



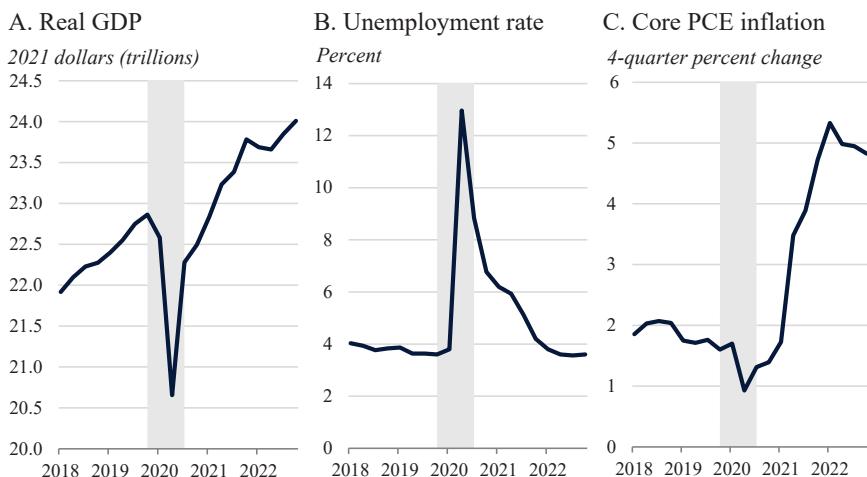
Chapter 2

The Year in Review and the Years Ahead

The U.S. economy in 2022 continued to navigate an unprecedented global pandemic, and weathered an additional price shock to energy and food caused by Russia's unprovoked invasion of Ukraine. Despite these and other challenges, the economy remained resilient with moderate output growth, strong employment growth, and inflation that peaked and then started to moderate late in the year (figure 2-1). In the face of supply constraints and changes in the composition of demand, the primary goal of fiscal and monetary policy in 2022 was to restore balance to supply and demand, fight inflation, and return the economy to a path of stable, steady growth.

Russia's invasion of Ukraine in February created acute supply constraints to energy, food, and other commodities that raised inflation globally. In

Figure 2-1. The U.S. Economy, 2018-22



Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; CEA calculations.

Note: Nominal GDP was converted to 2021 dollars using the GDP Price Index. PCE = Personal Consumption Expenditures Price Index. Core PCE inflation excludes volatile food and energy inflation. All values are seasonally adjusted.

addition, in the first half of the year, the COVID-19 virus continued to weigh on economies across the world—in the same ways, if to a different extent, as it had in 2021 (Chetty et al. 2022)—especially when its Omicron variant caused cases and fatalities to surge in the United States and abroad. Due to pandemic-related disruptions, global supply chains were stressed. To support the U.S. economy, the Federal Reserve kept the target range for the Federal Funds Rate near zero until March. Although the majority of direct household relief funds from the CARES Act, the American Rescue Plan, and related legislation had been dispersed by the end of 2021, many of these funds had not been spent by households, and Americans entered 2022 with historically elevated savings.

Recessions can leave lasting scars, but thanks to the fiscal and monetary support provided in 2020 and 2021, the United States' real gross domestic product (GDP) in 2022 was close to what it had been forecasted before the pandemic (CBO 2019) to be in 2022. After muted growth for much of the previous two years, growth in real consumer spending on services was particularly strong during the four quarters of 2022, as spending patterns started to return to normal. By most measures, the labor market was extraordinarily tight in 2022, creating some of the most favorable conditions for job seekers in decades.

As this chapter shows, the government's comprehensive response to the pandemic helped achieve the solid positive outcomes of 2022. At the same time, the combination and interaction of numerous factors exacerbated the elevated inflation. Although it is difficult to determine the relative importance of each factor, the pandemic, and responses to it, had substantial effects on both the supply and demand sides of the economy. Specific factors of note include pandemic-induced supply disruptions, shifts in consumer demand, the accumulation of excess savings, and stimulative fiscal and monetary support throughout 2020 and 2021.

In 2022, monetary policy turned to fighting inflation and fiscal policy focused on strategies to complement that fight, while also working to guide the economy to stable and steady growth, in 2022 and in the future. Even before the year began, government spending and deficits fell closer to pre-pandemic trends. In March, the Federal Reserve began to reverse its asset purchase program and started what became a swift series of interest rate hikes; stock markets and residential investment declined quickly. President Biden authorized a drawdown of the Strategic Petroleum Reserve to lower gasoline prices after Russia's invasion of Ukraine. In July and August, major pieces of legislation were passed to boost the economy's long-term supply side. Some measures of labor market tightness and inflation began to moderate, with inflation showing an easing at the end of the year. The fight against inflation is expected to continue into 2023, resulting in a near-term outlook of below-trend GDP growth, a modestly rising unemployment rate, and falling inflation.

This chapter begins with a review of the economy in 2022, first examining the recovery of GDP and its subcomponents, and then summarizing the conditions of labor markets and financial markets. Next, the chapter describes inflation in 2022, discussing possible causes along with the government's response. Finally, the chapter presents the forecast underpinning the President's Fiscal Year 2024 Budget and summaries of the near-term and long-term outlooks.

The Year in Review: The Continuing Recovery

This section summarizes the U.S. economy in 2022. By many measures, the economy had recovered from the recession induced by the COVID-19-pandemic by the end of 2022; by a few measures, the economy had not. For example, real GDP was near the level it would have been if it had continued to grow at its average 2010–19 pace from its prepandemic peak in 2019:Q4. The unemployment rate was near its prepandemic low for most of the year, and other labor market indicators showed more tightness than they had in 2019:Q4. On average, wages adjusted for inflation declined over the year, though they saw growth in the second half. The stock market started the

year at a record high, but fell over the year, partly due to rising inflation and tighter monetary policy. By most measures, and especially compared with recoveries from previous recessions, the economy in 2022 was healthy.

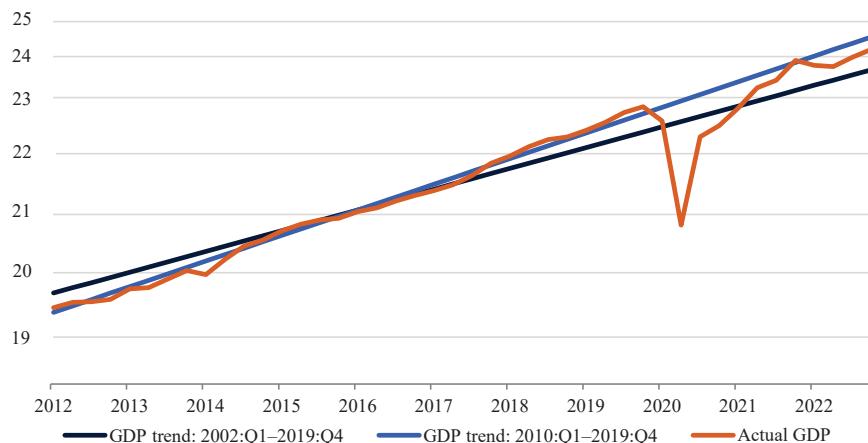
Output in 2022: A Return to Near Its Trend

Real GDP grew by 0.9 percent during the four quarters of 2022, a deceleration from its 5.7 percent pace during 2021. After a rapid decline in 2020 and a large bounce-back in 2021, the level of GDP in 2022 was roughly at its prepandemic trend. But GDP growth in 2022 was uneven, negative in the first half and positive in the second half. Some components increased and others contracted, reflecting the ongoing adjustment back to “normal” and away from the atypical spending and investment patterns seen over the past three years.

As shown in figure 2-2, real GDP in 2022 had rebounded to a level that was at or above a log-linear trend extrapolated from preceding years of GDP growth, an important achievement. In some previous economic cycles, including the recovery from the Great Recession of 2007–9, the economy took much longer to return to its extrapolated trend, meaning that workers and consumers suffered negative consequences for a longer period. (See figure 2-3, panel H, for a comparison of this recovery with other recoveries.) The longer-run trend level of GDP is a simple estimate of what is sometimes called potential GDP, which is a measure of what the economy can produce at full capacity at a particular point in time. Recessions can cause output to

Figure 2-2. GDP and Trend GDP, 2012–22

2021 dollars (trillions, log scale)



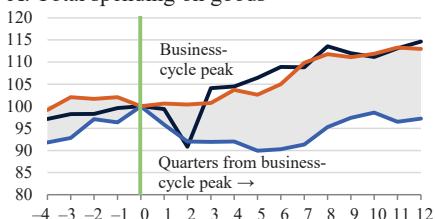
Sources: Bureau of Economic Analysis; CEA calculations.

Note: GDP trend lines were calculated by regressing the log of real GDP on time for the specified intervals, and plotting predicted values from that regression. Nominal GDP was converted to 2021 dollars using the GDP Price Index. All values are seasonally adjusted.

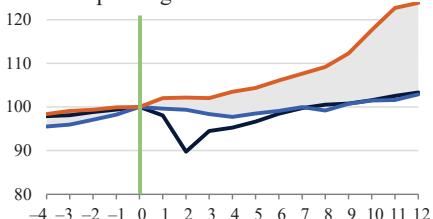
Figure 2-3. The 2019–22 Period Compared with Previous Business Cycles

Index = 100 at business-cycle peak; 2019–22 cycle peak is 2019:Q4

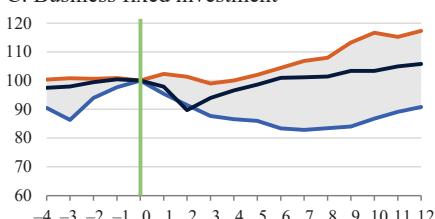
A. Total spending on goods



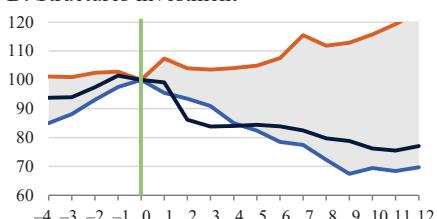
B. Total spending on services



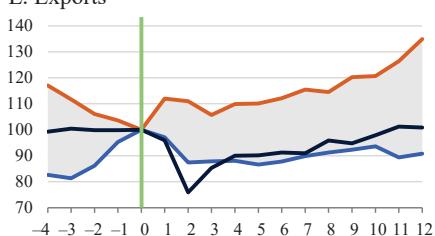
C. Business fixed investment



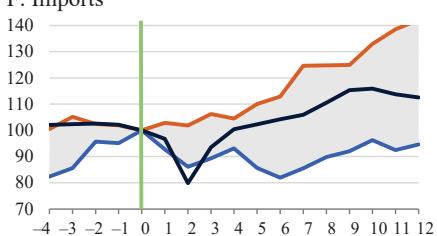
D. Structures investment



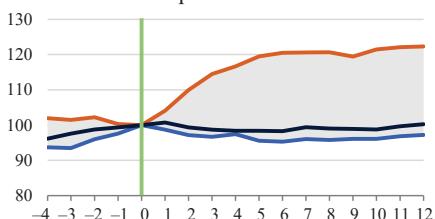
E. Exports



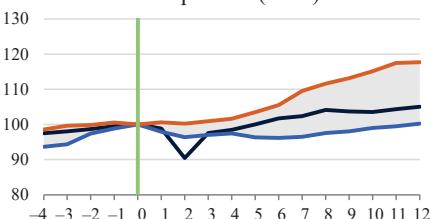
F. Imports



G. State and local purchases



H. Gross domestic product (GDP)



— Minimum of previous cycles — Maximum of previous cycles — 2019–22 cycle

Sources: Bureau of Economic Analysis; CEA calculations.

Note: Panels A and B include spending on goods and services by consumers, businesses, government, and as part of international trade, as defined in table 1.2.6 in the “National Income and Product Accounts.” Panel D includes business, residential, and government structures investment, also from table 1.2.6. All values are seasonally adjusted.

run below its trend, which may be followed by faster growth that returns the level of output toward its trend. Growth can also be so fast that the level of output rises above its trend, a situation that may lead to high inflation as aggregate demand outstrips the capacity of the economy to produce the desired level of goods and services; this is often referred to as an overheated economy. Usually, high inflation provokes a policy response—for example,

an interest rate hike by the Federal Reserve—that cools the economy and returns output to its trend.¹

Estimating the trend of GDP is not straightforward. Figure 2-2 plots two log-linear trend lines estimated over different intervals. The longer estimation interval suggests that the United States' output was above its trend in 2022, while the shorter one suggests that output was below it. Many other measures suggest the economy was running above its trend in 2022, including signals of tight labor markets, the elevated inflation rate and the growth of consumption without corresponding growth in investment or imports. Further, given the turmoil associated with the pandemic—lower labor force participation, demand shifts for specific skilled labor categories, and population movement—and the elevated inflation rate, there is ample reason to expect that the productive capacity of the economy was temporarily below its usual position in 2022. The position of the economy matters for the interpretation of growth in 2022, and has implications for the near-term economic outlook. If GDP was above trend, the slowdown of growth in 2022, influenced by the Federal Reserve's rate hikes, would mean the economy was returning to its trend, and may also presage continued slow growth in the near term.

To illustrate the strength of the economic recovery in 2021 and 2022 relative to previous recoveries, figure 2-3 consists of eight “butterfly charts” that plot the evolution of various components of real GDP before and after the 12 post–World War II business-cycle peaks in the United States, as determined by the National Bureau of Economic Research. To construct these charts, each highlighted component of GDP was normalized to equal 100 in the quarter at the peak of each business cycle. The orange lines in the figure show the maximum paths of each component during the 11 business cycles before the current cycle; the light blue lines show the minimum paths; and the gray areas show the range of historical variation. The dark blue lines plot the postpandemic recession recovery. If, to the right of the green vertical line, a dark blue line is closer to an orange line than to a light blue line, this means that, relative to previous recessions, the recovery was stronger for that component.

As can be seen in panel A of figure 2-3, the cumulative growth of real spending on all goods since the previous business cycle peak in 2019:Q4 through 2022 was at the top of historical experience. Conversely, in panel B of figure 2-3, real spending on all services was far below the range of historical experience at the end 2021, and growth through 2022 was only enough for it to recover to the lower historical bound by the end of 2022. As shown in panels C and D of figure 2-3, though real business fixed investment remained at the middle of its historical range, real investment in residential

¹ While higher GDP is generally beneficial, high inflation poses costs to the economy. It is these costs that the policy responses seek to avoid.

Table 2-1. Real GDP Growth and Its Components, 2022

| Component | Q4/Q4 Growth (percent) (1) | Contribution to Q4/Q4 GDP Growth (percentage points) (2) | Contribution to the Deviation of 2022:Q4 GDP from Its Trend (percentage points) (3) |
|-------------------------------|-------------------------------|---|---|
| Total | 0.9 | 0.9 | -1.1 |
| Consumer spending | 1.8 | 1.2 | 0.5 |
| Goods | -0.9 | -0.2 | 0.9 |
| Durables | 0.5 | 0.0 | 0.3 |
| Motor vehicles and parts | -1.5 | 0.0 | -0.3 |
| Nondurables | -1.7 | -0.3 | 0.5 |
| Services | 3.2 | 1.4 | -0.4 |
| Investment | -4.0 | -0.7 | -2.3 |
| Business fixed investment | 4.3 | 0.6 | -1.4 |
| Nonresidential equipment | 4.0 | 0.2 | -0.8 |
| Nonresidential structures | -3.3 | -0.1 | -0.9 |
| Intellectual property | 8.5 | 0.4 | 0.4 |
| Housing investment | -19.0 | -0.9 | -1.1 |
| Change in private inventories | - | -0.4 | - |
| Net exports | - | 0.3 | - |
| Exports | 5.2 | 0.6 | -1.1 |
| Imports | 1.8 | -0.3 | -0.3 |
| Government | 0.8 | 0.1 | 1.3 |
| Federal | 0.1 | 0.0 | 1.2 |
| Defense | -0.2 | 0.0 | 0.6 |
| Nondefense | 0.5 | 0.0 | 0.5 |
| State and local | 1.3 | 0.1 | 0.2 |

Sources: Bureau of Economic Analysis; CEA calculations.

Note: Column 2 lists the contribution of each component to the annual rate of growth of real GDP. These may not precisely sum to totals because of approximations to the formulas used in the National Income and Product Accounts. Column 3 shows that that GDP was 1.1 percent below prepandemic trend in 2022:Q4 and how much each component of GDP contributed, negatively or positively, to this deviation from trend. It was calculated by regressing the log of each real GDP component on time from 2010 to 2019, calculating the percent difference of the 2022:Q4 level predicted by that regression from the actual 2022:Q4 level of each component, and multiplying by the importance of that component to overall GDP (the average of the 2019:Q4 and 2022:Q4 ratios of that nominal component of GDP to total nominal GDP).

and other structures fell in 2022, and its recovery has remained near the bottom of its historical range.

Table 2-1 breaks down real GDP growth into its subcomponents. The first column lists the four-quarter growth rate for each component over 2022. The second column lists the contributions of each category to overall real GDP growth over those quarters. Contributions can be negative or positive. For example, because real exports grew 5.2 percent during the four quarters of the year and constituted about 11.7 percent of GDP, its contribution to real GDP growth was 0.6 percentage point. The first row of the third column compares the 2022:Q4 level of real GDP with what it would have been if it had followed its 2010–19 log-linear trend (the light blue line in figure 2-2); all other rows show the approximate contribution of that real GDP

component to this deviation. The major sectors that grew noticeably faster than overall GDP in 2022 include consumer spending on services, equipment investment, intellectual property investment, and exports. Imports also experienced relatively fast growth, but these reduce GDP. Expenditure categories that grew slower than overall GDP include consumer spending on goods, nonresidential and residential investment, Federal Government purchases, and inventory investment. State and local expenditures grew, but only slowly.

Consumer spending. The nominal goods-to-services consumer spending ratio—which had been in a long-term decline—increased during 2020 and 2021, reaching its highest level since 2006. Real consumer spending on services fell sharply when the pandemic hit, as in-person activities such as dining out and traveling became more difficult. In contrast, real goods spending, after initially falling during the first two pandemic quarters, rebounded and spiked above its prepandemic level, as people stuck at home spent a larger share of their total real consumption on goods like furniture, appliances, and sporting equipment and a smaller share on services.

During 2022, the goods-to-services spending ratio started to normalize; real goods spending fell 0.9 percent during the four quarters of 2022, while real consumer services spending grew 3.2 percent. Even so, this ratio remained well above prepandemic norms. Overall, real consumer spending grew modestly during the four quarters of 2022, at a 1.8 percent annual rate, with all of that growth accounted for by services.

Investment. Real business fixed investment increased 4.3 percent during the four quarters of 2022, continuing its steady recovery from its pandemic-induced low. Investment growth was particularly strong in intellectual property, as it has been for the last decade. But investment by businesses in structures fell 3.3 percent during the four quarters of the year, with declines in investment in commercial and health care structures and power and communication structures. Investment increased in manufacturing and petroleum and natural gas mining structures.

Increases in business fixed investment were offset by declines in fixed investment in residential and other structures, as the housing market cooled due to the rise in mortgage rates associated with the Federal Reserve's tightening cycle. Both business fixed investment and fixed investment in residential and other structures were below their prepandemic trends. Overall, spending on structures was near the lower end of the business-cycle range, as shown in panel D of figure 2-3.

Some of the slowing GDP growth in 2022—which followed strong growth in 2021—was accounted for by inventory investment. The overall real inventory-to-sales ratio shrank to the lowest on record in 2021:Q2, as firms fought supply chain bottlenecks and then began to rapidly recover, with inventory investment at high levels in 2021:Q4 and 2022:Q1. The

stock of real inventories continued to grow strongly in 2022, but because inventory investment was lower in 2022:Q2 and 2022:Q3 than in 2022:Q1, inventory investment subtracted from real GDP growth in those quarters and over the four quarters of the year.

Government spending. The Federal Government's real purchases (expenditures and gross investment) edged up slightly, by 0.1 percent, during the four quarters of 2022. Most of the surge in Federal spending that had supported households, businesses, and State and local governments in 2020 and 2021 consisted of transfers and subsidies that are not directly part of GDP; while these transfers and subsidies fell, purchases were little changed. Defense expenditures and gross investment barely changed during the four quarters of the year, while nondefense purchases edged up. State and local government purchases increased slowly, by 1.3 percent, during the four quarters of the year. Relative to the average cyclical response, State and local purchases were near the lower end of the business-cycle range, as shown in panel G of figure 2-3.

Imports and exports. Finally, real exports grew faster than overall GDP during the four quarters of 2022, growing by 5.2 percent at an annual rate, reflecting the continued reopening of the world economy. Although real imports grew more slowly than real exports during the four quarters of the year, at 1.8 percent, that import pace exceeded the growth of real GDP by 0.9 percentage point. Due to the stronger growth in real exports relative to imports, real net exports partially recovered from their pandemic-induced decline in 2022, contributing 0.3 percentage point to overall real GDP growth. (See chapter 3 of this *Report* for an in-depth discussion of international trade and investment in 2022.)

The Historic Strength of Labor Markets in 2022

Labor markets were very tight in 2022, as the strong economy led firms to continue to hire workers after pandemic-induced layoffs and hiring pauses. At the end of the year, the unemployment rate was 3.5 percent, matching the lowest rate—tied with September 2019 and prepandemic 2020—since 1969. Other labor market measures also showed a historically high degree of tightness, including the ratio of job openings per unemployed person, shown in figure 2-4, and the quit rate, considered by some to be the best measure of labor market tightness (Furman and Powell 2021), which reached at least a 20-year high at the end of 2021 and remained elevated through 2022.

Figure 2-4 shows the ratio of total job openings divided by the total number of unemployed people. During recessions, this measure tends to fall, as firms slow hiring, reduce job openings, and lay off workers, and it plummeted in 2020. By April 2022, however, the measure had climbed to the highest level on record, indicating that the labor market was unusually

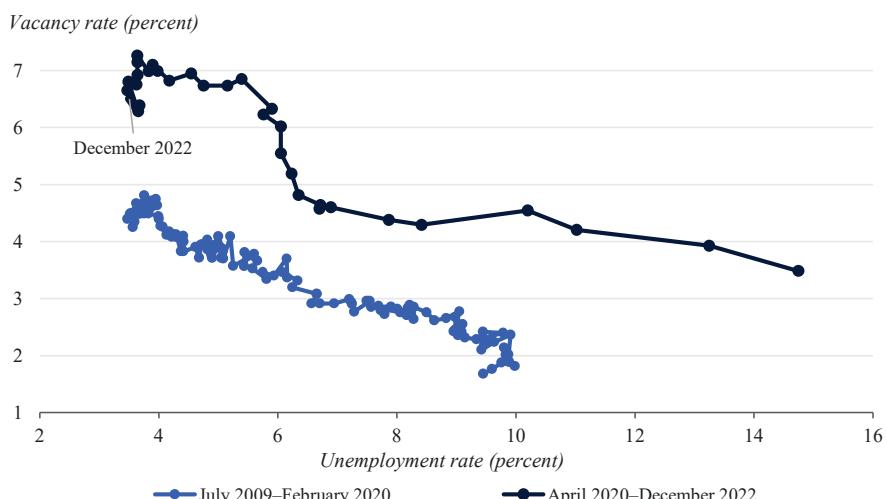
Figure 2-4. Job Openings per Unemployed Person, 2000-2022



Sources: Bureau of Labor Statistics; CEA calculations.

Note: All values are seasonally adjusted.

Figure 2-5. The Beveridge Curve at Two Intervals



Sources: Bureau of Labor Statistics, CEA calculations.

Note: All values are seasonally adjusted.

tight. In the second half of the year, job openings decreased and the number of unemployed persons increased slightly.

Figure 2-5 shows another view of the labor market: the Beveridge curve, the relationship between the unemployment rate and the percentage of job openings relative to labor demand, known as the “vacancy rate.”⁷² The

⁷² Labor demand equals job openings plus employment.

Beveridge curve during the pandemic-recession recovery, represented by the dark blue dots, shifted up and out, possibly due to increased pandemic-related difficulties in hiring and retaining workers. All the months of 2022 are located in the upper-left-hand corner of the figure, where vacancy rates are high and unemployment rates are low, indicating that labor markets were tight and that labor demand was high relative to labor supply.

Economists disagree about how much of this labor market tightness was due to a shortage in the supply of workers versus an excess demand for workers. On the demand side, the high aggregate demand described later in this chapter led to an increased demand for workers by businesses. There are a range of potential supply-side factors, which are discussed in chapter 6 of this *Report*.

The Cooling of Financial Markets in 2022

The stock market recovered quickly from large declines during the COVID-19 pandemic, reaching a new peak at the end of 2021. In early 2022, as inflation rose and the Federal Reserve began hiking the Federal Funds Rate to cool off the economy, stock prices declined. The losses in 2022 reversed only part of the gains made during the previous two years (figure 2-6).

Along with stock prices, bond prices also fell.³ The price of 10-Year Treasury Notes, which moves inversely to the yield, began the year near historical highs but ended the year quite a bit lower, likely due in part to upward revisions in market expectations for the future path of inflation and associated revisions in market participants' expectations for the path of the Federal Funds Rate.⁴

From near the beginning of the COVID-19 pandemic to the end of 2022, the correlation between changes in stock prices and long-term bond prices was reversed from its previous sign. From 2000 until the beginning of the COVID-19 pandemic in 2020, the correlation between changes in stock prices and bond prices was generally negative (Rankin and Idil 2014). During this 20-year period, the Federal Reserve lowered the Federal Funds Rate, increasing bond prices. These increases were primarily in response to negative aggregate demand shocks, which drove down stock prices, as during a typical recession.

As shown in figure 2-6, the pandemic-induced recession fit this pattern in early 2020: stock prices fell and bond prices rose. In contrast, in 2022 inflation led the Federal Reserve to raise the Federal Funds Rate, causing both stock and bond prices to decline. This relationship can be seen in

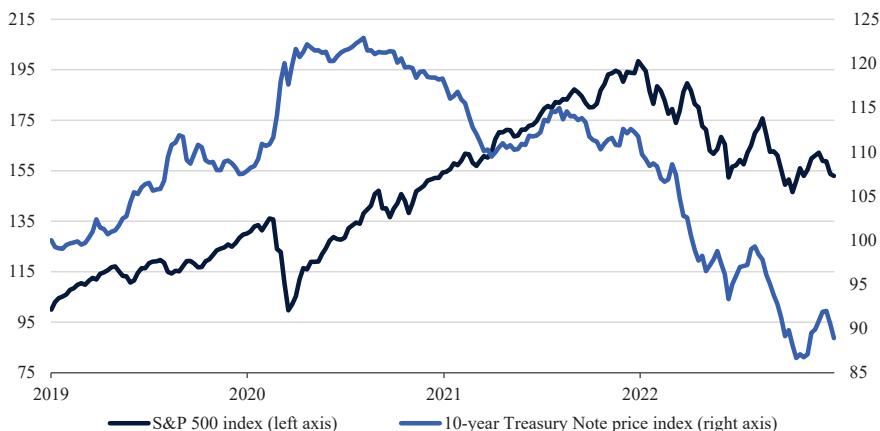
³ Bond prices, rather than bond yields, are discussed here in order to simplify the comparison with stock prices. The spot price of the 10-Year Treasury Note is calculated from the market yield, assuming no coupons.

⁴ A complete description of the drivers of changes in the interest rate on 10-Year Treasury Notes is beyond the scope of this chapter; see Stigum and Crescenzi (2007).

Figure 2-6. Stock Market and Bond Prices, 2019–22

Index; January 2019 = 100

Index; January 2019 = 100



Sources: Federal Reserve System; Standard & Poor's (S&P).

Note: The prices of 0 coupon 10-Year Treasury Notes are shown relative to January 2019.

figure 2-6, starting slightly before the tightening cycle began, possibly due to markets anticipating monetary actions. The change in the sign of this correlation after the start of the pandemic suggests that negative supply shocks were important for U.S. financial markets in 2022; these shocks moved the price level higher and output lower—thus hurting stock prices—and led to increasing interest rates, thus hurting bond prices.

Inflation in 2022

Beyond the developments summarized above in discussing output growth, the historically strong U.S. labor market, and financial markets, the rise of inflation in 2021 and its continued elevation through 2022, exacerbated by Russia's invasion of Ukraine, were important aspects of 2022's overall economic picture. For most of the 2010–19 period, the rate of inflation was below the Federal Reserve's long-term 2 percent target. Then the COVID-19 pandemic hit the United States in early 2020. Prices fell briefly in the spring of 2020, when the pandemic initially struck, interrupting many forms of economic activity; but prices, and the economy, quickly recovered.

Inflation began to climb in 2021. Although, at the end of 2021, many forecasters predicted that inflation would quickly fall, inflation instead persisted in 2022.⁵ The year 2022 was one of historically elevated inflation, but it was also a year that saw many actions taken to bring that elevated inflation

⁵ E.g., the 2022:Q1 annualized CPI inflation rate predicted by the December 2021 Blue Chip consensus was 3.3 percent, close to the Federal Reserve's target and much lower than the actual quarterly inflation rate of 9.2 percent.

Box 2-1. Measures of Consumer Price Inflation

Inflation can be challenging to precisely define and measure. This box describes what inflation is not and what it is, how the government measures inflation, and what information key inflation measures provide.

Defining inflation. Inflation can be tricky to talk about. First, inflation is the rate of change of the price level, not the level of prices. High inflation means that prices are rising rapidly, not that prices are high. Second, increases in the prices of specific goods and services do not always reflect inflation. Due to changes in *relative* demand and supply, prices for specific goods and services rise and fall *relative* to each other all the time. For example, during the COVID-19 pandemic, demand for television sets rose, and their prices increased. Concurrently, demand for airline tickets fell, along with their prices. Price indices—such as the Consumer Price Index (CPI) and the Personal Consumption Expenditures (PCE) Price Index, which are discussed below—aggregate prices in the economy in an attempt to measure the price level. Inflation is a positive rate of change in the price level.

Measuring inflation. Measuring the price level, and therefore inflation, is a difficult task. This chapter frequently references two measures that approximate the level of prices faced by consumers: the CPI, produced by the Bureau of Labor Statistics (BLS); and the PCE Price Index, produced by the Bureau of Economic Analysis (BEA).

(The main text refers exclusively to the CPI-U, which follows the market basket of urban consumers. The description “urban” refers to anyone not living in extremely rural areas, and covers about 90 percent of the U.S. population. The BLS also supports several other versions of the CPI. The CPI-W follows the market basket of wage earners; the CPI-E follows the market basket of the elderly; and the chain CPI follows the same consumers as the CPI-U, but it aggregates with a formula that allows for more substitution.)

The CPI measures the prices of a fixed basket of consumer goods and services (BLS 2020). The basket, which was updated every two years from 2002 to 2022 and will be updated every year in the future, approximates the average consumption of a household as surveyed in the annual Consumer Expenditure Survey. The assumption of a fixed consumption basket makes comparing the prices of the same goods and services across time relatively easy, but it can misrepresent the rate of price changes households actually face (or experience) if households change what they consume when prices change. For instance, if the price of oranges falls relative to the price of apples, consumers will usually buy more oranges and fewer apples. The PCE Price Index, in contrast to the CPI, uses a formula that allows for such substitution. Further, while the CPI focuses on out-of-pocket expenditures, the PCE Price Index captures a wider range of consumer costs—including, for example, employer-provided health insurance. Largely because the PCE Price Index allows for more substitution (but also due to other differences),

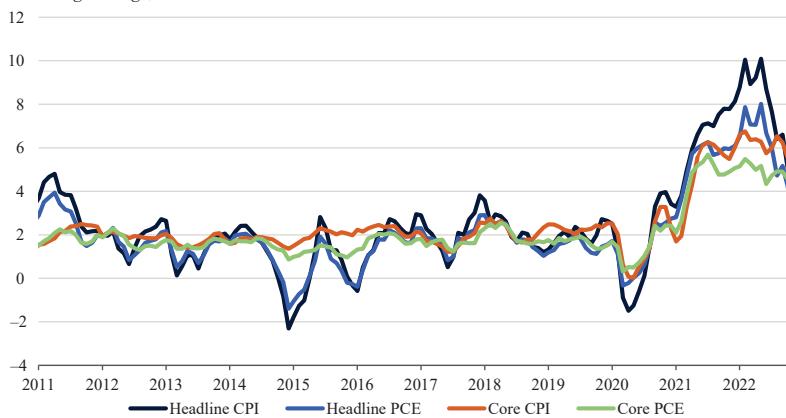
the 12-month change in the PCE Price Index has averaged 35 basis points less than the corresponding change in the CPI for the last 20 years.

Headline inflation versus core inflation. Economists and policymakers focus on price indices that exclude goods and services with volatile prices, such as food and energy, in order to get a better sense of persistent movements in inflation (Gordon 1975). Food and energy prices are erratic largely because they are influenced by weather and international commodity markets, and therefore can move independently from the other goods and services whose prices are determined domestically to a greater extent. The *core* CPI and the *core* PCE Price Index exclude food and energy, whereas the corresponding *headline* CPI and *headline* PCE Price Index include food and energy. Of course, because consumers buy food and energy, headline inflation measures better reflect the costs consumers actually face.

Monthly versus yearly inflation. Each month, the BLS and BEA update the CPI and the PCE Price Index, respectively, and the month-over-month percent change in each price level. They also report 12-month percent changes, which are substantially less volatile because they accumulate month-over-month percent changes over 12 months. Measures of annualized 3-month or 6-month inflation—the 3-month or 6-month percent change mathematically adjusted to be comparable to 12-month, or yearly, rates—can also be calculated from the raw price indices. These measures are less volatile than monthly inflation but are more timely than yearly inflation. Figure 2-i plots annualized 6-month inflation for four price indices: the headline CPI, the core CPI, the headline PCE Price Index, and the core PCE Price Index. All four inflation indices began to increase in 2021 but turned downward in the second half of 2022.

Figure 2-i. Types of Consumer Price Inflation, 2011–22

Percentage change, 6-month annualized

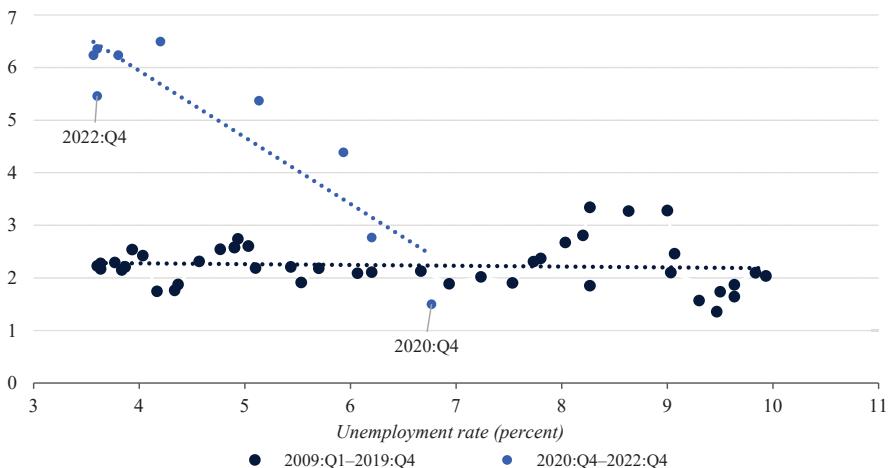


Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; CEA calculations.

Note: All values seasonally adjusted.

Figure 2-7. The Expectations-Augmented Phillips Curve at Two Intervals

3-month annualized core CPI inflation (percent), controlling for expected inflation (see note)



Sources: Bureau of Labor Statistics; Federal Reserve Bank of Philadelphia.

Note: CPI = Consumer Price Index. The y axis shows a measure of the actual rate of inflation minus the difference between the expected rate of inflation and the long-term rate of inflation, or $\pi - (E[\pi] - \pi^*)$, where π = core CPI inflation, $E[\pi]$ = 1-year lagged median 1-year ahead core CPI inflation expectations from the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters, and π^* = the long-term (post-2000) average of core CPI inflation, 2.3 percent. Actual CPI inflation values are seasonally adjusted.

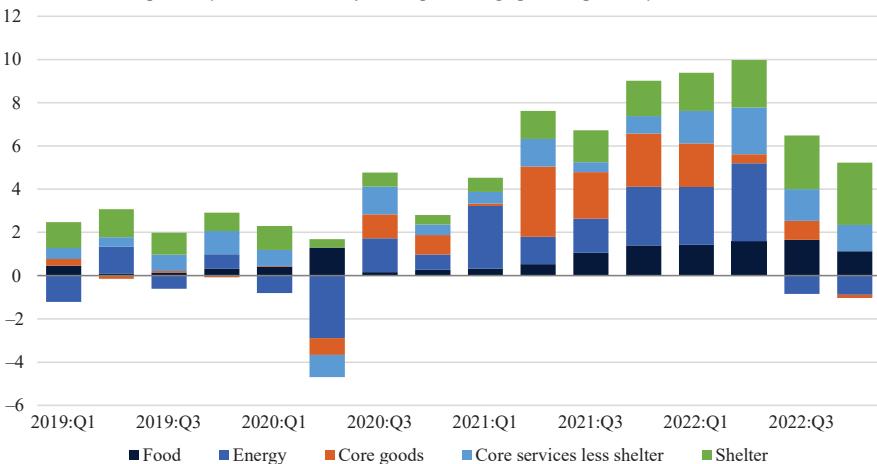
down. As discussed in box 2-1, there are many ways to measure inflation. One of the most common, the 12-month rate of change in the headline Consumer Price Index (CPI), peaked at 9.1 percent in June 2022—a pace not seen since 1981. The fight against inflation has not been an easy one, but progress has been made as of December 2022, when the 12-month rate of change in the headline CPI inflation was 2.6 percentage points lower than in June.

The unexpected nature of the inflation in 2021 and 2022 is exemplified by figure 2-7. The figure shows an estimate of the Phillips curve, the relationship between inflation, unemployment, and inflation expectations from 2009 until the last prepandemic quarter in 2019:Q4 (dark blue dots), and during the economic recovery from 2020:Q4 through 2022:Q4 (light blue dots). The light blue dots are substantially above the dark blue dots, indicating that inflation moved more strongly with unemployment during the economic recovery than in the previous economic expansion. Investigating why inflation responded so strongly, and the fiscal and monetary responses to it, occupies much of the rest of this chapter. (Also see box 2-2.)

Measures of inflation can be approximately decomposed into contributions from subcategories of goods and services. Figure 2-8 plots the decomposition of annualized three-month headline CPI inflation into five categories: food; energy; core goods, which exclude food and energy goods; shelter, which includes rent and “owners’ equivalent rent,” and core services

Figure 2-8. Decomposition of Inflation, 2019–22

Contributions to quarterly headline CPI inflation, percentage points, quarterly annualized rate



Source: Bureau of Labor Statistics.

Note: All values seasonally adjusted.

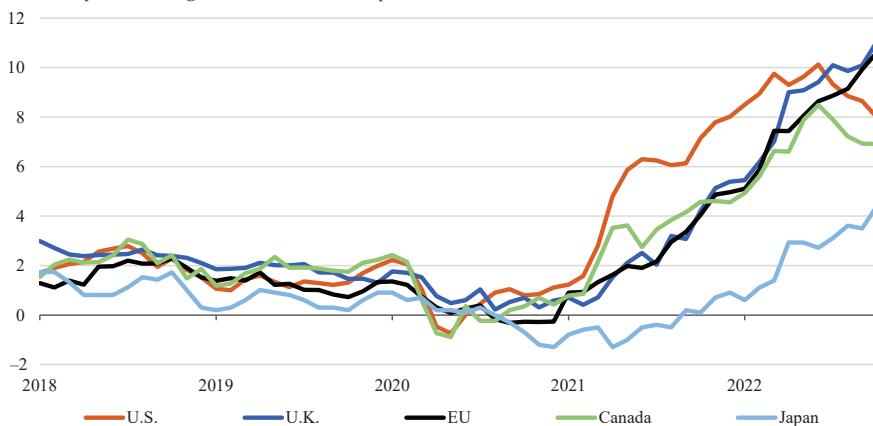
less shelter, which also excludes food and energy services. The figure shows that inflation during 2022 in the United States was broad-based, with each of the subcategories contributing substantially to overall inflation.

The timing of these contributions differs and tells an interesting story. In early 2021, the contribution of core goods inflation to overall inflation rose as consumer purchases rotated from services to goods during the pandemic, when supply chains snarled and productive capacity could not rise fast enough to match the rise in demand. As consumer behavior and supply chains both normalized in 2022, monthly core goods inflation declined and actually turned negative in late 2022. The contribution of food and energy inflation rose in 2021, and continued in 2022. Russia’s invasion of Ukraine in February 2022 increased pressure on global oil and agricultural commodity markets. Partly as a consequence, the contribution of food and energy to inflation rose both domestically and globally. Inflation in core services, which was the primary contributor to overall inflation in the decade before the pandemic, was only slightly above its prepandemic pace in 2021 but increased sharply in 2022.

The decomposition shown in figure 2-8 is informative, but it is only an accounting exercise: it does not explain the underlying economic factors that led one category to move relative to another. If one category “contributed” more than another in a certain quarter, it means that prices in that category were increasing *relative* to prices in the other category, not necessarily that price increases in that category were the underlying *cause* of inflation. For example, it is possible for headline CPI inflation to be 0.0 percent, with core

Figure 2-9. Global Measures of Consumer Price Inflation

12-month percent change in national consumer price indices



Sources: U.S. Bureau of Labor Statistics; U.K. Office for National Statistics; Eurostat; Japanese Ministry of Internal Affairs and Communications; Ministry of Statistics and Programme Implementation of India; Statistics Canada, CEA calculations.

Note: Measures are of headline consumer price inflation less owner-occupied housing (sometimes called the Harmonized Index of Consumer Prices).

goods inflation contributing negative 2.0 percent and core services inflation contributing positive 2.0 percent. The difference in goods and services inflation would mean that services prices were increasing relative to goods prices, not that either was causing inflation. In the next subsection, possible causes of U.S. inflation in 2022 are examined in detail.

High inflation in 2022 was not just a U.S. phenomenon, as shown in figure 2-9. In 2021, after years of relative stability, inflation began to climb across a number of countries. In the second half of 2022, inflation in the EU and the United Kingdom was higher than in the United States, partially reflecting the EU countries' and the United Kingdom's greater exposure to the war in Ukraine, and specifically the war's effect on energy prices. Inflation in some other countries, such as Japan, remained relatively low, though well above its prepandemic norm.

Factors That Had an Impact on Inflation in 2021–22

As discussed in box 2-2, the root causes of inflation are imperfectly understood, and economists use many theoretical frameworks to model and study it. Because the most common framework used to analyze inflation is aggregate supply and demand, this subsection first discusses what are generally thought of as “supply” factors and then examines what are generally thought of as “demand” factors. The role of expectations, a common theme in many inflation frameworks, is also discussed. Fiscal and monetary actions are both

Box 2-2. The Phillips Curve and Other Models of Inflation

Economists have spent much time and effort trying to explain and predict inflation, using a variety of methods and approaches. This box explains one common model, the Phillips curve; describes its recent history; and discusses each of its components—*inflation*; *economic tightness*, or “*slack*”; *inflation expectations*; and other factors—before briefly discussing theories of inflation that do not depend on a Phillips curve-type relationship.

The term “Phillips curve” is used to refer both to the empirical relationship between forms of inflation and measures of economic tightness or slack, used in the macroeconomic model developed by Klein and Goldberger (1955) and noted by Phillips (1958) (with regard to wage inflation and unemployment), and to the theoretical relationship between the two. Today, policymakers and forecasters often refer to the “expectations-augmented Phillips curve,” which recognizes that inflation expectations can influence inflation independently from measures of economic tightness or slack.

As shown in figure 2-7 in the main text, the empirical relationship between the unemployment rate, one measure of tightness, and Core CPI inflation can change drastically, even when controlling for inflation expectations. The Phillips curve appeared to have become “flat” in about 2000, as discussed in the 2016 edition of the *Economic Report of the President* (CEA 2016). More precisely, the coefficient on the unemployment rate was near zero (hence, the adjective flat). This flatness during the 2009–19 business-cycle expansion is shown by the dark blue dots in figure 2-7 and the accompanying flat dark blue dashed line. Elevated unemployment rates failed to lower inflation during the first half of this cycle, while the low unemployment rates during the second half of that cycle failed to increase inflation.

Viewed from the end of 2022, the Phillips curve has substantially changed, as the decline in the unemployment rate to near historic lows in 2022 coincided with the first major increase in U.S. inflation since the 1980s, as shown by the light blue dots in figure 2-7 and accompanying steeply sloped light blue dashed line. The increase in inflation during 2021 and 2022 was much larger than the consensus economic forecast, perhaps because most forecasters had come to believe in a flat Phillips curve anchored by stable inflation expectations (Federal Reserve Bank of Philadelphia 2020).

One of the important questions facing the economy in 2023 is whether the Phillips curve will remain steeply sloped as inflation continues to cool. If the Phillips curve remains steep, this implies that inflation may fall without much of an increase in the unemployment rate. A Phillips curve that returns to near its prepandemic slope would imply

that inflation may fall, but with a larger increase in the unemployment rate than in the second half of 2022.

Measures of inflation in the Phillips curve. As described in box 2-1, measures of inflation that include food and energy prices are volatile for reasons that have little to do with the domestic economy. Thus, core inflation measures, which exclude food and energy, fit better and are preferred for forecasting applications. Some practitioners use estimates of a deeper, more persistent, underlying inflation rate—as described or suggested by Ascari and Sbordone (2014), Yellen (2015), and Rudd (2020)—in order to enhance the fit and predictive power of the Phillips curve. Figure 2-7 uses annualized 3-month core CPI inflation.

(Simple estimates of this underlying inflation rate involve a menagerie of methods and measures, as discussed by Detmeister 2011. These measures include averaging across months of inflation data, using the inflation rate on specific categories of spending, such as the median CPI, from the Federal Reserve Bank of Cleveland 2023; and trimming categories that see the most and least inflation when calculating the inflation rate, such as the Trimmed-Mean PCE from the Federal Reserve Bank of Dallas, n.d., among others.)

Measures of economic tightness or slack in the Phillips curve. Choosing an appropriate measure of economic tightness or slack is a difficult conceptual issue. “Slack” refers to the intensity of resource utilization in the economy (Yellen 2015). Figure 2-2 shows one possible measure of slack: the difference between real GDP and a longer-run trend of real GDP. The situation at the end of 2022, when real GDP was higher than its trend, indicates that resource utilization was higher than normal, which may have fed through to inflationary pressures via increased costs to firms to produce a unit of output (Boehm and Pandalai-Nayar 2022).

Another commonly used measure of slack is the deviation of the unemployment rate from the natural rate of unemployment, the rate of unemployment that would exist when the economy is stable in the long-term and not disrupted by shocks. Estimating the natural rate of unemployment, which is by nature unobservable, is a difficult task. (Many practitioners estimate the natural rate of unemployment together with the Phillips curve. But to have separate measurement power, that natural rate estimate would need to come from a method external to estimation of the Phillips curve itself, as was done by Michaillat and Saez 2022.) For simplicity, figure 2-7 uses the unemployment rate alone, without an external estimate of the natural rate.

Inflation expectations in the Phillips curve. The expectations-augmented Phillips Curve includes inflation expectations because many theories of inflation suggest that expectations may in some cases be self-fulfilling—in other words, if people believe that inflation will rise, inflation will rise; and if people believe that inflation will fall, it will

fall. Empirically, expectations are important to explaining the decline in inflation since the 1970s, and its stability in the 2010s (Blanchard et al. 2015). The exact link between inflation expectations and actual inflation is still debated (Rudd 2021; Bernanke 2007, 2022; Werning 2022). Figure 2-7 uses projections of core CPI inflation from the Survey of Professional Forecasters.

Given the importance of inflation expectations, managing expectations is an important aspect of managing inflation. Inflation expectations are said to be “anchored” when they do not change much, even when the economic environment changes. Though many believe that the Federal Reserve had an implicit inflation target at which it wanted to anchor inflation starting in the 1990s or earlier, it was only in 2012 that the Federal Reserve announced an explicit longer-run target of 2 percent annual PCE Price Index inflation (Federal Reserve 2012). In 2020, the Federal Reserve revised its “Statement of Longer-Run Goals and Monetary Policy Strategy” to indicate that it would conduct policy in a way that seeks to anchor inflation expectations at 2 percent and results in inflation that averages 2 percent over time (Federal Reserve 2020). As can be seen below in the text, even though inflation in 2021 and 2022 rose well above 2 percent, measures of long-run inflation expectations remained relatively stable, lending support to the idea that the Federal Reserve had successfully anchored inflation expectations.

Other factors. While Phillips curves are often parsimonious models of inflation, factors other than expectations and slack may be used to help empirically estimate the curve and control for other influences. Yellen (2015) highlights the importance of changes in imported goods prices, which are an input to many production processes and can proxy for exchange rate dynamics. In a similar vein, below the text highlights a measure of supply chain pressures and its relation to a producer-side measure of inflation. The price of energy may also be included, although pass-through from energy prices to measures of core or underlying inflation has diminished in recent years (Clark and Terry 2010).

Alternative models of inflation. The Phillips curve is one of most common frameworks that economists use to understand inflation, but it is far from the only one. For example, when economists talk about how supply and demand affect inflation, they are usually referring to the Keynesian Aggregate Demand and Aggregate Supply (AD-AS) model, which evolved from attempts by John Hicks to formalize the ideas of John Maynard Keynes in the 1930s (Hicks 1937; Keynes 1936). The Phillips curve is often considered to be part of Keynesian theory because, due to the link between employment and real output, something similar can be implied from the AD-AS model. Keynesian theory can be understood as one explanation for the connection between inflation and slack observed in the empirical Phillips curve. New Keynesian theory, which

is a modern, mathematically formal development of Keynesian theory, offers a related explanation (Galí 2015). The standard New Keynesian Phillips curve relates inflation to the theory's measure of slack and features a larger role for expectations than most Keynesian models.

Monetarism is both a theory that describes a group of formal mathematical models and also a set of less formal ideas. As a theory, it is most associated with Milton Friedman, who famously said, “Inflation is always and everywhere a monetary phenomenon, in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output” (Friedman 1970). Monetarist models emphasize inflation as a consequence of the growth of the quantity of money compared with the level and growth of output, rather than a connection between inflation and slack.

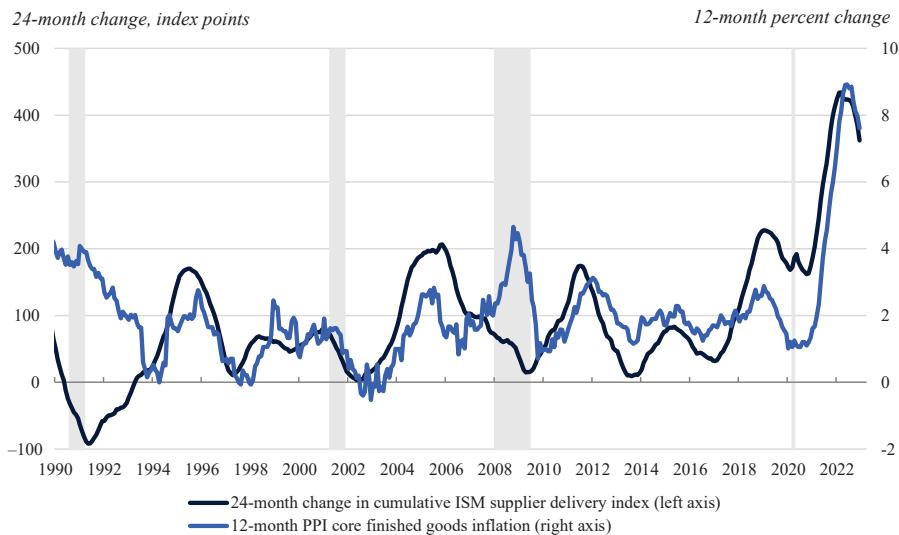
Finally, a number of models of inflation emphasize the importance of government debt. One of the best-known of these models, the Fiscal Theory of the Price Level (FTPL), argues that increases in government debt that are not backed by credible promises of repayment via increases in future tax revenue or reductions in future spending lead to inflation (Cochrane 2023). Proponents and critics of the FTPL disagree over the direction of causality in this relationship, and the implicit assumptions that such causality implies (Bassetto 2008).

usually considered to be demand factors in the near term; because they are both especially important, they are discussed separately.⁶

Over the last two years, many hypotheses about the causes of the current inflation situation have been proposed by academics, journalists, and politicians. The goal of this subsection includes reviewing prevalent propositions, not to argue for a single hypothesis or set of hypotheses. The possible causes discussed here likely played some role in the level and elevated nature of inflation in 2022—and the pandemic was a large exacerbating cause to each. Interactions between causes likely worsened inflationary pressures. Frequently cited hypotheses include the shock to energy, food, and other commodity prices associated with Russia's invasion of Ukraine; pandemic-related supply chain issues; the extension of zero interest rate monetary policy and accompanying quantitative easing; household transfers

⁶ In the medium to long terms, both monetary and fiscal actions can influence supply. For example, low interest rates can spur long-term investment. Government spending can build infrastructure—e.g., Donaldson and Hornbeck (2016)—and support research and development—e.g., Gross and Sampat (2020), as discussed in the paragraphs about legislative and executive actions in the text below. In general, these supply-side factors take longer to impact the economy than do demand-side effects of monetary and fiscal actions.

Figure 2-10. Supply Chain Pressures and Producer Inflation, 1990–2022



Sources: Bureau of Labor Statistics; Institute of Supply Management (ISM).

Note: PPI = Producer Price Index. The dark line is equal to $\sum(S_i - 50)$ with $i = 0.23$, where S_i = the ISM supplier deliveries index, which is equal to 50 if the number of manufacturers that report lengthening delivery times is equal to the number of manufacturers that report shortening delivery times. Longer lags include more information, and the 24-month changes fit with recent data on the change in PPI inflation.

legislated as part of the CARES Act, the American Rescue Plan, and related legislation; and households' accumulation of "excess savings."

The impact of supply factors on inflation. As described in the 2022 edition of the *Economic Report of the President*, the COVID-19 pandemic introduced challenges to the labor force and constraints on the supply of goods and services (CEA 2022). In mid-2022, these disruptions finally began to ease.

As shown in figure 2-10, increases in supply chain pressures were strongly correlated with rises in goods inflation in 2022. The measure of supply chain pressures in the figure is derived from an Institute for Supply Management (ISM) survey, in which supply managers are asked whether delivery times for their raw materials are shorter, the same, or longer than the preceding month. Because the resulting ISM measure captures monthly changes in delivery times, these responses must be cumulated over time to make an index of the level of delivery times.⁷ In figure 2-10, the change

⁷ The ISM supplier deliveries index is calculated by subtracting the percentage of supply managers saying that delivery times are longer from the percentage of supply managers saying that delivery times are shorter, dividing by 2, and adding 50. To construct this index of delivery time levels, 50 is subtracted from the ISM and the index is cumulated over 24 months. The ISM delivery index indicates only the one-month change in delivery lags, so cumulating more months includes more information. Cumulating over the preceding 24-month period fits the recent data on the change in PPI inflation.

Figure 2-11. Commodity Pressures and PCE Inflation, 2006–22



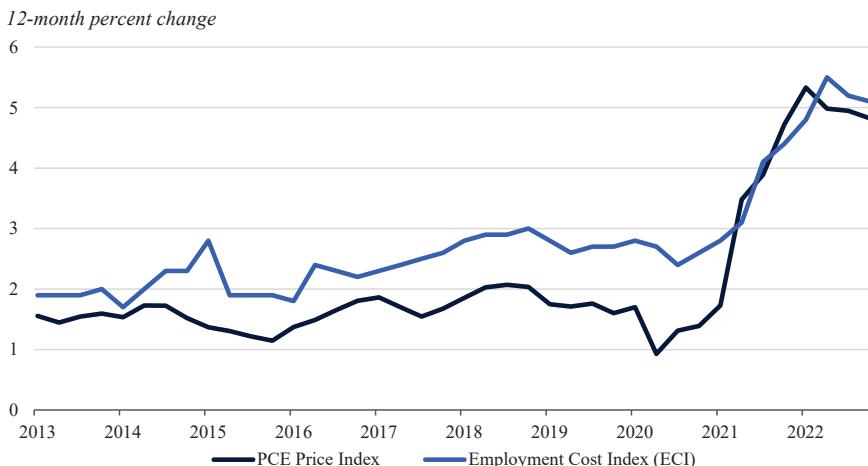
Sources: Bureau of Economic Analysis; U.S. Energy Information Administration; Bloomberg Agriculture Spot Index.
Note: FAO = Food Agriculture Organization of the United Nations. Data are displayed on two axes because commodity and gasoline prices are much more volatile than inflation. The PCE Price Index is seasonally adjusted.

in this measure of delivery times, over an appropriate interval, is plotted against the change in the core Producer Price Index (PPI) for finished goods. The PPI measure reflects prices charged by manufacturers. The relatively high correlation between the change in delivery times and core PPI finished goods inflation since 1990 suggests that supply chain issues have a significant impact on finished goods inflation.

According to the ISM survey, suppliers' delivery times started lengthening substantially shortly after the start of the COVID-19 pandemic, and most supply managers were reporting lengthening delivery times until September 2022. Delivery times shortened during the final three months of the year, but were still elevated at the end of 2022. Another measure of supply chain stress, the Global Supply Chain Pressure Index, produced by the Federal Reserve Bank of New York, also increased notably in 2020–21, but fell for most of 2022. Collectively, these measures indicate that supply chain delays stopped getting worse and even began to unsnarl toward the end of the year. Still, overall inflation remained high, indicating that the drivers of inflation had broadened, including to the service economy (Powell 2022a).

Figure 2-11 shows that commodity prices, as represented by gas and food price inflation, started rising in 2021. These commodities are traded on international markets, and their prices influence inflation globally. Then, in February 2022, Russia invaded Ukraine. The resulting chaos, both directly and indirectly, led food prices to quickly jump higher, and gasoline and natural gas prices soon followed. As commodity suppliers adapted to the

Figure 2-12. Employment Cost Index and Inflation, 2013–22



Sources: Bureau of Labor Statistics; Bureau of Economic Analysis; CEA calculations.

Note: The PCE Price Index is seasonally adjusted, but the ECI is not.

disruption caused by the war, commodity prices fell. Since commodities are a basic input to most production processes—and consumers directly purchase some commodities such as food, gasoline, and natural gas directly—higher commodity prices can quickly feed into overall inflation. Russia’s status as a major oil exporter led to a spike in many energy prices, and the price of regular gasoline in the United States peaked at \$5.02 a gallon in June. But by the end of the year, the price of regular gasoline had fallen to \$3.20 a gallon, partly due to the Biden-Harris Administration’s decision to draw down the Strategic Petroleum Reserve, which is further discussed below.

As the economy continued to recover from the recession in 2020 and consumer demand for goods and services increased, demand for workers to produce these goods and services also increased. Illustrated by the ratio of vacancies to unemployment shown in figure 2-4, the demand for workers relative to their supply has been high during much of the recovery from the pandemic-related recession. If firms are having difficulty hiring workers, then the relative price of workers—that is, hourly compensation—should increase. Figure 2-12 displays the Employment Cost Index, a measure of hourly compensation that adjusts for changes in the composition of the workforce, showing that inflation in 2022 was accompanied by rising wages. But rising wages can be both a cause and a consequence of inflation (Jordà et al. 2022). The BLS’s measure of real average wages, or wages relative to the overall price level, declined overall in 2022, falling in the first half of 2022 before rising in the second half. Some parts of the labor income distribution saw better real wage outcomes than others, with outcomes positive in the lowest quartile (Federal Reserve Bank of Atlanta, n.d.).

Although there were fears during 2022 of a “wage-price spiral”—where workers expecting increased inflation would demand higher wages, which would lead to higher realized inflation, and then workers would demand even higher wages, and so on—those fears lessened toward the end of 2022, as inflation and wage growth showed broad slowdowns. Notably, as shown below with the University of Michigan’s survey results (see figure 2-19), consumers’ short-term inflation expectations remained well below actual inflation throughout the year, and longer-term expectations remained anchored.

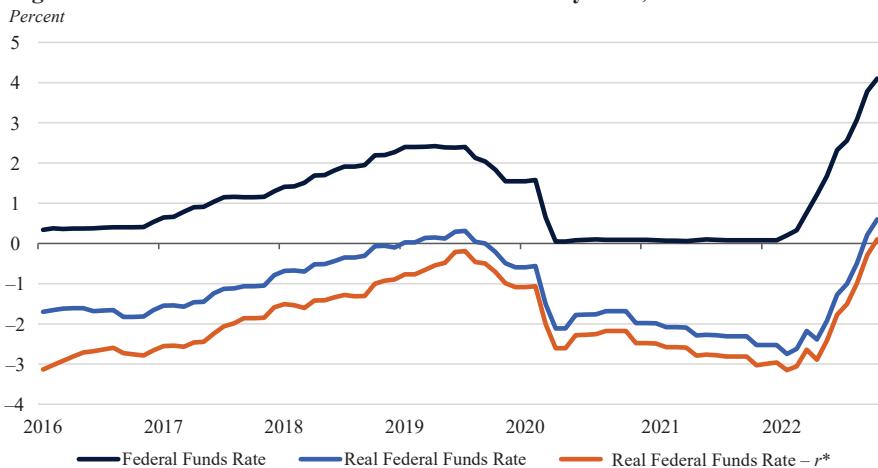
Some have pointed to another factor that may have influenced the reaction of prices and thus inflation to the COVID-19 shock: increased market concentration in U.S. industries. More U.S. industries have become dominated by a few, large firms over the last 20 years. There is some evidence that these firms increase prices in response to cost increases more than firms without market power would have done in the past ([Bräuning, Fillat, and Joaquim 2022](#)). However, the link between market power and pricing when subject to shocks like the pandemic is not clear ([Syverson 2019](#)). Measuring market power is a difficult task, and measuring the prices firms charge above the cost of their inputs, their “markup,” isolated from the effects of the increased demand and constrained supply of 2022, is even more fraught.

The impact of monetary factors on inflation. By controlling short-term interest rates, and through them, longer-term interest rates, the Federal Reserve is able to influence when consumers and businesses spend money versus save money, thereby affecting aggregate demand. In both traditional Keynesian and New Keynesian aggregate supply-and-demand frameworks (see box 2-2), higher interest rates lead to decreases in real output and inflation, all else being equal ([Miranda-Agrippino and Ricco 2021](#)). Figure 2-13 shows that the Federal Reserve kept the Federal Funds Rate close to zero from April 2020 until it began to raise the Federal Funds Rate in response to rising inflation in March 2022. By the end of 2022, the Federal Reserve had increased the Federal Funds Rate to a range between 4.25 and 4.50 percent. The rapid increase in the Federal Funds Rate was an attempt to bring demand into better alignment with supply and cool inflation. It is important to note that the Federal Funds Rate alone is not enough to judge the stance of monetary policy. The Federal Funds Rate is a nominal rate, so its effect on the real economy depends on inflation. The real Federal Funds Rate is approximated in figure 2-13 by subtracting short-term expectations of consumer inflation.⁸

Another perspective on the stance of monetary policy is the real rate relative to r^* , the long-term real rate consistent with the economy growing at its long-term trend. Though it is hard to estimate, there is evidence that

⁸ Exactly which measure of inflation is appropriate to use to deflate the nominal Federal Funds Rate is outside the scope of this chapter.

Figure 2-13. Nominal and Real Measures of the Policy Rate, 2016–22



Sources: Survey of Professional Forecasters (SPF); Federal Reserve System; CEA calculations.

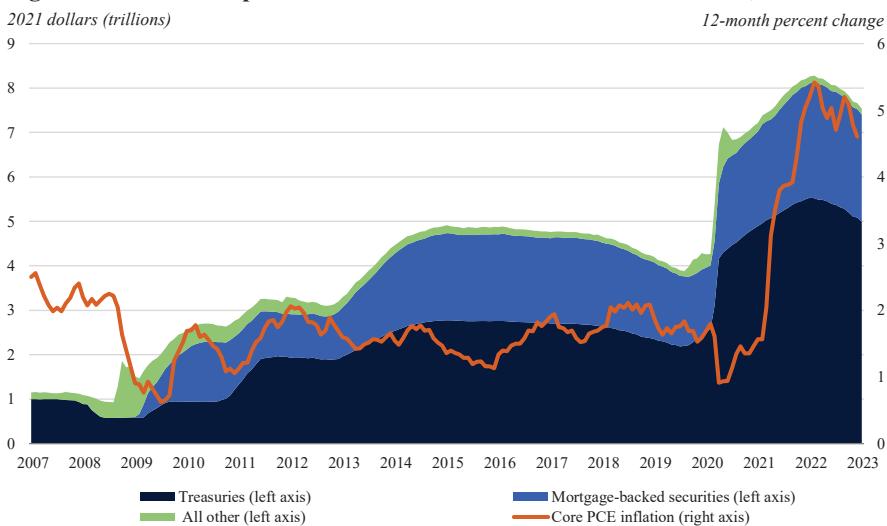
Note: The bright blue line subtracts 1-year-ahead expected inflation from the SPF from the dark blue line. The orange line subtracts the median estimate of the appropriate long-term Federal Funds Rate from the Federal Reserve quarterly Summary of Economic Projections (SEP) from the bright blue line.

r^* declined during recent decades (Powell 2018). Because of this decline in r^* , and depending on inflation expectations, low Federal Funds Rates may not be as stimulative as they were in the past (Jordà and Taylor 2019). The Federal Open Market Committee (FOMC), in its December 2022 “Summary of Economic Projections” (Federal Reserve 2022a), suggested that long-run r^* , calculated by subtracting the longer-run inflation rate (2.0 percent) from the longer-run Federal Funds Rate (2.5 percent), was 0.5 percent. The difference between the real Federal Funds Rate and r^* , shown by the orange line in figure 2-13, is a plausible measure of the stance of monetary policy. At the end of 2022, the stance of monetary policy, as measured by both the real Federal Funds Rate and the real Federal Funds Rate minus r^* , was above 0 percent, indicating a restrictive monetary policy.

An additional factor in judging the stance of monetary policy is the Federal Reserve’s balance sheet. In 2020, following the playbook used during the 2007–8 financial crisis, the Federal Reserve announced additional measures to support the economy, including emergency lending and asset purchase programs, sometimes known as “quantitative easing.” Figure 2-14 shows that assets held by the Federal Reserve—the sum of Treasuries, mortgage-backed securities, and all others—grew to \$8.2 trillion by the end of 2021—more than double their size before the COVID-19 pandemic.

The increase in the size of the Federal Reserve’s balance sheet contributed to a substantial increase in measures of the money supply. As discussed in box 2-2, in 2020, a monetarist would have predicted that the substantial

Figure 2-14. The Composition of the Federal Reserve's Balance Sheet, 2007–22



Sources: Bureau of Economic Analysis; Federal Reserve Bank of St. Louis; CEA calculations.

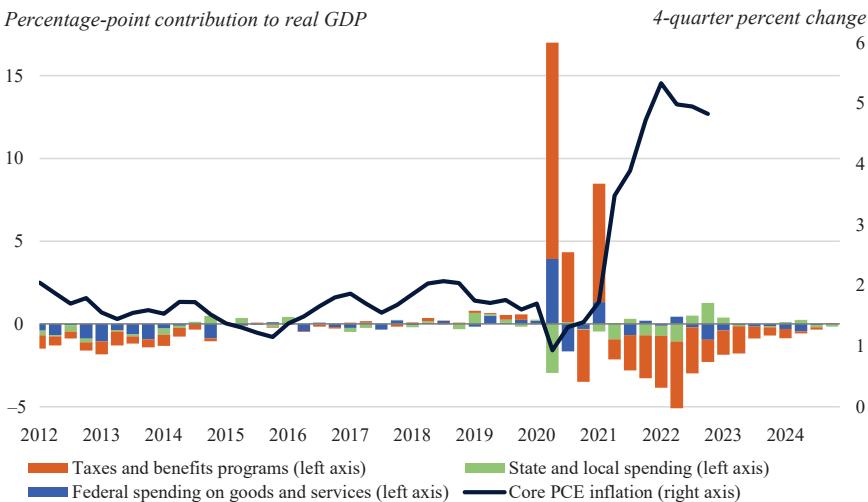
Note: Excludes unamortized premiums and discounts on securities held outright. Nominal dollars were converted to 2021 dollars using the PCE Price Index. The PCE Price Index is seasonally adjusted.

increase in “money” at a time when real output was shrinking would lead to inflation. In 2021 and 2022, with some lag, they would have been right.

But 10 years ago, they would have been wrong. When the Federal Reserve more than quadrupled its balance sheet in the five years after the 2007–9 financial crisis, inflation did not rise by much, and it quickly returned to a stable rate below 2 percent. There are important differences: the 2007–9 recession was longer and deeper; households and firms had worse balance sheets; the unique, pandemic-related supply-side challenges were not present; and the fiscal response to the crisis was smaller (Guerrieri et al. 2021). Nevertheless, the drastically different result in 2007–8 makes it hard to draw a straight line between the Federal Reserve’s balance sheet actions in 2020–22 and inflation (Crawley and Gagnon 2022).

The impact of fiscal factors on inflation. Extraordinary monetary policy in 2020 and 2021 was accompanied by expansive fiscal policy. In 2020, the pandemic prompted an increase of slightly more than 10 percentage points in the Federal Government’s outlays relative to GDP, the largest such increase since the increase of nearly 20 percentage points when the United States entered World War II. Much of this increased spending was distributed in economic impact payments made directly to households. Support was also provided via large temporary expansions of unemployment benefits and funds offered to small businesses to maintain payrolls and extend operations.

Figure 2-15. The Fiscal Impulse and Inflation, 2012–24



Sources: Hutchins Center at Brookings Institution; Bureau of Economic Analysis.

Note: All values are seasonally adjusted.

Aggregate supply-and-demand frameworks predict that, all else being equal, increases in government outlays will increase output and inflation. Estimates of the “fiscal multiplier,” or the ratio of the change in total real output to an expansionary fiscal policy action, vary considerably, with different estimates suggesting that government spending increases total output by more, or by less, than the government spending itself ([Ramey 2019](#)). Empirical estimates of the impact of government spending on inflation are mixed; a recent meta-analysis found that increases in government spending, offset by tighter monetary policy, often tend to be *deflationary* rather than inflationary ([Jørgensen and Ravn 2022](#)).

Figure 2-15 plots the Hutchins Center’s Fiscal Impact Measure (FIM), which uses information on the Federal Government’s spending on goods and services, State and local government spending on goods and services, and taxes and benefit programs to approximate the contribution of fiscal policy to total real GDP growth each quarter ([Belz, Sheiner, and Campbell 2022](#)). A positive fiscal impulse means that the contribution of fiscal policy to real GDP is larger than it was the quarter before. Figure 2-15 shows that the FIM spiked in 2020:Q2, mainly due to an expansion of transfer programs, and was positive for two of the next three quarters, but was a significant drag throughout 2022 and is projected to remain negative in 2023 and 2024, using projections for fiscal policy by the Congressional Budget Office in its current services baseline.

Table 2-2 highlights legislative and executive actions that cannot be easily characterized as “fiscal policy”—and hence are outside the scope of

Table 2-2. Selected Legislative and Executive Actions in 2022

| Date | Action | Goal |
|------------------|---|--|
| April to October | Release of 180 million barrels of crude oil from the Strategic Petroleum Reserve | Increase the supply of gasoline to lower its price, and the prices of other goods |
| May | Additional funding for domestic fertilizer production and technical assistance in agriculture, and expansion of eligibility for double-cropping insurance | Encourage farmers to expand production, lowering and stabilizing food prices |
| May | Housing Supply Action Plan | Increase the supply of available homes to lower housing costs |
| June | Ocean Shipping Reform Act | Lower shipping costs and improve supply chains by fostering competition |
| July | President Biden announces a series of actions that incentivize solar adoption and energy efficiency upgrades | Lower demand for fossil fuels and lower energy prices |
| August | IRA promotes clean energy adoption, authorizes Medicare to negotiate drug prices, and caps annual out-of-pocket prescription costs at \$2,000 | Increase the supply of clean energy to lower the price; reduce prices and lower markups in the pharmaceutical industry |
| October | Executive Order on Promoting Competition in the American Economy | Lower fees and hidden costs and increase consumer and small business bargaining power |

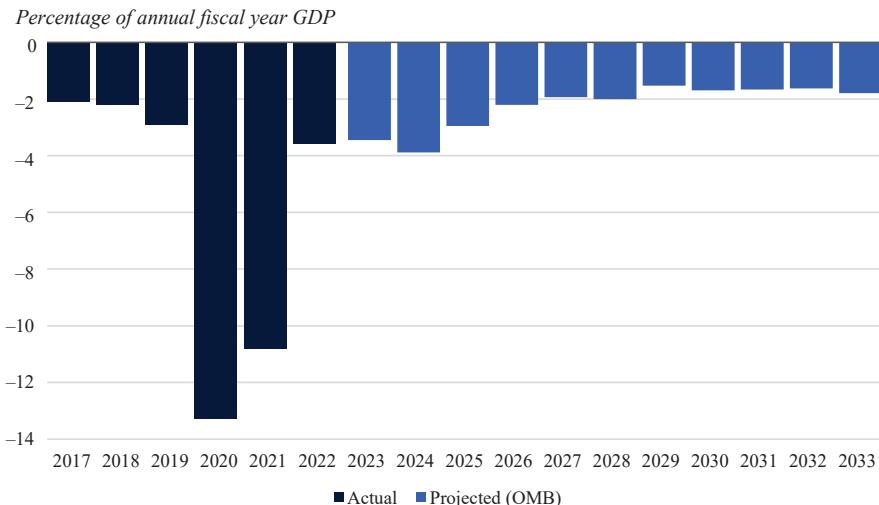
Note: IRA = Inflation Reduction Act. This table only captures some of the many actions taken in 2022.

the FIM—which by most economic definitions is primarily concerned with the levels of government revenue and spending and the path of deficits. The actions can be roughly divided into two categories. First, there are measures to promote competition in 2022 and in the future, such as the Ocean Shipping Reform Act, President Biden’s Executive Order on Promoting Competition in the American Economy, and the Inflation Reduction Act (IRA).⁹ Second, there are measures meant to either directly or indirectly expand the supply of particular goods or services, such as the President’s decision to tap into the Strategic Petroleum Reserve to reduce gasoline prices, and executive actions in May intended to help increase agricultural production and add to the stock of affordable housing. The actions listed in table 2-2 have likely lowered costs for specific goods or services, many of which are key inputs to other industries, and increased the future supply of many products. The long-term impact of these plans should be disinflationary.

Figure 2-16 shows the Federal Government’s historic primary deficits, or total revenues minus total spending not including interest payments on outstanding debt, and those deficits projected for the next 10 years by the Office of Management and Budget (OMB), which uses the economic

⁹ Procompetitive IRA measures include provisions that granted Medicare greater bargaining power in prescription drug cost negotiations with pharmaceutical companies. The IRA’s clean energy provisions will boost supply in targeted industries in the long term.

Figure 2-16. OMB's Primary Deficit Forecast, 2017-33



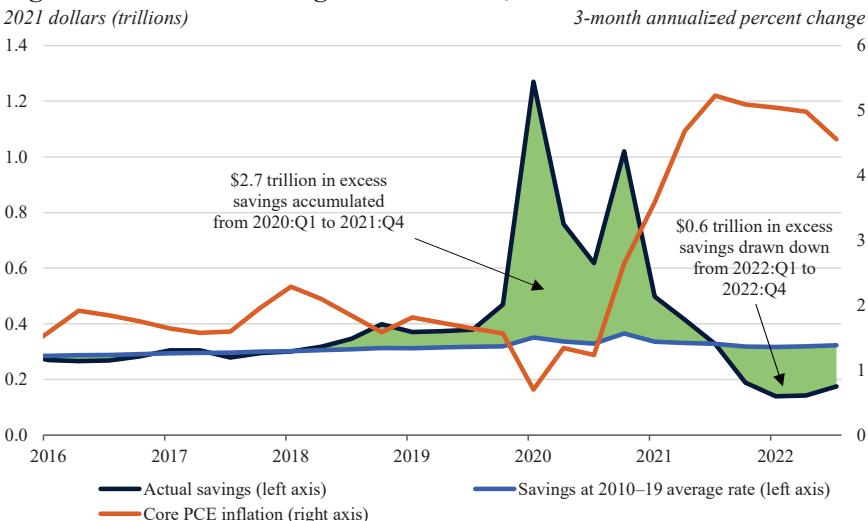
Sources: Office of Management and Budget (OMB); CEA calculations.

assumptions from the Administration forecast presented in the next section. The winding down of spending under the CARES Act, the American Rescue Plan, and related legislation, combined with higher tax revenue due to the recovery in GDP, led to a smaller deficit in 2022 as a share of GDP than in 2020 and 2021, or the 3 years after the 2007–8 financial crisis; but the deficit was higher than the post–World War II prepandemic average. One of the intentions of the reforms to the tax code made during the Biden-Harris Administration—including an increase in the corporate minimum tax, an increase in the Internal Revenue Service’s funding to help it bring in uncollected taxes and close loopholes, and a new excise tax on stock buybacks—is to reduce future deficits ([Gleckman and Holtzblatt 2022](#); [Congressional Research Service 2022](#)).

In an op-ed on May 30, 2022, President Biden said that he expected the reduction in the Federal deficit in 2022 to help ease price pressures ([Biden 2022](#)). Some theories suggest that lower deficits (or higher surpluses) over time can ease inflationary pressures (see box 2-2). Empirical estimates of the impact of government deficits on inflation do not provide consistent answers ([Catão and Terrones 2005](#); [Banerjee et al. 2022](#)). Nevertheless, the global coincidence of unprecedented, deficit-funded fiscal actions begun in 2020, and the highest rate of inflation in 40 years has convinced some economists that the two are related ([Bordo and Levy 2021](#)).

In 2020 and 2021, partially due to pandemic-era fiscal measures, and pandemic-related constraints on in-person spending, consumer income exceeded consumer spending by substantially more than it usually does,

Figure 2-17. Excess Savings and Inflation, 2016–22



Sources: Bureau of Economic Analysis; CEA calculations.

Note: The average saving rate from 2010 to 2019 was 7.3 percent. Nominal dollars were converted to 2021 dollars using the PCE Price Index. All values are seasonally adjusted.

leading to a surplus of savings beyond what would have occurred if the saving rate (i.e., saving as a share of disposable income) had remained at prepandemic levels. The buildup of excess savings was due to the increased precautionary savings and pandemic-related constraints on spending that led consumers to spend less and save more than usual ([Bilbiie et al. 2021](#)) paired with the direct payments and income support program expansions included in the CARES Act, the American Rescue Plan, and related legislation. Figure 2-17 plots one measure of excess savings; the dark blue line represents the deviation of actual saving from what it would have been under the average quarterly saving rate from 2010 to 2019 (7.3 percent); and the green shaded area between the dark blue line and the light blue line is the excess savings in the quarter. By the end of 2021, the amount of cumulative excess savings peaked at about \$2.7 trillion, or more than two months of usual prepandemic consumer spending.

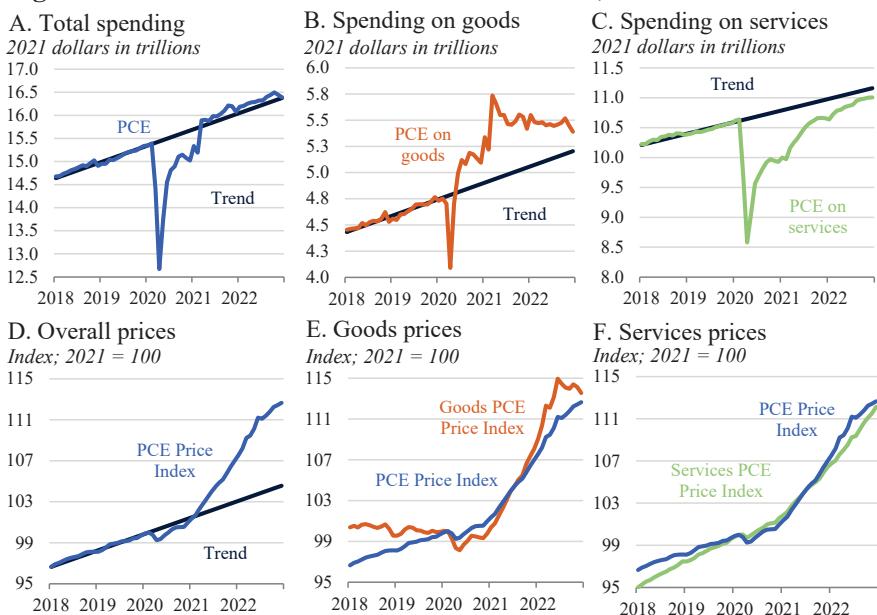
Given the excess savings, households had the potential to spend more than they normally would without incurring debt, even after the withdrawal of some fiscal recovery programs. In an aggregate supply-and-demand framework, if households spend their excess savings, the spending will increase aggregate demand, exacerbating inflation when supply is constrained ([Aladangady et al. 2022](#)). Excess savings, as shown in figure 2-17, were drawn down by about \$0.6 trillion in 2022, and consumer spending rose, counteracting the aggregate demand effect of the negative fiscal impulse shown in figure 2-15. If the drawdown of excess savings, together

with current income, boosted aggregate demand, it could have contributed to high inflation in 2021 and 2022.

Additional demand factors affecting inflation. The pandemic and recovery, supported by funds provided by the CARES Act, the American Rescue Plan, and related legislation, also generated large and unusual shifts in consumer demand—most importantly, away from in-person services and toward distancing-friendly goods, and then back again, as shown in panels B and C of figure 2-18. In April 2021, possibly driven by this unusual spending on goods, inflation in the price of goods over the preceding 12 months, as measured by the PCE Price Index, was higher than inflation in the price of services for the first time in nearly a decade, as shown in panels D through F of figure 2-18. In the second half of 2022, goods inflation settled some, but the consumer demand rotation back to services caused services inflation to increase. Correspondingly, the ratio of the consumption of real goods to that of real services also rose, and then fell back somewhat toward prepandemic levels, but remained elevated.

Because consumer spending makes up nearly 70 percent of GDP, it is informative to look at consumer spending on its own, as a measure of where the economy in 2022 was relative to its trend, as shown in figure 2-2 above. Figure 2-18, panel B, shows that goods consumption remained above its

Figure 2-18. Consumer Goods-Services Rotation, 2018-22



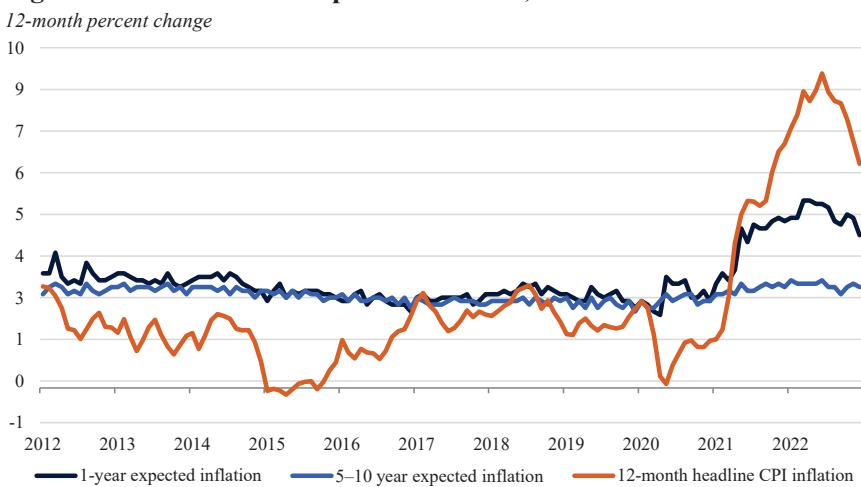
Sources: Bureau of Economic Analysis; CEA calculations.

Note: PCE = Personal Consumption Expenditures. Trend lines were calculated by regressing each respective series on time from 2015 to 2019. All values are seasonally adjusted.

trend through 2022. Services consumption—as shown in figure 2-18, panel C—recovering from the obstacles to in-person services during the pandemic and seeing a rapid rise in prices, remained below its trend. Overall, as shown in panel A of figure 2-18, consumer spending was near its trend. Business fixed investment, as broken out in figure 2-3—which is necessary to add to domestic productive capacity—did not see the same rapid increase as consumption. This disconnect between above trend goods consumption and the lack of increased production, whether due to supply constraints on production or slow investment, means that domestic supply was not able to provide the level of goods and services demanded. As supply chain disruptions made it challenging to address this imbalance through increased imports, inflation rose as goods prices increased (Guerrieri et al. 2021).

The impact of inflation expectations. Expectations play an important role in the major frameworks that economists use to analyze inflation, as described in box 2-2. Some economists think that higher expectations of future inflation can be self-fulfilling, making efforts to fight inflation more difficult or painful. If businesses, consumers, and financial market participants expect inflation to be high, they will behave in ways consistent with this expectation and that may bring about actual higher inflation. For example, workers with high inflation expectations may demand higher wages, and businesses with high inflation expectations may price goods higher. The back and forth between these effects can lead to further increases in inflation. In 2022, long-term inflation expectations stayed near their historical levels, and short-term expectations moved with actual inflation, pointing

Figure 2-19. Actual and Expected Inflation, 2012-22



Sources: University of Michigan; Bureau of Economic Analysis; CEA calculations.

to inflation expectations that were dependent on actual inflation rather than being driven independently in a way that could lead to further inflation.

When inflation began to rise in 2021, long-term inflation expectations had been steady for decades, and even as inflation started to climb, these expectations remained low. Figure 2-19 plots two of the most commonly tracked measures of inflation expectations: the median expected annual price change over the next 12 months, from the University of Michigan's monthly survey of households; and the median expected average annual price change over the next five to 10 years, from the same survey. Although both measures increased during 2022, they did not increase by nearly as much as realized inflation. Long-term inflation expectations (5–10 year expected inflation, the light blue line) in particular were reassuringly stable, indicating that although elevated inflation was expected in the short run, it was not expected to last. As discussed in box 2-2, this stability was taken as evidence that inflation expectations were anchored. Still, toward the end of 2022, some economists worried that the modest increases in long-run inflation expectations, and the possibility of sustained increases in expectations, would make it harder to bring inflation down (Powell 2022b).

The Forecast for the Years Ahead

The Biden-Harris Administration finalized the latest version of its official economic forecast on November 28, 2022. This forecast provides the Administration's estimated projections of key economic variables over the next 11 years, from 2023 to 2033, and also includes its forecast for 2022. During the interval between when this forecast was finalized and the publication of this *Report*, more 2022 data have become available, so that the official forecast discussed in this chapter differs from those published more recently.

This overall forecast is a critical input to the President's Fiscal Year 2024 Budget, because it is an input into the budget projections of many Federal agencies, and to projections of tax revenues. The forecast development also provides insight into what challenges lie ahead and where the economy might need additional investment and support.

COVID-19 continues to generate forecasting uncertainty. Although U.S. COVID-19 fatalities surged to 1,700 a day in 2022:Q1 due to the new Omicron variant, they declined to 500 per day in April and then the four-week moving average fluctuated in the range of 300 to 500 per day for the rest of the year—held down by vaccinations, increasing immunity, and new treatments. Further COVID-19 declines or future surges pose upside and downside risks for the forecast. The potential for future supply chain disruptions due to COVID-19 surges abroad or wartime disruptions provide further risks; the Russian invasion of Ukraine is another source of uncertainty.

Table 2-3. Economic Projections, 2021–33

| Year | Percent Change (Q4 to Q4) | | | Level (percent) | | | |
|----------|---------------------------|--------------------|-----|-------------------|-----|-----------------|-----------------|
| | Real GDP | Inflation Measures | | Unemployment Rate | | Interest Rates | |
| | | GDP Price Index | CPI | Annual | Q4 | 3-Month T-Bills | 10-Year T-Notes |
| Actual | | | | | | | |
| 2021 | 5.7 | 6.1 | 6.7 | 5.4 | 4.2 | 0.0 | 1.4 |
| 2022 | 0.9 | 6.4 | 7.1 | 3.6 | 3.6 | 2.0 | 3.0 |
| Forecast | | | | | | | |
| 2022 | 0.2 | 6.6 | 7.6 | 3.7 | 3.8 | 2.0 | 3.0 |
| 2023 | 0.4 | 2.8 | 3.0 | 4.3 | 4.6 | 4.9 | 3.8 |
| 2024 | 2.1 | 2.1 | 2.3 | 4.6 | 4.5 | 3.8 | 3.6 |
| 2025 | 2.4 | 2.1 | 2.3 | 4.4 | 4.4 | 3.0 | 3.5 |
| 2026 | 2.0 | 2.1 | 2.3 | 4.3 | 4.3 | 2.5 | 3.4 |
| 2027 | 2.0 | 2.1 | 2.3 | 4.2 | 4.2 | 2.3 | 3.4 |
| 2028 | 2.0 | 2.1 | 2.3 | 4.1 | 4.1 | 2.2 | 3.4 |
| 2029 | 2.1 | 2.1 | 2.3 | 4.0 | 4.0 | 2.3 | 3.4 |
| 2030 | 2.2 | 2.1 | 2.3 | 3.9 | 3.8 | 2.4 | 3.4 |
| 2031 | 2.2 | 2.1 | 2.3 | 3.8 | 3.8 | 2.4 | 3.4 |
| 2032 | 2.2 | 2.1 | 2.3 | 3.8 | 3.8 | 2.5 | 3.4 |
| 2033 | 2.2 | 2.1 | 2.3 | 3.8 | 3.8 | 2.5 | 3.4 |

Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; Department of the Treasury; Office of Management and Budget; CEA calculations.

Note: These forecasts are based on data available as of November 28, 2022; actual data for 2022 arrived later. The interest rate on 3-month (91-day) Treasury Bills is measured on a secondary-market discount basis.

Averaging these risks, the Administration presents a central forecast; table 2-3 summarizes its key aspects.

The Near Term

For this *Report*'s near-term forecast, two questions were paramount. First, does real GDP currently exceed its short- or long-run potential level? And second, how soon will inflation return to the Federal Reserve's 2 percent target, and how will this return influence output and employment?

The Administration forecast largely followed the consensus of Blue Chip forecasters by revising its GDP forecast downward. Over the six months between March and October 2022, the Blue Chip consensus economic forecast was revised to show substantially lower real GDP growth and higher inflation during the two years 2022 and 2023 (see table 2-4). This combination of revisions suggests that the consensus—implicitly—recognized that demand had exceeded available supply during 2022; the consensus panel did not make any offsetting upward revisions during the subsequent two years. The lack of a bounce-back in the consensus forecast for real GDP growth in

Table 2-4. Evolution of the Blue Chip Consensus Real GDP Forecast

| | Percent Growth, Annual Average to Annual Average | | | | |
|-----------------|--|------|------|------|------|
| | 2022 | 2023 | 2024 | 2025 | 2026 |
| Real GDP | | | | | |
| March 2022 | 3.5 | 2.5 | 2.1 | 2.0 | 2.0 |
| October 2022 | 1.6 | 0.2 | 1.5 | 2.1 | 2.1 |
| Revision | -1.9 | -2.3 | -0.6 | 0.1 | 0.1 |
| CPI | | | | | |
| March 2022 | 6.2 | 2.6 | 2.3 | 2.2 | 2.2 |
| October 2022 | 8.0 | 3.9 | 2.4 | 2.2 | 2.2 |
| Revision | 1.8 | 1.3 | 0.1 | 0.0 | 0.0 |

Source: Blue Chip Economic Indicators.

Note: The Blue Chip panel revises its long-term forecast in March and October, with growth rates that are annual average to annual average.

2024 and 2025 may reflect that the constraints on supply during 2022 partly reflected long-term factors. Between October and December 2022, inflation in 2022 came in lower and real GDP growth during 2022 came in stronger than the Administration had predicted as of November. In light of the new data available since the forecast was finalized, a forecast assembled today would differ from that finalized in November.

The forecast given in table 2-3 predicted slow (0.4 percent) real GDP growth for the four quarters of 2023 because GDP growth may need to be less than trend growth to alleviate the current tight labor market. The Blue Chip consensus panel also predicted that 2023 real GDP growth would be slow over the four quarters of the year.¹⁰

The second question, how soon will inflation return to levels consistent with the Federal Reserve's target, depends on the success of monetary and fiscal policy, and the legislative and executive actions discussed above. As a consequence of the FOMC's decision to raise the target Federal Funds Rate from close to 0 percent in February 2022 to between 4.25 and 4.50 percent in December, other short-term rates also increased, including the yield on 91-day Treasury Bills, which rose 4.2 percentage points during the 12 months of the year to 4.3 percent by the end of the year. Though nominal interest rates on long-term securities also rose, they did not increase by as much as short-term rates, perhaps reflecting market confidence that inflation will recede over the next 10 years. As of November 2022, the Administration predicted that interest rates would continue to increase during 2023, but would then begin to decline in 2024. The Administration further predicted that inflation would fall quickly in 2023 from its 2022 pace as supply chains unsnarled, and would return to rates consistent with the Federal Reserve's

¹⁰ In October, the Blue Chip panel predicted that Q4-to-Q4 real GDP growth would be 0.4 percent, which was lowered to -0.1 percent in the December survey.

long-term targets by 2024 (see, e.g., the FOMC’s December 14, 2022, statement: [Federal Reserve 2022b](#)).

Consistent with slow GDP growth, in November 2022 the Administration expected the unemployment rate would edge up in 2023, averaging 4.3 percent but peaking at 4.6 percent in 2023:Q4. The combination of this rising unemployment, slow GDP growth, a falling vacancy rate, the effects of expected fiscal policies and executive actions, and continued confidence in the Federal Reserve’s commitment to its 2 percent target rate was expected to lower the rate of CPI inflation to 3.0 percent during 2023, and to 2.3 percent during 2024. As mentioned in box 2-1 above, CPI inflation tends to outpace the PCE Price Index; hence, a 2.3 percent CPI inflation rate is consistent with the Federal Reserve’s target of a 2 percent PCE Price Index inflation rate. Another measure of inflation, the price index for GDP, was expected to fall from a forecasted 6.6 percent rate during 2022 to 2.1 percent during 2024.

Post–World War II history suggests that bringing down inflation, via monetary policy or otherwise, will likely lower employment growth and output growth. Recognizing this relationship, in November the Administration expected that unemployment would increase during the four quarters of 2023, before starting to decline in 2024. From its expected 4.6 percent peak in 2023:Q4, the unemployment rate was expected to edge lower to 4.5 percent by the end of 2024, eventually falling—in 2030—to the long-term rate of 3.8 percent that the Administration considers to be consistent with stable inflation.

The Administration’s near-term forecasts for real GDP growth in 2023–24, near-term inflation, the unemployment rate, and interest rates were roughly consistent with the forecast of the Blue Chip Economic Indicators (the consensus), and that of the FOMC as of November 2022.¹¹

The Long Term

In contrast to the near-term outlook, the Administration’s long-term forecast for real GDP growth exceeded the October 2022 Blue Chip consensus long-term forecast by an average of 0.2 percentage point a year during the nine years 2025–33. The Administration believed that potential real GDP growth in the long run would be modestly higher because of the expected effect of the President’s proposed economic policies, assuming that they are enacted, including a range of programs to enhance human capital formation, provide childcare, and reform immigration policy. In addition, the Administration recognized that the downward pressure on labor force participation from the

¹¹ The Congressional Budget Office’s forecast is absent from this list because its latest 2022 forecast (during the interval that the Administration forecast was in play) was finalized on March 2, 2022, before the release of much data on GDP and inflation, and was therefore out of date.

Table 2-5. Supply-Side Components of Forecasted Real Output Growth

| Component | Percentage-Point Contribution to Annual Real Output Growth | | | | |
|----------------------------------|--|---------------------|---------------------|---------------------|---------------------|
| | 1953:Q2– 2019:Q4 | 1990:Q3– 2001:Q1 | 2001:Q1– 2007:Q4 | 2007:Q4– 2019:Q4 | 2019:Q4– 2033:Q4 |
| (1) | (2) | (3) | (4) | (5) | |
| 1 Population | 1.4 | 1.2 | 1.1 | 1.0 | 0.7 |
| 2 Labor force participation rate | 0.1 | 0.1 | -0.3 | -0.4 | -0.2 |
| 3 Employed share of labor force | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 |
| 4 Average weekly hours | -0.2 | -0.1 | -0.2 | -0.1 | 0.0 |
| 5 Output per hour | 2.0 | 2.4 | 2.4 | 1.4 | 1.6 |
| 6 Output per worker differential | -0.3 | -0.3 | -0.6 | -0.4 | -0.2 |
| 7 Sum: Real GDO | 3.0 | 3.5 | 2.4 | 1.7 | 1.9 |

Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; Department of the Treasury; Office of Management and Budget; CEA calculations.

Note: These forecasts are based on data available as of November 28, 2022. Total may not add up due to rounding. 1953:Q2, 1990:Q3, 2001:Q1, 2007:Q4, and 2019:Q4 are all quarterly business-cycle peaks. Population, labor force, and household employment have been adjusted for discontinuities in the population series. Detailed row definitions: (1) civilian noninstitutional population, 16+ (4) nonfarm business average weekly hours (5) nonfarm business output per hour; output is measured as the average of income- and product-side measures (6) difference between output-per-worker growth in the economy as a whole and in the nonfarm business sector (7) gross domestic output (GDO) is the average of GDP and gross domestic income (GDI).

retirement of baby boom cohorts is likely to wane during the last five years of the budget window (2028–33), as discussed in box 2-3.

Although the circumstances surrounding this year’s near-term forecast were unique to 2022, the key issues affecting the long-term forecast are less tied to recent events. These issues can be described most clearly in terms of the supply-side components of GDP, which, although erratic in the short run, have more understandable long-term movements.

The first set of key issues has to do with the long-term labor supply. As discussed in chapter 6 of this *Report*, the U.S. population is aging. The first row of table 2-5 shows that the Administration’s forecast expected that the civilian, noninstitutional population age 16 years and above would grow by an average of 0.7 percent at an annual rate from 2019 to 2033, below the average 1.0 percent annual growth rate from 2007 to 2019.¹² Much of this expected growth will likely come from immigration.¹³ The labor force participation rate was projected to continue its decline, reflecting the aging of the baby boom cohorts into retirement. This downward pressure on the

¹² The civilian, noninstitutional population excludes individuals who are incarcerated or are living in mental health facilities or homes for seniors, or who are on active duty in the Armed Forces. Projected growth rates come from demographers at the Social Security Administration. Table 2-5 shows projected growth rates for the 15 years since the business cycle peak in 2019:Q4. The choice of this long period to discuss these supply-side components is because many of these components move sharply for business-cycle reasons (workweek and productivity), and others have large erratic components in the short run (labor force participation rate and the productivity differential).

¹³ Also see Social Security Administration (2022a).

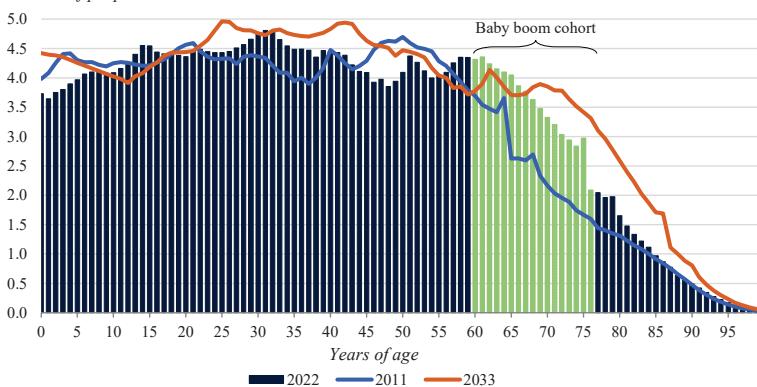
Box 2-3. Aging and Growth

The United States, like most advanced countries, is going through a demographic transition, and this will have a large impact on a variety of economic variables for years to come. In figure 2-ii, the blue line plots the age distribution of the United States in 2011, the bars show the current age distribution, and the orange line plots the expected age distribution in 2033. Although the U.S. population is still growing, the center of mass of the age distribution is shifting to the right—that is, to older ages.

Of particular note is the baby boom cohort, whose members were between 58 and 76 years of age in 2022. Most baby boomers are now

Figure 2-ii. The Evolution of the U.S. Population’s Age Composition

Millions of people

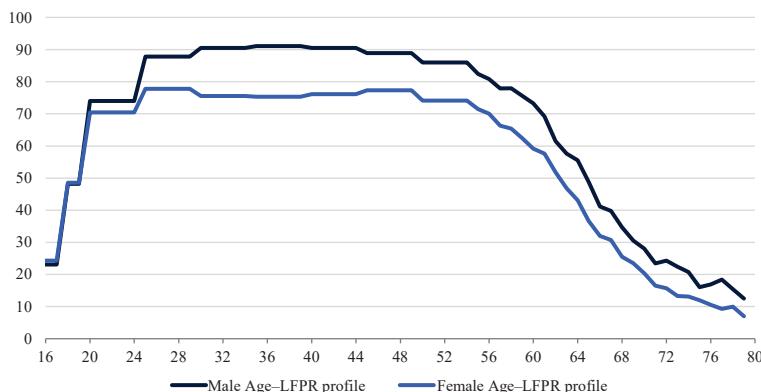


Source: Social Security Administration (2022b).

Note: The U.S. Social Security population differs slightly from the U.S. civilian noninstitutional population.

Figure 2-iii. Age–Labor Force Participation Rate Profiles in 2019

Percent



Sources: Bureau of Economic Analysis; CEA calculations.

Note: LFPR = labor force participation rate.

at or above the age of retirement. As they age, the baby boomers will continue to push out the right tail of the distribution.

Most people retire when they are between the ages of 62, the earliest age of eligibility under Social Security, and 70, as can be seen from the sharp decline in participation for those ages shown in the age-participation rate profiles given in figure 2-iii. Using the Social Security Administration's projections for the age distribution through 2033, together with these age-participation profiles, overall participation is projected to drop about 0.4 percent (or about 0.2 percentage point) a year for the next five years. But during the last five years of the forecasted interval, this downward pressure on the overall labor force participation rate will be reduced to about 0.2 percent a year, because most of the baby boom cohort will have already retired. Using the identity shown in table 2-5, the less negative growth in the participation growth rate is expected to have a positive impact on GDP growth.

participation rate was projected to wane after 2028, however, as discussed in box 2-3. The workweek (row 4 of table 2-5) was projected to stabilize after a long historical period of decline attributable to the entry of women, who, on average, have shorter workweeks than men, and to the declining share of manufacturing in total employment.

In the Administration's forecast, the employed share of the labor force was projected to remain close to its level at the 2019 business-cycle peak, and therefore made no net contribution over the forecast interval. Productivity growth (measured as output per hour) was projected to grow 1.6 percent a year over the 15-year interval, somewhat more slowly than its 2.0 percent long-term average but faster than the 1.4 percent growth rate during the 2007–19 business cycle. Finally, the output per worker differential, which is the difference between the output per person for the economy as a whole and the output per person in the nonfarm business sector, was expected to be negative, because of the national income accounting convention that productivity does not grow in the government or household sectors. Because productivity growth is assumed to be zero for these sectors of the economy, while productivity growth was forecasted to be positive in the nonfarm business sector, the differential was necessarily negative. That said, this differential was projected to be less negative than the historical average because of the projected declining share of government in total output.

The long-term forecast of the inflation rate was based on the assumption that the Federal Reserve will succeed in hitting its target of 2 percent for inflation, as measured by the PCE Price Index. Forecasts for future interest rates were informed by the FOMC's near-term forecast of the Federal Funds

Rate. Projections for the yield on 10-year Treasury Notes lie between the Blue Chip consensus forecast and the implicit forecast provided by forward rates derived from the market prices of U.S. Treasury securities.

Conclusion

The forces that have buffeted the U.S. economy since the beginning of the COVID-19 pandemic only began to calm in 2022. The United States found itself in an enviable position among advanced economies, with substantial growth during 2021 and positive growth in 2022, a low unemployment rate, and lower inflation than some other countries. Moreover, inflation pressures abated from their mid-year highs by the end of 2022, both in terms of headline and, more importantly for the future, core inflation. The U.S. economy has, by some economic measures, such as the record low unemployment rate and the return of output to—or even above—the trend, fully recovered from the COVID-19-induced recession.

As discussed in this chapter, the rise in inflation during this period appears to have been driven partly by the intersection of constrained supply and strong demand. These dynamics reflected the effects of the pandemic on consumer demand and supply chains, along with the strong fiscal and monetary support that was necessary to offset the unique and powerful negative shock caused by COVID-19. Though these fiscal and monetary interventions contributed to the strong demand that played a role in the ensuing inflationary pressures, they also set the stage for the historically strong 2021–22 labor market and supported smoothly functioning financial markets. At the same time, these interventions helped avoid the deep and lasting hardships that otherwise would likely have beset millions of American households. In this uncertain environment, as President Biden said at the time, the risk of doing too little exceeded the risk of doing too much (White House 2021).

Overall, the recovery from the pandemic-induced recession progressed far enough in 2022 that the U.S. economy is well situated to weather the anticipated below-trend growth over the near term. The speed and strength of the pandemic recovery testifies to the power of fiscal and monetary policy to fight even the largest negative shocks. The government is united in working toward sustainable growth, low inflation, and inclusive prosperity.