projections show that significant fiscal imbalances remain and will eventually require attention.

Section II discusses the effects of the pandemic on state and local government budgets. We first examine recent estimates of the effects on revenues—some of which find relatively modest effects and others of which find effects that dwarf those experienced during the Great Recession. We note that the very unusual nature of the current recession means that relying on the historical relationships between the state of the economy and state and local tax revenues may produce misleading results. We instead attempt to calculate the impact on state and local governments using a bottom-up approach that accounts for the geographic variation in the distribution of unemployment and consumption declines, the fact that low-wage workers have been particularly hard hit this recession, and the fact that the stock market has held up.

Our findings suggest that this pandemic is indeed having very unusual effects on state and local revenues. We estimate far smaller income tax losses than would have been expected on the basis of historical experience, which we attribute to the fact that employment losses have been unusually concentrated on low-wage workers, the unprecedented increases and expansions of unemployment insurance benefits and business loans, which will shore up taxable income in 2020, and the fact that the stock market has held up so far, unlike most of the prior economic downturns. On the other hand, our estimates of the losses in sales and other taxes and fees are much larger than one would have expected—the decline in use of transportation services alone seems likely to depress revenues by over $45 billion this year. In aggregate, we estimate that state and local own-source revenues, excluding fees to public hospitals and institutions of higher education—which we view as somewhat distinct—will decline $156 billion in 2020, $165 billion in 2021, and $143 billion in 2022. Including lower fees to hospitals and higher education would bring these totals to $189 billion, $187 billion, and $165 billion.

We then turn to a discussion of federal aid to states and localities. We estimate that the legislation enacted in March 2020 provides about $211 billion in aid, excluding aid to public hospitals and higher education, and $253 billion including that aid. While this appears to be larger than the

total revenue declines expected for 2020, that doesn't mean that the aid has been sufficient to preclude tough budget choices and poor macroeconomic outcomes. First, should the economy remain below its pre-COVID-19 baseline for many years, as the CBO projections suggest, state and local governments will face significant shortfalls in coming years. Knowing that, they are likely to restrain spending somewhat this year and make additional cuts in coming years. Second, the pandemic itself has likely increased the demands on state and local governments—for public health spending, virtual schooling, the elderly, and so on. Simply maintaining pre-COVID-19 levels of spending may not be enough to assure that necessary services aren't cut. Finally, our analysis shows that smaller states got much more generous aid relative to their losses and that states like New York and California will likely be facing budget shortfalls in the current year even without consideration of the spending demands brought on by the COVID-19 pandemic.

Section III provides concluding remarks.

We note at the outset that the CBO economic projection is more pessimistic than that of many other forecasters. Activity has already rebounded far more quickly than CBO had anticipated in July 2020—for example, the unemployment rate ended the third quarter at 7.9 percent whereas the CBO had projected it to be 10.5 percent in the fourth quarter. Moreover, the CBO has the economy operating below potential for almost a decade, while other forecasters predict a much quicker rebound. As we base our calculations on the CBO's economic projection, our federal, state, and local projections are likely somewhat more pessimistic than would be implied by alternative economic forecasts.[2] Alternatively, the CBO's economic outlook may prove more accurate when viewed over a longer time period.

I. The Federal Budget Outlook

We examine the fiscal outlook over ten- and thirty-year horizons. While the shorter horizon conforms to that used by the CBO in its standard budget analysis, the longer horizon provides additional insight about underlying budget trends and questions of fiscal sustainability.

2. A second set of estimates using a more optimistic economic projection, as our discussant suggested, would clearly be a useful addition, but unfortunately we were not able to include it given the time and space allotted.

I.A. Constructing Budget Baselines

TEN-YEAR OUTLOOK To provide perspective on both the current budget outlook and how it was affected by the COVID-19 pandemic, we examine three baselines. The pre-COVID-19 baseline is based entirely on current law projections that the CBO made in January, predating any consideration of the impact of COVID-19 on the economy.[3]

The current law baseline is embodied in the CBO's most recent ten-year budget projection (CBO 2020b) and is consistent with their most recent economic projection (CBO 2020d). These projections—by law and convention—assume that Congress does (almost) nothing in the way of new programs or tax changes for the next ten years.[4] Current law projections serve an important purpose—they show where the government is headed in the absence of almost any action. Another way to proceed, however, is to ask where the government is headed if policymakers continue to make choices like they have in the past. Constructing a baseline along these lines—typically characterized as current policy—clearly requires judgment calls to project the consequences of Congress following a business-as-usual approach.

Our current policy projections start with current law projections and make a series of adjustments (based on CBO data). These adjustments simply show the effects of what, in our judgment, can be viewed as a continuation of current policies. Given the wide array of provisions enacted in the last year due to the COVID-19 pandemic, judgments about what constitutes current policy are particularly difficult under present circumstances, so we take a conservative approach and focus narrowly on items that are conventionally included in current policy estimates.

Specifically, we assume that Congress, as it has done in the past, makes temporary tax cut provisions permanent, including the temporary

3. Congressional Budget Office, "Long-Term Budget Projections" [data file], https://www.cbo.gov/system/files/2020-01/51119-2020-01-ltbo.xlsx.

4. But the projections do require that Congress increase or suspend the debt limit as needed to carry out the tax and spending programs in the baseline, that temporary entitlement programs (like SNAP and TANF) are reauthorized on schedule, and that outlays for discretionary spending programs remain constant in real terms over the decade, unless such authority is governed by a specific law. Also, current law projections assume that when the Social Security, Disability, and Medicare Part A trust funds are exhausted, Congress will authorize full payment of promised benefits and cover any shortfalls with general revenue financed by federal borrowing.

provisions in the 2017 Tax Cuts and Jobs Act.[5] We allow real nondefense discretionary spending to rise with population growth, rather than remaining constant over time, as the CBO assumes, because maintaining current services for these programs is likely to require a population adjustment. In contrast, defense spending, which largely provides a nonrival public good, plausibly can maintain current services over the relatively short ten-year horizon without a population adjustment.[6] We assume all Coronavirus Aid, Relief, and Economic Security (CARES) Act provisions are implemented and allowed to expire as scheduled and that the president's payroll tax deferral has no effect on any budget outcome.

THIRTY-YEAR OUTLOOK Looking only at the next ten years gives an incomplete picture of the fiscal outlook, even with adjustments made to characterize current policy. Projections covering thirty years are generally sufficient to capture most long-term trends. To generate the longer-term projections, we begin with budget and economic figures for 2030 (in the three baselines developed above) and project forward each part of the government budget. Except where noted below, the three baselines are based on similar assumptions after 2030.

First, following the CBO (2020a), the nominal growth rate of GDP is set equal to 3.6 percent for 2031–2040 and 3.5 percent for 2041–2050. Second, for Medicare and Old-Age, Survivors, and Disability Insurance (OASDI), we project all elements of spending and dedicated revenues (payroll taxes, income taxes on benefits, premiums, and contributions from states) using the growth rates as a share of GDP in the intermediate projections in the 2020 Boards of Trustees reports for the period between 2030 and 2050. Third, for Medicaid and the Children's Health Insurance Program (CHIP), we use the most recent long-term CBO (2020a) projections. Fourth, all

5. Examples of major expiring provisions in the 2017 tax act include 100 percent bonus depreciation (expensing of business investment in qualifying equipment), the marginal individual rate cuts, the increased standard deduction, the repeal of personal exemptions, the increased estate tax exemption, the cap on state and local tax deductions, and the 20 percent deduction for certain pass-through income. Examples of expiring provisions outside of the 2017 tax act include tax credits for biodiesel and alternative fuel mixtures and the deduction for mortgage insurance premiums.

6. The ten-year current law projections for discretionary spending are uncertain because the law does not specify appropriations over the whole period. Thus, one might argue that not all nondefense discretionary spending requires a population adjustment, implying that our projections are too high. On the other hand, defense spending depends not just on maintaining current services but also responding to the actions of our political adversaries, and so our projections may be too low. There is no way to know for sure, so we follow rules of thumb that are both plausible and easy to understand.

other noninterest spending—other mandatory spending and discretionary spending—is assumed to remain constant as a share of GDP. Fifth, income taxes other than those tied to Social Security and Medicare benefits grow with bracket creep according to the CBO's most recent long-term projections. Sixth, all other revenues (corporate taxes, excise taxes, etc.) remain constant at their 2030 shares of GDP. Seventh, current law and current policy average interest rates on the public debt follow the projections in the latest long-term budget outlook (CBO 2020a). To estimate net interest payments in the years after 2030, we multiply the average interest rate in a given year by the sum of half of the primary deficit in that year and outstanding government debt at the end of the previous year.[7]

In addition to projecting debt and deficits over the thirty-year horizon, we also present estimates of the fiscal gap, an accounting measure that is intended to reflect the long-term budgetary status of the government.[8] The fiscal gap answers the question: If one starts a policy change in a given year

7. Alternative projections of policy over a thirty-year period naturally differ for a variety of reasons. In particular, the assumptions underlying our thirty-year projections differ in several ways from those made by the CBO (2020a) but the aggregate effects of their projections and ours are similar. The CBO (2020e) uses its own estimates for Social Security and Medicare, which project longer life spans and thus higher spending than the estimates we use, which come from the Boards of Trustees of those programs (scaled for differences in GDP projections). We allow other mandatory spending and discretionary spending to remain constant shares of GDP from 2030 to 2050. The CBO has them declining somewhat. Despite these differences, both our projections and the CBO's generate primary deficits of 4.5 percent of GDP in 2050. We use interest rate estimates embedded in the CBO (2020a) projections. Although the projected interest rates reported in CBO (2020a, 47) are larger than those reported above, the difference is due to different definitions. The CBO reports effective interest rates as the ratio of net interest payments in a given year to debt at the end of the previous year. We report effective interest rates as the ratio of net interest payments in a given year to the sum of half of the primary deficit in that year and the debt at the end of the previous year. Finally, the CBO generates a debt-to-GDP ratio of 195 percent in 2050, compared to our estimate of almost 190 percent under current law. The CBO (2020a) compares its budget outlook to its 2019 long-term budget outlook (CBO 2019), which projects a 2049 debt-to-GDP ratio of 144 percent. We compare our current law baseline to the CBO's January 2020 long-term baseline—which was the most recent projection prior to the pandemic and which projects a 2050 debt-to-GDP ratio of 180 percent.

8. See Auerbach (1994). Online appendix 1 describes the construction of the fiscal gap and how interest rates affect it. Auerbach, Gale, and Orszag (2003) discuss the relationship between the fiscal gap, generational accounting, accrual accounting, and other ways of accounting for government. Note that estimates of the fiscal gap do not in any way imply that level reductions as a share of GDP are the best way to achieve a given fiscal target, rather than, say, level reductions as a share of primary deficits (which in the present circumstance would imply a growing path of primary deficit reductions). The fiscal gap measure just provides one convenient way to think about the magnitude of a fiscal shortfall, given a future fiscal goal.

to reach a given fiscal target in a given future year, what is the size of the annual, constant share-of-GDP increase in taxes or reduction in noninterest expenditures (or combination of the two) that would be required, holding projected economic performance unchanged? For example, one might ask what immediate and constant policy change would be needed to obtain some target debt-to-GDP in 2050.[9] Or, one might ask what constant share-of-GDP change would be required, starting with a delay, say in 2025, to achieve a net interest-to-GDP ratio of 2 percent by 2050.

I.B. Projections

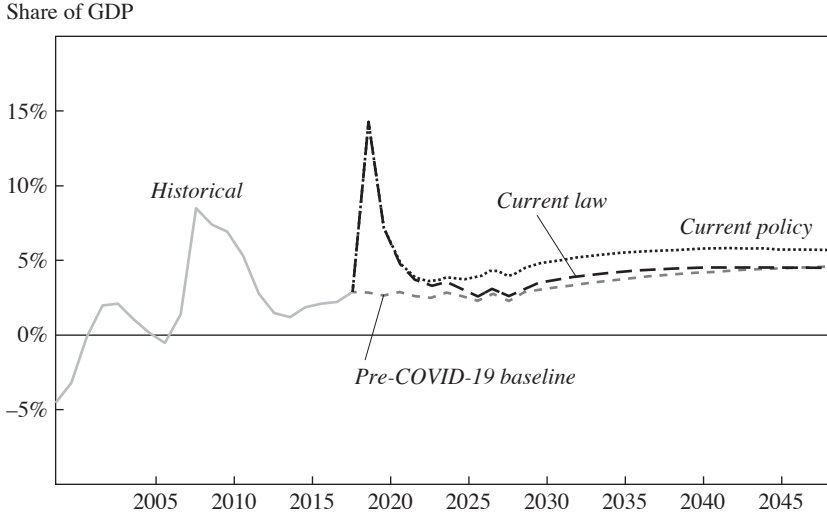
ECONOMIC PROJECTIONS Relative to the pre-COVID-19 baseline, projected real GDP falls significantly early in the decade and is not projected to reach the pre-COVID-19 baseline even by 2030 (online appendix figure 1). Economic growth between 2030 and 2050 is lower than under pre-COVID-19 projections. The weaker economy, slower inflation, and aggressive Federal Reserve policy translate into sharply lower projections of interest rates for about a dozen years (online appendix figure 2).[10] The average interest rate falls to 1.1 percent by mid-decade before rising to its pre-COVID-19 baseline value (2.9 percent) by 2034 and then rising further to 4.1 percent by 2050. That is, the projection implies that nominal interest rates will rise above the nominal GDP growth rate around 2042 and will exceed the growth rate by more than 0.5 percentage points by 2050. These economic projections help drive the budget outcomes discussed below.

EFFECTS OF COVID-19: COMPARING THE PRE-COVID-19 BASELINE AND CURRENT LAW Noninterest spending spiked in 2020 (online appendix figure 3), mostly because of the CARES Act, rising by 11 percent of GDP relative to the pre-COVID-19 baseline but is projected to fall rapidly in subsequent years and to return to about its pre-COVID-19 baseline projection of 21 percent by 2030. After that, noninterest spending under both the pre-COVID-19 and current law baselines rises by about 2 percent of GDP through 2050. These spending increases are driven mainly by health care (Medicare, Medicaid, CHIPS, and exchange subsidies) and, to a lesser extent, Social Security.

9. Implementing the adjustments indicated by the fiscal gap does not stabilize debt after the target year—say 2050; it only adjusts tax and spending trajectories so that the debt hits a target by 2050. Under all the scenarios considered in this paper, the debt-to-GDP ratio would continue rising after hitting the specified target in a specified year.

10. Online appendix figure 2 shows effective interest rates, the ratio of net interest payments in a given year to the sum of half of the primary deficit in that year and debt outstanding at the beginning of the year.

Figure 1. Primary Deficit, 2000–2050



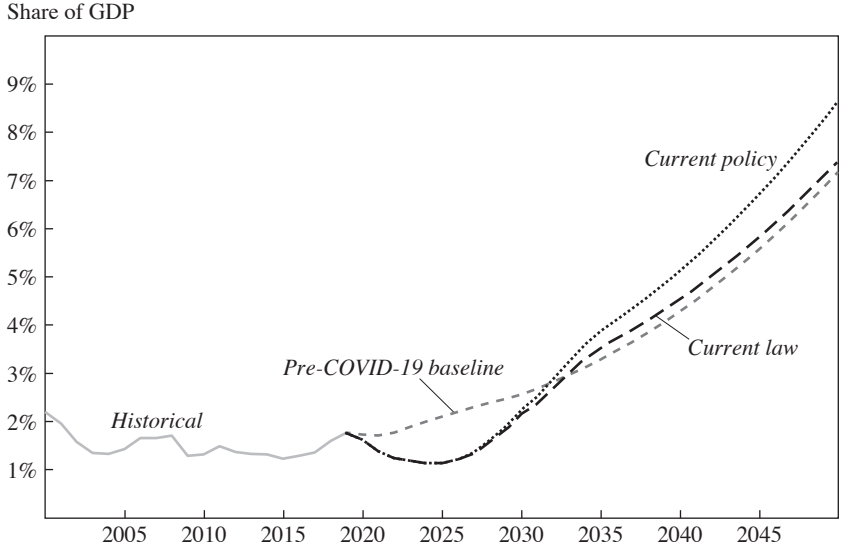
Source: Authors' calculations based on CBO (2020a, 2020b, 2020d).

Revenues, as a share of GDP, dip somewhat in 2020 and 2021 but regain pre-COVID-19 shares of GDP by 2022 and essentially mimic pre-COVID-19 shares thereafter (online appendix figure 4). Of course, with post-COVID-19 GDP lower than under the pre-COVID-19 baseline, the projected level of revenues is still substantially below what had been expected in January. Revenues are projected to rise more slowly than noninterest spending, however. Between 2030 and 2050, projected revenues rise by less than 1 percent of GDP, reaching 18.6 percent of GDP under both the current law and the pre-COVID-19 baselines, with the only changes over time due to bracket creep in the income tax and a slight increase in payroll tax revenues.

As a result of these changes, the primary deficit spikes in 2020—exceeding 14 percent of GDP—but then falls sharply in the next few years and then hews closely to its projected values under the pre-COVID-19 baseline (figure 1). The primary deficit rises gradually from 3.2 (2.9) percent of GDP in 2030 to 4.5 (4.6) percent of GDP in 2050 under the current law (pre-COVID-19) baseline.

Under the current law projections, interest payments plummet and then explode (figure 2). Despite the increase in COVID-19-related debt, net interest payments fall from about 1.6 percent of GDP currently to

Figure 2. Net Interest, 2000–2050

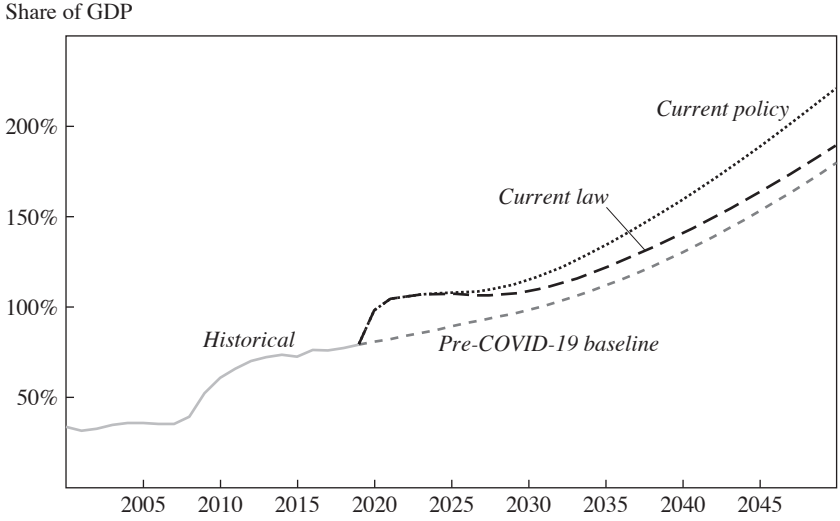


Source: Authors' calculations based on CBO (2020a, 2020b, 2020d).

1.1 percent in 2024–2025 because of the projected decline in interest rates. But as a result of economic growth and rising debt, both of which raise interest rates, interest payments rise to 2.2 percent of GDP in 2030 and continue rising over time, reaching 7.4 percent of GDP under current law in 2050, slightly higher than the 7.2 percent of GDP projected under the pre-COVID-19 baseline. Both figures, however, far exceed the peak historical net interest level of 3.2 percent of GDP in 1991 (CBO 2020f).

The unified deficit, combining the effects of primary deficits and interest payments, reached 16 percent of GDP in 2020—more than 11 percent of GDP larger than was predicted in the pre-COVID-19 baseline, and much higher than even the peak deficit in the Great Recession—about 10 percent of GDP (online appendix figure 5). The effect is projected to be temporary, however. Deficits are projected to decline sharply after 2020 and to return to their pre-COVID-19 projected share of GDP by 2024. At that point, relative to the pre-COVID-19 baseline, the projections imply that noninterest spending will be about 1 percent of GDP higher, net interest payments will be about 1 percent of GDP lower, and revenue will raise about the same share of GDP. By the end of the decade, the deficit is projected to be 5.3 percent of GDP under current law.

Figure 3. Public Debt, 2000–2050



Source: Authors' calculations based on CBO (2020a, 2020b, 2020d).

The projected 2020–2030 unified deficit rose from $14.2 trillion in the pre-COVID-19 baseline to $16.3 trillion under current law. Excluding net interest, legislative changes added $2.6 trillion to the projected deficit—more than the entire increase in deficits. The effects of macroeconomic changes added another $1.3 trillion, and other changes accounted for $0.4 trillion more. Despite these increases in spending and reductions in revenue, net interest payments are projected to decline by $2.2 trillion because of sharply lower projected interest rates.

After 2030, the unified deficit continues to rise under both the pre-COVID-19 baseline and the current law scenario. By 2050, the unified deficit reaches almost 12 percent of GDP under both baselines.

Figure 3 shows the impact of COVID-19 on the public debt. Before the pandemic, the United States already had historically high debt as a share of GDP—the highest since just after the end of World War II. Under the pre-COVID-19 baseline, the stock of outstanding public debt would have been 81 percent of GDP at the end of fiscal year 2020 and 82 percent by the end of fiscal year 2021. Now, analogous current law projections are 98 percent and 104 percent, respectively. Projected debt rises gradually for the rest of the decade, reaching 109 percent of GDP in 2030 under current law, compared to 98 percent under the pre-COVID-19 baseline.

Table 1. Fiscal Gap (as a Percentage of GDP)

	Current law beginning			*Current policy beginning*		
Target	*2021*	*2025*	*2030*	*2021*	*2025*	*2030*
Debt = current	3.19	3.54	4.24	4.23	4.74	5.73
Net interest = 3.2	3.79	4.21	5.06	4.81	5.40	6.55

Source: Authors' calculations based on CBO (2020a, 2020b, 2020d).

After 2030, rates of debt accumulation pick up because of rising primary deficits and rising interest payments. By 2050, the debt rises to 190 percent of GDP under current law compared to 180 percent in the pre-COVID-19 baseline. Essentially, the higher deficits incurred in 2020 and 2021 are carried forward on a long-term basis but since interest rates are lower than growth rates on average over the 2020–2050 period, the effect relative to GDP is slightly dissipated.

CURRENT LAW VERSUS CURRENT POLICY While comparing the pre-COVID-19 baseline to current law shows the impact of the pandemic, comparing current law to current policy shows the impact of certain business-as-usual changes that Congress tends to make. These differences occur during the first ten years, given our process for generating projections, but they have ramifications for longer-term outcomes. Making the temporary provisions of the Tax Cuts and Jobs Act permanent, along with modest adjustments to spending, would raise the 2050 debt-to-GDP ratio to 222 percent compared to 190 percent under current law. By 2050, revenues would be at 17.6 percent of GDP, compared to 18.6 percent under current law; the primary deficit would rise to 5.7 percent of GDP and interest payments would rise to 8.7 percent of GDP, compared to 4.5 and 7.4 percent, respectively, under current law. The current policy projections use the same interest rate assumptions as the current law projections; incorporating any upward impact of higher debt in the current policy projections on interest rates would raise debt by additional amounts.

THE FISCAL GAP Turning to the fiscal gap, under current law projections, obtaining a debt-to-GDP ratio in 2050 equal to its 2020 level of 98 percent would (ignoring any macroeconomic feedback effects) require permanent tax increases or noninterest spending cuts totaling 3.2 percent of GDP starting in 2021 (table 1). This would be the equivalent to a sustained tax increase equal to about 34 percent of income tax revenues, a 17 percent increase in all tax revenues, or a 14 percent reduction in average noninterest spending. The longer policymakers wait to implement change, the

larger are the required changes, because the debt must be brought down to meet the assumed target over fewer years.

Policymakers could choose a net-interest-to-GDP target instead of a debt target. To hold 2050 interest payments equal to 3.2 percent of GDP—the historical maximum for this ratio, obtained in 1991—would require policy changes equal to about 3.8 percent of GDP starting in 2021.

Under current policy, all the shortfalls are larger. Obtaining the current debt-to-GDP ratio would require policy changes equal to 4.2 percent of GDP starting in 2021. Holding net interest payments to their historical maximum share of GDP would require policy changes of 4.8 percent of GDP.

SENSITIVITY ANALYSIS How future economic and budget outcomes evolve depends crucially on how the virus and the economy change over time. After the Great Recession, the CBO (and many other forecasters) expected the economy to recover to close to its prerecession path, which, in the end, did not happen.[11] As a result of prolonged slower growth, the CBO eventually significantly lowered its projections for potential GDP.[12] The CBO's current GDP projection is that real GDP will be 1.1 percent lower in 2030 than prior to the pandemic.[13] If the economy's gap from the pre-COVID-19 path is larger than projected, the fiscal outlook will likely be worse, with the obvious caveat that if interest rates fall enough, the overall fiscal position could be improved. However, projected rates are already very low, so there is a limit on how much lower they can fall. To address the possibility that the economy may not recover as close to the pre-COVID-19 path, we use the CBO's interactive workbook (CBO 2020c) to apply the agency's rules of thumb for the impact of alternative economic scenarios on budget projections and find that if the annual productivity growth rates were lower than projected by 0.5 percentage points for each of the next ten years, the debt-to-GDP ratio would rise by an additional 12 percentage points by 2030. The CBO (2020a) shows that if the annual growth rate of

11. See Gale (2019a) for a more detailed analysis.

12. In its January 2009 budget outlook (https://www.cbo.gov/sites/default/files/111th-congress-2009-2010/reports/01-07-outlook.pdf), the CBO noted that its projection of potential output in 2018 had been revised downward by 1 percentage point. In 2014 (https://www.cbo.gov/publication/45150), the CBO wrote that its projection of 2017 potential GDP had fallen by more than 7 percent since 2007.

13. According to the January 2020 long-term budget outlook, 2030 GDP would have been $25,885 billion (in 2019 dollars; Congressional Budget Office [data file], https://www.cbo.gov/system/files/2020-01/51119-2020-01-ltbo.xlsx), while in the September 2020 long-term budget outlook, 2030 GDP is projected to equal $25,595 billion (in 2019 dollars; Congressional Budget Office [data file], https://www.cbo.gov/system/files/2020-09/51119-2020-09-ltbo.xlsx). In both data files, see "Economic Vars," line 44.

total factor productivity is 0.5 percentage points lower than projected, debt will rise to 239 percent of GDP in 2050 under current law, compared to the 195 percent figure in its baseline.

Online appendix figure 2 shows that projected rates decline until 2025 and then rise more or less steadily through 2050. In our alternative scenario, we assume that interest rates stay constant at their 2025 levels through 2050. Under this specification, the 2050 debt-to-GDP ratio reaches 133 percent under current law and 157 percent under current policy. Net interest payments rise slowly, remaining below 1.4 percent of GDP, lower than their average value over the last fifty years. The CBO (2020a) shows that if interest rates are 1 percentage point higher (lower) than predicted over the next thirty years, the debt-to-GDP ratio will be higher (lower) by 69 (46) percent of GDP by 2050 under current law.

I.C. Perspectives and Interpretations

The sharp changes in the economy brought about by the COVID-19 pandemic and the associated policy responses raise several interesting issues for fiscal policy. First, the debt-to-GDP ratio is projected to rise by 25 percentage points between 2019 and 2021 and could rise by more if there is new legislation or a weaker than expected recovery. This increase is sizable but is not out of line with other debt buildups over the past century. For instance, the coupling of World War I with the 1918 flu pandemic led to a debt-to-GDP increase of 30 percentage points over three years. World War II raised the debt-to-GDP ratio by 64 percentage points over six years. The Great Recession boosted the debt-to-GDP ratio by about 31 percentage points over four years.

Second, the previous peak in the debt-to-GDP ratio—106 percent—occurred just after World War II, following which the debt-to-GDP ratio gradually dwindled over the ensuing thirty-five years to 25 percent in 1981, an outcome that contains both good and bad news for the current long-term fiscal shortfall (Gale 2019a, 2019b). Between 1945 and 1980, interest rates on government debt were often below the economic growth rate, which helped to reduce the debt-to-GDP ratio. Likewise, although economic growth is projected to be lower than during the earlier postwar period, so are interest rates, which as discussed above are projected to remain below growth rates for the next thirty years, providing the same help in reducing the debt-to-GDP ratio over time.

However, the federal government maintained balanced primary budgets on average over the 1945–1980 period. In contrast, we project sizable and growing primary deficits as a share of GDP even after the pandemic and its

economic aftermath subside. These primary deficits are sufficiently large to cause debt to grow inexorably relative to GDP despite lower interest rates, and there is nothing in the forecast to suggest that this growth will slow even after 2050.

Approaching a balanced primary budget through reductions in spending would be much more challenging now than in the earlier postwar period because of differences in demographics and budget composition. In 1945 and the years that followed, defense spending was an important part of the federal budget, expenditures on Social Security were small, and Medicare and Medicaid did not exist. In fiscal year 2019, the last prepandemic fiscal year, federal spending on defense was just 3.2 percent of GDP, while spending on the three major entitlement programs accounted for 10.8 percent of GDP and over half of noninterest federal spending. Moreover, spending on the entitlement programs is projected to grow faster than GDP over the next three decades, due to population aging and increases in health care costs. At the same time, with greater inequality than during the period ending in 1980, there is stronger support for increased spending on social services. One may also conjecture that demand will increase for health insurance coverage, a stronger social safety net, and more redistribution, given the differential impact of both COVID-19 itself and the economic burdens associated with the pandemic. In short, the upward pressure on federal spending is much stronger now than in the past.

Reducing the primary deficit through tax increases may prove difficult politically, but there is room to maneuver. As a share of GDP, federal revenues equaled 16 percent in 2020. If the Tax Cuts and Jobs Act and other temporary provisions are extended in the usual manner, then revenues are projected to total just 17.0 percent over the 2020–2050 period. In the fifty years prior to 2020, revenues averaged 17.4 percent of GDP and reached a high of 20 percent in 2000.[14]

Third, a key factor in the fiscal picture is the path of interest rates. The reduction in projected interest rates unambiguously improves the federal government's overall fiscal stance—because it is a net borrower. We can certainly borrow more and consume more with low interest rates and not hurt future generations (who can in turn borrow more from later generations). But the optimality of this pattern may fall apart if interest rates subsequently rise, resulting in higher interest rates on higher levels

14. See Congressional Budget Office [data file], https://www.cbo.gov/system/files/2020-01/51134-2020-01-historicalbudgetdata.xlsx.

of debt (Ball, Elmendorf, and Mankiw 1998), particularly if this rise in interest rates is not accompanied by a sufficiently large increase in the rate of productivity growth.[15]

The path of interest rates will also depend in part on monetary policy. But the relevance of the Federal Reserve to the fiscal picture goes well beyond its role in the determination of interest rates. The Fed has sharply expanded its balance sheet since the onset of the pandemic, acquiring large quantities of the new government debt being issued.[16] In addition, through facilities created under its emergency lending authority, it has taken on the debts of companies and state and local governments. Some have argued that these facilities, which were utilized in response to the financial crisis and expanded in scope in the current situation, signify a growing role of the Fed in conducting fiscal policy (Plosser 2012; Warsh 2020). Alternatively, however, the facilities can be viewed as an extension of the Fed's traditional lender of last resort role, which reflects the relative shift in financial activity since the Fed's creation away from bank loans toward securities traded in capital markets (Labonte 2020). Moreover, the facilities can only address temporary interruptions to liquidity via loans. Addressing solvency issues, which requires fiscal spending authority, has been left to Congress and the presidential administration (Powell 2020).

Nonetheless, the previously sharp lines between monetary policy, fiscal policy, and debt management policy have arguably become blurred somewhat in recent years (Greenwood and others 2014). With the Federal Reserve's adoption of paying interest on reserves held by banks, bank balance sheets have become functionally similar to Treasury bills.[17] And there may be concerns over the extent to which the Treasury can use changes in the federal debt's maturity structure as a debt management tool while the Fed is pursuing its own policies to influence the term structure of interest rates. Finally, as the Fed's tool kit has expanded in recent years, so too may the pressure to use those tools to implement fiscal or debt management objectives (Plosser 2012; Warsh 2020).

15. If the increase in interest rates is in response to higher productivity, the effect on debt sustainability is unclear (Sheiner 2018).

16. Data in the CBO (2020b, table 2) imply that Federal Reserve holdings of public debt will rise by about 70 percent of the increase in public debt from 2019 to 2021.

17. Several international central banks also have the authority to pay interest on reserves.

II. Effects of COVID-19 on the State and Local Sector

The COVID-19 pandemic presents the states with potentially serious fiscal problems, but ones that differ from the federal situation. State and local governments generally must balance their operating budgets each year, which not only constrains their behavior, but does so in a way that is particularly damaging to the macroeconomy during a business cycle contraction. Specifically, when an economic downturn reduces revenues, state and local governments may be forced to cut spending or raise taxes to make up the budget shortfall. Not only do these changes deprive taxpayers of valuable services or reduce their disposable income in a time of economic stress, but they also impede the economic recovery.

This dynamic was particularly strong in the recovery from the Great Recession (Cashin and others 2018). As shown in online appendix figure 6, state and local government purchases of goods and services—the state and local government contribution to GDP—were flat, on net, over the course of the economic expansion following the Great Recession. In contrast, these purchases rose significantly in most prior expansions.

The states and localities entered the COVID-19 pandemic in a relatively strong fiscal position along some dimensions. State total balances—reserve accounts (so-called rainy day funds) plus general budget surpluses—stood at $122 billion in fiscal year 2019, equal to 14 percent of general fund expenditures—a historic high (National Association of State Budget Officers 2020). And the decision to sharply curtail infrastructure investment in recent years led to less need for borrowing and a gradual reduction in debt, which fell from around 20 percent of GDP prior to the financial crisis to around 14 percent currently; the interest payments of these governments fell from around 1.9 percent of GDP at the end of 2009 to roughly 1.4 percent currently.[18] Moreover, the CARES Act and other legislation enacted in the spring of 2020 provided federal aid to states and localities of over $200 billion.

Nonetheless, many believe that these savings and federal aid will be insufficient to meet the scale of the revenue losses and spending requirements these governments will experience over the next few years, and the state and local sectors will again generate significant economic headwinds for the economic recovery (Bernanke 2020). Moreover, state and local governments are responsible for many public goods that are crucial to

18. Authors' calculations based on data from the Financial Accounts of the United States and the US Bureau of Economic Analysis.

the response to the pandemic, for example, public health departments and public hospitals. Budget strain may impair their ability to mount an effective response to the COVID-19 outbreak.

Although most states have balanced budget requirements of some kind, some are more stringent than others. Some, for example, require midyear adjustments to spending and taxes to offset any shortfalls, while others only require governors to submit budgets that they expect to balance. Thus, revenue shortfalls in the near term can constrain spending for many years, as we saw in the Great Recession. Capital expenditures—which are typically not subject to balanced budget requirements—are also surprisingly cyclical (US GAO 2011), perhaps because spending required to plan and maintain capital projects comes out of operating budgets, governments may wish to avoid the costs of servicing debt during times of economic stress, and many areas require voter approval for any bond issuance, which is less likely to be forthcoming during an economic downturn.[19] Finally, unemployment benefits, which are also not subject to balanced budget requirements, leave debts that need to be repaid within two to three years to avoid having the federal government raise the federal unemployment tax.

II.A. Estimates of Revenue Losses from COVID-19 in the Literature

As shown in table 2, a number of researchers have estimated the likely effects of the pandemic on the fiscal health of states and localities. The estimates of state and local revenue losses over the two fiscal years starting from the onset of the pandemic vary widely, ranging from $130 billion (White, Crane, and Seitz 2020) to $875 billion (Bartik 2020).[20] The range reflects both differences in underlying economic assumptions and differences in coverage (all state and local revenues or some subset), as well as differences in methodology.

The top three estimates in table 2 all rely on the work of Fiedler, Furman, and Powell (2019), who estimate that a 1 percentage point increase in the unemployment rate lowers real per capita total state revenues by 3.7 percent. Both Bivens and Walker (2020) and Bartik (2020) increase this number by about a third to roughly account for the impact of COVID-19 on local taxes. These estimates tend to show very large effects of the pandemic.

19. Tax Policy Center, Briefing Book, "The State of State (and Local) Tax Policy," https://www.taxpolicycenter.org/briefing-book/what-are-municipal-bonds-and-how-are-they-used.

20. Fiscal years for states generally end on June 30, so these two fiscal years end June 30, 2021.

Table 2. Summary of Recent Projections for Revenue Losses from COVID-19 in the State and Local Sectors

Authors	*Revenue sources considered*	*Revenue losses FY2020 and FY2021 (billions)*	*Economic forecast underlying estimate*	*Methodology*
Bartik (2020), Upjohn Institute	State and local taxes	$899	May CBO	Historical relationship augmented for assumed local revenue effect; 1 percent increase in unemployment to lower state and local revenues by $60 billion.
McNichol, Leachman, and Marshall (2020), Center on Budget and Policy Priorities	State taxes	$395	April CBO	Historical relationship: 1 percent increase in unemployment rate lowers revenues 3.7 percent.
Bivens and Walker (2020), Economic Policy Institute	State and local taxes	$345	Goldman Sachs April forecast	Historical relationship augmented for assumed local revenue effect: 1 percent increase in unemployment associated with a $60 billion decline in state and local revenues.
Clemens and Veuger (2020a)	State income and sales tax	$148	April CBO	Historical relationship: 1 percent decline in personal income lowers revenues by 1.6 percent.
White, Crane and Seitz (2020), Moody's Analytics	State revenues general funds	$130 baseline; $203 more severe scenario	Baseline: max. 10 percent decline in real GDP, gradual recovery. More severe: max. 14 percent decline in real GDP, gradual recovery.	Proprietary model that includes state-by-state regressions of state revenues on economic revenues.
Whitaker (2020b)	All state and local revenue (including fees, charges, etc.)	$200–$490	Best: recovery complete by 2020:Q4. Worst: second wave shutdown 2020:Q4; economy recovered by 2021:Q4.	For income taxes: estimate wage declines and assume tax revenues decline proportionally. For sales taxes, use national changes in portions of PCE likely subject to sales tax.
Urban Institute (2020)	State taxes	$200	States' forecasts	Estimated for all fifty states based on forecast data from twenty-seven states.

Source: Authors' compilation.

A second method—relied on by Clemens and Veuger (2020a)—uses the historical relationship between changes in personal income and income tax collections and changes in personal consumption and sales tax collections.[21] White, Crane, and Seitz (2020) adopt a broadly similar approach at the state level. Whitaker (2020a, 2020b) uses a variety of methods to project changes in the whole suite of state and local revenues and fees. Finally, Dadayan (2020) uses information on states' own forecasts of revenue losses to project losses for the nation as a whole.

The estimates in the literature that relate changes in economic conditions to changes in revenue collections seem appropriate as a general rule of thumb to know what the effect of a typical recession might be on revenues. Indeed, Fiedler, Furman, and Powell (2019) note that their estimate is intended to capture not only the direct effect of unemployment on revenues but also any indirect effects stemming from changes in economic conditions that occur in recessions. But there are reasons to believe that these historical relationships may not prove to be very accurate for the current very unusual recession. First, as noted by Chetty and others (2020), while all recessions affect those with the lowest incomes the most, this one appears to have hit low-wage workers disproportionately hard relative to historic norms; these individuals often work in service industries that have been decimated by a fall in demand and are also the least likely to be able to work from home. Indeed, data on employment rates by income group from Opportunity Insights suggest that the recession is basically over for high-wage workers, but still very severe for low-wage workers.[22] This concentration of unemployment among the lowest-paid workers means that the increase in the unemployment rate may be less consequential for state and local revenues than in the past.

Second, most recessions are accompanied by stock market declines. Stock market declines depress revenues by depressing taxable capital gains realizations and are likely associated with lower taxable business income. But although the market did fall by almost 30 percent in March 2020, the recovery in equity prices was swift and, as of October 19, the market was

21. Clemens and Veuger (2020b) update the income and sales tax estimates in Clemens and Veuger (2020a) and also extend the estimates by accounting for other state taxes, as well as local taxes. They estimate a total state and local government revenue loss due to the COVID-19 pandemic of $240 billion in fiscal year 2021. In these papers, as we do here, they base their COVID-19 shock on the evolution of CBO economic projections.

22. Data from Opportunity Insights are at Tracktherecovery.org.

up almost 5 percent for the year, suggesting that capital gains tax revenues won't be significantly depressed relative to a typical year.[23]

Third, the huge fiscal response to this recession at the federal level has important implications for state and local tax revenues. While the $1,200 rebate checks sent to most families are not taxable, much of the Paycheck Protection Program (PPP) spending will likely show up as higher profits for sole proprietorships, partnerships, and S corporations (all taxed at the individual level), and the large expansion and increase in unemployment benefits is taxable in most states with an income tax.[24] Projections based on historical relationships between tax collections and the unemployment rate will miss these increments to taxable income, as they far surpass anything that has been enacted in the past. Projections based on the regressions on personal income, on the other hand, will capture the higher income from unemployment benefits but will also capture the approximately $300 billion in rebate checks, which are not taxable.[25]

Fourth, the pattern of consumption changes in this recession are very different than in previous recessions. The drop in consumption is far larger than observed in previous recessions—suggesting that regressions based on income or the unemployment rate will understate the decline in sales tax revenues. But the composition of the consumption decline has also changed dramatically. Consumption of services—which are usually far less cyclical than consumption of goods—has plummeted, while consumption of goods has shown much more resilience. Given that most services are untaxed, this might lessen the hit to sales tax collections. State and local governments also rely importantly on fees and charges, however. With driving and flying

23. The effects of changes in the stock market tend to affect tax receipts with a lag, as much of the effect occurs when people make estimated quarterly tax payments or final payments in April of the following year.

24. Autor and others (2020) calculate that the PPP loans created 2.3 million jobs at an average annual wage of $60,000. These loans covered only two and a half months of payroll, meaning that only $29 billion went to firms who otherwise would have laid off their workers; the remaining $489 billion accrued to business profits. Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, and Wyoming do not have income taxes on earned income and so don't tax unemployment benefits. In addition, California, Montana, New Jersey, Pennsylvania, and Virginia exempt unemployment benefits from income taxes; see "Is Unemployment Taxable? State-by-State Guide to Unemployment Benefits," Kiplinger, https://www.kiplinger.com/slideshow/taxes/t055-s001-state-taxes-on-unemployment-benefits/index.html. The $1,200 rebate checks may, however, indirectly boost sales tax revenues by supporting consumption.

25. Clemens and Veuger (2020a) correct for this by taking out the rebate checks when doing their calculations.

Table 3. State and Local Tax Revenues and the Business Cycle, 1985–2019

		Dependent variable: log change in real per capita state and local income taxes			
Independent variable		*All*	*Exclude 2009*	*Include stocks*	*Include stocks and exclude 2009*
Change in unemployment rate	Coeff.	–4.9	–3.5	–3.3	–2.7
	Rsq adj.	0.56	0.24	0.65	0.35
Log change real per capita personal income	Coeff.	2	1.4	1.4	1.1
	Rsq adj.	0.58	0.28	0.65	0.36
Log change real per capita taxable personal income	Coeff.	1.5	1.1	1.1	0.89
	Rsq adj.	0.61	0.33	0.67	0.4
		Dependent variable: log change in real per capita state and local sales taxes			
Change in unemployment rate	Coeff.	–3	–2.3	–2.4	–2
	Rsq adj.	0.72	0.44	0.75	0.49
Log change real per capita personal income	Coeff.	1.1	0.7	0.8	0.6
	Rsq adj.	0.6	0.27	0.64	0.31

Sources: Data on taxes and personal income from the Bureau of Economic Analysis (BEA); unemployment rates from the Bureau of Labor Statistics (BLS); stock market uses the Wilshire 5000 from FRED.

way down and many public parks closed, this category of revenues is likely to suffer much larger declines than in previous recessions.

Finally, as we show below, even after making various adjustments, these types of regressions are very sensitive to the experience of the Great Recession, when revenues fell sharply even given the very large rise in unemployment. It is unclear whether that outsized relationship reflected a structural change or something specific to the Great Recession.

II.B. A Reexamination of the Historical Relationships between State and Local Revenues and the State of the Economy

In table 3, we reexamine some of the historical relationships at the national level. As noted by Fiedler, Furman, and Powell (2019), examining the relationship between actual tax revenues and economic conditions can lead to an underestimate of the true coefficients, because state and local governments may respond to lower anticipated tax revenues by raising taxes and fees. However, they show that such effects are quite modest, and so we ignore these policy responses here. In the bottom-up approach we focus on

below, we control for any such policy changes directly by using existing tax codes to project state and local revenues.

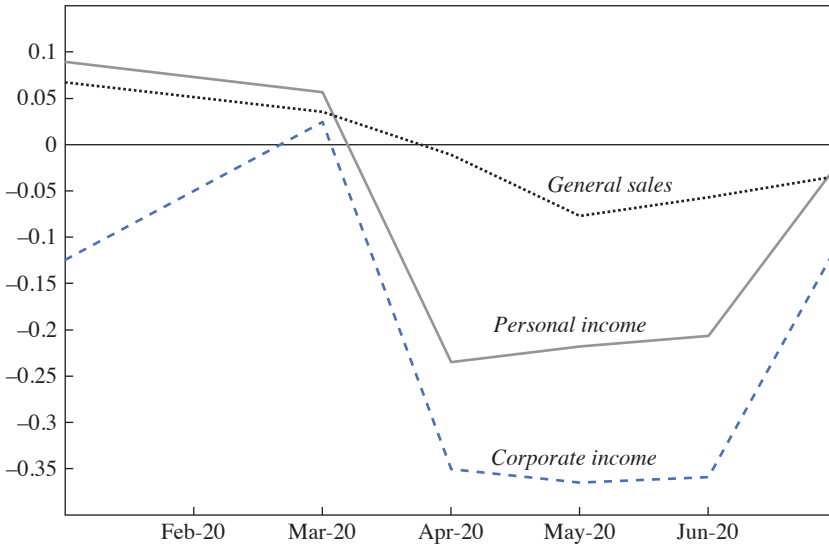
We first examine the relationship between the log difference of real state and local income taxes and sales taxes and two economic indicators: the change in the unemployment rate and the log change in real per capita personal income. In order to try to assess the importance of changes in stock market returns in depressing tax revenues during recessions, we include the lagged change in the log of the inflation-adjusted Wilshire 5000 index.

The regressions illustrate a few important points. First, excluding 2009 leads to much smaller estimates of the effects of changes in the economy—regardless of the economic indicator—on both income and sales tax collections. Second, including a measure of stock price changes similarly lowers the estimated coefficient, and including stock prices and excluding 2009 lowers the estimates yet again. For example, the effect on the percentage change in state and local income tax revenues from a 1 percentage point increase in the unemployment rate is a fall from –4.9 percent to –2.7 percent, or by about half, and a similar change is seen in the coefficient on the change in personal income. Third, the estimates are relatively variable across specifications.

Using the change in unemployment projected by the CBO for 2020 as a whole, for example, the estimated revenue loss from income taxes declines from roughly $160 billion using the estimates in the first column to about $88 billion using the estimates in the fourth column.

We also attempt to understand the relationship between changes in personal income and changes in income tax revenues. Clemens and Veuger (2020a), for example, use an elasticity of state income tax revenue with respect to personal income of 1.6, even though state income tax systems are not very progressive. We note that a large and growing share of personal income is not subject to taxation and is not very cyclical—including Medicare, Medicaid, Social Security, and imputed rent on owner-occupied housing. That means that when personal income falls by 1 percent in a recession, the taxable and more cyclical components fall much more, giving rise to a coefficient on personal income greater than one in a regression of tax collections on personal income. To test whether this wedge between taxable and total personal income accounts for the large elasticity of state income tax revenue with respect to personal income, we run the regression using the taxable portion of personal income. We define this as all personal income less governments transfers other than unemployment insurance (which is taxable in most states), imputed rent on owner-occupied housing, and employer-provided benefits like health insurance and pensions. As

Figure 4. State Taxes: Year-to-Date Percent Change Relative to Previous Year



Source: Data provided by the Urban Institute, https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/projects/state-tax-and-economic-review/data-subscriptions.

Notes: Figure displays percentage changes for 2020 relative to 2019 for year-to-date state government tax collections. Personal income tax collections reflect data for thirty-three states, which accounted for roughly 85 percent of national income tax collections in 2019; corporate income tax collections reflect data for thirty-six states, which accounted for roughly 82 percent of national corporate income tax collections in 2019; sales tax collections reflect data for thirty-six states, which accounted for roughly 88 percent of national sales tax collections in 2019.

shown in the third row of table 3, a regression of income tax revenues on taxable personal income shows a much smaller coefficient. Indeed, it is just below one once the stock market is included in the regression and 2009 is excluded.

But the large differences between this recession and previous ones suggest that relying on past experience may not necessarily provide very accurate projections of budget pressures for state and local governments. Indeed, data on state government tax collections suggest that, at least through midsummer, the revenue shock may not have been as severe as suggested by some of the estimates considered so far.

Figure 4 displays the percent change in year-to-date tax collections through July relative to 2019.[26] Tax revenue plummeted following the

26. The data are collected by the State and Local Finance Initiative at the Urban Institute, https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/projects/state-tax-and-economic-review/data-subscriptions.

onset of the pandemic as many states followed the federal government's decision to delay final 2019 and estimated quarterly 2020 income tax payments from April and June to July. The decline in collections was historic and exceeded the declines experienced as a result of the Great Recession (Gordon, Dadayan, and Rueben 2020). However, year-to-date personal income tax collections rebounded smartly in July as delayed payments came in. Sales taxes staged a more muted recovery in June and July, reflecting the broader economic recovery as well as delays in filing and remittance deadlines in some states (Urban Institute 2020).

Overall, year-to-date personal income tax and sales tax collections in July were down around 2 percent and 3.4 percent, respectively, relative to last year; corporate collections were down a much larger 11 percent. The declines in personal income taxes and sales taxes are smaller than the decline in economic activity over the same period. This divergence likely reflects, in part, the effects of the massive fiscal stimulus enacted by the federal government—for example, the boost to personal income attributable to the expanded unemployment insurance (UI) program. Nonetheless, tax collections remain depressed due to the pandemic. Moreover, year-to-date growth in collections could well fall back in the months ahead—for example, the end of the $600 supplement to UI payments in July will reduce taxable personal income.[27]

Given the unusual nature of the current economic downturn, and the corresponding uncertainty over the appropriateness of using elasticities based on historic experience, our preferred approach is to use a more detailed bottom-up method that accounts for the geographic variation in the magnitude of the impact on employment and consumption, the distributional effects, and the impact of federal fiscal policy on taxable income. We attempt a detailed projection of revenues through the end of calendar year 2022. These bottom-up estimates should be viewed as complementary to the more standard top-down estimates discussed above.

27. The 2020 year-to-date collections include revenue from the prepandemic months of January and February; these months will become a relatively smaller share of year-to-date collections as additional months of collections come in. The Urban Institute (2020) documents that the percentage declines in cumulative tax collections from March through July relative to 2019 are larger than the year-to-date percentage declines reported here. Finally, looking to 2021 tax revenue, final tax payments for the 2020 tax year, to be collected in 2021, may well be weaker than 2019 final payments. See Gordon, Dadayan, and Rueben (2020) for a much more detailed, point-in-time description of state and local government finances as of July 2020.

II.C. A Bottom-Up Methodology for Calculating State and Local Revenues

Our bottom-up approach explicitly accounts for heterogeneity across states and estimates revenue losses on a state-by-state basis. We consider state and local governments jointly by state. While this is appropriate given the substantial fiscal linkages between a state and its localities, it does gloss over the substantial heterogeneity in fiscal conditions at the local level.[28]

We consider five categories of revenues for state and local governments: individual income taxes, which make up 16 percent of general own-source revenues (revenues excluding utility, liquor store, and insurance trust fund revenue, as well as rents from the federal government); sales taxes, which account for another 16 percent; corporate income taxes, which make up just 2 percent of general own-source revenues; and fees and charges, which make up 44 percent. House prices have held up well so far in this recession and property taxes respond to changes in market values with a lag of several years (Lutz, Molloy, and Shan 2011). Accordingly, we assume no change to property taxes, which make up 22 percent of own-source revenues.[29]

Our basic methodology compares recent data on employment and consumption with what had been projected pre-COVID-19 to measure the COVID-19 shock, using the CBO's economic projection from January 2020 as the pre-COVID-19 baseline. We project that shock forward using the difference between the CBO's economic post-COVID-19 projections (July 2020) and their pre-COVID-19 projections (January 2020), as well as their estimate of social distancing. We describe the methodology for each type of revenue briefly below and in detail in section II of the online appendix.

The CBO projections include much lower inflation over the next few years, which we take on board in the form of lower nominal wages, capital income, and consumption, and hence lower revenues. Whether lower revenues due to lower inflation represent strains for state and local governments depends on what happens to the prices of the items they purchase.

28. See Chernick, Copeland, and Reschovsky (2020) for a detailed examination of the effect of the pandemic on the fiscal position of large cities; these authors find substantial variation in the fiscal effect across cities.

29. Delinquencies could push down property tax revenues. However, even during the housing crisis coincident with the Great Recession, delinquencies appear to have had only a minor effect on property tax collections. A decline in commercial real estate prices could, however, eventually push down property tax collections. See Chernick, Copeland, and Reschovsky (2020) for a discussion of these issues.

While we think using nominal revenue decline is reasonable, we also report declines in real revenues.

THE EFFECTS OF COVID-19 ON STATE AND LOCAL INCOME TAXES To calculate state and local income tax revenues, we create a small-scale microsimulation model using data from the Current Population Survey and the NBER's TAXSIM, which, given a set of inputs about taxable income, calculates individual income tax liabilities by state using each state's tax code.[30] We gross up state revenues to account for local income taxes, using the ratio of local to state income tax revenues in 2017. In using TAXSIM, we are calculating annual tax liabilities, rather than tax payments—for example, some of the declines in 2020 tax liability won't show up until April 2021, when final payments are due.

We compare the revenues under a pre-COVID-19 baseline to one that reflects the effects of the pandemic on income. To calculate post-COVID-19 income, we use CBO economic projections to shock wage rates, income, dividends, pensions, and business income on a national basis. To calculate wage income and unemployment rates, we use data from Opportunity Insights on employment by month by state for three broad income groups: those in the bottom quartile, those in the middle two quartiles, and those in the top quartile.[31] These data allow us to capture the heterogeneity across states and across income groups in the effects of the recession. We adjust the size of the employment declines each month so that, rather than being relative to January (as the Opportunity Insights data are), they are relative to the employment levels in the CBO's January 2020, pre-COVID-19 economic projections.[32] Using these data, we have a different COVID-19 shock for each state and income group combination. We use the unemployment benefits calculator in Ganong, Noel, and Vavra (2020) and our estimates of unemployment by month to calculate weekly unemployment insurance benefits by state.

30. At the time of writing, TAXSIM had state income taxes only through 2018, but there have been few significant changes in tax laws since then. We use TAXSIM based on the 2018 state tax codes.

31. The Opportunity Insights data come from the private sector, whereas we are implementing the shocks for all workers. Because the private sector experienced, on average, somewhat higher relative employment losses than the public sector, we view the shocks to wages as an upper bound. The cutoffs for the bottom and top quartiles in the data are 27,000 and 60,000, respectively. Using these cutoffs with the CPS wage data put too many people in the top quartile, which would have understated unemployment. Instead, we used the 25 percent and 75 percent quartiles from the national CPS data to define the income groups.

32. That is, we account for the fact that simply reaching January's employment doesn't mean that the economy is back to the pre-COVID-19 baseline.

We use Opportunity Insights data through August 2020. To calculate 2020:Q3, we assume that September employment was unchanged from August. To project employment into the future, we assume the recovery in employment for each state follows the recovery in the CBO unemployment projection. For example, the unemployment rates for 2021:Q3 and 2021:Q4 in the CBO's July 2020 projection are 8 percent and 7.6 percent, respectively, compared to 3.6 percent for both quarters in the January 2020 projection. Thus, the difference between the CBO's pre- and post-COVID-19 unemployment rates falls 9 percent between 2021:Q3 and 2021:Q4; we use that rate of decline for each state/income group.[33]

One issue we had to contend with is that the incoming data have been far stronger than anticipated by the CBO in their July projection. For example, the CBO projected that the unemployment rate would be 14.1 percent in the third quarter and then begin to decline, hitting 8.6 percent by the second quarter of 2021. In fact, the unemployment rate was 10.2 percent in July and 8.4 percent in August. We assume that the CBO simply missed the timing of the recovery, and, rather than assuming the shock continues to dissipate over the remainder of the year, we have chosen to keep it constant at its current value through the middle of 2021 and then allow it to follow the CBO path. That is, we assume no improvements in employment relative to baseline until the middle of next year. While this is a less optimistic projection than many other forecasters, it may be reasonable given that, unlike these other forecasts, it is a current law projection that assumes no additional fiscal stimulus. Furthermore, it provides for the possibility of a second wave in the fall or winter that will slow the recovery.

Line 2 of table 4 provides our results of the effects of the pandemic on state and local personal income tax collections. Online appendix table 1 contains projections for each state. Income tax revenues decline 5.2 percent in 2020, 7.4 percent in 2021, and 7.5 percent in 2022, for totals of $24 billion, $36 billion, and $38 billion, respectively. These revenue losses are the result of losses in taxable income of 4.3 percent, 6.3 percent, and 6.4 percent, suggesting that state tax systems are moderately progressive.[34] In real pre-COVID-19 dollars, these declines are quite a bit smaller in 2021 and 2022 (line 17).[35]

33. The 9 percent decline comes from comparing 4.4 (8 – 3.6) to 4 (7.6 – 3.6).

34. See Cooper, Lutz, and Palumbo (2015) for a discussion of state personal income tax progressivity.

35. The CBO lowered GDP inflation by 1.2 percentage points in 2020, 1.3 percentage points in 2021, and .5 percentage points in 2022, which lowers revenues accordingly. Our "real" revenue losses exclude losses due to these changes in inflation.

Table 4. Effects of the Pandemic on State and Local Fiscal Outlook, National Summary

		$ (billions)		
		2020	*2021*	*2022*
1	Projected nominal declines in revenues excluding fees from higher education and hospitals	156	165	143
2	Personal income tax revenues	24	36	38
3	Corporate income tax revenues	2	29	14
4	Sales tax revenues	49	45	46
5	Other taxes and fees	82	55	45
6	Projected nominal declines in fees to public hospitals and institutions of higher education	33	22	22
7	Additional demands on spending	?	?	?
8	Nominal state aid excluding hospitals and higher education	211	16	12
9	COVID-19 relief	150		
10	K-12 aid	13		
11	Transit	25		
12	Medicaid (excess over additional spending)	23	16	12
13	Nominal state aid to hospitals and higher education	42		
14	Health provider relief	35		
15	Higher education relief	7		
	Declines in real revenues (pre-COVID-19 $)			
16	Revenues excluding fees from higher education and hospitals	140	130	98
17	Personal income tax revenues	19	25	24
18	Corporate income tax revenues	1	29	12
19	Sales tax revenues	44	35	33
20	Other taxes and fees	76	42	28
21	Fees to public hospitals and institutions of higher education	30	15	13

Source: Authors' calculations.

The moderate size of these declines—especially relative to the declines that would have been estimated using the regressions above—primarily reflects the low incomes of most of the unemployed and the sizable taxable fiscal stimulus. We calculate that, without the CARES Act, income tax revenues would have declined an additional $11 billion in 2020, $5 billion from unemployment insurance and $6 billion from PPP.[36]

THE EFFECTS OF COVID-19 ON CORPORATE TAXES While corporate tax collections make up only a small part of state and local revenues, they are also

36. As discussed in the online appendix, the amount of PPP money included in these estimates is quite minor.

highly procyclical, and the large declines in federal corporate tax collections in the CBO forecast suggest that the revenue declines for state and local governments are likely to be substantial. The CBO has adjusted its estimates of corporate tax receipts down because overall corporate profits are down, because the taxable share of profits tends to decline in recessions, and because of legislative changes made in the CARES Act. We adjust the July CBO projections to take out the legislative effects, as these are unlikely to affect state tax collections.[37] We then calculate the COVID-19 shock to corporate tax collections as the difference between this adjusted July projection and the January CBO projection and apply this percentage shock to our estimate of what state corporate tax revenues would have been in the absence of COVID-19. We calculate these counterfactual state corporate receipts using the 2017 Census of Governments, increased by the average growth rate of such taxes between 2014 to 2017. As shown in line 3 of table 4, we project that state corporate tax collections will decline $2 billion in 2020, $29 billion in 2021, and $14 billion in 2022.

THE EFFECTS OF COVID-19 ON SALES TAX REVENUES The sales tax is a large source of revenue for state and local governments. Forty-six states impose general sales taxes and so do some local governments. Because the sales tax is based on the dollar value of sales, sales tax revenues move proportionally with consumption of taxed items. But because of the unusual patterns of consumption changes during the current recession—large increases in groceries and large decline in spending at restaurants and hotels, for example—and because not all items of consumption are subject to the sales tax, looking at the past relationship between aggregate consumption expenditures and, particularly, unemployment and sales tax revenues may not yield a reasonable estimate of the effect of the pandemic on sales tax collections, at least in the near term. Online appendix table 2 describes the composition of state sales tax bases.

To isolate some of these unique effects, we approximate changes in taxable consumption for each state by using a combination of changes in spending by consumption category from the Opportunity Insights data, calibrated using national data for the second quarter from the National Income and Product Accounts (NIPA), and state-by-state variation in the sales tax base. Our projections of sales tax revenues take the easing of social distancing into account. In particular, following the CBO, we assume that the

37. The largest legislative change affecting corporate profits involved an adjustment to how net operating losses are treated. Most states did not adhere to this change in treatment (Ernst and Young 2020).

shock to spending coming from social distancing abates over the next three quarters. By the middle of 2021, we assume that the shock to consumption no longer reflects social distancing but instead only reflects the overall state of the economy. The online appendix contains detailed information on our methodology as well as results on a state-by-state basis.

Line 4 of table 4 shows our results for the nation over the next three years. The results by state are in online appendix table 3. In aggregate, we project that sales taxes will decline $49 billion this year, $45 billion next year, and $46 billion in 2022. As discussed above, part of this decline reflects the fact that the CBO has lowered the price level substantially as a result of COVID-19. Examining constant pre-COVID-19 dollars—line 19—the declines are somewhat smaller: $44 billion, $35 billion, and $33 billion. These projections may be somewhat too pessimistic. While we assume that the effects of social distancing wane, we do not account for the possibility that some of the lost spending will be made up. It seems likely that at least some of the cars not purchased and trips not taken represent consumption delayed rather than forgone, especially given the large rise in personal savings since the pandemic began.

THE EFFECTS OF COVID-19 ON OTHER TAXES AND FEES State and local governments derive significant revenue from sources other than the individual income tax, corporate income tax, property tax, and general sales tax, including revenue from selective sales taxes, fees and charges, and various other sources. Online appendix table 5 provides a detailed breakdown.

We use an approach similar to Whitaker (2020a, 2020b) to estimate the revenue declines. In most cases, we assign each revenue source a tax base measured at the monthly frequency in the NIPA. For instance, higher education fees are assigned a base of consumption of proprietary and public higher education services. For most categories of spending, we do not have state-specific information and assume that the declines in the tax bases in the NIPA are uniform across the states. The exceptions to this are for our estimates of motor fuel tax collections and hospital fees. We use a similar method to project the shocks forward as used for sales taxes—assuming that categories of spending driven by social distancing rebound to the average national decline in consumption by the middle of next year. The online appendix includes more detail on our methodology, and results by state are in online appendix tables 6 and 7.

As shown in line 5 of table 4, we estimate that the pandemic will lower revenues from other taxes and fees, excluding fees to public hospitals and institutions of higher education, by $82 billion this year, $55 billion next year, and $45 billion in 2022. Online appendix table 5 reports the

components of the revenue loss. The largest source—by far—is related to transportation, accounting for $46 billion in tax losses this year. This big hit to taxes and fees on transportation represents a massive difference from prior recessions.

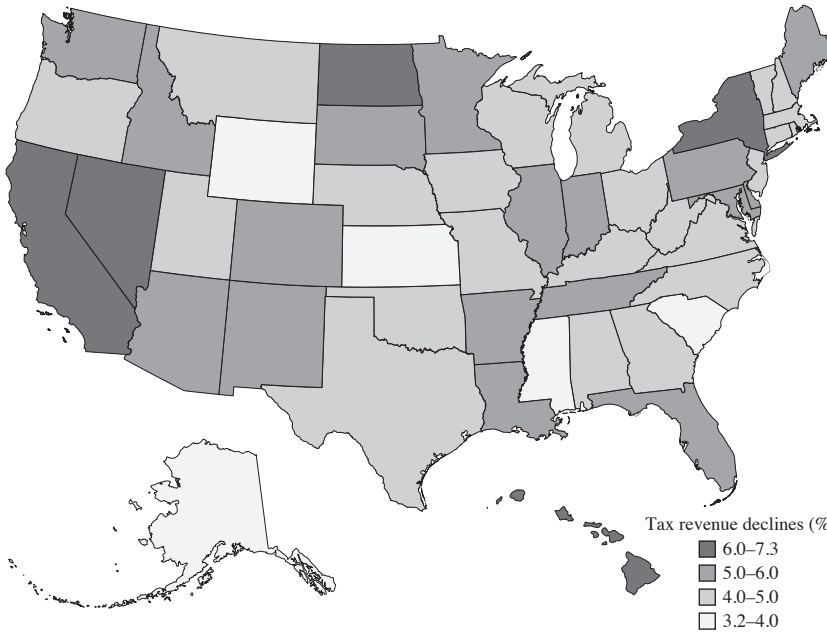
We estimate that the pandemic will lower fees to public hospitals and institutions of higher education by $33 billion this year, $22 billion in 2021, and $22 billion in 2022. It is difficult to assess the extent to which the projected declines in these fees should be included in our measures of revenue losses because these fees are typically provided in exchange for services rendered. As fees decline, so too do services and, possibly, expenditures. For example, the sharp decline in health expenditures in the spring meant that health care facility revenues plunged. To the extent that public hospitals reduced employment or cut back on supplies, these revenue losses were likely offset by declines in spending. On the other hand, running a hospital or university involves significant fixed costs, so the decline in revenues was likely not fully offset.[38]

Furthermore, while reductions in revenues offset by reductions in expenditures do have macroeconomic implications, much of this is the result of social distancing rather than tight budgets. Providing aid to state and local governments would not likely boost these expenditures. Furthermore, unlike declines in revenues that are not offset by declines in spending, they don't require any further changes in state and local spending beyond those already observed. Of course, some of these same dynamics apply to non-fee-based services. For example, according to BLS data, employment in local education declined about 5 percent in the spring. While some of these declines might have been in anticipation of tight budgets ahead, they also likely reflected, at least in part, layoffs of bus drivers, cafeteria workers, and other workers not needed for online schooling. From that perspective, these layoffs—while a negative for the macroeconomy, the workers, and the students—might be viewed as loosening budget constraints rather than as reflecting tight ones.

TOTAL REVENUE LOSSES As shown on line 1 of table 4, we estimate total revenue losses, excluding those from fees to public hospitals and institutions of higher education, of $156 billion in 2020, $165 billion in 2021, and $143 billion in 2023. These represent 5.8 percent, 5.9 percent, and 4.9 percent of general own-source revenues for 2020, 2021, and 2022,

38. Of course, it is possible that much of the lost revenue will be made up in the future as people ultimately get their conditions treated, a possibility we do not include in our projections.

Figure 5. Variation in Revenue Declines across States



Source: Authors' calculations.

Notes: This map shows projected declines in revenues from 2020 to 2022, as a share of own-source revenues excluding fees to hospitals and higher education. State-by-state numbers can be found in online appendix table 8.

respectively. Part of the reason revenue losses remain high is because of the CBO's assumption of lower inflation post-COVID-19. Line 16 shows the revenue losses excluding the effects of lower inflation, which are quite a bit lower, particularly in 2022.

Figure 5 shows the variation in nominal revenue losses, excluding hospitals and higher education, as a share of pre-COVID-19 own-source revenues from 2020–2022. The three states with the largest revenue losses—Nevada, California, and New York—have revenue losses exceeding 7 percent of own-source revenues, while the states with the smallest revenue losses—Wyoming, Alaska, South Carolina, and Kansas—have losses of less than 4 percent of own-source revenues. Online appendix table 8 includes the revenue losses by state by year.

ACCOUNTING FOR FEDERAL AID TO STATE AND LOCAL GOVERNMENTS States and localities are due to receive more than $200 billion in extra federal aid this year. The largest portion of that aid is $150 billion through the

coronavirus relief fund.[39] Legislation enacted last spring also provided aid to transit, education, and health care providers and raised the federal share of Medicaid spending by 6.2 percentage points—more than enough, we estimate, than necessary to cover additional Medicaid costs. The online appendix describes our methodology for our Medicaid estimates and the allocations of aid by state.

At least for 2020, federal aid seems large enough to offset state and local revenue losses. Looking forward, however, should the economy remain below its pre-COVID-19 baseline for many years, as the CBO projects, these governments will need additional aid in order to avoid cutting back on services or raising taxes and impeding the recovery.

Furthermore, even if state and local governments are not cutting back on spending in the aggregate, so that they are not a net drag on the economy, changes in the need for spending brought on by the pandemic could still mean that these governments might have to cut back on essential services. For example, if it is expensive to provide decent virtual education and public health services, then the ability to simply maintain pre-COVID-19 levels of spending may not be enough. A complete analysis of the fiscal conditions of state and local governments requires knowing much more about the spending side of the budget than we do at this point.

In addition, just because federal aid appears sufficient in the near term in aggregate does not mean that it is sufficient for every state. As shown in online appendix table 9, there is a great deal of variation across the states in the amount of aid received. While the largest source of federal aid, the $150 billion coronavirus relief fund, is generally distributed on the basis of population, states received a minimum of $1.25 billion. That made the aid exceedingly generous for some states, while others are likely to face budget shortfalls even in the absence of significant increases in COVID-19-related spending. For instance, Vermont, South Dakota, and Montana each received aid exceeding 20 percent of 2020 own-source revenues, whereas Iowa, Missouri, Mississippi, California, Connecticut, New York, and Washington received aid of 6 percent or less.

II.D. The Fiscal Outlook for State and Local Governments in the Medium Term

Because state and most local governments have to roughly balance their operating budgets, near-term fiscal distress should mostly be accompanied

39. Although those funds are required to be used for COVID-19-related spending that was not anticipated in the prior year's budget, the states have now mostly appropriated these funds, indicating they are likely to be spent (Gordon, Dadayan, and Rueben 2020).

by near-term cutbacks in spending and reductions in spending, although, as we saw in the Great Recession, severe near-term fiscal distress can linger on as states spread the fiscal distress over multiple years and rebuild their rainy day funds.[40] The pandemic will also affect some sources of revenue that are not subject to balanced budget requirements—in particular, spending on unemployment insurance, interest costs on state and local debt, and asset returns on state and local pensions.

EFFECTS OF COVID-19 ON STATE UNEMPLOYMENT INSURANCE FINANCING State unemployment insurance (UI) programs are funded jointly by the federal and state governments through an employer-side payroll tax. State UI taxes are deposited in a state-specific trust fund at the US Treasury and used to pay UI benefits in that state. If the trust funds become insolvent, states may borrow from the US Treasury to cover the shortfall. The UI program is typically viewed as an automatic stabilizer which buffers the economic cycle by increasing benefit payments as the economy slows. However, concerns have been expressed that increases in UI tax schedules due to depletion of trust funds may impede labor market recovery (Duggan, Guo, and Johnston 2020) and the need to replenish trust funds may divert resources from other uses in already strained state budgets. Indeed, following the Great Recession most UI trust funds became insolvent and average UI tax rates rose.

Nevertheless, the effects of UI financing strains seem likely to be fairly moderate. The various expanded UI benefits are not subject to experience rating and hence will not trigger increased tax rates. In addition, as of May 11, over half the states had exempted at least some current UI benefit charges from experience rating (Loughead 2020). Moreover, although UI tax rates increased significantly in percentage terms in the aftermath of the Great Recession and some firms and industries experienced large increases, in aggregate the average tax rate was only 0.6 percent of payroll in 2008 and rose to only 0.9 percent in 2012 before falling back.[41]

In terms of state budget strain, states may borrow to address UI financing shortfalls; as a result, they can adjust to the shock gradually over many years, as opposed to the much quicker adjustment necessitated by general revenue shortfalls. Indeed, following the Great Recession, states in

40. See Rueben and Randall (2017) for a discussion of the stringency of state balanced budget requirements. States held $119 billion in budget balances (rainy day funds plus general fund surpluses) at the end of 2019; these funds, which are not explicitly accounted for in the analysis in this paper, will initially allow the states to mitigate the magnitude of expenditure cuts and tax increases.

41. See Pavosevich (2020). In dollar terms, state UI taxes rose from about $30 billion in 2008 to about $50 billion in 2012.

aggregate eliminated their UI debt very slowly, only extinguishing it in 2019 (US Department of Labor 2014, 2020).

EFFECTS OF LOWER INTEREST RATES ON STATE AND LOCAL FINANCES State governments are both borrowers and savers. The saving is mostly in the form of contributions to state and local employee pension funds, while the borrowing is through the issuance of municipal debt—mostly to finance long-term capital projects. According to the Census of Governments for 2017, total state and local government debt equaled $3 trillion in 2017, while total financial assets were $6.9 trillion. Thus, on net, state and local governments are net lenders rather than borrowers; this was true not just for the United States as a whole, but for each state individually as well.

To a first approximation, the immediate fiscal pressures coming from lower interest rates can be calculated as the change in rates of return multiplied by net financial assets, assuming that changes in Treasury rates are passed on one-for-one to changes in rates of return on other assets.[42] The CBO lowered its projection of rates on Treasuries by about 1.1 percentage points in 2020, 1.4 percentage points in 2021, and 1.6 percentage points in 2022. In the aggregate, we estimate that the lower real interest rates reduce funds available to state and local governments by roughly $40 billion in 2020, $50 billion in 2021, and $60 billion in 2022.

Looking beyond the near term, a longer-term decline in interest rates would place additional stress on state and local employee pension funds. But, as argued by Lenney and others (2019), lower real interest rates not only increase the rate of contributions needed to close existing pension funding gaps; they also make the case for pre-funding pensions weaker. Lenney and others (2019) note that when valuing the liabilities at risk-free rates, these plans have always been less than fully funded, and thus state and local governments have long been carrying implicit debt. Lower interest rates lessen the value of pre-funding.

Furthermore, recognizing that not fully funding pension contributions is a form of borrowing, it is worth asking whether lowering contributions could provide fiscal space if necessary. State and local governments contributed $169 billion to their defined benefit pension plans in 2019.[43] Budget balances (rainy day funds plus general fund surpluses) at the end of 2019, while at a record high of $119 billion, can only be used once—whereas

42. This calculation ignores the fact that not all debt and financial assets roll over immediately but should nevertheless give a reasonable measure of the near-term fiscal effects of lower rates of return.

43. Bureau of Economic Analysis, Nation Income and Product Accounts (NIPA), table 7.24., line 5, https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2.

contributions can be cut for multiple years. Furthermore, while budget balances were at a record high for the country as a whole, not all states were in such a good position. Yet, as shown in online appendix figure 7, many states without much in reserves do make sizable pension contributions, which could provide them some fiscal space if needed. Thus, cutting back on pension contributions could go some distance toward mitigating spending cuts. However, cutting back on pension funding comes at the cost of making pension commitments less sustainable over medium and longer terms. Moreover, higher grants from the federal government would be a more efficient way of smoothing through the costs of the pandemic: the federal government is better able to bear debt, has lower borrowing costs, and can internalize the economic spillovers arising from the macroeconomic effects of higher state and local spending.

III. Conclusion

The COVID-19 pandemic has had the biggest effect on the economy, at least in the short run, of any downturn since the Great Depression. The policies undertaken to deal with the crisis will have important implications for the length of the recession and the strength of the recovery. The pandemic will also affect the conduct of fiscal policy once the crisis is past, given the projection of rising debt, the long-lasting effects on the economy, and the effects of the crisis on US political imperatives.

ACKNOWLEDGMENTS We thank Sophia Campbell, Grace Enda, Claire Haldeman, and Tyler Powell for outstanding research assistance; Jason Furman, Douglas Holtz-Eakin, Adam Looney, Will Peterman, David Ratner, and conference participants for helpful comments; and Lucy Dadayan and Kim Rueben for assistance with the Urban Institute state tax data. William Gale thanks Arnold Ventures for generous research support. The views expressed here are solely those of the authors and should not be attributed to any other person or any organization, including the Board of Governors of the Federal Reserve.

References

Auerbach, Alan J. 1994. "The U.S. Fiscal Problem: Where We Are, How We Got Here, and Where We're Going." *NBER Macroeconomics Annual* 9: 141–86.

Auerbach, Alan J., William G. Gale, and Peter R. Orszag. 2003. "Reassessing the Fiscal Gap: Why Tax-Deferred Saving Will Not Solve the Problem." *Tax Notes*, July 28, 567–84.

Autor, David, David Cho, Leland D. Crane, Mita Goldar, Byron Lutz, Joshua Montes, William B. Peterman, David Ratner, Daniel Villar, and Ahu Yildirmaz. 2020. "An Evaluation of the Paycheck Protection Program Using Administrative Payroll Microdata." Working Paper. https://economics.mit.edu/files/20094.

Ball, Laurence, Douglas W. Elmendorf, and N. Gregory Mankiw. 1998. "The Deficit Gamble." *Journal of Money, Credit and Banking* 30, no. 4: 699–720.

Bartik, Timothy J. 2020. "An Updated Proposal for Timely, Responsive Federal Aid to State and Local Governments during the Pandemic Recession." Blog post, May 8, Upjohn Institute for Employment Research. https://www.upjohn.org/research-highlights/updated-proposal-timely-responsive-federal-aid-state-and-local-governments-during-pandemic-recession.

Bernanke, Ben S. 2020. "Ben Bernake: I Was Chairman of the Federal Reserve. Save the States." *New York Times*, July 15. https://www.nytimes.com/2020/07/15/opinion/ben-bernanke-coronavirus-federal-aid.html.

Bivens, Josh, and Naomi Walker. 2020. "At Least $500 Billion More in Coronavirus Aid Is Needed for State and Local Governments by the End of 2021." Blog post, April 9, Economic Policy Institute Working Economics. https://www.epi.org/blog/at-least-500-billion-more-in-coronavirus-aid-is-needed-for-state-and-local-governments-by-the-end-of-2021/.

Blanchard, Olivier. 2019a. "Public Debt: Fiscal and Welfare Costs in a Time of Low Interest Rates." Policy Brief 19–2. Washington: Peterson Institute for International Economics. https://www.piie.com/publications/policy-briefs/public-debt-fiscal-and-welfare-costs-time-low-interest-rates.

Blanchard, Olivier. 2019b. "Public Debt and Low Interest Rates." *American Economic Review* 109, no. 4: 1197–229.

Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. 2020. *The 2020 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds*. Washington: Centers for Medicare and Medicaid Services.

Boards of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. 2020. *The 2020 Annual Report of the Boards of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. Washington: Social Security Administration.

Cashin, David, Jamie Lenney, Byron Lutz, and William Peterman. 2018. "Fiscal Policy and Aggregate Demand in the U.S. before, during, and following the Great Recession." *International Tax and Public Finance* 25, no. 6: 1519–58.

CBO (Congressional Budget Office). 2019. "The 2019 Long-Term Budget Outlook." Washington. https://www.cbo.gov/publication/55331.

CBO (Congressional Budget Office). 2020a. "The 2020 Long-Term Budget Outlook." Washington. https://www.cbo.gov/publication/56516.

CBO (Congressional Budget Office). 2020b. "An Update to the Budget Outlook: 2020 to 2030." Washington. https://www.cbo.gov/publication/56542.

CBO (Congressional Budget Office). 2020c. "Workbook for How Changes in Economic Conditions Might Affect the Federal Budget, February 2020." Washington. https://www.cbo.gov/publication/56097.

CBO (Congressional Budget Office). 2020d. "An Update to the Economic Outlook: 2020 to 2030." Washington. https://www.cbo.gov/publication/56465.

CBO (Congressional Budget Office). 2020e. "The Outlook for Major Federal Trust Funds: 2020 to 2030." Washington. https://www.cbo.gov/publication/56523.

CBO (Congressional Budget Office). 2020f. "The Budget and Economic Outlook: 2020 to 2030." Washington. https://www.cbo.gov/publication/56020.

Chernick, Howard, David Copeland, and Andrew Reschovsky. 2020. "The Fiscal Effects of the COVID-19 Pandemic on Cities: An Initial Assessment." *National Tax Journal* 73, no. 3: 699–732.

Chetty, Raj, John Friedman, Nathaniel Hendren, Michael Stepner, and Opportunity Insights Team. 2020. "The Economic Impacts of COVID-19: Evidence from a New Public Database Built from Private Sector Data." Working Paper 27431. Cambridge, Mass.: National Bureau of Economic Research. https://www.nber.org/papers/w27431.

Clemens, Jeffrey, and Stan Veuger. 2020a. "Implications of the COVID-19 Pandemic for State Government Tax Revenues." *National Tax Journal* 73, no. 3: 619–44.

Clemens, Jeffrey, and Stan Veuger. 2020b. *The COVID-19 Pandemic and the Revenues of State and Local Governments: An Update*. Washington: American Enterprise Institute. https://www.aei.org/research-products/report/the-covid-19-pandemic-and-the-revenues-of-state-and-local-governments-an-update/.

Cooper, Daniel H., Byron F. Lutz, and Michael G. Palumbo. 2015. "The Role of Taxes in Mitigating Income Inequality across the U.S. States." *National Tax Journal* 68, no. 4: 943–74.

Dadayan, Lucy. 2020. "COVID-19 Pandemic Could Slash 2020–21 State Revenues by $200 Billion." Blog post, July 1, TaxVox: State and Local Issues. https://www.taxpolicycenter.org/taxvox/covid-19-pandemic-could-slash-2020-21-state-revenues-200-billion.

Duggan, Mark, Audrey Guo, and Andrew C. Johnston. 2020. "Unemployment during the Pandemic: How to Avoid Going for Broke." Policy brief. Stanford Institute for Economic Policy Research. https://siepr.stanford.edu/research/publications/unemployment-during-pandemic-how-avoid-going-broke.

Elmendorf, Douglas W., and Louise M. Sheiner. 2017. "Federal Budget Policy with an Aging Population and Persistently Low Interest Rates." *Journal of Economic Perspectives* 31, no. 3: 175–94.

Ernst and Young. 2020. "Federal Coronavirus Law, CARES Act, Has State Tax Implications." Tax News Update, U.S. Edition, March 30. https://taxnews.ey.com/news/2020-0784-federal-coronavirus-law-cares-act-has-state-tax-implications.

Fiedler, Matthew, Jason Furman, and Wilson Powell III. 2019. *Increasing Federal Support for State Medicaid and CHIP Programs in Response to Economic Downturns*. Washington: Brookings Institution, Hamilton Project. https://www.brookings.edu/research/increasing-federal-support-for-state-medicaid-and-chip-programs-in-response-to-economic-downturns/.

Gale, William G. 2019a. *Fiscal Therapy: Curing America's Debt Addiction and Investing in the Future.* New York: Oxford University Press.

Gale, William G. 2019b. "Fiscal Policy with High Debt and Low Interest Rates." In *Maintaining the Strength of American Capitalism*, edited by Melissa S. Kearney and Amy Ganz. Washington: Aspen Institute, Economic Strategy Group. https://www.economicstrategygroup.org/publication/maintaining-the-strength-of-american-capitalism/.

Ganong, Peter, Pascal J. Noel, and Joseph S. Vavra. 2020. "US Unemployment Insurance Replacement Rates during the Pandemic." Working Paper 27216. Cambridge, Mass.: National Bureau of Economic Research. https://www.nber.org/papers/w27216.

Gordon, Tracy, Lucy Dadayan, and Kim Rueben. 2020. "State and Local Government Finances in the COVID-19 Era." *National Tax Journal* 73, no. 3: 733–58.

Greenwood, Robin, Samuel G. Hanson, Joshua S. Rudolph, and Lawrence H. Summers. 2014. "Government Debt Management at the Zero Lower Bound." Working Paper 5. Washington: Brookings Institution, Hutchings Center on Fiscal and Monetary Policy. https://www.brookings.edu/research/government-debt-management-at-the-zero-lower-bound/.

IMF (International Monetary Fund). 2020. *World Economic Outlook Update, June 2020: A Crisis like No Other, an Uncertain Recovery*. Washington: International Monetary Fund.

Labonte, Marc. 2020. *The Federal Reserve's Response to COVID-19: Policy Issues*. Washington: Congressional Research Service. https://crsreports.congress.gov/product/pdf/R/R46411.

Lenney, Jamie, Byron Lutz, Finn Schuele, and Louise Sheiner. 2019. "The Sustainability of State and Local Pensions: A Public Finance Approach." https://www.brookings.edu/wp-content/uploads/2019/07/lenney_lutz_sheiner_MFC_Final.pdf.

Loughead, Katherine. 2020. "More Than Half the States Will Protect Businesses from Certain COVID-19-Related Unemployment Insurance Tax Hikes." Blog post, May 19, Tax Foundation. https://taxfoundation.org/unemployment-insurance-tax-hikes-COVID19.

Lutz, Byron, Raven Molloy, and Hui Shan. 2011. "The Housing Crisis and State and Local Government Tax Revenue: Five Channels." *Regional Science and Urban Economics* 41, no. 4: 306–19.

McNichol, Elizabeth, Michael Leachman, and Joshuah Marshall. 2020. *States Need Significantly More Fiscal Relief to Slow the Emerging Deep Recession*. Washington: Center on Budget and Policy Priorities. https://www.cbpp.org/research/state-budget-and-tax/states-need-significantly-more-fiscal-relief-to-slow-the-emerging.

National Association of State Budget Officers. 2020. *Fall 2020 Fiscal Survey of States*. www.nasbo.org/reports-data/fiscal-survey-of-states.

Pavosevich, Robert. 2020. "The Cost of Layoffs in Unemployment Insurance Taxes." *Monthly Labor Review*, April. https://www.bls.gov/opub/mlr/2020/article/the-cost-of-layoffs-in-ui-taxes.htm.

Plosser, Charles. 2012. "Fiscal Policy and Monetary Policy: Restoring the Boundaries." Speech given at the US Monetary Policy Forum, University of Chicago Booth School of Business, New York, February 24. https://www.philadelphiafed.org/-/media/frbp/assets/institutional/speeches/plosser/2012/02-24-12_us-monetary-policy-forum.pdf.

Powell, Jerome H. 2020. "Current Economic Issues." Speech given at the Peterson Institute for International Economics, Washington, May 13. https://www.federalreserve.gov/newsevents/speech/powell20200513a.htm.

Rueben, Kim, and Megan Randall. 2017. "Balanced Budget Requirements: How States Limit Deficit Spending." Fact Sheet. Washington: Urban Institute. https://www.urban.org/sites/default/files/publication/94891/balanced-budget-requirements_2.pdf.

Sheiner, Louise. 2018. "Effects of Low Productivity Growth on Fiscal Sustainability in the United States." Working Paper 18–9. Washington: Peterson Institute for International Economics. https://www.piie.com/publications/working-papers/effects-low-productivity-growth-fiscal-sustainability-united-states.

Urban Institute. 2020. "State Tax Revenues Surged in July 2020, but Cumulatively Are Down during COVID-19 Period." Fact Sheet. Washington: Urban Institute. https://www.urban.org/sites/default/files/2020/09/16/monthlystrh_july2020.pdf.

US Department of Labor. 2014. *State Unemployment Insurance Trust Fund Solvency Report*. https://oui.doleta.gov/unemploy/docs/trustFundSolvReport2014.pdf.

US Department of Labor. 2020. *State Unemployment Insurance Trust Fund Solvency Report*. https://oui.doleta.gov/unemploy/docs/trustFundSolvReport2020.pdf.

US Government Accountability Office (GAO). 2011. *State and Local Governments: Knowledge of Past Recessions Can Inform Future Federal Fiscal Assistance*. Washington: GAO. https://www.gao.gov/assets/320/317223.pdf.

Warsh, Kevin. 2020. "The Fed Puts Its Independence on the Line." *Wall Street Journal*, September 7. https://www.wsj.com/articles/the-fed-puts-its-independence-on-the-line-11599498437.

Whitaker, Stephan D. 2020a. "Estimates of State and Local Government Revenue Losses from Pandemic Mitigation." Data brief. Federal Reserve Bank of Cleveland. https://www.clevelandfed.org/en/newsroom-and-events/publications/

cfed-district-data-briefs/cfddb-20200513-estimates-of-state-and-local-government-revenue-losses-from-pandemic-mitigation.aspx.

Whitaker, Stephan D. 2020b. "How Much Help Do State and Local Governments Need? Updated Estimates of Revenue Losses from Pandemic Mitigation." Data brief. Federal Reserve Bank of Cleveland. https://www.clevelandfed.org/en/newsroom-and-events/publications/cfed-district-data-briefs/cfddb-20200629-updated-estimates-of-revenue-losses-from-pandemic-mitigation.aspx.

White, Dan, Sarah Crane, and Colin Seitz. 2020. "Stress-Testing States: COVID-19." Moody's Analytics, Economic View, April 14. https://www.economy.com/economicview/analysis/379097/StressTesting-States-COVID19.

Comment and Discussion

COMMENT BY

DOUGLAS HOLTZ-EAKIN I want to thank the authors for a paper that is timely and relevant to policymakers, but also rigorously executed and a contribution to our understanding of the mechanics of the COVID-19 recession and recovery. The analyses of the federal budget impacts and the state and local impacts could each stand on their own; together they form an extremely valuable paper.

FEDERAL FISCAL EFFECTS There are two main questions to be answered. First, what is the fiscal outlook, especially over the longer term? Second, how did COVID-19 contribute to that outlook?

As a start to the former, the authors build a "current law," thirty-year projection off of the recently released revised ten-year baseline and long-term budget outlook from the Congressional Budget Office (CBO 2020a, 2020b). They find that if the budget is effectively put on autopilot, the ratio of federal debt to gross domestic product (GDP) rises to almost 190 percent in 2050 and would continue to rise thereafter. In short, the fiscal outlook is terrible and unsustainable.

For followers of the federal budget outlook, this is not news. The same basic trajectory has been baked in since the early 2000s. The magnitudes, however, have gotten worse due to the legislation that was passed. The authors attempt to capture the future of this dynamic by presenting a "current policy" projection that embodies future legislative decisions (e.g., making the provisions of the Tax Cuts and Jobs Act permanent) consistent with their view of current policy. By this metric, federal debt will rise to over 220 percent of GDP by 2050.

Current policy is fundamentally subjective, and that is the Achilles' heel of any such analysis. At the present juncture, it is even more difficult to discern as it depends crucially on the outcome of the election.

For example, many believe that a Democrat-controlled administration and Congress would make permanent the paid family leave enacted in the Families First Coronavirus Response Act. This is excluded from the authors' current policy analysis. I could name a number of such examples. My own view is that current policy is to pass only laws that worsen the deficit and debt. That means current law is the lower bound for the debt trajectory, and the future is essentially unbounded. Again, this has been true since the early 2000s.

The second question is how did COVID-19 affect the fiscal outlook. This is new territory, and the authors have a series of interesting findings. I think three points stand out. First, the policy response to the COVID-19 recession has been historically large—the deficit reaches 16 percent of GDP in 2020 and the ratio of debt-to-GDP hits historic highs—because the economic downdraft has been historically large.

Second, the response to date has been genuinely temporary; the Coronavirus Aid, Relief, and Economic Security (CARES) Act, in particular, has no impact on the outlook for spending and revenues after a few years. One might not have anticipated that Congress would pass up the opportunity to alter the long-term outlook in its response to the coronavirus.

Third, the most important indirect impact of COVID-19 is the downward revision to the interest rate outlook. Indeed, this is the real impact of COVID-19 on the long-term budget trajectory, and it is substantial. Over the ten-year window, the budgetary impact of reduced interest rates is comparable in magnitude to the budgetary impact of the CARES Act.

I have no real criticisms of this work. It is carefully executed and captures the fiscal outlook and implications of COVID-19 in a straightforward way.

STATE AND LOCAL BUDGET IMPACTS The section on state and local governments has three main exercises. The first is to document sharp differences between the mechanics of this recession and previous US downturns. These are dramatic and important and lead the authors to conclude—correctly in my view—that it is inappropriate to use historical relationships between economic indicators of the cycle (e.g., the unemployment rate) and the health of state and local budgets, in general, and revenues, in particular.

The second is to build careful, state-by-state estimates of the impact of the COVID-19 recession on income taxes, sales taxes, corporate income taxes, and other fees and taxes. These are painstakingly detailed efforts that will be a durable contribution to the analysis of states and localities. They find that these receipts will decline by $156 billion in 2020, $165 billion in

2021, and $143 billion in 2022. Thus far, federal aid to states and localities has totaled around $200 billion; the authors suggest that a failure to close the gap between $464 billion and $200 billion will force fiscal retrenchment and harm the recovery.

The composition of the revenue losses is an important finding by the authors. While attention is typically focused on income taxes (estimated to be off by $24 billion in 2020) or sales taxes ($49 billion), the big losses (estimated at $82 billion) are in other taxes and fees. These declines are driven by declines in transportation fees, an important difference between the COVID-19 experience and previous recessions.

Perhaps most importantly, the authors provide not only these aggregate results, but state-by-state estimates of the revenue declines and federal aid receipts. Not surprisingly, there is considerable heterogeneity in the impact of COVID-19 on state and local finances. It is a real contribution by the authors to have documented this variation.

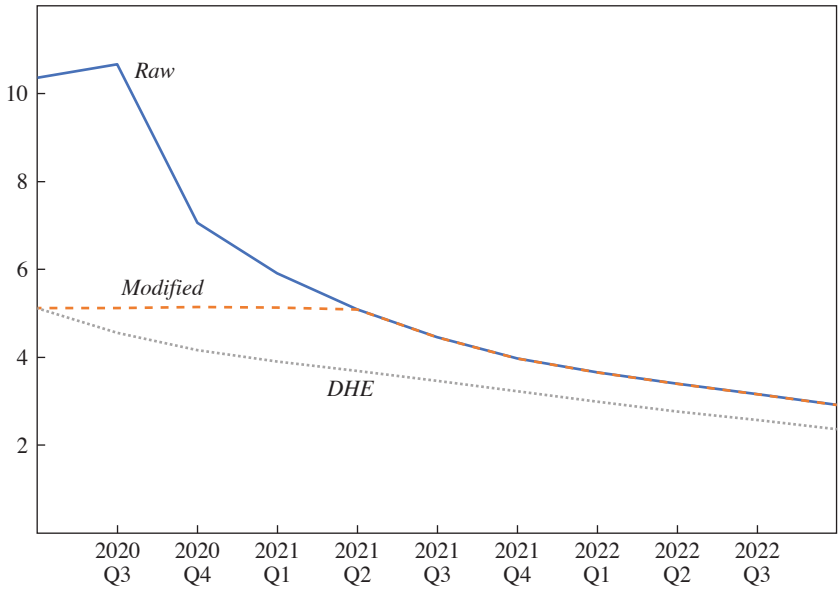
The final analysis is to look longer-term at the budgetary implications of the enormous demand for unemployment insurance and the low interest rate environment.

For many, the most topical aspect of the paper will be the estimated revenue shortfalls and their implications for federal aid. My main comment is to emphasize that the analysis appears to embody an extremely pessimistic outlook for the near-term recovery. The authors acknowledge this as it is an artifact of using the CBO projection for unemployment. In simple terms (and the actual computations are far more intricate), a decline in employment reduces labor earnings and lowers income taxes, which are 16 percent of general own-source revenue.

The authors parametrize the COVID-19 "shock" to employment as the difference between the CBO economic projections of the unemployment rate in July 2020 (post-COVID-19) and January (pre-COVID-19). These are shown in figure 1, showing the raw difference in the projections. As the authors note, this measure runs into the issue that the unemployment rate is already substantially lower in the third quarter of 2020 than the CBO projected in July. To use the raw difference would be to overstate the shock and overstate the decline in personal income taxes.

The authors' solution is to freeze the size of the shock at its current level until mid-2021 (when it matches the differences in the CBO projections) and then to follow the path of the CBO projections. This is shown as the "modified" path in figure 1. However, this is tantamount to assuming that there will be essentially no labor market improvement for the next year. The fiscal consequences for state and local income taxes follow directly.

Figure 1. Alternative Unemployment Rate Shocks



Source: Author's calculations.

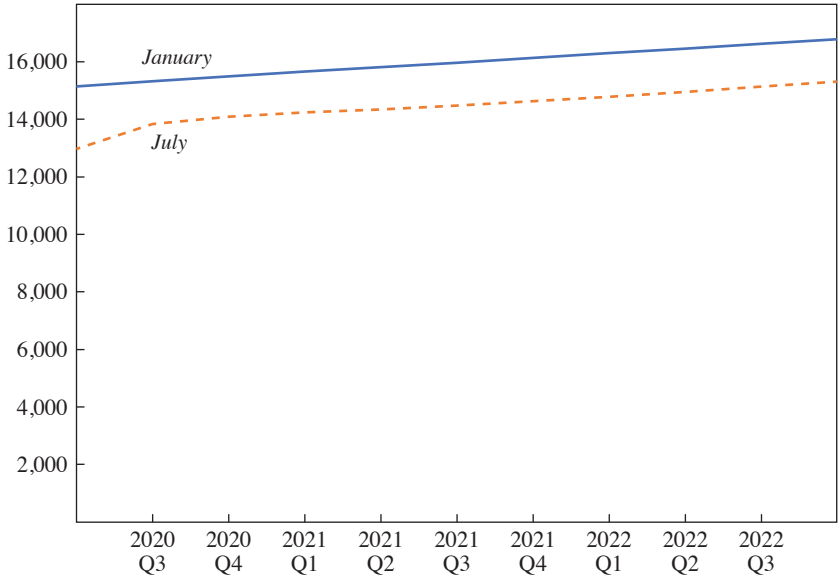
Obviously, there is no "right" projection of the labor income shock. However, one alternative that uses the same CBO projections as its foundation is labelled DHE in figure 1. The authors note that one way to think about the outlook is that the CBO missed the timing of the recovery but not the trajectory. The alternative simply assumes that the pace of labor market improvement starting in 2020:Q3 is the same as the CBO projected to begin a year from now.

The important point is that this alternative would show a shock that is smaller, and diminishing, over the key projection period 2020–2022.

A similar point can be made regarding the shock to nominal personal consumption expenditures (PCE). This shock underlies the authors' analysis of the impact of COVID-19 on sales taxes (another 16 percent of revenues) and state and local fees (which account for 44 percent of revenues). Again, at the core, the decline in household spending translates into lower sales taxes and collection of fees.

Once more, to operationalize the analysis the authors use the difference in the July and January projections of nominal PCE as their measure of the

Figure 2. CBO Projection: Nominal PCE



Source: Author's calculations.

COVID-19 shock. Figure 2 shows those projections. Clearly, the analysis implicitly assumes that the shock does not diminish over the 2020–2022 projection period.

As a whole, then, the authors' estimates strike me as built on a relatively pessimistic near-term outlook. Given the attention that will be given to this analysis, it is important to be clear about this. More generally, I think it highlights the desirability of a sensitivity analysis built on alternatives for the near-term recovery.

This is, of course, an oversimplification of the actual analysis. I want to especially applaud the detailed efforts made to simulate the impact of COVID-19 on the income taxes, sales taxes, and fees.

CONCLUSION The authors have produced timely, useful, quality analyses of the budgetary outlook at the federal, state, and local levels. In each case, an important focus is the impact of the COVID-19 recession and response. I think the major lesson at the federal level is the transitory nature of the deficits produced by the policy response, while the composition of the revenue losses and the heterogeneity across states stand out in the state and local analysis.

REFERENCES FOR THE HOLTZ-EAKIN COMMENT

CBO (Congressional Budget Office). 2020a. "The 2020 Long-Term Budget Outlook." Washington. https://www.cbo.gov/publication/56516.

CBO (Congressional Budget Office). 2020b. "An Update to the Budget Outlook: 2020 to 2030." Washington. https://www.cbo.gov/publication/56542.

GENERAL DISCUSSION Alan Blinder began the discussion by congratulating the authors on writing a very useful paper. Noting that the authors' forecasts of the near-term economy are critically dependent on the course of the pandemic, Blinder asked to hear more about the CBO's near-term assumptions about the pandemic going forward and whether the authors find them reasonable. He also asked how the authors accounted for the dramatic variation across states in the pandemic's course, citing as examples the curves for infections or deaths in New York versus in Florida.

Olivier Blanchard pointed out an apparent tension between the paper's estimated revenue declines at the federal and at state and local levels, noting that the deviation from the former deficit improves by the end of fiscal year 2020 while the state and local revenue losses are close to constant from 2020 to 2022. He wondered whether this phenomenon reflects federal subsidies to the states in 2020 and asked for clarification.

Robert J. Gordon asked to call attention to declines in mass transit use, which can be a source of state and local revenues and may need government bailouts. He argued that although personal consumption expenditures were only 4.4 percent below February 2020 levels as of July 2020, implying minor sales tax declines, national transit ridership and fare revenues declined in April 2020 from April 2019 levels by 73 percent and 86 percent, respectively.[1] He suggested that the authors include a section that comments on whether they consider this an issue for state and local governments.

Mark Mazur also pointed out that the projected 0.5 percent decline in federal revenues appears small, but given that federal revenues were expected to increase by 4.9 percent in fiscal year 2020 as of January 2020, it should be considered a 5.4 percent shortfall in revenues.

Alan J. Auerbach began by responding first to the comment made by Douglas Holtz-Eakin in his presentation that Congress reacted with an

1. US Bureau of Economic Analysis, Personal Consumption Expenditures [PCE], FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/PCE, accessed October 3, 2020.

appropriately large stimulus package in response to the shock but kept the impact transitory rather than taking advantage of the crisis to make any permanent changes. Auerbach speculated that any restructuring of entitlement programs or tax reforms in reaction to the crisis was likely to be in the direction of a stronger social safety net in both the short and long run, given that the pandemic was likely to make programs like Social Security, Medicare, and Medicaid popular, and he suggested that a short-term, limited response that didn't allow for large restructuring was more appropriate. Holtz-Eakin agreed.

Auerbach agreed with Mazur's suggestion to view the decline in federal revenues in comparison to pre-COVID-19 projections for revenue growth, adding that although not exact, the paper's estimated decline in revenues do appear to be smaller than expected due to the higher proportion of job losses affecting low-income individuals. Compared to other recessions, the changes are far larger on the spending side than the revenue side both in absolute terms and when comparing the difference between the two.

In response to Blinder's comments on the relevance of the near-term course of the pandemic to the estimates given in the paper, Holtz-Eakin added that the authors did run some sensitivity analyses, but he is consistently surprised by how little variations in the growth rate actually affect the future deficit. The small effects of a decline in the growth rate result from subsequent declines in interest rates, which allow the government to save on future interest payments. In contrast, the budget outlook is very sensitive to the level of interest rates. The course of the pandemic will affect the certainty of the budget outlook, he concluded, but the level of interest rates will have more of an impact than the level of output.

Byron Lutz thanked Holtz-Eakin for his comments and added that he agreed with Holtz-Eakin's feedback that the CBO projection used for the state and local estimates is too pessimistic. However, he continued, the CBO projection is a gold standard, and its detail and granularity are useful for the bottom-up methodology. Furthermore, although the CBO projection has been inaccurate in the near term, it may be more useful for the three-year estimates given in the paper—for example, improvements in the near term could be counterbalanced by a second wave of the pandemic. Given that the CBO projection is well outside the consensus of most private sector forecasters, Lutz concurred that the authors should follow up with sensitivity analyses using private sector projections.

In response to Blinder's comment about the estimates' sensitivity to the course of the pandemic, Lutz added that the CBO assumes social distancing

will gradually decrease over time and come to an end in the second half of 2021.[2] The state and local estimates are pinned tightly to that projection.

Finally, Lutz responded to Gordon's comment about the historic collapses in transit authority revenues. Lutz assured him that these declines are captured in the combined losses of state and local governments and emphasized that the decline in revenue from charges and fees was almost entirely driven by a large decline in transportation activity, particularly that of transit authorities. Louise Sheiner added that the paper uses data through August 2020 on actual vehicle miles driven in addition to consumption.

Furthermore, continued Sheiner, these first few months of data allow the estimates to capture the large variation in the course of the pandemic across states mentioned by Blinder. The initial months capture the disparities and then extend them unilaterally by the CBO's national estimates for social distancing, until all states return to their pre-COVID-19 activity levels.

In response to Blanchard's question about the difference between the federal and state and local outlooks, Sheiner explained that the losses in state and local revenues from 2020 to 2022 appear relatively constant because the state and local losses are expressed in nominal terms, which do not reflect falling price levels from low inflation, while the federal portion is in real terms relative to GDP.

Martin N. Baily asked whether the authors were concerned that foreigners may no longer be willing to buy US debt, given the large increase projected in the paper, despite the United States historically receiving stable flows of investments. Many are saying that deficits do not matter as long as interest rates remain low, he noted, but could an unstable downturn and rising interest rates that prevented the United States from financing its deficits lead to a constraint on the deficit? In response, Holtz-Eakin remarked that foreigners bought a fairly large share of incremental debt in the early 2000s but have bought a smaller share than that held by Americans in the last decade.[3] If it becomes an issue, he concluded, it would be political rather than economic.

2. Congressional Budget Office, "An Update to the Budget Outlook: 2020 to 2030," Washington, July, https://www.cbo.gov/system/files/2020-07/56442-CBO-update-economic-outlook.pdf.

3. US Department of the Treasury, Fiscal Service, Federal Debt Held by Foreign and International Investors [FDHBFIN], FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/FDHBFIN, accessed October 3, 2020.