PIIE PETERSON INSTITUTE FOR INTERNATIONAL ECONOMICS

WORKING PAPER

24-22 Fiscal Policy and the Pandemic-Era Surge in US Inflation

Lessons for the Future

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December 2024

ABSTRACT

In the United States, massive fiscal expansion during the pandemic protected households and helped to return output and unemployment nearly to pre-pandemic expectations by the end of 2021—a sharp contrast with the slow recovery from the previous US recession. We document that many policymakers and analysts expected the fiscal-induced increase in demand for goods and services to be accommodated by an increase in supply without much change in inflation. However, those expectations proved incorrect, as fiscal stimulus pushed demand beyond the productive capacity of the economy, stoking temporarily high inflation. We present a collection of evidence implying that the inflation surge was driven largely by supply being fairly inelastic at the level of utilization to which the demand boom pushed the economy, with adverse supply shocks beyond the initial impact of COVID playing a smaller role. We conclude with lessons for future fiscal stabilization policy.

JEL codes: E31, E32, E62, E65
Keywords: Inflation, fiscal stimulus, supply constraints

Note: This Working Paper is part of a series titled Understanding the COVID Era Inflation. PIIE gratefully acknowledges the financial support from a donor who wishes to remain anonymous for the research presented in this Working Paper. The research was conducted independently; funders are never given the right to review a publication before its release.

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The authors are grateful to Justin Hill for research assistance at an early stage of this project and to Charlie Evans, Don Kohn, Greg Mankiw, David Wilcox, and seminar participants at Dartmouth College for helpful comments. The authors alone are responsible for the views expressed.

The US response to the COVID-19 pandemic included a stunning amount of expansionary fiscal policy. Six bills enacted between March 2020 and March 2021 increased federal spending and reduced federal taxes by an estimated total of nearly $5.1 trillion, or 23 percent of pre-pandemic annual gross domestic product (Swagel, 2021).

This massive fiscal expansion, along with a sharp cut in the federal funds rate and large-scale asset purchases by the Federal Reserve, protected American households from greater economic distress and cushioned the US economy from a deeper and longer slowdown. While the direct effects of the fiscal expansion on households that received new benefits or paid less in taxes were significant (see, for example, the social insurance arguments by Romer and Romer, 2022), our paper focuses on the aggregate economic effects.

By increasing the demand for goods and services, fiscal stimulus in 2020 and 2021 reduced layoffs, hastened the recovery of output, and pushed down the unemployment rate more rapidly than would have occurred otherwise. Indeed, both output and unemployment in the United States returned nearly to pre-pandemic expectations by the end of 2021—a stark contrast to the painfully slow recovery following the Great Recession a dozen years earlier and to slower post-pandemic recoveries in many other advanced economies.

However, booming US aggregate demand significantly exceeded the economy's ability to supply goods and services between mid-2021 and mid-2022. The excess of demand relative to supply caused a surge in US inflation, with consumer prices rising at the fastest pace in four decades. Although inflation began to decline in the second half of 2022, consumer prices in August 2024 were 9 percent above what they would have been if they had increased at the Fed's target rate since the beginning of 2021. Surveys of households suggest substantial and enduring unhappiness about the higher prices.[1]

Through an analysis of different vintages of economic projections from the Congressional Budget Office, the Federal Open Market Committee, and private forecasters, we show that policymakers and analysts generally expected that fiscal stimulus would significantly boost demand and that supply would rise to meet demand with little effect on prices. In terms of the workhorse framework of aggregate demand and supply, many policymakers and analysts thought that fiscal stimulus, combined with monetary support, would shift the aggregate demand curve notably to the right along a nearly flat aggregate supply curve.

[1] For example, see Binetti et al (2024) and Stantcheva (2024).

Why did that desirable outcome not occur? Some analysts have pointed to the role of adverse supply shocks. Although the impact of COVID was diminishing during the inflation surge as vaccines became available and most people returned gradually to their usual activities, reduced availability of key types of semiconductors and fallout from the Russian invasion of Ukraine held down aggregate supply. But the broader backlogs and bottlenecks observed in that period demonstrate only that quantities demanded exceeded quantities supplied; they do not indicate the degree to which those gaps arose from supply shocks or from supply constraints in the face of demand shocks.

To distinguish between those explanations, we present an assemblage of evidence regarding the timing and breadth of the inflation surge and the tightness of the labor market. This evidence implies that the primary cause of higher inflation was the strength of demand rather than shocks to supply—in other words, that the aggregate supply curve turned out to be fairly steep at the level of utilization to which the demand boom pushed the economy.[2]

We emphasize the distinction between adverse supply shocks and fairly inelastic supply (a steep supply curve over the relevant range) to draw lessons for future fiscal stabilization policy. Supply shocks are generally idiosyncratic and unpredictable, while inelastic supply is somewhat foreseeable and can be taken into account by policymakers when calibrating responses to economic downturns. The pandemic experience shows that even when demand falls short of potential supply, spurring demand too strongly may have less effect on output and more on inflation if the economy is already nearing full employment.

In the following sections we review the fiscal stimulus that was enacted, describe the impact expected by analysts and policymakers, examine what the outcomes imply about fiscal stimulus and inflation, and draw lessons for future fiscal stabilization policy.

1. Fiscal Stimulus Enacted in 2020 and 2021

Between March 2020 and March 2021, the US federal government responded to the COVID pandemic with legislation that increased federal spending by $4.6 trillion and cut federal

[2] Other researchers whose analysis yields a similar conclusion include Benigno and Eggertsson (2023 and 2024); Comin, Johnson, and Jones (2023); Demirel and Wilson (2023); Giannone and Primiceri (2024); Jordà and Nechio (2023); and Koch and Noureldin (2023). Inflation surged in Europe as well as in the United States, even though fiscal stimulus was more limited in Europe, and some observers have interpreted that fact as evidence against a significant role for fiscal policy in the pickup of US inflation. However, Europe was significantly more exposed than the United States to inflationary pressures from energy and food price shocks related to the invasion of Ukraine, and inflation in Europe increased later than inflation in the United States, so inferring causes of higher inflation from cross-country comparisons is difficult. For analyses of recent European inflation, see Gagnon and Rose (2024), Honohan (2024), and Schnabel (2024).

revenue by $0.5 trillion, as estimated by the Congressional Budget Office (CBO; see Swagel, 2021). Although those figures include all years in the subsequent decade, reflecting CBO's usual practice, the policy changes were heavily concentrated in 2020 through 2022. Together, these amounts equaled 23 percent of pre-pandemic annual gross domestic product (GDP).[3]

The legislation is listed in Table 1: In March and April of 2020, Congress and the president agreed to almost $2½ trillion of fiscal stimulus distributed among four bills. Eight months later, a broad appropriations bill was enacted of which nearly $1 trillion represented pandemic-related stimulus. Nearly three months after that, in March 2021, about $1¾ trillion of further stimulus was enacted.[4]

For comparison, fiscal stimulus enacted in 2008 and 2009 in response to the Global Financial Crisis and Great Recession was much smaller. Policymakers in that earlier period enacted the Economic Stimulus Act in February 2008, increasing the budget deficit by an estimated $124 billion over a decade (CBO, 2008a). In October 2008, they passed the Emergency Economic Stabilization Act (EESA), for which CBO (2008b) stated that it could not provide a cost estimate because of uncertainty about the implementation of the Troubled Asset Relief Program. The American Recovery and Reinvestment Act (ARRA), enacted in March 2009, increased the budget deficit by an estimated $787 billion over a decade (CBO, 2009). A number of subsequent bills increased the budget deficit by an estimated $706 billion (Council of Economic Advisers, CEA, 2014). The total, roughly $1.6 trillion (excluding the cost of EESA), equaled 10 percent of the country's pre-crisis annual output.

[3] In addition to traditional fiscal policies, many countries used credit policies, such as loan guarantees and direct lending, to mitigate the economic fallout from the pandemic. Hong and Lucas (2023) showed that such support was limited in the United States but quite large in some other countries.

[4] Other significant changes in fiscal policy followed in 2021 and 2022, including the Infrastructure Investment and Jobs Act and the CHIPS Act. However, those policy changes were focused on long-term issues and had limited macroeconomic effects in the short term (CBO, 2022, Box 2-2, and 2023, Box 2-1), so we do not address them in this paper.

Table 1: COVID-Era Fiscal Stimulus

Legislation	Change in Spending	Change in Revenue	Change in Budget Deficit
Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020 *March 6, 2020*	8	0	8
Families First Coronavirus Response Act *March 18, 2020*	97	-94	192
Coronavirus Aid, Relief, and Economic Security (CARES) Act *March 27, 2020*	1314	-408	1721
Paycheck Protection Program and Health Care Enhancement Act *April 24, 2020*	483	0	483
Consolidated Appropriations Act, 2021, Divisions M and N *December 27, 2020*	862	-5	868
American Rescue Plan Act of 2021 *March 11, 2021*	1803	0	1803
Total	4567	-507	5075

Note: Figures are CBO's estimates of billions of dollars over the traditional decade-long budget window (Swagel, 2021). Enactment dates are shown.

The legislation of 2020 and 2021 was expected to boost inflation-adjusted ("real") output and employment substantially relative to what would have occurred in the absence of stimulus. For example, CBO estimated that:

- The legislation enacted in March and April of 2020 would raise real GDP by 4.7 percent in 2020, 3.1 percent in 2021, and 0.3 percent in 2022 (CBO, 2020);

- The legislation enacted in December 2020 would raise real GDP by 1.8 percent in 2021 and 1.1 percent in 2022 (CBO, 2021a); and
- The legislation enacted in March 2021 would raise real GDP by 1.0 percent in 2021, 2.7 percent in 2022, 1.4 percent in 2023, and 0.5 percent in 2024 (CBO, 2021b).

Those figures cannot be summed exactly because the projected levels of GDP used in the calculations changed over time and because CBO's assessment of the effect of the initial bills may have changed by the time the later packages were enacted. But in rough terms, CBO expected that, relative to what would have happened in its absence, the fiscal stimulus enacted in 2020 and 2021 would raise the level of real output by roughly 5 percent in 2020 through 2022 and roughly 4 percent in 2023—very large effects.[5]
Rather than reviewing every step in fiscal policymaking during 2020 and early 2021 as the pandemic and its economic fallout rapidly evolved, our analysis focuses on the final piece of pandemic-oriented fiscal stimulus in early 2021 and the subsequent economic developments. That package—the American Rescue Plan (ARP)—has been at the heart of the debate over the connection between pandemic fiscal support and the surge in inflation.

2. Analyzing Fiscal Policy's Impact on Output and Inflation

We begin by reviewing the framework and methods used by many policymakers and analysts to predict how fiscal stimulus affects economic outcomes.

A basic framework

Our starting point is the textbook graph of aggregate supply and demand, with real output on the horizontal axis and inflation on the vertical axis.[6] While policy analyses often do not present these diagrams explicitly, they typically rely on the underlying logic.[7]

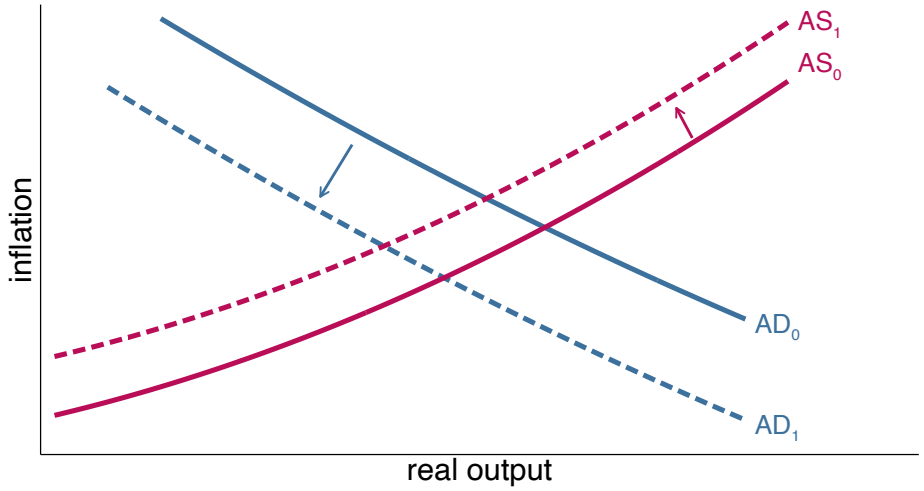
The pre-stimulus economy is captured by the solid lines in Figure 1. The COVID pandemic and public health measures adopted in response to it reduced people's ability and willingness to go to their usual workplaces—in the United States, and in China and other countries that produced items sold to US consumers or used in US production. Those

[5] By raising the level of output more in the near term than beyond it, fiscal stimulus reduced the *growth* of output in later years. That effect explains why the estimated contribution of fiscal policy to growth can be negative even during periods of substantial fiscal support; see, for example, the "fiscal impact" measure published by Brookings' Hutchins Center on Fiscal and Monetary Policy.
[6] Mankiw (2019, pages 435-449) showed how to derive this framework from one that has the price level on the vertical axis.
[7] Papers that explicitly include such diagrams include Gagnon (2024) and Benigno and Eggertsson (2024).

developments constituted a large adverse supply shock, shifting the aggregate supply curve to the left. At the same time, aggregate demand declined, as people who lost jobs or work hours received less income and curtailed their consumption, as many people were reluctant to go out in public and lowered their spending, and as businesses facing falling or uncertain sales cut back on their hiring and investment. Those changes shifted the aggregate demand curve significantly to the left.

Monetary policymakers responded by cutting the federal funds rate sharply and purchasing financial assets on a large scale. Fiscal policymakers increased federal spending and reduced federal taxes. Those fiscal actions boosted household income, business cash flow, and the resources available to state and local governments. The actions also may have affected the incentives for people, firms, and governments to spend, invest, work, and hire.

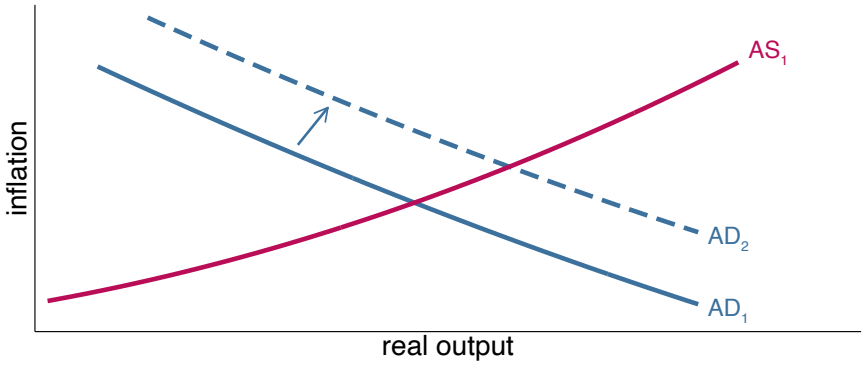
Figure 1
COVID Pandemic Reduces Aggregate Supply and Aggregate Demand



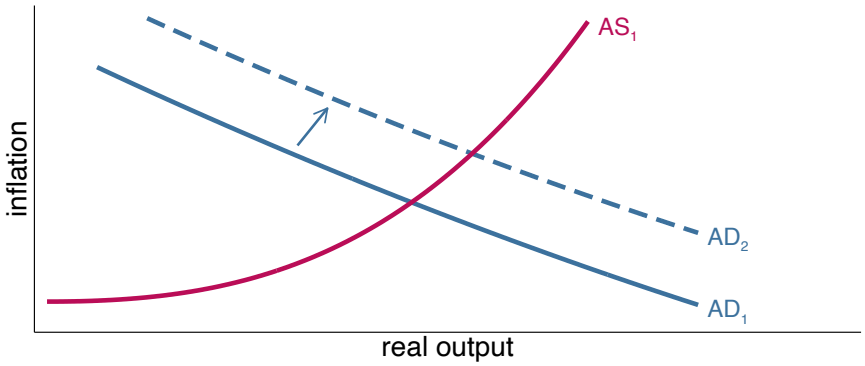
The panels of Figure 2 show the effects of fiscal stimulus on aggregate demand under different assumptions about supply conditions. To highlight the impact of that stimulus, the solid lines in Figure 2 include the initial effects of the pandemic shown in Figure 1, and Figure 2 omits the effect of monetary policy on aggregate demand and the effects of fiscal stimulus on aggregate supply.

Figure 2
Aggregate Supply and Demand Analysis
of Fiscal Policy Response

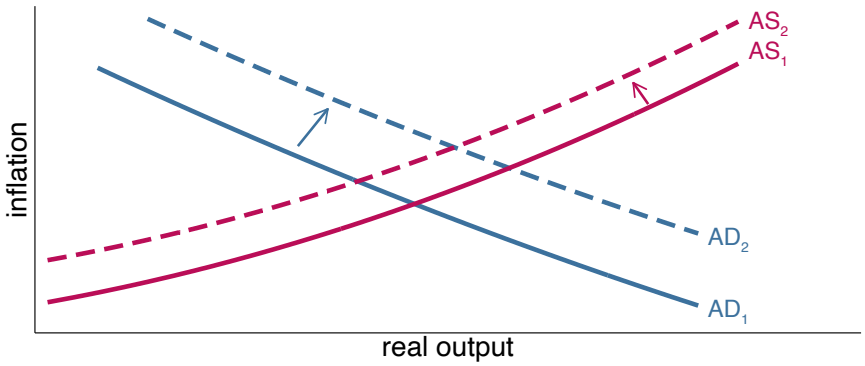
(a) Fiscal Policy Response



(b) Fiscal Policy Response
When Economy is on Steeper Part of Aggregate Supply Curve



(c) Fiscal Policy Response
With Further Aggregate Supply Shocks



Notes: The solid lines in the figures include the initial effects of the pandemic. The analysis omits the effects of monetary policy on aggregate demand and the effects of fiscal stimulus on aggregate supply.

On net, the effects of fiscal policy described above are captured by a rightward shift of the aggregate demand curve, leading to increases in both output and inflation. The magnitudes of those increases depend on two factors:

- How much households, businesses, and state and local governments spend rather than save out of the federal tax and spending changes; and
- How much producers of goods and services raise production and raise prices in response to the higher demand—that is, how flat or steep is the aggregate supply curve in the range over which aggregate demand increases.

Comparing Figures 2a and 2b shows that when the relevant part of the supply curve is steeper, a given stimulus has a smaller effect on real output and a larger effect on inflation.

Applying this framework

In practice, many analysts estimating the short-run impact of fiscal policy on real output and inflation essentially apply the foregoing framework: They quantify changes in demand for goods and services and then incorporate changes in supply.

A change in policy with a budgetary effect of x dollars directly changes demand by amounts ranging from ***x*** dollars (for changes in federal purchases) to something much smaller than ***x*** dollars (say, for changes in the timing of tax payments by businesses whose investments are not cash-constrained). That direct effect ripples through the economy, creating indirect effects that may be reinforcing (such as firms with higher sales deciding to increase investment) or opposing (such as greater demand raising interest rates, which reduces investment); in addition, changes in incentives can have indirect effects by altering the supply of goods and services. Taken together, the direct and indirect effects produce an overall effect.

For example, CBO (2020b) and Seliski et al (2020) explain how the agency estimated the impact of the legislation enacted in March and April of 2020. In CBO's terminology, the "output multiplier" is the change in GDP per dollar of budgetary change in fiscal policy, which equals the product of a policy's direct effect on purchases of goods and services and a "demand multiplier" that captures indirect effects. The agency "used delayed and reduced estimates of the output multiplier to reflect the effects of social distancing" (Seliski at al, 2020, Abstract) and predicted that the stimulus would raise GDP cumulatively by 58 cents per dollar change in the budget deficit (CBO, 2020b). CBO (2021b, Appendix B) reported later that the stimulus legislation enacted in March 2021 would raise GDP cumulatively by 73 cents per dollar change in the budget deficit.

Multipliers are uncertain, of course. Different studies have reached different conclusions about average multipliers, and multipliers are known to differ across types of government

spending and taxes, so analysts need to make a host of specific judgments. For example, CBO applied multipliers to different aspects of fiscal stimulus legislation that differed by a factor of more than two.[8] Moreover, multipliers vary over time based on economic circumstances—including, during the pandemic, social distancing reducing people's willingness to engage with others in consumption or work.[9] To capture this uncertainty, CBO (2020b) provided a two-thirds confidence region for the effect of the early stimulus packages on real GDP that stretched from 2 percent to 15 percent in the third quarter of 2020, and that range did not even account for uncertainty about "the impact of social distancing and the trajectory of the pandemic on the effectiveness of fiscal policy" (pages 11-12).

CBO's approach is in no way idiosyncratic. The CEA (2014) conducted a similar analysis for the Great Recession period. In section 4, we show that the outcomes expected during 2021 and 2022 by Federal Reserve policymakers and by private forecasters surveyed by *The Wall Street Journal* aligned very closely with the expectations of CBO.

Supply shocks versus a steep aggregate supply curve

In 2021 and 2022, the initial adverse pandemic supply shock continued to unwind—a positive development for supply. But the economy was hit by further adverse supply shocks that have received significant attention in the discussion around the post-pandemic surge in inflation.

We discuss these adverse supply shocks in more detail later in the paper, but they include reduced availability of key types of semiconductors and fallout from the Russian invasion of Ukraine. Such developments would be expected to shift the aggregate supply curve to the left as shown in Figure 2c (which omits for clarity the waning of the initial pandemic shock). Those reductions in the aggregate quantity of goods and services supplied at the pre-existing inflation rate tended to decrease output and increase inflation.

Together, Figures 2b and 2c show that when a limited increase in real output and a sharp rise in inflation follow an increase in aggregate demand, the cause might be either a steep aggregate supply curve as in Figure 2b or adverse supply shocks as in Figure 2c.

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[8] See CEA (2014) for a survey of research at the time, Ramey (2019) for a later review of the evidence, and CBO (2020b) and Seliski et al (2020) for many relevant citations.

[9] The pandemic period saw a wave of research on consumer and business responses to fiscal support, but the unique conditions and data limitations have hindered firm conclusions about lessons for the future. See Gelman and Stephens (2022) for an overview of estimated propensities to consume out of Economic Impact Payments, Edelberg and Sheiner (2021) for a discussion of uncertainty related to the unusual circumstances of the pandemic, and Auerbach et al (2022) for estimates of fiscal multipliers during the pandemic.

Yet, this distinction is important. Shifts of supply curves—that is, shifts of the relationship between price and quantity supplied—are appropriately termed "supply shocks." Movements along supply curves—that is, changes in prices and quantities caused by shifts of demand curves—can appropriately be described as reflecting "supply constraints," but they are not "supply shocks." Unfortunately, many analyses of supply issues during and after the pandemic have conflated these concepts. "Supply chain disruptions" seem to represent supply shocks. But the terms "shortages," "bottlenecks," "backlogs," "pressures," and "delivery times" do not necessarily involve supply shocks; instead, those terms apply to gaps between quantities supplied and demanded, without addressing whether the gaps arise from supply shocks or from supply constraints in the face of demand shocks.[10]

Distinguishing between a steep supply curve and adverse supply shocks in the COVID-era experience is important to drawing lessons for the designers of future stabilization policy. Supply shocks such as those seen over the past few year are generally idiosyncratic and not particularly likely to recur in future economic downturns. But if the aggregate supply curve was steep as the economy neared full employment during the COVID era, that characteristic may persist in future downturns, implying that policymakers should be concerned about providing too much stimulus as well as too little stimulus.

Moreover, the optimal policy response to higher inflation may be different when inflation is driven by the economy being on a steep portion of the supply curve rather than by adverse supply shocks. In the former case, inflation can be reduced by constraining demand enough to pull the economy back from the steep part of the supply curve. In the latter case, a large reduction in demand might be needed to offset the impact of the supply shocks, but if policymakers view those shocks as transitory, they may choose to take no action and wait for the shocks to ease (an approach sometimes described, as in Powell, 2023, as "looking through" the shocks).

[10] For example, a *New York Times* article about supply issues in January 2022 (Swanson, 2022) explained that China "has confined millions of its residents in recent weeks to try to keep the Omicron variant at bay"—a supply shock—and that US Secretary of Transportation Pete Buttigieg "said the record volumes of goods moving through American ports were straining systems"—a supply constraint facing strong demand. As another example, the Federal Reserve Bank of New York publishes a Global Supply Chain Pressure Index that incorporates various useful measures of supply pressures, but the cost-based components do not disentangle shifts in supply curves from movements along supply curves generated by changes in demand.

3. Considerations Shaping the American Rescue Plan of March 2021

When the ARP was being developed in early 2021, debate arose about whether the amount of additional stimulus under consideration was appropriate to address the ongoing fallout from the pandemic or was unnecessary and risked overheating the economy.

Economic outlook before enactment of the ARP

A starting point for assessing the impact of additional fiscal stimulus in early 2021 is to appraise the economic outlook in the absence of such stimulus. We do so by comparing economic forecasts just prior to the ARP with forecasts before the pandemic.

One source of forecasts we explore is CBO's "baseline projections," which are typically issued twice per year. Those projections show CBO's expectations for economic and budgetary outcomes conditional on the laws regarding federal spending and revenue in place when the projections are prepared. We also analyze projections from participants in meetings of the Federal Open Market Committee (FOMC)—the Federal Reserve's governors and the presidents of the Federal Reserve Banks. Their "Summary of Economic Projections" (SEP) documents are released four times per year and include median projections for year-end values of key economic variables. Finally, we look at median projections from private forecasters, as collected by the *Wall Street Journal* (*WSJ*) Economic Forecasting Survey. This survey was published monthly through March 2021 and quarterly thereafter.[11] For all series, we link projections to the real-time history of variables so they reflect information about the economy at the time the projections were made.

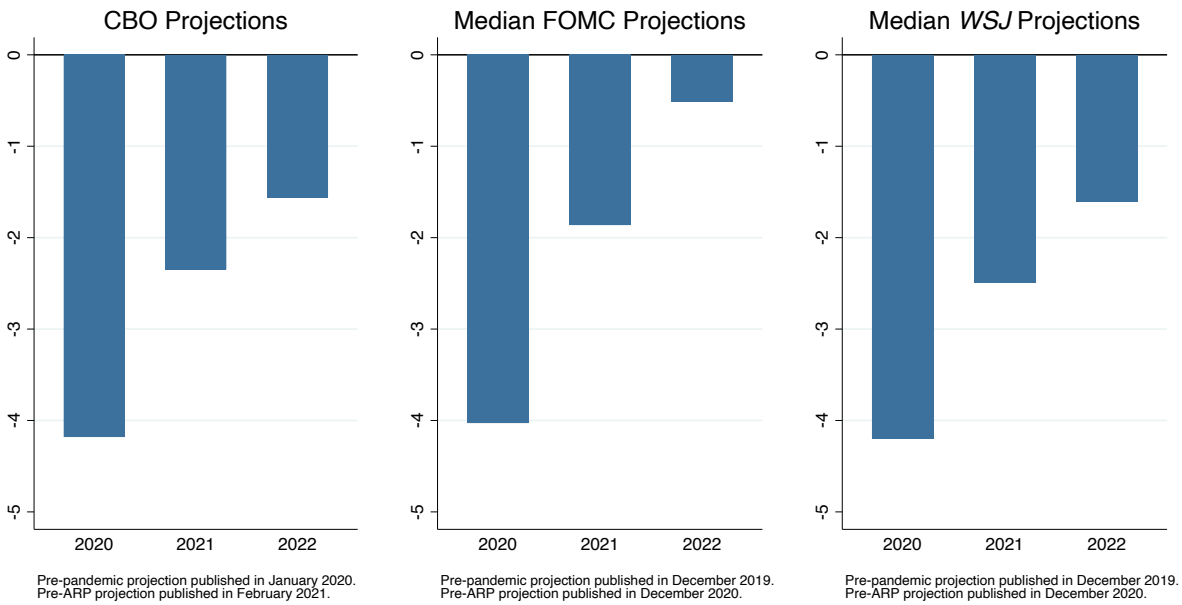
The Appendix presents figures showing selected vintages of projections from all three sources for four variables: inflation-adjusted GDP, the unemployment rate, inflation (as measured by the price index for personal consumption expenditures (PCE) excluding food and energy for CBO and the FOMC and by the consumer price index (CPI) for the *WSJ* forecasts), and the federal funds rate. In the text in this section and the following one, we present simpler figures that highlight the key points.

In February 2021, CBO projected that, conditional on the law of the time (and thus not taking account of the ARP), real GDP in the fourth quarters of 2021 and 2022 would be 2.3 percent and 1.6 percent below the January 2020 baseline projections for those quarters, as shown in the left panel of Figure 3.

[11] For both the SEP and *WSJ* projections, we converted projected fourth-quarter-over-fourth-quarter growth rates into projected levels of real GDP.

Also relevant for assessing the potential for the ARP to overheat the economy is CBO's estimate of the difference between output and potential output. CBO (2021, page 13) explained that its estimates of potential output are based on its "projections of trends in underlying factors, such as the size of the labor force, the average number of labor hours per worker, capital investment, and productivity—taking into account the effects of federal tax and spending policies embodied in current law." During the pandemic, CBO revised its estimates of potential output based on expected changes in investment and other factors, but it did *not* adjust its estimates to reflect the social distancing the agency expected in the short run (CBO, 2020a). In February 2021, CBO projected quarterly gaps between actual and potential output for the second quarter of 2021 through the fourth quarter of 2022 of -2.1, -1.7, -1.3, -1.0, -1.0, -0.9, and -0.8 percent of potential output, for a total of -2.2 percent of annual potential output. Because social distancing reduced available labor input and productivity, the projected shortfall of output relative to *a short-run concept of potential* would have been notably smaller than CBO's published gap.

Figure 3
Shortfall in Projected Real GDP Relative to Pre-Pandemic Expectations as of Early 2021
(percent, calculated from fourth-quarter levels)



Decisionmakers in the Federal Reserve System had similar views before the ARP was enacted about real output returning to its pre-pandemic path. The most recent SEP at that time had been released in December 2020, and for comparison, we use the pre-pandemic SEP from December 2019. As shown in the middle panel of Figure 3, the median FOMC member expected real GDP to end 2021 1.9 percent below the December 2019 projection and to end 2022 just 0.5 percent below that benchmark.

Likewise, the median expectation among private forecasters surveyed by *The Wall Street Journal* at the end of 2020 was for a moderate and gradually closing shortfall in real GDP relative to its pre-pandemic trend.[12] As shown in the right panel of Figure 3, the median projection in the *WSJ*'s December 2020 survey showed GDP in the fourth quarters of 2021 and 2022 at 2.5 percent and 1.6 percent below the December 2019 survey.

Policymaker and forecasters appeared more concerned about the pace of labor market recovery compared with real output, but pre-ARP expectations were still for ongoing improvement. In February 2021, the unemployment rate was 6.2 percent, well above most analysts' estimates of the sustainable rate, and the labor force participation rate was 61.4 percent, roughly 2 percentage points below the pre-pandemic mark. CBO projected that the unemployment rate would fall to 4.9 percent by the fourth quarter of 2022, still nearly a full percentage point above its pre-pandemic projection for that quarter. The FOMC was more optimistic, expecting that the unemployment rate would fall to 4.2 percent by the fourth quarter of 2022—but that would still have been a half-percentage point above its pre-pandemic projection. The forecasters surveyed by the *WSJ* aligned closely with CBO, expecting that the unemployment rate would fall to 4.8 percent by the fourth quarter of 2022, roughly a percentage point above their pre-pandemic projection.

In sum, before enactment of the ARP, analysts and policymakers at key federal agencies, along with leading private-sector forecasters, expected that real output and unemployment would move significantly back toward their pre-pandemic trends during 2021 and 2022, though not fully reach those benchmarks within that timeframe. Still, this anticipated recovery represented a substantial rebound, considering that the pre-pandemic benchmarks were quite strong: The US economy had just experienced the longest expansion on record, the unemployment rate had been below four percent for most of the preceding year and a half, and labor force participation among people ages 25 and 54 had risen to its highest mark in more than a decade.[13]

Considerations regarding potential further fiscal stimulus in early 2021

The fiscal stimulus enacted in March, April, and December of 2020 was an important driver of the economic rebound that occurred in 2020 and the pre-ARP projections for continued

[12] The *WSJ* survey was published monthly (as noted earlier), but we chose not to use early 2021 vintages of the survey because they likely embodied mounting expectations of additional fiscal stimulus.
[13] The FOMC had cut the funds rate three times in 2019 amid concerns about international trade disputes and weaker global economic prospects, but, by the end of the year, the median projection by FOMC members for GDP growth during 2020 was about equal to the longer-run trend.

recovery. The question facing fiscal policymakers in early 2021 was how much additional stimulus, if any, was appropriate.

The projections described above are the basis for one argument against enacting much additional stimulus. As noted, CBO projected that, from the second quarter of 2021 through the end of 2022, real output would be below long-run potential by a cumulative 2.2 percent; further, if one incorporated a significant reduction in labor supply and productivity due to social distancing—and adjustment CBO did not make—the shortfall would be considerably smaller. As also noted, projections from Federal Reserve policymakers and leading private forecasters suggested moderate and closing output gaps as well. If those expectations were accurate, another roughly $500 billion of well-designed spending increases and tax cuts—a small amount of additional stimulus relative to the 2020 bills or the ARP as ultimately enacted—could have absorbed all the available resources.

Relatedly, providing stimulus beyond what was needed to close the remaining output gap risked pushing aggregate demand for goods and services beyond the economy's ability to supply output, in turn putting upward pressure on inflation. This concern was raised forcefully in early 2021 by Summers (2021a and 2021b), as well as by Blanchard (2021), Mankiw (2021), Posen (2021), Strain (2021), and others.

A further argument against additional substantial stimulus was that federal debt imposes long-term economic costs, including by crowding out capital investment. If one doubted that additional federal borrowing in 2021 and 2022 would be offset by reduced borrowing in a foreseeable future year, then the advantages of using resources more fully in the short term would need to be compared with the disadvantages of having less resources in the long term. Such a comparison would imply that the optimal amount of further stimulus was less than $500 billion.

Why, then, did policymakers decide to enact a very large amount of additional fiscal stimulus—about $1¾ trillion, or roughly 8 percent of GDP? Multiple factors seem to have played a role.

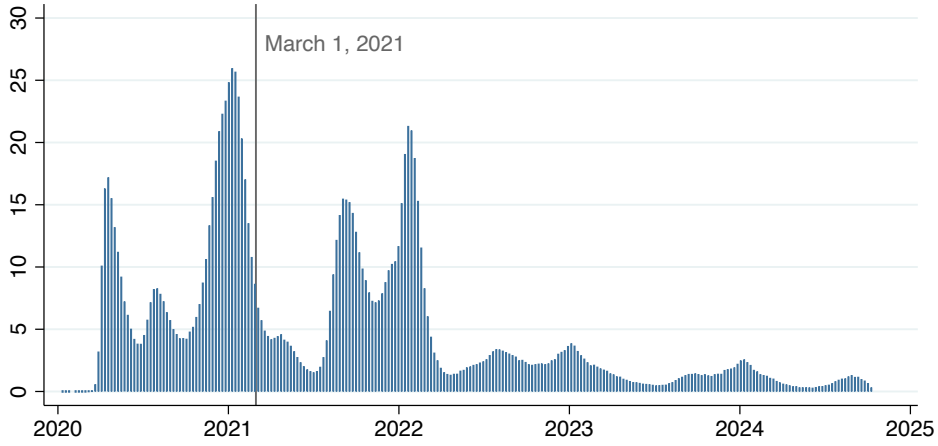
First, policymakers were skeptical about economic forecasts given considerable uncertainty about the course of the pandemic and the potency of fiscal policy:

- COVID-related deaths in the United States surged in late 2020, exceeding more than 20,000 per week between mid-December and the end of January, as shown in Figure 4. That pace was above the worst seen earlier. Although vaccinations against COVID began in mid-December and deaths declined rapidly through the winter, there was

uncertainty about how many people would be vaccinated, the vaccination timetable, and the vaccines' effectiveness. In addition, many people were chafing about social distancing and mask-wearing, so future behavioral patterns were difficult to predict.

- As discussed above, the effectiveness of fiscal policy in spurring demand for goods and services was uncertain, especially given the unprecedented nature of the pandemic. For example, if social distancing had caused households to defer some spending enabled by the initial rounds of fiscal stimulus, more stimulus remained in the pipeline and less new stimulus might be needed—but if social distancing continued, additional spending from further stimulus might be deferred as well.[14]

Figure 4
Weekly COVID-19 Deaths in the United States
(thousands)



Data source: Centers for Disease Control and Prevention. Last data point: October 12, 2024.

Second, many policymakers and analysts saw significantly greater danger in enacting too little stimulus than in enacting too much stimulus:

- Many observers thought that the government had provided too little fiscal stimulus in response to the Global Financial Crisis and Great Recession—and that the economic and social costs of that mistake were substantial.

[14] Aladangady et al (2022) pointed to significant "excess saving" in the early pandemic period. CBO (2021a, page 72) said that "because households, in aggregate, have accumulated considerable private savings over the past several quarters, they will tend to spend the additional resources provided by the recently enacted legislation at a slower pace than they spent the resources provided in legislation enacted last year." But CBO (2021b, page 48) noted that CBO had subsequently "raised its estimate of spending out of the additional savings accumulated during the pandemic."

In that period, significant amounts of unused resources persisted for many years. CEA (2014, Table 3-4) noted that the final pieces of recovery legislation were enacted in 2012 when the unemployment rate was still around 8 percent. As the economic expansion finally brought the unemployment rate down below 5 percent in 2016, labor force participation among workers ages 25 to 54 picked up notably, implying that the earlier worker demand shortfalls not only kept unemployment high but also deterred would-be workers from entering the labor force. Even when unemployment reached historic lows, inflation stayed below the Federal Reserve's target—consistent with the view that inadequate stimulus had led to years of unnecessarily high joblessness.

A substantial body of research documents the high costs of joblessness. Job displacement is associated with persistent negative effects on earnings (for example, see Couch and Placzek, 2010, and Shiro and Butcher, 2022), and displacement during the Great Recession had lasting negative effects on employment rates (Yagan, 2019). Moreover, "the impacts of the Great Recession [were] felt most strongly for men, black and Hispanic workers, youth, and low-education workers" (Hoynes et al, 2012). Dynan and Elmendorf (2023) showed that "families whose heads experienced long-term unemployment during or immediately after the Great Recession lost wealth between 2007 and 2019, on balance, while families that experienced no unemployment gained wealth."

Weak labor markets can also impose costs beyond the earnings and labor market prospects of those who lose jobs. Rothstein (2023) showed that college graduates entering the labor market around the time of the Great Recession had permanently lower employment probabilities than their counterparts who entered in better times. Nikolova and Nikolaev (2018) found persistent deleterious effects of parental job loss on the mental health of children.

More generally, the unevenness of the pandemic's impact—across economic sectors, geographic areas, and income levels—posed a heightened risk that some populations and parts of the economy would be "left behind" if overall stimulus were insufficient. Indeed, Guerrieri et al (2021) presented a model of structural reallocation in which asymmetric shocks lead monetary policy to aim for higher inflation in order to support all sectors of the economy.

- Many observers did not see much chance of notably higher inflation.

Core inflation as measured by the four-quarter change in the core PCE price index had not exceeded 2½ percent for two quarters in a row since 1993. In addition, that measure had been below the Federal Reserve's target of 2 percent almost continuously since the Great Recession—even as the unemployment fell below many analysts' estimates of its natural rate in the late 2010s. Indeed, many estimates of the Phillips curve implied that inflation would increase significantly only with very large declines in unemployment; we return to this issue later.[15]

Moreover, a modest increase in inflation was not viewed as unwelcome. The Fed had adopted a policy framework in August 2020 stating that: "following periods when inflation has been running persistently below 2 percent, appropriate monetary policy will likely aim to achieve inflation moderately above 2 percent for some time" (FOMC, 2020a).[16] In addition, some analysts had urged the Fed to raise its inflation target so that the nominal funds rate would tend to be higher and the effective lower bound would be less binding.

Finally, the Fed's ability to raise interest rates if fiscal stimulus overheated the economy was reassuring to some. In contrast, with the federal funds rate close to zero, the Fed could not cut interest rates further if too little fiscal stimulus were provided to return the economy to full employment.

Third, some supporters of significant further fiscal stimulus may have thought the time was right for Democrats to put their own stamp on policy. The recent elections had brought in a new Democratic president and a (bare) Democratic majority in the Senate, while retaining the Democratic majority in the House of Representatives. Those outcomes were credited in part to unhappiness about the government's handling of the pandemic. In particular, the Democratic Senate candidates from Georgia had emphasized in their successful runoff campaigns their support for further pandemic relief. And legislation to address the pandemic provided an opportunity to expand programs that many Democrats already backed, such as the child tax credit.

[15] Those estimates correspondingly implied that *reducing* inflation if it overshot the target would require very large *increases* in unemployment, which should have increased inflation aversion by policymakers.
[16] See the discussion in Blinder (2024).

4. Following Enactment of the American Rescue Plan

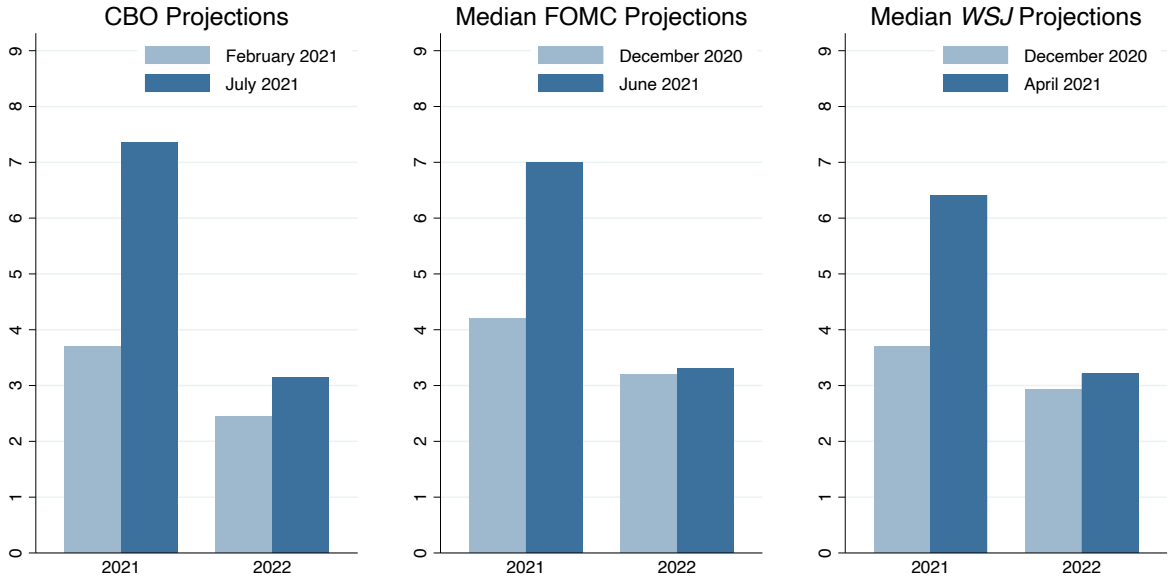
Following enactment of the ARP, forecasts for the US economy changed notably. However, economic outcomes differed from those forecasts in significant ways that can inform future stabilization policy.

Post-ARP updates to the economic outlook

Projections published after enactment of the ARP showed much better outcomes for real GDP and unemployment than previous projections, but only small upward revisions for inflation and little change in monetary policy.

In its July 2021 baseline—the first update after passage of the ARP—CBO projected real output growth of 7.4 percent over the four quarters of 2021 and 3.1 percent over 2022, as shown in the left panel of Figure 5. The resulting path for the level of real GDP (shown in Appendix Figure 12a) lay well above CBO's pre-ARP projection and even above its pre-pandemic projection, with a peak difference relative to the latter of 2.4 percent in the fourth quarter of 2022.

Figure 5
Projections of Q4/Q4 Real GDP Growth
(percent)

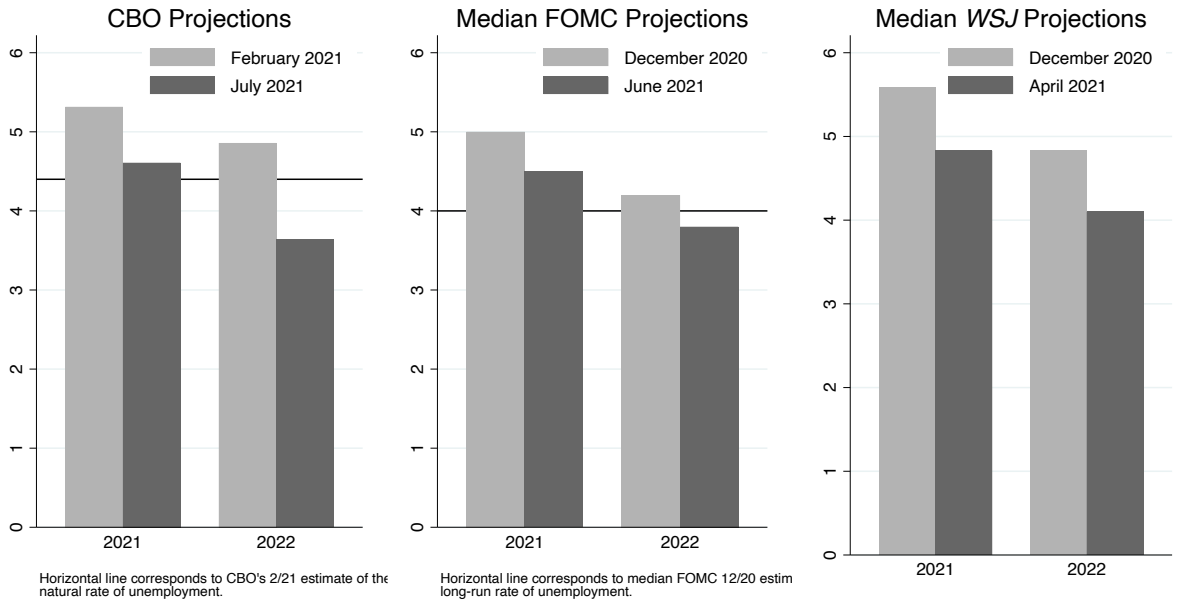


CBO's July 2021 projection of the output gap (not shown), which incorporated revisions to potential output as well as output, is noteworthy: From an estimated shortfall of output

relative to potential of 1.1 percent in the second quarter of 2021, CBO projected that output would *exceed* potential by 0.5 percent in the third quarter, 1.4 percent in the fourth quarter, nearly 2.4 percent during 2022, still 1.5 percent in the fourth quarter of 2023, and gradually declining amounts through 2025. The cumulative excess from the third quarter of 2021 through the end of 2025 was projected to be 5.9 percent of annual potential output—slightly below the estimated cumulative excess during the late 1990s boom but above the estimated cumulative excess in every other expansion since the late 1960s. In addition, as noted earlier, the CBO's estimates of potential output made no adjustment for social distancing; incorporating such effects would have made the excess even more striking.

As can be seen in the left panel of Figure 6, CBO projected that the unemployment rate would fall much more sharply than it anticipated before enactment of the ARP, reaching 4.6 percent in the fourth quarter of 2021 rather than the 5.3 percent projected earlier. Before the pandemic, CBO projected the unemployment rate to be 3.6 percent in that quarter. The agency also expected that the demand for workers would be strong enough to draw more people into the labor force, pushing the participation rate well above its pre-pandemic trend in late 2022 and beyond; we return to this point later.

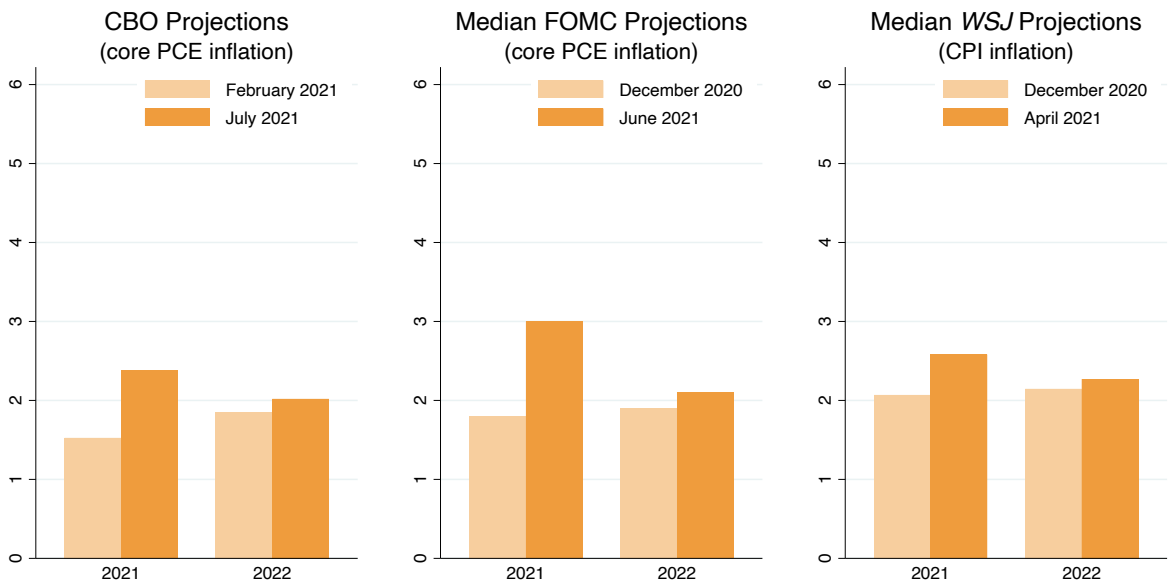
Figure 6
Projections of Q4 Unemployment Rate
(percent)



Despite anticipating strong demand for goods and services and a significant tightening of the labor market, CBO only nudged up its projection of core inflation. In July 2021, CBO estimated that core PCE prices had risen at an annual rate of 3.2 percent in the second

quarter of the year but would increase at an annual rate at or below 2.2 percent in every quarter going forward—just slightly above the pre-pandemic projection of increases between 2.0 and 2.1 percent. The resulting changes in core PCE inflation over the four quarters of 2021 and 2022 are shown in the left panel of Figure 7. Moreover, CBO continued to project that the federal funds rate would remain near zero until 2023.

Figure 7
Projections of Inflation
(percent change, year-end to year-end)



Federal Reserve policymakers revised their outlook similarly. The FOMC published an SEP in March 2021, just after the passage of the ARP, but the assumptions about the fiscal package embodied in those projections are unclear; therefore, we examine the FOMC's June 2021 projections compared with its December 2020 projections.

As can be seen in the middle panel of Figure 5, the median projection in the June 2021 SEP was for real GDP growth of 7.0 percent over the four quarters of 2021 and 3.3 percent over 2022. The resulting path for the level of real GDP lay above those policymakers' pre-ARP projection and even above their pre-pandemic projection, with a peak difference relative to the pre-pandemic projection of 2.3 percent in the fourth quarter of 2022 (see Appendix Figure 12b).

Like CBO, Federal Reserve policymakers expected that the unemployment rate would drop more sharply than they anticipated prior to enactment of the ARP, as shown in the middle panel of Figure 6. The median expectation was 4.5 percent for the fourth quarter of 2021—

0.5 percentage point below the pre-ARP expectation, though still above the expectation before the pandemic.

As with CBO, Federal Reserve policymakers' better expected post-ARP outcomes for GDP and unemployment were associated with a moderate but short-lived upward adjustment to expected inflation. As can be seen in the middle panel of Figure 7, the projected increase in core PCE prices was 3.0 percent over the four quarters of 2021, followed by a reversion to around a 2 percent rise in 2022. Additional information in the December 2020, March 2021, and June 2021 SEPs shows that, over the first half of 2021, FOMC members became slightly more uncertain about the inflation outlook and viewed the risks as increasingly skewed to the upside. Nonetheless, the median respondent expected that the federal funds rate would remain near zero until 2023.

The first *WSJ* survey of forecasters following enactment of the ARP took place in April 2021. The forecasters marked up their expectations for real GDP growth and marked down their expectations for the unemployment rate, as shown in the right panels of Figures 5 and 6, but not by as much as CBO or the FOMC did in their projections in the summer.

For both the FOMC and the private forecasters, the expectation that the level of real output would exceed their pre-pandemic projections in 2022 was accompanied by an expectation that the unemployment rate would *not* fall below their pre-pandemic projections in 2022. This divergence may reflect lags in the Okun's law relationship between output and unemployment gaps. But the slower expected return of low unemployment may have been important to the FOMC, which stated in September 2020 its intention to keep the federal funds rate very low "until labor market conditions have reached levels consistent with the Committee's assessments of maximum employment" (FOMC, 2020b).

As with the government agencies, the median private forecast of inflation showed only a small upward revision following enactment of the ARP, as can be seen in the right panel of Figure 7.[17] The 90th percentile of the distribution of projected twelve-month changes in the CPI for December 2021 was just 3.1 percent, only about a half percentage point higher than in the December 2020 survey. And, as with CBO and the FOMC, the median response to the *WSJ* survey looked for the federal funds rate to stay fairly close to zero until 2023.

To summarize: Following enactment of the American Rescue Plan, analysts and policymakers at key federal agencies and leading forecasters in the private sector

[17] This panel is not fully comparable to the other panels of the figure because, at the time, the *WSJ* survey asked forecasters for their predictions of the CPI but not the core CPI or any version of the PCE price index. Forecasts for PCE inflation and core inflation became available with the April 2022 *WSJ* survey.

generally expected that real output would rise above its pre-pandemic trend by late 2021 and stay above the trend for multiple years, that the unemployment rate would drop to about 4 percent by the end of 2021, and that inflation would rise a little but remain quiescent—and with those outcomes involving no adjustment to monetary policy.

Economic outcomes in 2021 and 2022

Those forecasts proved much too optimistic. US real output grew at a solid pace in 2021 and 2022 but not as rapidly as had been anticipated, and unemployment fell a little faster than projected, inflation surged, and the Federal Reserve responded by raising the federal funds rate very sharply.

According to current estimates, real GDP increased 5.7 percent over the four quarters of 2021 and 1.3 percent over 2022. This rebound marked a full recovery from the pandemic downturn, with the levels of GDP in the fourth quarters of 2021 and 2022 nearly matching the pre-pandemic projections of CBO, the FOMC, and private forecasters (as can be seen in Appendix Figure 12). Even so, this performance fell materially short of the post-ARP projections, as shown in Table 2 for all three sources and depicted in the top left panel of Figure 8 for CBO. (To limit the number of figures, we do not include corresponding figures for the FOMC or the *WSJ* survey, but the results are qualitatively similar.)

Unemployment dropped further in 2021 than many analysts and policymakers expected in the spring and summer, as shown in Table 2 and (for CBO) the top right panel of Figure 8. By early 2022, the unemployment rate had fallen to roughly the levels projected before the pandemic (as can be seen in Appendix Figure 13).

Inflation far outran the projections of most analysts and policymakers, as the core PCE price index jumped 4.9 percent over the four quarters of 2021 and 5.2 percent over 2022. The wide difference between expectations and outcomes is summarized in Table 2 and (for CBO) the bottom left panel of Figure 8. That runup in inflation reduced the inflation-adjusted federal funds rate, which provided a further boost to demand.

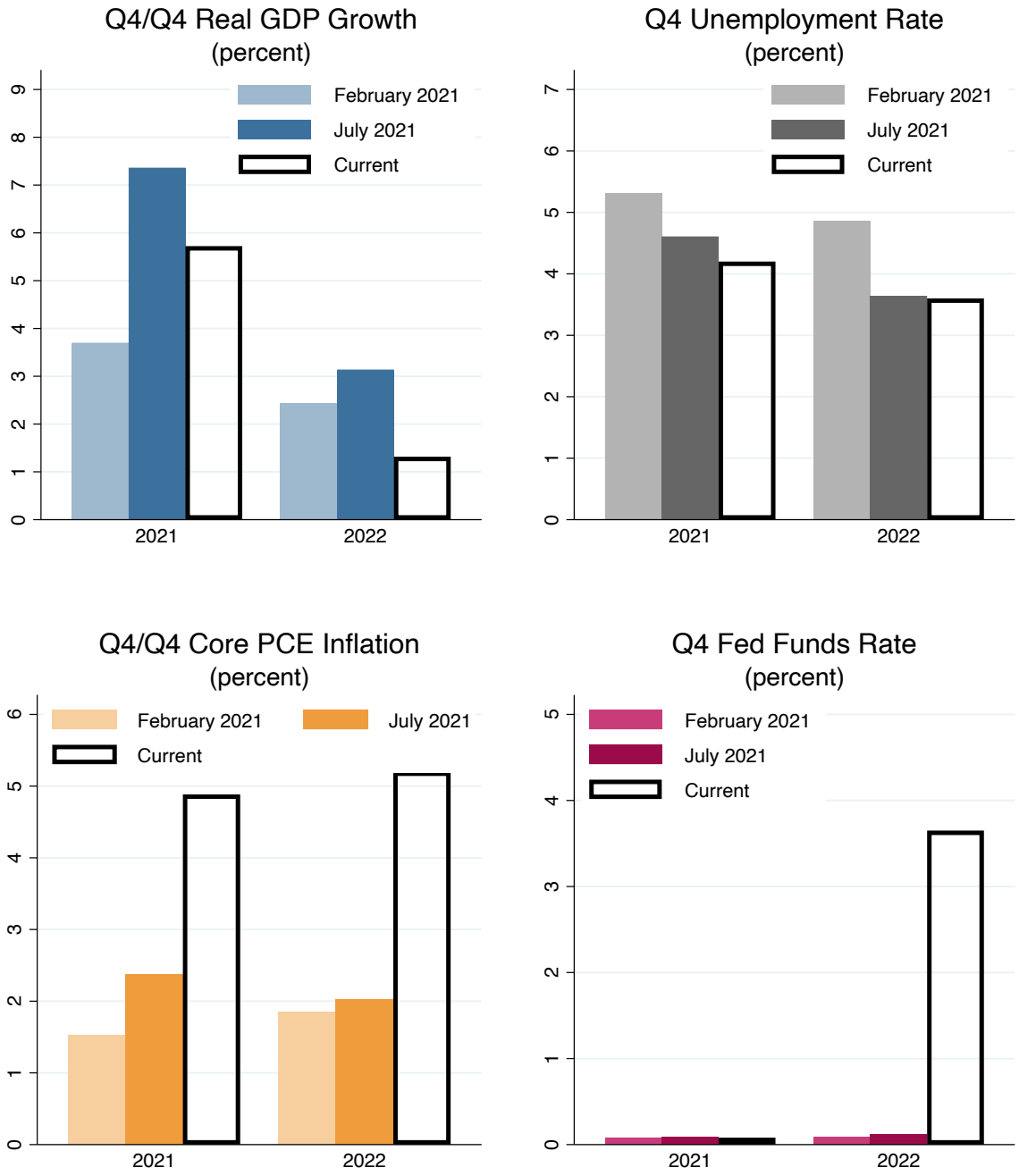
As the inflation surge persisted into 2022, the Federal Reserve became increasingly worried that demand for goods and services would continue to exceed available supply, and it embarked on a remarkably rapid pace of increases in the federal funds rate. The surprise relative to many analysts' and policymakers' expectations for the funds rate can be seen in Table 2 and (for CBO) the bottom right panel of Figure 8.

Table 2: Economic Projections in Mid-2021 and Subsequent Outcomes

Economic Measure	CBO	FOMC Median Response	*WSJ* Survey Median Response	Actual (Current Estimate)
Real GDP growth				
2021	7.4%	7.0%	6.4%	5.7%
2022	3.1%	3.3%	3.2%	1.3%
Unemployment rate (Q4)				
2021	4.6%	4.5%	4.8%	4.2%
2022	3.6%	3.8%	4.1%	3.6%
Core PCE inflation rate (Q4/Q4)				
2021	2.4%	3.0%		4.9%
2022	2.0%	2.1%		5.2%
CPI inflation rate (Dec./Dec.)				
2021			2.6%	6.8%
2022			2.3%	7.1%
Federal funds rate (Q4)				
2021	0.1%	0.1%	0.2%	0.1%
2022	0.1%	0.1%	0.3%	3.7%

Notes: The CBO forecast was published on July 1, 2021; the FOMC forecast on June 16, 2021; and the *WSJ* survey results on April 11, 2021. Actual values are the estimates reported by government statistical agencies in Fall 2024. Values for the unemployment rate correspond to the Q4 average for CBO, the FOMC, and the actual, and to the December value for the *WSJ* survey. Values for the federal funds rate correspond to the Q4 average for CBO and the actual, to the year-end value for the FOMC, and to the December value for the *WSJ* survey.

Figure 8
CBO Projections and Actual Realizations



5. Demand Boom, Inelastic Supply, and Supply Shocks

The US economic outcomes discussed in the previous section have a straightforward interpretation: Expansionary fiscal policy, expansionary monetary policy, and the natural rebound of the economy due to the waning of the pandemic generated a boom in demand for goods and services in 2021 and 2022. In mid-2021, many analysts and policymakers expected that the demand boom would push output in 2022 well above the path they had projected before the pandemic and bring unemployment in 2022 down to the pre-pandemic path—but that core inflation in 2022 would be close to the pre-pandemic projection. In other words, they expected that the economy could supply the additional output demanded by a boom without any significant upward pressure on inflation. However, output grew significantly less than they anticipated, and inflation surged to its highest mark in more than 40 years.

Why the supply of goods and services did not rise to meet demand without higher inflation is the topic of this section. Using the aggregate supply and demand framework from Section 2, the explanation is a combination of inelastic supply—with the demand boom pushing the economy onto a steep part of the aggregate supply curve—and further adverse supply shocks beyond the pandemic itself. Understanding the relative importance of these factors is useful in drawing lessons for future stabilization policy, as we discuss later.

We do not offer sharp empirical tests of the magnitudes of these factors. Rather, we present a collection of evidence that helps to distinguish between them—identifiable supply shocks, the timing and breadth of the inflation surge, the tightness of the labor market, the slope of the Phillips curve, and the disinflation of the past two years.

We find that inelastic supply was the dominant factor behind the inflation surge, with the aggregate supply curve being fairly steep at the level of output to which the demand boom pushed the US economy. Adverse supply shocks played a smaller role in raising inflation.

Identifiable supply shocks

The initial adverse supply shock from the pandemic continued to unwind during 2021 and 2022. A significant portion of this shock reversed relatively quickly, with many businesses reopening and a sharp partial rebound in labor force participation within a few months of the pandemic's onset. This process continued gradually thereafter. Notably, labor force participation among Americans ages 25 to 54 climbed fairly steadily in 2021 and 2022, as people received vaccinations or abandoned social distancing without being vaccinated. In contrast, labor force participation for Americans aged 55 and older showed little

rebound—likely due to continuing fear of COVID, increased wealth from rising equity and house prices, and aging within the group. On balance, though, the adverse labor-force shock of the pandemic diminished in 2021 and 2022, with the US labor force returning to its pre-pandemic high by late 2022.

However, additional adverse supply shocks hit the US economy during these years. To start, a global shortage of semiconductors emerged. Shocks that held back semiconductor production included COVID, severe weather, and earlier decisions by US automakers to cut back their semiconductor orders on (ultimately inaccurate) expectations of a prolonged drop in motor vehicle demand. As Levy (2024) argues, though, the shortage likely reflected the combination of these supply shocks and strong demand for goods produced with semiconductors, so it would be incorrect to attribute the inflation associated with the shortage solely to the supply shocks.

Another adverse supply shock was the Russian invasion of Ukraine in February 2022. The invasion disrupted global grain supplies, reduced natural gas shipments (especially to Europe), pushed up oil prices, and limited the availability of certain other raw materials. These shocks occurred after the initial surge of inflation but presumably played a role in keeping inflation high.

The United States also experienced a significant *favorable* shock to supply when immigration jumped upward in 2022. CBO (2024, page 30) estimated that net immigration apart from temporary foreign workers and lawful permanent residents "swelled from a historical rate of about 200,000 people per year to 1.9 million in 2022 and 2.4 million in 2023." CBO noted that immigrants who receive work authorization typically do so with a lag, so the jump in immigration may have had a limited effect on aggregate supply in 2022. Moreover, the increase in immigration boosted aggregate demand as well, making the net effect on the imbalance between demand and supply unclear.[18]

All else equal, the shocks that reduced semiconductor production and the supply disruptions from the Russian invasion of Ukraine raised inflation in 2021 and 2022, with the effects concentrated among items that were most exposed to those shocks. Gauging whether the aggregate supply curve was on net higher than expected when the ARP was being developed requires factoring in favorable supply shocks as well. Our informal sense is that the diminishment of social distancing may have gone roughly as expected, while the cutback in supply of semiconductors and the war in Ukraine probably obstructed supply

[18] See Duzhak (2023) for evidence that the post-pandemic immigration surge relieved US worker shortages on net.

more than the immigration surge increased supply relative to demand (at least through 2022).

Timing and breadth of the inflation surge

Examining the timing and breadth of the inflation surge sheds additional light on the importance of the adverse supply shocks just discussed relative to the broader stimulus-fueled demand shock.

Consumer prices began to accelerate in the spring of 2021. For core PCE prices, the annualized six-month change—which smooths through monthly volatility while responding more quickly to shifts than the often-used twelve-month change—reached 2.9 percent in March 2021, 5.1 percent in June 2021, and 5.6 percent in August 2021. This pickup is plotted in the solid line in Figure 9a. The annualized six-month change in overall PCE prices (not shown) also stepped up sharply over this period, reaching 6.2 percent in the summer of 2021. Both core PCE inflation and overall PCE inflation stayed high in 2022.

The acceleration in prices was concentrated initially in a fairly narrow set of goods and services but soon became visible across consumer items. The Federal Reserve Bank of Dallas publishes a "trimmed mean" measure of PCE inflation that excludes roughly the lowest and highest quarters of price changes each month.[19] Trimmed mean inflation on an annualized six-month basis reached 2.6 percent in June 2021, 3.2 percent in September 2021 and 4.9 percent in February 2022 (shown by the dashed line in Figure 9a). This series had only been materially above 2.0 percent once over the preceding decade.

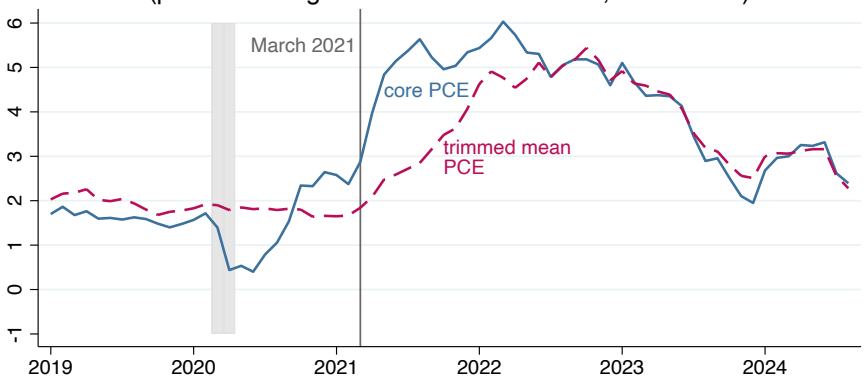
Other measures of the breadth of consumer price increases, published by the Federal Reserve Bank of San Francisco, also show sharp rises in the spring and summer of 2021. For example, the share of items in the CPI basket with twelve-month price changes that are two standard deviations above their average twelve-month price change over the preceding five years—known as the "t-diffusion" index—rose from roughly 12 percent at the start of 2021 to nearly 40 percent by May 2021, as shown by the solid line in Figure 9b. The share of consumer *expenditures* with such price increases jumped at about the same time and even more dramatically, shown by the dashed line.[20]

[19] See Dolmas and Koenig (2019).

[20] More information about these measures of price dispersion can be found on the Federal Reserve Bank of San Francisco's PCE Inflation Dispersion webpage.

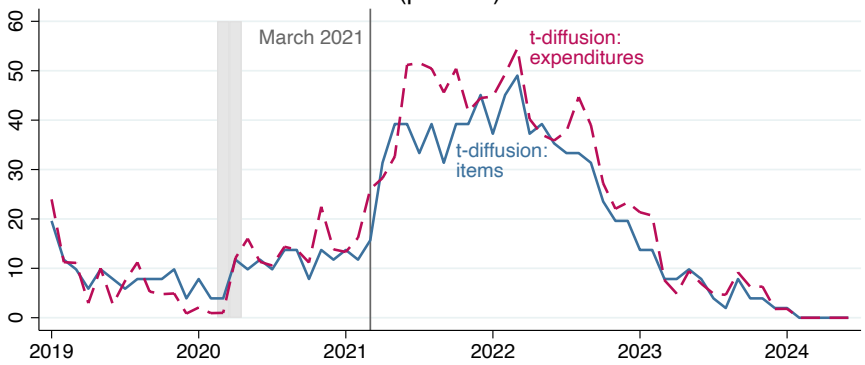
Figure 9
Inflation Realizations

(a) PCE Inflation Measures
(percent change from six months earlier, annualized)



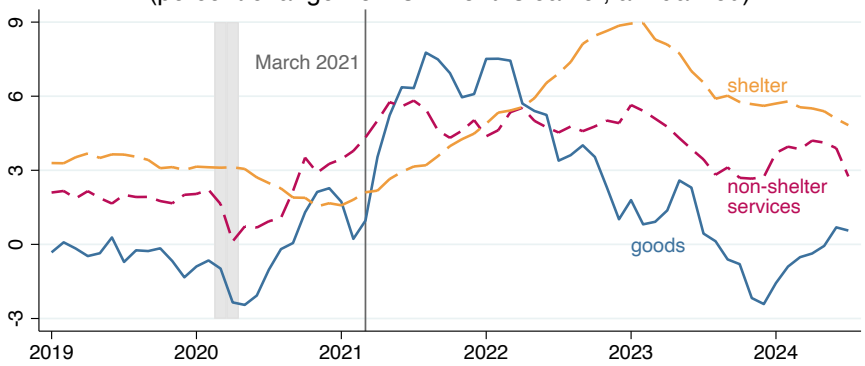
Shaded area corresponds to recession. Data sources: Bureau of Economic Analysis and Dallas Fed (via FRED).

(b) Measures of PCE Inflation Dispersion
(percent)



t-diffusion indexes represent percent of items/expenditures with 12-month increases 2 standard deviations above average of 12-month changes for the past 5 years. Shaded area corresponds to recession.
Data source: Federal Reserve Bank of San Francisco.

(c) PCE Core Inflation Components
(percent change from six months earlier, annualized)



Shaded area corresponds to recession. Data sources: Bureau of Economic Analysis and author's calculations.

One final perspective on the breadth of price acceleration in 2021 comes from the PCE price indexes for broad categories of consumption. The six-month changes in core goods prices and core prices for services excluding shelter both increased markedly in the first half of 2021, as shown on an annualized basis by the solid and red dashed lines in Figure 9c. In 2022, inflation in core goods retreated significantly, while inflation in core services excluding shelter stayed high. The six-month change in shelter prices, the gold dashed line, rose more gradually than the other categories, primarily because it takes time for the contracts of existing renters to turn over.[21] By the end of 2022, shelter inflation had roughly tripled.

Both the timing and early breadth of the inflation surge imply an important role for inelastic supply in the face of a broad demand boom. During 2021, the supply shock of social distancing eased, and the invasion of Ukraine had not yet occurred, while stimulus from fiscal and monetary policy was very strong. In the first half of 2022, policy stimulus remained strong, even though the Federal Reserve began to raise the funds rate in the spring. Moreover, the broad-based price acceleration points to economy-wide factors rather than idiosyncratic shocks as key drivers of inflation.

Tightness of the labor market

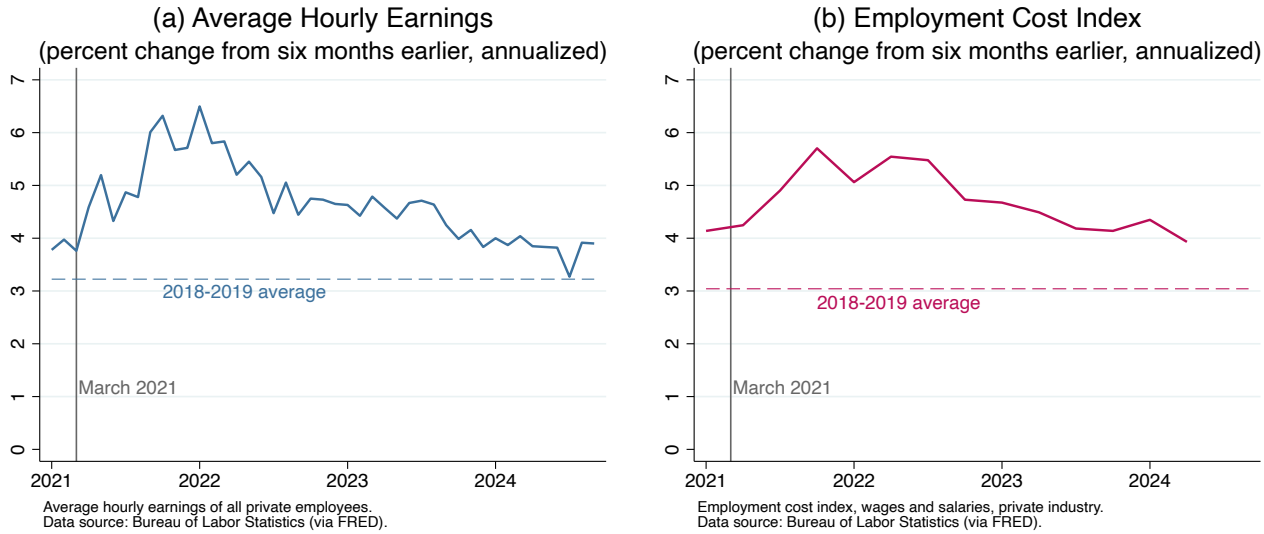
The available evidence suggests that labor supply constraints were an important underpinning of the steepness of the aggregate supply curve at the point where fiscal stimulus and other factors had pushed aggregate demand.

The unemployment rate fell rapidly during 2021, and by early 2022 it was nearly back to its pre-pandemic low. A further decline during 2022 brought the unemployment rate down to about 3½ percent. At the same time, job openings surged by more than 50 percent during 2021, reaching a level far above anything seen previously in the twenty-year history of the series. Job openings then held roughly steady at the higher level throughout 2022. As discussed by Furman and Powell (2021), Ball et al (2022), and other analysts, the rise in job openings meant the labor market was significantly tighter in 2021 and 2022 than the unemployment rate alone would suggest.

Strong demand for labor pushed up compensation growth in 2021 as measured by both average hourly earnings of private employees and the Employment Cost Index for wages and salaries of private industry workers. Over the course of 2021, the annualized six-month changes in both series climbed fairly steadily to levels notably above their pre-pandemic averages, as shown in Figure 10.

[21] For example, see McKay and Mehrotra (2024).

Figure 10
Compensation Growth Realizations



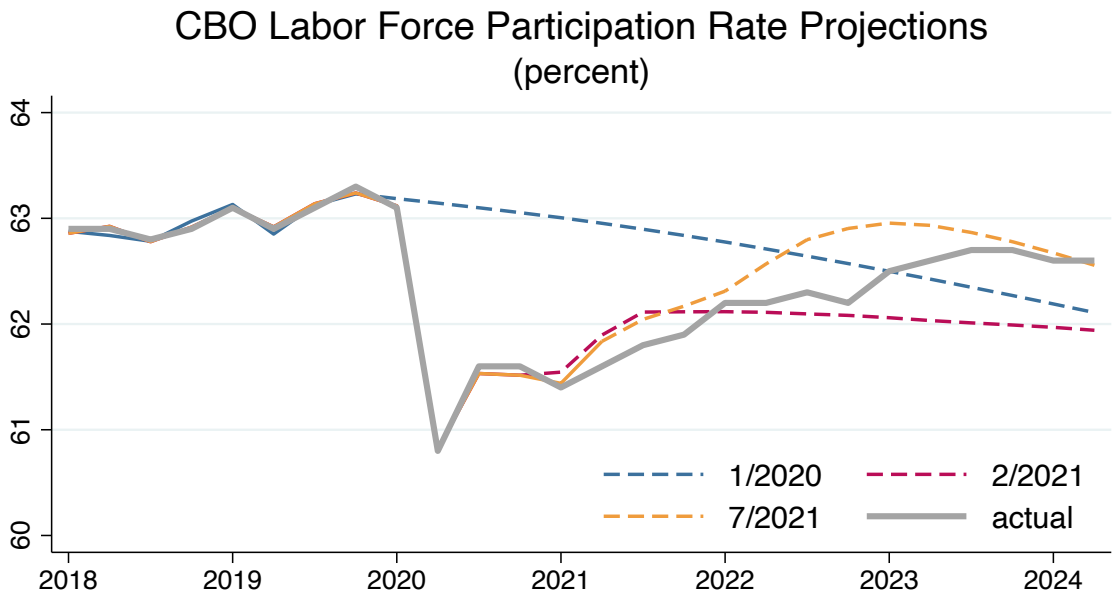
Following enactment of the ARP, CBO projected that the labor force participation rate would rise significantly and exceed the agency's pre-pandemic projection during the second half of 2022 and beyond, as shown in Figure 11. (Neither the FOMC's SEP nor the *WSJ*'s survey of private forecasters report projections of labor force participation.) The expectation that strong demand would induce a large increase in labor supply probably played a role in CBO's projection that inflation would not rise very much. However, the supply of labor turned out to be less elastic in 2021 and 2022 than CBO expected.

The acceleration in compensation and lack of a sharp increase in labor force participation, even as the adverse shock from social distancing was easing, imply that the demand for labor had been pushed up to a point at which the supply of labor was fairly inelastic.

Our interpretation of labor-market outcomes as a demand boom running into a supply constraint beginning in 2021 may seem at odds with Bernanke and Blanchard (2023). They argued that the inflation surge in 2021 did *not* stem from excess demand overheating the labor market because, according to their estimated model, prices rose faster than predicted given labor costs while labor costs did not rise faster than predicted given prices. However, pressures from an overheated economy can affect price-setting directly, not just through higher wages pushing up prices. Indeed, textbook presentations of the Phillips curve link it to the aggregate supply curve by using Okun's law to connect the labor and product markets; for example, see Mankiw (2019, pages 413-415). Moreover, Leduc et al. (2024) and others they cite find little change in the markups of prices over wages during the

inflation surge, which suggests that Bernanke and Blanchard's estimates may not be robust in this regard.

Figure 11



Data source: Congressional Budget Office and Bureau of Labor Statistics (via FRED). Dashed segments start with quarter of projection publication. Solid lines correspond to available history at time of projection.

Slope of the Phillips curve

Much of the literature focused on inflation dynamics in the decades preceding the pandemic concluded that the Phillips curve is quite flat, so inflation will increase by a noticeable amount only in response to very large drops in unemployment. Examples of this research include Del Negro et al (2020) and Hazell et al (2022). The post-ARP revisions to the economic projections of CBO, the FOMC, and the *WSJ* survey suggest that forecasters at the time embraced this finding. On that evidence, our narrative that a demand boom in 2021 and 2022 ran into a steep aggregate supply curve is not very persuasive, and an alternative narrative that a demand boom was undone by further adverse supply shocks is more compelling.

However, a good deal of other evidence regarding the Phillips curve—particularly analysis incorporating more recent data—is consistent with the narrative that a demand boom in 2021 and 2022 ran into a steep aggregate supply curve:

- Some research has found that the Phillips curve becomes steeper as the labor market tightens, so inflation becomes more responsive to unemployment at lower unemployment rates. Many of these papers incorporate data from the recent inflation surge, including Ball et al (2022), Demirel and Wilson (2023), Smith et al (2023), and Benigno and Eggertsson (2023 and 2024); see also the recent review by Furlanetto and Lepetit (2024). Notable exceptions based solely on earlier data include Gagnon and Collins (2019), Hooper et al (2019), and Forbes, Gagnon, and Collins (2021),[22]

- Some recent papers have included the job openings rate along with the unemployment rate in measuring labor-market tightness and have observed that the sharp climb of this measure in 2021 and 2022 helps to explain the runup in inflation. Examples of these papers include Furman and Powell (2021), Ball et al (2022), and Benigno and Eggertsson (2023 and 2024).

- Some analysts have attributed the inflation surge in part to a marked shift—or "rotation"—in consumer demand from services to goods combined with constraints on the supply of goods.[23] Indeed, real PCE goods moved above their pre-pandemic trend in mid-2020 and then surged around the time that the ARP was passed, staying well above trend for more than a year thereafter.[24] This pattern aligns well with the surge in core goods inflation shown in figure 9c and supports the view that at least some supply schedules are curved. Bernanke and Blanchard (2023, page 16) explained: "If we think for example of firms facing a flat marginal cost up to some physical constraint where supply becomes vertical, then relative demand increases, if large enough, will move prices along the vertical supply curve, but the corresponding relative demand decreases will move prices along the horizontal part of the supply curve. The increase in prices in some sectors will not be offset by a decrease in prices in the others." While aggregate supply is more elastic than sectoral supply, as some resources can be shifted across sectors, the logic that supply constraints are more likely to bind as resource utilization climbs applies to the overall economy as well.

- The strength of the demand boom implies that the aggregate demand curve was pushed quite far to the right relative to the aggregate supply curve. As discussed in section 4, following enactment of the ARP, CBO projected that actual output would

[22] Reifschneider (2024) described the Phillips curve used in his baseline simulation as "essentially linear" (page 17) but acknowledges the possibility of nonlinearities by including results from an alternative specification based on the Gagnon and Collins (2019) model.

[23] For example, see Bernanke and Blanchard (2023), Konczal (2023), and Gagnon and Rose (2024).

[24] The trend was estimated in logs using data from 2010 to 2019.

exceed potential output by an average of 1 percent in the second half of 2021 and nearly 2½ percent in 2022. That latter represented a striking overage by historical standards, even leaving aside the effects of social distancing (which were not incorporated into CBO's estimates).

On balance, then, evidence regarding the Phillips curve is consistent with the view that the aggregate supply curve was fairly steep in the relevant range during 2021 and 2022.

Disinflation in 2023 and 2024

US inflation began to ease gradually in the spring of 2022 and then fell sharply in 2023. Core inflation as measured by the annualized six-month change in core PCE prices dropped from close to 5 percent at the beginning of 2023 to an average of just under 3 percent over the first eight months of 2024, as shown by the solid line in Figure 9a.

Just as the surge in inflation can be attributed to a combination of adverse supply shocks and a demand boom colliding with fairly inelastic aggregate supply, so the rapid disinflation can be attributed to a combination of favorable supply shocks and demand restraint in the face of fairly inelastic aggregate supply.

Favorable supply shocks in late 2022 and 2023 included a marked gain in labor force participation, continued increases in semiconductor production, and the spike in immigration noted earlier. The labor force participation rate of individuals 55 and older has continued to drift down, but the rate for ages 25 to 54 has steadily increased, bringing the overall labor force participation rate up by about ½ percentage point since late 2022. As a result, the overall participation rate now stands only ¼ percentage point below its average in the late 2010s. These supply shocks helped to reduce inflation.

But the evidence we provided to show the dominant role of strong demand in pushing up inflation also shows that restraint of aggregate demand was probably the biggest factor bringing down inflation. If the aggregate supply curve is fairly steep only when product and labor markets are very tight, then significant disinflation does not require a massive drop in demand but only a drop sufficient to move the economy back to a flatter part of the supply curve. And, the restraint in demand that occurred was significant: The stimulus from the ARP and earlier rounds of expansionary fiscal policy was diminishing in late 2022 and beyond, and the Fed had implemented a decisive pivot in monetary policy earlier that year. Moreover, a broad easing of the demand-supply imbalance can be seen in a wide array of data—an increase in the unemployment rate, a striking drop in job openings to roughly their pre-pandemic mark, declines in core inflation and trimmed mean inflation shown in Figure 9a, a notable drop in the t-diffusion indexes for price changes shown in Figure 9b, and a slowing in compensation growth shown in Figure 10.

6. Lessons for Fiscal Stabilization Policy

Drawing on our analysis and other economic research, we see three principal lessons from the COVID experience for future fiscal stabilization policy in the United States.[25]

First, fiscal stimulus is a powerful tool for boosting demand for output and thereby reducing the human and economic costs of recessions, and it can be especially useful if monetary policy is constrained by the effective lower bound on interest rates.

The COVID-19 pandemic brought physical suffering and loss of life to the United States and countries around the world. The pandemic also caused a precipitous drop in economic activity and a spike in unemployment as many people adopted social distancing to reduce transmission of the disease. Policymakers responded by adopting a range of measures to protect public health and to support output and income. In the United States, sharply expansionary monetary and fiscal policy, along with an easing of pandemic fears, produced a boom in demand for goods and services in 2021.

By early 2022, US output and unemployment were back nearly to pre-pandemic expectations—a striking performance when compared with the slow recovery of many other advanced economies from the pandemic and the very slow US recovery from the Global Financial Crisis and Great Recession (during which the unemployment rate stayed above six percent for nearly seven years after the recession began). Indeed, the labor force participation rate rose above CBO's pre-pandemic projection in 2023 and 2024, as shown in Figure 11, implying that the strength of labor demand ultimately drew people into jobs as policymakers had sought, albeit more slowly than needed to contain wage pressures. More generally, abundant economic research shows that well-designed fiscal policies spur demand for output and workers *and* that supporting people's incomes during downturns and minimizing the depth and duration of labor-market weakness reduce the damaging consequences of downturns in the short and long runs.

Second, an increase in demand induced by fiscal stimulus may hit supply constraints that push up inflation, so weighing the risk and cost of higher inflation is important in calibrating fiscal stimulus.

Calibrating fiscal stimulus is very difficult. For example, the pandemic affected labor supply in ways that evolved over time—involving the pace of vaccinations, growing

[25] Our focus is on lessons for fiscal policymakers, but the COVID experience offers lessons for monetary policymakers as well. In particular, the strong effect of fiscal policy on aggregate demand and the inelastic nature of aggregate supply at high levels of resource utilization are directly relevant for the FOMC's decisions.

capabilities for remote work, and changing social mores—and that analysts had essentially no basis for estimating. As another example, the production problems with semiconductors were not anticipated—and might not recur in the same ways in the future, although those problems suggest that just-in-time global supply chains are intrinsically not very robust. And the spike in immigration, driven at least in part from the rapid US economic rebound, was not widely expected by economic forecasters but was large enough to significantly affect labor supply (and likely aggregate demand).

As policymakers balance the risks of providing too much or too little stimulus, they assess the social costs of inflation as well as the social costs of unemployment discussed earlier. Many economic models imply that inflation is not very costly, because increases in prices that are matched by increases in nominal incomes leave people with the same purchasing power. Indeed, for US workers, average real hourly compensation in the nonfarm business sector in the second quarter of 2024 was about 2¼ percent higher than in the fourth quarter of 2019. But survey evidence shows that many people view the inflation of recent years quite differently, perhaps due to variation in experiences across individuals depending on their income sources, consumption bundles, and balance sheets, or perhaps due to alternative perceptions of how nominal compensation is determined. And although inflation has fallen sharply, many households remain very unhappy about the higher price level.[26] Even if most people's views of inflation do not align with economists' views, the fact that inflation reduces many people's sense of well-being may be relevant for policymakers.

Third, because calibrating fiscal stimulus in an uncertain and evolving economy is so difficult, automatic triggers for providing and withdrawing additional stimulus could be valuable.

Aspects of law regarding taxes and government benefit programs lead to lower taxes and higher benefit payments when output and income decline. These "automatic stabilizers" play an important role in protecting people and supporting economic activity during downturns. However, the magnitude of this stabilization stems from policy decisions that focused on desired structural aspects of taxes and benefit programs rather than the desired amount of cyclical stabilization, and experience suggests that greater stabilization would be appropriate. Therefore, a number of analysts have proposed ways to augment the existing automatic stabilizers, and the COVID experience may encourage greater attention to those possibilities.[27]

[26] See Stantcheva (2024) and Binetti et al (2024).

[27] For example, see Boushey et al (2019) and Dynan and Elmendorf (2020).

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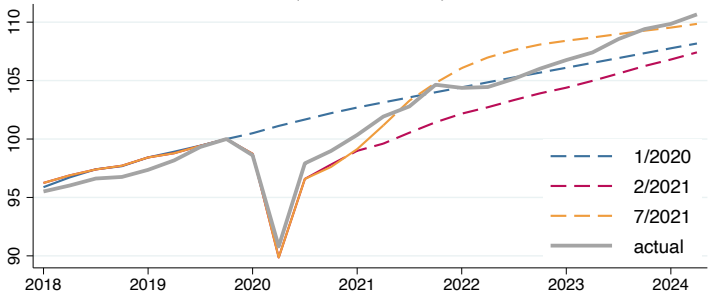
Appendix

This appendix presents selected vintages of projections from CBO, the FOMC, and the *WSJ* survey of private forecasters for four variables: inflation-adjusted GDP (Figure 12), the unemployment rate (Figure 13), inflation (Figure 14, as measured by the core PCE price index for CBO and the FOMC and by the CPI for the *WSJ* forecasts), and the federal funds rate (Figure 15).

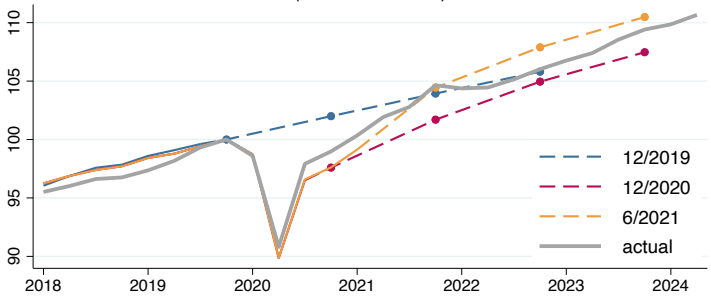
Figure 12
Selected Vintages of Real GDP Projections

(a) CBO Real GDP Projections
(2019:Q4 = 100)



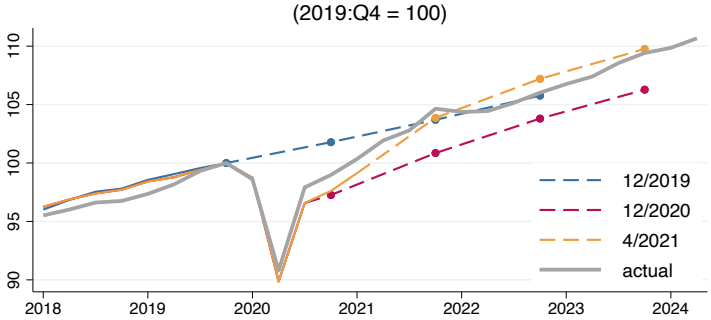
Quarterly average unemployment rate. Data source: Congressional Budget Office and Bureau of Economic Analysis (via FRED). Solid lines correspond to available history at time of projection; dashed lines start with quarter of projection publication.

(b) FOMC Median Real GDP Projections
(2019:Q4 = 100)



Data source: Bureau of Economic Analysis (via FRED and ALFRED), Federal Reserve Summary of Economic Projections, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the fourth quarter of each year.

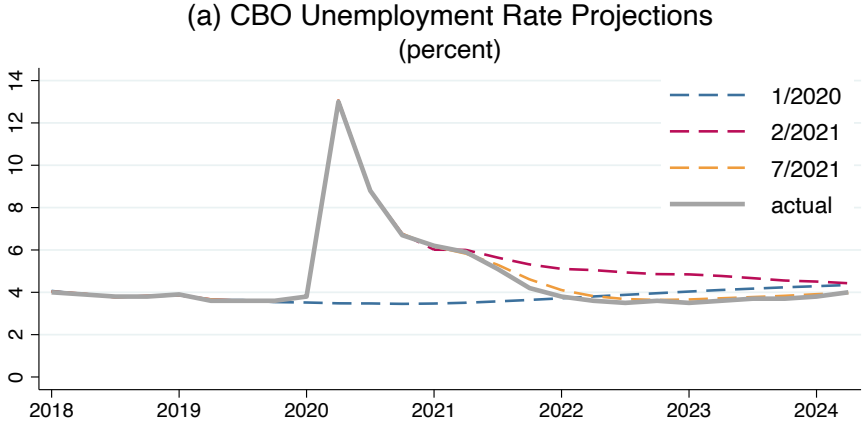
(c) WSJ Survey Median Real GDP Projections
(2019:Q4 = 100)



Data source: Bureau of Economic Analysis (via FRED and ALFRED), Wall Street Journal Economic Forecaster Survey, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the fourth quarter of each year.

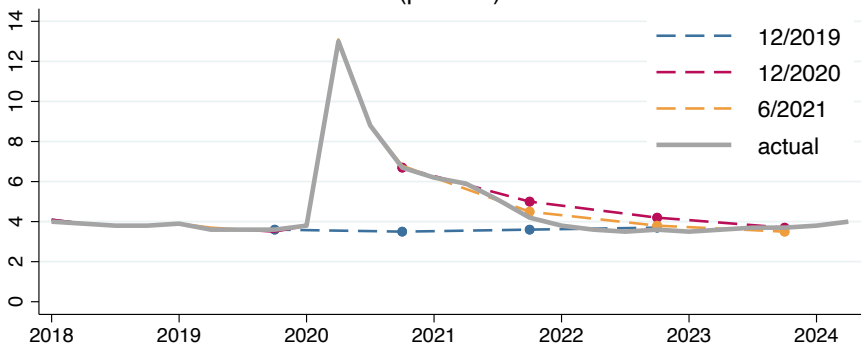
Figure 13
Selected Vintages of Unemployment Rate Projections

(a) CBO Unemployment Rate Projections



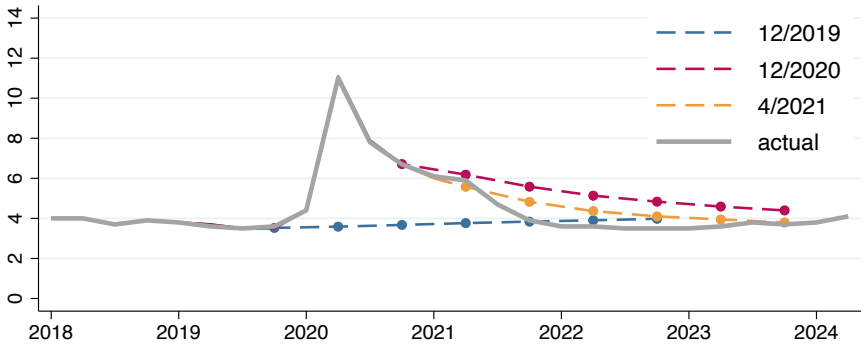
Quarterly average unemployment rate. Data source: Congressional Budget Office and Bureau of Labor Statistics (via FRED). Solid lines correspond to available history at time of projection. Dashed lines start with quarter of projection publication.

(b) FOMC Median Unemployment Rate Projections



Quarterly average unemployment rate. Data source: Bureau of Economic Analysis (via FRED and ALFRED), Federal Reserve Summary of Economic Projections, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the fourth quarter of each year.

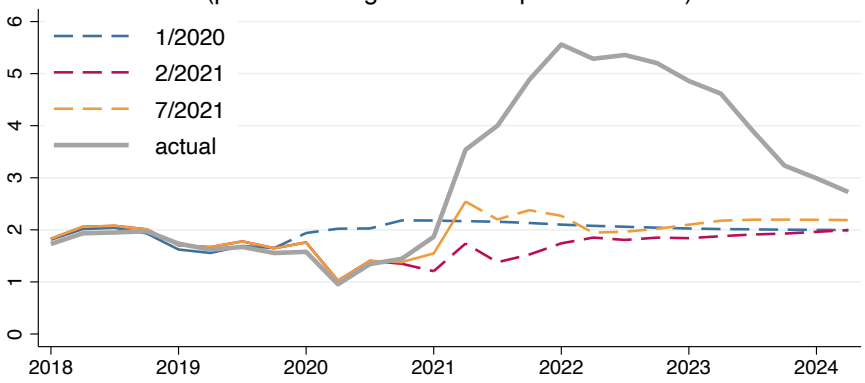
(c) WSJ Survey Median Unemployment Rate Projections



Unemployment rate for last month of quarter. Data source: Bureau of Labor Statistics (via FRED and ALFRED), Wall Street Journal Forecaster Survey, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the second and fourth quarters of each year.

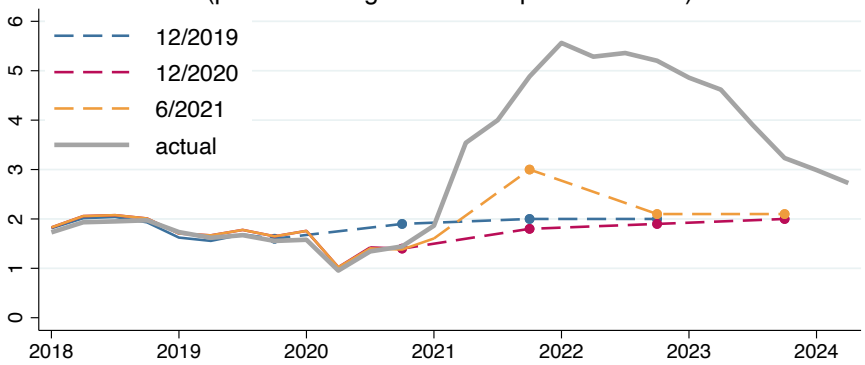
Figure 14
Selected Vintages of Inflation Projections

(a) CBO Core PCE Price Inflation Projections
(percent change from four quarters earlier)



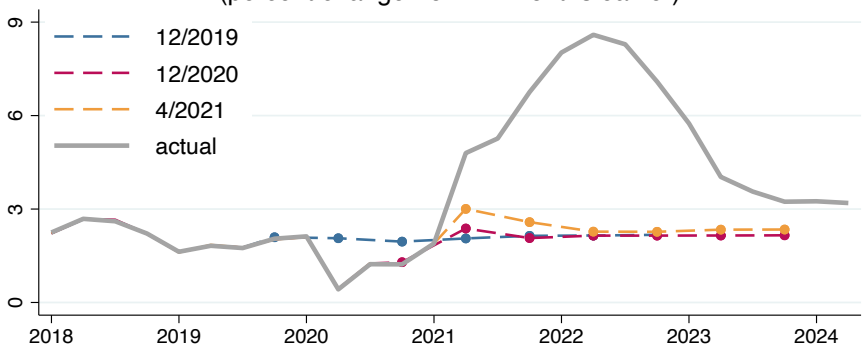
Data source: Congressional Budget Office and Bureau of Economic Analysis (via FRED). Solid lines correspond to available history at time of projection. Dashed lines start with quarter of projection publication.

(b) FOMC Median Core PCE Inflation Projections
(percent change from four quarters earlier)



Data source: Bureau of Economic Analysis (via FRED and ALFRED), Federal Reserve Summary of Economic Projections, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the fourth quarter of each year.

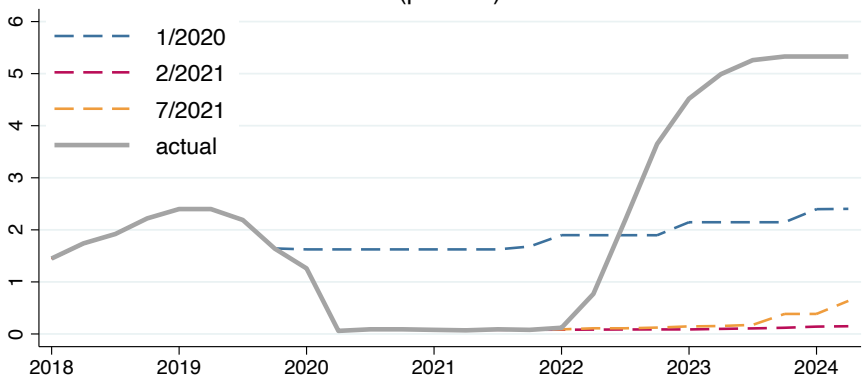
(c) WSJ Survey Median CPI Inflation Projections
(percent change from 12 months earlier)



Quarterly data corresponding to final month of quarter. Data source: Bureau of Labor Statistics (via (FRED and ALFRED), Wall Street Journal Forecaster Survey, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the fourth quarter of each year.

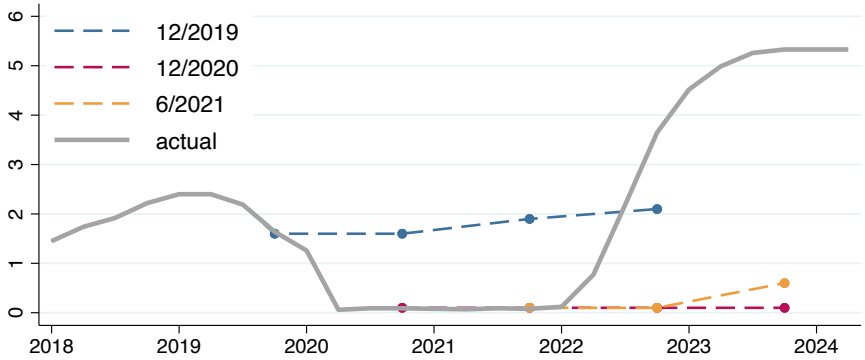
Figure 15
Selected Vintages of Federal Funds Rate Projections

(a) CBO Federal Funds Rate Projections
(percent)



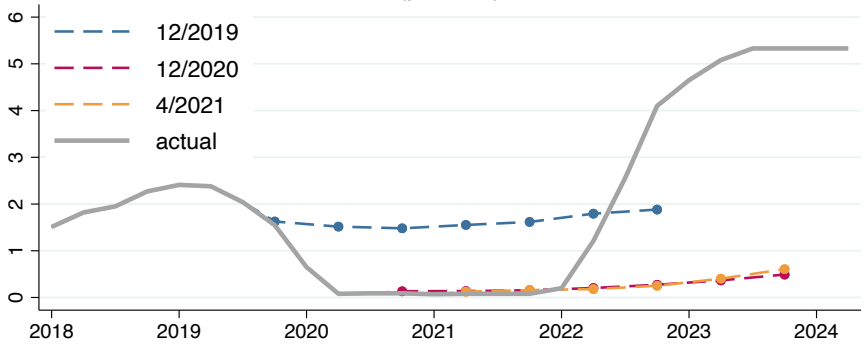
Data source: Congressional Budget Office and Federal Reserve Board (via FRED). Solid lines correspond to available history at time of projection; Dashed lines start with quarter of projection publication.

(b) FOMC Median Federal Funds Rate Projections
(percent)



Data source: Federal Reserve (via FRED and ALFRED), Federal Reserve Summary of Economic Projections, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the fourth quarter of each year.

(c) WSJ Survey Median Federal Funds Rate Projections
(percent)



Quarterly data corresponding to final month of quarter. Data source: Federal Reserve (via FRED and ALFRED), Wall Street Journal Forecaster Survey, and authors' calculations. Solid lines correspond to available history at time of projection; dashed lines connect the last point of history with the dots for the second and fourth quarters of each year.

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