Estimating the economic cost of the COVID-19 pandemic

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Abstract
Our study presents a framework to estimate economic costs of the COVID-19 pandemic for the U.S. economy. We characterize whether the pandemic-related damages are short-lived or long-lasting. The potential damages are estimated in terms of losses in eight major variables, including employment, consumption, and GDP. To estimate damages from the pandemic, we utilize the pre-COVID potential level of the target variables, GDP for example, as a benchmark and compare these estimates with those that are calculated during the COVID pandemic. Our study suggests damages from the pandemic are not short-lived as the major sectors have shifted to a lower growth trajectory compared to the pre-COVID growth path. Focusing only on the real GDP level would paint an illusion of a stronger recovery back to the “normal.” Furthermore, the illusion of a stronger recovery may lead to a sooner-than-appropriate policy normalization.

Keywords COVID-19 · Economic cost · Output · Employment · Policy-errors

JEL Classification E32 · E2 · E24

1 Introduction
The 2020 recession was the shortest on record as it only lasted for 2 months. The stage is set for the current recovery to be at the fastest pace in decades. The Q2-2021 real GDP level has already crossed the pre-recession peak. Financial market participants in the summer of 2021 were predicting a “tapering” announcement from the Federal Open Market Committee (FOMC) sometime later in the year. One gets a sense that some macroeconomics observers are suggesting that the COVID recession may have only produced short-term effects on the economy. However, as of August 2021 the reported level of payroll employment was still over 5.3 million jobs below its pre-pandemic peak. The still lingering labor market recovery raises a question of the long-lasting effects of the 2020 recession. Repairing long-lasting economic damages from the COVID pandemic may require a prolonged duration of accommodative policies.

Our study presents a framework to estimate the costs of the COVID recession. We characterize whether the damages are short-lived or long-lasting. The potential damages are estimated in terms of losses in eight major variables, including personal income, consumption, employment, labor productivity, investment and GDP. Our framework can be utilized to estimate losses from any recession and for any country/region.

Typically, during a recession, an economy’s output level falls below potential, and a recovery/expansion brings output back to the pre-recession trend. Standard macroeconomics textbooks consider recessions as temporary shocks, and those shocks reduce the level of output only in the short-run (for instance, Mankiw 2010). However, the performance of the U.S. economy (and those of many other developed nations) during the post-Great Recession era has raised a question about the traditional notion that recessions have only short-term effects. Many studies have concluded that the damages from the Great Recession were not only significant in the immediate term but also lingered (Cerra and Saxena 2008; IMF 2009; Ball 2014; Ollivaud and Turner 2014). Numbers of these studies estimated damages from the Great Recession not only terms of output lost relative to potential, but also computed losses in employment and productivity.
Our study contributes to this literature by focusing on the COVID recession and adding more variables to the analysis of loss. The main reason to include more variables is that the effect of the COVID recession may be unusually heterogeneous in its impact on different sectors and variables.

Our proposed framework estimates the losses for eight major variables. We estimate the pre-recession potential level of the target variables, GDP for example, to estimate the losses due to the recession. We utilize the Congressional Budget Office (CBO)’s August 2019 estimates of real GDP as the pre-recession benchmark and the July 2021 estimates for post-recession readings. Furthermore, the CBO provides estimates for 10 years out, i.e., the 2019 release includes estimates of potential GDP up to 2029, allowing us to estimate damage for the 2021–2029 period. Estimates for the “potential” levels of variables other than potential GDP are keyed off that one.

Our statistical analysis suggests that, during the 2021–2029 period, the average annual reduction in the level of potential real GDP will be 0.30%, 0.33% for personal consumption, and 0.25% for disposable personal income. During the same time period, the average annual loss in employment is 3.64% (largest average loss), 0.69% in the labor force and 0.2% in labor productivity. Except for the capital services index, all variables experienced a downward shift in their respective potential levels. That is, the COVID recession has downward shifted 7 of the 8 variables analyzed for the 2021–2029 period.

The finding that damages from the 2020 recession are long-lasting has vital implications for decision makers. The observation that the level of real GDP has already surpassed its pre-recession peak may suggest that things are well on the path back to “normal.” The illusion of a strong recovery may lead to a sooner-than-appropriate policy normalization. However, the downward shifting of potential GDP (and other variables) suggests that the economy may have shifted to a lower growth mode. Offsetting these long-lasting effects from the COVID recession may necessitate a longer duration of accommodative policies, all else equal.

2 A framework to estimate the economic cost of the COVID recession

To estimate damages from the recession, we use pre-recession estimates as a benchmark and compare these estimates with those which are published after the recession. For example, we utilize the potential GDP series published by Congressional Budget Office (CBO) in August 2019, labeled 2019 vintage, and then compare vintage 2019 with the potential GDP figures released in July 2021, labeled 2021 vintage, as well as with the actual GDP numbers.

The major reason to consider 2019 estimates as the benchmark is that these series were not affected by the COVID pandemic, and were made under the assumption of no recession during the next 10 years. Therefore, comparing the vintage 2019 series with the 2021 series helps us calculate damages from the recession.

We include the actual series in the analysis as well. We utilize the latest available number of an actual series as a proxy for the complete year of 2021. For example, Q2-2021 data for real GDP/personal consumption/personal income/investment/labor productivity are utilized as proxies for the full year of 2021 (complete year) for those variables and August 2021 numbers for employment/labor force (The 2021 data are the vintages available prior to the end of September).

We rebase all three series to set them equal to one for 2019. Then, we calculate the average annual loss for the 2021–2029 period. The CBO provides potential levels for GDP, labor force, labor productivity and the index of capital services. Except for the capital services index, we have actual 2020 and 2021 data for all series. For the capital services index, we use the CBO’s 2019 and 2021 estimates.

To the best of our knowledge, the CBO does not provide potential estimates for real disposable personal income, personal consumption, employment and real business fixed investment (BFI). We generate estimates for vintage 2019 and vintage 2021 levels of potential for these series by assuming their ratios to potential GDP are fixed at their 2019 levels. Comparing the actual 2020 and 2021 levels of all our variables and their new 2022–2029 potential paths to the paths linked to the 2019 estimates of potential allows us to computed the longer-term costs of the 2020 recession.

3 The results

We now turn to our estimates of the losses for each of the eight variables.

3.1 The estimated output damages

Figure 1 shows estimated losses from the 2020 recession. The vintage 2021 line lies under the vintage 2019 one, implying that recession has shifted the potential level of GDP downward. In other words, the damages from the COVID recession are not temporary.

3.2 The estimated damages for personal income and spending

In Fig. 2, the real personal spending line is closing the gap with vintage 2021, which indicates consumption is moving closer to its potential level. However, the vintage 2021 line is
below the vintage 2019 line, which emphasizes the notion of long-lasting damages from the 2020 recession. This is also case for real disposable income, Fig. 3. However, the huge amounts of stimulus provided by the federal government did boost real income well above either estimate of potential. We believe that as the stimulus is withdrawn the downshift in potential income will become more apparent.

### 3.3 Estimated employment damages

The COVID recession produced the largest employment loss in the post-World War II era. In addition, at the timing of this writing, the labor market recovery from the recession is relatively slow. The August 2021 employment level is well below (over 5.3 million less jobs) compared to the pre-recession peak. Figure 4 suggests that the recession has had long-lasting effect on employment, as the vintage 2021 line is well below the 2019 benchmark. Indeed, the current estimate is that the level of potential employment won’t exceed the estimate for 2019 until 2026.

### 3.4 The estimated damages for the labor force and labor productivity

The labor force estimates are consistent with the employment picture as the labor force is well below both the vintage 2019 and vintage 2021 lines (Fig. 5). The damages to the labor market seem long-lived as well because the vintage 2021 labor force line is well below the vintage 2019 line. Figure 6 depicts labor productivity and it also shows the long-term damages from the recession.
3.5 The estimates of business fixed investment and capital services damages

Figure 7 shows that BFI exceeded its pre-recession peak in Q4-2020 and has also passed above our estimates of potential. However, it appears that pace may not be sustainable: our 2021 estimates of potential BFI lie a touch under the 2019 line. Capital services are the only exception: our computations are that not only has this index passed its prior peak, but also that its potential path is higher than would have been estimated in 2019 (Fig. 8).

3.6 The average potential losses from the COVID pandemic

We also estimated the average annual loss for each of the eight variables for the 2021–2029 period. Results are reported in Table 1. Our analysis suggests that the largest annual average loss is estimated for employment (3.64%) and smallest damage is for the capital services index (0.06%). The average annual loss is 0.33% for personal consumption, 0.25% for personal income and 0.18% for BFI. During the same time period, the average annual loss in the labor force is 0.69% and 0.2% for labor productivity.

4 Concluding remarks

Our study suggests damages from the pandemic will not be short-lived, as the level/trend of the potential for numbers of variables have shifted downward, compared to the pre-COVID growth path. The estimated damages are asymmetric as labor market measures have been affected most.
We believe our work provides a useful tool to aid in designing effective policies, by systematically taking into account changes in the CBO estimates of potential.

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**Table 1** Estimated Long-term Damages from the COVID Recession

| Variable                  | Estimated long-term damages from the COVID recession
drop (%) |
|---------------------------|--------------------------------------------------|
| Real GDP                  | 0.30                                             |
| Personal consumption      | 0.33                                             |
| Disposable personal income| 0.25                                             |
| Business fixed investment | 0.18                                             |
| Labor force               | 0.69                                             |
| Employment                | 3.64                                             |
| Labor productivity        | 0.2                                              |
| Capital services          | 0.06                                             |

Losses are compared to the 2019 Vintage

*Average drop per year for the 2021–2029 period*

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