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Effective Inflation Control Requires Supply-Side Policy

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Effective Inflation Control Requires Supply-Side Policy

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Introduction and summary

After the pandemic-induced recession in 2020, fiscal policy helped raise gross domestic product (GDP) above pre-pandemic levels. But as output and employment have grown, so has inflation. The year-on-year increase in the core consumer price index (CPI)—which measures prices of goods and services other than energy and food, which are usually more volatile—was 6.3 percent in August 2022. And the year-on-year increase in the overall CPI was 8.3 percent in August.¹ Post-recession growth has taken place in an environment in which supply—of labor, manufactured goods, crude oil, natural gas, and food—has been and continues to be significantly disrupted. These negative supply shocks have been major contributors to core inflation and to energy and food inflation.

The Federal Reserve has responded to rising inflation by raising interest rates to reduce demand for goods, services, and labor. If interest rates are raised enough, output and employment will be reduced, price and money wages changes will slow, and, eventually, core price inflation will be reduced.

However, because recent inflation was significantly caused by supply factors, the contractionary monetary policy put in place to curb it will entail real economic loss, especially for those most vulnerable in the labor market—people of color, workers without a college degree, disabled workers, and others. Therefore, it makes sense to look for ways around the supply disruptions that are affecting the current expansion and may constrain growth in the future. There are several steps that could help in the short to medium term, including:

- Expanding the uptake of COVID-19 vaccines to reduce labor and manufacturing supply shocks
- Providing additional support for child and home care to raise labor force participation
- Reducing limits on working-age immigration to increase labor supply
- Intensifying antitrust enforcement to reduce the ability of corporations to raise prices more rapidly than costs

- Increasing the supply of renewable energy and eliminating reliance on fossil fuels to limit energy supply shocks, including by implementing and building on the recently enacted Inflation Reduction Act

Actions such as these are not part of the standard anti-inflation toolkit, but given the changing economic environment, they ought to be included.

How we got here: The factors influencing the surge in core inflation

After the lockdown-induced recession in 2020, fiscal policy helped restore employment and household income. The Coronavirus Aid, Relief, and Economic Security (CARES) Act, the American Rescue Plan, and other federal actions added about \$5 trillion in stimulus over a two-year period. This moved aggregate capacity utilization, as measured by the ratio of actual to potential GDP, to a high level. The increase in overall output has been accompanied by increasingly tight labor markets.

Without massive fiscal stimulus, the recovery would have been much weaker, and without the strong recovery, inflation would have been lower. However, high overall levels of utilization do not always produce high rates of inflation. Utilization rates in this expansion are no higher than those during the previous expansion, when average core CPI inflation was near 2 percent and showed much lower volatility. High-capacity utilization, by itself, is an incomplete explanation of what is being seen.

A more complete account includes the profound effects of supply reductions. The data show that negative supply shocks have significantly affected core CPI inflation. Reduced labor supply has contributed to tight labor markets, and pandemic-induced disruptions to global and domestic manufacturing supply chains have created unexpected shortages. This has created unusual price pressure as the economy has recovered. This pressure has been amplified by shifts in consumer demand to goods in short supply, as well as the exercise of market power by corporations, which has raised price-cost margins.

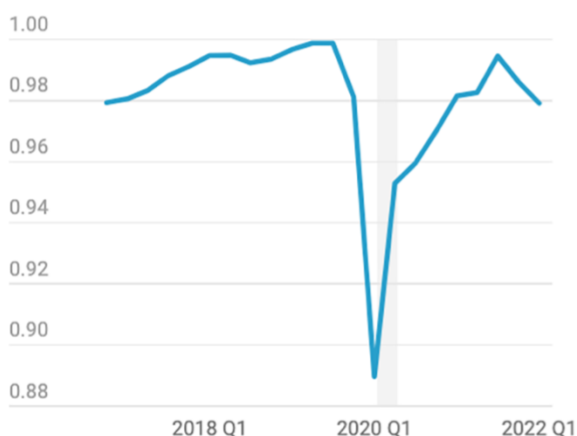
Core inflation anomalies in the current expansion

Compared with the previous expansion, increases in overall capacity utilization in the economy have produced higher rates of inflation and more volatile price movements. The economic recovery that began in the first quarter of 2020 has been accompanied by very large increases to the core CPI. (see Figure 1) The annual rate of change of core CPI moved upward from 3 percent in January 2020 to 8.5 percent in June 2022. This is an extraordinary change from the previous expansion. Not only is the inflation rate higher but month-to-month variations in the rate are relatively more extreme.

FIGURE 1

Capacity utilization is below the level before the 2020 recession, but core inflation is higher and more volatile

Ratio of real gross domestic product (GDP) to real potential GDP, 2017–2022



Monthly core consumer price index inflation, annual rate of change, 2017–2022



Chart: Center for American Progress. Sources: Author's calculations using U.S. Bureau of Economic Analysis data in Federal Reserve Bank of St. Louis (FRED), "Real Gross Domestic Product," available at <https://fred.stlouisfed.org/series/GDPC1> (last accessed August 2022); U.S. Congressional Budget Office data in FRED, "Real Potential Gross Domestic Product," available at <https://fred.stlouisfed.org/series/GDPPOT> (last accessed August 2022); U.S. Bureau of Labor Statistics data in FRED, "Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average," available at <https://fred.stlouisfed.org/series/CPILFESL> (last accessed August 2022).

Moreover, higher and more volatile inflation is occurring when overall capacity utilization is no higher than it was during the previous expansion. The ratio of actual GDP to the Congressional Budget Office's (CBO) estimate of potential GDP shows that, in the aggregate, the economy is close to capacity—that is, it is close to the level of real output that can be produced with normal levels of utilization of labor and capital inputs. However, this ratio is not that different from what occurred in 2019.

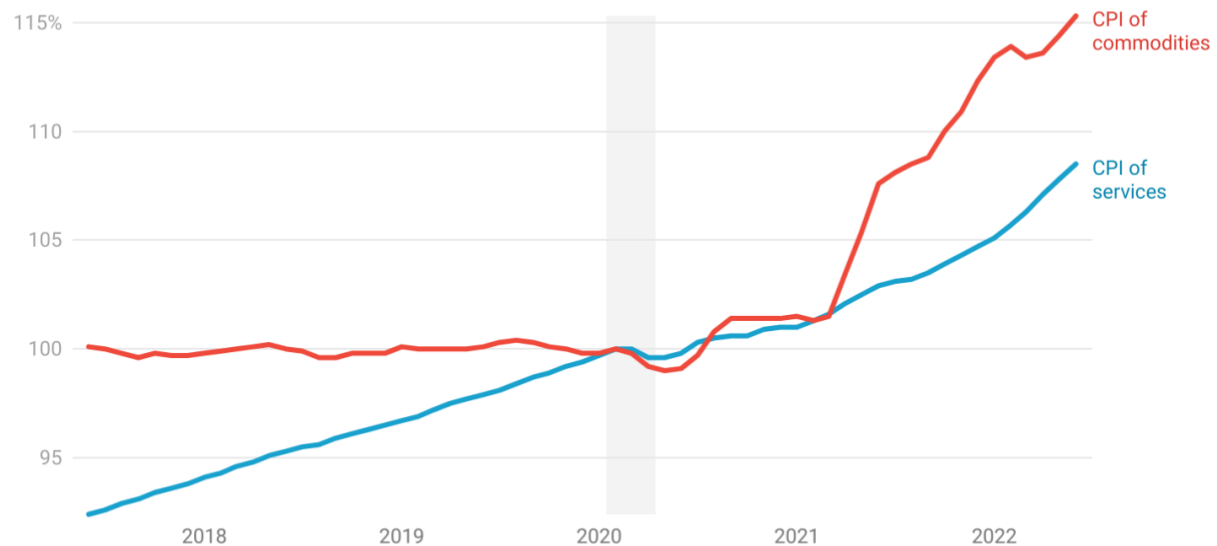
Compared with the previous expansion, commodities prices have diverged remarkably from the price of services. The core CPI—that is, the CPI less food and energy—has two component indices: the commodities less food and energy subindex, which tracks the prices of tangible goods that households purchase; and the services less energy services subindex, which tracks the prices of trade, transportation, health care, financial, and other services. Prior to the 2020 recession, the commodities price index was essentially flat, and the services price index was moving upward at a relatively steady rate, somewhat less than 2 percent annually. In the post-

recession period, the two indices diverged markedly, with commodities prices rising rapidly, especially after 2021. (see Figure 2) This divergence is hard to explain as a result of excess aggregate demand alone.

FIGURE 2

Commodities prices have risen more rapidly than services prices since 2021

Consumer price indexes (CPI) of services* and commodities,** 2017–2022



Hover or click to see values.

* Data from the Federal Reserve Bank of St. Louis are for "services less energy." ** Data are for "commodities less food and energy."

Chart: Center for American Progress • Source: U.S. Bureau of Labor Statistics data in Federal Reserve Bank of St. Louis (FRED), "Consumer Price Index for All Urban Consumers: Services Less Energy Services in U.S. City Average," available at <https://fred.stlouisfed.org/series/CUSR0000SASLE> (last accessed September 2022); U.S. Bureau of Labor Statistics data in FRED, "Consumer Price Index for All Urban Consumers: Commodities Less Food and Energy Commodities in U.S. City Average," available at <https://fred.stlouisfed.org/series/CUSR0000SACL1E> (last accessed September 2022).

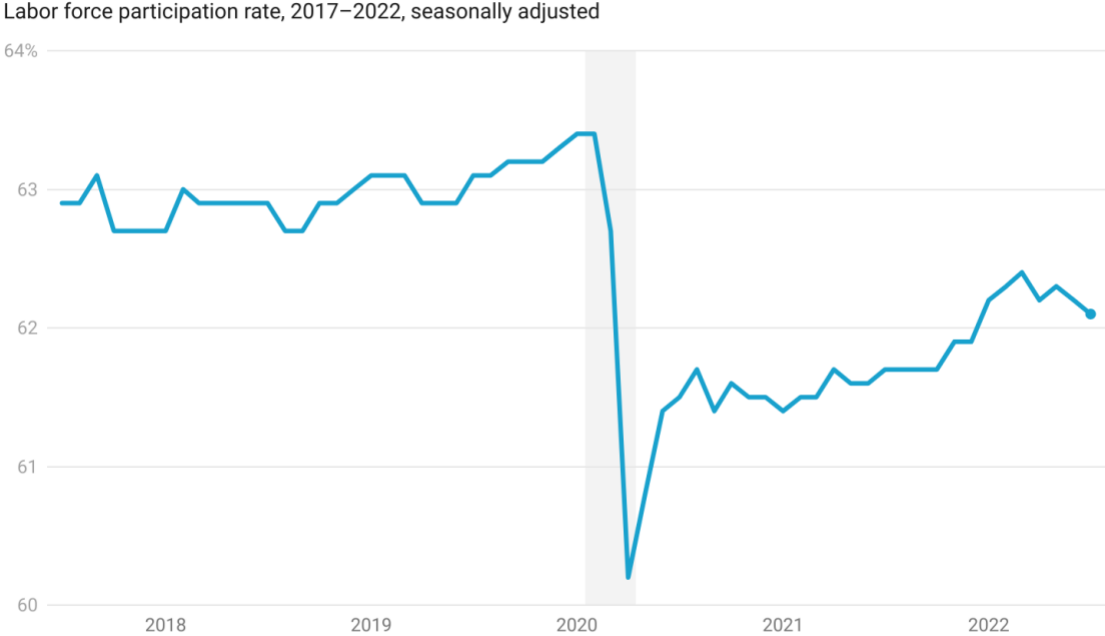
Explaining the core inflation anomalies

Negative supply shocks have played a major role in raising core CPI inflation: Reductions in labor supply have tightened labor markets, and pandemic-induced disruptions to global and domestic manufacturing supply chains have created unusual and unexpected shortages. As the economy has recovered, these supply shocks have added to price pressures. These effects have been amplified by shifts in consumer demand to goods in short supply and by corporate increases in price-cost margins.

Reductions in labor supply—caused by both the COVID-19 pandemic and abrupt changes in immigration policy—together with sustained employment growth have produced very tight labor markets. The result has been increased money wage growth, with low-wage workers experiencing real wage increases.

Although money wages are growing more rapidly than they were pre-recession—and, as a result, raising costs—there is no evidence of acceleration or a wage-price spiral. In July 2022, with continued strong job gains, employment climbed back above its pre-pandemic high. But the U.S. labor force was approximately equal to its February 2020 level.² This unusual stagnation is the consequence of two factors: First, the labor force participation rate fell markedly from its February 2020 level as the pandemic forced the economy into shutdown and workers left the labor force. Participation has yet to recover, (see Figure 3) and COVID-19 risk is the most likely explanation. If the current participation rate were equal to that in February 2020, there would be an additional 1.8 million people in the labor force.

FIGURE 3
U.S. labor force participation has not returned to its value before the 2020 recession



Hover or click to see values.
Chart: Center for American Progress • Source: U.S. Bureau of Labor Statistics data in Federal Reserve Bank of St. Louis, "Labor Force Participation Rate," available at <https://fred.stlouisfed.org/series/CIVPART> (last accessed August 2022).

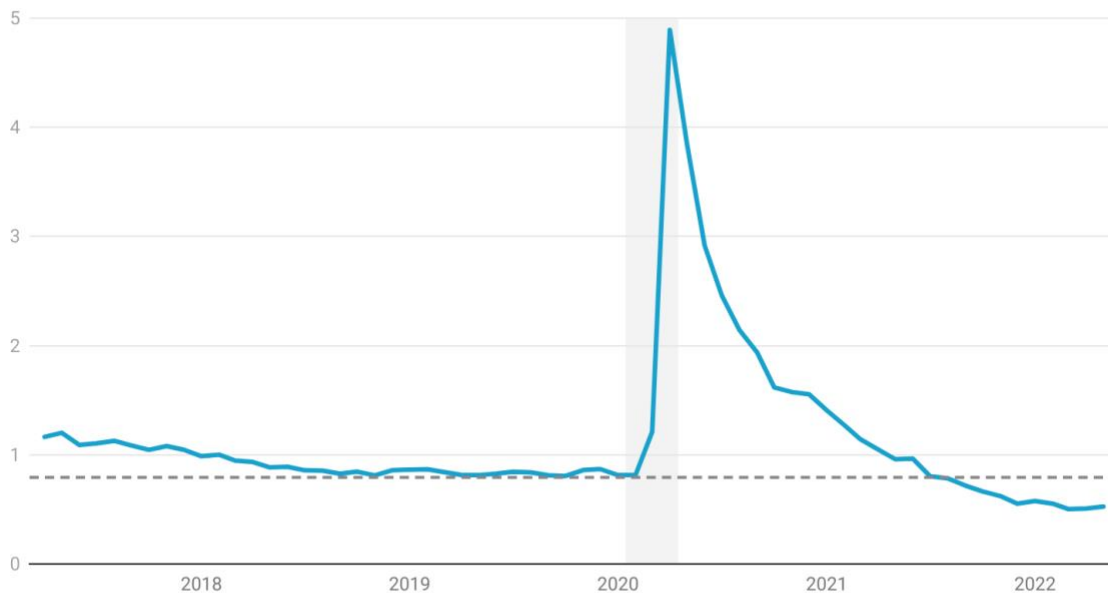
Second, labor force growth has been reduced by U.S. immigration restrictions. Deliberate policy decisions to reduce immigration under the prior administration, along with pandemic-related disruptions that have continued to affect immigration processing, have resulted in limited additions to the working-age population. Had immigration continued at the pre-2019 rate, there would have been approximately 2 million additional working-age immigrants in the United States by the end of 2021.³

Without these two labor supply shocks, the July 2022 labor force would be approximately 4.8 million workers larger, a 2 nearly 3 percent difference. This supply shortfall has had a measurable effect on the ratio of total people unemployed to total job vacancies—a recognized indicator of labor market tautness.⁴ In the run-up to the 2020 recession, this ratio was declining, reaching a value of 0.8 in February 2020. (see Figure 4) The recession caused massive unemployment, and the unemployed/vacancy rate spiked to nearly 5 in April 2020. As the economy recovered, this ratio declined, falling below 0.8 in July 2021 and reaching 0.5 in July 2022. With 3.5 4.8 million additional workers in the labor force, this ratio certainly would have been lower.⁵

FIGURE 4

Labor markets in the United States are tight

Ratio of the number of unemployed to the number of job vacancies, 2017–2022



Hover or click to see values.

Chart: Center for American Progress • Source: Author's calculations using U.S. Bureau of Labor Statistics data in Federal Reserve Bank of St. Louis (FRED), "Unemployment Level," available at <https://fred.stlouisfed.org/series/UNEMPLOY> (last accessed August 2022); and U.S. Bureau of Labor Statistics data in FRED, "Job Openings: Total Nonfarm," available at <https://fred.stlouisfed.org/series/JTSJOL> (last accessed August 2022).

The falling unemployment-to-vacancy ratio has been accompanied by increasing money wage growth. During the year before the 2020 recession, average annual earnings growth was about 3.1 percent. After fluctuating dramatically in the period between April 2020 and July 2021, average earnings began to grow more rapidly than in the pre-recession period, averaging about 5 percent annually between July 2021 and June 2022.⁶ With lower labor market pressure, money wage growth would very likely be lower.

It also should be noted that even though money wages are rising more rapidly than they were pre-recession, there is no evidence of acceleration in the past few months. In fact, the annualized rate of growth of average earnings has declined in the first six months of 2022, to 3.8 percent in June.⁷ These data do not point to a 1970s-style wage-price spiral, which can change expectations and make higher rates of inflation a more permanent issue. Moreover, there is nothing in the data that argues for permanently high levels of unemployment and slack labor markets. In 2019, the unemployment rate was identical to the current rate, the unemployment-to-vacancy ratio was 0.8, core inflation was about 2 percent, and real wages were growing at nearly 2 percent.⁸

It is also important to recognize that labor market tightness has delivered both employment and real wage growth to those who are lower in the wage distribution. As economists Joana Duran-French and Ira Regemi have pointed out:

Increasing wages for those earning the least is fundamental to ensuring an equitable economy that leaves no one behind. Wage increases among those who earn the least helps Black, brown, Latinx, and gender and sexual minorities most, as these communities are disproportionately represented in low-wage populations. For example, approximately 60 percent of low-wage earners are women, and wage increases at the bottom of the income distribution are likely to benefit nearly one-third of Black Americans and a quarter of Latinx Americans.⁹

A severe reduction in employment could reduce or reverse these gains.

Notably, pandemic-related disruptions in the supply of manufactured goods appear to have made a significant contribution to post-recession core inflation and its volatility. Parts of the U.S. economy are highly integrated into global supply chains, which have been repeatedly disrupted

by COVID-19 waves and lockdowns.¹⁰ This has reduced domestic availability of intermediate inputs and final goods and produced bottlenecks in cross-border transportation. These supply-side problems have had a measurable effect on prices.

The U.S. auto industry provides a canonical example of a negative global supply shock. Pandemic-related reduction in the supply of essential semiconductors has denied automakers an essential input.¹¹ As a consequence, U.S. auto production in May 2022 was about 28 percent below the pre-recession level. This decline in supply has been matched by a dramatic increase in overall vehicle prices. (see Figure 5) The scarcity of new cars has also driven up the price of used cars. From April 2021 to April 2022, new and used cars' price increases together added 1.17 percentage points to the overall CPI.¹²

FIGURE 5

The supply of new automobiles has declined, raising overall vehicle price

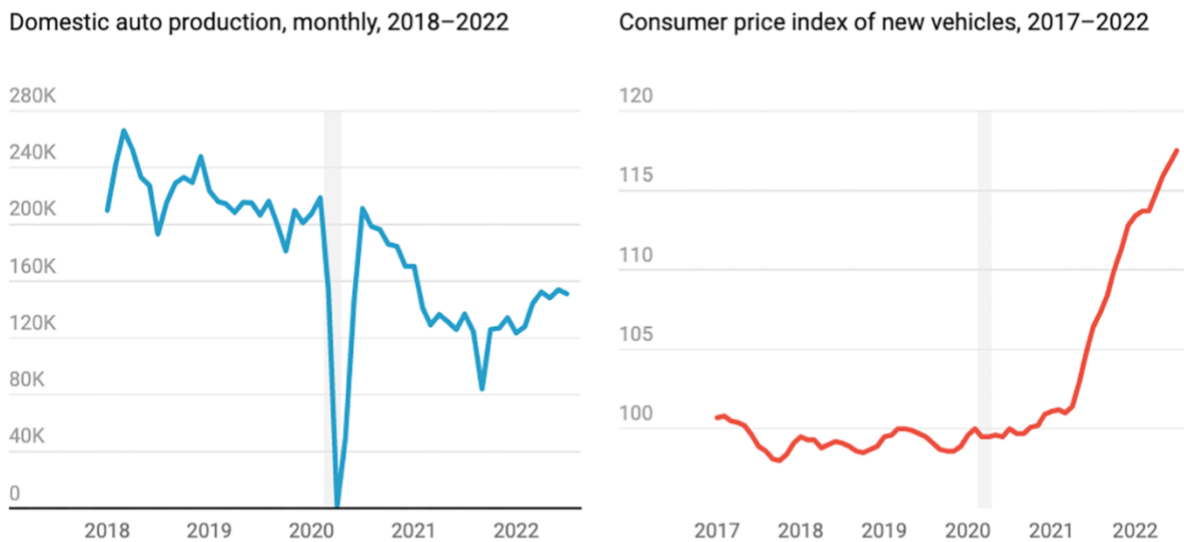


Chart: Center for American Progress. Sources: U.S. Bureau of Economic Analysis data in Federal Reserve Bank of St. Louis (FRED), "Domestic Auto Production," available at <https://fred.stlouisfed.org/series/DAUPNSA> (last accessed August 2022); U.S. Bureau of Labor Statistics data in FRED, "Consumer Price Index for All Urban Consumers: New Vehicles in U.S. City Average," available at <https://fred.stlouisfed.org/series/CUUR0000SETA01> (last accessed August 2022).

The importance of negative supply shocks to pandemic-era inflation has been confirmed by statistical analysis. The Federal Reserve Bank of New York has constructed a global supply chain pressure index (SCPI), a statistically weighted combination of several variables that reflect global supply disruptions.¹³ Deviations of the index from its mean value are highly correlated

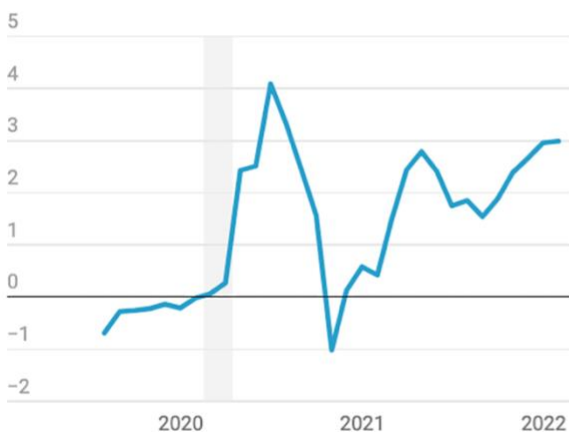
with changes in producer and consumer prices over the past 24 years.¹⁴ A statistical decomposition of post-2019 CPI inflation shows that the large increases in the SCPI during spring 2020 and summer 2021 made significant contributions to CPI growth, adding about 1 percentage point to the inflation total in early 2022.¹⁵

The co-movement of the U.S. SCPI—which measures global supply chain impacts affecting the United States specifically—with core CPI inflation is illustrated in Figure 6. As can be seen from the figure, directional changes of the U.S. SCPI generally match directional movements in core CPI.¹⁶ It also is worth noting that the U.S. SCPI increased strongly during the last quarter of 2021, when the United States and the rest of the world were hit by the delta COVID-19 variant. This global supply shock, together with domestic COVID-19 effects, may have contributed to the burst of core inflation during this quarter.

FIGURE 6

Supply shocks and core consumer price index (CPI) inflation have moved together during the recovery from the 2020 recession

Supply chain pressure index in the United States, in standard deviations from the mean



Monthly rate of core CPI inflation, 2019–2022

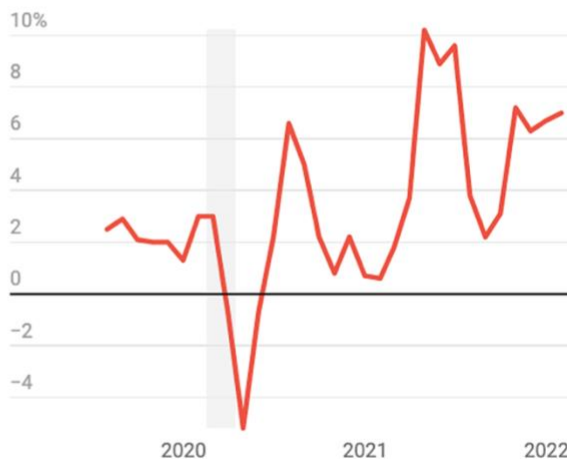


Chart: Center for American Progress. Sources: Gianluca Benigno and others, "Global Supply Chain Pressure Index: March 2022 Update," March 3, 2022, Federal Reserve Bank of New York, available at <https://libertystreeteconomics.newyorkfed.org/2022/03/global-supply-chain-pressure-index-march-2022-update/>; U.S. Bureau of Labor Statistics data in Federal Reserve Bank of St. Louis, "Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average," available at <https://fred.stlouisfed.org/series/CPIAUCSL> (last accessed August 2022).

Pandemic-induced changes in consumption behavior also added to commodities price inflation. Because of COVID-19 waves and lockdowns, U.S. households changed their expenditure patterns. Real expenditures on durable and nondurable goods rose significantly above pre-

recession levels during the first year of the recovery and moved sharply upward again during the first half of 2021. (see Figure 7) Econometric analysis confirms that, controlling for the increases in household disposable income produced by expansionary fiscal policy, changes in consumer behavior account for about half of the increases in durables spending.

FIGURE 7

Household consumption shifted to commodities during the recovery from the 2020 recession

Indexes of real durable goods and services consumption, 2020–2022

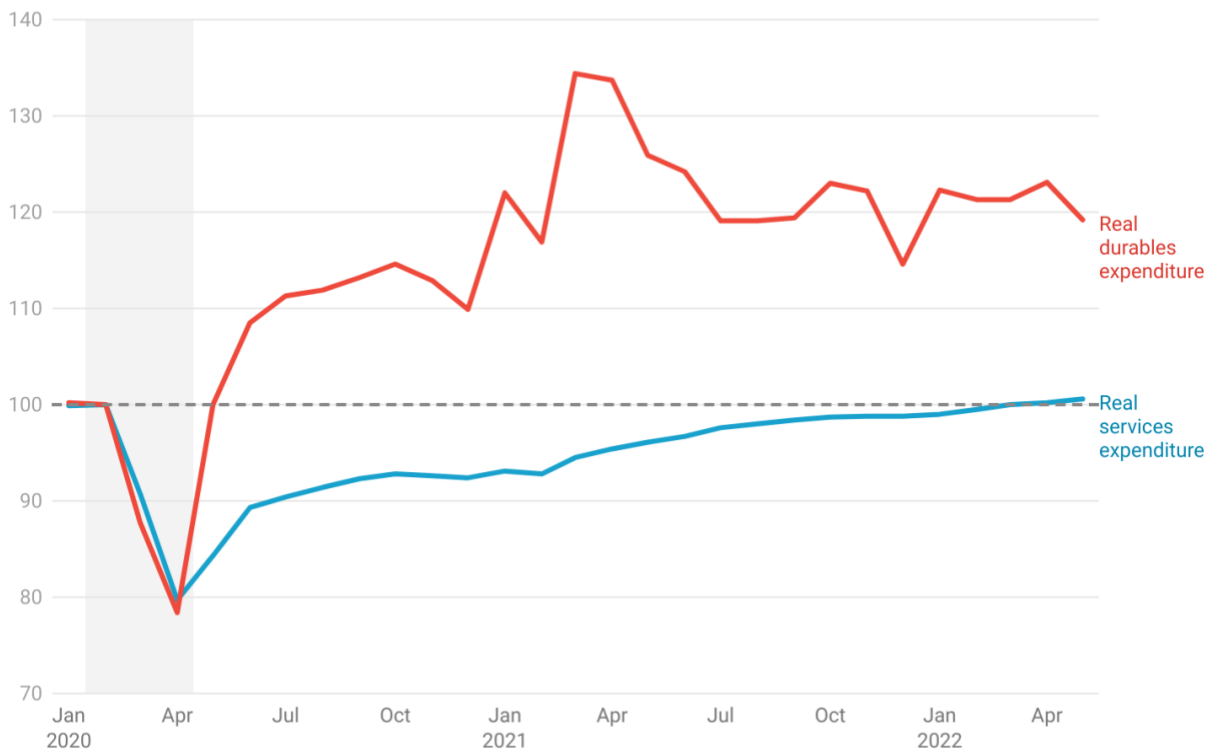


Chart: Center for American Progress • Source: U.S. Bureau of Labor Statistics data in Federal Bank of St. Louis (FRED), "Real Personal Consumption Expenditures: Durable Goods," available at <https://fred.stlouisfed.org/series/PCEDGC96> (last accessed August 2022); U.S. Bureau of Economic Analysis data in FRED, "Real Personal Consumption Expenditures: Services," available at <https://fred.stlouisfed.org/series/PCESC96> (last accessed August 2022).

These upward shifts in real demand for commodities, which were also roughly coincident with supply shocks, were accompanied by bursts of inflation in early 2020 and early 2021. (see Figure 8) There was a subsequent burst in late 2021, which came after durables demand had stabilized. That burst was coincident with the delta COVID-19 wave.

FIGURE 8

Volatile commodities inflation during the recovery from the 2020 recession reflects demand shifts and supply shocks

Monthly commodities and services inflation, annual rate of change, 2018–2022

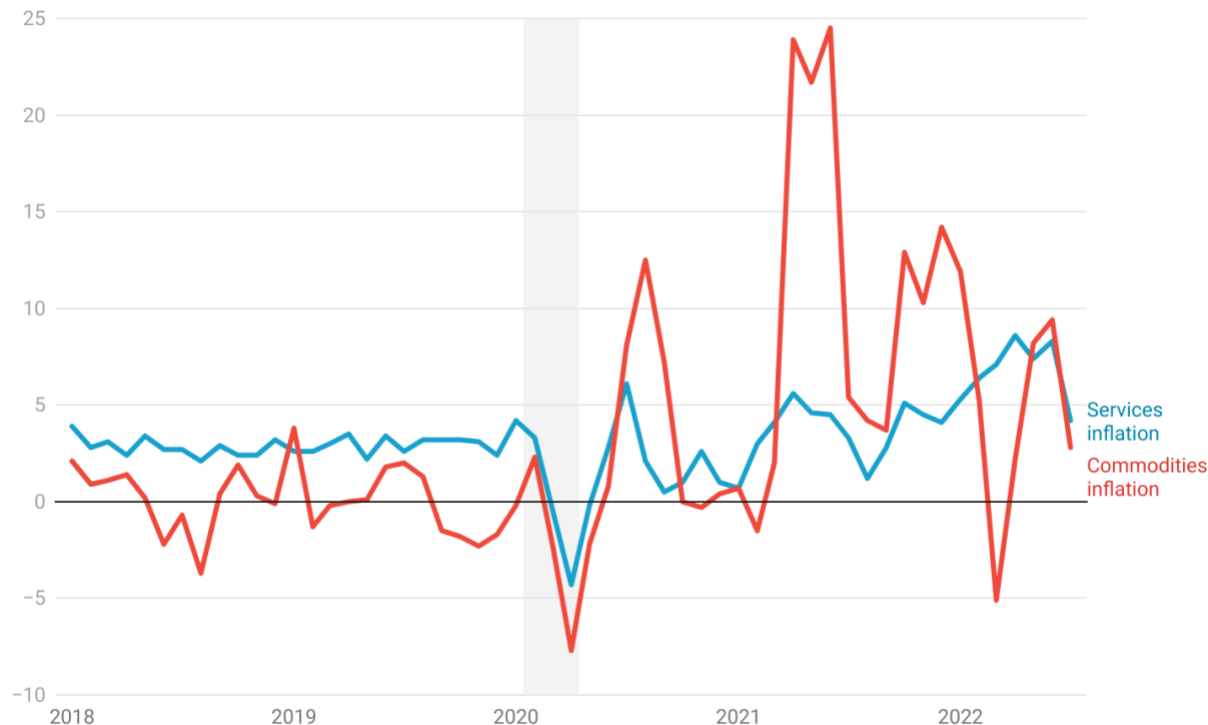


Chart: Center for American Progress • Source: U.S. Bureau of Labor Statistics data in Federal Reserve Bank of St. Louis (FRED), "Consumer Price Index for All Urban Consumers: Commodities Less Food and Energy Commodities in U.S. City Average," available at <https://fred.stlouisfed.org/series/CUSR0000SACL1E> (last accessed August 2022); U.S. Bureau of Labor Statistics data in FRED, "Consumer Price Index for All Urban Consumers: Services Less Energy Services in U.S. City Average," available at <https://fred.stlouisfed.org/series/CUSR0000SASLE> (last accessed August 2022).

There has been lively discussion about the effect of corporate pricing decisions on inflation. For example, researchers at the Roosevelt Institute have shown, using firm-level accounting data, that average markups for publicly traded firms jumped measurably in 2021.¹⁷ Increasing markups will raise prices, *ceteris paribus*. When mark-ups are constant, prices will change in proportion to costs. But when markups are increasing, because of temporary or permanent increases in market power, the percentage change in price will exceed the percentage change in costs.

These insights are consistent with what can be seen in a business cycle framework, using national income data. Estimated markups for the nonfinancial corporate (NFC) sector are graphed in Figure 9.¹⁸ The figure includes data for two business cycles.¹⁹ In both the 2009 and

2020 recoveries, markups rose as the expansion got under way. This is consistent with previous business cycles; markups typically increase at the beginning of a recovery.

FIGURE 9

Nonfinancial corporate markups have risen rapidly in the recovery from the 2020 recession

Average percent markup over cost for nonfinancial corporations, 2005–2022

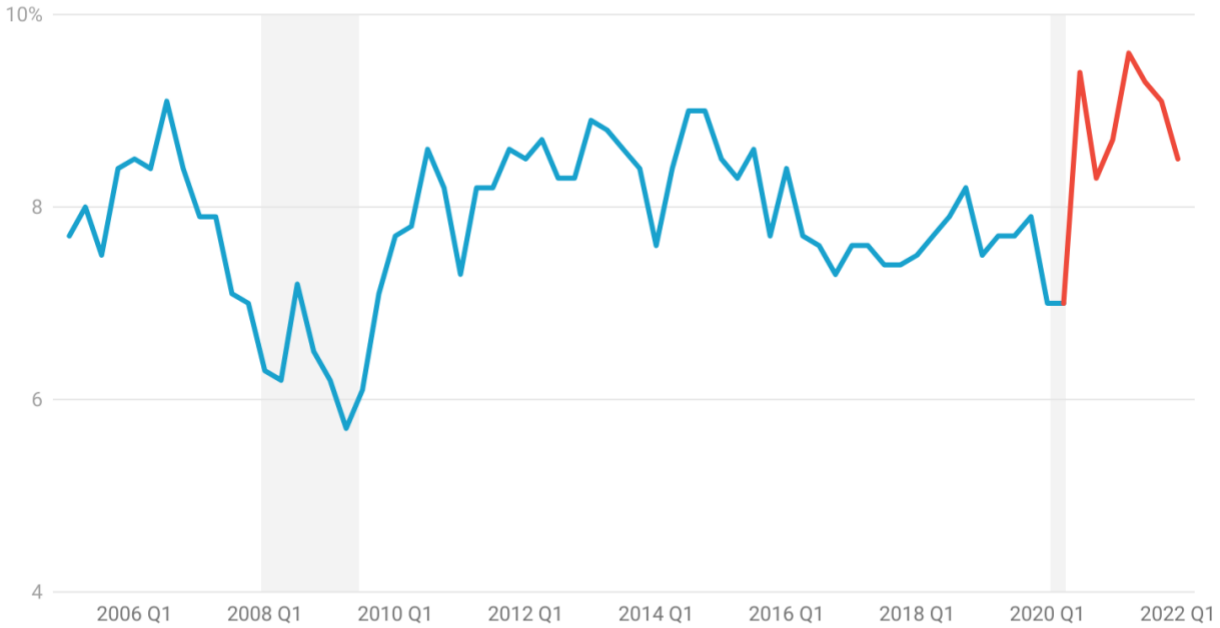


Chart: Center for American Progress • Source: Author's calculations from U.S. Bureau of Economic Analysis, "Gross Output by Industry," available at <https://apps.bea.gov/iTable/iTable.cfm?reqid=150&step=2&isuri=1&categories=gdpind> (last accessed August 2022); U.S. Bureau of Economic Analysis, "Value Added by Industry," available at <https://apps.bea.gov/iTable/iTable.cfm?reqid=150&step=2&isuri=1&categories=gdpind> (last accessed August 2022); U.S. Bureau of Economic Analysis data in Federal Reserve Bank of St. Louis (FRED), "Gross value added of nonfinancial corporate business," available at <https://fred.stlouisfed.org/series/A455RC1Q027SBEA> (last accessed August 2022); U.S. Bureau of Economic Analysis data in FRED, "Gross value added of nonfinancial corporate business," available at <https://fred.stlouisfed.org/series/A455RC1Q027SBEA> (last accessed August 2022); and Board of Governors of the Federal Reserve System data in FRED, "Nonfinancial Business; Corporate Profits Before Taxes Including IVA and CCAj, Transactions," available at <https://fred.stlouisfed.org/series/BOGZ1FA146060035Q> (last accessed August 2022).

However, the increase in markups in the 2020 recovery has been higher than those in the 2009 recovery. During the 2009 recovery, the average of the trough value and the subsequent seven quarters was 7.6 percent. During this recovery, the average was 8.7 percent. That is, in this recovery, rising markups increased NFC prices by about 1 percentage point more than they did in the previous recovery. These data, together with the other data cited above, show that prices grew proportionally more than costs during this recovery. That, by definition, has added to price inflation and to corporate profits. Corporate exercise of market power has had a measurable effect.

Core inflation summary

The data show that negative supply shocks have significantly raised core CPI inflation, reduced labor supply has contributed to tight labor markets, and pandemic-induced disruptions to global and domestic manufacturing supply chains have created unexpected shortages. This has created unusual price pressure as the economy has recovered, which has been amplified by shifts in consumer demand to goods in short supply and by corporate increases in price-cost margins.

Factors influencing energy and food inflation

The prices of energy and food increased rapidly beginning in 2021. From August 2021 to August 2022, energy added 1.7 percentage points to CPI year on year, and food added 1.5 percentage points. This is a large fraction of the overall 8.3 percent increase. It is also a dramatic change from the pre-recession period. During 2019, energy contributed 0.25 percentage points, and food contributed 0.24 percentage points to CPI growth.²⁰

The movements in energy prices have been driven by increases in worldwide demand, OPEC-coordinated reductions in supply, and disruptions caused by Russia's invasion of Ukraine, while U.S. food price movements have been caused by drought, increased input costs, and supply shocks related to the invasion of Ukraine.

Energy increases

Crude oil

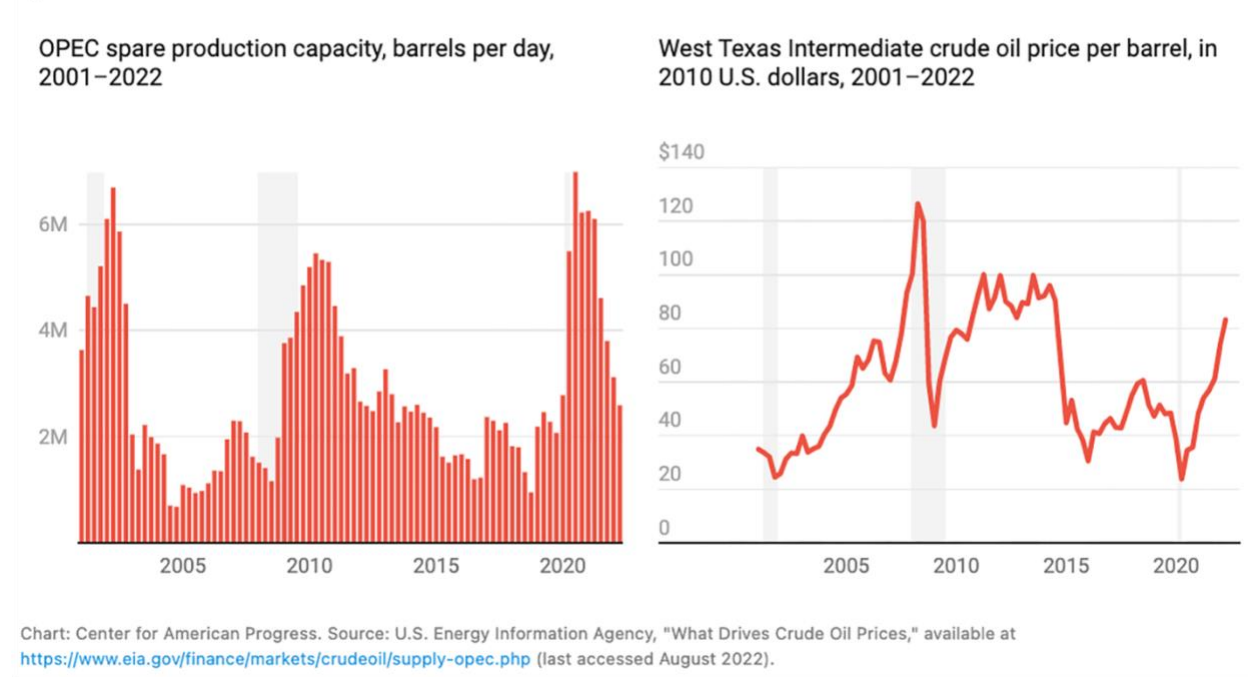
Crude oil prices, which are determined in a world market, rose as the world economy recovered from the effects of the pandemic. The price of West Texas Intermediate crude oil, for instance, increased, in 2010 dollars, from \$23.85 per barrel (bbl) in the first quarter of 2020 to \$83.03/bbl in the second quarter of 2022.²¹ The decision of the OPEC cartel to reduce production beginning in 2020, together with increased worldwide demand and disruption of the oil market caused by Russia's invasion of Ukraine, caused the large run-up in price.

Because OPEC produces about 40 percent of world oil supply, the cartel's production decisions have a huge effect on world oil supply. In 2020, OPEC reduced production levels, and this was

reflected in rising spare production capacity. (see Figure 10) Prices began to rise soon thereafter, and the worldwide recovery in economic activity raised demand further. Meanwhile, the invasion of Ukraine created expectations that world oil supply would be reduced still more, boosting crude prices. It appears, however, that the effects of the Ukraine invasion may dissipate rather quickly. Despite sanctions in the West, China and India have taken the place of Europe as buyers of Russian oil. This means that overall supply may be essentially unchanged by the sanctions.

FIGURE 10

Reduced OPEC supply and the global economic recovery have raised crude oil prices since 2020



Refined product prices

Rising oil prices have been the principal determinant of rising gasoline prices during the recovery, but data from the U.S. Energy Information Agency (EIA) indicate that refiner markups over crude oil costs—which is the principal variable input cost—have made a substantial contribution to gasoline prices. The difference between oil acquisition costs and the wholesale price of gasoline rose from around \$0.45 per gallon during 2021 to \$1.39 in June 2022.

This difference—or the “crack spread,” in industry jargon—has risen because refining capacity has decreased by nearly 5 percent since 2020. At present, refineries are operating near capacity with gasoline imports comprising only a small fraction of supply. This has given refiners increased market power.²²

Despite the rising cost of gasoline and its influence on inflation expectations, current household expenditures on gasoline as a share of disposable income are not unusually high. As the EIA has noted, “Gasoline expenditures averaged 2.6% of disposable personal income in the first quarter of 2022. This percentage is between the 2.4% average over the March 2015 to March 2020 period and the peak of 4.2% in 2008.”²³ The expenditure share is, of course, dramatically higher than it was in 2020, when the effects of the pandemic briefly created a negative price for crude.

Natural gas

The United States is a net exporter of natural gas, but an unusually cold winter has left stocks at below-normal levels, contributing to increasing prices. In addition, increased demand for U.S. liquid natural gas exports, caused by the war in Ukraine and Russian restrictions on exports to the European Union, has raised price pressure. As a result, domestic natural gas prices are more than double the level of a year ago.²⁴ These natural gas price increases have, likewise, raised the price of nitrogen-based fertilizer, which is made from natural gas.

Food price increases

World food prices have risen rapidly over the past year. The global economic recovery has raised demand, and supply has been disrupted by the war in Ukraine, the reduced supply of agricultural inputs, and extreme weather. While the world food price index has declined from its peak value in March, the year-on-year increase in July 2022 was 13.1 percent.²⁵

The Russian invasion interfered with Ukrainian exports of crops such as wheat, corn, barley, and sunflower oil. Ukraine has a 10 to 15 percent share of global trade in those three grains and an 80 percent share of world trade in sunflower oil, raising prices for all these commodities in world markets.²⁶

In addition, the world price of several important agricultural inputs has been raised by supply disruptions. The prices of three main fertilizers used in U.S. crop production—phosphate (phosphorus), potash (potassium), and urea (nitrogen)—have risen rapidly since 2020.²⁷ Export restrictions on all three fertilizers, imposed by Russia, China, and other countries since 2021, have reduced world trade for each by 20 percent.²⁸ Moreover, rising fuel prices have increased farm operating costs.

Drought, too, has reduced agricultural output in many parts of the world, including parts of the United States. This has affected the production and stocks of feed crops, such as hay, and livestock such as cattle.²⁹

Energy and food inflation summary

The post-pandemic recovery has taken place in an environment of reduced energy and food supplies. OPEC, which supplies about 40 percent of crude worldwide, reduced production beginning in 2020. Domestic weather has reduced natural gas inventories in the United States, causing natural gas prices to rise. Additionally, reductions in refining capacity since 2020 have increased the market power of U.S. refiners, and gasoline prices have risen more rapidly than the cost of crude oil. And as previously noted, the invasion of Ukraine decreased supply of fertilizers and drought disrupted food supplies, which has contributed to the rapid growth in food prices.

As in the case of core prices, supply limitations are playing an important role in both energy and food inflation.

What happens next

The current price inflation comes from multiple sources, but the Federal Reserve Board has only the blunt tool of demand reduction to deal with it. The Fed has begun raising interest rates to reduce demand for goods, services, and labor. If rates are raised enough, output and employment will be reduced, price and money wages changes will slow, and, eventually, core price inflation will be reduced. However, the Fed's attempt to reach its 2 percent inflation target could produce a very large reduction in demand, leading to big losses in output and employment.

In these circumstances, it makes sense to explore ways to address the supply disruptions that are affecting the current expansion and may constrain growth in the future. Fortunately, the Biden administration has taken several steps to resolve supply problems. It has made a major effort to reduce the transportation bottlenecks at West Coast ports, the primary destination for containerized shipments from Asia. Moreover, it is releasing crude oil from the Strategic Petroleum Reserve (SPR) to counter crude price increases and is entering into forward contracts to refill the SPR to encourage increased domestic shale oil production.³⁰ Recently the U.S. Department of Commerce released a strategy for a \$50 billion semiconductor investment, funded by the CHIPS and Science Act, designed to increase domestic production of both advanced and mature semiconductors.³¹

In addition, there are several other steps that could help in the short to medium term, including:

- **Expanding the uptake of COVID-19 vaccines to reduce labor and manufacturing supply shocks:** The COVID-19 pandemic continues, and new variants may lead to another wave of infections. The negative effects on labor supply, the operation of the economy, and the functioning of the global manufacturing supply chain also continue. Since vaccination is the most effective method of slowing the spread of the virus, increased vaccine uptake can help resolve supply limitations as well.

There is a need for additional federal funding to maintain the COVID-19 relief effort, improve public health infrastructure, and support continuing research and development of vaccines to provide immunity against new variants.³²

- Providing additional support for child and home care to raise labor force participation:** When employable adults must care for children or relatives, their rate of labor force participation declines. However, when employable adults have access to quality, affordable child or home care, which is complementary to the income rewards of working, their participation rates rise.³³ Since reduced participation is contributing to the current inflation surge, increased child and home care support would clearly be helpful.
- Reducing limits on working-age immigration to increase labor supply:** Immigration of working-age adults fell sharply after 2019, measurably reducing labor force growth. Additionally, about half of working-age immigrants have college degrees, and the sharp drop in immigration deprived the labor force of these skilled workers. Increased immigration rates would help resolve labor shortages in several sectors of the economy.
- Intensifying antitrust enforcement to reduce the market power of corporations:** It is now widely understood that the market power of corporations has increased significantly in recent decades.³⁴ This has allowed price-cost margins to widen and profits to rise above competitive levels. However, the evidence from this recession and recovery demonstrates that supply shocks create novel opportunities to exercise market power and raise margins—perhaps by providing cover for price increases. A more vigorous approach to antitrust enforcement, which would increase entry of new competitors, would reduce market power and should reduce the inflationary effects of future supply shocks.
- Increasing the supply of renewable energy and eliminating reliance on fossil fuels to limit energy supply shocks:** Increasing the supply of renewable energy and eliminating reliance on fossil fuels would help reduce the risk of energy-related inflation shocks. Supply conditions in the world market for oil are heavily influenced by OPEC, which controls spare production capacity. U.S. capacity is limited because domestic producers are unwilling to invest.³⁵ Increased supply of renewable energy, however, would allow substitution away from fossil fuel, diminishing the effect of increased demand on energy prices.

Moreover, the frequency of extreme weather events, which lower crop and livestock yields, will only rise unless carbon emissions are better controlled. Droughts have contributed to

current high food prices, and preventing increased frequency and severity is extraordinarily important.

In addition, empirical work has shown that as temperatures trend upward, labor force participation and productivity both decline. Outdoor work, in sectors such as agriculture and construction, is affected most intensely. Model estimates show that the effective U.S. labor supply will be reduced as average temperatures increase by 1.5 degrees Celsius or more above preindustrial levels.³⁶ As recent events have shown, relatively small reductions in labor supply can impact inflation.

Two recently passed pieces of legislation, which are among the most consequential contributions to industrial policy in decades, will make important contributions to eliminating reliance on fossil fuels. Initiatives in the CHIPS and Science Act will support renewable energy research along with much-needed initiatives to facilitate incorporation of scientific discoveries into manufacturing products and processes.³⁷ Initiatives in the Inflation Reduction Act, likewise, will dramatically increase renewable supply by providing subsidies for clean energy production and domestic manufacture of clean energy technologies. The Inflation Reduction Act also includes important support for incentivizing household purchases of electric vehicles, solar panels, and other clean technology.³⁸ By increasing the supply of renewable energy and reducing the demand for fossil fuels, these two bills will help mitigate climate change.

These and other initiatives in the CHIPS Act and Inflation Reduction Act take important steps toward limiting destructive climate change. They will also deliver the nontrivial benefit of reducing the inflation constraint on economic growth. When additional climate policy actions are considered, inflation-reducing effects should be included in the decision-making calculus.

Conclusion

The current inflation owes a lot to supply conditions that have been anything but normal. COVID-19 has thoroughly disrupted manufacturing and reduced labor supply. Crude oil markets have been strongly affected by OPEC's 2020 decision to lower production. Food supplies have been hit both by Russia's invasion of Ukraine and by extreme weather. Moreover, corporations with market power have exercised it freely during the recovery.

These supply problems are unlikely to resolve themselves quickly or completely. COVID-19 continues to disrupt markets for labor, products, and services. OPEC continues to have a dominant role setting world crude oil prices. Climate change continues to produce extreme weather. And domestic corporations continue to exercise monopoly power whenever they see the chance.

This changed economic landscape calls for a broader approach to inflation policy. Relying exclusively on Fed demand management is far too passive. Things will greatly improve if economic policy addresses the supply issues brought into high relief during this recovery. The policy measures discussed above provide a reasonable starting point. Adopting them will relax the inflation constraint on output and employment growth. Moreover, they will provide important benefits to public health, families, and climate. There is much to be gained from a change in approach.

Endnotes

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- ¹ U.S. Bureau of Labor Statistics, “Table 7. Consumer Price Index for All Urban Consumers (CPI-U): U.S. city average, by expenditure category, 12-month analysis table,” available at <https://www.bls.gov/news.release/cpi.t07.htm> (last accessed September 2022).
- ² The civilian labor force was 164.58 million in February 2020 and 163.96 million in July 2022. See Federal Reserve Bank of St. Louis, “Civilian Labor Force Level [CLF16OV],” available at <https://fred.stlouisfed.org/series/CLF16OV> (last accessed September 2022).
- ³ Giovanni Peri and Reem Zajour, “Labor Shortages and the Immigration Shortfall,” EconoFact, January 11, 2022, available at <https://econofact.org/labor-shortages-and-the-immigration-shortfall>.
- ⁴ Regis Barnichon and Adam Hale Shapiro, “What’s the Best Measure of Economic Slack?,” Federal Reserve Bank of San Francisco, February 22, 2022, available at <https://www.frbsf.org/economic-research/publications/economic-letter/2022/february/what-is-best-measure-of-economic-slack/>.
- ⁵ Calculating the counterfactual effect of increased labor supply would require the use of a macroeconomic model. For example, increased employment would have multiplier effects on output, which would in turn affect vacancies. But one can get a rough idea of the effect of increased supply by doing some arithmetic. Assume that the July unemployment rate of 3.5 percent holds for all workers and that an additional 2 million foreign-born workers participate at their current rate of 66.1 percent. Then, the addition of 4.8 million workers to the workforce would reduce total vacancies by 4.6 million and raise the number of unemployed by 166,000, reducing the ratio of unemployed to vacancies to 0.89.
- ⁶ Earnings growth rates are calculated as averages of continuously compounded monthly growth at an annual rate, using Federal Reserve Bank of St. Louis, “Average Hourly Earnings of All Employees, Total Private [CES0500000003],” available at <https://fred.stlouisfed.org/series/CES0500000003> (last accessed September 2022).
- ⁷ Ibid.
- ⁸ Using individual survey data from the Current Population Survey and adjusting for changes in the composition of the labor force, economists at the Federal Reserve Bank of Dallas have calculated that real average hourly earnings growth in 2019 averaged 1.9 percent. See Sean Howard, Robert Rich, and Joseph Tracy, “Real Wages Grew During Two Years of Covid-19 After Controlling for Workforce Composition,” Federal Reserve Bank of Dallas, February 15, 2022, available at <https://www.dallasfed.org/research/economics/2022/0215.aspx>.
- ⁹ Joana Duran-Franch and Ira Regmi, “Increasing Wages for Low-Income Workers Is Key for a Full Economic Recovery,” Roosevelt Institute, April 4, 2022, available at <https://rooseveltinstitute.org/2022/04/04/increasing-wages-for-low-income-workers-is-key-for-a-full-economic-recovery/>.
- ¹⁰ See, for example, Sebastian Heise, “How Did China’s COVID-19 Shutdown Affect U.S. Supply Chains?,” Liberty Street Economics, May 12, 2020, available at <https://libertystreeteconomics.newyorkfed.org/2020/05/how-did-chinas-covid-19-shutdown-affect-us-supply-chains/>.
- ¹¹ Supply was interrupted when auto component manufacturers canceled orders for semiconductors, anticipating a pandemic-induced decline in auto demand. Important chip foundries shifted production to the higher-value chips used in consumer goods, which experienced rising demand because of the pandemic. The supply of auto chips has not fully recovered. See Manpreet Singh, “Semiconductor Shortage Constrains Vehicle Production” (Washington: Congressional Research Service, 2021), available at <https://crsreports.congress.gov/product/pdf/IF/IF12000>.
- ¹² U.S. Bureau of Labor Statistics, “Consumer Price Index News Release,” Press release, May 11, 2022, Table 7, available at https://www.bls.gov/news.release/archives/cpi_05112022.htm.
- ¹³ Index variables include purchasing managers’ index (PMI) survey data on delivery time, order backlogs, and inventory accumulation, which track how smoothly domestic production and delivery systems are functioning. They also include measures of cross-border seaborne and air transportation costs, which are proxies for capacity constraints in global transport. Since each of these variables are determined by both demand and supply factors, statistical techniques are used to eliminate demand effects from each constituent variable before it is used in the index. See Gianluca Benigno and others, “A New Barometer of Global Supply Chain Pressures,” Liberty Street Economics, January 4, 2022, available at <https://libertystreeteconomics.newyorkfed.org/2022/01/a-new-barometer-of-global-supply-chain-pressures/>.
- ¹⁴ Ozge Akinci and others, “The Global Supply Side of Inflationary Pressures,” Liberty Street Economics, January 28, 2022, available at <https://libertystreeteconomics.newyorkfed.org/2022/01/the-global-supply-side-of-inflationary-pressures/>.

¹⁵ Giancarlo Benigno and others, “The GSCPI: A New Barometer of Global Supply Chain Pressures” (New York: Federal Reserve Bank of New York, 2022), available at https://www.newyorkfed.org/research/staff_reports/sr1017.

¹⁶ The first few months of the recovery, when prices declined dramatically because of lockdowns and related disruption to the economy, are an exception.

¹⁷ Mike Konczal and Niko Lusiani, “Prices, Profits and Power: An Analysis of 2021 Firm Level Markups” (New York: Roosevelt Institute, 2022), available at https://rooseveltinstitute.org/wp-content/uploads/2022/06/RI_PricesProfitsPower_202206.pdf.

¹⁸ A little manipulation shows that $R = (\text{NFC profits} / \text{NFC sales}) = 1 - (1 / (1 + m))$, where $(1 + m)$ is the gross markup. So, finding a value for the share of profits in sales revenue allows calculation of the markup, since $m = (R / (1 - R))$. NIPA data for the nonfinancial corporate sector, available at quarterly frequencies, is an obvious place to look for a representative share estimate. Unfortunately, while BEA releases data on NFC profits, it does not release data on NFC sales. However, since national income and product accounts (NIPA) sales data and gross value-added data are available for all nonfinancial business, there is a workaround. Start with the identity $R \times (\text{NFC sales} / \text{NFC gva}) = (\text{NFC profits} / \text{NFC gva})$, where “gva” is gross value added. If one assumes that the ratio (nonfinancial business sales / nonfinancial business gva) equals the ratio (NFC sales / NFC gva), the value of R can then be calculated. It should be emphasized that this calculation is based on the assumption that nonfinancial business and nonfinancial corporate business have the same profits / gva ratio.

¹⁹ The trough of the 2007 recession occurred in the second quarter of 2009, and the trough of the 2020 recession occurred in the second quarter of 2020.

²⁰ U.S. Bureau of Labor Statistics, “Table 7. Consumer Price Index for All Urban Consumers (CPI-U).”

²¹ U.S. Energy Information Administration, “What drives crude oil prices: Supply OPEC,” available at <https://www.eia.gov/finance/markets/crudeoil/supply-opec.php> (last accessed September 2022).

²² U.S. Energy Information Administration, “Petroleum & Other Liquids: Supply and Disposition,” available at https://www.eia.gov/dnav/pet/pet_sum_snd_a_epm0f_mbb1_m_cur.htm (last accessed September 2022); Kevin Hack, “EIA expects high refinery margins to contribute to increasing fuel production this summer,” U.S. Energy Information Administration, June 10, 2022, available at <https://www.eia.gov/todayinenergy/detail.php?id=52718>; U.S. Energy Information Administration, “Short-Term Energy Outlook: Petroleum Products,” available at <https://www.eia.gov/outlooks/steo/marketreview/petproducts.php> (last accessed September 2022).

²³ U.S. Energy Information Administration, “Short-Term Energy Outlook: Retail Gasoline Expenditures” (Washington: 2022), available at https://www.eia.gov/outlooks/steo/special/supplements/2022/2022_sp_01.pdf.

²⁴ U.S. Energy Information Administration, “Natural Gas Weekly Update,” available at <https://www.eia.gov/naturalgas/weekly/#tabs-supply-1> (last accessed September 2022).

²⁵ U.N. Food and Agricultural Organization, “World Food Situation,” available at <https://www.fao.org/worldfoodsituation/foodpricesindex/en/> (last accessed September 2022).

²⁶ Foreign Agricultural Service, “The Ukraine Conflict and Other Factors Contributing to High Commodity Prices and Food Insecurity” (Washington: U.S. Department of Agriculture, 2022), available at <https://www.fas.usda.gov/data/ukraine-conflict-and-other-factors-contributing-high-commodity-prices-and-food-insecurity>; John Baffes and Kaltrina Temaj, “Food prices continued their two-year-long upward trajectory,” World Bank Blogs, May 25, 2022, available at <https://blogs.worldbank.org/opendata/food-prices-continued-their-two-year-long-upward-trajectory>.

²⁷ Aaron Smith, “The Story of Rising Fertilizer Prices,” *Agricultural and Resource Economics* 25 (3) (2022): 1–4, available at https://s.giannini.ucop.edu/uploads/pub/2022/02/24/v25n3_1.pdf.

²⁸ Since nitrogen-based fertilizer is made from natural gas, natural gas shortages have also helped raise the supply price of nitrogen fertilizer. See Charlotte Hebebrand and David Laborde, “High fertilizer prices contribute to rising global food security concerns,” International Food Policy Research Institute, April 25, 2022, available at <https://www.ifpri.org/blog/high-fertilizer-prices-contribute-rising-global-food-security-concerns>.

²⁹ Economic Research Service, “Drought in the Western United States,” available at <https://www.ers.usda.gov/newsroom/trending-topics/drought-in-the-western-united-states/> (last accessed September 2022).

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³³ See H. Boushey, Lisa Barrow, and Kevin Rinz, “Supporting Labor Supply in the American Jobs Plan and the American Families Plan,” The White House, May 28, 2021, available at <https://www.whitehouse.gov/cea/written-materials/2021/05/28/supporting-labor-supply-in-the-american-jobs-plan-and-the-american-families-plan/>; Richard Frank and Jonathan Gruber, “Impacts of Better Care Better Jobs Act on Home Care and Jobs,” Medium, July 15, 2021, available at <https://gruberj.medium.com/impacts-of-better-care-better-jobs-act-on-home-care-and-jobs-d0ff8d1e4154>; Christian Weller and others, “Making Care Work Pay: How Paying at Least a Living Wage to Direct Care Workers Could Benefit Care Recipients, Workers, and Communities” (Washington: The LeadingAge LTSS Center @UMass Boston, 2020), available at <https://www.ltsscenter.org/wp-content/uploads/2020/09/Making-Care-Work-Pay-Report-FINAL.pdf>.

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