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## **Estimating the Economic Cost of COVID-19**

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# Estimating the Economic Cost of COVID-19

## *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. By accurately estimating near-term damages from the pandemic, our framework would assist policymakers in regard to effective decision making.

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. The intuition behind this method is that the pre-COVID potential GDP level is estimated using expansion phase growth rates and with the assumption of no COVID pandemic resurgence in the near future. Consequently, these rates are higher than those that are calculated during the pandemic and thereby the gap between these two measures of potential GDP is utilized as a benchmark to estimate the economic cost of COVID-19.

Our study suggests damages from the pandemic are not short-lived as the level/trend of potential GDP (seven of the eight variables) has shifted downward. That is, the major sectors have shifted to a lower growth trajectory compared to the pre-COVID growth path. These findings have vital implications for policymakers as focusing only on the real GDP level would paint an illusion of a stronger recovery and 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 Classifications:** E32; E2; E24.

# Estimating the Economic Cost of COVID-19

## Introduction

The 2020 recession was the shortest on record as it only lasted for two months. The stage is set for the current recovery to experience the fastest pace in decades. The Q2-2021 real GDP level has already crossed the pre-recession peak. Financial market participants are predicting a “tapering” announcement from the Federal Open Market Committee (FOMC) sometimes later this year. Essentially, some macroeconomics observer are suggesting that the COVID recession may have only produced short-term effects on the economy. However, the recent Nonfarm Payrolls data (August 2021) indicates that the level of current employment is well below (over 5.3 million less jobs) the pre-COVID employment peak. Therefore, the labor market recovery raises a question of long-lasting effects of the 2020 recession. The nature of the COVID-related economic damages such as short-term versus long-term effects would have vital implications. The long-lasting economic damages from the COVID pandemic may require longer duration of accommodative policies than those actions which are suggested by the short-term damages, all else equal.

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

Typically, economies follow business cycle properties of recession and recovery/expansion. That is, during a recession, an economy’s output level falls below the potential level and a recovery/expansion phase bring output level back to the normal (pre-recession trend). In addition, standard macroeconomics textbooks consider recessions as temporary shocks and those shocks reduce the output level only in the short-run as the economy get back to the normal level in the medium- to long-run, Mankiw (2010). However, the economic performance of the U.S. economy (and many other developed nations) during the post-Great Recession era has raised a question about the traditional notion that recessions have only short-term effect. Many studies have estimated the output losses in the short- to medium-run and concluded that the damages from the

Great Recession were significant even in the short/medium-run, for more detail see Cerra-Saxena (2008), IMF (2009), Ball (2014) and Ollivaud and Turner (2014). In addition, most studies have estimated damages from the Great Recession in terms of output, employment and productivity losses. For instance, Ball (2014) estimated the output losses compared to the pre-recession potential GDP (assuming as if there were no recession). Ollivaud and Turner (2014) estimated employment and productivity loss in addition to the output loss.

Our study contributes to the current literature by including more variables in its analysis and estimating losses for eight major variables. The main reason to include more variables in the analysis is that the effect of the COVID recession may be different on different sectors/variables, i.e., a heterogeneous effect. Therefore, incorporating more variables in the analysis would allow us to capture the 2020 recession effect on the economy more accurately.

Our proposed framework estimates the losses for eight major variables. Furthermore, we utilize the pre-recession potential level of the target variables, GDP for example, to estimate the cost of recession. The intuition behind this method is that the pre-recession potential GDP level is estimated using expansion phase growth rates and with the assumption of no COVID pandemic as well as recession in the near future (or at least for the period under study). Generally, these rates are higher than those which are calculated during recession/recovery times and thereby the gap between these two measures (estimated at two different time periods) of potential GDP is utilized as a benchmark to estimate the cost of a recession. We utilize the Congressional Budget Office (CBO)'s August 2019 estimates of the potential real GDP as the pre-recession benchmark and the July 2021 (most recent release) as the post-recession estimates of the target variable. Furthermore, the CBO provides estimate for the 10-year out, i.e., the 2019 release includes estimates up to 2029. Therefore, the estimated damages are for the 2021-2029 period.

Our statistical analysis suggests that, during the 2021-2029 period, the average annual reduction in the level of potential real GDP is 0.30 percent, 0.33 percent for personal consumption and 0.25 percent for disposable personal income. During the same time period, the average annual loss in employment is 3.64 percent (largest average loss), 0.69 percent in labor force and 0.2 percent in labor productivity. Except 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 during the 2021-2029 period. That implies, the estimated damages from the

COVID recession are long-lasting. Moreover, estimated damages for the employment/labor force are larger than other variables which indicates asymmetric damages from the COVID recession.

The finding that damages from the 2020 recession are long-lasting has vital implications for decision makers. That is, the *level* form of the real GDP has already crossed the pre-recession peak which may suggest things are on a path back to the “normal.” Furthermore, the illusion of a stronger recovery may lead to a sooner-than-appropriate policy normalization. However, the downward shifting of the *potential* GDP (and other variables) suggests that the economy may have shifted to a lower growth mode. The long-lasting effects from the COVID recession may need longer duration of accommodative policies, all else equal. We believe our proposed framework would help to design effective policies as the results can be updated with the every new CBO’s release to evaluate the pace of the recovery. That is, instead of just focusing on the level of key variables, monitoring potential levels of such variables compared to the pre-recession benchmark would provide an accurate picture of the state of the economy.

## **2. A Framework to Estimate the Economic Cost of the COVID-Recession**

We estimate damages from the 2020 recession for the U.S. economy and those estimates are for the short-/medium-term with potential long-run implications. That is, average annual losses are estimated for the 2021-2029 period. To estimate damages from the recession, we consider pre-recession estimates as a benchmark and compare these estimates with those which are published after the recession. For example, we utilize potential GDP series published by Congressional Budget Office (CBO) on August 2019, labeled 2019 vintage, (our benchmark pre-recession estimates) and then compare vintage 2019 with the potential GDP published on July 2021, labeled 2021 vintage, (post-recession estimates) as well as with the actual GDP numbers.

The major reason to consider vintage 2019 estimates as the benchmark is that these series were not affected by the COVID pandemic. Because these estimates were produced before the pandemic (as well as COVID induced-recession) and with the assumption of no recession during the next ten years. That is, typically, the CBO provides estimates for the next ten years, i.e., the 2019 vintage includes potential GDP estimates up to 2029. Therefore, the vintage 2019 series provide estimates for the next ten years (assuming no recession during the 2019-2029 period) which include the period of the 2020 recession and help us to calculate damages from the recession. The

vintage 2021 (estimates published by the CBO on July 2021), on the other hand, incorporate the COVID pandemic as well as the recovery phase from the 2020 recession. For instance, the 2021 vintage include potential GDP estimates up to 2031 (ten years out) and that series also includes revisions to the previous vintages (revisions to the 2019 vintage for example) and those revisions include the 2020 recession.

We include the actual series in the analysis as well. That is, we include actual real GDP data in the analysis along with potential real GDP from vintage 2019 and vintage 2021. Furthermore, we estimate the gap between the vintage 2019 series (our benchmark) and vintage 2021. Since actual variables have only one observation which is 2021 (as 2020 is a recession year) and thereby we estimate the gap for the potential levels of the eight variables. Furthermore, 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 the real GDP/personal consumption/personal income/investment are utilized as proxy for 2021 (complete year) for those variables. By the same token, August 2021 numbers for the employment/labor force and Q2-2021 for the labor productivity.

In the next phase, we rebase all three series (vintage 2019, vintage 2021 and actual series) using 2019 as the base year so that all series are equal to one for 2019. Then, we calculate the average annual loss for the 2021-2029 period. The CBO provides the potential level for GDP, labor force, labor productivity and index of capital services. Except for the capital services index, we have actual data for all series. Therefore, we plot those series relative to vintage 2019 as well as vintage 2021. For the capital services index, the chart depicts vintage 2019 and vintage 2021. Essentially, these charts would provide an illustration where is an actual series in 2021 relative to vintage 2019 as well as vintage 2021.

To the best of our knowledge, the CBO does not provide potential estimates for the personal income, personal consumption, employment and business fixed investment. These variables represent major sectors of the U.S. economy and therefore we include these variables in our analysis. We generate estimates for the vintage 2019 and vintage 2021 for these four series. For personal income, personal spending and business fixed investment, we utilize real GDP as a benchmark to generate estimated potential level for these series. For example, in the first step, we estimate a ratio of personal income to GDP and then multiply that ratio with GDP vintage 2019 (and with GDP vintage 2021) to obtain personal income vintage 2019 (and vintage 2021). That is,

we estimate potential personal income based on 2019 vintage (pre-recession) and 2021 vintage (post-recession). Therefore, now we have potential personal income levels for pre-recession period (vintage 2019) and for the post-recession period (vintage 2021) and we can estimate damages from the 2020 recession in terms of the loss in the potential personal income.

We follow the same procedure for the personal spending and business fixed investment series to obtain vintage 2019 and vintage 2021 estimates for these series. For employment (nonfarm payrolls) vintages, we obtain the ratio of employment to labor force and then multiply that ratio with labor force vintage 2019 (and with vintage 2021) to obtain employment vintage 2019 (and vintage 2021). In the final step, we rebase these four variables (estimates for potential vintage 2019 and vintage 2021 for each of the four variables) to 2019 and estimate potential losses for these four variables.

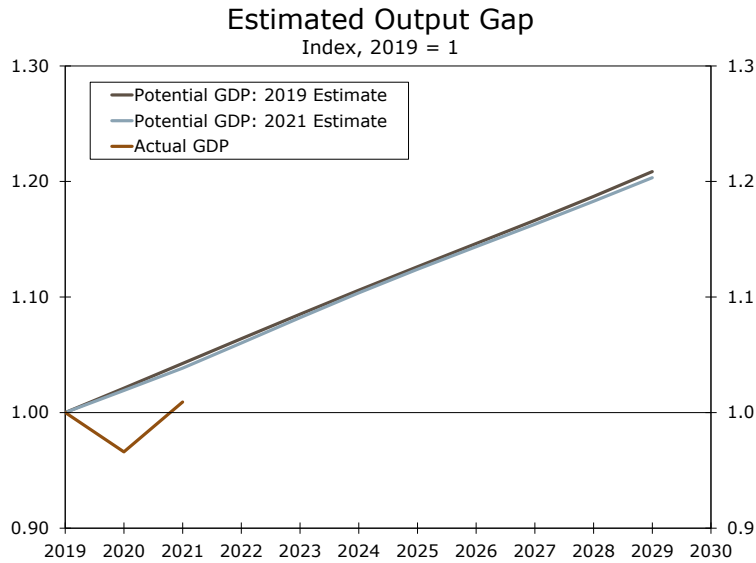
### **3. The Results**

The objective of this study is to estimate the economic damages from the COVID Recession. The damages are estimated for the U.S. economy and in particular for eight major sectors. In the following section, we discuss the losses for each of the eight variables.

#### ***3.1 The Estimated Output Damages***

GDP is a reliable indicator to judge the overall health of the economy. Figure 1 shows estimated losses from the 2020 recession. There are two notable observations from Figure 1. First, the actual GDP series is below the 2019 and 2021 vintages but above the benchmark-line (greater than one). This indicates that the U.S. economy has recovered but still below its potential level. Second, and most important in our view, the vintage 2021 is below the vintage 2019 (potential GDP estimates published in 2019) and that implies the recession has shifted the potential level of GDP downward. In other words, the damages from the COVID recession are not temporary (or transitory) as the vintage 2019 is higher than the level estimated in 2021 for the 2021-2029 period. This suggests that damages from the recession are long-lived.

**Figure 1**



### ***3.2 The Estimated Damages for the Personal Income and Spending***

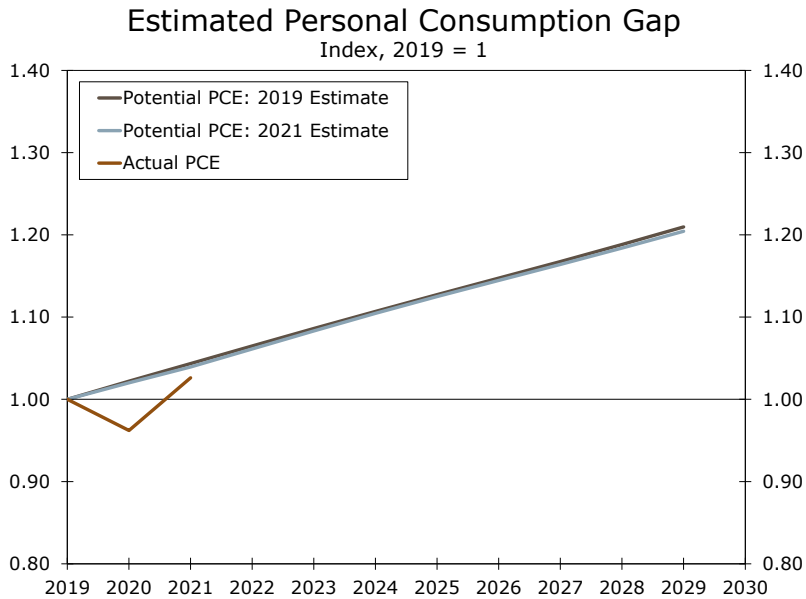
Private consumption is the largest component of GDP and therefore we include personal income (real disposable personal income) and personal spending (real personal consumption) in the analysis. As mentioned earlier, we estimated the vintage 2019 (potential personal consumption based on 2019, pre-recession estimates for example) and vintage 2021 to estimate potential losses from the recession for personal income and spending. In Figure 2, consistent with the GDP gap analysis, 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. The real disposable income behavior is also consistent with personal spending's behavior and confirms the long-term damages from the recession, Figure 3. However, the actual personal income line never dropped below the benchmark-line of one.

The COVID recession was different than the past recessions in that the 2020 recession was induced by a health pandemic. Furthermore, this time is different for the recovery, particularly for the real GDP, personal consumption and personal income, because robust policy actions were taken to combat the pandemic. That is, a number of policy actions were taken to provide direct stimuli to consumers and businesses. Multiple stimulus checks and larger and extended duration of unemployment benefits are prime examples. Consequently, personal income boosted during the

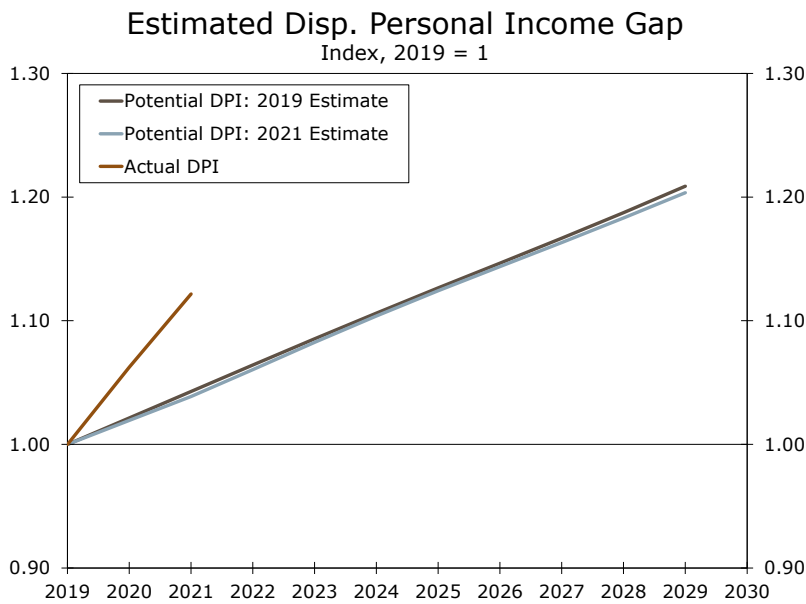


recession period (Q1/Q2 2020). As a result, a faster rebound in personal consumption (crossed the pre-recession peak in Q1-2021) and real GDP (crossed the pre-recession peak in Q2-2021). However, the downward shift of potential levels of these series highlight long-lasting damages by the COVID recession.

**Figure 2**



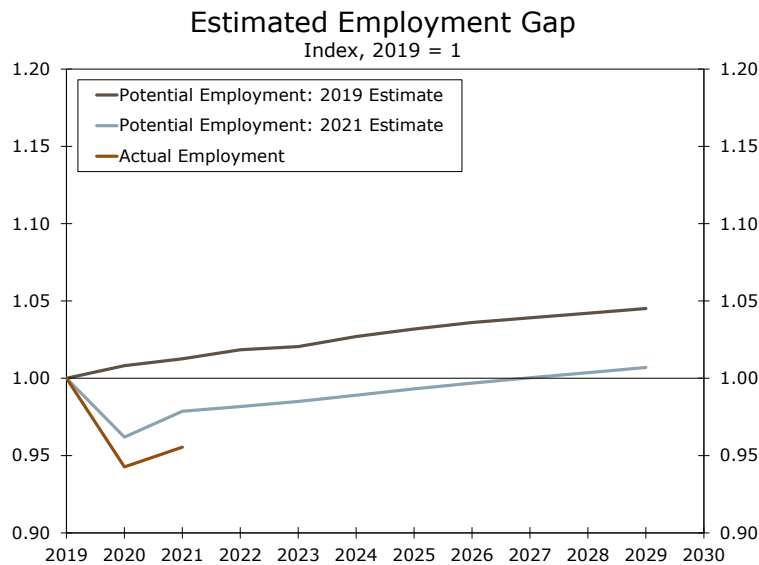
**Figure 3**



### 3.3 The 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 growth as both vintage 2021 and actual employment line have shifted downward significantly. Furthermore, the vintage 2021 line remains below the benchmark through 2026 which suggests a slower pace of recovery for the potential employment.

**Figure 4**



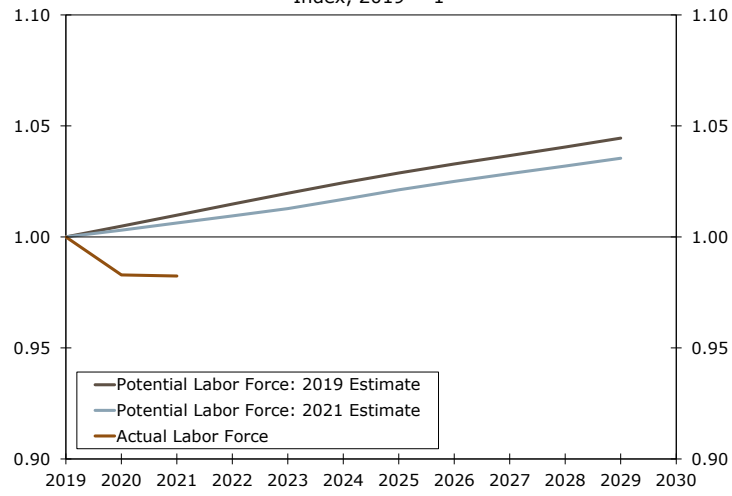
### 3.4 The Estimated Damages for the Labor Force and Labor Productivity

The labor force estimates are consistent with the employment picture as the labor force is well below the vintage 2019 and vintage 2021 (Figure 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.

**Figure 5**

**Estimated Labor Force Gap**

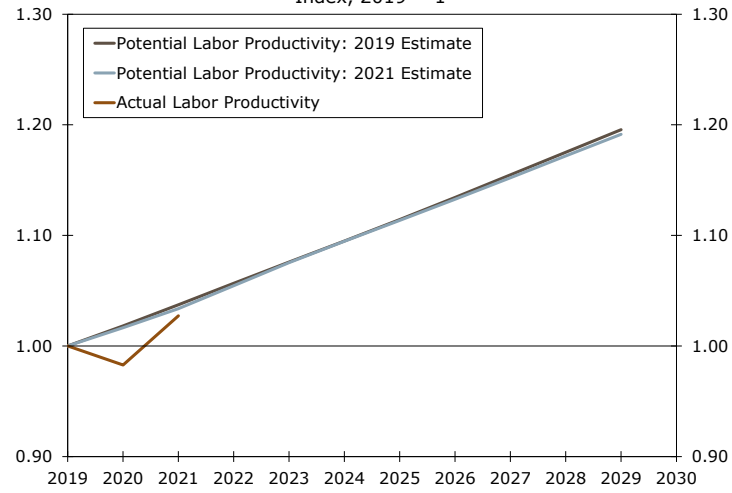
Index, 2019 = 1



**Figure 6**

**Estimated Labor Productivity Gap**

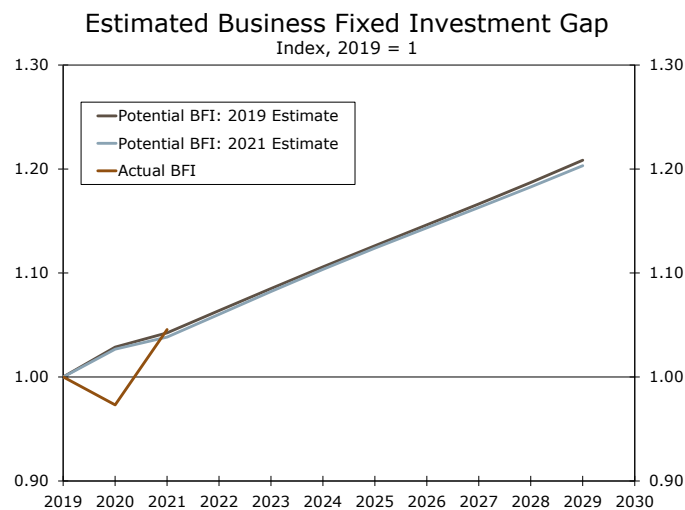
Index, 2019 = 1



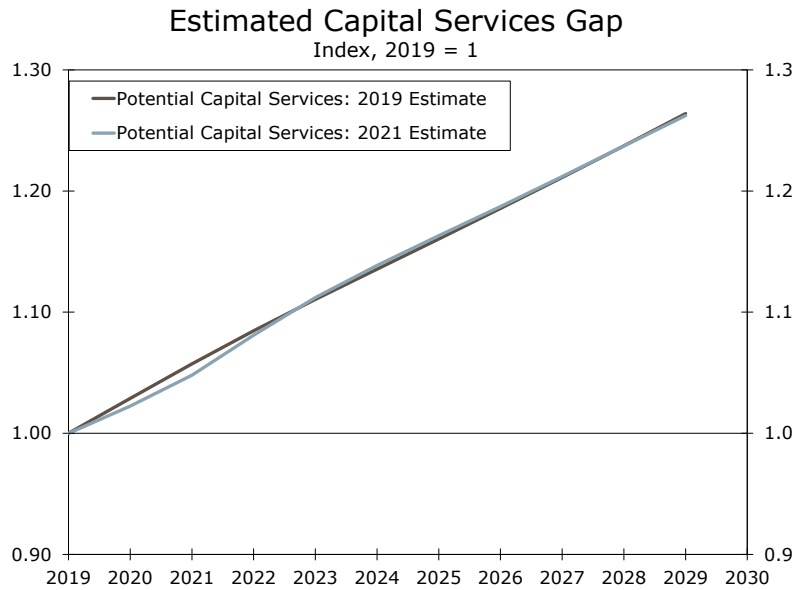
### 3.5 The Estimated Business Fixed Investment and Capital Services Damages

The business fixed investment (BFI) is another area which shows consistent behavior with the real GDP pattern in our analysis, Figure 7. BFI has crossed the pre-recession peak in Q4-2020, a faster pace of recovery than both real GDP and consumption. The actual BFI line has crossed its potential level, as well. However, vintage 2021 is below the vintage 2019 line for the 2021-2029 period, a sign of long-lasting damages from the COVID recession. The capital services index is the only series which suggests the possibility of short-lived damages as the vintage 2021 crossed the vintage 2019 line in 2023, Figure 8. Note, we do not have actual series for the capital services index and CBO produces the potential level of the index only.

**Figure 7**



**Figure 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. We compared the vintage 2019 with the vintage 2021 and that indicates losses due to the 2020 recession. For example, the estimated average annual loss in terms of the potential real GDP is -0.3 percent (the average difference between the two different levels of potential GDP). That is, the 2020 recession, on average, reduced the level of potential GDP by 0.3 percent each year during the 2021-2029 period.

Our analysis suggests that the largest annual average loss is estimated for employment (3.64 percent) and smallest damage is for the capital services index (0.06 percent). The average annual loss is 0.33 percent for personal consumption, 0.25 percent for personal income and 0.18 percent for BFI. During the same time period, the average annual loss in labor force is 0.69 percent and 0.2 percent for labor productivity.

**Table 1**

| Variable                   | Estimated Long-term Damages from The COVID Recession* |
|----------------------------|---|
|                            | Average-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%  |

\*Average drop per year for the 2021-2029 period  
Losses are compared to the 2019 Vintage

### ***3.7 What is Next? Future Implications of the Potential Losses***

Our analysis suggests that damages from the 2020 recession are long-lasting as the level (trend) of potential series (7 of the 8 variables) has shifted downward. These results are vital for decision makers. The faster pace of recovery in the *level* of real GDP (and in consumption and investment) may send a signal of the short-term damages from the COVID recession. Some participants of the financial markets are predicting a “tapering” announcement from the FOMC sometimes later this year. Some FOMC members are forecasting a potential rate hike in 2022.

However, our work stresses that policymakers may also consider the COVID recession effects on the *potential* level of the key variables. Our analysis which is based on the potential levels of the eight major variables indicate long-lasting damages from the recession. We believe our work provides a useful tool to design effective policies. The proposed framework would provide valuable highlights about the state of the economy by updating analysis with the new CBO releases in the near future.

## 4. Concluding Remarks

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. By accurately estimating near-term damages from the pandemic, our framework would assist policymakers in regard to effective decision making.

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 level/trend of potential GDP (seven of the eight variables) has shifted downward. That is, the major sectors have shifted to a lower growth trajectory compared to the pre-COVID growth path. The estimated damages are asymmetric as the labor market has been effected more than the real GDP.

In sum, damages from the 2020 recession are long-lasting which has vital implications for decision makers. That is, the *level* form of the real GDP has already crossed the pre-recession peak which may suggests things are on a path back to the “normal.” Furthermore, the illusion of a stronger recovery may lead to a sooner-than-appropriate policy normalization. However, the downward shifting of the *potential* GDP (and other variables) suggests that the economy may have shifted to a lower growth mode. The long-lasting effects from the COVID recession may necessitate continued policy accommodation. We believe our proposed framework would help to design effective policies as the results can be updated with the new CBO’s release to evaluate the pace of the recovery.

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