## Prefatory Note

The attached document represents the most complete and accurate version available based on original files from the FOMC Secretariat at the Board of Governors of the Federal Reserve System.

Please note that some material may have been redacted from this document if that material was received on a confidential basis. Redacted material is indicated by occasional gaps in the text or by gray boxes around non-text content. All redacted passages are exempt from disclosure under applicable provisions of the Freedom of Information Act.

Content last modified 1/10/2025.

# Report to the FOMC on Economic Conditions and Monetary Policy

## Book A

Economic and Financial Conditions:
Outlook, Risks, and Policy Strategies

September 6, 2019

Prepared for the Federal Open Market Committee
by the staff of the Board of Governors of the Federal Reserve System

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# Domestic Economic Developments and Outlook

Although the escalation of trade tensions and rising concerns about global growth have roiled financial markets both here and abroad in recent weeks, the domestic data releases have been relatively anodyne and continue to suggest economic activity is expanding at a solid pace this year. GDP increased 2.5 percent in the first half, and the latest readings on consumer spending and the labor market shore up our expectation of moderate output gains in the second half—despite anticipated declines in business investment. We are currently writing down average growth of 1.8 percent in the second half as our baseline projection. That said, when we tote up the risks that seem the most salient—including further worsening of trade tensions and adverse political and economic developments abroad—they are clearly slanted to the downside.

Although these downside risks extend beyond this year, our modal projection continues to call for only a modest further deceleration in economic activity that largely reflects a waning impetus from fiscal policy. After increasing 2.1 percent this year, GDP growth is expected to slow steadily over the forecast period to 1.7 percent in 2022. We project essentially no further labor market tightening after 2019, with the unemployment rate holding steady at 3.6 percent over the next few years.

Relative to the July Tealbook, GDP growth is revised somewhat lower in response to weaker data on net exports, our outlook for foreign growth, a stronger dollar, and lower readings on expected longer-run profits. The cumulative effect of these factors was only partly offset by a lower path for interest rates and a large upward revision to disposable personal income in recent quarters. Combined with some updates to our aggregate supply assumptions for the past few years—namely, a reduction in our natural rate of unemployment and a higher level of structural productivity—these changes to the forecast led to a sizable reduction in our assessment of the economy's tightness. All told, we now project that the output gap will be 1.4 percent by the end of the projection period, 0.7 percentage point narrower than our earlier estimate.

Monthly readings on core PCE prices were higher over the April to July period than in the first quarter, and we continue to anticipate that the 12-month change in core prices will move up from the latest reading of 1.6 percent in July to 1.8 percent by the end of 2019. We now expect core inflation to remain at 1.8 percent through the medium

## Revisions to the Staff Projection since the Previous SEP

The FOMC most recently published its Summary of Economic Projections, or SEP, following the June FOMC meeting. The following table compares the staff's current economic projection with the one we presented in the June Tealbook.

Trade tensions, global growth concerns, and financial market conditions have fluctuated notably since the June forecast, but our projections for slowing GDP growth and an unemployment rate that essentially moves sideways over the medium term are quite similar. On balance, GDP at the end of 2022 is slightly higher and the unemployment rate is a bit lower than in June. Even so, the output gap is now projected to roughly flatten out at a lower level, as we have revised up our assumption for potential output—largely reflecting a downward revision to our assumed natural rate of unemployment from 4.6 percent to 4.4 percent—in the current projection.

The less-tight resource utilization shows through to slightly lower projected inflation over the medium term relative to the June Tealbook. Core inflation is forecast to move sideways at 1.8 percent—equal to our estimate of underlying inflation—as the effects of still-tight resource utilization are offset by an appreciating dollar. Total inflation is forecast to run in line with core inflation after this year, because energy prices are projected to become less of a drag on inflation.

The assumed path for the federal funds rate is currently a bit lower than in June, reflecting the FOMC's decision to reduce the federal funds rate target in July, along with the smaller output gap and lower inflation in the current projection.

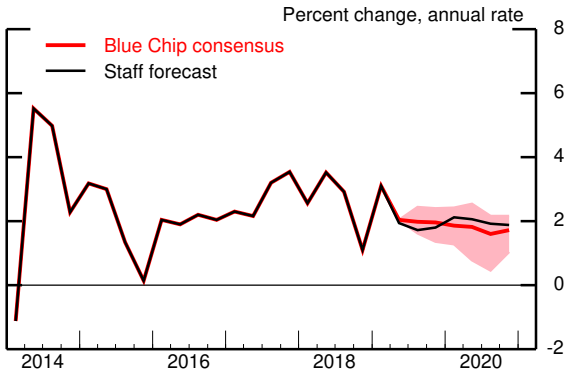
**Staff Economic Projections Compared with the June Tealbook**

| Variable | 2019 | | 2019 | 2020 | 2021 | 2022 | Longer run |
|---|---|---|---|---|---|---|---|
| | H1 | H2 | | | | | |
| Real GDP[1] | 2.5 | 1.8 | 2.1 | 2.0 | 1.8 | 1.7 | 1.7 |
| *June Tealbook* | *2.4* | *1.7* | *2.0* | *2.1* | *1.7* | *1.5* | *1.7* |
| Unemployment rate[2] | 3.6 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 4.4 |
| *June Tealbook* | *3.6* | *3.7* | *3.7* | *3.7* | *3.7* | *3.8* | *4.6* |
| PCE inflation[1] | 1.3 | 1.6 | 1.5 | 1.8 | 1.8 | 1.8 | 2.0 |
| *June Tealbook* | *1.4* | *1.6* | *1.5* | *1.9* | *1.9* | *1.9* | *2.0* |
| Core PCE inflation[1] | 1.4 | 2.1 | 1.8 | 1.8 | 1.8 | 1.8 | n.a. |
| *June Tealbook* | *1.5* | *2.1* | *1.8* | *1.9* | *1.9* | *1.9* | *n.a.* |
| Federal funds rate[2] | 2.40 | 2.23 | 2.23 | 2.40 | 2.46 | 2.50 | 2.50 |
| *June Tealbook* | *2.39* | *2.40* | *2.40* | *2.56* | *2.62* | *2.64* | *2.50* |
| Memo: | | | | | | | |
| Federal funds rate, end of period | 2.38 | 2.24 | 2.24 | 2.40 | 2.47 | 2.50 | 2.50 |
| *June Tealbook* | *2.39* | *2.40* | *2.40* | *2.56* | *2.62* | *2.64* | *2.50* |
| Output gap[2,3] | 1.5 | 1.5 | 1.5 | 1.7 | 1.6 | 1.4 | n.a. |
| *June Tealbook* | *2.0* | *1.9* | *1.9* | *2.2* | *2.0* | *1.7* | *n.a.* |

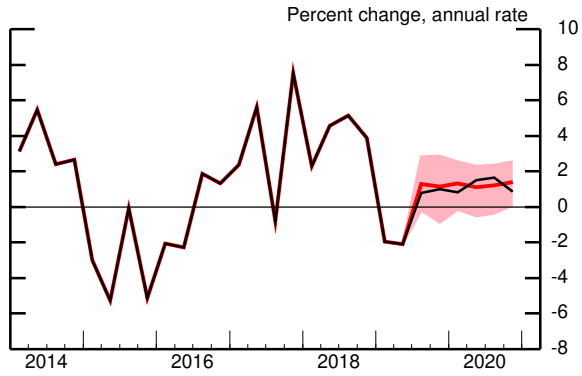
1. Percent change from final quarter of preceding period to final quarter of period indicated.
2. Percent, final quarter of period indicated.
3. Percent difference between actual and potential. A negative number indicates that the economy is operating below potential.
n.a. Not available.

# Tealbook Forecast Compared with Blue Chip
(Blue Chip survey released August 10, 2019)

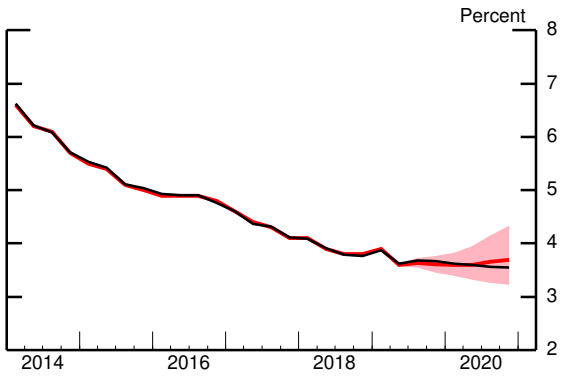
## Real GDP



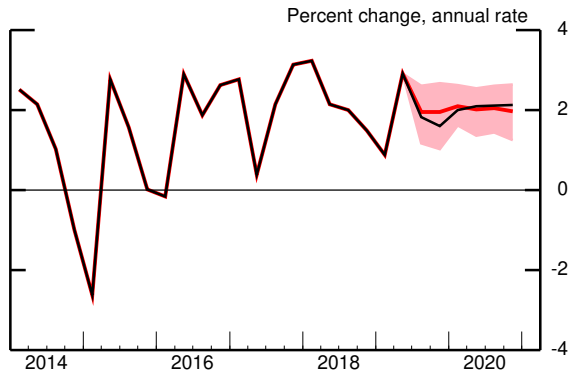

## Industrial Production



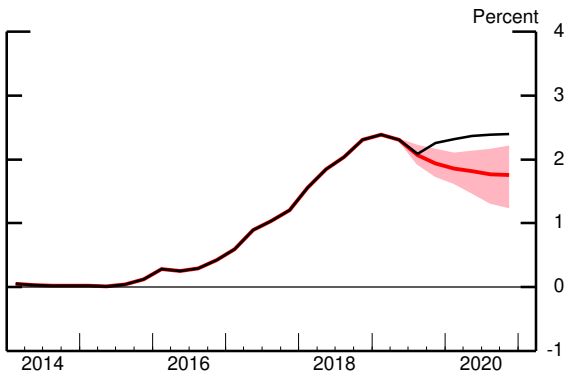

## Unemployment Rate



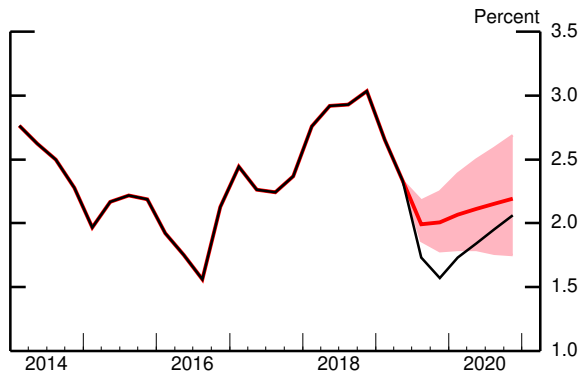

## Consumer Price Index




## Treasury Bill Rate




## 10-Year Treasury Yield




Note: The yield is for on-the-run Treasury securities. Over the forecast period, the staff's projected yield is assumed to be 15 basis points below the off-the-run yield.

Note: The shaded area represents the area between the Blue Chip top 10 and bottom 10 averages.

term. This projection is slightly lower than in the July Tealbook, reflecting downwardly revised data on nonmarket prices this year, a higher dollar, and a smaller boost from resource utilization. Total PCE inflation is expected to be in line with core inflation after this year, as energy prices are not expected to fall as rapidly.

## KEY BACKGROUND FACTORS

### Monetary Policy

- The baseline policy rule calls for the federal funds rate to hold steady this year at 2.2 percent and then to edge up gradually, reaching 2.5 percent by the end of 2022. In contrast, term-premium-adjusted market quotes suggest market participants expect the federal funds rate to decline roughly 50 basis points by the end of 2020, with most of the decline occurring this year.

- Our assumptions for the SOMA portfolio, which will be detailed in Tealbook B, imply that downward pressure on the term premium in Treasury yields diminishes over time.

### Other Interest Rates and Equity Prices

- The 10-year Treasury yield dropped sharply over the intermeeting period. Staff models attribute much of the decline to a decrease in the term premium to a level that is quite low historically. In our projection, we continue to assume that the term premium will rise to a more normal level over the next few years. However, we are assuming that the increase will happen more slowly in this projection because of more persistent downward pressure coming from global growth concerns, foreign monetary policy, and uncertainty regarding international trade. By the end of 2022, we look for the 10-year rate to be around 2.8 percent.

- The spreads of both the triple-B corporate bond yield and mortgage rates over the 10-year Treasury yield have widened in recent weeks. We expect the wider spreads to persist through the beginning of next year and so have revised down these rates by less than the Treasury yield for the next few quarters.

- Stock prices have declined 2 percent since the time of the July Tealbook. We now expect stock prices to appreciate a bit more over the forecast than we did

in July, based on lower projected interest rates and the recent modest reduction in valuation pressures. Relative to the July Tealbook, equity prices are slightly lower for most of the projection.

## Trade Policy

- On September 1, the United States imposed a new tariff of 15 percent on about $100 billion of imports from China. These particular categories of goods had not been previously affected by the tariff increases that had been implemented over the past two years. Also, on September 1, China boosted tariffs on nearly $30 billion of U.S. exports. Most of these tariff increases were applied to goods that had already experienced tariff hikes in 2018 or 2019. The tariffs on U.S. exports will likely be accompanied by additional nontariff barriers to trade.

- By themselves, this latest round of tariffs should reduce the level of U.S. GDP by the end of 2021 by 5 basis points and boost U.S. core PCE prices by a similar amount. We estimate that the cumulative effect of these and past tariff changes will lower the level of U.S. GDP 30 basis points by the end of 2021 and boost the level of core PCE prices 30 basis points. These estimated effects reflect only the direct effects of higher tariffs and do not include any indirect effects arising from greater trade policy uncertainty.

- As usual, the current Tealbook forecast conditions only on tariff increases that have already been implemented. The United States has also announced plans for additional tariff increases in the coming months: On October 1, the tariffs already in place on $230 billion of imports from China are scheduled to rise from 25 to 30 percent. On December 15, about $150 billion of previously unaffected imports are scheduled to receive a 15 percent tariff, effectively extending the recent tariff hikes to almost all imports from China. Likewise, China plans to boost tariffs on $45 billion of goods on December 15.

## Foreign Economic Activity and the Dollar

- Foreign GDP increased about 2 percent at an annual rate in the second quarter and is expected to remain near this below-potential pace throughout the second half of this year. The near-term outlook has been revised down, reflecting disappointing data in several economies. We expect foreign growth

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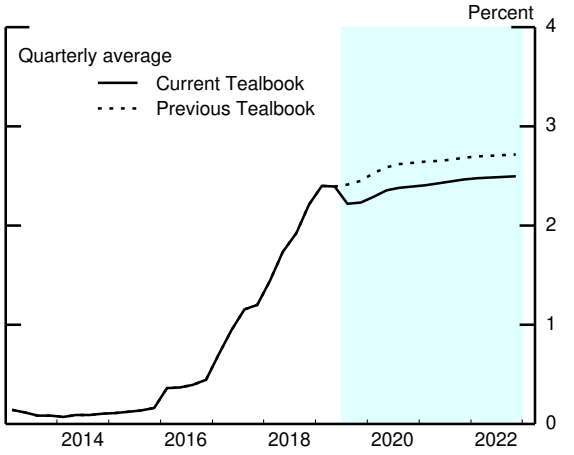
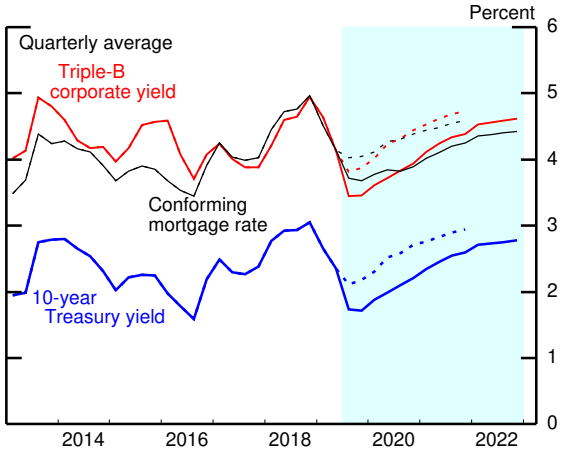
# Key Background Factors underlying the Baseline Staff Projection

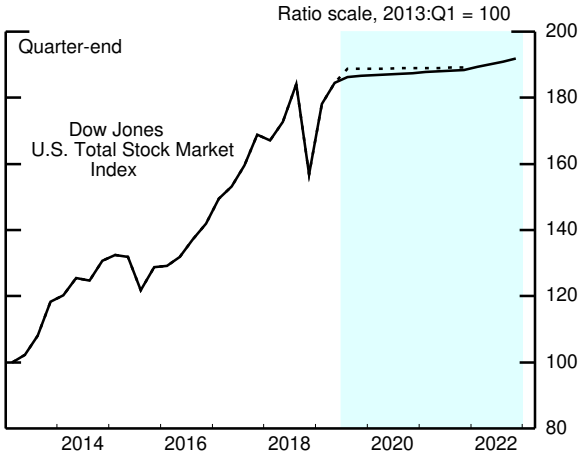
## Federal Funds Rate



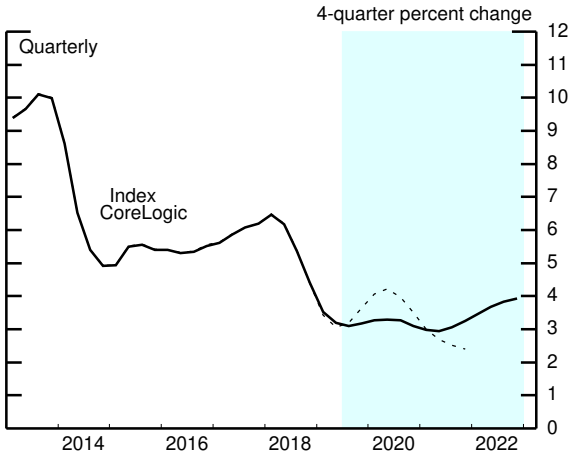

## Long-Term Interest Rates



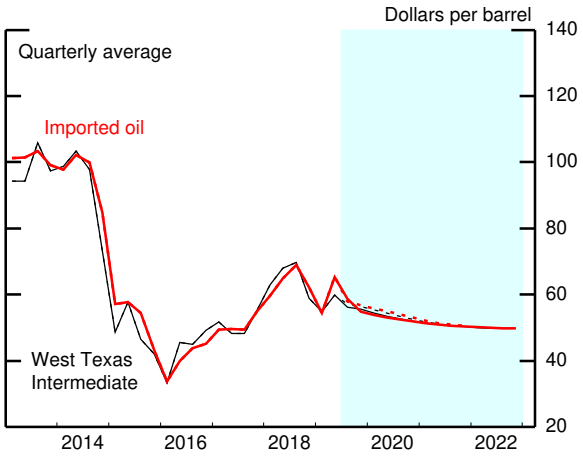

## Equity Prices



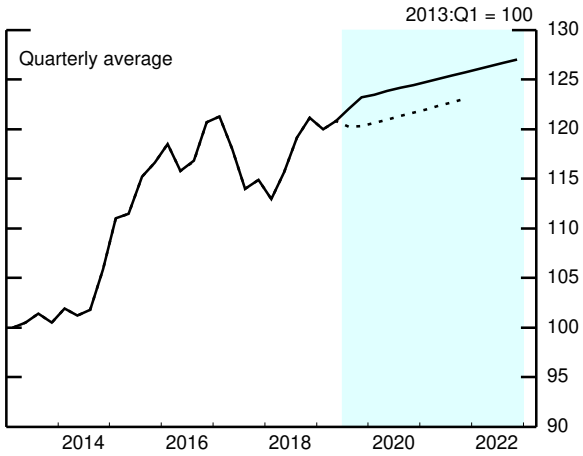

## House Prices




## Crude Oil Prices




## Broad Real Dollar



to pick up to 2.5 percent by the end of next year, as the drag from elevated trade policy uncertainty eases against a backdrop of continued very accommodative monetary policy and some fiscal stimulus. However, the global outlook remains unusually uncertain, with substantial downside risks.

- Since the July Tealbook, the dollar appreciated 3.5 percent against EME currencies and 1.2 percent against AFE currencies. We continue to expect that, as market expectations for the federal funds rate move up toward the staff forecast, the broad real dollar will appreciate at an annual rate of about 1 percent through 2022. All told, the path of the dollar is about 2 percent higher than in the July Tealbook.

## Fiscal Policy

- As we had expected, federal fiscal policymakers recently enacted legislation to increase the discretionary spending caps for fiscal years 2020 and 2021. See the box "The Bipartisan Budget Act of 2019" for additional details.

- Under our fiscal policy assumptions, the direct fiscal impetus from all levels of government contributes 0.7 percentage point to aggregate demand growth this year—about the same as in 2018—before tapering to 0.4 percentage point in 2020 and to a little less than 0.2 percentage point in 2021 and 2022. This contour is little changed relative to the July Tealbook.

## Oil and Other Commodity Prices

- Oil prices are little changed in this projection, as the drag on prices from concerns about global growth and trade tensions has been about offset by upward pressure from a sharp decline in Iranian oil exports combined with continued production declines in other OPEC nations.

- Agricultural prices have fallen 9 percent since the previous Tealbook to their lowest level in a decade, driven largely by a USDA report indicating that U.S. crop production may be better than previously expected despite remaining depressed due to poor weather earlier in the year. Ongoing trade tensions between the United States and China have also depressed agricultural prices and U.S. exports. (The box "Developments in the U.S. Agricultural Sector" provides additional background.)

## The Bipartisan Budget Act of 2019

The Bipartisan Budget Act of 2019 (BBA 2019) was signed into law on August 2. The legislation increased the caps that constrain federal discretionary budget authority in both fiscal years 2020 and 2021 to about $1.37 trillion.[1] Notably, the agreement eliminated the risk that budget authority in fiscal 2020 and 2021 would be constrained by the caps agreed to under the Budget Control Act of 2011, which were about $150 billion lower. In addition to increasing the caps for the next two years, the BBA 2019 suspended the statutory federal debt limit through July 31, 2021.

Although the BBA 2019 set higher nominal caps on budget levels, the spending is not authorized until legislators pass, and the President signs, fiscal 2020 and 2021 appropriations bills. Should the Congress and the Administration fail to reach an agreement on the necessary appropriations bills by the beginning of fiscal 2020 (October 1), they will need to pass a continuing resolution that temporarily extends funding in order to avoid a government shutdown.[2]

The new budget caps are about $25 billion higher relative to the fiscal 2019 caps and support aggregate demand through their effect on government purchases. If enacted budget authority is set at the cap levels—as we expect and as has been the case in recent years—then we project that federal discretionary spending will rise a little faster than inflation, on average, over the next couple of years.[3] Specifically, the staff now expects that real federal purchases will increase 1.2 percent in 2020 and move roughly sideways in 2021 (table, line 1). In terms of contributions to real GDP growth, the staff estimates that the direct first-round effect of federal purchases on aggregate demand will be about 0.3 percentage point in 2019, step down to 0.1 percentage point in 2020, and be roughly neutral in 2021 (line 3), close to the previous Tealbook (line 4).[4]

**Real Federal NIPA Purchases**
(Percent change, Q4/Q4)

| | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| (1) Current | 2.7 | 4.3 | 1.2 | .2 |
| *(2) July Tealbook* | *2.7* | *4.5* | *1.7* | *.8* |
| **Contribution to real GDP growth, percentage points** | | | | |
| (3) Current | .20 | .30 | .10 | .00 |
| *(4) July Tealbook* | *.20* | *.30* | *.10* | *.05* |

Source: Staff estimates.

[1] Some funding for discretionary spending is not subject to the caps, including appropriations designated for overseas contingency operations (such as those in Afghanistan and Iraq) and disaster relief. In fiscal 2019, those categories totaled $116 billion in budget authority.

[2] Recall that the partial federal government shutdown last December and January began when the Congress and the Administration were unable to pass appropriations bills for fiscal 2019 despite having already agreed to budget caps in the Bipartisan Budget Act of 2018.

[3] Within a fiscal year, government agencies generally sign contracts for goods and services that commit to spending that year's budget authority. However, a significant share of the purchases of goods and services typically occurs in subsequent fiscal years. To estimate the timing of purchases, we rely on estimates of budget authority spendout rates from the Congressional Budget Office and the Department of Defense.

[4] To place these projected aggregate demand effects in a historical context, since 1979 the average annual contribution of federal purchases to the rate of change in real GDP is about 0.15 percentage point.

- Metals prices are also down somewhat, due to concerns about global manufacturing growth that are discussed in the box "Weakness in the Global Manufacturing Sector" in the International Economic Developments and Outlook section.

## THE OUTLOOK FOR GDP

The contrast we observed in the first half of the year—between strong consumer spending and slowing business investment—looks likely to be more pronounced in the second half of the year: We are forecasting that consumption growth will remain strong, but we are penciling in an outright decline in business investment. These patterns, along with the waning of an anomalous first-half boost in government spending, point to a slowdown in GDP growth from a healthy 2.5 percent pace in the first half to a more moderate 1.8 percent increase in the second half.

- Recent data on consumer spending have been positive, with personal consumption expenditures posting a solid gain in July after rising at a nearly 3 percent pace in the first half. We expect growth in consumer spending to average 2.7 percent in the second half, reflecting recent strong readings on retail sales and light vehicle sales, as well as the support of continued solid gains in labor income.[1] We took only a small negative signal from the recent decline in the Michigan survey measure of consumer sentiment, as the Conference Board's measure remains elevated. If the lower level of the Michigan measure persists, we are likely to further temper our forecast for spending.

- After having declined for six consecutive quarters, residential investment is expected to increase in the second half at a rate of 4 percent, boosted by the decline in mortgage rates since late 2018. The expected increase is corroborated by measures of builder and homebuyer sentiment, which have rebounded from their lows around the turn of the year, and by single-family permits and pending sales, which have moved up, on net, in recent months.

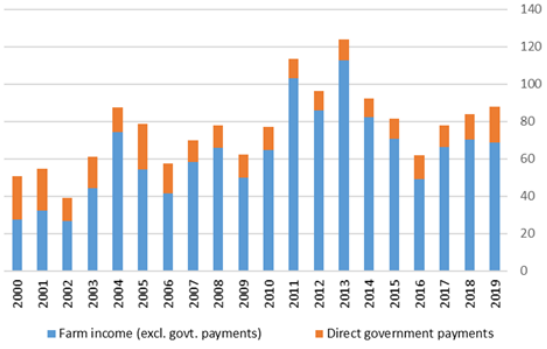
[1] The growth of personal income in the first quarter was revised up substantially in the BEA's recent annual revision. Wage data from ADP indicate that the upward revision reflected large increases in bonuses and exercised stock options. Because these are received by high-income consumers who tend to have a low marginal propensity to consume, we responded only with a small boost to consumption in the forecast period.

## Developments in the U.S. Agricultural Sector

The performance of the U.S. agricultural sector has been relatively subdued in recent years against a backdrop of fairly strong GDP growth. As shown in figure 1, nominal farm income was elevated from 2011 to 2013, reflecting strong export demand and elevated prices for agricultural commodities. Beginning in 2014, however, prices for major agricultural commodities dropped sharply and led to declines in farm income over the next few years. With prices for farm commodities having remained low, farm income is projected to rise only modestly this year, even after accounting for the increased support from direct government payments related to trade policies. The farm income figures for 2019 are USDA projections. Some private-sector analysts have indicated that the 2019 forecast appears overly optimistic and is likely to be marked down as more complete data become available.

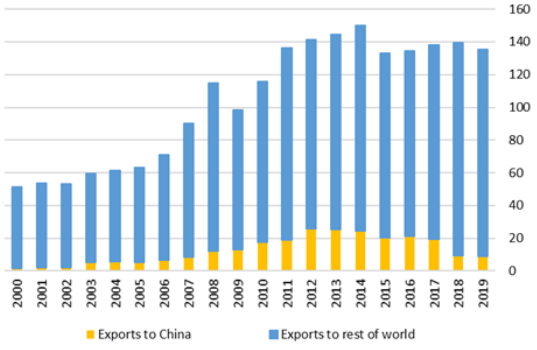
Over 2000 to 2014, U.S. agricultural exports increased almost 200 percent, with significant increases in exports to China (figure 2). Since then, however, U.S. agricultural exports have weakened, on average, as foreign production has risen strongly. Moreover, amid ongoing trade tensions, exports to China dropped sharply in 2018 and have fallen further so far this year. For example, the value of U.S. soybean exports to China dropped approximately 75 percent in 2018 compared with the previous year, and the pace in the first half of 2019 has remained unchanged from a year ago. Given recent trade tensions, China now buys most of its soybeans from Brazil, a pattern that some industry analysts suggest may become permanent and have long-lasting negative implications for U.S. producers.

Figure 1. Nominal U.S. Farm Income




Note: 2019 data are USDA forecasts.
Source: USDA, Farm Income and Wealth Statistics.

Figure 2. U.S. Agricultural Exports




Note: Annualized based on change from January to July 2019 relative to same period in 2018.
Source: USDA, Foreign Agriculture Service.

The low prices for agricultural products, which have been holding down farm income, have persisted this year as global supplies of agricultural commodities have continued to outpace demand and inventories of agricultural commodities carried over from previous seasons are expected to remain high. At the same time, adverse weather conditions have led to domestic production disturbances. Most notably, an unusually wet spring and severe flooding across large portions of the Midwest this year led to significant planting delays and prospects of reduced U.S. crop production, which we currently estimate will hold down GDP growth by 0.1 percentage point this year. Recent data suggest that more than 10 percent of planned U.S. corn and soybean acreage may have gone unplanted in 2019 because of weather-related disruptions.

Reduced incomes and cash flow shortages have led to weaker financial conditions in the agricultural sector in recent years, although the situation appears less dire than in the 1980s, a period often referred to as the U.S. Farm Crisis. Agricultural borrowing from various lending institutions has increased, though the rise in delinquency rates on agricultural loans thus far has been modest. Relative strength in the value of farm real estate has also provided support to producers' balance sheets, as farmland accounts for more than 80 percent of total assets in the U.S. farm sector. That said, farmers' liquidity appears exceptionally low by historical standards, raising concerns about their ability to withstand a potential downturn in demand.

In the coming years, U.S. farm income growth is projected to remain subdued. The U.S. Department of Agriculture projects that farm income will rise at an average annual rate of just 0.2 percent over the next 10 years, with the price of major agricultural commodities generally remaining flat because of limited prospects for significant demand growth and persistently high global production. Climate change is often cited as a primary risk to global agricultural production and could lead to more volatile swings in commodity prices in the future.

Amid these ongoing economic and financial challenges, productivity growth in the U.S. farm sector has remained high. From 2007 to 2017, multifactor productivity increased at an average annual pace of 1.2 percent in the U.S. crop and livestock industries, compared with 0.3 percent in the nonfarm U.S. economy. The strength in productivity has continued to encourage investment and expansion among agribusinesses, agricultural service firms, and businesses specializing in transportation and logistics.

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## Cyclical Position of the U.S. Economy: Near-Term Perspective

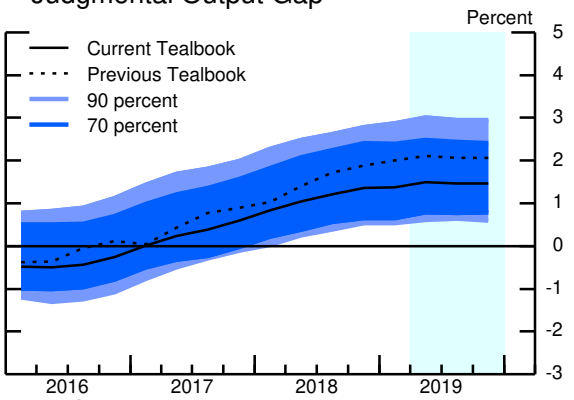
(Percent change at annual rate from final quarter of preceding period except as noted)

| Measure | 2017 | 2018 | 2019 | 2019 Q2 | 2019 Q3 | 2019 Q4 |
|---|---|---|---|---|---|---|
| **Output gap[1]** | **.6** | **1.4** | **1.5** | **1.5** | **1.5** | **1.5** |
| *Previous Tealbook* | *.9* | *1.9* | *2.1* | *2.1* | *2.1* | *2.1* |
| Real GDP | 2.8 | 2.5 | 2.1 | 1.9 | 1.7 | 1.8 |
| *Previous Tealbook* | *2.5* | *3.0* | *2.3* | *2.5* | *1.6* | *1.8* |
| Measurement error in GDP | .1 | -.1 | .2 | -.3 | .0 | .0 |
| *Previous Tealbook* | *.0* | *.2* | *.3* | *.3* | *.0* | *.0* |
| Potential output | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | *1.7* | *1.8* | *1.8* | *1.8* | *1.8* | *1.8* |

Note: The output gap is the percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. The change in the output gap is equal to real GDP growth less the contribution of measurement error less the growth rate of potential output. For quarterly figures, the growth rates are at an annual rate, and this calculation needs to be multiplied by 1/4 to obtain the quarterly change in the output gap.

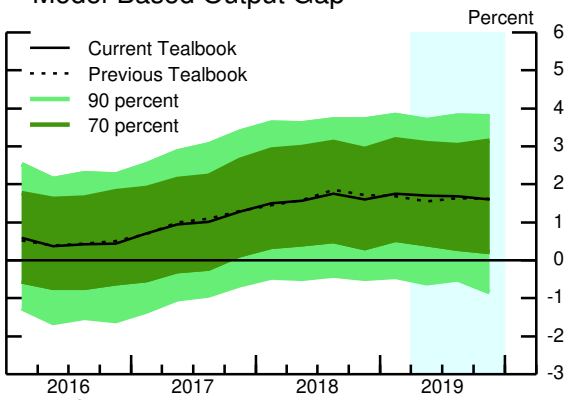
1. Percent, average for the final quarter in the period.

### Judgmental Output Gap



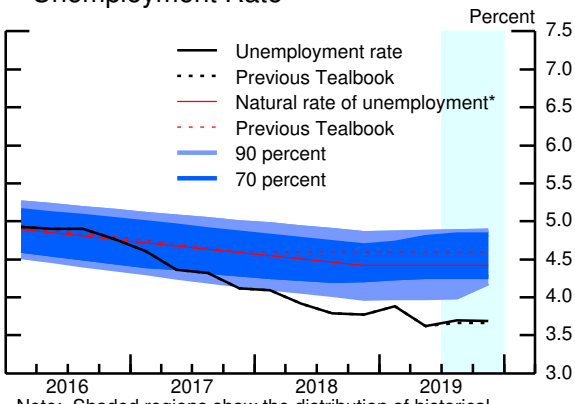

Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

### Model-Based Output Gap



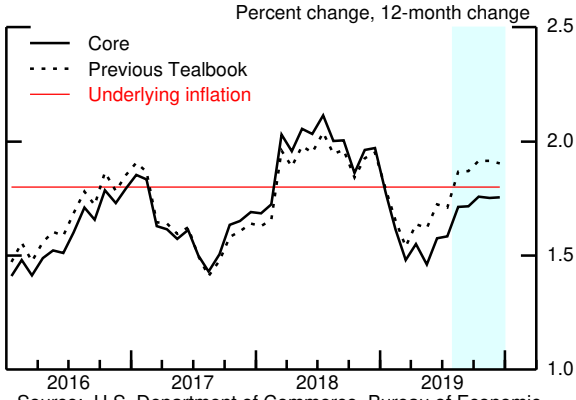

Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

### Unemployment Rate




Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

### Core PCE Price Inflation




Source: U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

- After posting robust gains last year, business fixed investment (BFI) decelerated to a 1.5 percent rate of increase in the first half, perhaps partly in response to uncertainty and lower expected longer-term profit growth. In the second half, these influences will probably intensify, as trade tensions have ratcheted up, analysts' expectations of longer-run profit growth have declined further, and business sentiment has weakened further. As a consequence, we now expect BFI to contract in the second half of the year, and indicators are so far consistent with that expectation.

- Manufacturing production moved down further in July after declining at an annual rate of 2.5 percent in the first half. We estimate that a substantial share of the downturn in factory output this year is due to the direct effects of tariffs imposed over the past year. The drag from tariffs is likely to persist, and national indexes of new export orders turned markedly negative in August. Even so, we project that overall manufacturing output will be little changed through year-end, as the sector is supported, in part, by higher production of motor vehicles than in the first half of the year.

- Exports continued to decline in the first half of this year, consistent with the stronger dollar, tepid foreign growth, retaliatory tariffs against the United States, and delayed aircraft exports. We project that the increased tariffs that have already been implemented by the United States and its trading partners will continue to depress both export and import growth through the near term. In addition, both the strong dollar and weak foreign growth should weigh on exports. Hence, after having been a neutral influence on GDP growth in the first half of the year, net exports will likely be a slight drag on growth in the second half.

The key question for our medium-term projection is how the recent escalation in trade tensions, as well as signs of more persistent weakness in foreign growth, will affect economic activity. As a starting point, we have taken on board the stronger dollar and weaker foreign growth (which are negatives for the outlook) as well as the lower interest rates (a positive) as we typically do, on an other-things-equal basis. But we also need to make sure our projection has appropriately taken on board the factors driving the financial market changes in the first place. With that in mind, and influenced by a further reduction in analysts' longer-run profit expectations, we took down our projection a bit more than the other-things-equal calculation above would call for. However, our

## Summary of the Near-Term Outlook for GDP

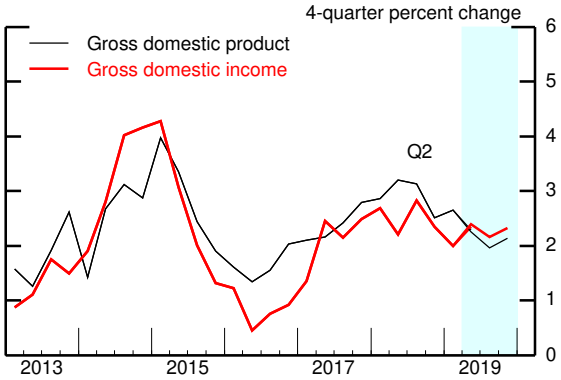
(Percent change at annual rate except as noted)

| Measure | 2019:Q2 | | 2019:Q3 | | 2019:H2 | |
|---|---|---|---|---|---|---|
| | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook |
| **Real GDP** | **2.5** | **1.9** | **1.6** | **1.7** | **1.7** | **1.8** |
| Private domestic final purchases | 3.1 | 3.3 | 2.2 | 2.2 | 2.2 | 2.2 |
| Personal consumption expenditures | 4.1 | 4.7 | 2.5 | 3.2 | 2.5 | 2.7 |
| Residential investment | -2.6 | -3.1 | 4.3 | 1.9 | 5.8 | 4.1 |
| Nonres. private fixed investment | .0 | -1.4 | .0 | -3.0 | -.1 | -1.1 |
| Government purchases | 6.2 | 4.6 | 1.1 | 1.4 | 1.2 | 1.4 |
| *Contributions to change in real GDP* | | | | | | |
| Inventory investment[1] | -.8 | -.9 | -.2 | -.1 | -.3 | -.3 |
| Net exports[1] | -.3 | -.7 | -.3 | -.3 | .0 | -.1 |

1. Percentage points.

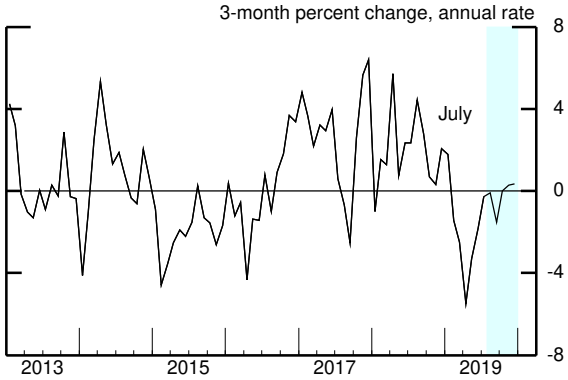
## Recent Nonfinancial Developments (1)

Real GDP and GDI



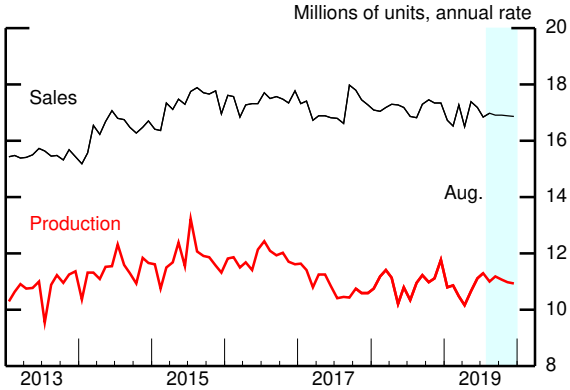

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



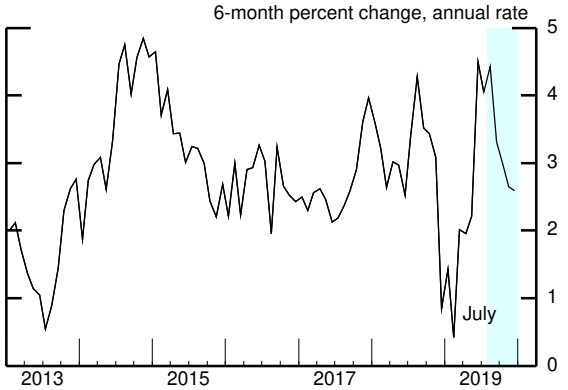

Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles




Source: Ward's Communications; Chrysler; General Motors; FRB seasonal adjustments.

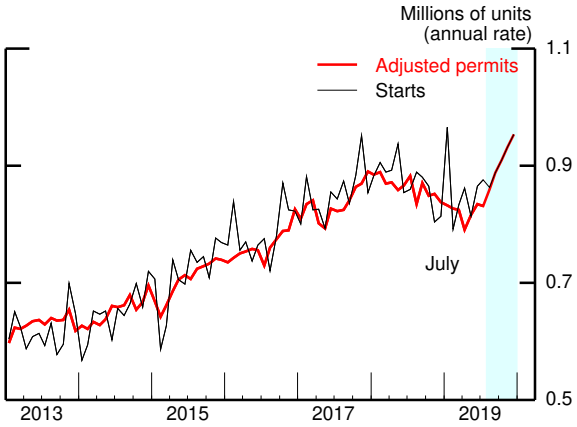
Real PCE Growth




Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

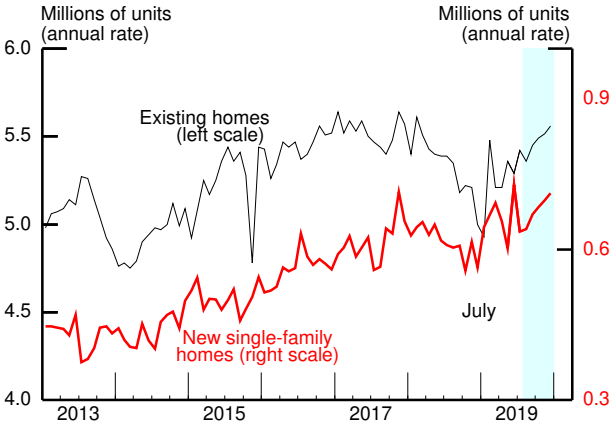
# Recent Nonfinancial Developments (2)

## Single-Family Housing Starts and Permits



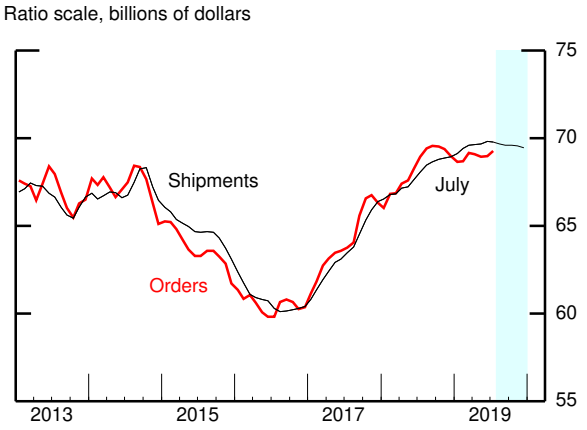

Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

## Home Sales



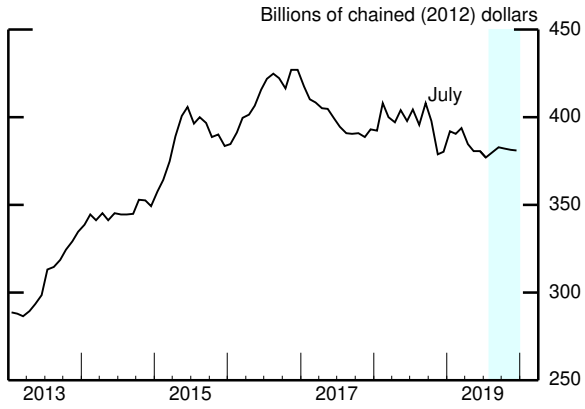

Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

## Nondefense Capital Goods ex. Aircraft



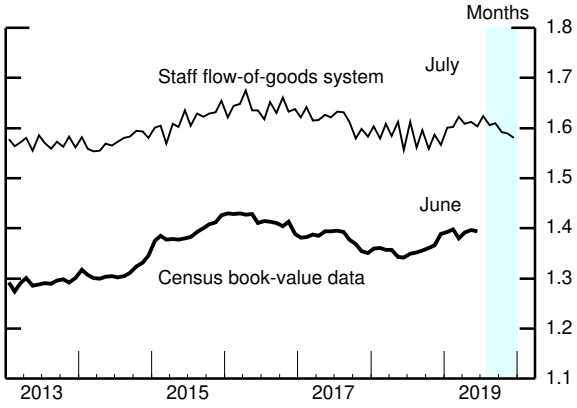

Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

## Nonresidential Construction Put in Place



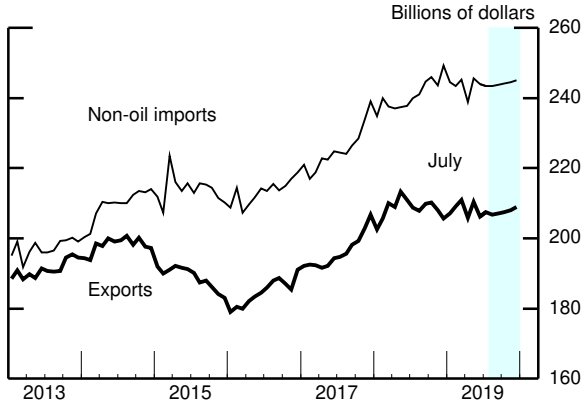

Note: Nominal CPIP deflated by BEA prices through 2019:Q1 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

## Inventory Ratios




Note: Flow-of-goods system inventories include manufacturing and mining industries and are relative to consumption. Census data cover manufacturing and trade, and inventories are relative to sales.
Source: U.S. Census Bureau; staff calculations.

## Exports and Non-oil Imports




Note: Forecasts are linear interpolations of quarterly values.
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis; U.S. Census Bureau.

**Federal Reserve System Nowcasts of 2019:Q3 Real GDP Growth**
(Percent change at annual rate from previous quarter)

| Federal Reserve entity | Type of model | Nowcast as of Sept. 4, 2019 |
|---|---|---|
| Federal Reserve Bank | | |
| Boston | • Mixed-frequency BVAR | 1.4 |
| New York | • Factor-augmented autoregressive model combination | 2.9 |
| | • Factor-augmented autoregressive model combination, financial factors only | 2.7 |
| | • Dynamic factor model | 1.5 |
| Cleveland | • Bayesian regressions with stochastic volatility | 1.5 |
| | • Tracking model | 1.2 |
| Atlanta | • Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow) | 1.5 |
| Chicago | • Dynamic factor models | 1.6 |
| | • Bayesian VARs | 1.9 |
| St. Louis | • Dynamic factor models | 2.0 |
| | • News index model | 2.7 |
| | • Let-the-data-decide regressions | 2.5 |
| Kansas City | • Accounting-based tracking estimate | 1.0 |
| Board of Governors | • Tealbook estimate (judgmental) | 1.7 |
| | • Monthly dynamic factor models (DFM-45) | 1.9 |
| | • Mixed-frequency dynamic factor model (DFM-BM) | 2.9 |
| Memo: Median of Federal Reserve System nowcasts | | 1.8 |

assumptions that trade tensions and uncertainty do not rise further and that foreign growth recovers limit the downward revision to the level of GDP by the end of the medium term to ¼ percent.

## THE OUTLOOK FOR THE LABOR MARKET AND AGGREGATE SUPPLY

The labor market has tightened a bit further so far this year but at a slower pace than last year. Although published payroll gains have been slowing, the unemployment rate has edged down, on net, from the end of 2018, and the employment-to-population ratio has moved up a little. However, we project essentially no further tightening of the labor market after this year.

- After rising at an average monthly pace of 163,000 during the first half, total nonfarm payrolls rose 159,000 in July and 130,000 in August.[2] These latest readings were below our expectations in the July Tealbook but above the monthly gains of 95,000 to 125,000 that we estimate are needed to keep labor utilization constant.[3] We expect payroll gains to average 131,000 from September through December and to continue to step down over the medium term, reaching a pace of 65,000 in 2022, as GDP growth slows. Compared with the July Tealbook, monthly payroll growth is revised down by 20,000 to 30,000 throughout the medium term.
    - Based on the BLS's preliminary estimate of the benchmark revision to payroll employment released last month, we anticipate that next February's annual payroll revisions will reduce payroll gains from April 2018 to March 2019 by an average of about 42,000 per month.[4] As a result, we expect that the average monthly gain in payroll employment for 2018 will be revised down from 223,000 per month, as currently published, to about 190,000 per month, a pace that is similar to the average for 2017. In addition, we anticipate that revised

[2] Temporary hiring by the Census Bureau added 25,000 to the gain in nonfarm payrolls in August.

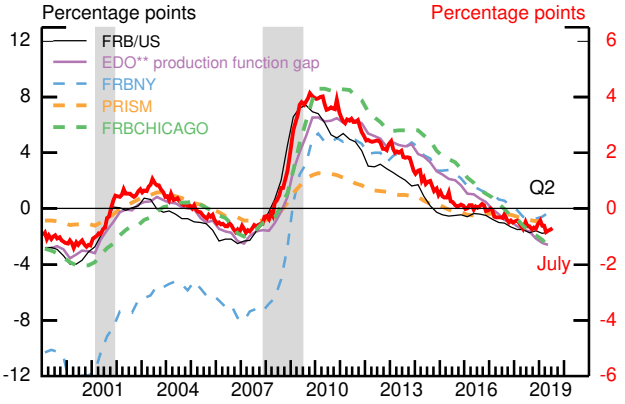
[3] This is the range that would be, on average, consistent with no change in the unemployment rate and a decline in the participation rate in line with its trend over the next year.

[4] Each year, the BLS benchmarks its sample-based estimate of the level of payroll employment in March to the level of employment based on the universe of firms reporting to their states' unemployment insurance systems. The universe-based count fully captures the employment effects of firm births and deaths, while the currently published monthly employment changes since the previous benchmark in March 2018 are based on a statistical model of births and deaths.

# Alternative Measures of Slack

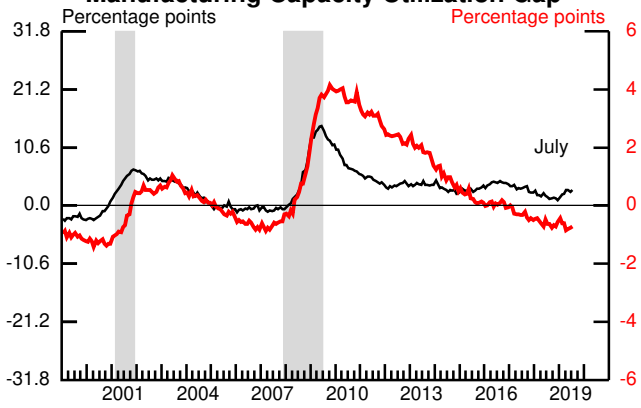
The red line in each panel is the staff's measure of the unemployment rate gap (right axis).

## Output Gaps



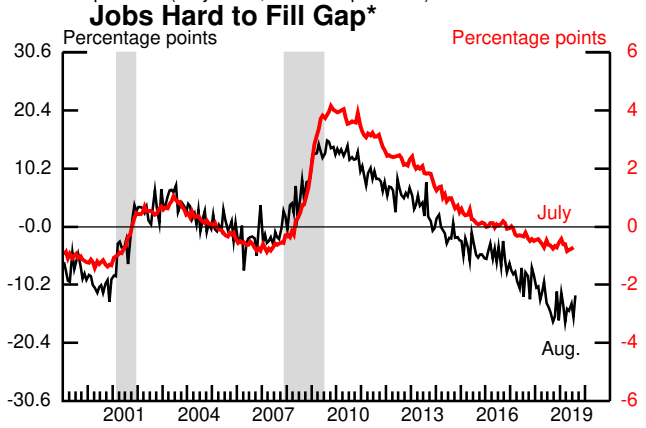

** EDO is Estimated, Dynamic, Optimization-based model.
Source: Federal Reserve Board; PRISM: Federal Reserve Bank of Chicago; Federal Reserve Bank of Philadelphia, PRISM Model Documentation (June 2011); FRBNY: Federal Reserve Bank of New York Staff Report 618 (May 2013, revised April 2014).

## Manufacturing Capacity Utilization Gap*



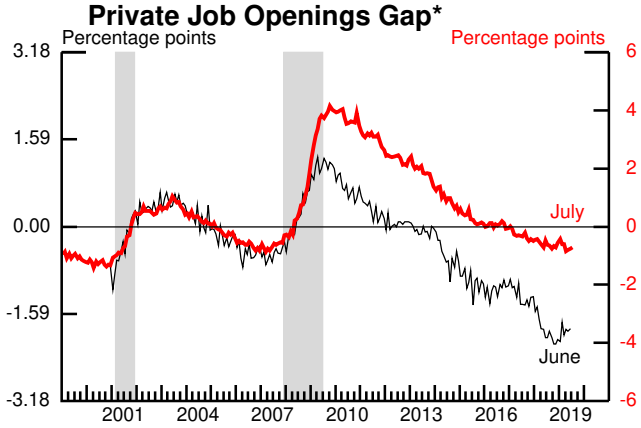

Source: Federal Reserve Board.

## Jobs Hard to Fill Gap*



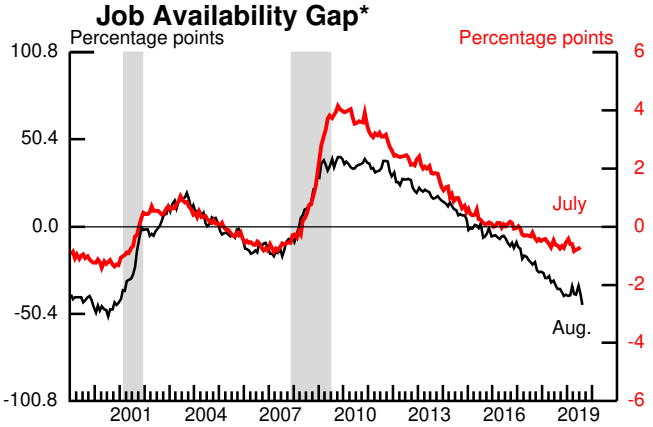

Note: Percent of small businesses surveyed with at least one "hard to fill" job opening. Seasonally adjusted by Federal Reserve Board staff.
Source: National Federation of Independent Business, Small Business Economic Trends Survey.

## Private Job Openings Gap*



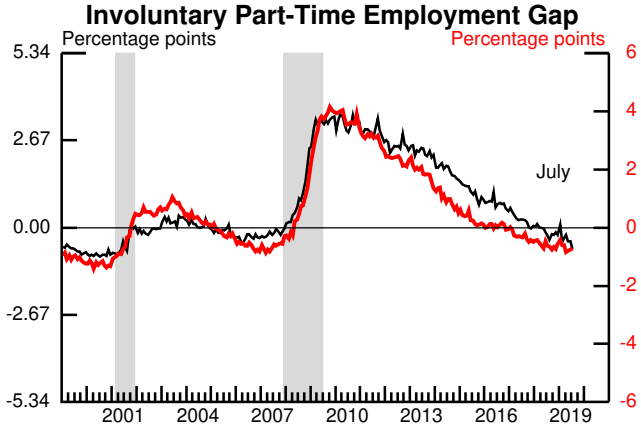

Note: Job openings rate is the number of job openings divided by employment plus job openings.
Source: Job Openings and Labor Turnover Survey; U.S. Department of Labor, Bureau of Labor Statistics, Current Employment Statistics.

## Job Availability Gap*




Note: Percent of households believing jobs are plentiful minus the percent believing jobs are hard to get.
Source: Conference Board.

## Involuntary Part-Time Employment Gap




Note: Percent of employment.
Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

* Plots the negative of the gap to have the same sign as the unemployment rate gap.
Note: The shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research. Output gaps are multiplied by negative 0.52 to facilitate comparison with the unemployment rate gap. Manufacturing capacity utilization gap is constructed by subtracting its average rate from 1972 to 2018. Other gaps were constructed by subtracting each series' average in 2004:Q4 and 2005:Q1.

first-quarter payroll gains will be about 130,000 per month, compared with the currently published 174,000 per month, and that the BLS will likely revise down published (or to be published) employment gains from April through December of this year by an average of 15,000 per month (with a wide confidence band around this estimate). After the annual revision, we expect that employment gains will be reported to have slowed from an average of 134,000 in the first half of this year to 120,000 in the second half.

- Gains in private payrolls derived from microdata from the payroll-processing firm ADP have also slowed since last year, and to a somewhat larger extent than in the published BLS data, on average, so far this year.

- Initial claims for unemployment insurance, which are a reliable early indicator of a downturn, have been little changed in recent months at a very low level.

- The unemployment rate was unchanged at 3.7 percent in August. We expect the unemployment rate to remain at this level through the end of 2019 and then to edge down to 3.6 percent, staying at that level through 2022, a path that is similar to our projection in the July Tealbook.

- The LFPR rose to 63.2 percent in August from 63.0 percent in July, boosted by a jump in prime-age female participation. We expect that the LFPR will decline over the projection period, as the ongoing aging of the working-age population is no longer offset by cyclical improvement in participation.

- We estimate that output per hour in the business sector increased at a 2.9 percent rate in the first half of this year, well above its pace in 2018. This recent surge likely overstates the true gains in productivity, as it reflects, in large part, a steep decline in self-employed hours, which are a poorly measured and volatile component of aggregate hours; indeed, self-employed hours increased in both July and August. We expect productivity to grow around 1¼ percent through the medium term.

- The box "Platform Gig Workers in the U.S. Economy" discusses characteristics of the portion of the workforce using new technologies to supply labor and earn income.

We have reevaluated our aggregate supply assumptions this round.

- In particular, we now assume that the natural rate of unemployment declined to 4.4 percent by the end of 2018, 0.2 percentage point lower than in the July Tealbook. To be clear, the information we use to pin down the natural rate of unemployment—residuals from our wage and price inflation equations, data on the demographic and educational composition of the workforce, and various measures of labor market efficiency and tightness—cannot neatly distinguish between 4.4 percent and 4.6 percent. With this change, we have judged that a balanced assessment is one that puts a little more weight on the indicators calling for a lower natural rate.

- We also raised our estimate of structural productivity growth in recent years, and the level at the end of 2018 is ¼ percent higher than in the July Tealbook. In the past, actual productivity has tended to fall below trend in a tight economy, possibly reflecting individuals with below-average human capital being drawn into the labor force. With the higher trend in this forecast, actual productivity in recent years now appears more consistent with past experience.

- With these changes, we have addressed some tensions that have arisen over the past year between our view of resource utilization and data on the labor market and productivity. All told, we now estimate the level of potential output at the end of 2018 to stand 0.5 percent higher than in the July Tealbook, a revision that contributed meaningfully to the lower output gap mentioned in the introduction.

## THE OUTLOOK FOR INFLATION

Core PCE inflation is projected to move up to 1.8 percent by the end of this year. We project core inflation to stay at that level through the medium term—equal to our estimate of underlying inflation—as the effects of tight resource utilization are offset by

an appreciating dollar. Total PCE inflation is expected to be in line with core inflation after this year, as energy prices become less of a drag on the inflation projection.

- Core PCE prices rose 1.6 percent over the 12 months ending in July. This figure is a little below that in the July Tealbook due to downwardly revised monthly readings on nonmarket prices in the first part of the year. As we anticipated, low monthly readings on core inflation from early in the year have proven transitory. We expect core inflation to move up to 1.7 percent in August and to increase to 1.8 percent later this year, as core inflation is boosted by tariff increases.
    - Alternative measures of inflation also indicate that the weakness earlier this year was transitory. The Dallas Fed's trimmed mean measure of inflation rose 2.0 percent in the 12 months ending in July, similar to readings recorded late last year. In addition, a staff estimate of core PCE inflation excluding idiosyncratic price changes was 1.7 percent in July, also little changed from its level late last year.
- We estimate that the effective price for imported core goods (which includes the effects of tariffs) was about unchanged in the first half of the year, somewhat less than we expected in the July Tealbook, as falling prices for imported foods and metals offset a boost from the increased tariffs on imports from China. For the second half of the year, we expect effective core import price inflation to step up to 1.6 percent, as the higher tariffs more than offset the effects of the appreciating dollar and lower commodity prices. After this year, core import price inflation is expected to be subdued—reflecting an appreciating dollar and the fading effects of the recent tariff increases—and to hold down domestic prices.
- Median long-run inflation expectations from the Michigan survey edged up to 2.6 percent in August. This measure has moved roughly sideways since 2016 despite fluctuating within a somewhat wider range in 2019 than in previous years. By contrast, the FRBNY Survey of Consumer Expectations measure of median three-year-ahead expected inflation edged down, as did TIPS-based measures of longer-term inflation compensation.

## Platform Gig Workers in the U.S. Economy

Over the past decade, the use of online platforms to match workers to short-term jobs, or "gigs," has grown rapidly. Workers on these platforms provide labor to generate income and might also use their own capital—for example, by driving their own cars for delivery or chauffer services or by renting their properties to travelers. Although informal work has been a long-standing characteristic of the labor market, gig platforms have expanded because they are easy for workers to join and provide efficient and flexible ways of locating and transacting with customers. At the same time, platform gig work has raised concerns because it is thought to be associated with little job security and a lack of employer-provided benefits. Here we describe recent findings about the size of the platform gig workforce and the characteristics of such work and workers. Currently, because of its small size, platform gig work appears to have a limited influence on the overall labor market, but its prevalence will likely increase in the future as new platforms enter and existing ones expand.

Although gig platforms are widely available, only a small fraction of U.S. workers currently engages in platform-related gig work; estimates range from 1 to 5 percent of the U.S. workforce.[1] Notably, since individuals participate in gig work sporadically over time, the number of platform gig workers is higher on an annual basis than at shorter frequencies. For example, a study of Chase checking account holders finds that the majority of platform gig participants earn gig income in only a few months out of the year.[2]

For most platform participants, gig work appears to be a secondary source of income. For instance, a study of IRS personal income tax data shows that for the majority of gig platform participants, earnings reported on W-2 forms are much greater than those from gig work reported on 1099 forms.[3] Similarly, in the 2018 Survey of Household Economics and Decisionmaking (SHED), respondents more commonly report that gig work provides a supplemental rather than a primary source of income.[4] While gigs tend to be a small

[1] Some other research has focused on contingent workers, defined as workers who do not expect their jobs to last. The Bureau of Labor Statistics reports that these workers, some of whom may work platform gigs, accounted for 4 percent of employment in its 2017 survey, similar to the share in 2005. See Bureau of Labor Statistics (2018), "Contingent and Alternative Employment Arrangements—May 2017," press release, June 7, https://www.bls.gov/news.release/pdf/conemp.pdf.

[2] See Diana Farrell, Fiona Greig, and Amar Hamoudi (2018), *The Online Platform Economy in 2018: Drivers, Workers, Sellers, and Lessors* (New York: JPMorgan Chase Institute, September).

[3] See Brett Collins, Andrew Garin, Emilie Jackson, Dmitri Koustas, and Mark Payne (2019), "Is Gig Work Replacing Traditional Employment? Evidence from Two Decades of Tax Returns," IRS SOI Joint Statistical Research Program Working Paper (Washington: Internal Revenue Service, March 25), https://www.irs.gov/pub/irs-soi/19rpgigworkreplacingtraditionalemployment.pdf.

[4] The results of the SHED are discussed in Board of Governors of the Federal Reserve System (2019), *Report on the Economic Well-Being of U.S. Households in 2018* (Washington: Board of Governors, May), https://www.federalreserve.gov/publications/files/2018-report-economic-well-being-us-households-201905.pdf.

share of income on an annual basis, a 2018 study found that platform gig work provides about half of workers' household income in the months they work on these gigs.[5]

Platform gig workers differ in several respects from the typical U.S. employee. First, the workplaces, hours, and earnings of gig workers are generally more variable than those of wage and salary employees. This flexibility has some advantages: Gig workers typically set their own schedules and can work more on a given day or opt out for weeks or months at a time. However, as independent contractors, platform gig workers do not receive employer-provided medical insurance or paid sick leave and are not covered by unemployment insurance, have no guarantee of minimum wage or overtime pay, and limited protection from discrimination or other unfair practices. Second, platform gig workers tend to be younger than the overall workforce; male and black workers are also overrepresented among platform workers. In addition, some evidence suggests that workers with college degrees are overrepresented in platform workers, although the 2018 SHED finds that less-educated workers are more likely to rely on gigs as their primary source of income.[6] Finally, transportation platforms, such as Uber and Lyft, account for a large share of platform gig employment and income, and these gigs are concentrated in large cities and tourist destinations. On the whole, platform gigs are more prevalent in densely populated areas, whereas small cities and rural areas have less platform gig work.

Future growth in platforms would likely make platform work increasingly available to individuals looking to work more hours. As a result, even though platform gig work may be more unstable than traditional employment, the ability to substitute platform gigs for traditional work could make individual income and spending more resilient to temporary, idiosyncratic reductions in income from traditional jobs. However, some types of workers will likely continue to face higher barriers to participating in platform gig work. For example, it seems likely that older individuals and those in rural areas will continue to be underrepresented in platform gig work, at least for the foreseeable future, and less able to use it to ensure against reductions in other sources of income.[7] Moreover, we do not know how the availability of platform gig work would change in an economic downturn. If demand for platform gigs declines along with the demand for traditional jobs, then platform gig work may be unable to offset reductions in traditional employment during recessions to the same extent as in expansions.

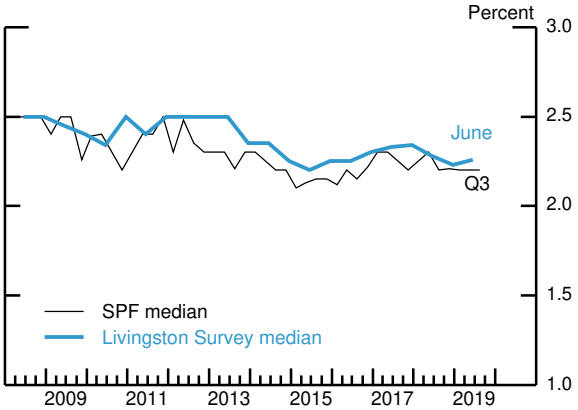
[5] See Farrell, Greig, and Hamoudi, *Online Platform Economy in 2018* in note 2.

[6] For data on participation in electronically mediated work by education level, see Bureau of Labor Statistics (2018), "Electronically Mediated Work: New Questions in the Contingent Worker Supplement," *Monthly Labor Review,* September, https://doi.org/10.21916/mlr.2018.24.

[7] In the 2019 paper "Is Gig Work Replacing Traditional Employment?" (see note 3), Collins and others show that, relative to the total workforce, older individuals and those in rural areas are underrepresented in platform gigs but overrepresented in nonplatform gigs, which suggests that these types of individuals have less access to platform gigs.

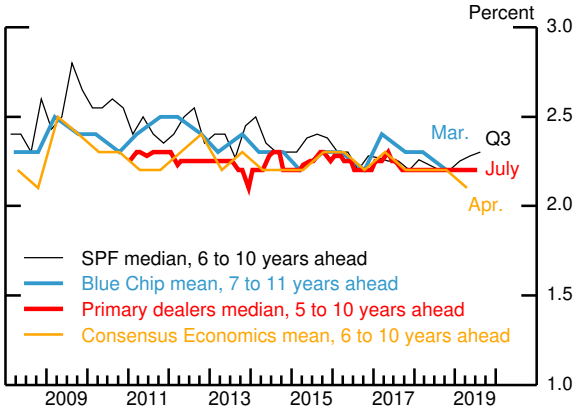
# Survey Measures of Longer-Term Inflation Expectations

CPI Next 10 Years



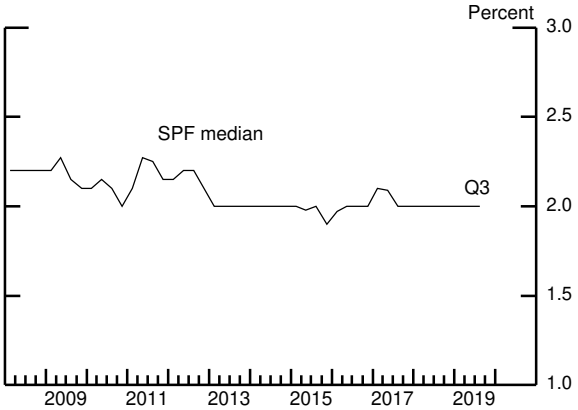

Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations



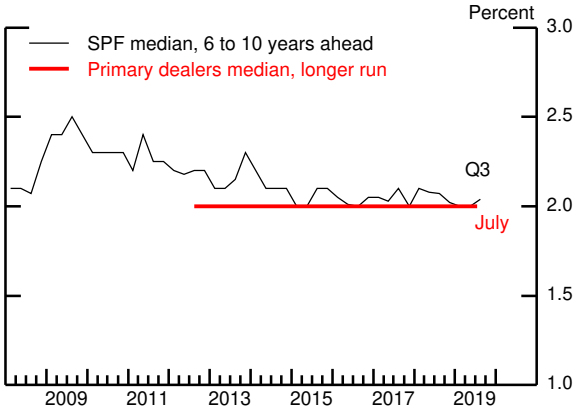

Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

PCE Next 10 Years



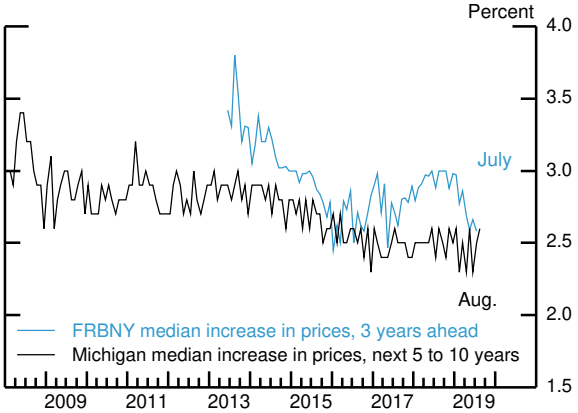

Source: Federal Reserve Bank of Philadelphia.

PCE Forward Expectations



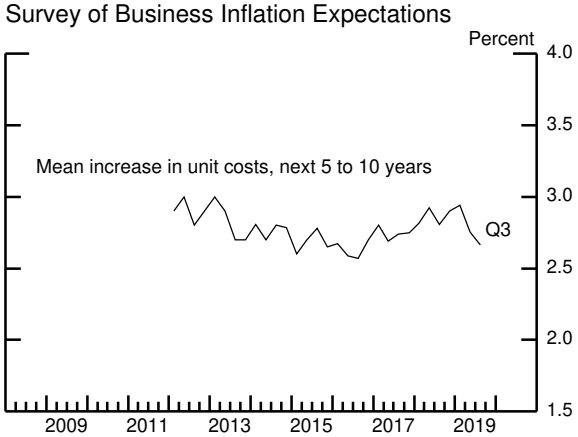

Note: Primary dealers data begin in August 2012.
Source: Federal Reserve Bank of Philadelphia; Federal Reserve Bank of New York.

Surveys of Consumers




Note: Federal Reserve Bank of New York (FRBNY) Survey of Consumer Expectations reports expected 12-month inflation rate 3 years from the current survey date. FRBNY data begin in June 2013.
Source: University of Michigan Surveys of Consumers; Federal Reserve Bank of New York Survey of Consumer Expectations.

Survey of Business Inflation Expectations




Note: Survey of businesses in the Sixth Federal Reserve District. Data begin in February 2012.
Source: Federal Reserve Bank of Atlanta.

- In the current projection, we have maintained our view that underlying inflation is 1.8 percent and that it will hold steady at this level over the medium term. This assumption is informed by a variety of statistical models, some of which incorporate information on inflation expectations.

We project that hourly compensation will increase moderately over the medium term.

- Compensation per hour, which is more cyclically sensitive and much noisier than other measures of compensation, surged in the first half of this year. However, we believe this jump is transitory, in part because wage data from ADP suggest gains in compensation in the first quarter were driven by bonuses and stock option exercises. As a result, we expect compensation per hour to rise 5.3 percent this year but to increase 3.5 percent per year, on average, over the medium term.

- The employment cost index (ECI), which excludes stock options, rose 2.6 percent in the 12 months ending in June, down a bit from three months earlier. We expect the ECI to maintain this pace through the end of the projection period.

- Average hourly earnings rose 3.2 percent over the 12 months ending in August, the same as over the preceding 12 months. We expect growth in average hourly earnings to be near this pace through the near term.

## THE LONG-TERM OUTLOOK

- We assume that the natural rate of unemployment is 4.4 percent over the longer run, 0.2 percentage point lower than in the July Tealbook. We continue to assume that potential output growth will slow after 2021 to 1.7 percent per year in the longer run, as the boost to potential growth from the 2017 tax cuts wanes.

- We have maintained our assumption that the real long-run equilibrium federal funds rate will be 0.5 percent. The nominal yield on 10-year Treasury securities is 3.4 percent in the longer run.

- We continue to assume that fiscal policymakers will eventually reduce primary deficits by an amount sufficient to stabilize the debt-to-GDP ratio. We expect this ratio to settle around 105 percent in the longer run, 20 percentage points higher than would have occurred in the absence of the 2017–18 federal tax and discretionary spending changes and the recently approved increase in spending caps. We also still assume that this 20 percentage point increase in the debt-to-GDP ratio will push up the term premium on 10-year Treasury yields 50 basis points in the long run.

- GDP growth averages slightly below its long-run value of 1.7 percent from 2023 through 2025 and rises gradually to its long-run value thereafter. The unemployment rate moves up gradually from 3.6 percent at the end of 2022 toward its assumed natural rate in subsequent years. Core PCE price inflation remains at 1.9 percent for many years before converging eventually to its long-run value of 2.0 percent.

- Given the outlook for inflation and resource utilization, the nominal federal funds rate remains close to its long-run value of 2.5 percent from the end of the medium term onward.

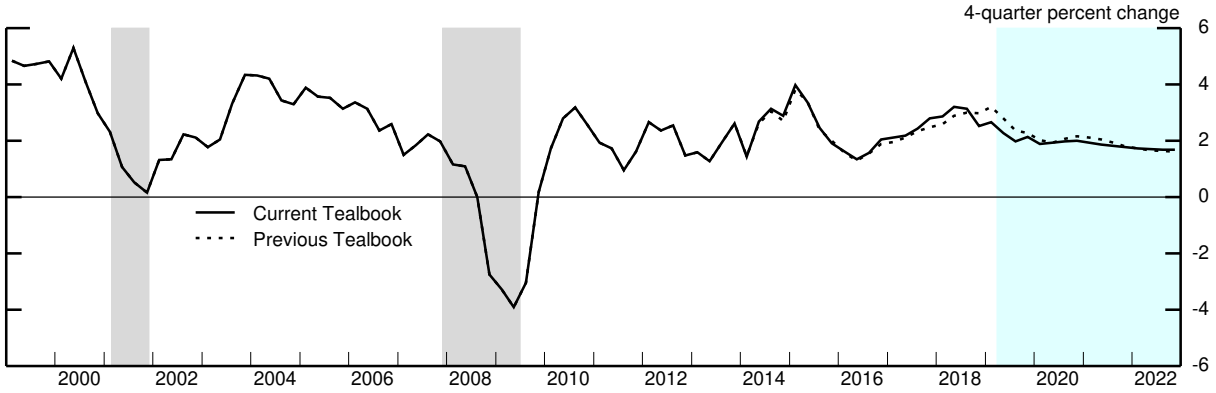
## Projections of Real GDP and Related Components

(Percent change at annual rate from final quarter of preceding period except as noted)

| Measure | 2018 | 2019 H1 | 2019 H2 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| **Real GDP** | **2.5** | **2.5** | **1.8** | **2.1** | **2.0** | **1.8** | **1.7** |
| *Previous Tealbook* | *3.0* | *2.8* | *1.7* | *2.3* | *2.1* | *1.8* | *1.6* |
| Final sales | 2.2 | 2.7 | 2.0 | 2.4 | 2.1 | 1.7 | 1.6 |
| *Previous Tealbook* | *2.6* | *3.0* | *2.0* | *2.5* | *2.2* | *1.8* | ... |
| Personal consumption expenditures | 2.6 | 2.9 | 2.7 | 2.8 | 2.4 | 2.3 | 2.2 |
| *Previous Tealbook* | *2.6* | *2.5* | *2.5* | *2.5* | *2.4* | *2.3* | ... |
| Residential investment | -4.4 | -2.1 | 4.1 | 1.0 | 5.3 | -4.0 | -4.7 |
| *Previous Tealbook* | *-3.3* | *-2.3* | *5.8* | *1.6* | *2.8* | *-3.6* | ... |
| Nonresidential structures | 2.6 | -4.6 | -1.5 | -3.1 | -2.2 | -1.4 | -2.2 |
| *Previous Tealbook* | *4.9* | *-2.2* | *-1.1* | *-1.6* | *-1.9* | *-.8* | ... |
| Equipment and intangibles | 6.8 | 3.3 | -.9 | 1.1 | 2.1 | 3.1 | 1.6 |
| *Previous Tealbook* | *7.6* | *3.5* | *.2* | *1.9* | *3.0* | *2.7* | ... |
| Federal purchases | 2.7 | 5.1 | 3.6 | 4.3 | 1.2 | .2 | .7 |
| *Previous Tealbook* | *2.7* | *5.3* | *3.7* | *4.5* | *1.7* | *.8* | ... |
| State and local purchases | .9 | 2.9 | .1 | 1.5 | 1.1 | 1.1 | 1.1 |
| *Previous Tealbook* | *.8* | *4.0* | *-.4* | *1.8* | *.9* | *1.0* | ... |
| Exports | .4 | -.8 | .7 | -.1 | 2.2 | 3.2 | 3.5 |
| *Previous Tealbook* | *2.3* | *1.3* | *1.8* | *1.5* | *3.0* | *3.5* | ... |
| Imports | 3.2 | -.7 | 1.2 | .3 | 2.1 | 3.1 | 3.2 |
| *Previous Tealbook* | *3.4* | *-.9* | *1.7* | *.4* | *2.3* | *3.2* | ... |
| | Contributions to change in real GDP (percentage points) | | | | | | |
| Inventory change | .3 | -.2 | -.3 | -.2 | -.1 | .0 | .1 |
| *Previous Tealbook* | *.4* | *-.2* | *-.3* | *-.2* | *-.1* | *.0* | ... |
| Net exports | -.4 | .0 | -.1 | -.1 | .0 | -.1 | -.1 |
| *Previous Tealbook* | *-.2* | *.3* | *.0* | *.1* | *.0* | *-.1* | ... |

... Not applicable.

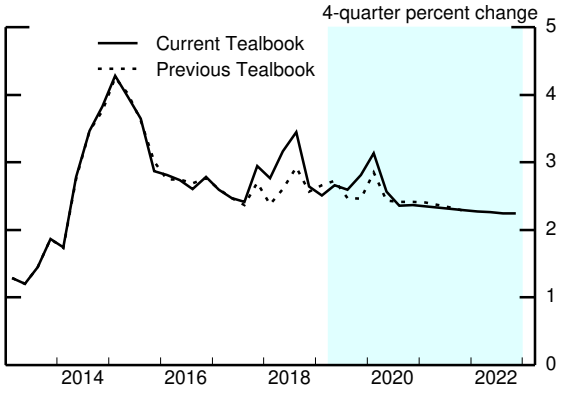
Real GDP



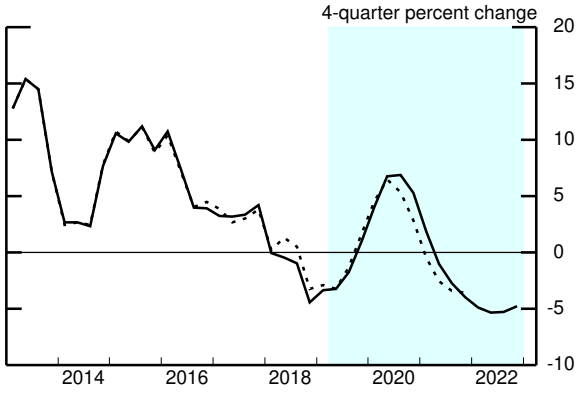

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

# Components of Final Demand

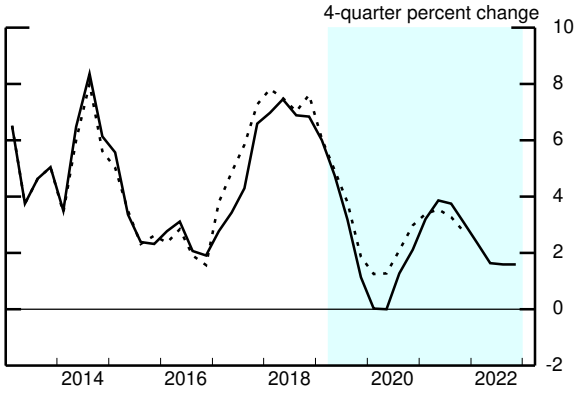
Personal Consumption Expenditures



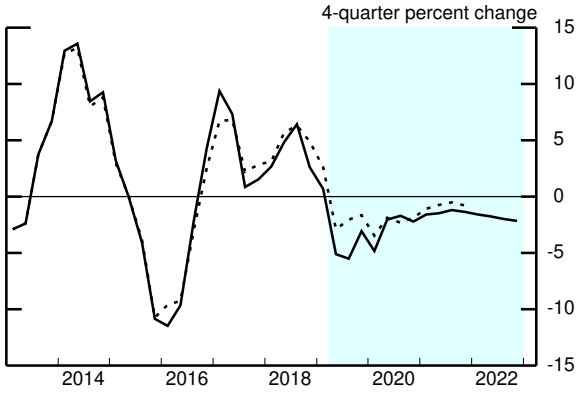

Residential Investment



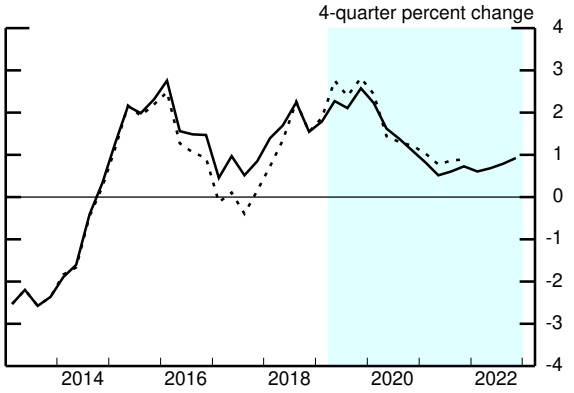

Equipment and Intangibles



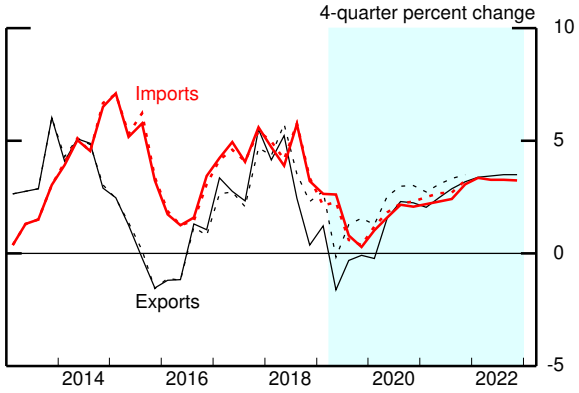

Nonresidential Structures




Government Consumption and Investment



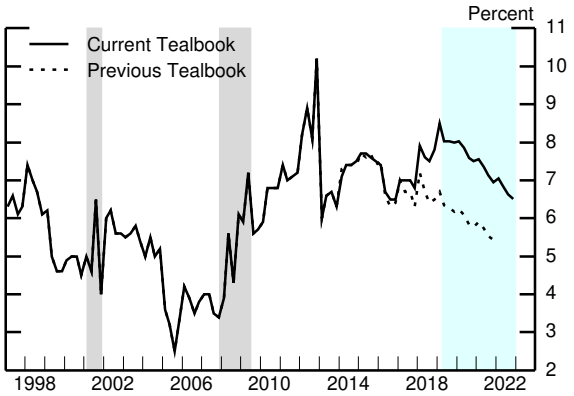

Exports and Imports




Source: U.S. Department of Commerce, Bureau of Economic Analysis.

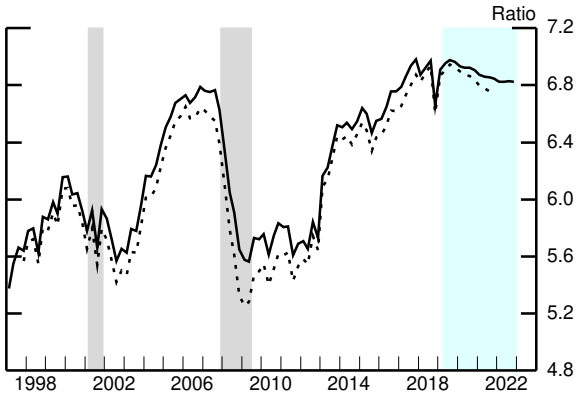
# Aspects of the Medium-Term Projection

## Personal Saving Rate



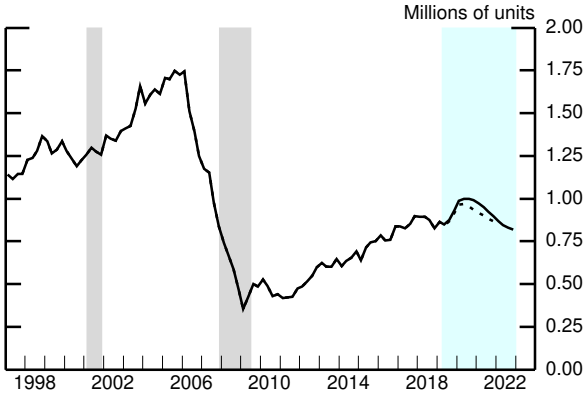

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Wealth-to-Income Ratio



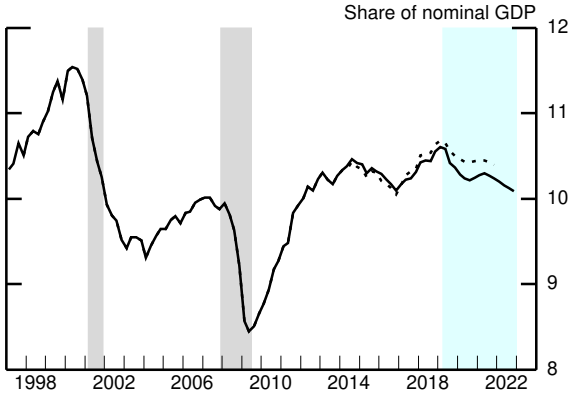

Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Single-Family Housing Starts



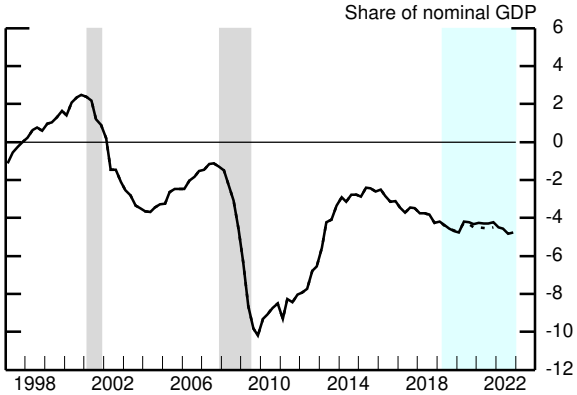

Source: U.S. Census Bureau.

## Equipment and Intangibles Spending



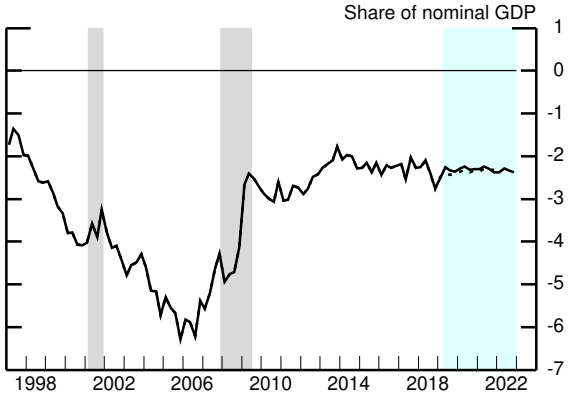

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Federal Surplus/Deficit




Note: 4-quarter moving average.
Source: *Monthly Treasury Statement.*

## Current Account Surplus/Deficit



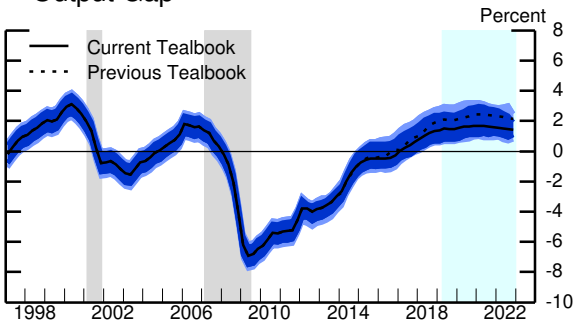

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

Domestic Econ Devel & Outlook

# Cyclical Position of the U.S. Economy: Longer-Term Perspective

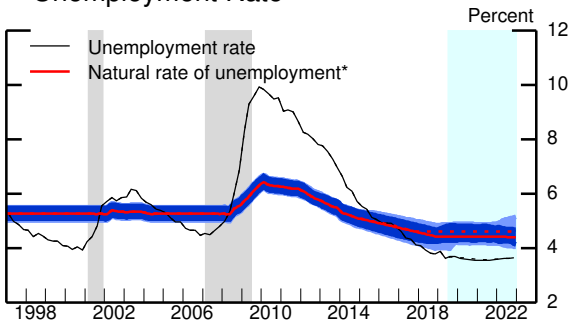
## Output Gap




Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the output gap.

Source: Various macroeconomic data; staff assumptions.

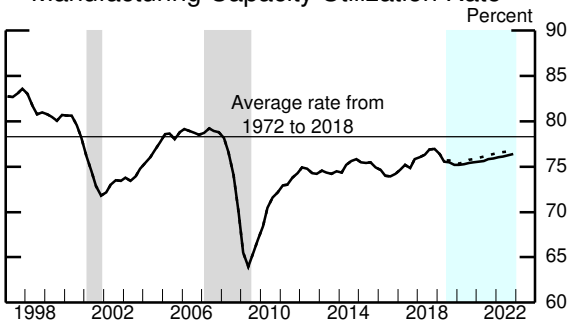
## Unemployment Rate




Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.

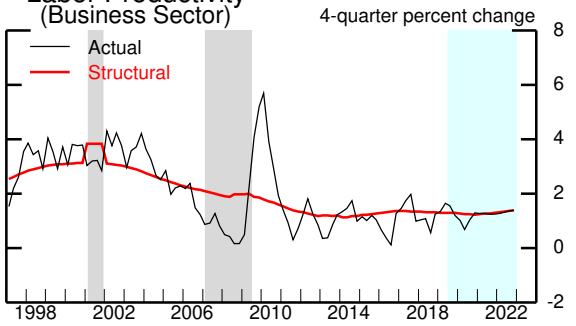
Source: Various macroeconomic data; staff assumptions.

## Manufacturing Capacity Utilization Rate




Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

## Labor Productivity (Business Sector)




Source: U.S. Department of Labor, Bureau of Labor Statistics; U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

## Decomposition of Potential Output

(Percent change, Q4 to Q4, except as noted)

| Measure | 1974-95 | 1996-2000 | 2001-07 | 2008-10 | 2011-17 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| Potential output | 3.1 | 3.6 | 2.7 | 1.9 | 1.5 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 |
| *Previous Tealbook* | *3.1* | *3.6* | *2.7* | *1.9* | *1.4* | *1.8* | *1.8* | *1.8* | *1.9* | *1.8* |
| Selected contributions:[1] | | | | | | | | | | |
| Structural labor productivity[2] | 1.7 | 2.9 | 2.7 | 1.8 | 1.3 | 1.3 | 1.3 | 1.2 | 1.3 | 1.4 |
| *Previous Tealbook* | *1.7* | *2.9* | *2.7* | *1.8* | *1.2* | *1.3* | *1.3* | *1.2* | *1.3* | ... |
| Capital deepening | .7 | 1.4 | 1.0 | .5 | .8 | .7 | .7 | .5 | .5 | .5 |
| Multifactor productivity | .8 | 1.1 | 1.4 | 1.1 | .2 | .4 | .4 | .5 | .6 | .7 |
| Structural hours | 1.5 | 1.3 | .8 | .5 | .4 | .9 | .3 | .6 | .5 | .5 |
| *Previous Tealbook* | *1.5* | *1.3* | *.8* | *.5* | *.4* | *.7* | *.2* | *.6* | *.5* | ... |
| Labor force participation | .4 | -.1 | -.2 | -.4 | -.5 | -.2 | -.2 | -.2 | -.2 | -.3 |
| *Previous Tealbook* | *.4* | *-.1* | *-.2* | *-.4* | *-.5* | *-.2* | *-.2* | *-.2* | *-.2* | ... |
| Memo: | | | | | | | | | | |
| Output gap[3] | -1.2 | 2.5 | .3 | -5.4 | .6 | 1.4 | 1.5 | 1.7 | 1.6 | 1.4 |
| *Previous Tealbook* | *-1.2* | *2.5* | *.3* | *-5.4* | *.9* | *1.9* | *2.1* | *2.4* | *2.3* | *2.1* |

... Not applicable.
Note: For multiyear periods, the percent change is the annual average from Q4 of the year preceding the first year shown to Q4 of the last year shown.
1. Percentage points.
2. Total business sector.
3. Percent difference between actual and potential output in the final quarter of the period indicated. A negative number indicates that the economy is operating below potential.

## The Outlook for the Labor Market

| Measure | 2018 | 2019 H1 | 2019 H2 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| Nonfarm payroll employment[1] | 223 | 163 | 136 | 149 | 115 | 88 | 65 |
| *Previous Tealbook* | *223* | *173* | *155* | *164* | *147* | *111* | ... |
| Private employment[1] | 215 | 156 | 122 | 139 | 106 | 78 | 55 |
| *Previous Tealbook* | *215* | *161* | *143* | *152* | *138* | *101* | ... |
| Labor force participation rate[2] | 63.0 | 62.9 | 63.0 | 63.0 | 62.7 | 62.6 | 62.3 |
| *Previous Tealbook* | *63.0* | *62.9* | *62.9* | *62.9* | *62.9* | *62.8* | ... |
| Civilian unemployment rate[2] | 3.8 | 3.6 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 |
| *Previous Tealbook* | *3.8* | *3.6* | *3.7* | *3.7* | *3.6* | *3.6* | *3.6* |
| Employment-to-population ratio[2] | 60.6 | 60.6 | 60.6 | 60.6 | 60.5 | 60.3 | 60.1 |
| *Previous Tealbook* | *60.6* | *60.6* | *60.6* | *60.6* | *60.7* | *60.6* | ... |

... Not applicable.
1. Thousands, average monthly changes.
2. Percent, average for the final quarter in the period.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

## Inflation Projections

| Measure | 2018 | 2019 H1 | 2019 H2 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|
| *Percent change at annual rate from final quarter of preceding period* | | | | | | | |
| PCE chain-weighted price index | 1.9 | 1.3 | 1.6 | 1.5 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | *1.9* | *1.6* | *1.8* | *1.7* | *1.8* | *1.8* | *1.9* |
| Food and beverages | .5 | 1.8 | 1.9 | 1.8 | 2.4 | 2.4 | 2.4 |
| *Previous Tealbook* | *.5* | *1.8* | *2.6* | *2.2* | *2.6* | *2.6* | ... |
| Energy | 3.9 | -.7 | -9.1 | -5.0 | -1.0 | .5 | 1.0 |
| *Previous Tealbook* | *3.5* | *-.8* | *-6.8* | *-3.8* | *-1.4* | *.0* | ... |
| Excluding food and energy | 1.9 | 1.4 | 2.1 | 1.8 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | *1.9* | *1.7* | *2.2* | *1.9* | *1.9* | *1.9* | *1.9* |
| Prices of core goods imports[1] | .2 | -1.2 | -1.0 | -1.1 | .7 | 1.0 | .9 |
| *Previous Tealbook* | *.5* | *-.6* | *1.1* | *.3* | *.9* | *.8* | ... |

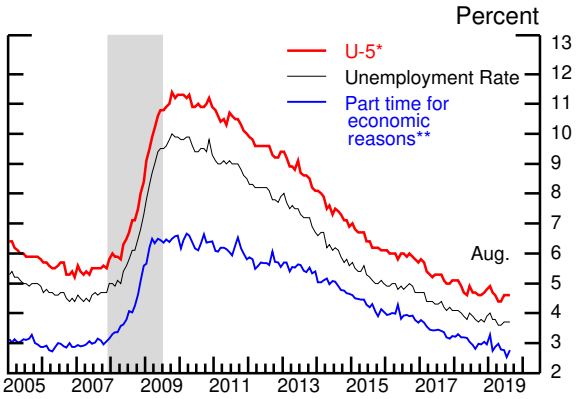
| | June 2019 | July 2019 | Aug. 2019[2] | Sept. 2019[2] | Oct. 2019[2] | Nov. 2019[2] | Dec. 2019[2] |
|---|---|---|---|---|---|---|---|
| *12-month percent change* | | | | | | | |
| PCE chain-weighted price index | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.6 |
| *Previous Tealbook* | *1.5* | *1.6* | *1.7* | *1.6* | *1.6* | *1.7* | *1.8* |
| Excluding food and energy | 1.6 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | *1.7* | *1.7* | *1.9* | *1.9* | *1.9* | *1.9* | *1.9* |

... Not applicable.
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Domestic Econ Devel & Outlook

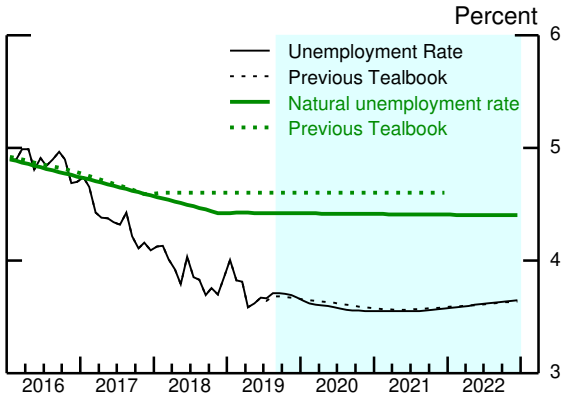
# Labor Market Developments and Outlook (1)

## Measures of Labor Underutilization



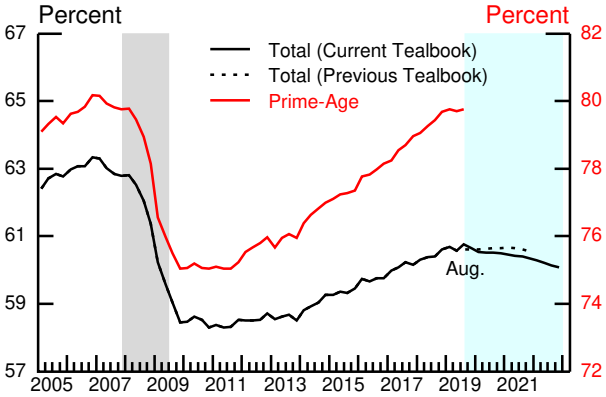

* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Unemployment Rate



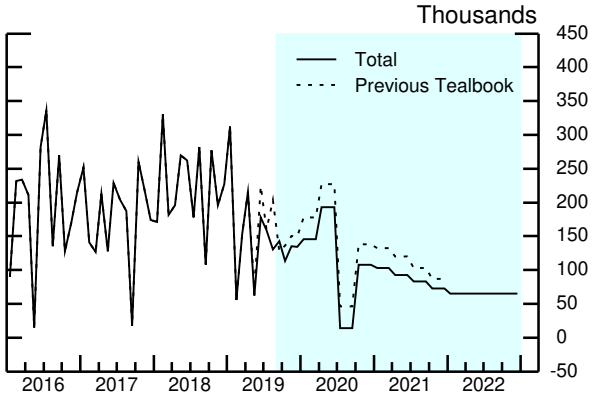

Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Employment-to-Population Ratio



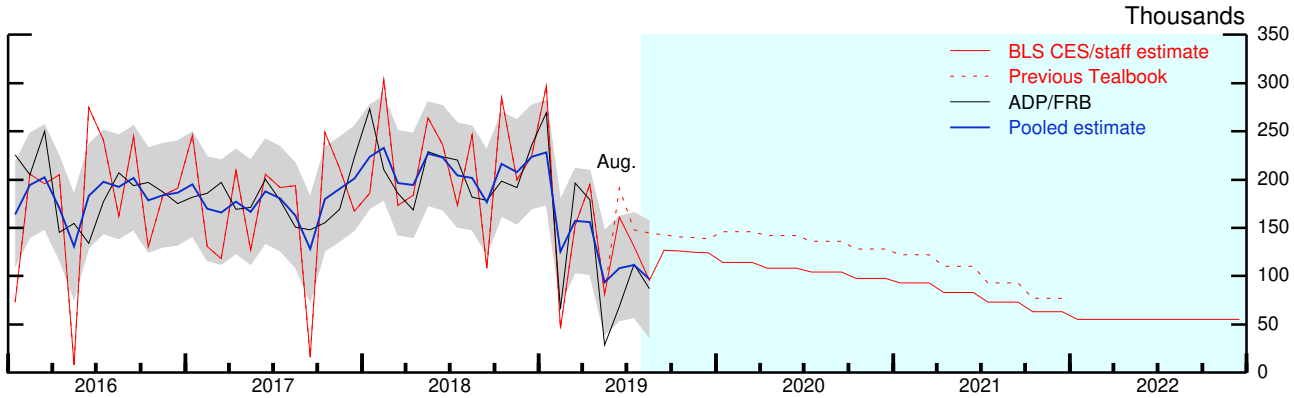

Source: U.S. Department of Labor, Bureau of Labor Statistics.
Note: Every graph except the one for the prime-age population corresponds with the left axis.

## Change in Total Payroll Employment




Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Change in Private Payroll Employment

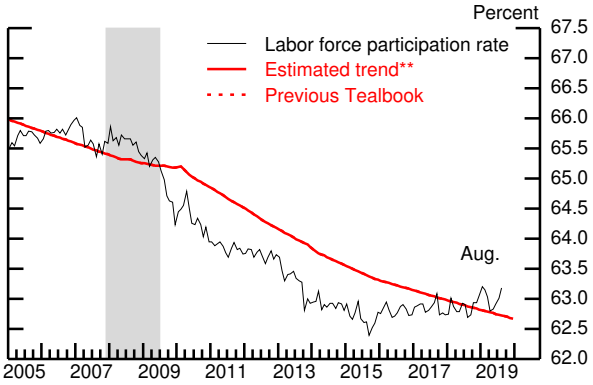


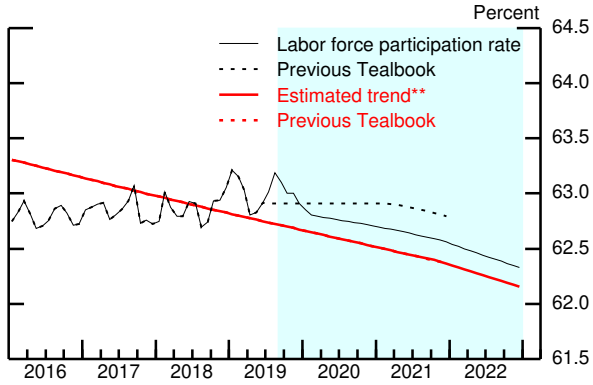

Note: Gray shaded area around blue line is 90 percent confidence interval around pooled estimate.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff calculations using microdata from ADP.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

# Labor Market Developments and Outlook (2)

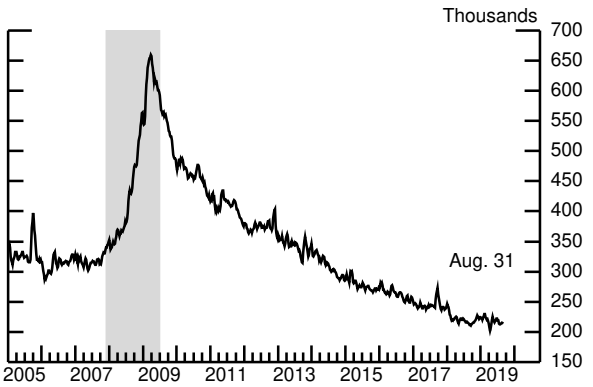
## Labor Force Participation Rate*



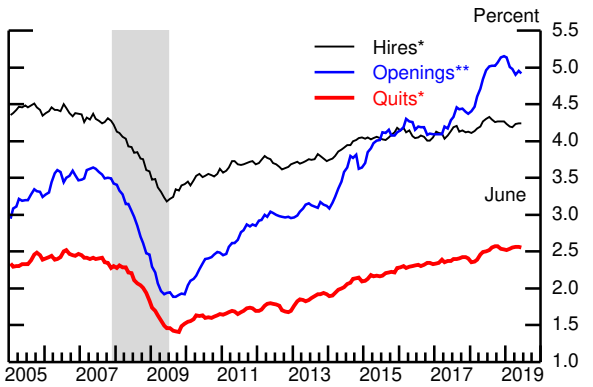

* Published data adjusted by staff to account for changes in population weights.
** Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

## Initial Unemployment Insurance Claims*



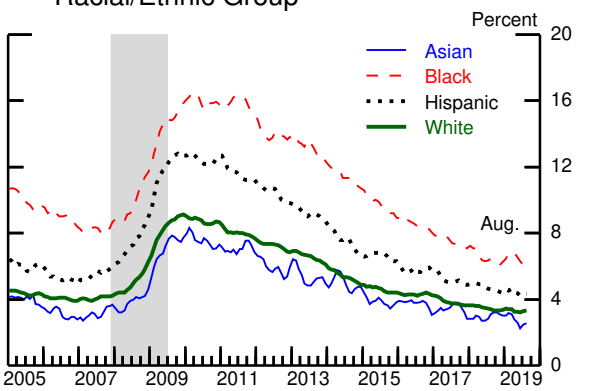

* 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

## Hires, Quits, and Job Openings



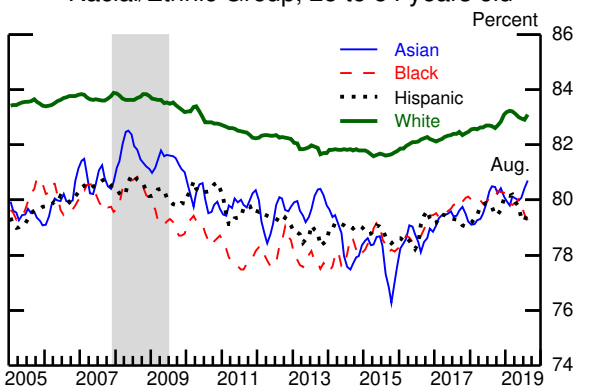

* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

## Unemployment Rate by Racial/Ethnic Group




Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

## Labor Force Participation Rate by Racial/Ethnic Group, 25 to 54 years old



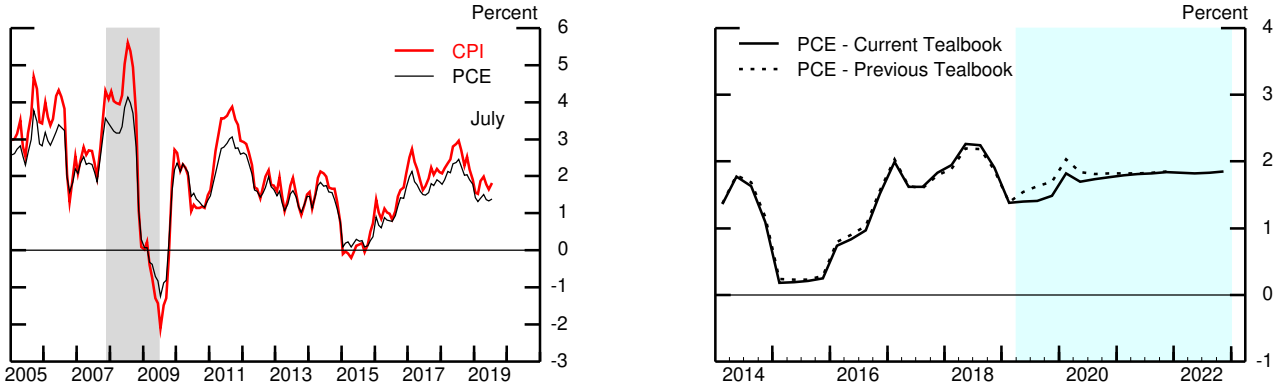

Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey.

Domestic Econ Devel & Outlook

# Inflation Developments and Outlook (1)

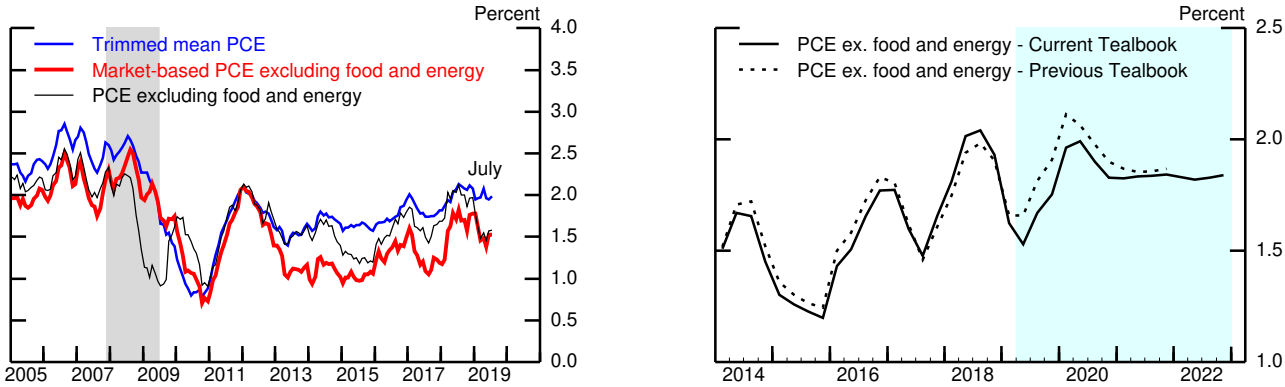
(Percent change from year-earlier period)

## Headline Consumer Price Inflation



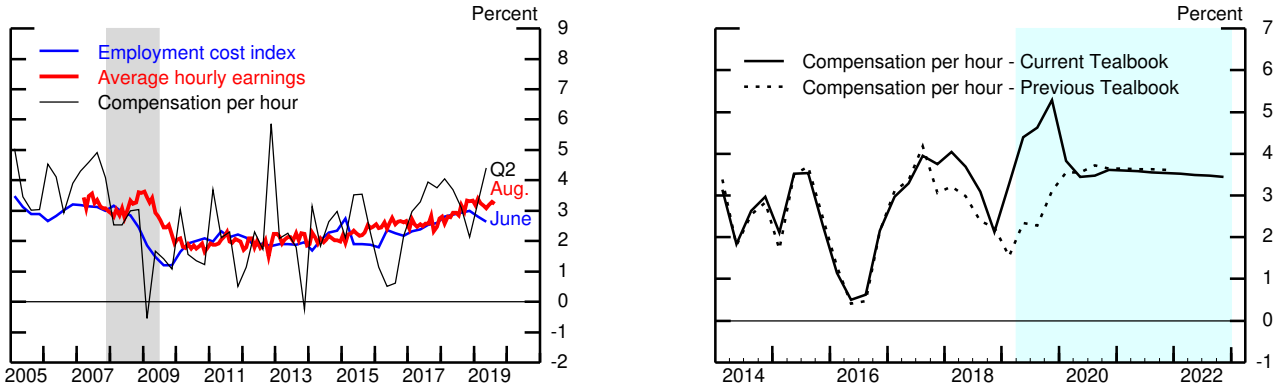

Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

## Measures of Core PCE Price Inflation




Source: For trimmed mean PCE, Federal Reserve Bank of Dallas; otherwise, U.S. Department of Commerce, Bureau of Economic Analysis.

## Labor Cost Growth



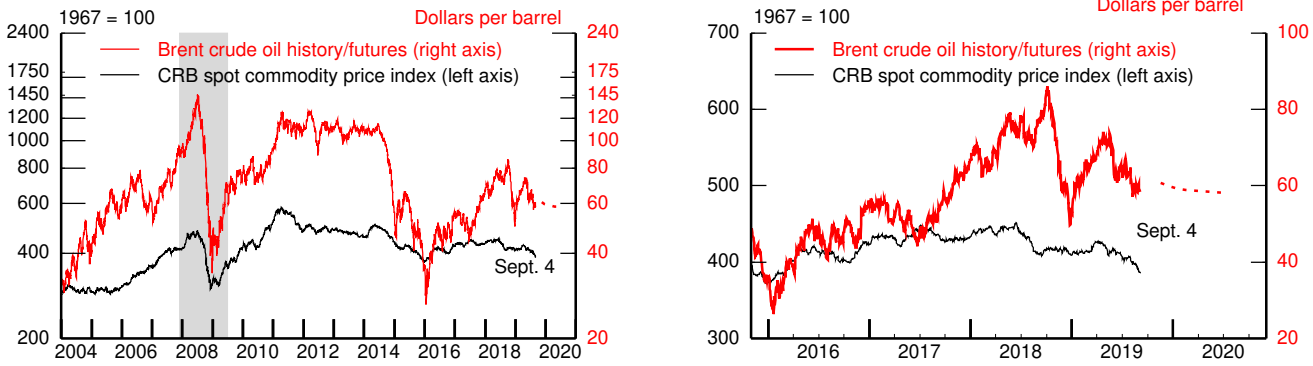

Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

# Inflation Developments and Outlook (2)

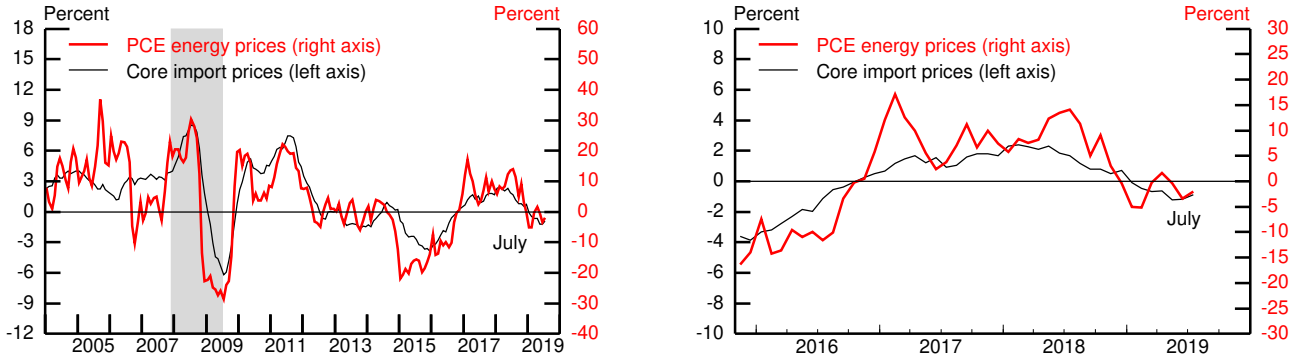
(Percent change from year-earlier period, except as noted)

## Commodity and Oil Price Levels



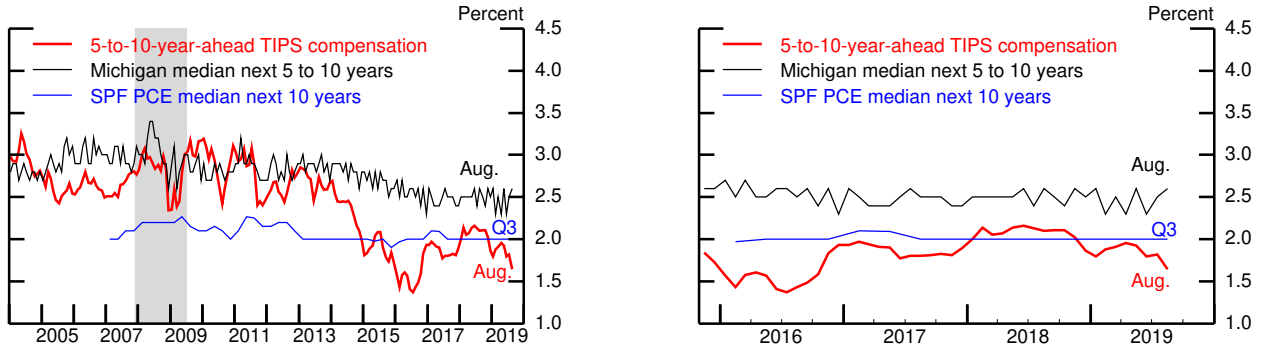

Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

## Energy and Import Price Inflation




Source: For core import prices, U.S. Dept. of Labor, Bureau of Labor Statistics; for PCE, U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Long-Term Inflation Expectations and Compensation




Note: Based on a comparison of an estimated TIPS (Treasury Inflation-Protected Securities) yield curve with an estimated nominal off-the-run Treasury yield curve, with an adjustment for the indexation-lag effect.
SPF Survey of Professional Forecasters.
Source: For Michigan, University of Michigan Surveys of Consumers; for SPF, the Federal Reserve Bank of Philadelphia; for TIPS, Federal Reserve Board staff calculations.

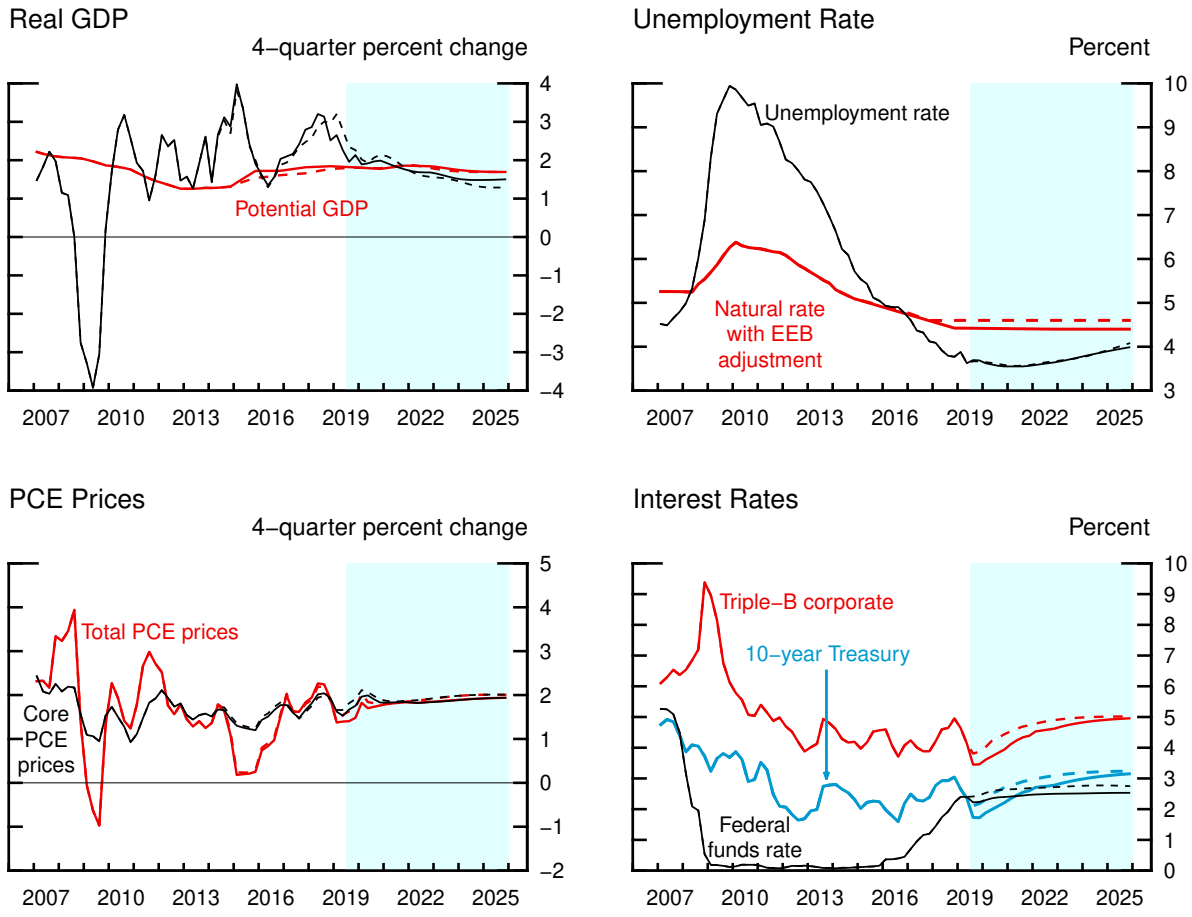
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

# The Long–Term Outlook

(Percent change, Q4 to Q4, except as noted)

| Measure | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Longer run |
|---|---|---|---|---|---|---|---|---|
| Real GDP | 2.1 | 2.0 | 1.8 | 1.7 | 1.5 | 1.5 | 1.5 | 1.7 |
| Previous Tealbook | 2.3 | 2.1 | 1.8 | 1.6 | 1.5 | 1.3 | 1.3 | 1.7 |
| Civilian unemployment rate[1] | 3.7 | 3.6 | 3.6 | 3.6 | 3.8 | 3.9 | 4.0 | 4.4 |
| Previous Tealbook | 3.7 | 3.6 | 3.6 | 3.7 | 3.7 | 3.9 | 4.1 | 4.6 |
| PCE prices, total | 1.5 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 |
| Previous Tealbook | 1.7 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| Core PCE prices | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 |
| Previous Tealbook | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| Federal funds rate[1] | 2.23 | 2.40 | 2.46 | 2.50 | 2.51 | 2.53 | 2.53 | 2.50 |
| Previous Tealbook | 2.45 | 2.64 | 2.68 | 2.72 | 2.76 | 2.77 | 2.75 | 2.50 |
| 10-year Treasury yield[1] | 1.7 | 2.2 | 2.6 | 2.8 | 3.0 | 3.1 | 3.2 | 3.4 |
| Previous Tealbook | 2.2 | 2.7 | 2.9 | 3.1 | 3.2 | 3.2 | 3.2 | 3.4 |

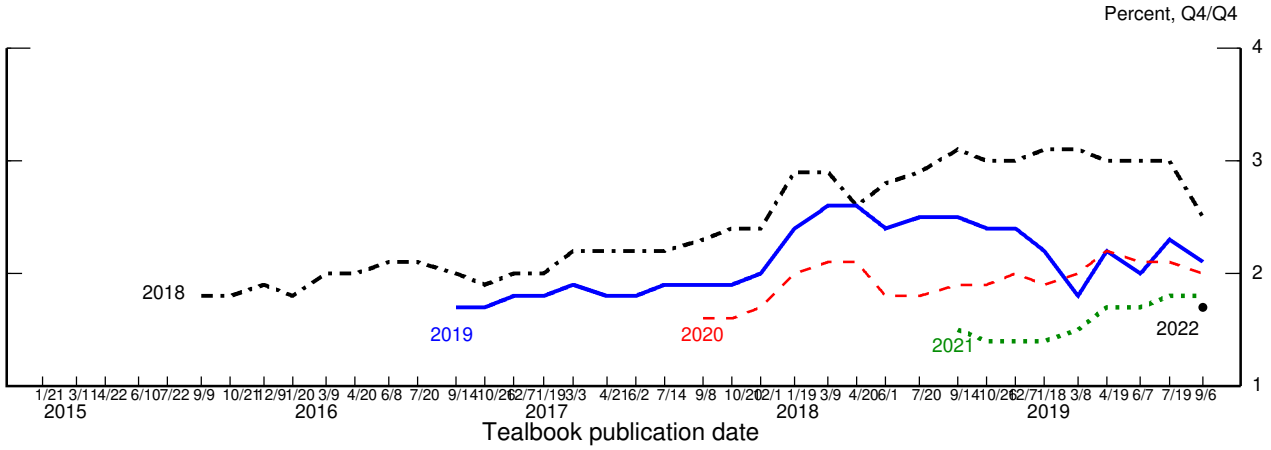
1. Percent, average for the final quarter of the period.



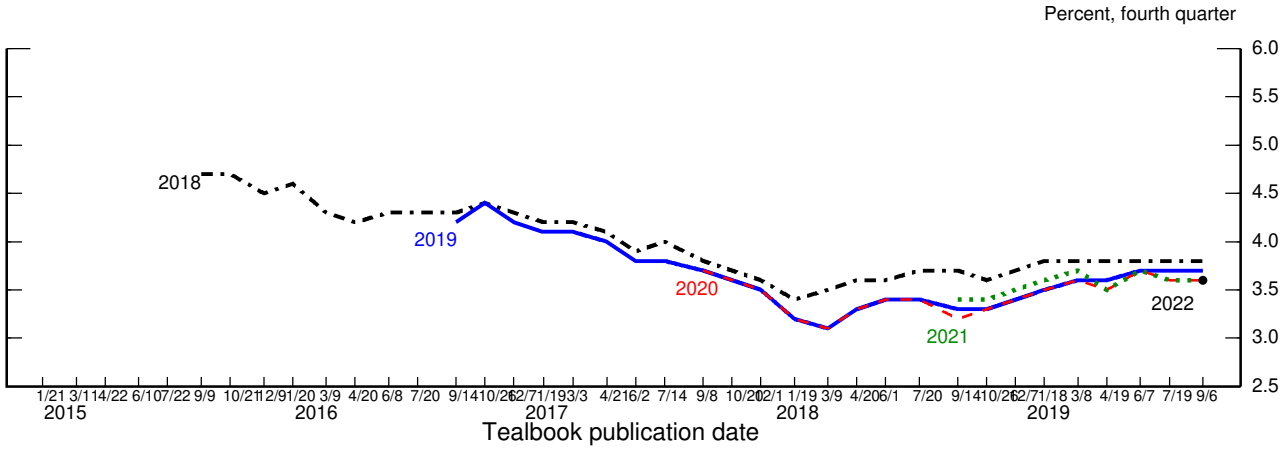

Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

# Evolution of the Staff Forecast

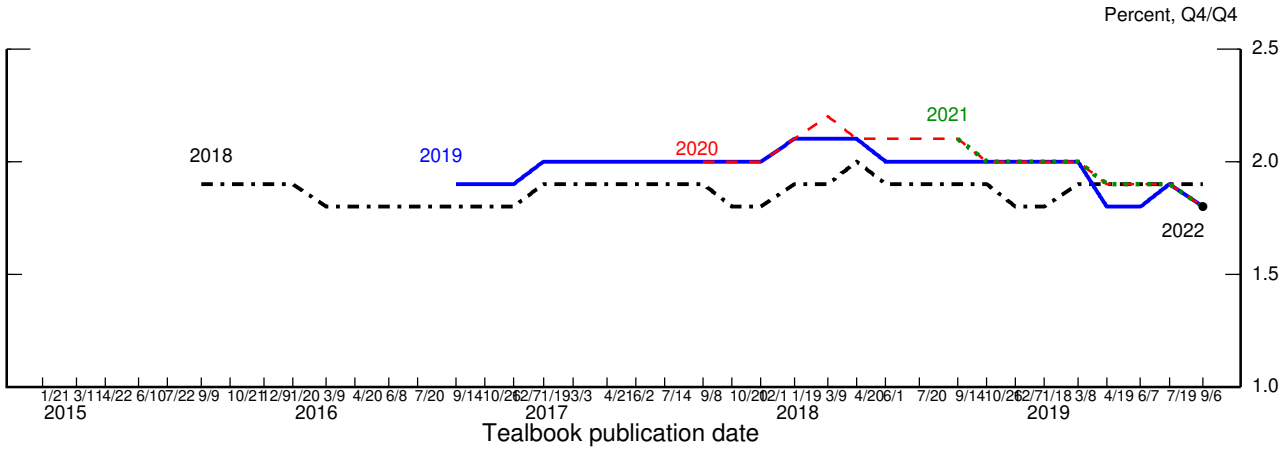
## Change in Real GDP




## Unemployment Rate




## Change in PCE Prices excluding Food and Energy



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# International Economic Developments and Outlook



Despite the buzz about a global recession, we do not see one around the corner. Notwithstanding the trade tensions and a continued slump in manufacturing, services—which account for the largest share of activity in most advanced economies—are holding up relatively better, and most economies are set for further expansion. But there is hardly cause to be sanguine. We have revised down our foreign outlook yet again and now see economic growth abroad holding steady below potential in the second half of the year rather than picking up modestly as projected in the July Tealbook. Moreover, downside risks have increased noticeably amid another escalation of trade tensions, despite some abatement of the political turmoil in Hong Kong and Italy. The prospects for Brexit remain highly uncertain.

Incoming GDP data put foreign growth in the second quarter at 2.1 percent at an annual rate, a touch higher than we were expecting in the July Tealbook. Growth in Brazil, Canada, and Japan was stronger than expected, but this positive surprise was largely offset by downward surprises in Germany, Hong Kong, and the United Kingdom—where output contracted—and in several other emerging market economies (EMEs). Third-quarter indicators have generally disappointed, including for much-watched Germany and China as well as for Canada. We now see aggregate foreign growth remaining at about 2 percent in the second half of the year (0.3 percentage point lower than in the July Tealbook) as some recovery in the EMEs is roughly offset by slower growth in the advanced foreign economies (AFEs). Moreover, the pickup in EMEs is predicated on sustained recoveries in Brazil and Mexico, which are hardly assured at this point.

We expect foreign growth to edge up to about 2.5 percent next year, close to potential, and remain about there over the forecast period. We assume that the drag from several factors that have weighed on foreign growth, including trade policy uncertainty and the global manufacturing slump (the latter is discussed in the box "Weakness in the Global Manufacturing Sector"), will ease, consistent with the recent industrial production strength in emerging Asia excluding China. Highly accommodative monetary policies should also provide support.

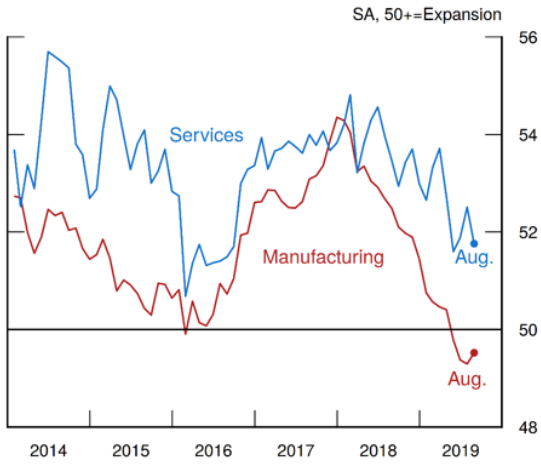
## Weakness in the Global Manufacturing Sector

Global manufacturing activity has been weakening since 2018 (red line in figure 1). Moreover, this weakness has become increasingly widespread, with manufacturing purchasing managers indexes (PMIs) indicating contractions (below 50) in the majority of countries for which we have data. In contrast, the service sector has performed relatively better (blue line in figure 1), with service PMIs indicating contractions in only a few countries. Because movements in the manufacturing PMI can be followed by more generalized downturns in economic activity, the manufacturing slowdown warrants close attention.[1] In this discussion, we present evidence that a global investment slowdown—perhaps triggered by the surge in trade policy uncertainty—is an important contributor to the weakness in the global manufacturing sector.[2]

The downturn in global manufacturing activity has coincided with a global investment slowdown. Both industrial production (IP) (red line in figure 2) and investment growth (blue line in figure 2) have trended down since 2018, with the latter reaching its lowest level since the Global Financial Crisis. This investment downturn has also been widespread, with more than three-fourths of the economies in our sample—among them China, Germany, and the United Kingdom—experiencing a deceleration. Moreover, as shown in figure 3, the contribution of capital goods (green bars) to growth of global IP has fallen markedly since 2017, which provides further evidence of the importance of investment in dragging down global manufacturing activity.

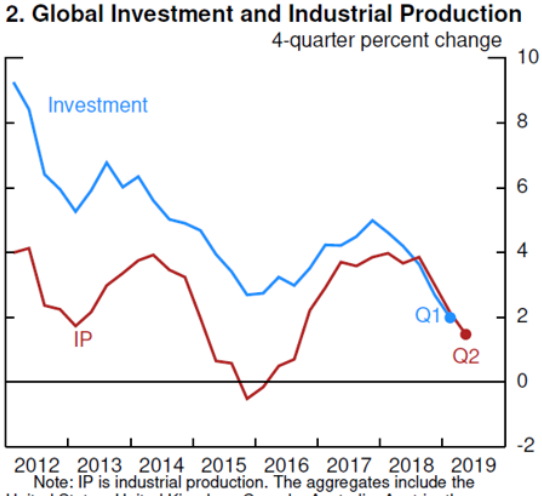
What accounts for this manufacturing and investment slowdown? A likely explanation is that trade tensions, although concentrated in the United States and China, have had wider international spillovers. For instance, recently imposed tariffs and uncertainty about future tariffs could be weighing on global manufacturing activity through supply chain connections, and

**1. Global PMIs**




Source: JP Morgan, IHS Markit.

**2. Global Investment and Industrial Production**




Note: IP is industrial production. The aggregates include the United States, United Kingdom, Canada, Australia, Austria, the Netherlands, Switzerland, Germany, Spain, Italy, France, Sweden, Japan, Argentina, Brazil, Chile, Colombia, Mexico, China, India, Korea, Malaysia, Philippines, Indonesia, Taiwan, Thailand, Israel, and Russia.
Source: Haver Analytics.

[1] For example, manufacturing PMIs tend to lead services PMIs.

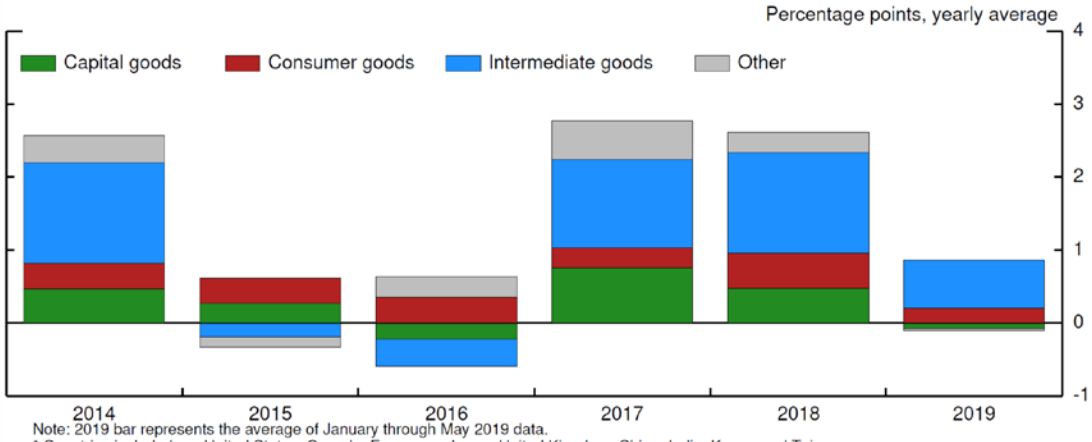
[2] A recent memo by the Board staff finds that the direct effect of tariff increases accounts for about half of the recent deceleration in U.S. manufacturing industrial production. See Aaron Flaaen and Justin Pierce (2019), "Effects of Recent Tariffs on Manufacturing Output," memorandum, Board of Governors of the Federal Reserve System, Division of Research and Statistics, August 26.

heightened uncertainty about future tariffs is likely depressing investment. Both investment and manufacturing started to turn down in 2018 when trade tensions intensified. Figure 4 shows that decreases in manufacturing PMIs have been larger in those countries with higher trade openness, consistent with the hypothesis that trade tensions are weighing on manufacturing activity and investment. The IEDO box "The Effects of Trade Policy Uncertainty on Global Economic Activity," attempts to quantify the drag of trade policy uncertainty on global activity.

Besides trade tensions, other more idiosyncratic factors have likely contributed to the weakness of manufacturing as well. First, European auto production remains sluggish, as German manufacturers have failed to bounce back from the introduction of more stringent emission standards in the summer of 2018. Second, Chinese domestic demand has weakened, in part because of the country's deleveraging campaign, leading to knock-on effects for its major trade partners. For example, weak global demand for electronic products, driven in large part by China, has caused a sharp slowdown in emerging Asia's technology sector. Finally, it is possible that some still unidentified factor is weighing on global manufacturing.

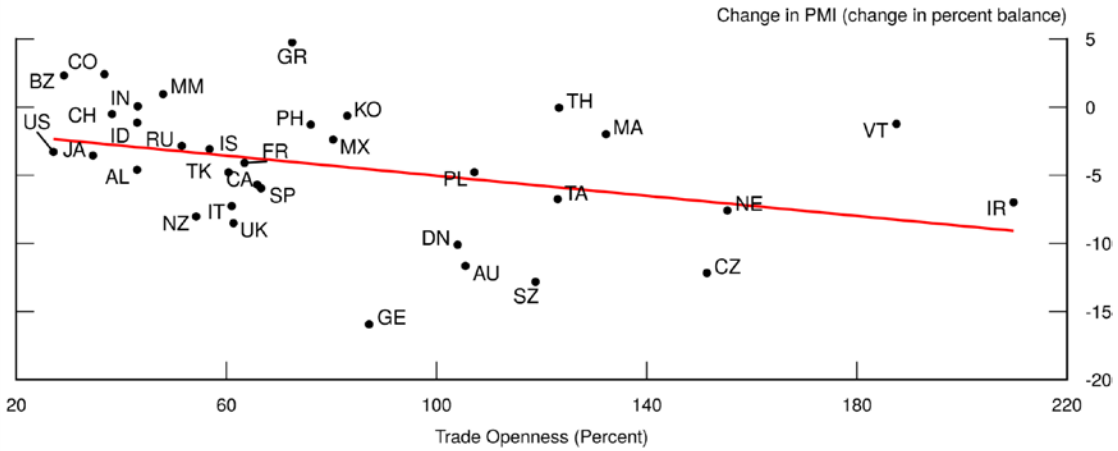


**3. Contributions to Global* Industrial Production Growth**




Note: 2019 bar represents the average of January through May 2019 data.
* Countries included are United States, Canada, Euro area, Japan, United Kingdom, China, India, Korea, and Taiwan.
Source: Haver Analytics.

**4. Change in Manufacturing PMI[1] against Trade Openness[2]**




1. Change in manufacturing PMI is calculated by its average 2017 level subtracted from its most recent level.
2. Trade openness is measured by the sum of exports and imports, as a percentage of GDP.
Source: IHS Markit, World Bank.

However, downside risks around this outlook have increased. First, trade policy uncertainty (TPU) ratcheted up again as the United States and China implemented further tariff increases in September and threatened even more later in the year. Our econometric estimates of the effects of TPU on global growth suggest that the most recent spike in TPU would reduce global growth about 0.1 percentage point, which is broadly consistent with the size of our downward revision to foreign growth (see the box "The Effects of Trade Policy Uncertainty on Global Growth"). Consistent with our standard practice, we are assuming no further increases in tariffs and, with negotiations resuming in October between China and the United States, this outcome may even come true. However, a further escalation of trade tensions is quite plausible, as we explore in our "Escalation of Trade Tensions" alternative scenario in the Risks and Uncertainty section.

The United Kingdom continues to struggle with Brexit. The political developments of the past few weeks have made it clear that no consensus around a Brexit deal is likely to emerge any time in the next few months. Therefore, the assumption in our previous forecasts that the United Kingdom will leave the European Union (EU) with a deal in place by the end of the year is no longer tenable. Instead, we assume that there will be another extension and that it will take an additional year to reach consensus on a Brexit deal. Meanwhile, the continued uncertainty will weigh on the U.K. economy, with some adverse spillovers to the euro area but a more limited effect on the rest of the world. However, a no-deal Brexit by the October 31 deadline could still happen. As discussed in our alternative scenario "No-Deal Brexit," given the substantial preparation for this possible outcome and markets having internalized some likelihood of such an event, there will likely not be large disruptions to global financial markets. As such, a no-deal Brexit would probably push foreign growth only slightly below our new baseline. That said, we cannot rule out more severe and disruptive outcomes.

Foreign inflation stepped up in the second quarter, broadly in line with expectations, due to earlier increases in oil prices and, in some key EMEs, food prices. Incoming data show little sign of underlying inflationary pressures, however, with 12-month core inflation in July for the euro area and Japan remaining subdued—at 0.9 percent and 0.4 percent, respectively—and oil prices falling. Against the backdrop of subdued inflation and faltering growth, we expect the European Central Bank (ECB) will soon announce further stimulus. AFE policy rates, more generally, are set to remain low for long, and we have revised down the policy rate path for Canada a bit on the weaker

outlook. There was a plethora of policy rate cuts in EMEs, including Brazil, Chile, India, Indonesia, Russia, Mexico, Thailand, and the Philippines, with central banks citing weak domestic activity, concerns about global growth, and trade uncertainty.

## ADVANCED FOREIGN ECONOMIES

- ***United Kingdom.*** Real GDP contracted 0.8 percent in the second quarter, held back by the reversal of the stockpiling ahead of the original Brexit deadline, temporary shutdowns by several car producers, and a sharp decline in investment. This reading is 0.6 percentage point lower than our July Tealbook estimate and, with PMI data through August also coming in surprisingly weak, we have revised down our projection for growth in the current quarter to only 0.4 percent.

  Given the recent approval of a bill by the House of Commons that intends to block an exit from the EU without a deal, as well as the failed attempt by Prime Minister Johnson to consolidate his power by calling elections for October 15, we are moderately comfortable that the United Kingdom will not crash out of the EU by the October 31 deadline. That said, the political turbulence of recent weeks convinces us that we can no longer assume that the United Kingdom will leave the EU with a deal in place by year-end. Instead, we assume that the United Kingdom will take an additional year to come up with an orderly way to execute Brexit as approved by the EU. With elevated Brexit-related uncertainty persisting for much longer, we marked down growth 0.6 percentage point for 2020 to 1 percent. That said, as Prime Minister Johnson plans to repeat his call for a snap election for October, the risk of a no-deal Brexit on October 31 remains, though it is somewhat diminished. Acknowledging the huge uncertainty around this possibility, we see a no-deal Brexit as depressing U.K. growth a further 0.7 percentage point to near zero next year, while euro-area growth is lowered 0.3 percentage point to about 1 percent. (See the scenario "No-Deal Brexit" in the Risks and Uncertainty section for details.)

- ***Euro Area.*** GDP growth slowed from 1.7 percent in the first quarter to a below-potential pace of 0.8 percent in the second, mainly reflecting a slump in net exports and ongoing weakness in the manufacturing sector. The slowdown was especially marked in Germany, with output contracting 0.3 percent at an annual rate. Economic indicators, such as July retail sales as well as PMIs and economic sentiment through August, suggest that euro-area growth will remain at 0.8 percent in the third quarter, a touch weaker than our July Tealbook forecast. Going forward, we expect growth to

## The Effects of Trade Policy Uncertainty on Global Economic Activity

The outlook for trade remains highly uncertain. Figure 1 shows the staff's index of trade policy uncertainty (TPU), which is constructed by counting the frequency of joint occurrences of trade policy and uncertainty terms in major newspapers. The TPU index, which had fallen in July, rose again in August amid renewed trade tensions between the United States and China, which included the announcement of additional tariffs, the designation of China as a "currency manipulator," and mutual threats of further tariff hikes. The August increase marks the third wave of pronounced increases in TPU in recent years, following a first wave of increases in early 2018—when initial tariffs were announced and then imposed on steel, aluminum, and some imports from China—and a second wave of increases in May and June of this year, when additional tariffs were imposed on China and threatened on Mexico.

While it is possible that trade negotiations will eventually lead to a more open and fair global competitive landscape, heightened uncertainty about trade policies is likely weighing on economic activity in the United States and around the world through a variety of channels.[1] In particular, higher uncertainty may delay or deter firms' investment and hiring, lower consumer confidence and spending, and depress investors' sentiment while boosting flight-to-safety flows that appreciate the dollar, thus reducing U.S. net exports.

To quantify the economic effects of increased trade tensions, we estimate a monthly vector auto-regression (VAR) model that includes the staff's index of TPU; manufacturing industrial production in the United States, in the AFEs, and in the EMEs; the broad real dollar index; world imports; U.S. stock prices; U.S. credit spreads; and U.S. import tariffs.[2] The inclusion of tariffs in the VAR model allows us to isolate movements in TPU that reflect variation in genuine trade uncertainty from those that reflect implemented trade policy actions.[3]

According to the VAR estimates, an increase in TPU lowers industrial production in the United States and abroad, boosts the dollar, reduces the price of risky assets, and lowers world imports. These effects build over time—the maximum decline in industrial production occurs after six months—and die out slowly. We convert the effects on industrial production into GDP effects using the historical elasticity of GDP growth to industrial production growth.

Our estimates imply that the three waves of trade tensions combined should subtract about 1 percent from the level of GDP in both the United States and the foreign economies by early 2020 (the black lines in figure 2). The first wave of increased uncertainty (red lines) accounts for the largest effects and is estimated to have subtracted about 0.7 percent from the level of GDP. Had trade tensions not escalated further in May and again more recently, the drag on GDP would have started to ease in the second half of 2019. In particular, the second wave that started in May (blue lines) has exerted an additional drag on the level of global GDP of about 0.2 percent, while the third wave since August 2019 should subtract an additional 0.1 percent.

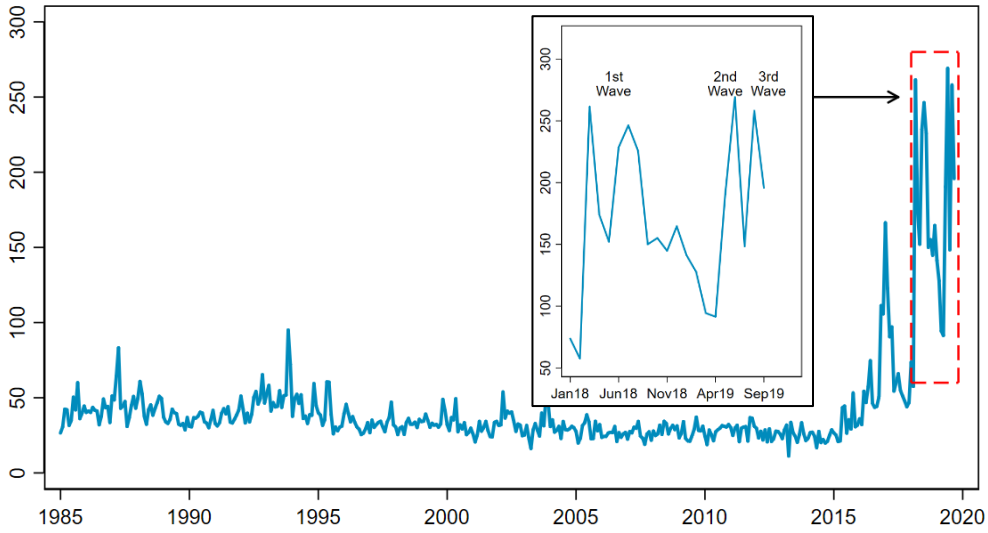
[1] For a more detailed description of the TPU index and a review of the literature, see Dario Caldara, Matteo Iacoviello, Patrick Molligo, Andrea Prestipino, and Andrea Raffo (2019), "The Economic Effects of Trade Policy Uncertainty," International Finance Discussion Paper 1256 (Washington: Board of Governors of the Federal Reserve System, September), https://doi.org/10.17016/IFDP.2019.1256.

[2] Our sample runs from 1985:M1 through 2019:M6. The VAR model, estimation details, and estimated impulse responses are described in Dario Caldara, Matteo Iacoviello, Patrick Molligo, Andrea Prestipino, and Andrea Raffo (2019), "Does Trade Policy Uncertainty Affect Global Economic Activity?" FEDS Notes (Washington: Board of Governors of the Federal Reserve System, September 4), https://doi.org/10.17016/2573-2129.47. The VAR results are similar when we truncate the estimation sample for the VAR in 2015, thus excluding the spikes in trade uncertainty in the last part of the sample.

[3] Like many news-based uncertainty indicators, our measure of trade uncertainty may also capture news about future changes in tariffs regardless of whether they are realized or not.

This analysis represents an attempt to quantify the all-in effects of increased TPU on global economic activity. Our empirical model predicts material effects of trade tensions that will only begin to ease in the second half of 2020. That said, the confidence intervals around these estimates point to some degree of uncertainty, especially given the lack of historical experience with increases in TPU of the magnitude that we have seen recently. For the United States, the estimated adverse effects are somewhat larger than the drag we have built into the Tealbook baseline and so represent a downside risk to that baseline projection. For foreign economies, the estimated adverse effects are more in line with the downward revisions to our forecast since last year, hinting that trade tensions may keep weighing on the outlook going forward.

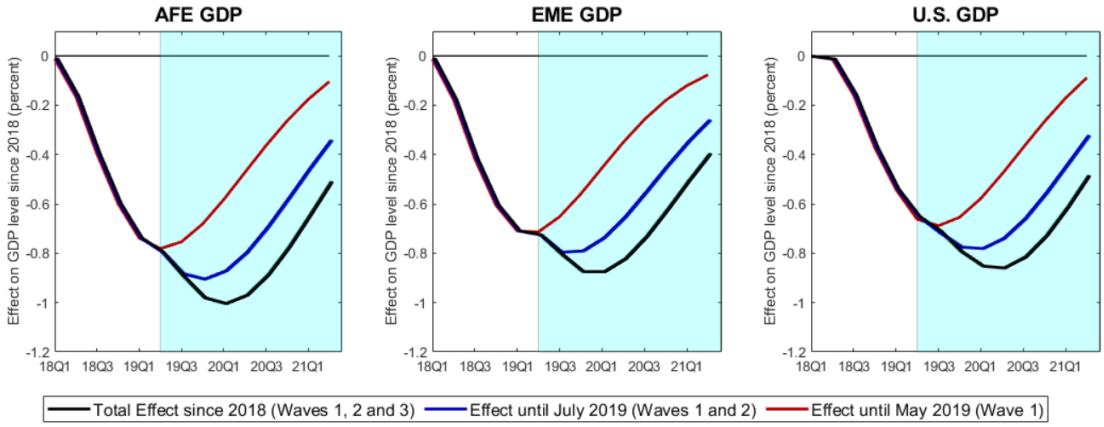
**Figure 1: Monthly Trade Policy Uncertainty Index**




Note: At an index value of 100, 1 percent of news articles contain references to trade policy uncertainty. The September 2019 data are preliminary and updated through September 4.

Source: Staff calculations based on Dario Caldara, Matteo Iacoviello, Patrick Molligo, Andrea Prestipino, and Andrea Raffo. 2019, "The Economic Effects of Trade Policy Uncertainty." International Finance Discussion Paper 1256 (Washington: Board of Governors of the Federal Reserve System, September), https://www.federalreserve.gov/econres/ifdp/files/ifdp1256.pdf.

**Figure 2: VAR-Based Effects of the Recent Waves of Trade Policy Uncertainty**




Note: Variables are shown in percent deviation from baseline.

Source: Staff calculations.

gradually rise amid highly accommodative monetary policy, reaching 1.8 percent by the first half of 2021, and hover around this pace through 2022. The outlook for next year is down a bit, as we now expect Brexit uncertainty to persist for longer, causing adverse spillovers to the euro area.

Headline 12-month inflation edged down from 1.3 percent in May to 1 percent in July and August. With core inflation at just 0.9 percent, we have inflation remaining subdued in the second half of this year before rising gradually to 1.6 percent at the end of the forecast period. In light of the weak outlook for inflation and growth, we expect the ECB to cut its deposit rate 20 basis points to negative 60 basis points at its September 12 meeting and restart its asset purchase program in October, as we assumed in July.



- ***Japan.*** GDP growth was puzzlingly strong in the first half of this year, given declines in industrial production and exports. After expanding at an annual rate of 2.8 percent in the first quarter, real GDP increased 1.8 percent in the second as a sharp pickup in domestic demand offset the drag from net exports. That said, consumer confidence declined further in July, and the manufacturing PMI remained in contractionary territory in August, leaving us more pessimistic about future growth. Smoothing through the volatility induced by the scheduled October consumption tax hike, we see growth declining to about zero in the second half of the year. Over the next two years, we expect growth to be slightly above its potential pace of 0.7 percent, supported by additional spending related to the 2020 Tokyo Olympics and very accommodative monetary policy.

  Both total and core 12-month inflation remained subdued in July at 0.6 percent and 0.4 percent, respectively. The upcoming consumption tax hike will provide only a modest temporary boost to inflation, as its effect will be largely offset by stimulative fiscal policies that will cut costs for households, including free public early childhood education and higher education support. We expect total inflation to rise to about 1 percent by 2021. With inflation still well below the Bank of Japan's (BOJ) 2 percent inflation target, we anticipate that the BOJ will keep its deposit rate at negative 0.1 percent through 2021. The BOJ continued its purchases of Japanese government bonds but reduced the purchase size in the 5- to 10-year tenures, as the 10-year sovereign yield fell below the lower end of its targeted range of negative 0.2 percent to positive 0.2 percent. The BOJ also announced that it will further cut purchase amounts in this sector in September.

- ***Canada.*** Real GDP growth picked up from a meager 0.5 percent in the first quarter to 3.7 percent in the second, 1.1 percentage points higher than in the July Tealbook, reflecting rebounds in oil production and exports. That said, weak investment in the second quarter and subdued manufacturing PMIs through August point to a step-down in growth to 1.2 percent this quarter. We expect growth to edge up to its potential pace of 1.7 percent by the second half of 2020 and remain about there over the forecast period. The projection for 2020 is a bit lower than in the July Tealbook, reflecting lower oil prices and the weaker U.S. outlook. We expect the weakness over the next several quarters to lead the Bank of Canada to cut its policy rate 25 basis points early next year to 1.5 percent.

## EMERGING MARKET ECONOMIES

- ***China.*** After slowing sharply to 5.6 percent in the second quarter, we expect similar growth in the current quarter. Industrial production contracted and retail sales growth slowed in July. Much of this weakness was anticipated and reflected a slowing of auto sales and production following a surge in June ahead of a tightening of auto emissions standards. In contrast, July exports held up relatively well, as a rebound in sales to Asia and the EU more than offset falling exports to the United States. All told, we have revised down the outlook a touch for the second half, but growth this year should still come in within the Chinese authorities' target range of 6 to 6½ percent.

  We expect the recently implemented 15 percentage point tariff hike on about $100 billion of Chinese goods (together with China's retaliation on about $30 billion of U.S. goods), the uncertainty effects of the recent increase in trade tensions, and some offsetting further policy stimulus to take about 0.1 percentage point, on net, off China's growth over the forecast period. With this small downward revision, we see growth holding steady at about 5.7 percent through the end of the forecast period.

- ***Other Emerging Asia.*** India's GDP growth stepped down to an unexpectedly low 2.7 percent last quarter, as manufacturing activity contracted. This step-down, together with a contraction of output in Hong Kong driven by a collapse in investment, pushed down overall growth in the region to 2.5 percent in the second quarter, 0.3 percentage point below our July Tealbook estimate. We now expect real GDP growth to rise to only 2.7 percent in the current quarter, 0.5 percentage point below our July forecast. The markdown, in large part, is due to substantial downward

revision to Hong Kong's near-term outlook as a consequence of political unrest, which is weighing especially hard on tourism and retail sales. These disruptions should abate following the announcement by Hong Kong's government that it will formally withdraw the extradition bill, but the situation remains quite uncertain. Elsewhere in the region, incoming data continue to point to a recovery in the second half of the year. Exports bounced back in July after a very weak end to the second quarter, and industrial production grew strongly in July in Taiwan, Korea, and Singapore. Recovery in manufacturing, together with support from fiscal policy in some countries, should boost growth in the region to its potential pace of 3.5 percent by the beginning of next year.



- ***Mexico.*** Real GDP stagnated in the second quarter following a 1 percent drop in the first, weighed down by weak domestic demand, particularly investment. However, with relatively strong manufacturing exports, together with a projected pickup in U.S. manufacturing, growth should recover somewhat in the second half of the year, albeit to a still lackluster 1.5 percent. Inflation has moved down in recent months to 3.8 percent on a 12-month basis, below the 4 percent upper limit of the tolerance range, reflecting lower energy prices. Amid lessened inflationary pressures and responding to the weak economy, the Bank of Mexico (BOM) lowered its policy rate 25 basis points to 8 percent in mid-August—its first cut in five years. With the BOM easing monetary policy, we expect growth to move up gradually to a trend-like pace of 2.5 percent by 2021. However, the downbeat tone of the incoming data, particularly in investment, prompted us to lower our path for growth over the forecast period about 0.2 percentage point.

- ***Brazil.*** Real GDP grew 1.8 percent at an annual rate in the second quarter after contracting in the first quarter, printing well above our July Tealbook estimate. The surge was led by investment, but growth was also boosted by the dissipation of the drag from temporary factors, including the Brumadinho dam collapse. The central bank of Brazil surprised markets with a 50 basis point cut in interest rates, and, with inflation running below target at just over 3 percent, we expect further monetary easing. In addition, progress on the long-awaited pension reform, which is expected to be approved in October, should improve business confidence. All told, we expect growth to pick up to 2.3 percent next year and to 2.8 percent in 2021. If this forecast materializes, it will mean that, after several years of faltering recovery, Brazil will finally climb out of the deepest recession in its history.

- ***Argentina.*** Financial turmoil again intensified in Argentina, this time triggered by President Macri's resounding defeat in the August 11 primaries. The result makes it highly likely that opposition challenger Alberto Fernández (no relation to Fernández's running mate, former President Cristina Fernández de Kirchner) will win in the October 27 presidential election. Concerns about the policies of a potential Fernández administration fueled a currency crash and rendered the government unable to roll over its short-term debt. As a result, on August 28, the Macri government announced that it would unilaterally extend the maturities of Treasury bills and seek a voluntary "reprofiling" of about $100 billion in longer-term public debt, about half of which is owed to the IMF under Argentina's Stand-By Arrangement. These announcements only intensified downward pressures on the currency, prompting the Macri government to impose capital controls on September 1. The risk of further deterioration in the country's financial and economic situation is pronounced.

# The Foreign GDP Outlook

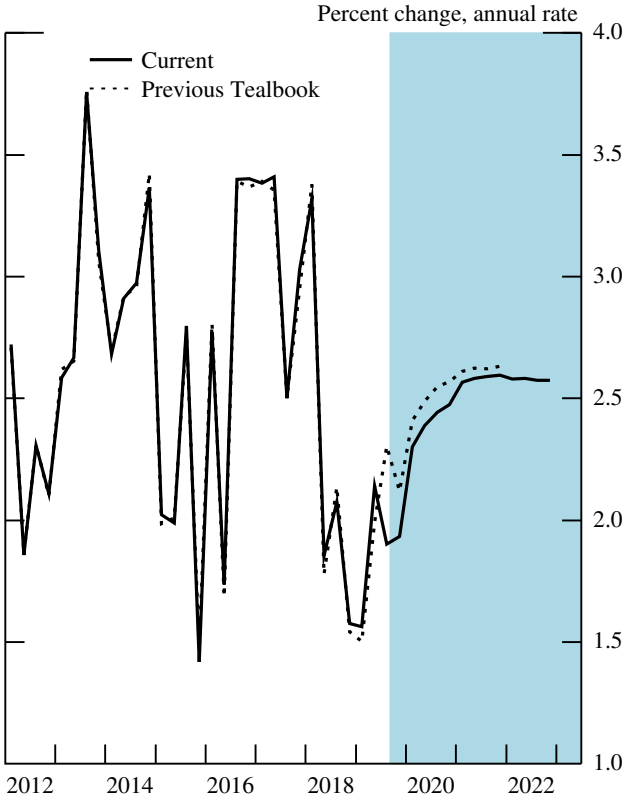
Real GDP* Percent change, annual rate

| | 2018 | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|
| 1. Total Foreign | 2.2 | 1.6 | 2.1 | 1.9 | 1.9 | 2.4 | 2.6 | 2.6 |
| *Previous Tealbook* | *2.2* | *1.5* | *2.0* | *2.3* | *2.1* | *2.5* | *2.6* | ... |
| 2. Advanced Foreign Economies | 1.3 | 1.4 | 2.1 | 1.1 | .8 | 1.4 | 1.7 | 1.7 |
| *Previous Tealbook* | *1.3* | *1.2* | *1.5* | *1.6* | *1.1* | *1.6* | *1.7* | ... |
| 3. Canada | 1.6 | .5 | 3.7 | 1.2 | 1.3 | 1.6 | 1.8 | 1.8 |
| 4. Euro Area | 1.2 | 1.7 | .8 | .8 | 1.0 | 1.4 | 1.8 | 1.7 |
| 5. Japan | .3 | 2.8 | 1.8 | 1.8 | -2.3 | .8 | .8 | .8 |
| 6. United Kingdom | 1.4 | 2.0 | -.8 | .4 | .9 | .9 | 1.6 | 1.6 |
| 7. Emerging Market Economies | 3.1 | 1.8 | 2.2 | 2.7 | 3.0 | 3.3 | 3.5 | 3.4 |
| *Previous Tealbook* | *3.1* | *1.8* | *2.4* | *3.0* | *3.2* | *3.4* | *3.6* | ... |
| 8. China | 6.4 | 7.3 | 5.6 | 5.7 | 5.7 | 5.6 | 5.7 | 5.6 |
| 9. Emerging Asia ex. China | 3.3 | 2.5 | 2.5 | 2.7 | 3.3 | 3.5 | 3.5 | 3.4 |
| 10. Mexico | 1.6 | -1.0 | .1 | 1.4 | 1.6 | 2.2 | 2.5 | 2.5 |
| 11. Brazil | 1.1 | -.3 | 1.8 | .8 | 2.3 | 2.3 | 2.8 | 2.8 |

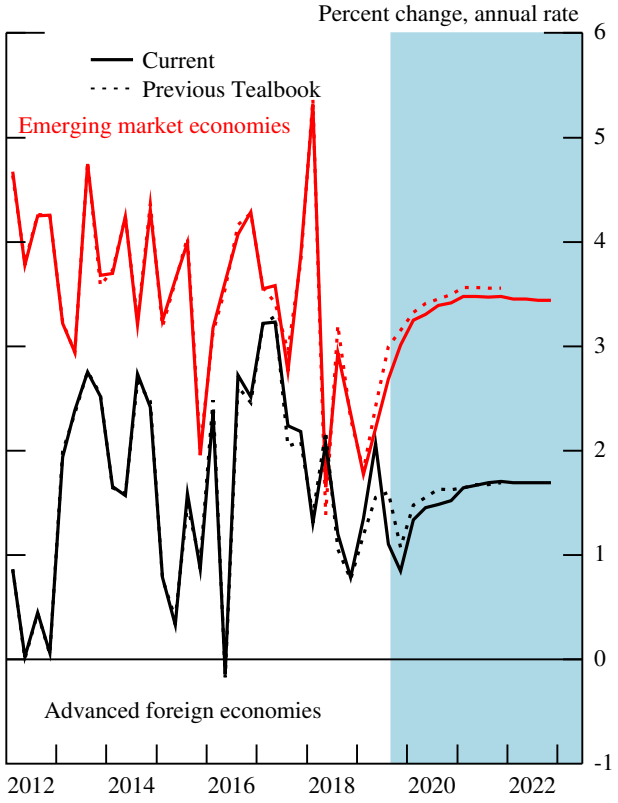
* GDP aggregates weighted by shares of U.S. merchandise exports.
... indicates not applicable. This is the first time we have included a Tealbook forecast for 2022.

Int'l Econ Devel & Outlook

**Total Foreign GDP**




**Foreign GDP**



# The Foreign Inflation Outlook

Consumer Prices* Percent change, annual rate

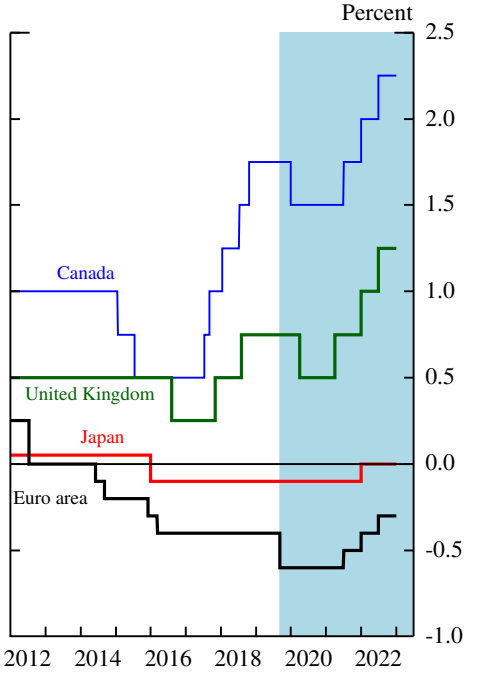
| | 2018 | 2019 | | | | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | | | |
| 1. Total Foreign | 2.4 | .8 | 3.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *2.4* | *.8* | *3.3* | *2.5* | *2.7* | *2.3* | *2.3* | ... |
| 2. Advanced Foreign Economies | 1.7 | .8 | 2.2 | 1.2 | 1.5 | 1.4 | 1.6 | 1.6 |
| *Previous Tealbook* | *1.7* | *.7* | *2.2* | *1.4* | *2.5* | *1.5* | *1.5* | ... |
| 3. Canada | 2.1 | 1.6 | 3.4 | 2.1 | 1.9 | 1.9 | 2.0 | 2.0 |
| 4. Euro Area | 1.9 | .2 | 2.1 | .8 | 1.1 | 1.2 | 1.4 | 1.6 |
| 5. Japan | .8 | .9 | .3 | .2 | 2.0 | .7 | 1.0 | 1.1 |
| 6. United Kingdom | 2.3 | .9 | 2.7 | 2.6 | 2.1 | 2.0 | 2.0 | 1.9 |
| 7. Emerging Market Economies | 2.9 | .8 | 4.1 | 3.1 | 2.9 | 2.9 | 2.8 | 2.8 |
| *Previous Tealbook* | *2.9* | *.8* | *4.1* | *3.2* | *2.9* | *2.8* | *2.8* | ... |
| 8. China | 2.2 | .6 | 4.3 | 3.9 | 2.6 | 2.5 | 2.5 | 2.5 |
| 9. Emerging Asia ex. China | 1.9 | .1 | 3.1 | 1.3 | 2.5 | 2.8 | 2.7 | 2.7 |
| 10. Mexico | 4.8 | 1.1 | 4.5 | 3.5 | 3.2 | 3.2 | 3.2 | 3.2 |
| 11. Brazil | 4.1 | 2.9 | 5.2 | 3.0 | 3.9 | 3.8 | 3.7 | 3.5 |

* CPI aggregates weighted by shares of U.S. non-oil imports.
... indicates not applicable. This is the first time we have included a Tealbook forecast for 2022.

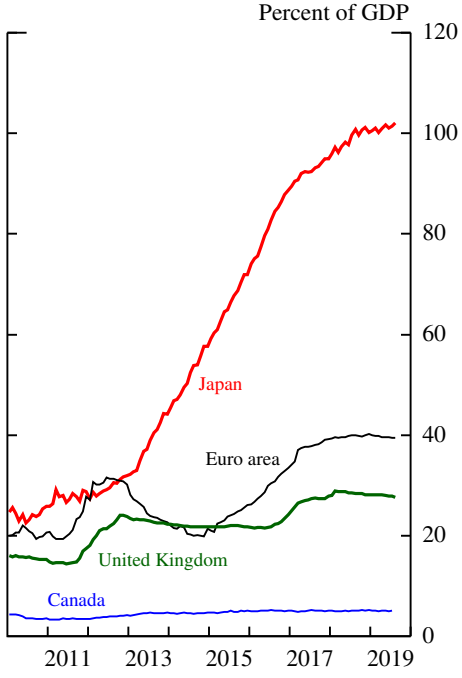
Int'l Econ Devel & Outlook

# Foreign Monetary Policy

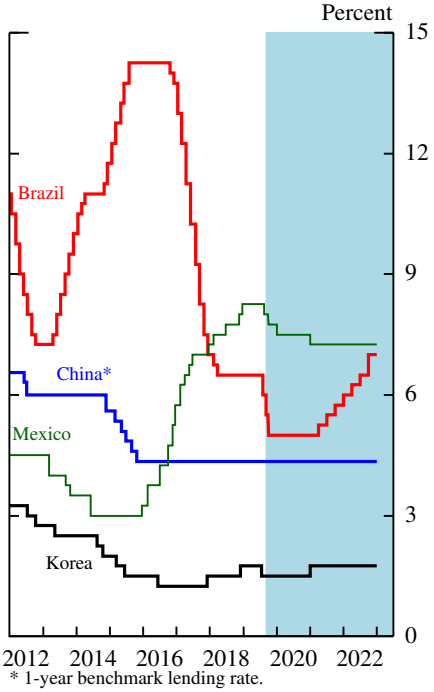
**AFE Policy Rates**




**AFE Central Bank Balance Sheets**



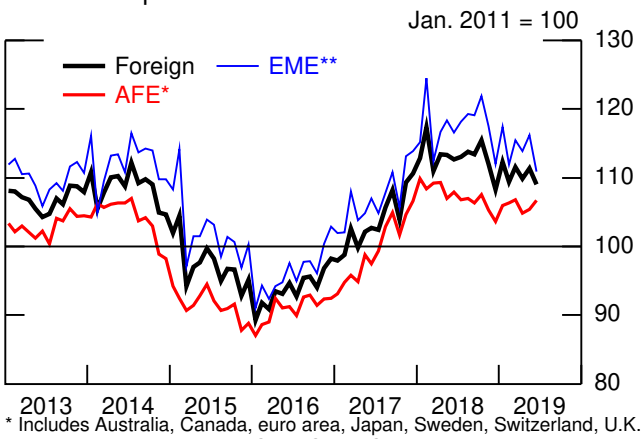

**EME Policy Rates**




* 1-year benchmark lending rate.

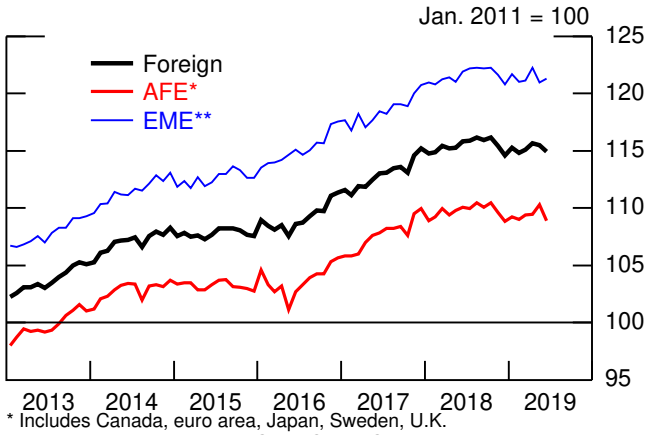
# Recent Foreign Indicators

## Nominal Exports



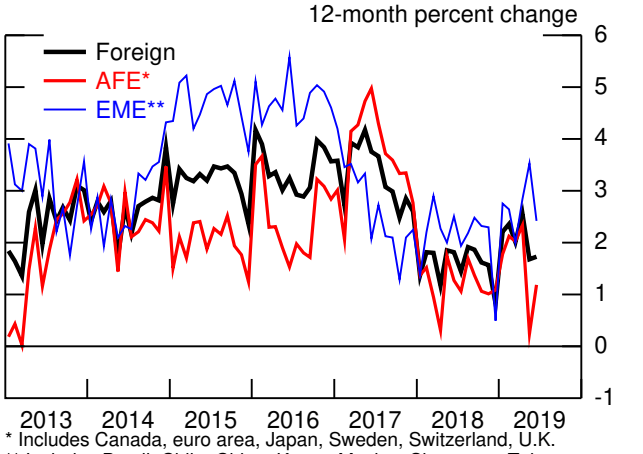

* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Singapore, Taiwan, Thailand.

## Industrial Production



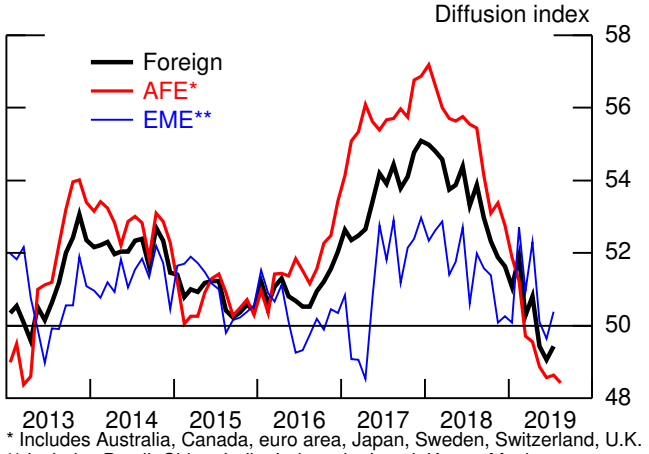

* Includes Canada, euro area, Japan, Sweden, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand.

## Retail Sales



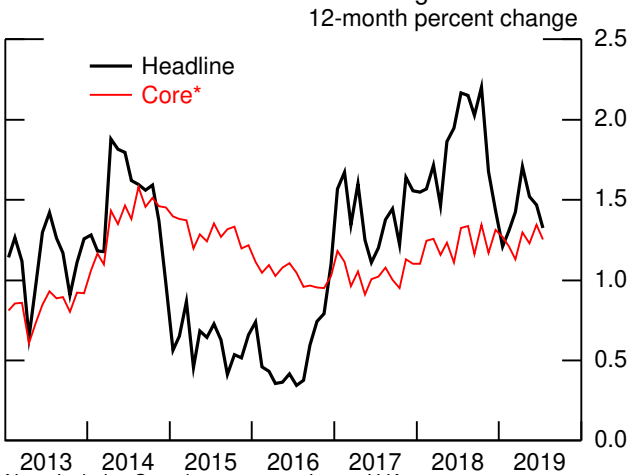

* Includes Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, Chile, China, Korea, Mexico, Singapore, Taiwan.

## Manufacturing PMI



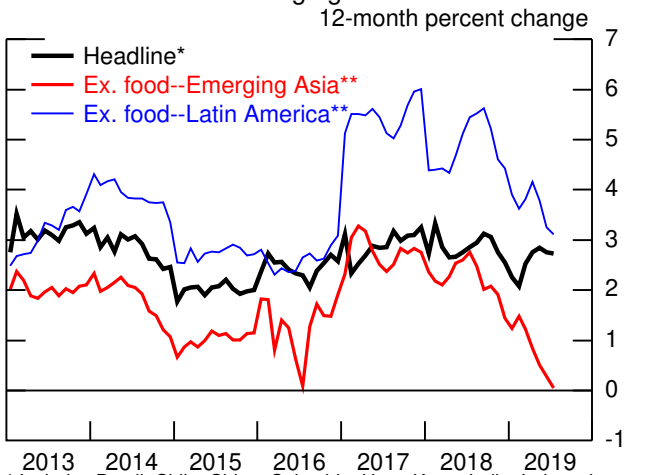

* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, China, India, Indonesia, Israel, Korea, Mexico, Russia, Singapore, Taiwan, Turkey.

## Consumer Prices: Advanced Foreign Economies




Note: Includes Canada, euro area, Japan, U.K.
* Excludes all food and energy; staff calculation.
Source: Haver Analytics.

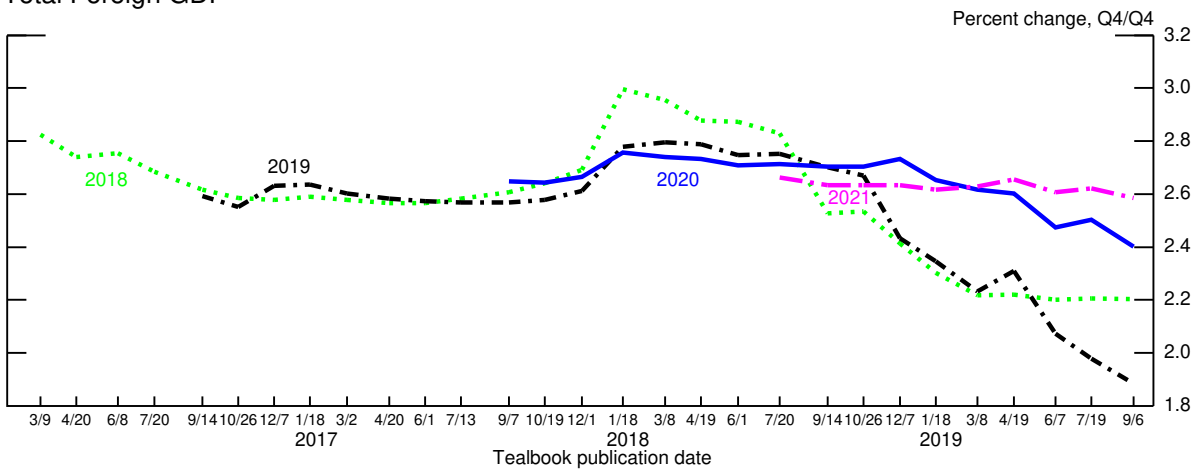
## Consumer Prices: Emerging Market Economies



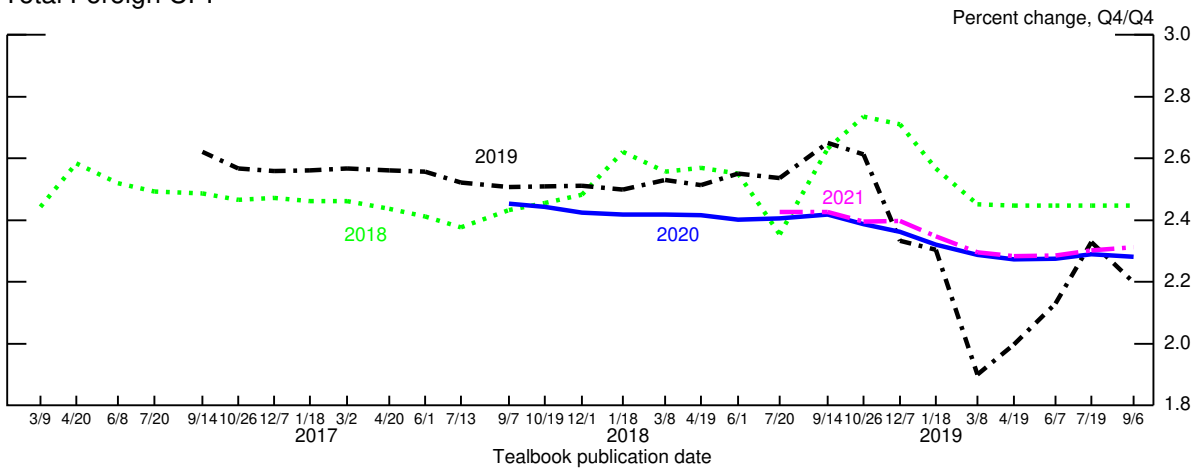

* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Latin America excludes Argentina and Venezuela.

# Evolution of Staff's International Forecast

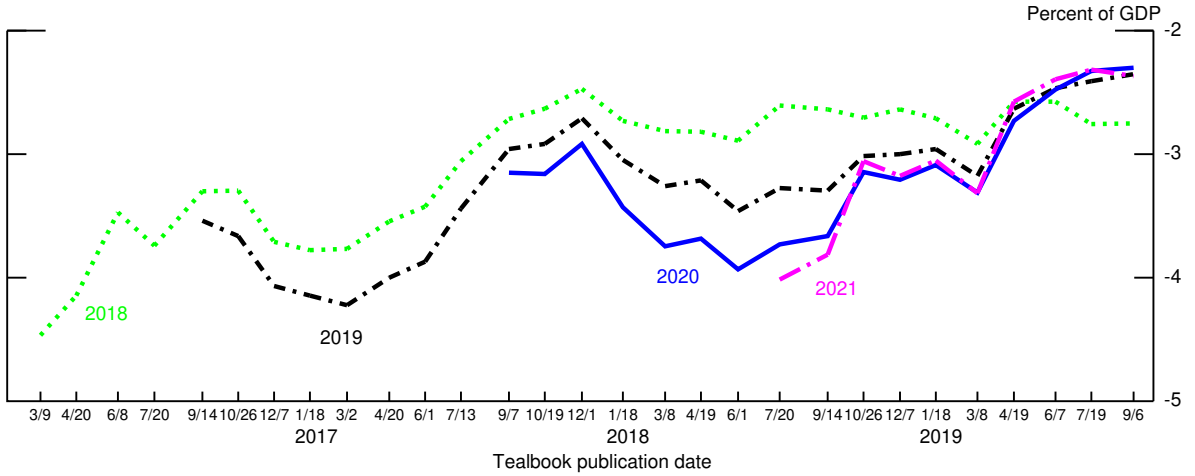
Total Foreign GDP




Total Foreign CPI




U.S. Current Account Balance




Int'l Econ Devel & Outlook

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# Financial Market Developments

Financial market developments over the intermeeting period were driven by an escalation in international trade tensions, growing concerns about the global growth outlook, and the prospect of more policy accommodation by central banks.[1] Nominal Treasury yields posted very large declines, with the 30-year yield reaching historical lows at one point. The declines in Treasury yields were likely due in part to typical flight-to-safety demands triggered by the uptick in concerns about the domestic economic outlook. In addition, global demands for safe U.S. assets may have increased markedly over the period, perhaps due in part to somewhat greater concerns about the foreign outlook than the domestic outlook and to the increasing share of sovereign debt with very low and negative yields in AFEs. The market-implied path of the federal funds rate shifted down notably, showing particular sensitivity to trade-related news. A straight read of options quotes suggests that market participants see a 25 basis point reduction in the target range as the most likely outcome at the September FOMC meeting. Broad equity price indexes were down as much as 6 percent in early August but are down only about 1.5 percent, on net, over the intermeeting period as a whole. Corporate bond spreads widened modestly.

- Nominal Treasury yields fell 28, 47, and 53 basis points, respectively, at the 2-, 10-, and 30-year maturities. The spread between 2- and 10-year tenors turned negative in mid-August for the first time since 2007 and has since remained near zero.

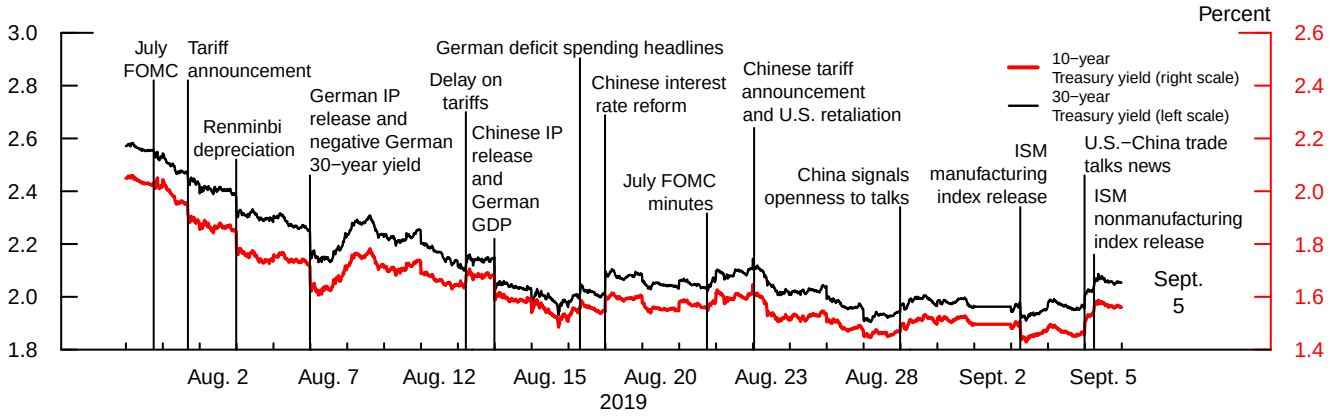
- Measures of the expected level of the federal funds rate at the end of this year and beyond moved down. A straight read of OIS forward rates suggests that investors expect the federal funds rate to decline about 60 basis points by the end of this year, while a model that adjusts for term premiums implies a decline of about 35 basis points.



[1] The analysis in this section reflects market data through close of business on September 5. On the morning of September 6, the Bureau of Labor Statistics published the August Employment Situation report. In the report, payrolls growth was slightly below expectations, the unemployment rate was in line with expectations, and hourly earnings and labor force participation printed above expectations. Nominal Treasury yields were down 3 basis points at both the 2- and 10-year maturities in the first 10 minutes of trading subsequent to the release. Equity index futures were little changed on net.

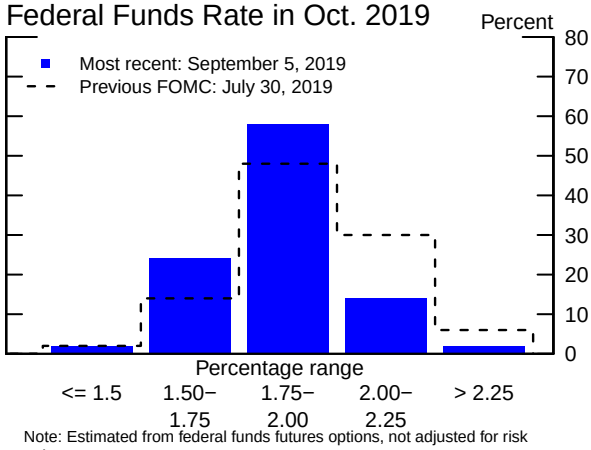
# Policy Expectations and Treasury Yields

## Intraday Treasury Yields



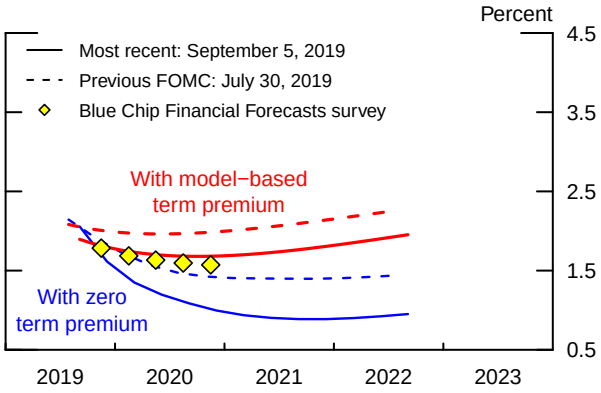

Note: Data are spaced at 5−minute intervals from 8:00 a.m. to 4:00 p.m.
Source: Bloomberg.

## Market−Implied Probability Distribution of the Federal Funds Rate in Oct. 2019



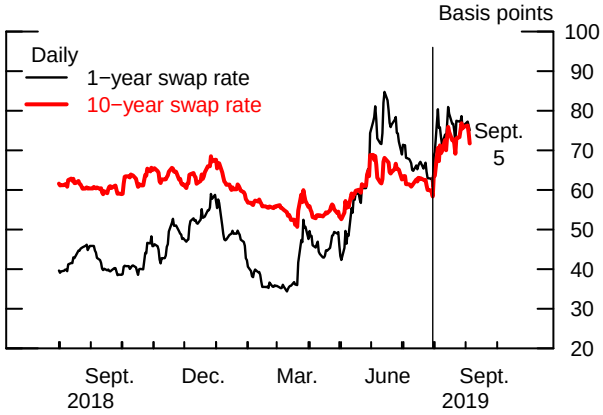

Note: Estimated from federal funds futures options, not adjusted for risk premiums.
Source: CME Group; Board staff calculations.

## Implied Federal Funds Rate



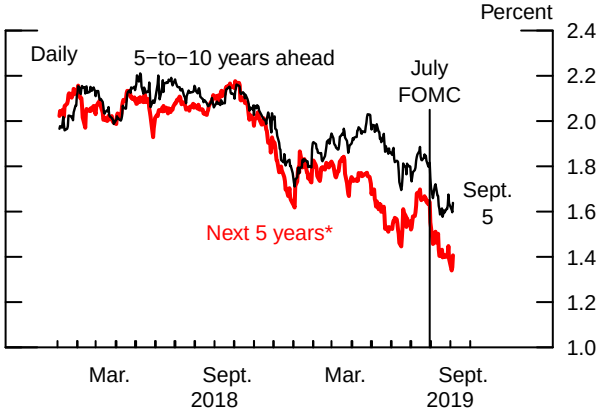

Note: Zero term premium path is estimated using overnight index swap quotes with a spline approach and a term premium of 0 basis points. Model−based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premiums. The Blue Chip path is the average of respondents' expectations for the federal funds rate in the survey published on September 1.
Source: Bloomberg; Wolters Kluwer Legal and Regulatory Solutions U.S.; Board staff calculations.

## Measures of Implied Volatility




Note: Implied volatility on the 1−year and 10−year swap rate 6 months ahead is derived from swaptions.
Source: Barclays.

## TIPS−Based Inflation Compensation




Note: Estimates based on smoothed nominal and inflation−indexed Treasury yield curves.
* Adjusted for lagged indexation of Treasury Inflation−Protected Securities (TIPS) (carry effect).
Source: Federal Reserve Bank of New York; Board staff calculations.

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- Inflation compensation declined 24 basis points and 17 basis points, on net, for the 5-year and the 5-to-10-year horizons, to 1.41 percent and 1.64 percent, respectively.

- Broad equity price indexes decreased by about 1.5 percent, on net, and option-implied volatility for the S&P 500 index—the VIX—increased about 2 percentage points. Investment-grade and high-yield corporate bond spreads widened by 13 basis points and 22 basis points, respectively.

- Global equity indexes generally declined, the exchange value of the dollar increased, and AFE sovereign yields fell notably.

## DOMESTIC DEVELOPMENTS

Nominal U.S. Treasury yields decreased markedly across the curve, on net, over the intermeeting period, with the yields on 2-, 10- and 30-year Treasury securities dropping 28, 47, and 53 basis points, respectively. These moves are quite significant, with the decline in the 10-year yield falling within the 6th percentile of intermeeting changes since 1994, while the decline in the 30-year yield is the largest since 2008 and the third largest since 1994.

While it is difficult to fully account for the magnitudes of these yield movements, market participants cited several factors that may help explain the recent declines in longer-term yields. These factors included the escalation in trade tensions between the United States and China, concerns about the global growth outlook, and the relative attractiveness of longer-term U.S. Treasury securities due to the very low levels of sovereign yields in many AFEs. U.S. economic data releases were mixed and, on balance, had only modest effects on financial markets. Staff models attribute about half of the declines in nominal longer-term Treasury yields to lower term premiums, with an estimate of the 10-year term premium currently standing near its lowest historical level at around negative 71 basis points. (The box "Drivers of Recent Movements in Treasury Yields" provides additional analysis on these yield movements.)

Expectations of near- and medium-term domestic monetary policy shifted down over the period and were particularly sensitive to news about U.S.–China trade tensions. Overall, FOMC communications had only modest effects on policy expectations. The July FOMC statement and press conference were seen as slightly less accommodative

## Drivers of Recent Movements in Treasury Yields

Yields on nominal Treasury securities have declined dramatically, on net, across the curve since the July FOMC meeting. Our analysis suggests that the decline in short-term Treasury yields largely reflected heightened trade tensions between the United States and China that lowered investors' expectations for the near-term path of monetary policy. The declines in longer-term yields are not as closely linked to trade-related news. Instead, a larger share of the fall in long-term yields appears to be related to investors' concern about the downside risks to the foreign outlook. In addition, investor demand for long-term U.S. Treasury securities reportedly increased as the share of sovereign debt with negative yields has risen.

Yields on short-term U.S. Treasury securities responded to escalating trade tensions between the United States and China. As shown by the red dots in the lower-left quadrant of figure 1, declines in two-year Treasury yields immediately after adverse news on U.S.–China trade tensions were large. On net, taking into account negative and positive trade news that occurred in either daytime or after-hours trading, the change in the two-year Treasury yield in narrow windows after these announcements explains 18 basis points of the 28 basis point intermeeting decline (see figure 2). In addition, staff term structure models ascribe a majority of the decline of short-term Treasury yields over the period to declines in the expected path of short-terms rates. Taken together, these results suggest that investors expect monetary policy to respond to the perceived drag on growth related to the U.S.–China trade tensions.

In contrast, the immediate response of longer-term yields to both negative and positive news about trade developments account, on net, for only 10 basis points of the total 53 basis point

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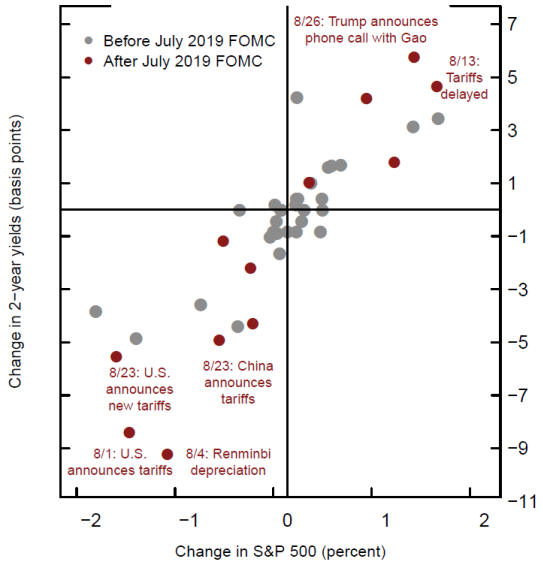
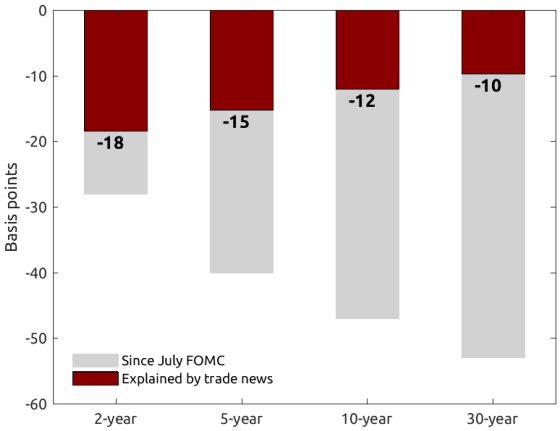
**Figure 1: Change in Treasury Yields and S&P 500 Immediately after Trade-Related News**




Note: The scatterplot presents the change in Treasury yields and the S&P 500 around a narrow window that brackets the release of news. The window considers quotes 30 minutes before and 2 hours after the release of the news. If the news occurred over a weekend, we use quotes between Friday at the end of the business day and 2 a.m. on Monday.
Source: Bloomberg; Board staff estimates.

**Figure 2: Change in Treasury Yields since the July FOMC Explained by the Immediate Reaction of Yields to Trade News**



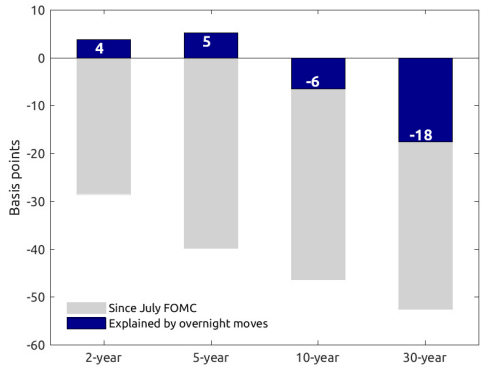

Note: Red bars show the net contribution of changes in yields around a window that brackets the release of news about trade policy to the overall change in yields since the July FOMC (gray bars). The window considers quotes 30 minutes before and 2 hours after the release of the news. If the news occurred over a weekend, we use quotes between Friday at the end of the business day and 2 a.m. on Monday.
Source: Bloomberg; Board staff estimates.

decline in 30-year Treasury yields (see figure 2).[1] However, we can attribute 18 basis points of the decline to negative news emanating from abroad (which includes foreign economic data releases and some after-hours news related to U.S.–China trade tensions) (see figure 3).[2] This inference relies on the assumption that most of the news about foreign economic developments occurred after domestic trading hours. In stark contrast, overnight moves in the two-year Treasury yield were, on balance, slightly positive. These findings suggest that concerns about downside risks to the foreign growth outlook had a greater effect on long-term yields than short-term yields.

Long-term U.S. Treasury yields were likely also depressed by increasing demand for positive-yielding long-dated U.S. Treasury securities from investors globally. Over the intermeeting period, the share of euro-area sovereign debt with a negative yield and maturity greater than 10 years increased 17 percentage points and accounts for about 40 percent of the total outstanding sovereign debt with maturities greater than 10 years (not shown). Similarly, the duration of the global stock of debt with negative yields has moved up from 5.2 years to 6.3 years over the same period, the largest intermeeting increase in duration in the past few years (see figure 4).

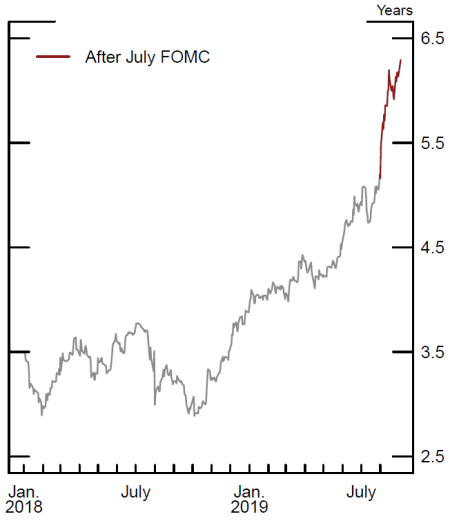
Anecdotal reports support the reach-for-yield factor behind falling long-term yields. The demand for positive-yielding long-dated U.S. Treasury securities, notably from pensions and insurers, was reportedly very strong. In addition, foreign investors were reportedly increasingly willing to add such exposure without hedging the FX risk, while U.S. pensions were influenced by a mid-September deadline that allowed them to mitigate tax liabilities associated with portfolio rebalancing.[3]

**Figure 3: Change in Treasury Yields since the July FOMC Explained by Changes during Overnight Hours**




Note: The blue bars show the net contribution of changes in yields during the overnight trading session to the overall change in yields since the July FOMC (gray bars). The overnight session is defined as changes in yields between 8 a.m. and 5 p.m. of the previous business day.
Source: Bloomberg; Board staff estimates.

**Figure 4: Modified Duration of the Global Stock of Debt with Negative Yield**




Source: Bloomberg.

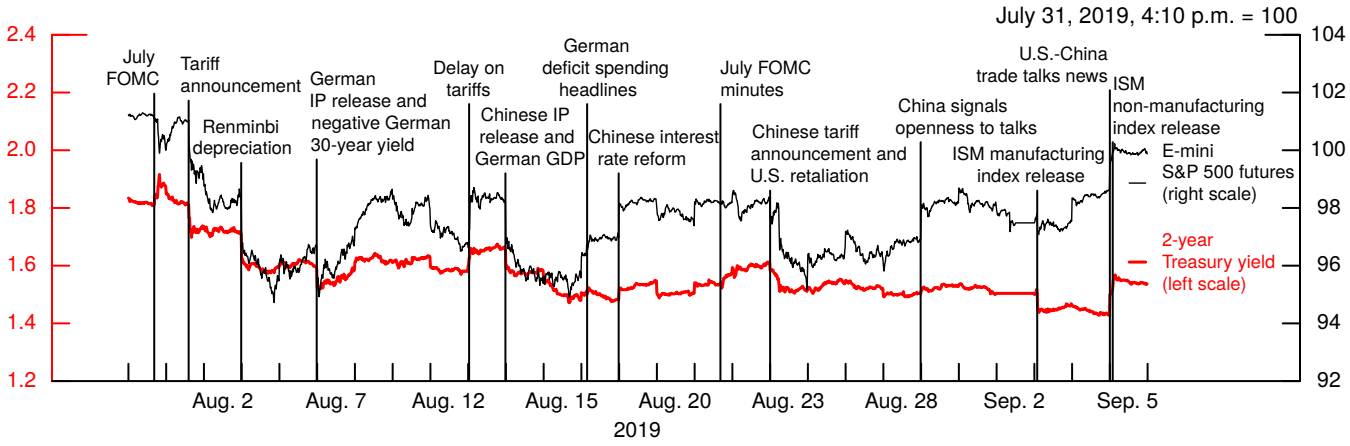
[1] Intermeeting negative trade-related news was associated with gross declines in the 30-year yield of roughly 27 basis points, based on the immediate response of yields, but positive news on trade that emerged mainly during the overnight trading session offset a large part of this decline.

[2] Overnight yield changes are the change in yields between 8 a.m. and 5 p.m. of the previous business day. For a historical perspective of the overnight vis-à-vis daytime contributions to long-term Treasury yield changes, see Don Kim (2016), "Evidence on the Increased Foreign Influence on the U.S. Yield Curve," memorandum, Board of Governors of the Federal Reserve System, Division of Monetary Affairs, August 8.

[3] For more details about the demand from domestic pension funds, see the box "Will Pension Fund Demand for Long-Dated U.S. Treasury Securities Shift in Mid-September?" in the Financial Market Developments section of the September 2018 Tealbook A.

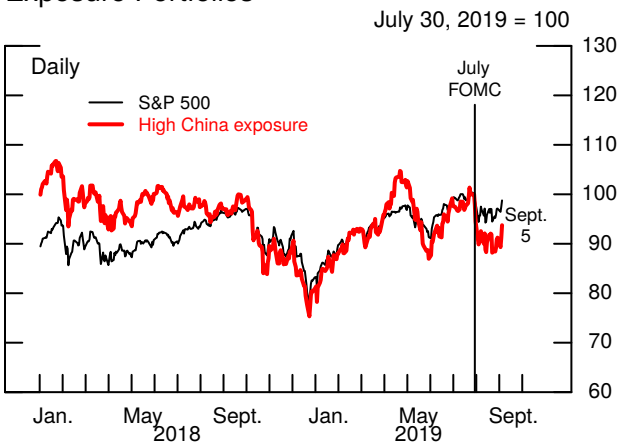
# Corporate Asset Market Developments

## Intraday S&P 500 Futures and 2-Year Treasury Yield



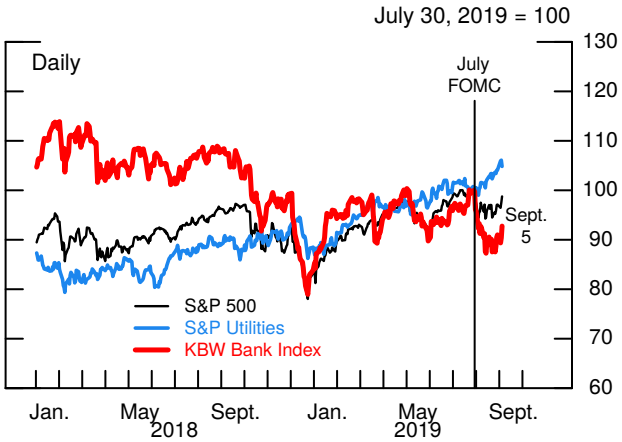

Note: Data are spaced at 5-minute intervals from 9:30 a.m. to 4:10 p.m.
Source: Bloomberg.

## S&P 500 Index and China Exposure Portfolios



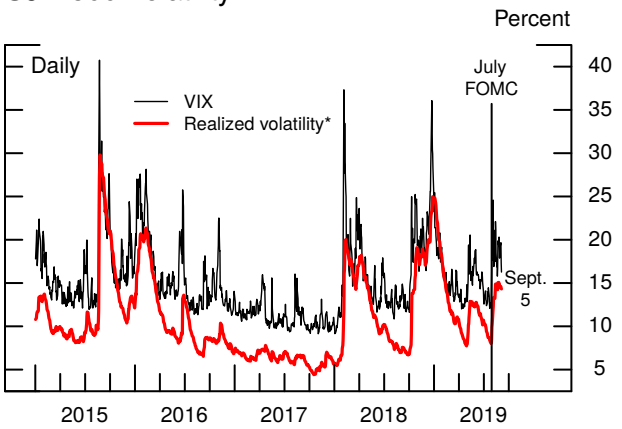

Note: China exposure is measured based on Board staff calculations of stock price sensitivity to the ASHR China A-Shares exchange-traded fund.
Source: Bloomberg; Compustat; Yahoo Finance.

## Selected S&P 500 Stock Price Indexes



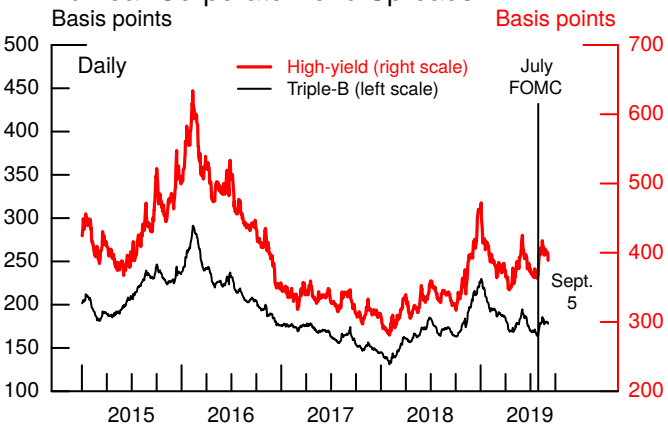

Source: Bloomberg.

## S&P 500 Volatility




* 5-minute returns used in exponentially weighted moving average with 75 percent of weight distributed over the most recent 20 days.
Source: Bloomberg.

## 10-Year Corporate Bond Spreads




Note: Spreads over 10-year Treasury yield.
Source: Merrill Lynch; Federal Reserve Bank of New York; Board staff calculations.

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than expected, but subsequent communications—including the Chair's Jackson Hole remarks—were seen as pointing to a slightly more accommodative outlook on the margin.

A straight read of the option-implied probability distribution of the federal funds rate suggests that the odds investors attach to a 25 basis point or larger reduction in the target range of the federal funds rate at the September meeting increased to around 85 percent, while the odds attached to the target range remaining unchanged fell to about 15 percent. In addition, market-implied policy expectations by year-end and beyond moved down notably since the previous FOMC meeting. A straight read of OIS forward rates suggests that investors expect the federal funds rate to decline about 60 basis points by year-end, to a level 25 basis points lower than was expected at the time of the July FOMC meeting, and roughly an additional 55 basis points by the end of 2020. However, a staff model that adjusts for term premiums implies only about a 35 basis point decline in the federal funds rate by year-end 2019 and, approximately, an additional 10 basis point decline in 2020.

The near-term forward spread on Treasury securities—defined as the difference between the six-quarter-ahead forward rate and the three-month Treasury bill yield—has moved down further since the July FOMC meeting and, at one point, reached its lowest level since the beginning of 2008. The 10-year to 3-month Treasury spread also slipped deeper into negative territory and has now been negative or near zero since the end of May 2019. In addition, the 10-year to 2-year Treasury spread turned negative for the first time since 2007 and fluctuated around zero over most of the intermeeting period. Staff models that use term spreads to forecast recessions but also correct for term premiums suggest that the implied probability of recession within the next 12 months has increased a touch over the intermeeting period. These probabilities now stand at roughly 40 to 50 percent, levels that are substantially lower than what is implied by models using term spreads alone.

Uncertainty about short- and long-term rates implied by swaptions increased, with the implied volatility on the 10-year swap rate remaining near levels not seen since February 2018. Despite the notable increase in volatility and associated reduction in Treasury market depth, trading conditions were described as orderly, and liquidity was noted as less of a factor compared with the period of heightened market volatility in late 2018.

Since the July FOMC meeting, 5-year and 5-to-10-year TIPS-based inflation compensation declined notably, by 24 basis points and 17 basis points, on net, to 1.41 percent and 1.64 percent, respectively, reaching their lowest levels since the end of last year. The staff's term structure models suggest that about half of the decline in inflation compensation is explained by a decrease in the inflation risk premium. Surveys generally continue to point to stable longer-term inflation expectations.

Broad stock price indexes decreased about 1.5 percent, on net, over the intermeeting period amid heightened volatility. The escalation of trade tensions between China and the United States weighed on equity prices, as stock prices of high-China-exposure firms notably underperformed the broader market. Consistent with the sizable decline in yields and the inversion of the yield curve, bank equity prices also underperformed, and bank earnings forecasts for the next few quarters were revised down. Conversely, the stock prices of utilities and real estate firms increased, reportedly benefiting from demand by investors reaching for less cyclical and higher-yielding assets. The VIX increased 2 percentage points, on net, but remained well below the high levels reached in December 2018.

Yields on investment- and speculative-grade corporate bonds decreased notably, reaching historical lows at one point. Spreads on corporate bonds over comparable-maturity Treasury yields widened by 13 basis points and 22 basis points, respectively, and are currently a bit below the midpoints of their historical ranges.

The observed declines in equity prices and the increases in corporate bond spreads were relatively modest given the large declines in longer-term Treasury yields. Shifts in investors' expectations toward more accommodative monetary policies, both domestically and abroad, as well as some reassuring second-quarter corporate earnings and retail-sector data, may have partially supported corporate asset prices. Another possibility is that, while increased uncertainty about the U.S. outlook weighed on both domestic corporate assets and Treasury securities, the global demand for safe U.S. assets may have been boosted by even greater investor concerns about the foreign outlook and by the reach-for-yield behavior stemming from very low or negative yields abroad.

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## FOREIGN DEVELOPMENTS

Since the July FOMC meeting, the escalation of U.S–China trade tensions and intensifying investor concerns about the growth outlook abroad were key drivers of asset

price moves in foreign financial markets. On balance, foreign equity indexes fell, the dollar and other safe-haven currencies appreciated, and AFE sovereign yields declined notably, in part as central bank communications abroad remained quite accommodative.

On balance, the broad dollar index rose about 1.79 percent over the intermeeting period as investor demand for safe assets led to large outflows from dedicated emerging market funds and declines in emerging market currencies. The dollar initially moved higher amid the strong risk-off market reaction following the August 1 announcement by the U.S. Administration of additional tariffs on Chinese goods. The dollar continued its rise over the next week as the People's Bank of China allowed the renminbi to depreciate through the psychologically important threshold of 7 CNY/USD, which prompted the U.S. Administration to label China a "currency manipulator."[2] Later in the period, the announcement by Chinese authorities of additional tariffs on U.S. goods and retaliatory measures by the U.S. Administration renewed pressure on the renminbi, which fell by almost 4 percent to 7.15 CNY/USD, its lowest level since 2008. The dollar also strengthened notably against Latin American currencies, including about 3.5 percent against the Mexican peso, 8.5 percent against the Brazilian *real,* and 27.5 percent against the Argentine peso. The Argentine peso depreciated sharply and Argentine sovereign yields soared following the defeat of the current pro-market president in Argentina's presidential election primary and subsequent announcement of plans for a debt restructuring and the imposition of capital controls.

The dollar was little changed against the aggregate of AFE currencies. The dollar rose modestly against the euro and the Canadian dollar but fell against the Japanese yen and the Swiss franc, both traditional safe-haven currencies vis-à-vis the U.S. dollar. The Swiss franc ended the period about 0.5 percent stronger against the dollar, and the Swiss National Bank reportedly intervened to limit further appreciation. The British pound was sensitive to Brexit headlines and appreciated on developments that made a no-deal outcome less likely; on net, the pound was up about 1.5 percent against the dollar over the period.

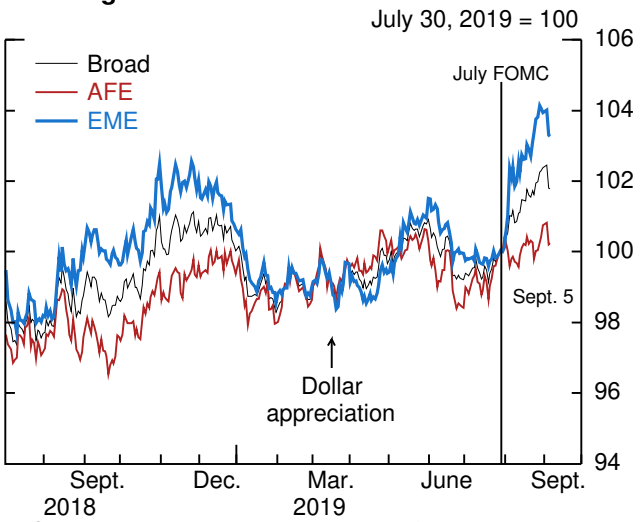
The risk-off sentiment and prospect of more accommodative monetary policy abroad led to significant declines in AFE yields, which reached record low levels in

[2] The Treasury Secretary cited China as a "currency manipulator" under the Omnibus Trade and Competitiveness Act of 1988. Under the act, the Treasury Secretary is directed to "initiate negotiations with such countries in the International Monetary Fund or bilaterally to ensure that they regularly adjust exchange rates between their currencies and the U.S. dollar."

# Foreign Developments

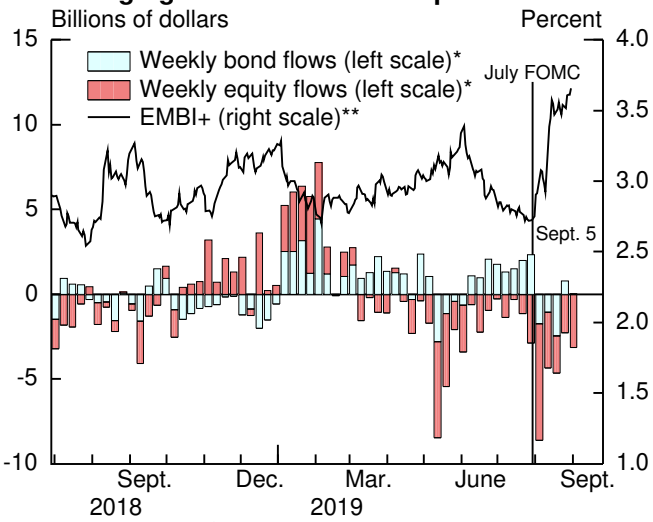


## Exchange Rates



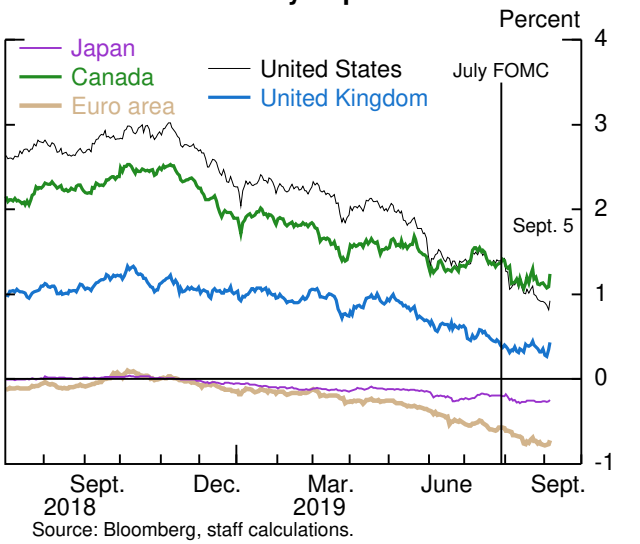

Source: Bloomberg; Federal Reserve Bank of New York; Board staff calculations.

## Emerging Market Flows and Spreads




Note: EMBI+ refers to emerging market bond spreads to Treasury securities.
* Average weekly flow by month.
** Excluding Venezuela.
Source: Emerging Portfolio Fund Research. Excludes intra-China flows.

## 24-Month-Ahead Policy Expectations



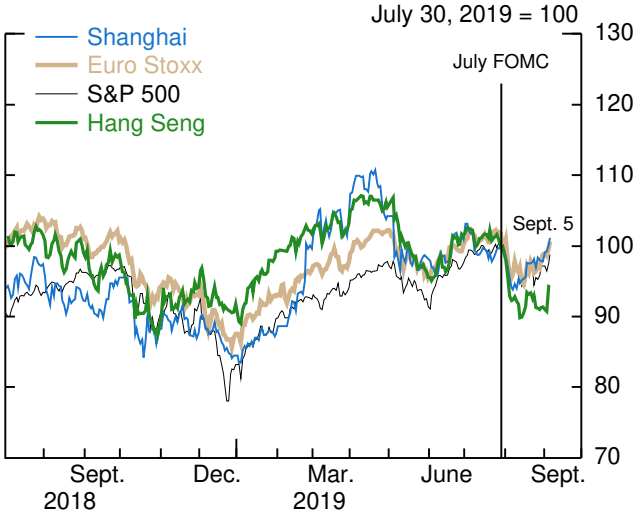

Source: Bloomberg, staff calculations.

## AFE and U.S. Sovereign Yields

| | 2-Year | Change | 10-Year | Change |
|---|---|---|---|---|
| United States | 1.54 | -.31 | 1.56 | -.5 |
| Germany | -.87 | -.11 | -.59 | -.2 |
| United Kingdom | .44 | -.01 | .6 | -.03 |
| Canada | 1.45 | -.07 | 1.27 | -.22 |
| Japan | -.29 | -.08 | -.26 | -.11 |

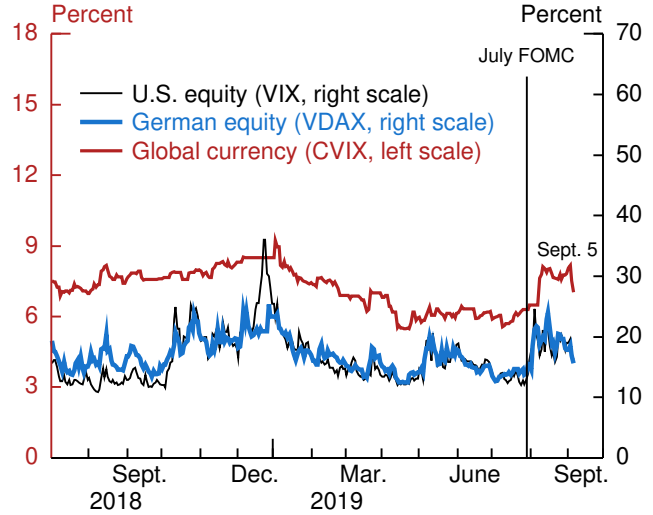
Source: Bloomberg. Data as of September 5.
Changes are calculated from July 30.

## Equity Indexes




Note: Indexes denominated in local currency.
Source: Bloomberg.

## Implied Volatilities




Source: Bloomberg.

Germany, Italy, and the United Kingdom before moving higher toward the end of the period. Market-based policy expectations moved lower, with notable declines in Canada and the euro area. Remarks by ECB official Olli Rehn in mid-August noting a need for significant monetary stimulus in the euro area pushed the implied two-year-ahead policy rate in the euro area to a new low of negative 0.76 percent. Weaker-than-expected industrial production and business sentiment data in Germany contributed to the decline in longer-term euro-area yields. On balance, the German 10-year yield fell 20 basis points to negative 0.59 percent. The Italian 10-year yield also reached a record low of 0.95 percent as a new coalition government was formed, thus avoiding the need for new elections. Amid evolving Brexit-related headlines, the 10-year U.K. yield was volatile, initially falling to a record low of 0.41 percent, but is little changed on net. Staff models suggest around half of the decline in long-term AFE yields was in the term premium component, implying that both expectations of lower future short rates and uncertainty about future growth contributed materially to the declines.

The risk-off sentiment weighed on foreign equity prices over most of the period. However, foreign equity indexes were supported both by expectations for more monetary and fiscal stimulus in the euro area and China and by political developments in the United Kingdom and Italy late in the period that were viewed as reducing near-term risks. On balance, foreign equity indexes are slightly lower, and banks and automobile manufacturers declined notably. Equity markets in Hong Kong underperformed amid ongoing protests, but some of the losses retraced as political tensions abated somewhat. Measures of implied volatility increased, but volatility levels remain near their long-term historical averages. Emerging market sovereign bond spreads widened by 70 basis points.



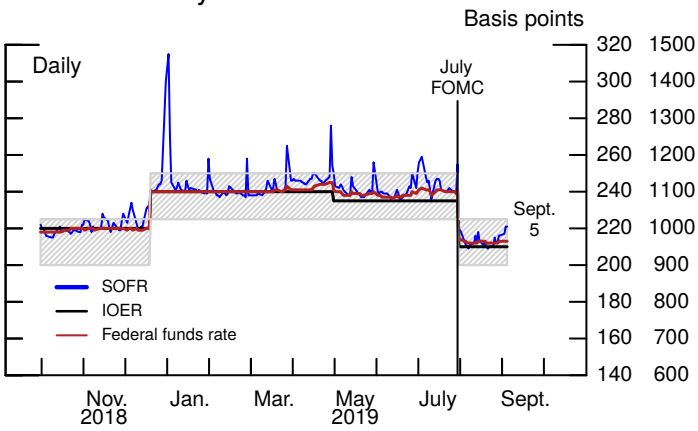
## SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Despite the volatility in many domestic and global financial markets over the intermeeting period, conditions in domestic short-term funding markets remained stable. The EFFR averaged 2.13 percent, with its spread to IOER down a bit relative to the previous intermeeting period.

Assets under management of government and prime MMFs increased about 3 percent over the intermeeting period, extending a trend seen since before the previous FOMC meeting. These inflows were reportedly due in part to the increased attractiveness of MMFs amid the flattening of the yield curve, although the deterioration in risk

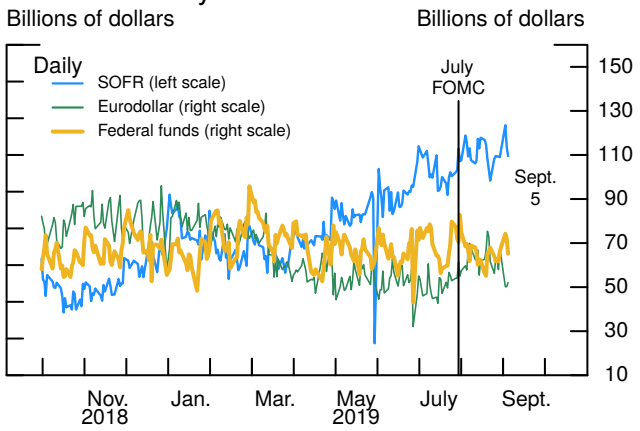
# Short-Term Funding Markets

## Selected Money Market Rates



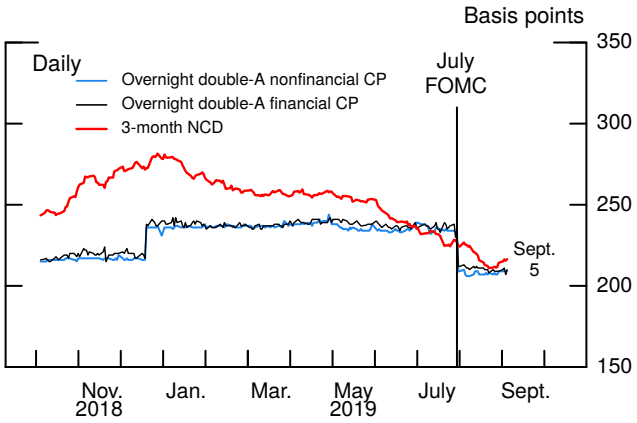

Note: Federal funds rate is a weighted median. Shaded area is the target range for the federal funds rate. SOFR is Secured Overnight Financing Rate; IOER is interest on excess reserves.
Source: Federal Reserve Bank of New York; Federal Reserve Board.

## Selected Money Market Volumes



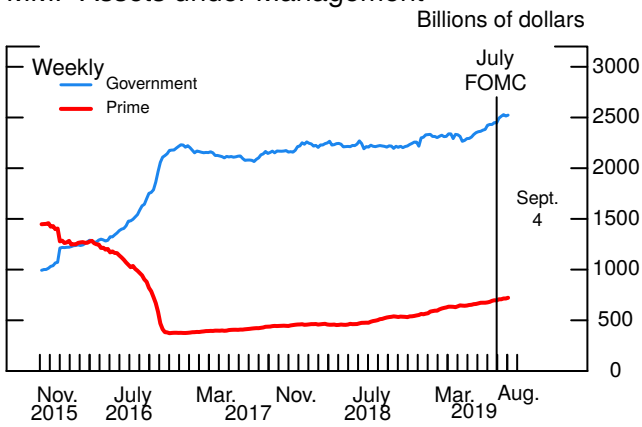

Note: SOFR is Secured Overnight Financing Rate.
Source: Federal Reserve Bank of New York; Federal Reserve Board.

## CP and NCD Rates



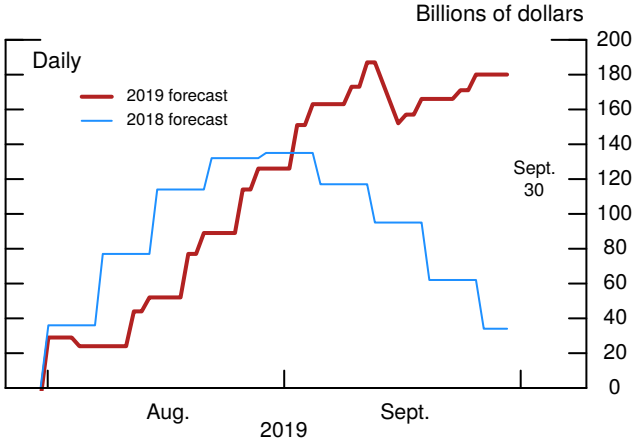

Note: Rates on negotiable certificates of deposit (NCDs) are computed as 5-day moving averages. CP is commercial paper.
Source: Depository Trust & Clearing Corporation.

## MMF Assets under Management



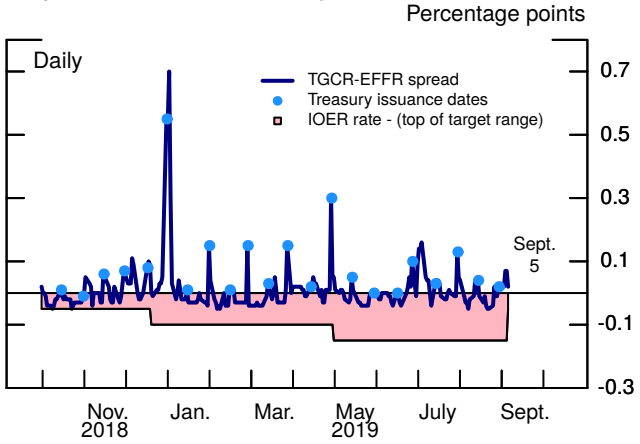

Note: MMF is money market fund.
Source: Investment Company Institute.

## Cumulative Net Bill Issuance




Source: Treasury auction announcements and staff forecast.

## Repo Rates and Treasury Issuance




Note: EFFR is the Effective Federal Funds Rate; TGCR is the Tri-Party General Collateral Rate; Repo is repurchase agreement; IOER is interest on excess reserves.
Source: Federal Reserve Bank of New York.

Financial Markets

sentiment may also have contributed. MMF inflows helped offset some of the upward pressure on money market rates coming from increased Treasury bill issuance following the resolution of the debt ceiling. On net, overnight secured spreads to IOER narrowed somewhat, while spreads to OIS for Treasury bills and for unsecured private instruments at tenors of a month or more widened. Take-up at the Federal Reserve's ON RRP operations averaged about $6 billion during the intermeeting period.[3]

As a result of the July FOMC decision to cease balance sheet runoff, the Federal Reserve will purchase an additional $68 billion in Treasury securities—including Treasury bills—through the end of the year. Most of these purchases, which began in August, will be conducted in the secondary market. This is the first time Treasury purchases have been conducted in the secondary market since 2014.



[3] On August 22, 2019, the Federal Reserve conducted the second and last TDF test operation for 2019. The Fed offered seven-day term deposits at a rate of 1 basis point over IOER. The take-up and participation were in line with that seen in recent similarly parameterized tests; take-up totaled $1.7 billion, with 18 banks participating and five max bids.

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# Financing Conditions for Businesses and Households

Financing conditions for businesses and households appear to have been little affected by recent turbulence in financial markets. As such, financing conditions remain generally supportive of spending and economic activity.

- Corporate bond issuance was solid in August, driven by resilient investment-grade issuance, while speculative-grade issuance was somewhat weaker than average. Growth of commercial and industrial (C&I) loans on banks' books picked up in July and August.
- Mortgage rates declined roughly 30 basis points, and originations have moved up in recent months for both purchases and refinancing.
- Consumer credit conditions continued to be generally supportive of spending. Consumer credit expanded at a moderate pace in the second quarter, and consumer loan growth at banks remained robust in July and August.

## BUSINESS FINANCING CONDITIONS

### Nonfinancial Businesses

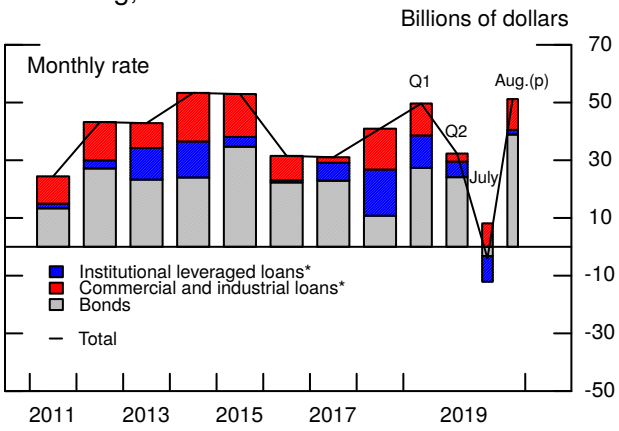
The market volatility over the intermeeting period has, so far, left little imprint on financing conditions for corporations. In particular, while spreads on corporate bonds relative to comparable-maturity Treasury securities widened over the intermeeting period, yields on corporate bonds decreased notably, reaching historical lows.

Against this backdrop, overall issuance of corporate bonds was solid in August, driven by resilient investment-grade issuance. While speculative-grade corporate bond issuance was somewhat subdued in August, it was comparable to that seen over the same period in 2018. Corporate bond issuance exhibited the usual slowdown in late August; however, investors reportedly expect issuance to pick up in September.

Preliminary data suggest that institutional leveraged loan issuance in August was moderate, partly due to seasonal patterns, with a small number of riskier leveraged loan offerings reportedly withdrawn amid greater investor scrutiny. July issuance was somewhat larger and exceeded the average monthly pace for the first half of 2019, as strong new-money issuance offset weak refinancing volumes. Meanwhile, C&I loan growth at banks ticked up in July and August, driven by faster growth at large domestic

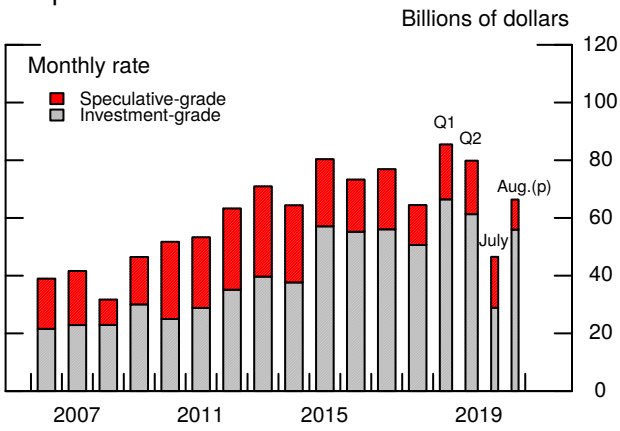
# Business Finance

## Selected Components of Net Debt Financing, Nonfinancial Firms



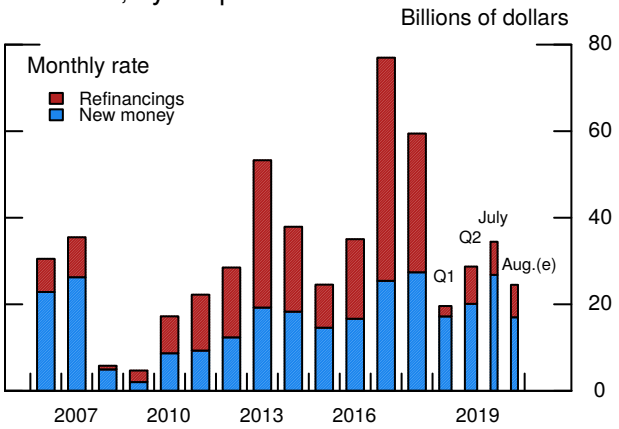

* Period-end basis.
p Preliminary.
Source: Mergent Fixed Income Securities Database; Thomson Reuters LPC; Federal Reserve Board.

## Gross Issuance of Nonfinancial Corporate Bonds



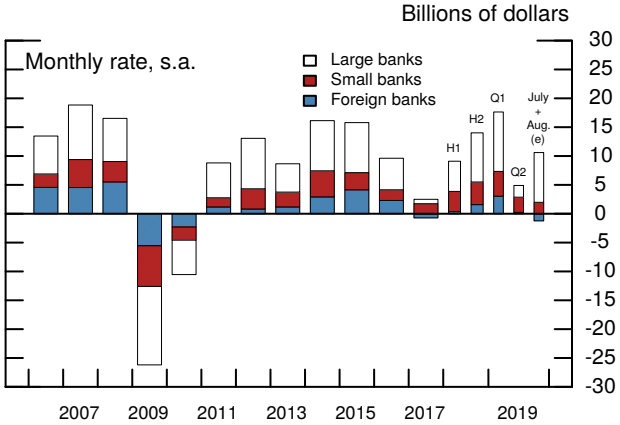

Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
p Preliminary.
Source: Mergent Fixed Income Securities Database.

## Institutional Leveraged Loan Gross Issuance, by Purpose



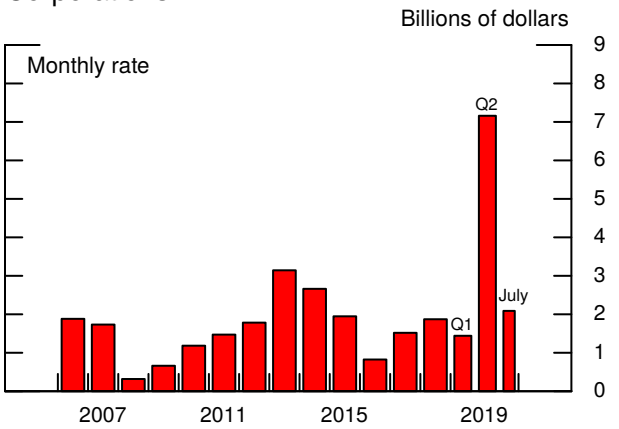

e Estimate.
Source: Thomson Reuters LPC.

## Commercial and Industrial Loans



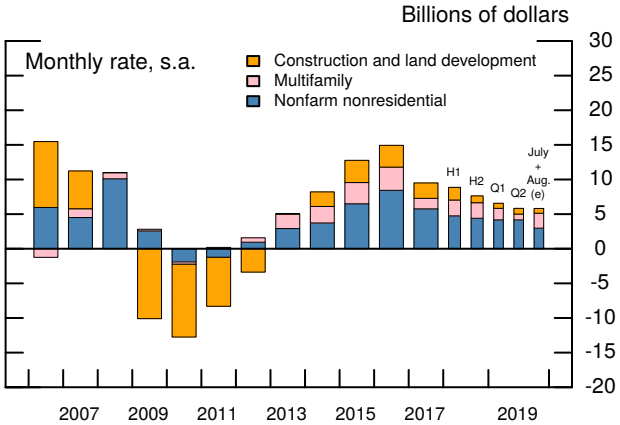

e Estimate.
Source: Federal Reserve Board Staff calculations; Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

## IPO Issuance by Nonfinancial Corporations




Note: IPO is initial public offering.
Source: Securities Data Company.

## Commercial Real Estate Loans




e Estimate.
Source: Federal Reserve Board Staff calculations; Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Financing Conditions

banks. Interest rates on fixed-rate nonsyndicated C&I loans declined in July, while interest rates on floating-rate loans remained little changed from their June levels.

Public equity issuance through both initial and seasoned offerings slowed in July but remained roughly in line with July issuance levels over the past few years. Amid increased market volatility, there were no initial public equity offerings by domestic firms in August; however, several deals are reportedly expected to be completed over the next few months.

On balance, the credit quality of nonfinancial corporations weakened slightly over the intermeeting period. In particular, the volume of nonfinancial corporate bond downgrades modestly outpaced that of upgrades in July and August. The six-month trailing nonfinancial bond default rate edged down, while the KMV expected year-ahead default rate ticked up; both measures currently stand at roughly the midpoints of their historical distributions. Expectations of year-ahead earnings per share for S&P 500 firms were revised down in July and August, although by much less than the sharp downgrades around the turn of the year. Analyst estimates for long-term earnings growth have continued to decline and are currently slightly below their median since 2000.

## Small Businesses

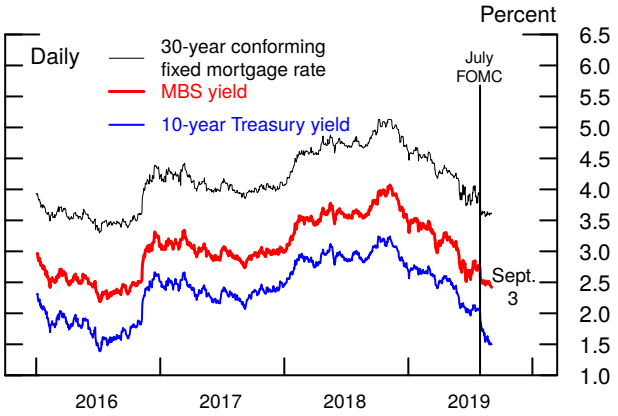
Available data suggest that the supply of credit to small businesses remained accommodative, while demand continued to be somewhat weak. Small business loan originations—as measured by the Thomson Reuters/PayNet Small Business Lending Index—ticked down in June but remained approximately 2 percent higher than their year-ago level. In the August National Federation of Independent Business (NFIB) survey, the net percent of respondents reporting that it was harder to obtain credit now compared with three months ago inched down further to near its post-crisis low. At the same time, the demand for credit by small businesses appears to have remained muted, with over half of small business owners in the August NFIB poll continuing to report that they were not interested in a loan. Recent indicators of small business loan performance have also been strong, as delinquencies have stayed low relative to historical levels.

## Commercial Real Estate

Financing conditions remained generally accommodative for commercial real estate (CRE). Bank CRE loan growth has decelerated moderately since the second quarter, driven by slower growth in loans secured by nonfarm nonresidential properties. New commitments from life insurance companies to fund CRE mortgages decreased a bit in the second quarter but remained close to their average level over the past four years.

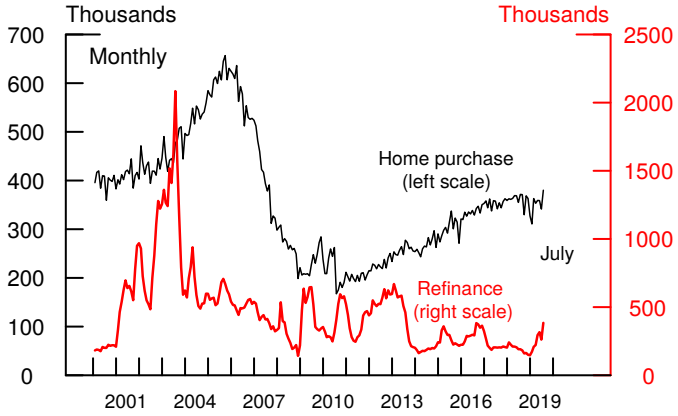
# Household Finance

## Mortgage Rate and MBS Yield



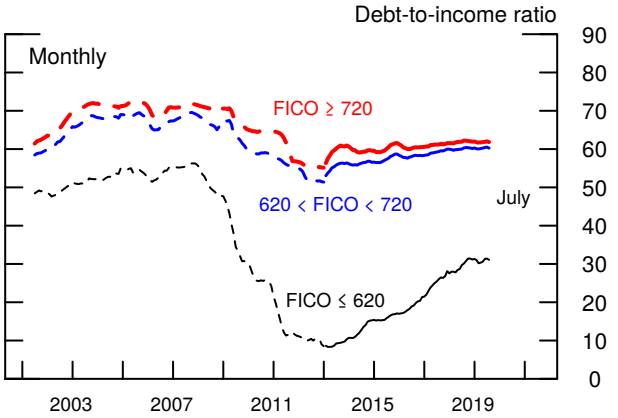

Note: Through May 31, 2019, the mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate. From June 3, 2019, forward, the MBS yield is the uniform MBS 30-year current-coupon rate.
Source: For MBS yield, Barclays; for mortgage rate, Loansifter; for Treasury yield, Federal Reserve Bank of New York and Board staff calculations.

## Purchase and Refinance Originations



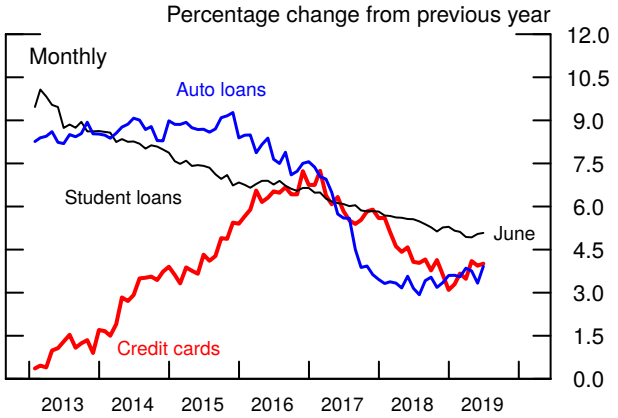

Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values before 2019, data reported under the Home Mortgage Disclosure Act of 1975; for values in 2019, Board staff estimates.

## Maximum Debt-to-Income Ratio, by Credit Score



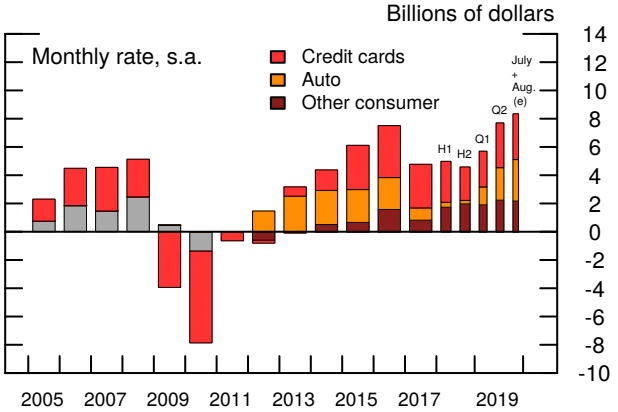

Note: Weighted average of maximums by borrower and loan type, where types are defined by loan-to-value ratio, property location, and credit score.
Source: For frontiers shown with dashed lines, McDash and CoreLogic; for frontiers shown with solid lines, Optimal Blue.

## Consumer Credit



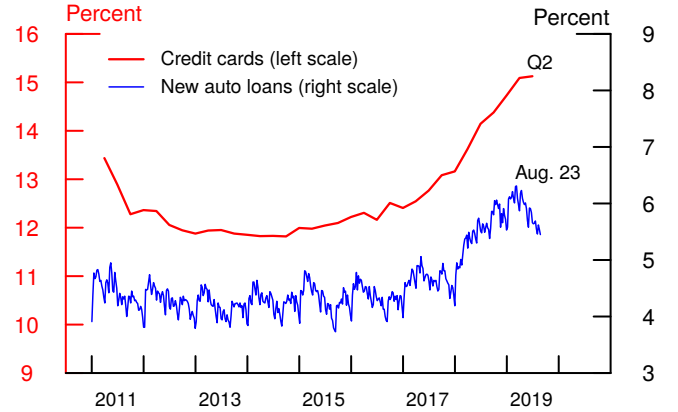

Source: Federal Reserve Board, Statistical Release G.19, "Consumer Credit."

## Consumer Loans at Commercial Banks




Note: Before 2012, data on auto and other consumer loans were not separately available. The combined series is depicted here by the gray bars. Yearly averages are Q4 to Q4, half-years are based on Q4 and Q2 average levels, and quarterly and monthly annual rates use corresponding average levels.
e Estimate.
Source: Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

## Consumer Interest Rates




Note: Credit card data reflect rates at commercial banks on all credit card plans; data are reported quarterly and not seasonally adjusted. Auto loans data are reported weekly and not seasonally adjusted.
Source: For credit cards, Federal Reserve Board; for auto loans, J.D. Power.

Financing Conditions

The volume of agency and non-agency commercial mortgage-backed securities issuance was slightly weaker in July and August than the same period last year, though industry analysts reportedly anticipate that issuance will pick up in September in response to recent declines in interest rates.

## MUNICIPAL GOVERNMENT FINANCING CONDITIONS

Credit conditions for state and local governments in municipal bond markets remained accommodative on balance. Gross issuance of municipal bonds was solid in July and robust in August, with new capital raising accounting for the majority of the issuance. Municipal bond yields in both the primary and secondary markets declined notably over the intermeeting period but less so than the yields on comparable-maturity Treasury securities, leaving yield ratios notably higher.

## HOUSEHOLD FINANCING CONDITIONS

### Residential Real Estate

Financing conditions in the residential mortgage market eased over the intermeeting period. Residential mortgage rates declined but less than long-term Treasury yields, as the increase in prepayment risk and the rise in implied interest rate volatility reportedly reduced the appeal of mortgage-backed securities. Since their recent peak last November, mortgage rates have fallen about 150 basis points and now stand near their lowest level since mid-2016. Home-purchase originations moved up to near their solid 2017 levels. Refinancing originations rose in July, although they remained fairly low compared with the refinancing wave seen in 2011 and 2012, when a larger share of borrowers had more to gain from refinancing. Staff analysis suggests that refinancing volumes are not likely to rise much further given the expected path of mortgage rates, as the share of borrowers who potentially stand to benefit from refinancing remains low. Mortgage credit standards—as measured by staff estimates of lenders' maximum available debt-to-income ratios—have been stable since late 2018 and, after several years of easing, appear to have settled at somewhat tighter levels than in the early 2000s.

### Consumer Credit

Financing conditions in consumer credit markets remained generally supportive of growth in consumer spending, although supply conditions continued to be tight for subprime credit card borrowers. Consumer credit expanded at a moderate pace in the

second quarter overall, with bank credit data pointing to continued growth through July and August. The moderate pace of overall consumer credit growth in the second quarter may reflect, in part, a restraint on demand brought about by increases in the past couple of years in consumer interest rates. However, interest rates on existing credit card balances leveled off in the second quarter and are expected to fall in August with the recent decline in the prime rate. In addition, since the beginning of the year, auto loan interest rates have decreased on net. In consumer ABS markets, issuance was solid, and spreads remained at relatively low levels, though somewhat above their post-crisis averages.

## FINANCING AND FINANCIAL CONDITIONS INDEXES

A staff index that provides a measure of financing conditions for nonfinancial corporations indicates that financing conditions have tightened modestly over the intermeeting period but remain accommodative relative to historical standards. The tightening in the index is consistent with the decline in equity prices and the widening of corporate bond spreads over the same period. As shown in the appendix to this Tealbook section, other publicly available financial conditions indexes, which aggregate a large set of financial variables into a summary series, also pointed to either roughly unchanged or modestly tighter financial conditions. Overall, these indexes indicate that broad financial conditions are either accommodative or close to a neutral level relative to historical standards.

# Appendix

## Technical Note on Financial Conditions Indexes

The table "Overview of Selected FCIs" provides a summary of various financial conditions indexes (FCIs) that have been developed at the Federal Reserve Board and elsewhere. The historical evolution of these indexes is reported in the exhibit "Selected Financial Conditions Indexes."

**Overview of Selected FCIs**

| Index | Frequency | Sample start | Methodology | Components |
|---|---|---|---|---|
| Staff FCI for nonfinancial corporations | Daily | 1973 | Difference in equity returns between two portfolios of firms with credit ratings above and just below investment grade | Nonfinancial firms' stock returns and credit ratings; five Fama-French factors, plus momentum and quality minus junk factors |
| SLOOS Bank Lending Standards Index | Quarterly | 1991 | Weighted average of the net percentage of domestic banks tightening standards for 11 loan categories, with weights given by the size of each loan category on banks' balance sheets | Lending standards for 11 loan categories |
| Goldman Sachs Financial Conditions Index | Daily | 1990 | Weighted average of financial variables with weights pinned down by the contribution of each financial variable on real GDP growth over the following year using a VAR model | 5 financial variables: the federal funds rate, the 10-year Treasury yield, the triple-B yield spreads to Treasury, the S&P price-to-earnings ratio, and the broad value of the U.S. dollar |
| Chicago Fed National Financial Conditions Index | Weekly | 1971 | Dynamic factor model | 100 financial variables related to money markets (28 indicators), debt and equity markets (27 indicators), and the banking system (45 indicators) |
| St. Louis Fed Financial Stress Index | Weekly | 1993 | Principal component analysis | 18 variables, including short- and long-term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index |
| Kancas City Fed Financial Stress Index | Monthly | 1990 | Principal component analysis | 11 financial variables, including short- and long-term interest rates, corporate and consumer yield spreads, the VIX, and the volatility of bank stock prices |

Source: CRSP; Yahoo Finance; Moody's Bond Ratings; Ken French website; AQR Capital Management website; Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices; Bloomberg; Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

The first index in the table, the staff FCI for nonfinancial corporations, measures financing conditions for nonfinancial corporations.[1] This index is constructed as the difference in equity returns between two portfolios of firms with credit ratings above and just below investment grade. To the extent that speculative-grade firms are more sensitive to changes in financing conditions than investment-grade firms but have similar exposure to other shocks, movements in this index provide a measure of changes in financing conditions for nonfinancial corporations.

The second index in the table measures the net share of domestic banks reporting tighter lending standards across all core loan categories in the Senior Loan Officer Opinion Survey on Bank Lending Practices. Banks' responses for a given loan category are weighted by banks' holdings of those loans on their balance sheets.[2]

The other FCIs are constructed by aggregating a large set of financial variables into a summary series using various statistical methods. While these indexes provide a useful summary of broad financial market developments, the movements in these indexes may reflect both changes in financing conditions and other shocks to the economy.

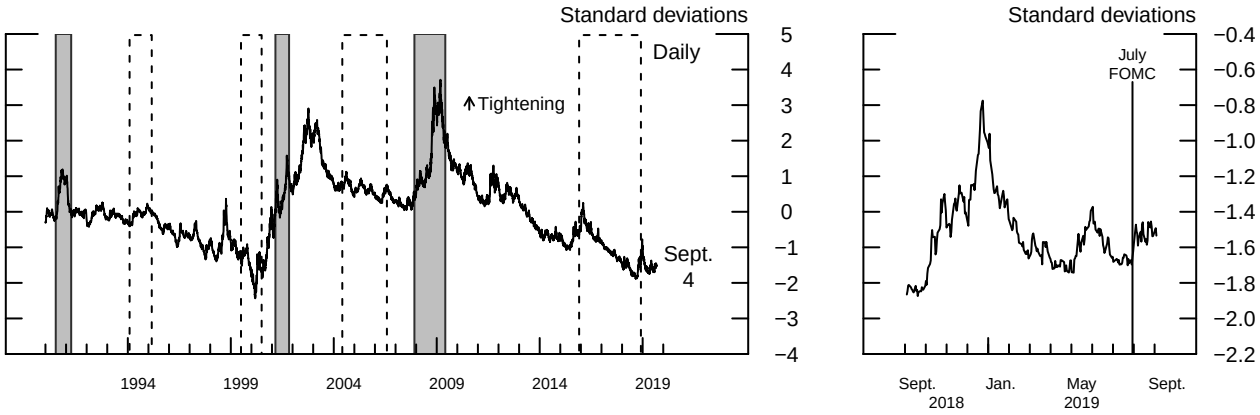


[1] This index was first discussed in the box "Financial Conditions Indexes" in the Financing Conditions for Businesses and Households section of the September 2018 Tealbook A.

[2] This index is an updated version of the index developed in William F. Bassett, Mary Beth Chosak, John C. Driscoll, and Egon Zakrajsek (2014), "Changes in Bank Lending Standards and the Macroeconomy," *Journal of Monetary Economics*, vol. 62 (March), pp. 23–40. The current index uses a new weighting approach for each loan category.

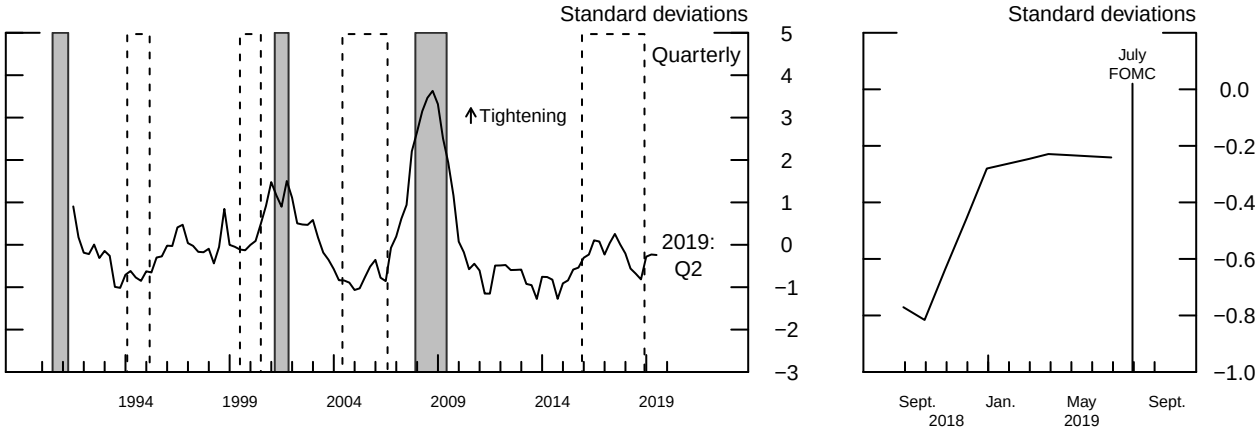
# Selected Financial Conditions Indexes

## Staff FCI for Nonfinancial Corporations



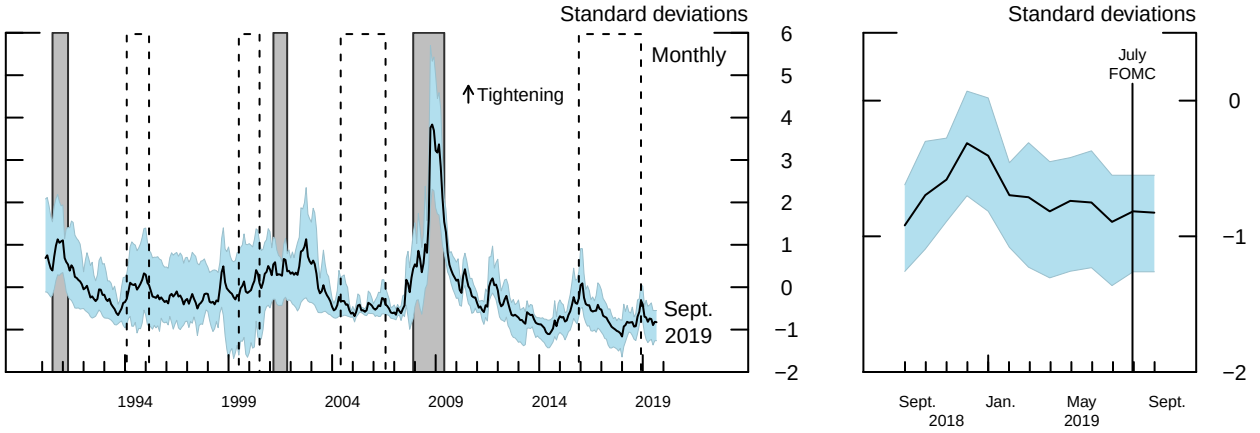

Note: The financial conditions index (FCI) is the deviation from the long−run relation between the systematic components of the cumulative log returns of 2 portfolios of firms with credit ratings above and just below investment grade. The systematic components are derived from the 5−factor Fama−French asset pricing model, augmented with the momentum and quality minus junk factors.
Source: CRSP; Yahoo Finance; Moody's Bond Ratings; Ken French website; AQR Capital Management website.

## SLOOS Bank Lending Standards Index




Note: The index is a weighted average of the net percentage of domestic banks tightening standards for 11 loan categories, with weights given by the size of each loan category on banks' balance sheets.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

## Mean and Range of External FCIs

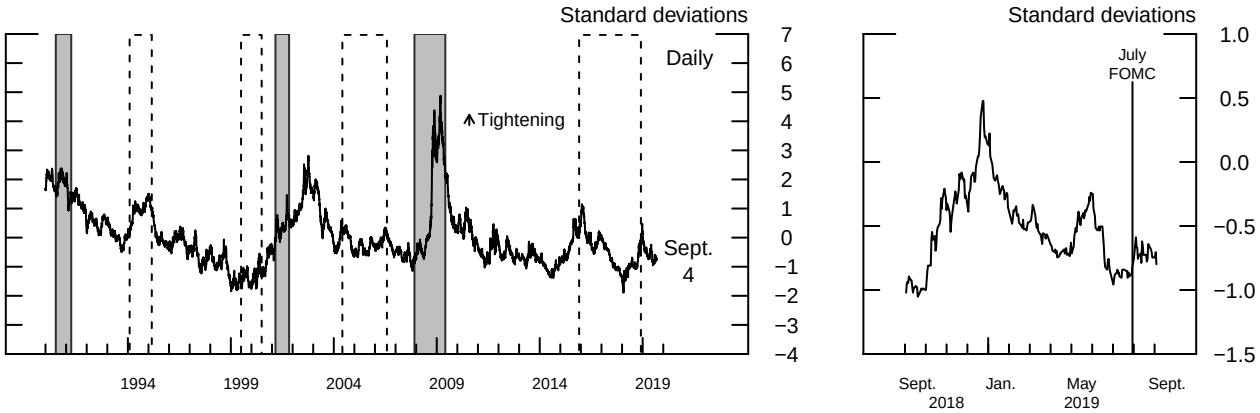



Note: Mean FCI represents the mean of FCIs developed by Goldman Sachs and The Federal Reserve Banks of Chicago, St. Louis, and Kansas City. The blue shaded region represents the range of these 4 standardized FCIs.
Source: Bloomberg; Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

**For all panels: Indexes are standardized. Values above (below) zero represent tighter (easier) than average financial conditions. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research. The dashed boxes denote monetary policy tightening cycles.**

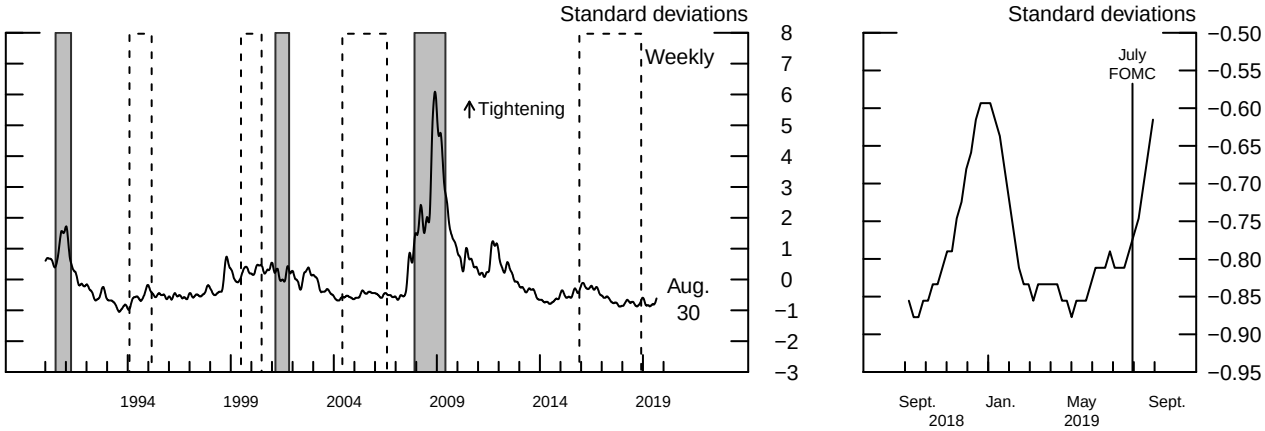
# Selected Financial Conditions Indexes (continued)

## Goldman Sachs FCI



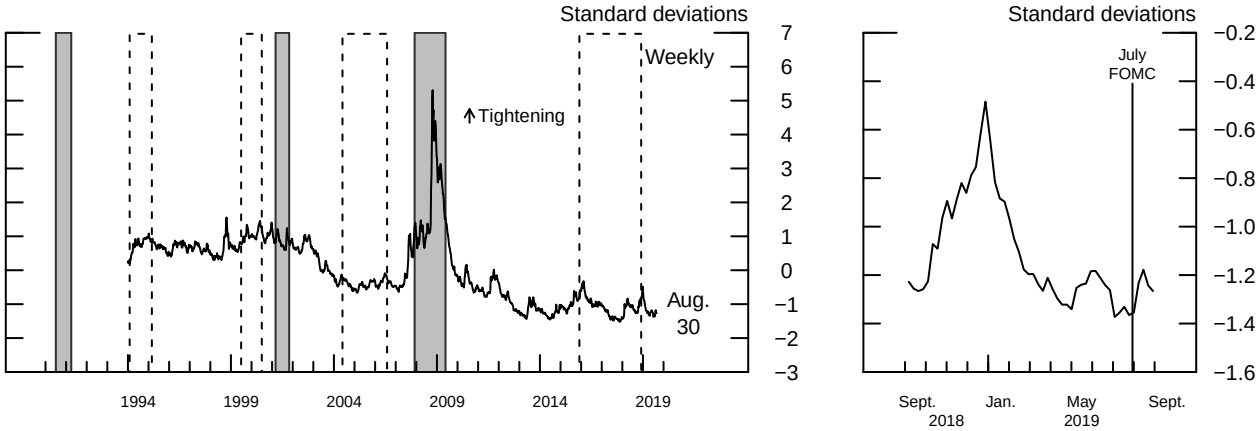

Note: The index is a weighted average of 5 financial variables: the federal funds rate, the 10−year Treasury yield, the triple−B yield spreads to Treasury, the S&P price−to−earnings ratio, and the broad value of the U.S. dollar. Weights are pinned down by the contribution of each financial variable on real gross domestic product growth over the following year using a vector auto−regression model.
Source: Bloomberg.

## Chicago Fed NFCI




Note: The index is based on 100 financial variables related to money markets (28 indicators), debt and equity markets (27 indicators), and the banking system (45 indicators). The index is weekly and is derived using a dynamic factor model.
Source: Federal Reserve Bank of Chicago.

## St. Louis Fed Financial Stress Index

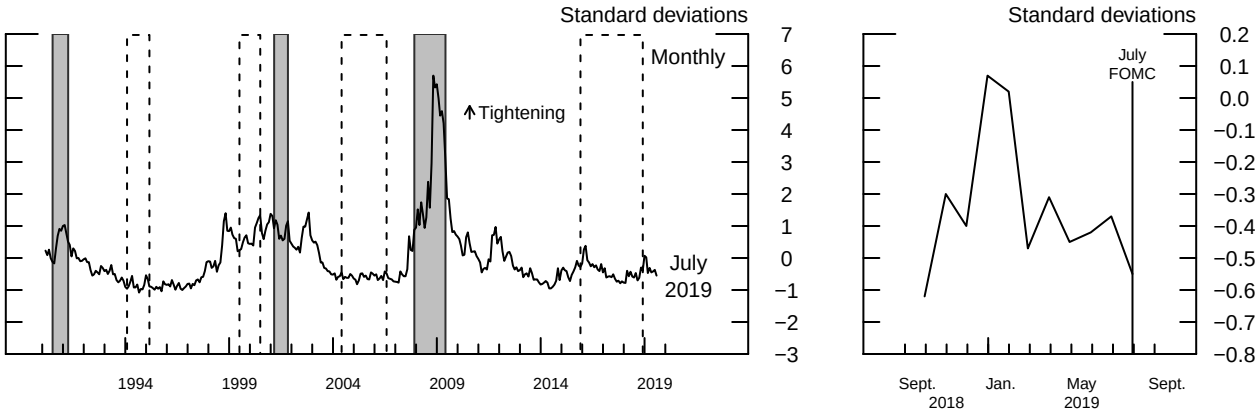



Note: The index is the principal component of 18 variables, including short− and long−term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index.
Source: Federal Reserve Bank of St. Louis.

**For all panels: Indexes are standardized. Values above (below) zero represent tighter (easier) than average financial conditions. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research. The dashed boxes denote monetary policy tightening cycles.**

# Selected Financial Conditions Indexes (continued)

## Kansas City Fed Financial Stress Index




Note: The index is the principal component of 11 financial variables, including short− and long−term interest rates, corporate and consumer yield spreads, the VIX, and the volatility of bank stock prices.
Source: Federal Reserve Bank of Kansas City.

**For all panels: Indexes are standardized. Values above (below) zero represent tighter (easier) than average financial conditions. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research. The dashed boxes denote monetary policy tightening cycles.**

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# Risks and Uncertainty

## ASSESSMENT OF RISKS

In our assessment, the risks around our baseline projection for GDP are tilted to the downside, both over the next year and further out, and we see a corresponding upward skew for the unemployment rate. Among the most salient risks, trade policies and foreign economic developments seem more likely to move in directions that would create a significant drag on domestic activity than to resolve more favorably than assumed. In addition, the softness in business investment and manufacturing production so far this year could be pointing to a much more substantial slowing in economic growth than we currently recognize. Of course, there are risks to the upside as well. Many of the underlying fundamentals for household spending and business investment remain solid—bolstered, in part, by the 2017 tax cuts—and financial conditions, despite recent volatility, remain favorable. In these circumstances, spending could expand at a pace that is faster than in the staff projection. Although we view the current circumstances as quite uncertain, we judge the overall degree of uncertainty as being broadly in line with the average over the past 20 years (the benchmark used by the FOMC) because that period includes the most recent two recessions along with a number of other episodes with elevated uncertainty and market volatility.

Recession risks have likely increased. As shown in the bottom table of the "Assessment of Key Macroeconomic Risks" exhibit, the estimated probability of moving into recession over the next year based on a term-spread model has moved up further to 66 percent. This estimate should be interpreted with some caution given the long sample period over which the model is estimated and secular trends—particularly declining term premiums—that may materially affect its predictions. The recession probability estimate from a model-averaging framework that uses a selection of both real and financial variables is 45 percent. This figure is above the unconditional recession probability of 23 percent and has also moved up since the July Tealbook, mainly because of the decline in the term spread and the increase in the VIX.[1]

As indicated in the exhibit "Effective Lower Bound Risk Estimate," the estimated probability of returning to the effective lower bound (ELB) over the next three years has moved

[1] The probability from the model-averaging framework (MAF) is likely also boosted because of the same factors affecting the term-spread model, although to a smaller extent because the MAF model also considers other factors.

# Assessment of Key Macroeconomic Risks

## Probability of Inflation Events

(4 quarters ahead)

| Probability that the 4-quarter change in total PCE prices will be . . . | Staff | FRB/US | EDO | BVAR |
|---|---|---|---|---|
| *Greater than 3 percent* | | | | |
| Current Tealbook | .04 | .05 | .05 | .08 |
| Previous Tealbook | .09 | .05 | .02 | .05 |
| *Between 1 3/4 and 2 1/4 percent* | | | | |
| Current Tealbook | .24 | .27 | .38 | .25 |
| Previous Tealbook | .28 | .27 | .41 | .25 |
| *Less than 1 percent* | | | | |
| Current Tealbook | .17 | .13 | .00 | .14 |
| Previous Tealbook | .07 | .13 | .02 | .19 |

## Probability of Unemployment Events

(4 quarters ahead)

| Probability that the unemployment rate will . . . | Staff | FRB/US | EDO | BVAR |
|---|---|---|---|---|
| *Increase by 1 percentage point* | | | | |
| Current Tealbook | .02 | .05 | .23 | .02 |
| Previous Tealbook | .01 | .03 | .14 | .04 |
| *Decrease by 1 percentage point* | | | | |
| Current Tealbook | .04 | .01 | .00 | .15 |
| Previous Tealbook | .09 | .03 | .02 | .05 |

## Probability of Recession Over Next 4 Quarters

| Probability of transitioning into or remaining in a recession | Staff | FRB/US | MAF | Term Spread | Unconditional |
|---|---|---|---|---|---|
| Current Tealbook | .07 | .08 | .45 | .66 | .23 |
| Previous Tealbook | .07 | .09 | .36 | .56 | .23 |

Note: "Staff" represents stochastic simulations in FRB/US around the staff judgmental baseline; baselines for FRB/US, EDO, and BVAR are generated by those models. The "MAF" estimate uses a model averaging framework to infer the probability from a selection of real and financial variables. "Term Spread" shows the probability implied by the spread between the current month's 10-year and 3-month Treasury yields. "Unconditional" is calculated using NBER recession dating from 1973:Q1 to the most recent quarter with a BEA estimate of GDP.

up to 23 percent and rises to about 37 percent by the end of the medium term. Given the proximity of the federal funds rate to the ELB, monetary policy may have less capacity to offset significant negative economic shocks than positive ones, contributing to the downside skew in economic outcomes. Similarly, the estimated distributions in the exhibit "Conditional Distributions of Macroeconomic Variables 2 Years Ahead" have become increasingly skewed to the downside since last year, with the probability of very high unemployment rates two years from now reaching levels previously attained only just prior to the onset of a recession. In contrast, as shown in the exhibit "Time-Varying Macroeconomic Risk 1 Year Ahead," four-quarter-ahead estimates of forecast risks around GDP growth and the unemployment rate, based on historical staff forecast errors, are not unusually wide or skewed. One reason the estimates in these two exhibits differ may be that the asymmetries associated with recessions are more prominent at longer horizons, as the consequences of adverse shocks accumulate.

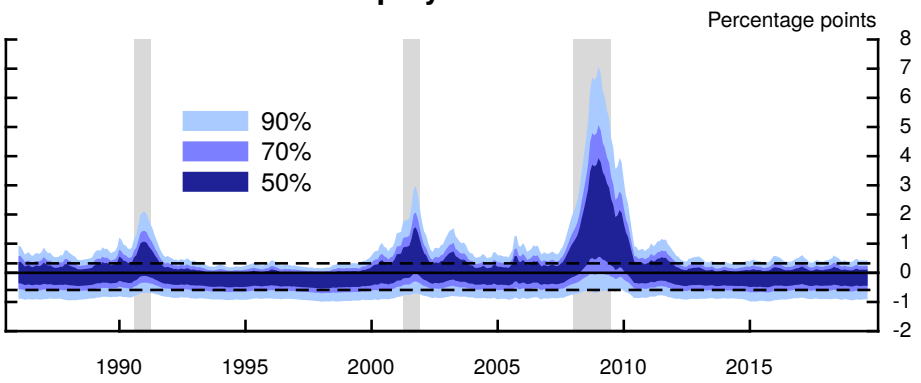
With regard to inflation, we view the risks to the inflation projection as slanted to the downside—in part because of the downside risks to economic activity. Moreover, inflation has been running low this year, and longer-run inflation expectations could currently be lower than we recognize. Also, the exchange value of the dollar could appreciate more than expected and put downward pressure on inflation. There are also risks to the upside. For example, an extended period with unusually tight resource utilization could lead to greater upward pressure on wages and prices, consistent with the predictions of models that emphasize nonlinear effects of resource utilization on inflation. In addition, a widespread and sustained increase in trade barriers could lead to temporarily higher inflation.

All of these inflation risks would tend to be of modest size as long as inflation expectations remained reasonably well anchored. However, the risks could increase substantially, in either direction, if expectations were to follow actual inflation up or down. Such movements in expectations could induce changes in inflation to build on themselves and thus lead inflation to deviate significantly and persistently from 2 percent. Notwithstanding all of these concerns, the overall degree of uncertainty is probably about the same as over the past 20 years.

Risks & Uncertainty

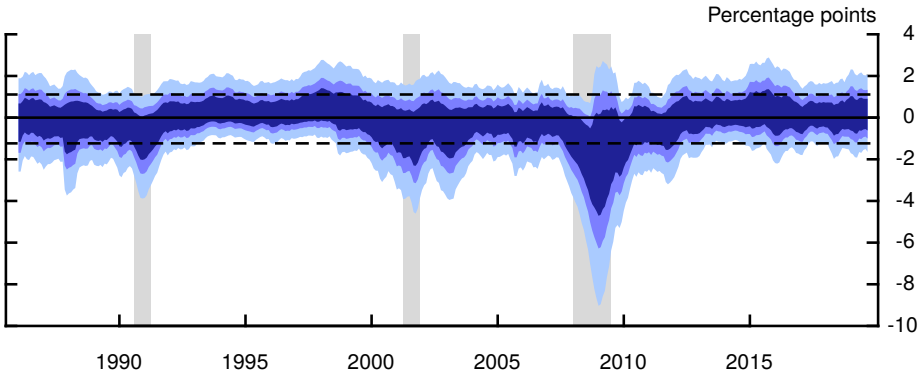
# Time-Varying Macroeconomic Risk 1 Year Ahead

## Unemployment Rate



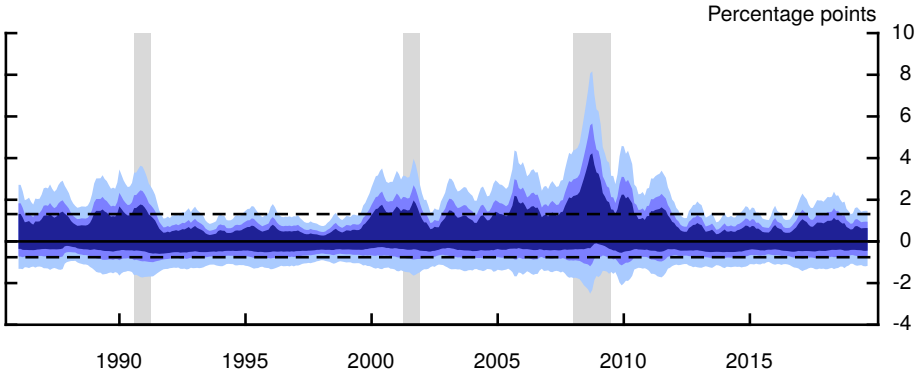

| September 2019 | |
|---|---|
| 95th | .4 |
| 85th | .2 |
| 50th | - .1 |
| 15th | - .6 |
| 5th | - .9 |

## GDP Growth




| September 2019 | |
|---|---|
| 95th | 2.1 |
| 85th | 1.3 |
| 50th | .1 |
| 15th | -1.0 |
| 5th | -1.6 |

## CPI Inflation

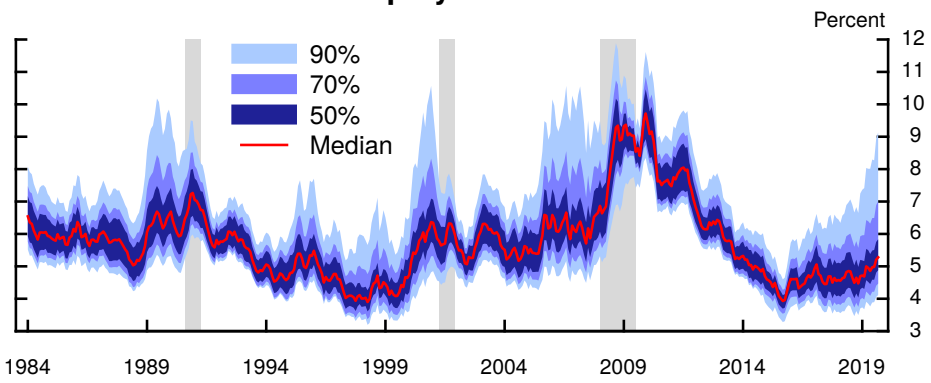



| September 2019 | |
|---|---|
| 95th | 1.5 |
| 85th | .9 |
| 50th | .1 |
| 15th | - .7 |
| 5th | -1.2 |

Note: The exhibit shows estimates of quantiles of the distribution of errors for four-quarter-ahead staff forecasts. The estimates are conditioned on indicators of real activity, inflation, financial market strain, and the volatility of high-frequency macroeconomic indicators. The tables show selected quantiles of the predictive distributions for the respective variables as of the current Tealbook. Dashed lines denote the median 15th and 85th percentiles. Gray shaded bars indicate recession periods as defined by the National Bureau of Economic Research.

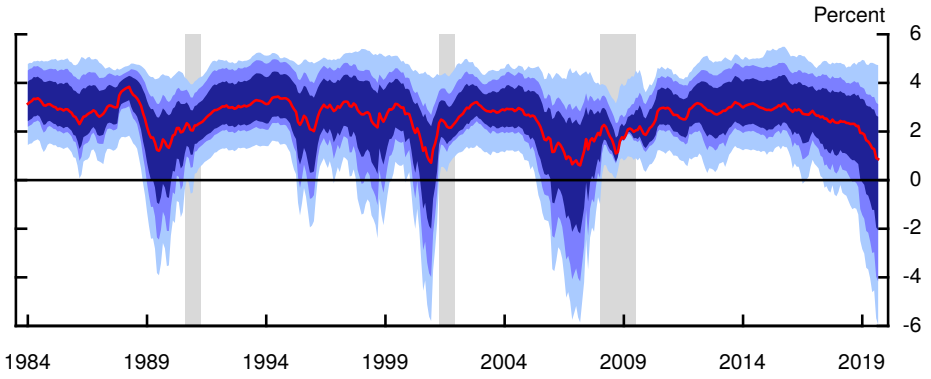
# Conditional Distributions of Macroeconomic Variables 2 Years Ahead

## Unemployment Rate



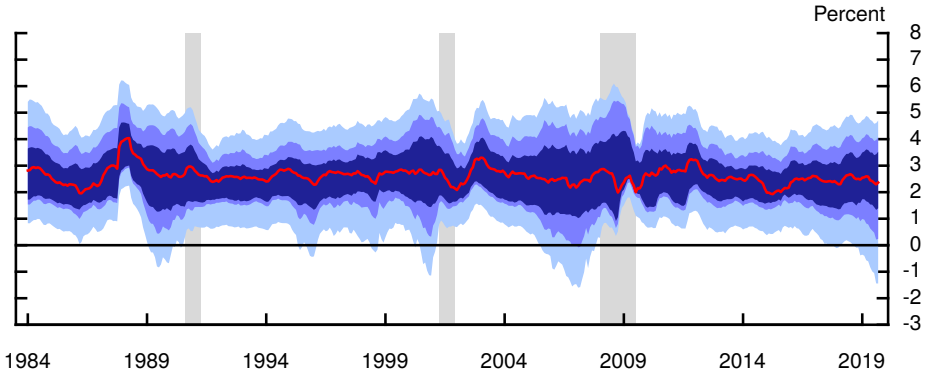

| September 2019 | |
|---|---|
| 95th | 9.1 |
| 85th | 7.0 |
| 50th | 5.3 |
| 15th | 4.5 |
| 5th | 4.1 |

## GDP Growth




| September 2019 | |
|---|---|
| 95th | 4.7 |
| 85th | 3.1 |
| 50th | .9 |
| 15th | -4.2 |
| 5th | -6.0 |

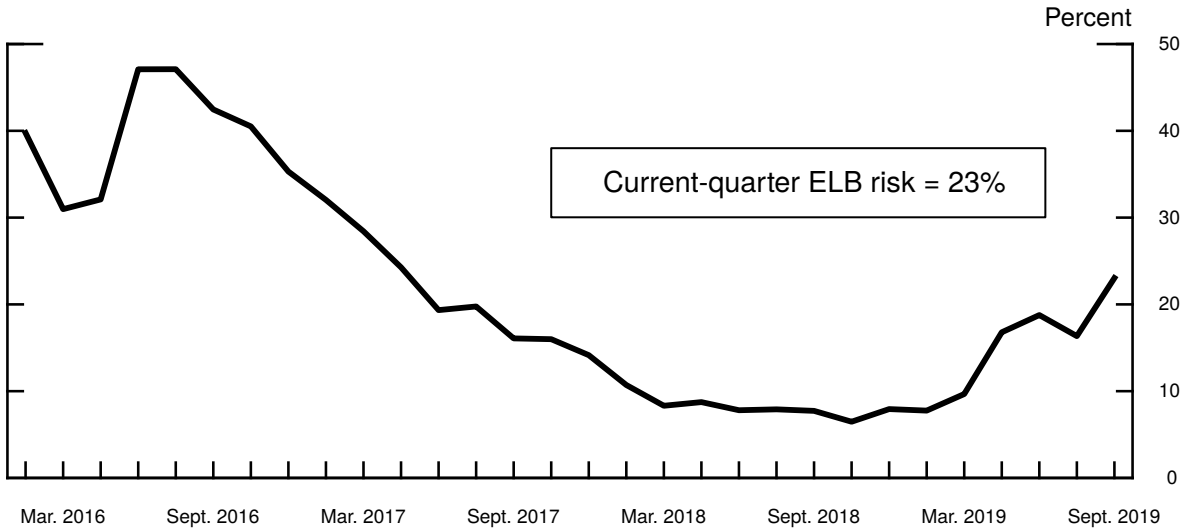
## CPI Inflation



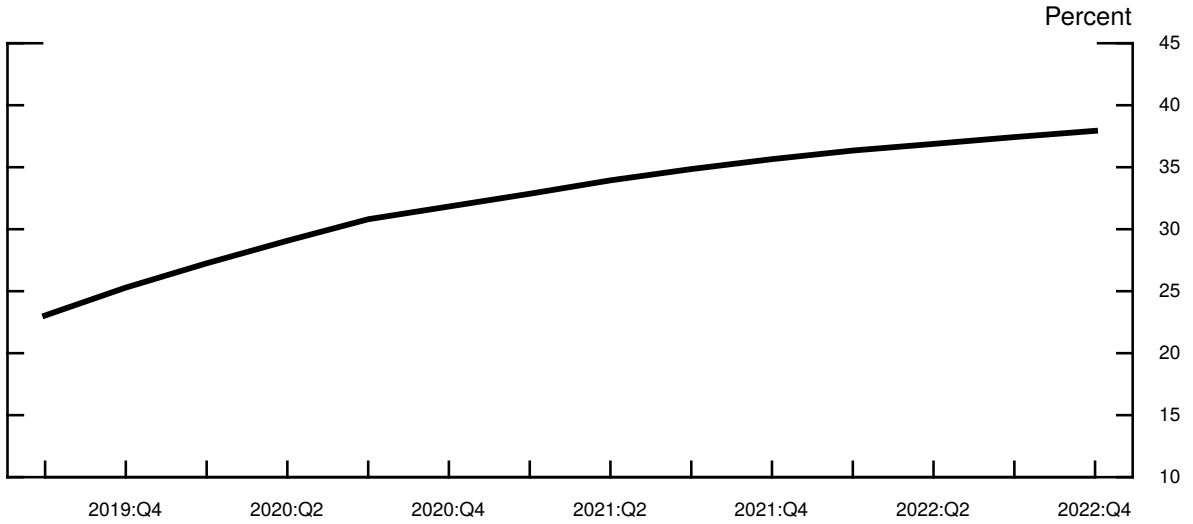

| September 2019 | |
|---|---|
| 95th | 4.7 |
| 85th | 4.1 |
| 50th | 2.4 |
| 15th | .2 |
| 5th | -1.4 |

# Effective Lower Bound Risk Estimate

## ELB Risk since Liftoff




## ELB Risk over the Projection Period




Note: The figures show the probability that the federal funds rate reaches the effective lower bound (ELB) over the next 3 years starting in the given quarter. Details behind the computation of the ELB risk measure are provided in the box "A Guidepost for Dropping the Effective Lower Bound Risk from the Assessment of Risks" in the Risks and Uncertainty section of the April 2017 Tealbook A. The lower panel computes ELB risk over a forward-looking moving 3-year window using stochastic simulations in FRB/US beginning in the current quarter. The simulations are computed around the Tealbook baseline.

## ALTERNATIVE SCENARIOS

### No-Deal Brexit [SIGMA model]

Our current baseline assumes that negotiations between the United Kingdom and the European Union will extend beyond the current deadline of October 31 and result in an orderly Brexit sometime in 2020. However, the political developments of the past few weeks point to contentious negotiations ahead and a higher risk of a no-deal Brexit. In this scenario, we assume that the United Kingdom rejects the current withdrawal proposal and leaves the European Union on October 31 without a deal, creating a range of economic disruptions despite current efforts by the authorities to prepare for such an event. Financial conditions in the United Kingdom and, to a lesser extent, in the rest of Europe tighten, while household and business confidence deteriorate. All told, the levels of U.K. and EU (excluding the United Kingdom) GDP decline 1.1 percent and 0.5 percent, respectively, by the end of 2021. Flight-to-safety flows into dollar-denominated assets cause the dollar to appreciate 3 percent, and global equity prices decline 3 percent.

Weaker foreign activity, the stronger dollar, and some tightening of U.S. financial conditions lead U.S. GDP growth to moderate to 1.6 percent in 2020, about 0.4 percentage point below the baseline. The U.S. unemployment rate rises about 0.2 percentage point above the baseline over the forecast period. Core PCE inflation runs at 1.6 percent in 2020, before gradually increasing to 1.9 percent in 2024. The inertial Taylor rule with a parameter value of 1.0 on the output gap—which is a more responsive specification than in the baseline policy rule—prescribes a path for the federal funds rate that is about 25 basis points below the baseline.[2]

The relatively modest effect of a no-deal Brexit in this scenario, compared with other, more pessimistic assessments of a no-deal Brexit being bandied about, is predicated on the assumption that the safeguards that European governments and financial institutions have put in place since the 2016 Brexit referendum are effective in containing most economic and financial disruptions and that financial markets have by now discounted much of this event. However, given the unprecedented nature of Brexit, more-adverse outcomes are entirely possible.

[2] In addition, the size and composition of the SOMA portfolio are assumed to follow the baseline paths in all scenarios.

## Alternative Scenarios

(Percent change, annual rate, from end of preceding period except as noted)

| Measure and scenario | 2019 H2 | 2020 | 2021 | 2022 | 2023 | 2024-25 |
|---|---|---|---|---|---|---|
| *Real GDP* | | | | | | |
| Tealbook baseline and extension | 1.8 | 2.0 | 1.8 | 1.7 | 1.5 | 1.5 |
| No-deal Brexit | 1.7 | 1.6 | 1.6 | 1.7 | 1.6 | 1.5 |
| Escalation of trade tensions | .4 | 1.0 | 1.8 | 2.0 | 1.8 | 1.6 |
| Recession with financial amplification | .8 | -1.2 | .1 | 2.1 | 2.4 | 2.5 |
| Lower long-run equilibrium FF rate | 1.4 | 1.5 | 1.4 | 1.5 | 1.5 | 1.7 |
| Stronger aggregate demand | 3.5 | 2.9 | 2.4 | 2.1 | 1.8 | 1.6 |
| Stronger aggregate supply | 2.4 | 2.8 | 2.8 | 2.7 | 2.5 | 2.3 |
| *Unemployment rate*[1] | | | | | | |
| Tealbook baseline and extension | 3.7 | 3.6 | 3.6 | 3.6 | 3.8 | 4.0 |
| No-deal Brexit | 3.7 | 3.7 | 3.8 | 3.8 | 3.9 | 4.1 |
| Escalation of trade tensions | 3.8 | 4.0 | 4.1 | 4.0 | 4.0 | 4.0 |
| Recession with financial amplification | 4.1 | 5.8 | 6.8 | 6.7 | 5.9 | 4.8 |
| Lower long-run equilibrium FF rate | 3.8 | 3.9 | 4.0 | 4.2 | 4.3 | 4.3 |
| Stronger aggregate demand | 3.5 | 3.1 | 2.9 | 2.9 | 3.0 | 3.4 |
| Stronger aggregate supply | 3.7 | 3.6 | 3.5 | 3.4 | 3.3 | 3.2 |
| *Total PCE prices* | | | | | | |
| Tealbook baseline and extension | 1.6 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 |
| No-deal Brexit | 1.5 | 1.6 | 1.7 | 1.8 | 1.8 | 1.9 |
| Escalation of trade tensions | 3.4 | 1.4 | 1.7 | 1.9 | 2.1 | 2.1 |
| Recession with financial amplification | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.6 |
| Lower long-run equilibrium FF rate | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Stronger aggregate demand | 1.6 | 1.8 | 1.9 | 1.9 | 2.0 | 2.1 |
| Stronger aggregate supply | 1.6 | 1.7 | 1.7 | 1.6 | 1.7 | 1.8 |
| *Core PCE prices* | | | | | | |
| Tealbook baseline and extension | 2.1 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 |
| No-deal Brexit | 2.0 | 1.6 | 1.7 | 1.8 | 1.8 | 1.9 |
| Escalation of trade tensions | 3.9 | 1.5 | 1.7 | 1.9 | 2.0 | 2.1 |
| Recession with financial amplification | 2.1 | 1.7 | 1.5 | 1.5 | 1.5 | 1.6 |
| Lower long-run equilibrium FF rate | 2.1 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Stronger aggregate demand | 2.1 | 1.8 | 1.9 | 1.9 | 2.0 | 2.1 |
| Stronger aggregate supply | 2.1 | 1.7 | 1.7 | 1.6 | 1.7 | 1.8 |
| *Federal funds rate*[1] | | | | | | |
| Tealbook baseline and extension | 2.2 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 |
| No-deal Brexit | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.4 |
| Escalation of trade tensions | 2.1 | 1.7 | 1.7 | 1.9 | 2.2 | 2.6 |
| Recession with financial amplification | 1.8 | .1 | .1 | .1 | .2 | 1.2 |
| Lower long-run equilibrium FF rate | 2.3 | 2.3 | 2.1 | 1.9 | 1.7 | 1.4 |
| Stronger aggregate demand | 2.3 | 2.6 | 2.7 | 2.9 | 3.0 | 3.1 |
| Stronger aggregate supply | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 |

1. Percent, average for the final quarter of the period.

## Escalation of Trade Tensions [GEMUS model]

Our current baseline assumes that the United States and its trading partners impose no new tariffs, but existing tariffs—including those raised on September 1 on a sizable tranche of Chinese imports—remain in place. The United States, however, has threatened additional tariffs on Chinese imports that, absent successful negotiations, would be levied later this year, causing the average tariff rate on Chinese imports to rise from its current level of about 17 percent to 25 percent.[3] While the current process of trade negotiations could ultimately lead to lower trade barriers, we cannot exclude the possibility that trade tensions with China and other trading partners escalate further, resulting in a sizable increase in trade barriers that would entail profoundly adverse effects.

This scenario assumes that trade tensions between the United States and China escalate, causing tariffs on all Chinese imports to increase to 33 percent by the end of 2019. In addition, tariffs of 25 percent are imposed on $314 billion of imports from Mexico, and tariffs of 20 percent are levied on $160 billion of vehicle imports.[4] In our scenario, Mexico and China partially retaliate against the U.S. actions, while tariffs on vehicles trigger a fully proportional response. Because higher U.S. tariffs reduce imports while higher foreign tariffs reduce U.S. exports, these policies have little effect on the trade balance. However, the higher cost of imported consumption goods depresses household spending, while business demand for investment declines as a result of the higher cost of imported capital goods and lower expected profits. In addition, the escalation of trade tensions leads to a widespread decline in global sentiment, with corporate borrowing spreads widening and global equity prices falling about 20 percent.

These developments lead to a significant and protracted slowdown in U.S. growth. GDP growth drops to 0.4 percent in the second half of 2019 and rises only to 1 percent in 2020, 1 percentage point below the baseline. Higher import prices boost total PCE inflation to 3.4 percent in the second half of this year before inflation slows down to 1.4 percent in 2020 as

[3] The average tariff rate on Chinese imports was around 3 percent in 2017. The current average level of 17 percent is the result of an average tariff increase of 14 percentage points. This increase is computed by averaging the 25 percent tariff rate on $230 billion of imports levied starting in 2018; the 15 percent tariff rate on $100 billion of imports levied on September 1, 2019; and the 0 percent tariff rate on the remaining $175 billion of imports that have not been tariffed to date. The additional measures that have been threatened include a further 5 percentage point hike on the $230 billion of imports that are currently taxed at 25 percent and tariffs of 15 percent on the remaining $175 billion of imports from China that have not been taxed so far.

[4] Most of these tariffs would be levied on imports from the European Union, Japan, and South Korea.

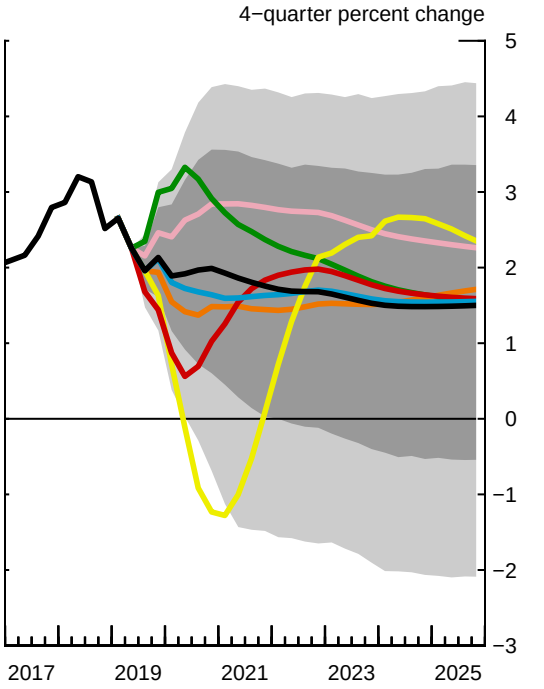
Risks & Uncertainty

# Forecast Confidence Intervals and Alternative Scenarios

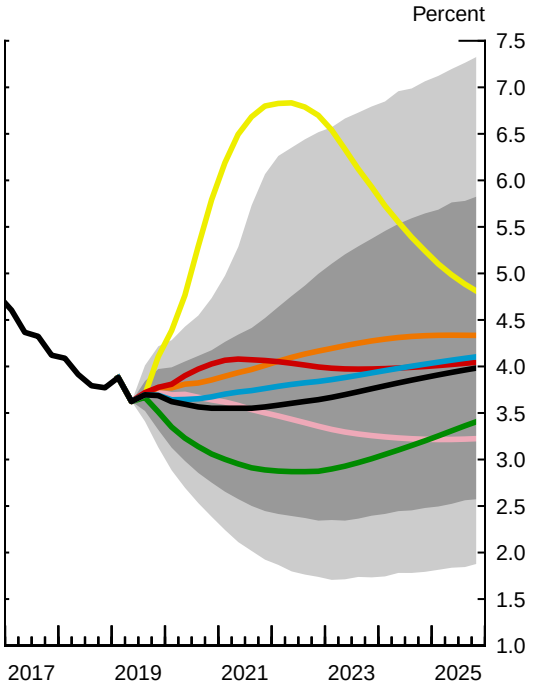
## Confidence Intervals Based on FRB/US Stochastic Simulations*

Tealbook baseline and extension
No−deal Brexit
Escalation of trade tensions
Recession with financial amplification
Lower long−run equilibrium FF rate
Stronger aggregate demand
Stronger aggregate supply

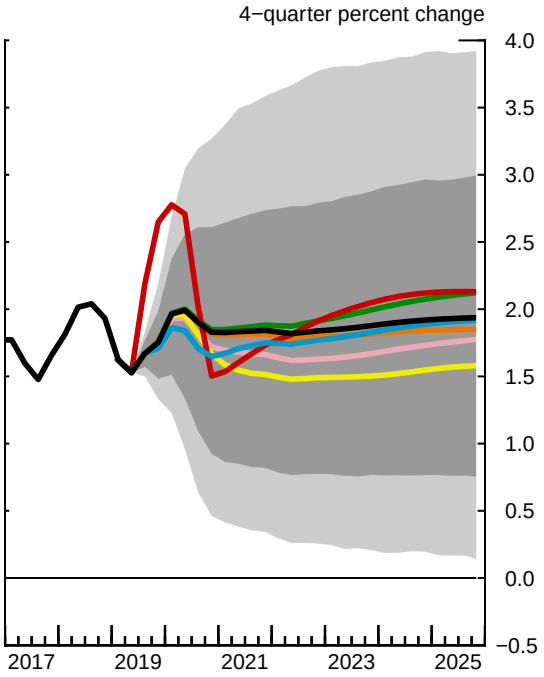
### Real GDP



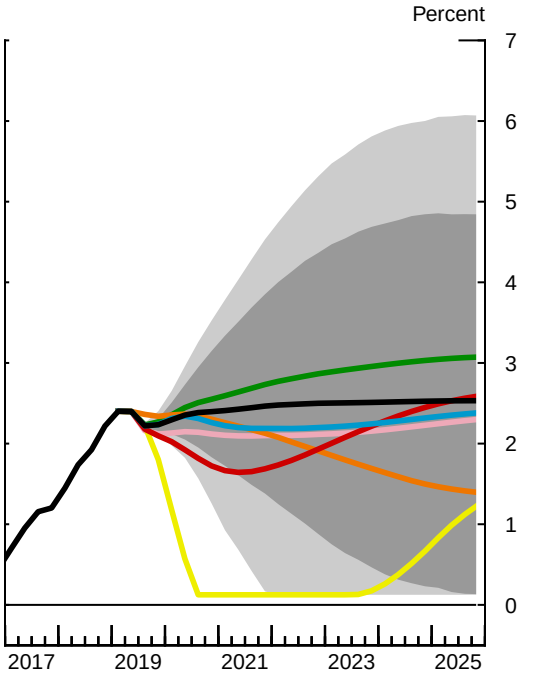

### Unemployment Rate




### PCE Prices excluding Food and Energy




### Federal Funds Rate




* The dark gray shaded area is the 70 percent interval, and the light gray shaded area is the 90 percent interval from stochastic simulations around the Tealbook baseline.

the effect of the new tariffs dies out and the economy slows down. Despite the initial jump in inflation, we assume policymakers "see through" the temporary increase in prices. Accordingly, the federal funds rate declines to 1.7 percent by the end of 2020, 0.7 percentage point below the baseline.[5]

## Recession with Financial Amplification [FRB/US model]

The softness in business investment and manufacturing production so far this year and the recent inversions in the yield curve could be pointing to a substantial deterioration in economic activity, and, as noted earlier, a number of statistical models indicate that the probability of a recession over the next year is above average. Moreover, leverage in the nonfinancial business sector is elevated. In this scenario, a recession is assumed to be amplified by the high levels of business indebtedness, which lead firms to reduce hiring and investment by more than they would if their debt were lower. We also assume that monetary policymakers aggressively respond to the sharp and sustained increase in the unemployment rate consistent with the FOMC's typical reaction in previous recessions.

Real GDP growth starts to decline later this year, and the unemployment rate rises. The federal funds rate drops sharply but becomes constrained by the ELB in the third quarter of 2020, thereby prolonging the downturn in the absence of unconventional monetary policy actions. GDP only begins to recover in 2022, and the unemployment rate peaks at 6.8 percent, an increase of 3.1 percentage points from the start of the recession.[6] With substantial slack in resource utilization, inflation falls to 1.5 percent in 2021.

## Lower Long-Run Equilibrium Federal Funds Rate [FRB/US model]

While there is substantial uncertainty around the empirical estimates of the long-run equilibrium federal funds rate, most estimates suggest that it has declined in recent decades. Long-term yields have been mostly below 3 percent in recent years, and their pronounced declines since the beginning of the year raise the possibility that the long-run equilibrium rate might be even lower than we are currently assuming. If this were the case, monetary policy would currently be restrictive. In this scenario, we assume that the real long-run equilibrium rate

[5] As in the previous scenario, the federal funds rate evolves following an inertial Taylor rule with a coefficient of 1.0 on the output gap.

[6] If the effective lower bound on nominal interest rates were not a constraint, the policy rate would fall to negative 2¼ percent, which would shave ½ percentage point off the increase in the unemployment rate. Alternatively, unconventional monetary policy actions could conceivably achieve that same amount of easing.

is negative 0.5 percent and that policymakers only come to recognize the lower level gradually over the next five years.

Because of this gradual recognition, and because of inertia in the baseline policy rule, the federal funds rate does not fall enough to fully offset the weaker aggregate demand implied by the lower real long-run equilibrium rate. As a result, output expands more slowly than in the baseline, and the path for the unemployment rate is slightly higher. GDP growth through 2020 and 2021 is, on average, about ½ percentage point lower than in the baseline projection; the unemployment rate is between ¼ and ½ percentage point higher from 2020 to 2025. With resource utilization only slightly weaker, inflation remains close to the baseline.

In the longer run, monetary policy fully responds to the lower equilibrium rate. By 2025, the federal funds rate is about 1 percentage point lower than in the baseline, allowing GDP growth to recover to near its potential pace and helping keep the unemployment rate near its longer-run value.[7] Although the outcomes over the next few years are not particularly bad, the fact that policymakers take a while to recognize the lower real long-run equilibrium rate may represent a lost opportunity to sustain a very strong labor market for longer. In the long run, once policymakers have recognized the situation, they will realize that they have substantially less space to ease in case of an adverse shock.

## Stronger Aggregate Demand [FRB/US model]

Many of the underlying fundamentals for household spending and business investment remain solid, including strong labor market conditions and low interest rates. Indeed, consumer spending is estimated to have increased at a strong pace through July. In this scenario, we assume that consumer spending and, in turn, investment expand at a faster pace than in the baseline. We also assume that these favorable conditions result in a larger cyclical response in labor force participation than is typical, which attenuates somewhat the decline in the unemployment rate.

Under these assumptions, GDP increases about 3 percent, on average, in 2019 and 2020, and the unemployment rate declines to 2.9 percent by the end of 2021. Inflation increases

[7] In the current and two remaining scenarios, the federal funds rate is governed by the baseline policy rule, which assumes a coefficient of just 0.2 on the output gap.

slightly, reaching 2.1 percent in 2025. In response to the stronger economy, and with inflation little changed, the federal funds rate rises relative to the baseline, reaching 3 percent in 2024.

### Stronger Aggregate Supply [FRB/US model]

While the staff revised down its estimate of the natural rate of unemployment this round, the updated estimate remains about 0.7 percentage point above the actual unemployment rate. Despite that unemployment gap, wage gains by most measures have remained modest in recent years, in line with the staff's assessment of trend productivity growth and underlying inflation. However, another way of reconciling modest wage growth with a very low unemployment rate is that resource utilization may be less tight than assumed in the baseline. In this scenario, we assume that the natural rate of unemployment has been lower in the past several years and continues to fall to 3.75 percent at the end of 2019, nearly ¾ percentage point lower than in the baseline.[8] We also assume that the trend labor force participation rate has been decreasing at a slower pace for the past several years and continues to do so going forward. In addition, structural productivity is assumed to grow ¼ percentage point faster than in the baseline in the past several years and going forward.

We assume that households and businesses fully recognize the higher potential growth and its implications for income and profits; thus, consumer spending and investment are commensurately stronger. GDP growth is, on average, about 1 percentage point above the baseline. The unemployment rate falls to 3.2 percent by 2024, around ¾ percentage point lower than in the staff projection. Even so, given the lower natural rate of unemployment, resource utilization is, on average, less tight than in the baseline. The path for inflation is slightly lower, primarily reflecting the stronger productivity growth in this scenario. Because policymakers are assumed to recognize these more favorable supply-side conditions, the path of the federal funds rate is about ¼ percentage point lower, on average, than in the baseline.

## ALTERNATIVE MODEL FORECASTS

As shown in the "Alternative Model Forecasts" exhibit, the FRB/US model projects real GDP growth to slow from about 2¼ percent in 2019 to about 1½ percent in the next three

[8] A natural rate of 3.75 percent is comparable with the average of the 10 lowest forecasts for the longer-run unemployment rate submitted by respondents in the March 2019 long-range Blue Chip survey.

## Alternative Model Forecasts

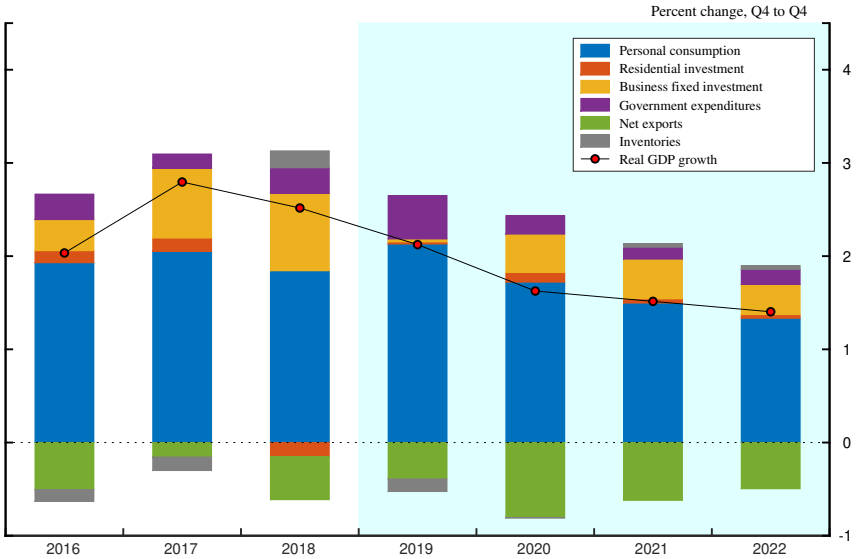
(Percent change, Q4 to Q4, except as noted)

| Measure and projection | 2019 | | 2020 | | 2021 | | 2022 | |
|---|---|---|---|---|---|---|---|---|
| | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook |
| *Real GDP* | | | | | | | | |
| Staff | 2.3 | 2.1 | 2.1 | 2.0 | 1.8 | 1.8 | 1.6 | 1.7 |
| FRB/US | 2.1 | 2.1 | 1.5 | 1.6 | 1.6 | 1.5 | n.a. | 1.4 |
| EDO[1] | 2.5 | 2.3 | 2.1 | 1.6 | 2.3 | 1.8 | 2.7 | 2.4 |
| *Unemployment rate*[2] | | | | | | | | |
| Staff | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.6 |
| FRB/US | 3.8 | 3.7 | 4.0 | 4.0 | 4.2 | 4.3 | n.a. | 4.5 |
| EDO[1] | 4.0 | 3.9 | 4.3 | 4.4 | 4.6 | 4.8 | 4.8 | 5.1 |
| *Total PCE prices* | | | | | | | | |
| Staff | 1.7 | 1.5 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 |
| FRB/US | 1.5 | 1.5 | 1.8 | 2.0 | 1.9 | 2.0 | n.a. | 2.0 |
| EDO[1] | 1.7 | 1.6 | 1.9 | 2.5 | 2.0 | 2.5 | 2.1 | 2.3 |
| *Core PCE prices* | | | | | | | | |
| Staff | 1.9 | 1.8 | 1.9 | 1.8 | 1.9 | 1.8 | 1.9 | 1.8 |
| FRB/US | 1.8 | 1.8 | 2.0 | 2.1 | 2.0 | 2.1 | n.a. | 2.0 |
| EDO[1] | 1.7 | 1.8 | 1.9 | 2.5 | 2.0 | 2.5 | 2.1 | 2.4 |
| *Federal funds rate*[2] | | | | | | | | |
| Staff | 2.4 | 2.2 | 2.6 | 2.4 | 2.7 | 2.5 | 2.7 | 2.5 |
| FRB/US | 2.4 | 2.4 | 2.5 | 2.6 | 2.5 | 2.6 | n.a. | 2.6 |
| EDO[1] | 2.8 | 2.7 | 3.2 | 3.6 | 3.6 | 4.0 | 3.9 | 4.1 |

1. The EDO projections labeled "Previous Tealbook" and "Current Tealbook" integrate over the posterior distribution of model parameters.
2. Percent, average for Q4.

n.a. Not available.

### Decomposition of FRB/US Real GDP Growth Forecast




Note: Shading represents the projection period.
Source: Staff calculations.

years—a modestly weaker path than in the Tealbook baseline.[9] The projected deceleration in GDP mainly reflects both consumption and business investment growth moving down from what the model perceives as unusually strong readings in recent years. In the case of consumption, the model could not explain those earlier positive surprises based on fundamentals (wealth and income) and, hence, does not carry that strength forward in the projection; instead, it has consumption rising at a rate closer to the model's trend. The model's assessment that asset prices (equity and property wealth) are currently above normal valuations and thus will fall or decelerate over the next year also contributes to the weakening in consumption growth through the wealth channel. With slowing overall output growth, business investment decelerates. Marked negative contributions from net exports also weigh on the model's forecast of real GDP growth. Given a projection of output growing slightly below that of potential, the output gap declines from the model's current estimate of a bit more than 1½ percent to about ¼ percent at the end of 2022, and the unemployment rate rises to 4½ percent at the end of 2022, slightly below the model's estimate of the natural rate of 4.7 percent. Core inflation increases from 1.8 percent in 2019 to about 2.0 percent, on average, over the next three years.

The EDO model projects GDP growth to fall to 1.9 percent, on average, over the next three years, about the same as the Tealbook projection, as favorable risk premium shocks (the main driver of aggregate demand in this model) and the effects of previously accommodative monetary policy fade. Because this pace is below the EDO model's estimate of potential growth and because this model already assesses that the output gap is near zero, the model projects the gap to fall below zero in the near term and reach negative ½ percent by the end of 2021. Nevertheless, by next year, the model predicts that core inflation will modestly overshoot the FOMC's 2 percent objective, driven by persistent adverse shocks to investment, which lower productivity and raise costs.

[9] The FRB/US forecast is conditioned on the staff projections for variables from the U.S. government sector, foreign real GDP growth, foreign inflation, and the paths of the U.S. dollar and oil prices. The federal funds rate is governed by the same specification for the policy rule used in the baseline. The model forecast starts in the fourth quarter of this year, taking as given key macroeconomic variables from the judgmental forecast for the third quarter.

## Selected Tealbook Projections and 70 Percent Confidence Intervals Derived from Historical Tealbook Forecast Errors and FRB/US Simulations

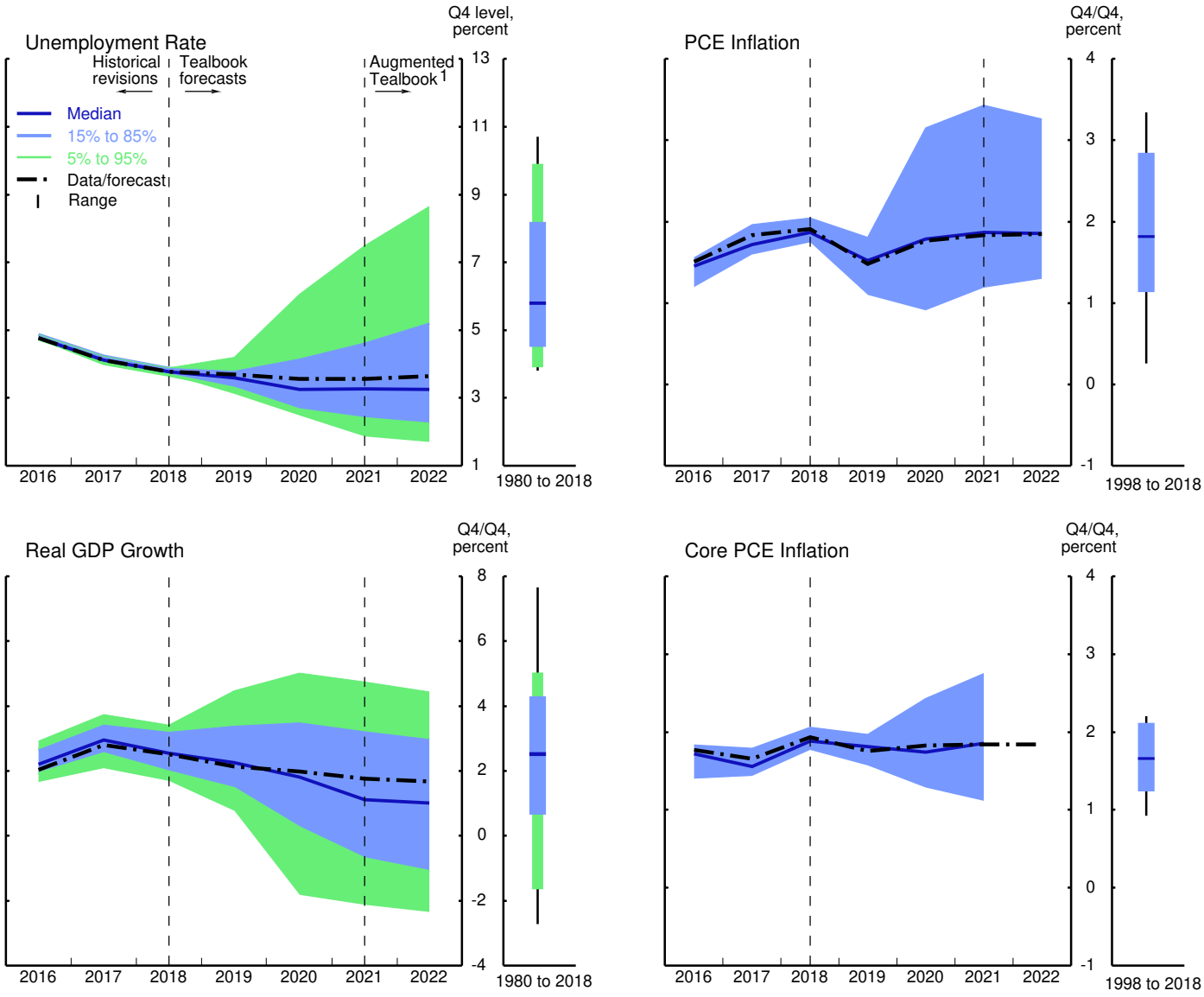
| Measure | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|
| *Real GDP (percent change, Q4 to Q4)* | | | | | | | |
| Projection | 2.1 | 2.0 | 1.8 | 1.7 | 1.5 | 1.5 | 1.5 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 1.4–3.4 | .2–3.5 | -.7–3.2 | -1.1–3.0 | . . . | . . . | . . . |
| FRB/US stochastic simulations | 1.6–2.8 | .6–3.6 | .0–3.4 | -.1–3.3 | -.4–3.3 | -.5–3.3 | -.5–3.4 |
| *Civilian unemployment rate (percent, Q4)* | | | | | | | |
| Projection | 3.7 | 3.6 | 3.6 | 3.6 | 3.8 | 3.9 | 4.0 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 3.3–3.8 | 2.7–4.2 | 2.4–4.6 | 2.2–5.2 | . . . | . . . | . . . |
| FRB/US stochastic simulations | 3.3–4.0 | 2.8–4.2 | 2.4–4.5 | 2.3–5.0 | 2.4–5.4 | 2.5–5.6 | 2.6–5.8 |
| *PCE prices, total (percent change, Q4 to Q4)* | | | | | | | |
| Projection | 1.5 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 1.1–1.8 | .9–3.2 | 1.2–3.4 | 1.3–3.3 | . . . | . . . | . . . |
| FRB/US stochastic simulations | 1.1–1.8 | .8–2.7 | .7–2.8 | .7–2.9 | .7–3.0 | .7–3.1 | .7–3.1 |
| *PCE prices excluding food and energy (percent change, Q4 to Q4)* | | | | | | | |
| Projection | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 1.6–2.0 | 1.3–2.4 | 1.1–2.7 | . . . | . . . | . . . | . . . |
| FRB/US stochastic simulations | 1.5–2.0 | .9–2.6 | .8–2.7 | .8–2.8 | .8–2.9 | .8–3.0 | .8–3.0 |
| *Federal funds rate (percent, Q4)* | | | | | | | |
| Projection | 2.2 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Confidence interval | | | | | | | |
| FRB/US stochastic simulations | 2.2–2.3 | 1.8–3.1 | 1.4–3.9 | .9–4.4 | .5–4.7 | .2–4.8 | .1–4.8 |

Note: Shocks underlying FRB/US stochastic simulations are randomly drawn from the 1969–2018 set of model equation residuals. Intervals derived from Tealbook forecast errors are based on projections made from 1980 to 2018 for real GDP and unemployment and from 1998 to 2018 for PCE prices. The intervals for real GDP, unemployment, and total PCE prices are extended into 2022 using information from the Blue Chip survey and forecasts from the CBO and CEA.
. . . Not applicable.

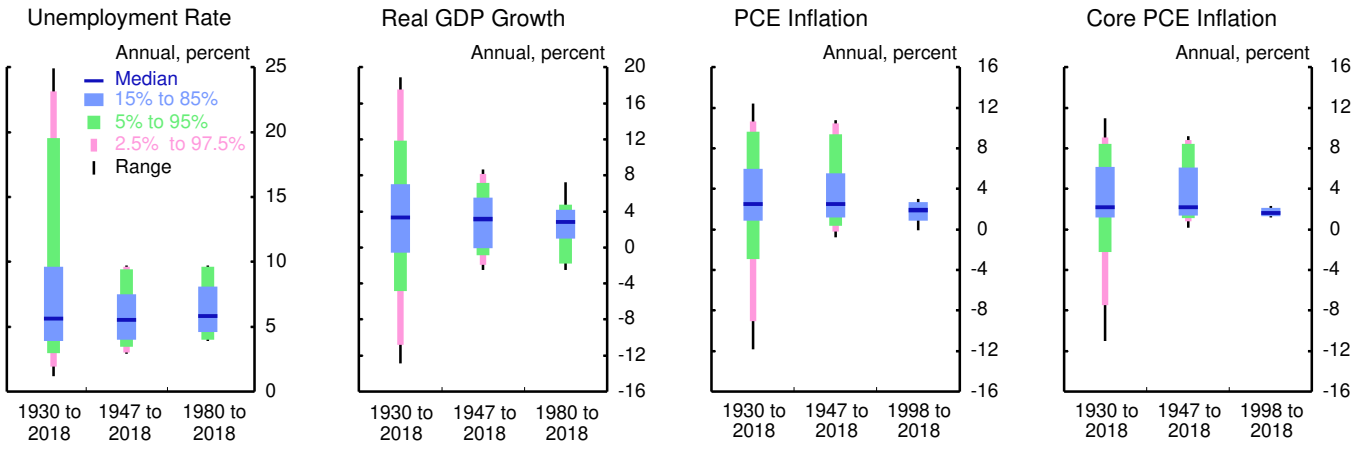
# Prediction Intervals Derived from Historical Tealbook Forecast Errors

## Forecast Error Percentiles

## Historical Distributions




## Historical Distributions




Note: See the technical note in the appendix for more information on this exhibit.

1. Augmented Tealbook prediction intervals use 2- and 3-year-ahead forecast errors from Blue Chip, CBO, and CEA to extend the Tealbook prediction intervals through 2022.

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# Appendix

## Technical Note on "Prediction Intervals Derived from Historical Tealbook Forecast Errors"

This technical note provides additional details about the exhibit "Prediction Intervals Derived from Historical Tealbook Forecast Errors." In the four large fan charts, the black dotted lines show staff projections and current estimates of recent values of four key economic variables: average unemployment rate in the fourth quarter of each year and the Q4/Q4 percent change for real GDP, total PCE prices, and core PCE prices. (The GDP series is adjusted to use GNP for those years when the staff forecast GNP and to strip out software and intellectual property products from the currently published data for years preceding their introduction. Similarly, the core PCE inflation series is adjusted to strip out the "food away from home" component for years before it was included in core.)

The historical distributions of the corresponding series (with the adjustments described above) are plotted immediately to the right of each of the fan charts. The thin black lines show the highest and lowest values of the series during the indicated time period. At the bottom of the page, the distributions over three different time periods are plotted for each series. To enable the use of data for years prior to 1947, we report annual-average data in this section. The annual data going back to 1930 for GDP growth, PCE inflation, and core PCE inflation are available in the conventional national accounts; we used estimates from Lebergott (1957) for the unemployment rate from 1930 to 1946.[1]

The prediction intervals around the current and one-year-ahead forecasts are derived from historical staff forecast errors, comparing staff forecasts with the latest published data. For the unemployment rate and real GDP growth, errors were calculated for a sample starting in 1980, yielding percentiles of the sizes of the forecast errors. For PCE and core PCE inflation, errors based on a sample beginning in 1998 were used. This shorter range reflects both more limited data on staff forecasts of PCE inflation and the staff judgment that the distribution of inflation since the mid-1990s is more appropriate for the projection period than distributions of inflation reaching further back. In all cases, the prediction intervals are computed by adding the percentile bands of the errors onto the forecast. The blue bands encompass 70 percent prediction-interval ranges; adding the green bands expands this range to 90 percent. The dark blue line plots the median of the prediction intervals. There is not enough historical forecast data to calculate meaningful 90 percent ranges for the two inflation series. A median line above the staff forecast means that forecast errors were positive more than half of the time.

[1] Stanley Lebergott (1957), "Annual Estimates of Unemployment in the United States, 1900–1954," in National Bureau of Economic Research, *The Measurement and Behavior of Unemployment* (Princeton, N.J.: Princeton University Press), pp. 213–41.

Because the staff has produced two-year-ahead forecasts for only a few years, the intervals around the two-year-ahead forecasts are constructed by augmenting the staff projection errors with information from outside forecasters: the Blue Chip consensus, the Council of Economic Advisers, and the Congressional Budget Office. Specifically, we calculate prediction intervals for outside forecasts in the same manner as for the staff forecasts. We then calculate the change in the error bands from outside forecasts from one year ahead to two years ahead and apply the average change to the staff's one-year-ahead error bands. That is, we assume that any deterioration in the performance between the one- and two-year-ahead projections of the outside forecasters would also apply to the Tealbook projections. Limitations on the availability of data mean that a slightly shorter sample is used for GDP and unemployment, and the outside projections may only be for a similar series, such as total CPI instead of total PCE prices or annual growth rates of GDP instead of four-quarter changes. In particular, because data on forecasts for core inflation by these outside forecasters are much more limited, we did not extrapolate the staff's errors for core PCE inflation two years ahead.

The intervals around the historical data in the four fan charts are based on the history of data revisions for each series. The previous-year, two-year-back, and three-year-back values as of the current Tealbook forecast are subtracted from the corresponding currently published estimates (adjusted as described earlier) to produce revisions, which are then combined into distributions and revision intervals in the same way that the prediction intervals are created.

# Monetary Policy Strategies

In this section, we discuss a range of strategies for setting the federal funds rate and compare the associated interest rate paths and macroeconomic outcomes with those in the Tealbook baseline projection. The staff's current projection incorporates significantly less tightness in resource utilization than in the July Tealbook, reflecting both a downward revision to the forecast for real GDP and a higher trajectory for potential output. Additionally, the staff revised down slightly its forecast of core PCE inflation for this year and the next. As a consequence of these revisions, the policy rate paths discussed herein are notably lower than in the July Tealbook. An additional exhibit provides updated estimates of the equilibrium real federal funds rate in the longer run.



## NEAR-TERM PRESCRIPTIONS OF SELECTED SIMPLE POLICY RULES

The top panel of the first exhibit shows near-term prescriptions for the federal funds rate from four simple policy rules: the inertial version of the Taylor (1999) rule, the Taylor (1993) rule, a first-difference rule, and a flexible price-level targeting (FPLT) rule.[1] These near-term prescriptions take as given the Tealbook baseline projections for the output gap and core inflation, which are shown in the middle panels.[2] On average, over the projection period shown, the staff lowered its projection for the output gap 0.7 percentage point and marked down its core inflation forecast a bit. The top and middle panels also provide the staff's baseline path for the federal funds rate.

- Reflecting the smaller output gap and slightly lower core inflation, the near-term prescriptions of the policy rules are lower than those in the July Tealbook.

- The inertial Taylor (1999) rule prescribes higher policy rates than the Tealbook baseline in the next two quarters because it responds more strongly

[1] The appendix in this Tealbook section provides technical details on these simple policy rules. Except for the first-difference rule, which has no intercept term, the simple rules examined herein use intercept terms that are consistent with a real federal funds rate of 50 basis points in the longer run.

[2] Because the FPLT rule responds to the gap between the unemployment rate and the natural rate of unemployment, this rule takes as given the Tealbook baseline projections for these variables instead of the projection for the output gap.

# Policy Rules and the Staff Projection

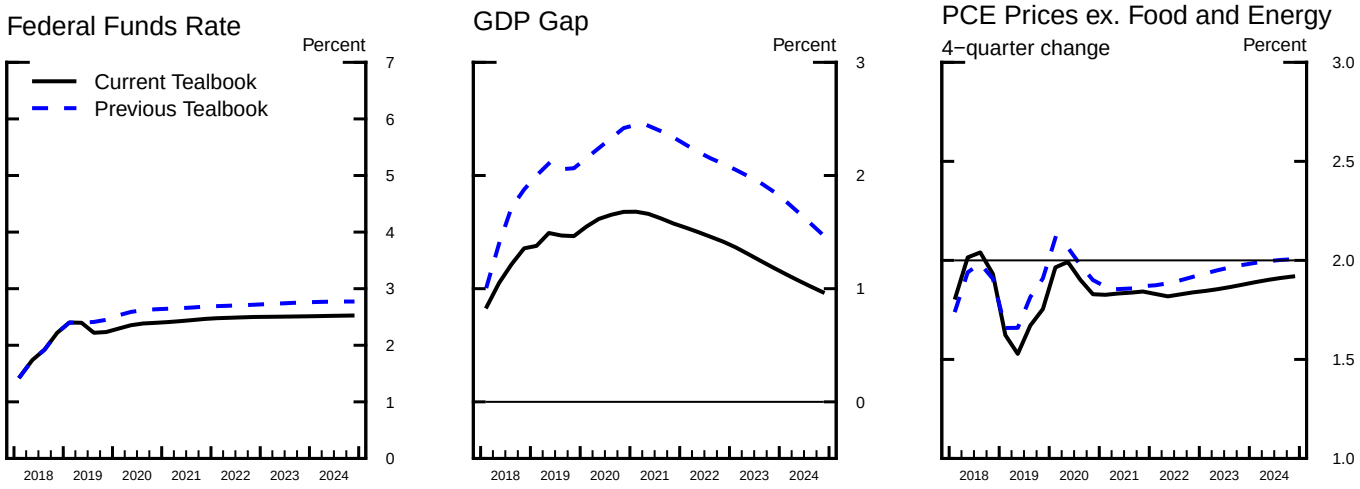


## Near−Term Prescriptions of Selected Simple Policy Rules[1]

(Percent)

| | 2019:Q4 | 2020:Q1 |
|---|---|---|
| Inertial Taylor (1999) rule | **2.42** | **2.65** |
| *Previous Tealbook projection* | *2.55* | *2.88* |
| Taylor (1993) rule | **2.84** | **3.19** |
| *Previous Tealbook projection* | *3.37* | *3.71* |
| First−difference rule | **2.26** | **2.28** |
| *Previous Tealbook projection* | *2.35* | *2.47* |
| Flexible price−level targeting rule | **1.91** | **1.69** |
| *Previous Tealbook projection* | *2.00* | *1.85* |
| *Addendum:* | | |
| Tealbook baseline | **2.23** | **2.29** |

## Key Elements of the Staff Projection




## A Medium−Term Notion of the Equilibrium Real Federal Funds Rate[2]

(Percent)

| | Current Value | *Previous Tealbook* |
|---|---|---|
| Tealbook baseline | | |
| FRB/US *r** | 1.40 | *1.97* |
| Average projected real federal funds rate | .56 | *.71* |
| SEP−consistent baseline | | |
| FRB/US *r** | .65 | |
| Average projected real federal funds rate | .38 | |

1. The lines denoted "Previous Tealbook projection" report prescriptions based on the previous Tealbook's staff outlook for inflation and resource slack. Rules that have a lagged policy rate as a right−hand−side variable are conditional on the current−Tealbook value of the lagged policy rate.

2. The "FRB/US *r**" is the level of the real federal funds rate that, if maintained over a 12−quarter period (beginning in the current quarter) in the FRB/US model, sets the output gap equal to zero in the final quarter of that period given either the Tealbook or SEP−consistent projection. The SEP−consistent baseline corresponds to the June 2019 median SEP responses. The "Average projected real federal funds rate" is calculated under the Tealbook and SEP−consistent baseline projections over the same 12−quarter period as FRB/US *r**.

to the positive output gap than the conditional attenuated rule underlying the Tealbook baseline projection.

- The Taylor (1993) rule, which does not feature an interest rate smoothing term, calls for higher policy rates than the inertial Taylor (1999) rule and the Tealbook baseline rule.

- The first-difference rule, which responds to the change in the expected output gap, prescribes a fairly flat policy rate path in the near term—one that is similar to the Tealbook baseline path.

- The FPLT rule calls for cutting the federal funds rate to below 1¾ percent by the first quarter of 2020 in an effort to eliminate a cumulative shortfall in the core PCE price index of 2¾ percent since the end of 2011.



## A Medium-Term Notion of the Equilibrium Real Federal Funds Rate

The bottom panel of the first exhibit reports estimates of a medium-term concept of the equilibrium real federal funds rate (*r**) generated under two baselines: the Tealbook baseline and a projection consistent with the medians in the June 2019 SEP.[3] In both cases, simulations of the FRB/US model are used. This concept of *r**, labeled "FRB/US *r**," corresponds to the level of the real federal funds rate that, if maintained over a 12-quarter period starting in the current quarter, would bring the output gap to zero in the final quarter of that period. This concept of *r** is a summary of the projected underlying strength of the real economy and does not take into account considerations such as achieving the inflation objective or avoiding sharp changes in the federal funds rate.

- At 1.40 percent, the current value of the Tealbook-consistent FRB/US *r** is about 60 basis points lower than the value consistent with the July Tealbook.

[3] To construct a baseline projection consistent with median SEP responses for the FRB/US model, the staff interpolated annual SEP information to a quarterly frequency and assumed that, beyond 2021 (the final year reported in the June 2019 SEP), the economy transitions to the longer-run values in a smooth and monotonic way. The staff also posited economic relationships to project variables not covered in the SEP. For example, the staff assumed an Okun's law relationship to recover an output gap from the deviation of the median SEP unemployment rate from the median SEP estimate of its longer-run value.

This reduction reflects the smaller output gap projected by the staff in the medium term.

- At 0.65 percent, the June 2019 SEP-consistent FRB/US *r** is lower than the Tealbook-consistent FRB/US *r**, even though the two projections contain similar policy rate paths. This difference in FRB/US *r** arises because, even after the staff's downward revision to the output gap, the current Tealbook projection embeds more resource tightness than does the SEP-consistent projection.



## SIMPLE POLICY RULE SIMULATIONS

The second exhibit reports the Tealbook baseline projection and results from dynamic simulations of the FRB/US model under the inertial Taylor (1999) rule, the Taylor (1993) rule, the first-difference rule, and the FPLT rule. These simulations reflect the endogenous responses of resource utilization and inflation to the different federal funds rate paths implied by the policy rules. The simulations for each rule are carried out under the assumptions that policymakers commit to following that rule in the future and that financial market participants, price setters, and wage setters correctly anticipate that monetary policy will follow through on this commitment and are aware of the implications for interest rates and the economy.

- Under the conditional attenuated policy rule used to construct the Tealbook baseline, the federal funds rate holds steady this year at 2.2 percent and then edges up gradually, reaching 2.5 percent in late 2021.

- The inertial Taylor (1999) rule, which embodies the same degree of inertia as the Tealbook baseline rule but responds more strongly to the positive output gap, calls for the federal funds rate to increase at a faster pace and to peak slightly above 3 percent in 2021. Thereafter, the path remains above the Tealbook baseline path for several years. The less accommodative monetary conditions result in an unemployment rate path that, in contrast to the Tealbook baseline, holds fairly steady at 3.7 percent next year before rising toward the staff's estimate of the natural rate of unemployment. Under this rule, inflation is lower and the real 10-year Treasury yield is higher than the corresponding values in the Tealbook baseline.

- Because the Taylor (1993) rule has no interest rate smoothing term, it calls for increasing the federal funds rate to a bit above 3 percent by early 2020, after which the rule calls for slight declines. The federal funds rate path prescribed by this rule is above the corresponding path of the Tealbook baseline rule, but the rates prescribed by the two rules move closer together in 2020 and beyond.

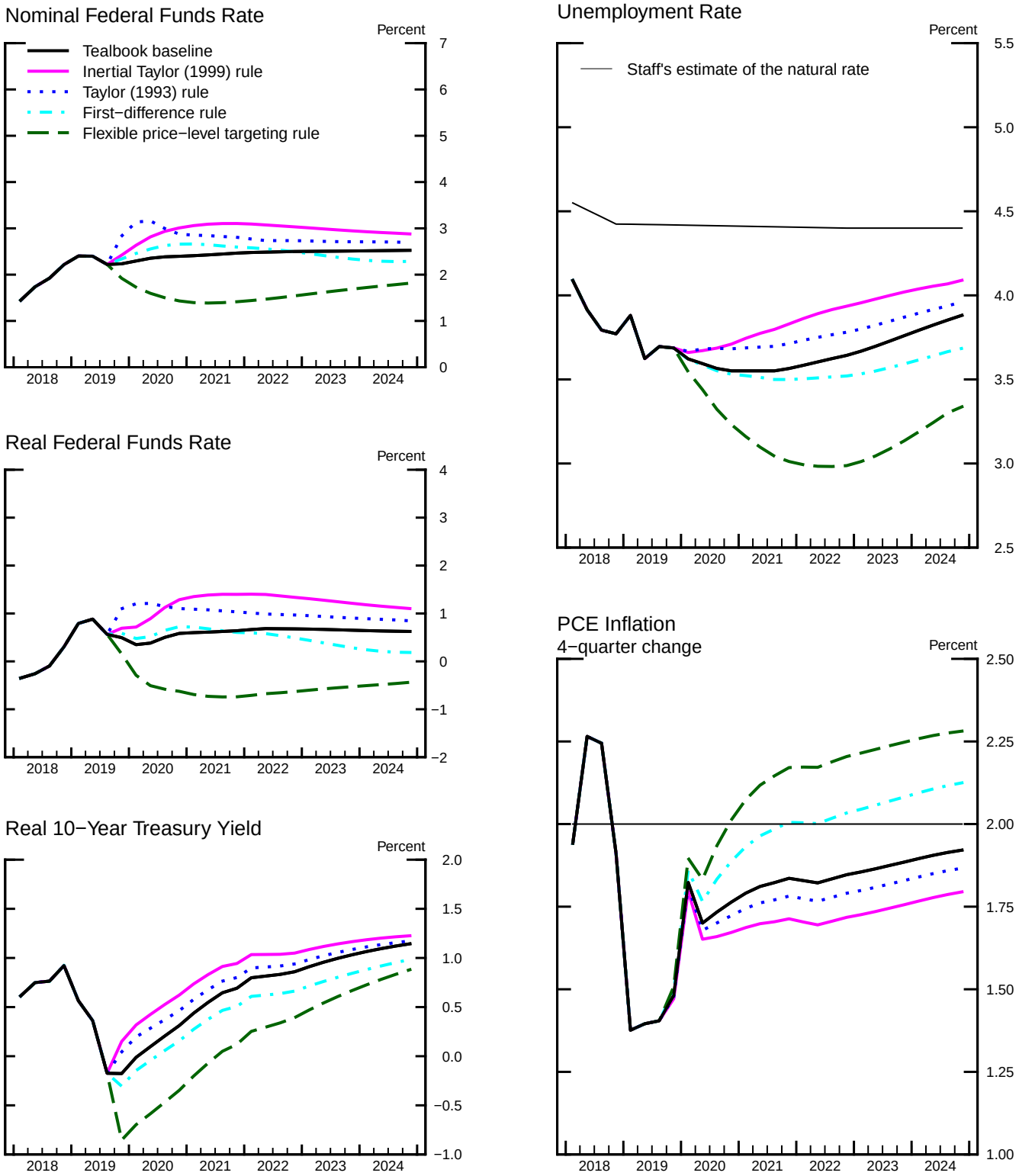
- The first-difference rule, which reacts to the expected change in the output gap rather than its level, prescribes small, gradual increases in the federal funds rate through the beginning of 2021, followed by a sequence of slight reductions during the period in which the output gap is projected to narrow. The resulting federal funds rate path edges below the prescriptions of the conditional attenuated rule in 2023 and subsequently remains slightly more accommodative than the baseline funds rate path for several years. As a result, this strategy generates higher inflation and a lower unemployment rate than the staff projection and a path of the real 10-year Treasury yield that runs below the trajectory under the baseline rule.

- The FPLT rule responds to, and seeks to eliminate, the cumulative shortfall of the level of core PCE prices from a target path defined by the growth of that price level at an annual rate of 2 percent from the end of 2011 onward. Eliminating the current 2¾ percent shortfall requires inflation to run above 2 percent in coming years. Because the simulation embeds the assumptions that policymakers can credibly commit to closing this gap over time and that financial market participants, price setters, and wage setters correctly anticipate the ensuing long period of a low federal funds rate, the path of the real 10-year Treasury rate immediately drops to negative 0.85 percent and remains below the corresponding Tealbook baseline path throughout the period shown. The unemployment rate is substantially lower under the FPLT rule than in the Tealbook baseline and all other simulations, dropping to 3 percent in late 2021. Inflation exceeds 2 percent by about 20 basis points, on average, over the next decade.

- The policy rate prescriptions from the simple policy rules are lower than those in the July Tealbook by an average of 35 to 50 basis points over the projection period shown. This change reflects a lower projection for the degree of resource utilization and a slightly weaker outlook for inflation. As a result of

# Simple Policy Rule Simulations






Note: The policy rule simulations in this exhibit are based on rules that respond to core inflation rather than to headline inflation. This choice of rule specification was made in light of a tendency for current and near−term core inflation rates to outperform headline inflation rates as predictors of the medium−term behavior of headline inflation.

the smaller output gap, there is somewhat less dispersion in prescribed policy rates across rules over the projection period than was the case in the July Tealbook.

## OPTIMAL CONTROL SIMULATIONS UNDER COMMITMENT

The third exhibit displays optimal control simulations conditional on the Tealbook baseline under two different assumptions about policymakers' preferences, as captured by alternative specifications of the loss function.[4] The concept of optimal control employed here is one in which current policymakers are able to commit future policymakers to their plans; such a commitment, when feasible, may lead to improved economic outcomes.[5]

- The simulation labeled "Equal weights" presents the case in which policymakers are assumed to place equal weights on keeping headline PCE inflation close to the Committee's objective of 2 percent, on keeping the unemployment rate close to the staff's estimate of the natural rate of unemployment, and on keeping the federal funds rate close to its previous value. Under this strategy, the federal funds rate runs significantly higher than the Tealbook baseline path, reaching a peak of 4.4 percent at the end of 2021. This strategy is designed to counter the projected persistent undershooting by the unemployment rate of its natural rate that occurs in the Tealbook baseline—an outcome that policymakers with the equal-weights loss function judge to be undesirable. The less negative unemployment gap implies only a modestly lower path of inflation because, in the FRB/US model, the response of inflation to the level of resource utilization is small.

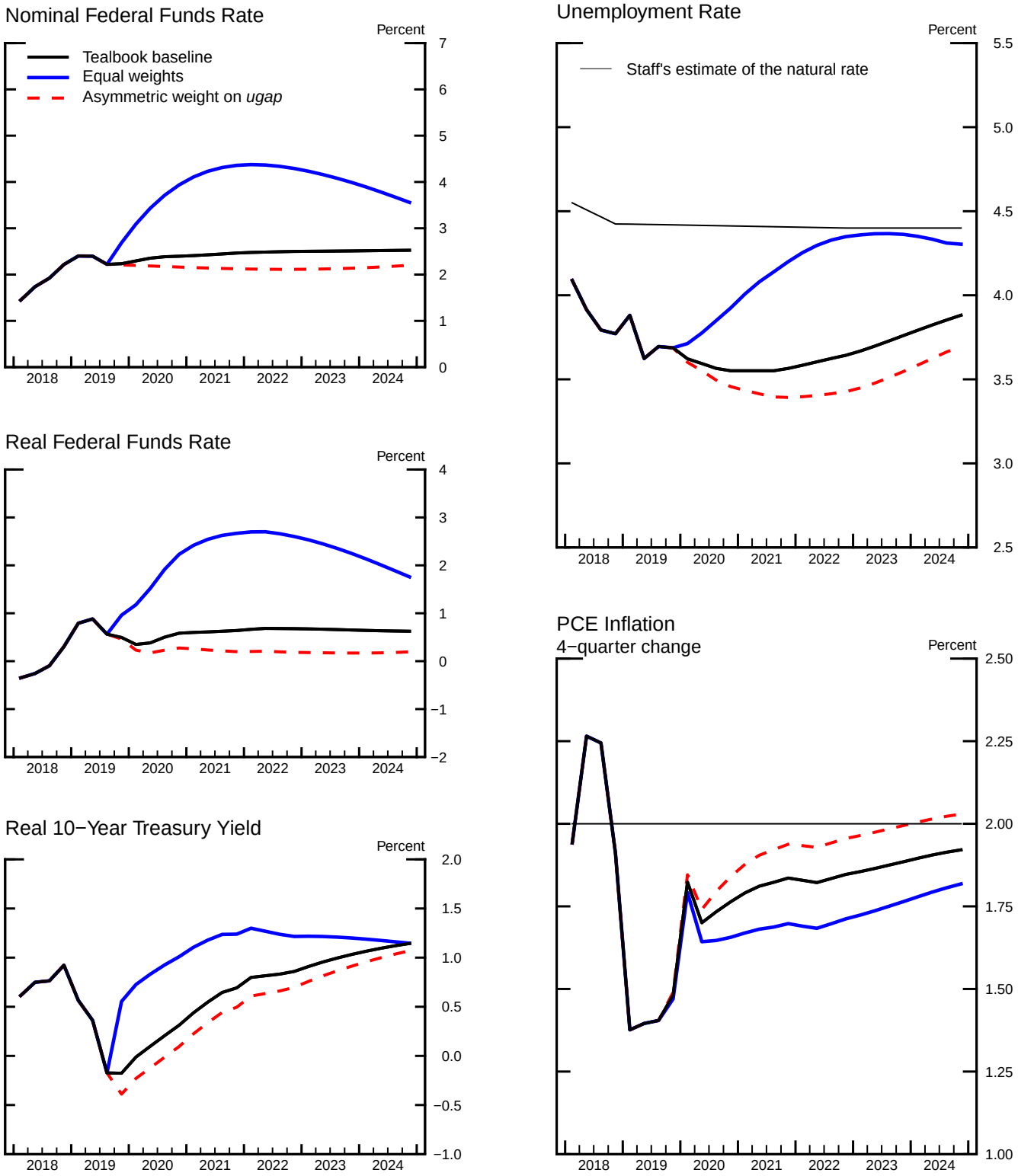
- The simulation labeled "Asymmetric weight on *ugap*" uses a loss function that assigns no cost to deviations of the unemployment rate from the natural rate when the unemployment rate is below the natural rate, but is otherwise identical to the specification with equal weights. Under this strategy, the path

[4] The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of Tealbook B for June 2016 offers motivations for these specifications. The appendix in this Tealbook section provides technical details on the optimal control simulations.

[5] Under the optimal control policies, policymakers achieve the displayed economic outcomes by making promises that bind future policymakers to take actions that may not be optimal from the perspective of those future policymakers (that is, the promises are time inconsistent). It is assumed that these promises are taken as credible by wage and price setters and by financial market participants.

# Optimal Control Simulations under Commitment






Note: Each set of lines corresponds to an optimal control policy under commitment in which policymakers minimize a discounted weighted sum of squared deviations of 4−quarter headline PCE inflation from the Committee's 2 percent objective, of squared deviations of the unemployment rate from the staff's estimate of the natural rate, and of squared changes in the federal funds rate. The weights vary across simulations. See the appendix for technical details and the box "Optimal Control and the Loss Function" in the June 2016 Tealbook B for a motivation.

for the federal funds rate is essentially flat over the medium term and only slightly below the current Tealbook baseline path. Policymakers choose this slightly more accommodative path for the policy rate because their desire to keep inflation close to 2 percent is not tempered by an aversion to the unemployment rate falling below its natural rate. The tighter labor market pushes inflation more promptly toward 2 percent than under the baseline.

- Over the projection period shown, the federal funds rate prescriptions from the equal-weights and asymmetric specifications conditional on the current Tealbook projection are, on average, about 70 basis points and 35 basis points lower, respectively, than their corresponding prescriptions based on the July Tealbook.[6] The revisions to the asymmetric specification are somewhat smaller than those for the equal-weights specification because policy in the former specification is only affected by revisions to the unemployment gap when the unemployment rate is above the estimate of its natural rate.



## ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

The next exhibit updates selected estimates of the equilibrium real federal funds rate in the longer run, denoted $r^{LR}$. This concept is the rate consistent with the economy operating at its potential once the transitory effects of economic shocks have abated. This rate, along with the Committee's inflation objective, determines the longer-run level of the nominal federal funds rate and other interest rates in the staff's projection and economic models. In addition, $r^{LR}$ is also a parameter in many of the simple policy rules, including the staff's baseline policy rule, considered in this and other sections of Tealbook A.

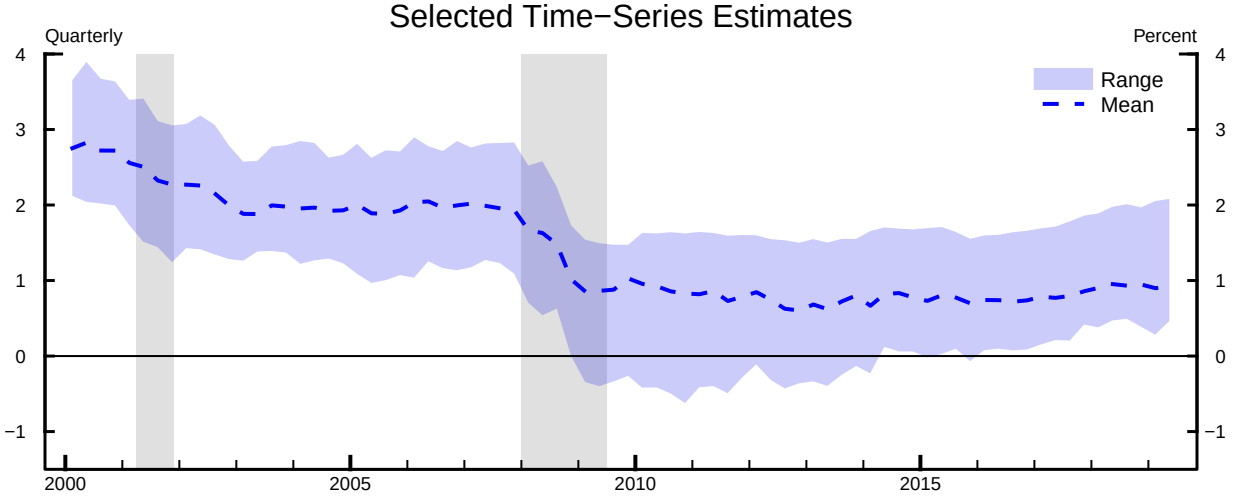
- The top panel of the exhibit shows the range of historical values through 2019:Q2 for several model-based time-series estimates of $r^{LR}$.[7] The estimates

[6] After these downward revisions, the current-Tealbook optimal control policy prescriptions under the equal-weights loss function remain above the corresponding prescriptions using a baseline consistent with the June 2019 SEP (shown in the Monetary Policy Strategies section of the July 2019 Tealbook A). The policy rate prescriptions under the asymmetric loss function using current-Tealbook projections are similar to those derived using the SEP-consistent baseline.

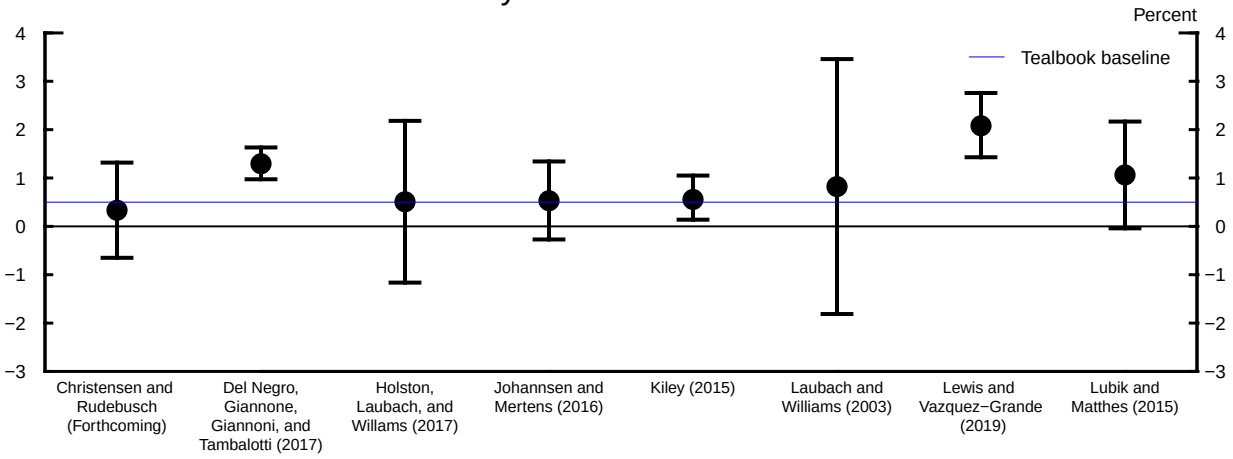
[7] See the appendix to this section for sources and methodology. Although the modeling approaches and econometric techniques differ across models, the studies have the common feature that they use time-series methods to infer $r^{LR}$ from the co-movement of either macroeconomic series (like inflation,

# Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run

## Selected Time−Series Estimates




## 68 Percent Uncertainty Bands around Latest Point Estimates




## Longer−Run Values from Selected Forecasters

| | Release Date | Percent |
|---|---|---|
| Tealbook baseline | Sept. 2019 | .50 |
| Median SEP | June 2019 | .50 |
| Median Survey of Primary Dealers | July 2019 | .50 |
| Median Blue Chip (6−to−10−year) | Mar. 2019 | .74 |
| Congressional Budget Office (10−year) | Aug. 2019 | .74 |

The latest time−series estimates are for 2019:Q2. The shaded vertical areas in the top panel are NBER recessions. See the technical appendix for sources.

for 2019:Q2 range from 0.5 to 2.1 percent, with a mean just below 1 percent. The range and mean of the 2019:Q2 point estimates are similar to the corresponding statistics reported for 2019:Q1 in the June Tealbook.

- Time-series estimates of $r^{LR}$ are subject to considerable uncertainty, as depicted in the middle panel. The sources of this uncertainty vary across the studies, reflecting factors such as the choice of econometric approach as well as the uncertainty that exists within each model about the prevailing state of the economy and the model's parameter estimates.

- The lower panel of the exhibit reports longer-term estimates of the real federal funds rate from selected sources. The Tealbook baseline assumption, at ½ percent, is similar to, or only slightly below, the median values reported in a number of surveys as well as the most recent estimate from the Congressional Budget Office.

- The evidence presented in this exhibit, taken as a whole, indicates that the Tealbook baseline $r^{LR}$ assumption is broadly in line with time-series and survey estimates, especially because all of these estimates are subject to considerable uncertainty.

The final four exhibits tabulate the simulation results for key variables under the policy rules shown in the exhibit "Simple Policy Rule Simulations" and optimal control simulations shown in the exhibit "Optimal Control Simulations under Commitment."



interest rates, and output) or both macroeconomic and financial data (like TIPS yields). The top panel reports the range of one-sided estimates, meaning that the estimates for a particular date only condition on data up to that date.

## Outcomes of Simple Policy Rule Simulations

(Percent change, annual rate, from end of preceding period, except as noted)

| Outcome and strategy | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| *Nominal federal funds rate*[1] | | | | | | |
| Inertial Taylor (1999) | 2.4 | 3.0 | 3.1 | 3.0 | 2.9 | 2.9 |
| Taylor (1993) | 2.8 | 2.9 | 2.8 | 2.7 | 2.7 | 2.7 |
| First-difference | 2.3 | 2.7 | 2.6 | 2.5 | 2.3 | 2.3 |
| Flexible price-level targeting | 1.9 | 1.4 | 1.4 | 1.5 | 1.7 | 1.8 |
| Extended Tealbook baseline | 2.2 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 |
| *Real GDP* | | | | | | |
| Inertial Taylor (1999) | 2.1 | 1.6 | 1.5 | 1.6 | 1.6 | 1.6 |
| Taylor (1993) | 2.1 | 1.7 | 1.7 | 1.7 | 1.6 | 1.5 |
| First-difference | 2.1 | 2.1 | 1.9 | 1.8 | 1.6 | 1.6 |
| Flexible price-level targeting | 2.1 | 2.7 | 2.3 | 1.9 | 1.5 | 1.4 |
| Extended Tealbook baseline | 2.1 | 2.0 | 1.8 | 1.7 | 1.5 | 1.5 |
| *Unemployment rate*[1] | | | | | | |
| Inertial Taylor (1999) | 3.7 | 3.7 | 3.8 | 3.9 | 4.0 | 4.1 |
| Taylor (1993) | 3.7 | 3.7 | 3.7 | 3.8 | 3.9 | 4.0 |
| First-difference | 3.7 | 3.5 | 3.5 | 3.5 | 3.6 | 3.7 |
| Flexible price-level targeting | 3.7 | 3.2 | 3.0 | 3.0 | 3.1 | 3.3 |
| Extended Tealbook baseline | 3.7 | 3.6 | 3.6 | 3.6 | 3.8 | 3.9 |
| *Total PCE prices* | | | | | | |
| Inertial Taylor (1999) | 1.5 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 |
| Taylor (1993) | 1.5 | 1.7 | 1.8 | 1.8 | 1.8 | 1.9 |
| First-difference | 1.5 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 |
| Flexible price-level targeting | 1.5 | 2.0 | 2.2 | 2.2 | 2.2 | 2.3 |
| Extended Tealbook baseline | 1.5 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 |
| *Core PCE prices* | | | | | | |
| Inertial Taylor (1999) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 |
| Taylor (1993) | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 |
| First-difference | 1.8 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 |
| Flexible price-level targeting | 1.8 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 |
| Extended Tealbook baseline | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 |

1. Percent, average for the final quarter of the period.

## Outcomes of Simple Policy Rule Simulations, Quarterly

(4-quarter percent change, except as noted)

| Outcome and strategy | 2019 | | 2020 | | | | 2021 | |
|---|---|---|---|---|---|---|---|---|
| | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| *Nominal federal funds rate*[1] | | | | | | | | |
| Inertial Taylor (1999) | 2.2 | 2.4 | 2.6 | 2.8 | 2.9 | 3.0 | 3.1 | 3.1 |
| Taylor (1993) | 2.2 | 2.8 | 3.1 | 3.2 | 3.0 | 2.9 | 2.9 | 2.8 |
| First-difference | 2.2 | 2.3 | 2.5 | 2.6 | 2.6 | 2.7 | 2.7 | 2.6 |
| Flexible price-level targeting | 2.2 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 | 1.4 |
| Extended Tealbook baseline | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| *Real GDP* | | | | | | | | |
| Inertial Taylor (1999) | 2.0 | 2.1 | 1.8 | 1.8 | 1.7 | 1.6 | 1.6 | 1.5 |
| Taylor (1993) | 2.0 | 2.1 | 1.8 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 |
| First-difference | 2.0 | 2.1 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 |
| Flexible price-level targeting | 2.0 | 2.1 | 2.1 | 2.3 | 2.5 | 2.7 | 2.6 | 2.5 |
| Extended Tealbook baseline | 2.0 | 2.1 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 |
| *Unemployment rate*[1] | | | | | | | | |
| Inertial Taylor (1999) | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.8 |
| Taylor (1993) | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| First-difference | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 |
| Flexible price-level targeting | 3.7 | 3.7 | 3.5 | 3.4 | 3.3 | 3.2 | 3.2 | 3.1 |
| Extended Tealbook baseline | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| *Total PCE prices* | | | | | | | | |
| Inertial Taylor (1999) | 1.4 | 1.5 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Taylor (1993) | 1.4 | 1.5 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 |
| First-difference | 1.4 | 1.5 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 2.0 |
| Flexible price-level targeting | 1.4 | 1.5 | 1.9 | 1.8 | 1.9 | 2.0 | 2.1 | 2.1 |
| Extended Tealbook baseline | 1.4 | 1.5 | 1.8 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 |
| *Core PCE prices* | | | | | | | | |
| Inertial Taylor (1999) | 1.7 | 1.7 | 1.9 | 1.9 | 1.8 | 1.7 | 1.7 | 1.7 |
| Taylor (1993) | 1.7 | 1.8 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 |
| First-difference | 1.7 | 1.8 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 |
| Flexible price-level targeting | 1.7 | 1.8 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| Extended Tealbook baseline | 1.7 | 1.8 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 |

1. Percent, average for the quarter.

## Outcomes of Optimal Control Simulations under Commitment

(Percent change, annual rate, from end of preceding period, except as noted)

| Outcome and strategy | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| *Nominal federal funds rate*[1] | | | | | | |
| Equal weights | 2.7 | 3.9 | 4.4 | 4.3 | 4.0 | 3.6 |
| Asymmetric weight on *ugap* | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 |
| Extended Tealbook baseline | 2.2 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 |
| *Real GDP* | | | | | | |
| Equal weights | 2.1 | 1.2 | 1.2 | 1.5 | 1.7 | 1.8 |
| Asymmetric weight on *ugap* | 2.1 | 2.2 | 1.9 | 1.8 | 1.5 | 1.4 |
| Extended Tealbook baseline | 2.1 | 2.0 | 1.8 | 1.7 | 1.5 | 1.5 |
| *Unemployment rate*[1] | | | | | | |
| Equal weights | 3.7 | 3.9 | 4.2 | 4.3 | 4.4 | 4.3 |
| Asymmetric weight on *ugap* | 3.7 | 3.5 | 3.4 | 3.4 | 3.5 | 3.7 |
| Extended Tealbook baseline | 3.7 | 3.6 | 3.6 | 3.6 | 3.8 | 3.9 |
| *Total PCE prices* | | | | | | |
| Equal weights | 1.5 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 |
| Asymmetric weight on *ugap* | 1.5 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 |
| Extended Tealbook baseline | 1.5 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 |
| *Core PCE prices* | | | | | | |
| Equal weights | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 |
| Asymmetric weight on *ugap* | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 |
| Extended Tealbook baseline | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 |

1. Percent, average for the final quarter of the period.

## Outcomes of Optimal Control Simulations under Commitment, Quarterly

(4-quarter percent change, except as noted)

| Outcome and strategy | 2019 | | 2020 | | | | 2021 | |
|---|---|---|---|---|---|---|---|---|
| | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 |
| *Nominal federal funds rate*[1] | | | | | | | | |
| Equal weights | 2.2 | 2.7 | 3.1 | 3.4 | 3.7 | 3.9 | 4.1 | 4.2 |
| Asymmetric weight on *ugap* | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 |
| Extended Tealbook baseline | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| *Real GDP* | | | | | | | | |
| Equal weights | 2.0 | 2.1 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.1 |
| Asymmetric weight on *ugap* | 2.0 | 2.1 | 1.9 | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 |
| Extended Tealbook baseline | 2.0 | 2.1 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 |
| *Unemployment rate*[1] | | | | | | | | |
| Equal weights | 3.7 | 3.7 | 3.7 | 3.8 | 3.8 | 3.9 | 4.0 | 4.1 |
| Asymmetric weight on *ugap* | 3.7 | 3.7 | 3.6 | 3.6 | 3.5 | 3.5 | 3.4 | 3.4 |
| Extended Tealbook baseline | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| *Total PCE prices* | | | | | | | | |
| Equal weights | 1.4 | 1.5 | 1.8 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 |
| Asymmetric weight on *ugap* | 1.4 | 1.5 | 1.8 | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 |
| Extended Tealbook baseline | 1.4 | 1.5 | 1.8 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 |
| *Core PCE prices* | | | | | | | | |
| Equal weights | 1.7 | 1.7 | 1.9 | 1.9 | 1.8 | 1.7 | 1.7 | 1.7 |
| Asymmetric weight on *ugap* | 1.7 | 1.8 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 |
| Extended Tealbook baseline | 1.7 | 1.8 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 |

1. Percent, average for the quarter.

# Appendix

## Implementation of the Simple Rules and Optimal Control Simulations

The monetary policy strategies considered in this section of Tealbook A typically fall into one of two categories. Under simple policy rules, policymakers set the federal funds rate according to a reaction function that includes a small number of macroeconomic factors. Under optimal control policies, policymakers compute a path for the federal funds rate that minimizes a loss function meant to capture policymakers' preferences over macroeconomic outcomes. Both approaches recognize the Federal Reserve's dual mandate. Unless otherwise noted, the simulations embed the assumption that policymakers will adhere to the policy strategy in the future and that financial market participants, price setters, and wage setters not only believe that policymakers will follow through with their strategy, but also fully understand the macroeconomic implications of policymakers doing so. Such policy strategies are described as commitment strategies.



The two approaches have different merits and limitations. The parsimony of simple rules makes them relatively easy to communicate to the public, and, because they respond only to variables that are central to a range of models, proponents argue that they may be more robust to uncertainty about the structure of the economy. However, simple rules omit, by construction, other potential influences on policy decisions; thus, strict adherence to such rules may, at times, lead to unsatisfactory outcomes. By comparison, optimal control policies respond to a broader set of economic factors; their prescriptions optimally balance various policy objectives. And, although this section focuses on policies under commitment, optimal control policies can more generally be derived under various assumptions about the degree to which policymakers can commit. That said, optimal control policies assume substantial knowledge on the part of policymakers and are sensitive to the assumed loss function and the specifics of the particular model.

Given the different strengths and weaknesses of the two approaches, they are probably best considered together as a means to assess the various tradeoffs policymakers may face when pursuing their mandated objectives.

### POLICY RULES USED IN THE MONETARY POLICY STRATEGIES SECTION

The table "Simple Rules" that follows gives expressions for four simple policy rules reported in the first two exhibits of the Monetary Policy Strategies section. It also reports the expression for the conditional attenuated rule that the staff uses in the construction of the Tealbook baseline projection.[1] $R_t$ denotes the nominal federal funds rate prescribed by a strategy for quarter *t;* for quarters prior to the projection period under consideration, $R_t$ corresponds to the historical data in the economic projection. The right-hand-side variables of the first four rules include the staff's projection of trailing four-quarter core PCE price inflation for the current

[1] The box "A New Conditional Baseline Policy Rule" in the Domestic Economic Developments and Outlook section of the April 2019 Tealbook A describes the conditional baseline rule.

quarter and three quarters ahead ($\pi_t$ and $\pi_{t+3|t}$), the output gap estimate for the current period ($ygap_t$), and the forecast of the three-quarter-ahead annual change in the output gap ($ygap_{t+3|t} - ygap_{t-1}$). The value of policymakers' longer-run inflation objective, denoted $\pi^{LR}$, is 2 percent. In the case of the flexible price-level targeting rule, the right-hand-side variables include an unemployment rate gap and a price gap. The unemployment gap is defined as the difference between the unemployment rate, $u_t$, and the staff's estimate of its natural rate, $u_t^*$, which currently stands at 4.4 percent. The price gap is defined as 100 times the difference between the log of the core PCE price level, $p_t$, and the log of the target price-level path, $p_t^*$. The 2011:Q4 value of $p_t^*$ is set to the 2011:Q4 value of the core PCE price index, and, subsequently, $p_t^*$ is assumed to grow at a 2 percent annual rate.

**Simple Rules**

| | |
|---|---|
| **Taylor (1993) rule** | $R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.5ygap_t$ |
| **Inertial Taylor (1999) rule** | $R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t)$ |
| **Conditional attenuated rule** | $R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.2\, ygap_t)$ |
| **First-difference rule** | $R_t = R_{t-1} + 0.5(\pi_{t+3\|t} - \pi^{LR}) + 0.5\Delta^4 ygap_{t+3\|t}$ |
| **Flexible price-level targeting rule** | $R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + (p_t - p_t^*) - (u_t - u_t^*))$ |

The first rule in the table was studied by Taylor (1993). The inertial Taylor (1999) rule features more inertia and a stronger response to resource slack over time compared with the Taylor (1993) rule. The inertial Taylor (1999) and rules that depend on a price gap, like the FPLT rule, have been featured prominently in analysis by Board staff.[2] The conditional attenuated rule has the same form as the inertial Taylor (1999) rule but responds less strongly to the output gap. Where applicable, the intercepts of the simple rules, denoted $r^{LR}$, are constant and chosen so that they are consistent with a 2 percent longer-run inflation objective and an equilibrium real federal funds rate in the longer run of 0.5 percent. The prescriptions of the first-difference rule do not depend on the level of the output gap or the longer-run real interest rate; see Orphanides (2003).

## NEAR-TERM PRESCRIPTIONS OF SELECTED POLICY RULES

The "Near-Term Prescriptions of Selected Policy Rules" reported in the first exhibit are calculated taking as given the Tealbook projections for inflation and the output gap. When the Tealbook is published early in a quarter, the prescriptions are shown for the current and next quarters. When the Tealbook is published late in a quarter, the prescriptions are shown for the next two quarters. Rules that include a lagged policy rate as a right-hand-side variable are conditioned on the lagged federal funds rate in the Tealbook projection for the first quarter shown and then conditioned on their simulated lagged federal funds rate for the second quarter shown.

[2] For applications, see, for example, Erceg and others (2012). An FPLT rule similar to the one above is also analyzed by Chung and others (2015).

To isolate the effects of changes in macroeconomic projections on the prescriptions of these inertial rules, the lines labeled "Previous Tealbook projection" report prescriptions that are conditional on the previous Tealbook projections for inflation and the output gap but that use the value of the lagged federal funds rate in the current Tealbook for the first quarter shown.

## A MEDIUM-TERM NOTION OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE

The bottom panel of the exhibit "Policy Rules and the Staff Projection" provides estimates of one notion of the equilibrium real federal funds rate that uses alternative baselines: the Tealbook baseline and another one consistent with median responses to the latest Summary of Economic Projections (SEP). The simulations are conducted using the FRB/US model, the staff's large-scale econometric model of the U.S. economy. "FRB/US $r^*$" is the real federal funds rate that, if maintained over a 12-quarter period (beginning in the current quarter), makes the output gap equal to zero in the final quarter of that period, given either the Tealbook or the SEP-consistent economic projection. This measure depends on a broad array of economic factors, some of which take the form of projected values of the model's exogenous variables.[3] The measure is derived under the assumption that agents in the model form VAR-based expectations—that is, agents use small-scale statistical models so that their expectations of future variables are determined solely by historical relationships.

The "Average projected real federal funds rate" for the Tealbook baseline and the SEP-consistent baseline reported in the panel are the corresponding averages of the real federal funds rate under the Tealbook baseline projection and SEP-consistent projection, respectively, calculated over the same 12-quarter period as the Tealbook-consistent and SEP-consistent FRB/US $r^*$. For a given economic projection, the average projected real federal funds rates and the FRB/US $r^*$ may be associated with somewhat different macroeconomic outcomes even when their values are identical. The reason is that, in the FRB/US $r^*$ simulation, the real federal funds rate is held constant over the entire 12-quarter period, whereas, in the economic projection, the real federal funds rate can vary over time.

## FRB/US MODEL SIMULATIONS

The results presented in the exhibits "Simple Policy Rule Simulations" and "Optimal Control Simulations under Commitment" are derived from dynamic simulations of the FRB/US model. Each simulated policy strategy is assumed to be in force over the whole period covered by the simulation; this period extends several decades beyond the time horizon shown in the exhibits. The simulations are conducted under the assumption that market participants as well as price and wage setters form model-consistent expectations and are predicated on the staff's extended Tealbook projection, which includes the macroeconomic effects of the Committee's large-scale asset purchase programs. When the Tealbook is published early in a quarter, all of the simulations begin in that quarter; when the Tealbook is published late in a quarter, all of the simulations begin in the subsequent quarter.

[3] For a discussion of the equilibrium real federal funds rates in the longer run and other concepts of equilibrium interest rates, see Gust and others (2016).

## COMPUTATION OF OPTIMAL CONTROL POLICIES UNDER COMMITMENT

The optimal control simulations posit that policymakers choose a path for the federal funds rate to minimize a discounted weighted sum of squared inflation gaps (measured as the difference between four-quarter headline PCE price inflation, $\pi_t^{PCE}$, and the Committee's 2 percent objective), squared unemployment gaps ($ugap_t$, measured as the difference between the unemployment rate and the staff's estimate of the natural rate), and squared changes in the federal funds rate. In the following equation, the resulting loss function embeds the assumption that policymakers discount the future using a quarterly discount factor, $\beta = 0.9963$:

$$\boldsymbol{L_t} = \sum_{\boldsymbol{\tau=0}}^{T} \boldsymbol{\beta^{\tau}} \left\{ \lambda_{\pi} \left( \pi_{t+\tau}^{PCE} - \pi^{LR} \right)^{\mathbf{2}} + \lambda_{u,t+\tau} (ugap_{t+\tau})^{\mathbf{2}} + \lambda_R (R_{t+\boldsymbol{\tau}} - R_{t+\boldsymbol{\tau-1}})^{\mathbf{2}} \right\}.$$

The exhibit "Optimal Control Simulations under Commitment" considers two specifications of the weights on the inflation gap, the unemployment gap, and the rate change components of the loss function. The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of the June 2016 Tealbook B provides motivations for the specifications of the loss function. The table "Loss Functions" shows the weights used in the two specifications.

**Loss Functions**

| | $\lambda_{\pi}$ | $\lambda_{u,t+\tau}$ | | $\lambda_R$ |
|---|---|---|---|---|
| | | $ugap_{t+\tau} < 0$ | $ugap_{t+\tau} \geq 0$ | |
| **Equal weights** | 1 | 1 | 1 | 1 |
| **Asymmetric weight on *ugap*** | 1 | 0 | 1 | 1 |

The first specification, "Equal weights," assigns equal weights to all three components at all times. The second specification, "Asymmetric weight on *ugap*," uses the same weights as the equal-weights specification whenever the unemployment rate is above the staff's estimate of the natural rate, but it assigns no penalty to the unemployment rate falling below the natural rate. The optimal control policy and associated outcomes depend on the relative (rather than the absolute) values of the weights.

For each of these specifications of the loss function, the optimal control policy is subject to the effective lower bound constraint on nominal interest rates. Policy tools other than the federal funds rate are taken as given and subsumed within the Tealbook baseline. The path chosen by policymakers today is assumed to be credible, meaning that the public sees this path as a binding commitment on policymakers' future decisions; the optimal control policy takes as given the initial lagged value of the federal funds rate but is otherwise unconstrained by policy decisions made prior to the simulation period.

## ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

The top panel of the exhibit "Estimates of the Equilibrium Real Federal Funds Rate in the Longer Run" shows a range of estimates of $r^{LR}$ from eight time-series models based on the following studies: Christensen and Rudebusch (forthcoming); Del Negro, Giannone, Giannoni, and Tambalotti (2017); Holston, Laubach, and Williams (2017); Johannsen and Mertens (2016); Kiley (2015); Laubach and Williams (2003); Lewis and Vazquez-Grande (2019); and Lubik and Matthes (2015). For comparability, all computations use the latest vintage of historical data through 2019:Q2. Moreover, the estimates are "one sided" in the sense that, at each point, they make use of historical data only up to that point in time. As a result, their historical movements can differ from the "two sided" estimates reported in some of those studies.

The middle panel reports 68 percent uncertainty bands around each model's point estimate for 2019:Q2. The computation and interpretation of these bands are specific to each study.

The bottom panel shows $r^{LR}$ values from selected forecasters. These values were obtained as follows:

- "Tealbook baseline" is the staff's assumption about the level of the equilibrium real federal funds rate in the longer run.
- "Median SEP" is the median of FOMC participants' projections of the federal funds rate in the longer run minus the corresponding projection of PCE inflation as of the June 2019 SEP.
- "Median Survey of Primary Dealers" equals the long-run median dealer forecast for the target rate minus the longer-run median dealer forecast of PCE inflation as of the July 2019 survey.
- "Median Blue Chip (6-to-10-year)" equals the consensus five-year average (2026–30) forecast for the three-month Treasury bill rate minus the consensus five-year average (2026–30) forecast for the annual change in the GDP chained price index as of the March 2019 Blue Chip Economic Indicators survey.
- "Congressional Budget Office (10-year)" equals the federal funds rate at the end of 2029 minus the annualized change in the PCE index at the end of 2029 as of August 2019.

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**Changes in GDP, Prices, and Unemployment**
(Percent, annual rate except as noted)

| Interval | Nominal GDP | | Real GDP | | PCE price index | | Core PCE price index | | Unemployment rate[1] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 07/19/19 | 09/06/19 | 07/19/19 | 09/06/19 | 07/19/19 | 09/06/19 | 07/19/19 | 09/06/19 | 07/19/19 | 09/06/19 |
| *Quarterly* | | | | | | | | | | |
| 2019:Q1 | 3.8 | 3.9 | 3.1 | 3.1 | .5 | .4 | 1.2 | 1.1 | 3.9 | 3.9 |
| Q2 | 4.8 | 4.4 | 2.5 | 1.9 | 2.6 | 2.3 | 2.1 | 1.7 | 3.6 | 3.6 |
| Q3 | 4.0 | 4.1 | 1.6 | 1.7 | 1.9 | 1.6 | 2.2 | 2.1 | 3.7 | 3.7 |
| Q4 | 3.7 | 3.7 | 1.8 | 1.8 | 1.8 | 1.6 | 2.1 | 2.1 | 3.7 | 3.7 |
| 2020:Q1 | 4.1 | 4.0 | 2.1 | 2.1 | 1.9 | 1.8 | 2.0 | 1.9 | 3.6 | 3.6 |
| Q2 | 4.4 | 4.2 | 2.1 | 2.0 | 1.8 | 1.8 | 1.9 | 1.9 | 3.6 | 3.6 |
| Q3 | 4.2 | 3.9 | 2.1 | 1.9 | 1.8 | 1.8 | 1.9 | 1.8 | 3.6 | 3.6 |
| Q4 | 4.1 | 3.8 | 2.1 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 3.6 | 3.6 |
| 2021:Q1 | 3.9 | 3.8 | 2.0 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 3.6 | 3.6 |
| Q2 | 4.0 | 3.9 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 3.6 | 3.6 |
| Q3 | 3.7 | 3.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.9 | 1.8 | 3.6 | 3.6 |
| Q4 | 3.6 | 3.6 | 1.7 | 1.7 | 1.9 | 1.8 | 1.9 | 1.8 | 3.6 | 3.6 |
| *Two-quarter*[2] | | | | | | | | | | |
| 2019:Q2 | 4.3 | 4.2 | 2.8 | 2.5 | 1.6 | 1.3 | 1.7 | 1.4 | -.2 | -.2 |
| Q4 | 3.8 | 3.9 | 1.7 | 1.8 | 1.8 | 1.6 | 2.2 | 2.1 | .1 | .1 |
| 2020:Q2 | 4.2 | 4.1 | 2.1 | 2.1 | 1.9 | 1.8 | 2.0 | 1.9 | -.1 | -.1 |
| Q4 | 4.2 | 3.8 | 2.1 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | .0 | .0 |
| 2021:Q2 | 4.0 | 3.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | .0 | .0 |
| Q4 | 3.6 | 3.6 | 1.7 | 1.7 | 1.9 | 1.8 | 1.9 | 1.8 | .0 | .0 |
| *Four-quarter*[3] | | | | | | | | | | |
| 2018:Q4 | 5.2 | 4.9 | 3.0 | 2.5 | 1.9 | 1.9 | 1.9 | 1.9 | -.3 | -.3 |
| 2019:Q4 | 4.0 | 4.0 | 2.3 | 2.1 | 1.7 | 1.5 | 1.9 | 1.8 | -.1 | -.1 |
| 2020:Q4 | 4.2 | 4.0 | 2.1 | 2.0 | 1.8 | 1.8 | 1.9 | 1.8 | -.1 | -.1 |
| 2021:Q4 | 3.8 | 3.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 | .0 | .0 |
| 2022:Q4 | 3.6 | 3.7 | 1.6 | 1.7 | 1.9 | 1.8 | 1.9 | 1.8 | .0 | .0 |
| *Annual* | | | | | | | | | | |
| 2018 | 5.2 | 5.4 | 2.9 | 2.9 | 2.0 | 2.1 | 1.9 | 1.9 | 3.9 | 3.9 |
| 2019 | 4.4 | 4.1 | 2.6 | 2.2 | 1.6 | 1.4 | 1.8 | 1.6 | 3.7 | 3.7 |
| 2020 | 4.1 | 4.0 | 2.0 | 1.9 | 1.9 | 1.8 | 2.0 | 1.9 | 3.6 | 3.6 |
| 2021 | 4.0 | 3.8 | 2.0 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 | 3.6 | 3.6 |
| 2022 | 3.6 | 3.7 | 1.6 | 1.7 | 1.9 | 1.8 | 1.9 | 1.8 | 3.6 | 3.6 |

1. Level, except for two-quarter and four-quarter intervals.
2. Percent change from two quarters earlier; for unemployment rate, change is in percentage points.
3. Percent change from four quarters earlier; for unemployment rate, change is in percentage points.

**Changes in Real Gross Domestic Product and Related Items**
(Percent, annual rate except as noted)

| Item | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 Q1 | 2020 Q2 | 2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3 | 2021 Q4 | 2019[1] | 2020[1] | 2021[1] | 2022[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP | 1.9 | 1.7 | 1.8 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.7 | 1.7 | 2.1 | 2.0 | 1.8 | 1.7 |
| *Previous Tealbook* | 2.5 | 1.6 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 1.8 | 1.7 | 1.7 | 2.3 | 2.1 | 1.8 | 1.6 |
| Final sales | 2.9 | 1.8 | 2.2 | 2.4 | 2.2 | 1.7 | 2.2 | 2.0 | 1.9 | 1.5 | 1.5 | 2.4 | 2.1 | 1.7 | 1.6 |
| *Previous Tealbook* | 3.4 | 1.8 | 2.3 | 2.7 | 2.3 | 1.8 | 2.2 | 2.0 | 1.9 | 1.6 | 1.6 | 2.5 | 2.2 | 1.8 | 1.6 |
| Priv. dom. final purch. | 3.3 | 2.2 | 2.2 | 2.3 | 2.4 | 2.2 | 2.4 | 2.2 | 2.1 | 1.8 | 1.7 | 2.3 | 2.3 | 2.0 | 1.7 |
| *Previous Tealbook* | 3.1 | 2.2 | 2.2 | 2.5 | 2.4 | 2.3 | 2.3 | 2.1 | 2.0 | 1.9 | 1.8 | 2.2 | 2.4 | 2.0 | 1.8 |
| Personal cons. expend. | 4.7 | 3.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.8 | 2.4 | 2.3 | 2.2 |
| *Previous Tealbook* | 4.1 | 2.5 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.5 | 2.4 | 2.3 | 2.2 |
| Durables | 13.0 | 6.2 | 3.8 | 1.9 | 1.8 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 5.7 | 1.8 | 1.7 | 1.7 |
| Nondurables | 6.8 | 5.2 | 2.8 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 4.2 | 2.5 | 2.4 | 2.3 |
| Services | 2.8 | 2.2 | 1.9 | 2.5 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.0 | 2.4 | 2.3 | 2.3 |
| Residential investment | -3.1 | 1.9 | 6.3 | 11.5 | 7.4 | 2.4 | .2 | -2.3 | -4.1 | -4.7 | -4.8 | 1.0 | 5.3 | -4.0 | -4.7 |
| *Previous Tealbook* | -2.6 | 4.3 | 7.3 | 9.7 | 4.8 | -.1 | -2.6 | -3.7 | -3.8 | -3.5 | -3.4 | 1.6 | 2.8 | -3.6 | -3.4 |
| Nonres. priv. fixed invest. | -1.4 | -3.0 | .9 | -.8 | 1.0 | 1.3 | 3.1 | 3.2 | 3.2 | 1.2 | .9 | .2 | 1.2 | 2.1 | .8 |
| *Previous Tealbook* | .0 | .0 | -.2 | .8 | 1.6 | 2.1 | 3.0 | 2.8 | 2.4 | 1.5 | 1.1 | 1.1 | 1.9 | 1.9 | .8 |
| Equipment & intangibles | 2.0 | -2.7 | .9 | .0 | 1.8 | 2.4 | 4.3 | 4.4 | 4.5 | 1.9 | 1.6 | 1.1 | 2.1 | 3.1 | 1.6 |
| *Previous Tealbook* | 2.6 | .0 | .5 | 2.0 | 2.6 | 3.3 | 4.0 | 3.6 | 3.3 | 2.2 | 1.8 | 1.9 | 3.0 | 2.7 | 1.6 |
| Nonres. structures | -12.4 | -3.9 | .8 | -3.4 | -1.8 | -2.5 | -1.1 | -1.1 | -1.3 | -1.4 | -1.7 | -3.1 | -2.2 | -1.4 | -2.2 |
| *Previous Tealbook* | -8.3 | .1 | -2.2 | -3.3 | -2.0 | -1.8 | -.3 | -.1 | -.7 | -1.0 | -1.4 | -1.6 | -1.9 | -.8 | -2.3 |
| Net exports[2] | -981 | -998 | -995 | -986 | -997 | -1016 | -1011 | -1011 | -1016 | -1028 | -1039 | -979 | -1003 | -1023 | -1052 |
| *Previous Tealbook*[2] | -923 | -938 | -929 | -914 | -922 | -939 | -933 | -931 | -936 | -948 | -956 | -924 | -927 | -943 | -965 |
| Exports | -5.6 | -1.1 | 2.4 | 3.5 | 1.4 | 1.8 | 2.2 | 2.7 | 3.2 | 3.4 | 3.5 | -.1 | 2.2 | 3.2 | 3.5 |
| Imports | .1 | 1.1 | 1.4 | 1.5 | 2.3 | 3.4 | 1.1 | 1.8 | 2.9 | 3.8 | 3.7 | .3 | 2.1 | 3.1 | 3.2 |
| Gov't. cons. & invest. | 4.6 | 1.4 | 1.5 | 1.5 | 2.1 | .5 | .3 | .4 | .9 | .8 | .9 | 2.6 | 1.1 | .7 | .9 |
| *Previous Tealbook* | 6.2 | 1.1 | 1.2 | 1.3 | 2.1 | .6 | .9 | .6 | 1.1 | .9 | 1.0 | 2.8 | 1.2 | .9 | .9 |
| Federal | 8.1 | 3.6 | 3.6 | 2.2 | 3.7 | -.5 | -.8 | -.7 | .6 | .4 | .5 | 4.3 | 1.2 | .2 | .7 |
| Defense | 3.1 | 3.5 | 4.9 | 1.9 | 1.2 | .9 | .2 | .1 | .3 | .5 | .0 | 4.8 | 1.0 | .2 | .7 |
| Nondefense | 16.0 | 3.6 | 1.7 | 2.6 | 7.5 | -2.4 | -2.2 | -2.0 | .9 | .2 | 1.3 | 3.7 | 1.3 | .1 | .6 |
| State & local | 2.4 | .1 | .2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.5 | 1.1 | 1.1 | 1.1 |
| Change in priv. inventories[2] | 68 | 64 | 40 | 24 | 14 | 28 | 12 | 4 | -4 | 6 | 17 | 72 | 20 | 6 | 40 |
| *Previous Tealbook*[2] | 79 | 69 | 46 | 18 | 11 | 31 | 26 | 26 | 25 | 29 | 31 | 79 | 22 | 28 | 29 |

1. Change from fourth quarter of previous year to fourth quarter of year indicated.
2. Billions of chained (2012) dollars; annual values show annual averages.

**Changes in Real Gross Domestic Product and Related Items**
(Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise noted)

| Item | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| Real GDP | 2.6 | 2.9 | 1.9 | 2.0 | 2.8 | 2.5 | 2.1 | 2.0 | 1.8 | 1.7 |
| *Previous Tealbook* | 2.6 | 2.7 | 2.0 | 1.9 | 2.5 | 3.0 | 2.3 | 2.1 | 1.8 | 1.6 |
| Final sales | 2.0 | 3.2 | 1.8 | 2.2 | 2.9 | 2.2 | 2.4 | 2.1 | 1.7 | 1.6 |
| *Previous Tealbook* | 2.0 | 3.0 | 1.9 | 2.1 | 2.6 | 2.6 | 2.5 | 2.2 | 1.8 | 1.6 |
| Priv. dom. final purch. | 2.6 | 4.5 | 2.5 | 2.8 | 3.4 | 2.8 | 2.3 | 2.3 | 2.0 | 1.7 |
| *Previous Tealbook* | 2.6 | 4.3 | 2.7 | 2.7 | 3.3 | 3.0 | 2.2 | 2.4 | 2.0 | 1.8 |
| Personal cons. expend. | 1.9 | 3.8 | 2.9 | 2.8 | 2.9 | 2.6 | 2.8 | 2.4 | 2.3 | 2.2 |
| *Previous Tealbook* | 1.9 | 3.8 | 3.0 | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.3 | 2.2 |
| Durables | 5.0 | 9.2 | 5.8 | 7.3 | 7.7 | 3.8 | 5.7 | 1.8 | 1.7 | 1.7 |
| Nondurables | 2.8 | 3.2 | 2.8 | 1.8 | 3.7 | 2.5 | 4.2 | 2.5 | 2.4 | 2.3 |
| Services | 1.1 | 3.2 | 2.5 | 2.4 | 2.0 | 2.5 | 2.0 | 2.4 | 2.3 | 2.3 |
| Residential investment | 7.1 | 7.7 | 9.1 | 3.9 | 4.2 | -4.4 | 1.0 | 5.3 | -4.0 | -4.7 |
| *Previous Tealbook* | 7.1 | 7.8 | 8.9 | 4.5 | 3.8 | -3.3 | 1.6 | 2.8 | -3.6 | -3.4 |
| Nonres. priv. fixed invest. | 5.4 | 6.9 | -.9 | 2.4 | 5.4 | 5.9 | .2 | 1.2 | 2.1 | .8 |
| *Previous Tealbook* | 5.4 | 6.4 | -.7 | 1.8 | 6.3 | 7.0 | 1.1 | 1.9 | 1.9 | .8 |
| Equipment & intangibles | 5.1 | 6.1 | 2.3 | 1.9 | 6.6 | 6.8 | 1.1 | 2.1 | 3.1 | 1.6 |
| *Previous Tealbook* | 5.1 | 5.6 | 2.6 | 1.6 | 7.3 | 7.6 | 1.9 | 3.0 | 2.7 | 1.6 |
| Nonres. structures | 6.7 | 9.3 | -10.9 | 4.3 | 1.5 | 2.6 | -3.1 | -2.2 | -1.4 | -2.2 |
| *Previous Tealbook* | 6.7 | 8.8 | -10.7 | 2.5 | 2.9 | 4.9 | -1.6 | -1.9 | -.8 | -2.3 |
| Net exports[1] | -533 | -577 | -722 | -784 | -850 | -920 | -979 | -1003 | -1023 | -1052 |
| *Previous Tealbook*[1] | -533 | -578 | -725 | -786 | -859 | -912 | -924 | -927 | -943 | -965 |
| Exports | 6.0 | 2.9 | -1.5 | 1.1 | 5.5 | .4 | -.1 | 2.2 | 3.2 | 3.5 |
| Imports | 3.0 | 6.5 | 3.2 | 3.4 | 5.6 | 3.2 | .3 | 2.1 | 3.1 | 3.2 |
| Gov't. cons. & invest. | -2.4 | .3 | 2.3 | 1.5 | .8 | 1.5 | 2.6 | 1.1 | .7 | .9 |
| *Previous Tealbook* | -2.4 | .2 | 2.2 | .9 | .1 | 1.5 | 2.8 | 1.2 | .9 | .9 |
| Federal | -6.1 | -1.1 | 1.1 | .1 | 1.7 | 2.7 | 4.3 | 1.2 | .2 | .7 |
| Defense | -6.5 | -3.4 | -.4 | -.8 | 1.9 | 4.0 | 4.8 | 1.0 | .2 | .7 |
| Nondefense | -5.5 | 2.7 | 3.4 | 1.5 | 1.4 | .7 | 3.7 | 1.3 | .1 | .6 |
| State & local | .2 | 1.2 | 3.0 | 2.3 | .4 | .9 | 1.5 | 1.1 | 1.1 | 1.1 |
| Change in priv. inventories[1] | 109 | 86 | 132 | 23 | 32 | 48 | 72 | 20 | 6 | 40 |
| *Previous Tealbook*[1] | 109 | 87 | 129 | 23 | 23 | 45 | 79 | 22 | 28 | 29 |

1. Billions of chained (2012) dollars; annual values show annual averages.

**Contributions to Changes in Real Gross Domestic Product**
(Percentage points, annual rate except as noted)

| Item | 2019 | | | 2020 | | | | 2021 | | | | 2019[1] | 2020[1] | 2021[1] | 2022[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | | | | |
| Real GDP | 1.9 | 1.7 | 1.8 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.7 | 1.7 | 2.1 | 2.0 | 1.8 | 1.7 |
| *Previous Tealbook* | 2.5 | 1.6 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 1.8 | 1.7 | 1.7 | 2.3 | 2.1 | 1.8 | 1.6 |
| Final sales | 2.9 | 1.8 | 2.2 | 2.4 | 2.2 | 1.7 | 2.2 | 2.0 | 1.9 | 1.5 | 1.5 | 2.4 | 2.1 | 1.7 | 1.6 |
| *Previous Tealbook* | 3.3 | 1.8 | 2.3 | 2.7 | 2.3 | 1.8 | 2.2 | 2.0 | 1.9 | 1.6 | 1.6 | 2.5 | 2.2 | 1.8 | 1.6 |
| Priv. dom. final purch. | 2.8 | 1.8 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 1.9 | 1.8 | 1.5 | 1.5 | 2.0 | 2.0 | 1.7 | 1.5 |
| *Previous Tealbook* | 2.6 | 1.8 | 1.9 | 2.1 | 2.0 | 1.9 | 1.9 | 1.8 | 1.7 | 1.6 | 1.6 | 1.9 | 2.0 | 1.7 | 1.5 |
| Personal cons. expend. | 3.1 | 2.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.9 | 1.6 | 1.6 | 1.5 |
| *Previous Tealbook* | 2.7 | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.7 | 1.6 | 1.6 | 1.5 |
| Durables | .9 | .4 | .3 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .4 | .1 | .1 | .1 |
| Nondurables | .9 | .7 | .4 | .3 | .3 | .3 | .3 | .3 | .3 | .3 | .3 | .6 | .3 | .3 | .3 |
| Services | 1.3 | 1.0 | .9 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | .9 | 1.1 | 1.1 | 1.1 |
| Residential investment | -.1 | .1 | .2 | .4 | .3 | .1 | .0 | -.1 | -.2 | -.2 | -.2 | .0 | .2 | -.2 | -.2 |
| *Previous Tealbook* | -.1 | .2 | .3 | .4 | .2 | .0 | -.1 | -.1 | -.1 | -.1 | -.1 | .1 | .1 | -.1 | -.1 |
| Nonres. priv. fixed invest. | -.2 | -.4 | .1 | -.1 | .1 | .2 | .4 | .4 | .4 | .2 | .1 | .0 | .2 | .3 | .1 |
| *Previous Tealbook* | .0 | .0 | .0 | .1 | .2 | .3 | .4 | .4 | .3 | .2 | .2 | .1 | .3 | .3 | .1 |
| Equipment & intangibles | .2 | -.3 | .1 | .0 | .2 | .2 | .4 | .4 | .5 | .2 | .2 | .1 | .2 | .3 | .2 |
| *Previous Tealbook* | .3 | .0 | .0 | .2 | .3 | .3 | .4 | .4 | .3 | .2 | .2 | .2 | .3 | .3 | .2 |
| Nonres. structures | -.4 | -.1 | .0 | -.1 | -.1 | -.1 | .0 | .0 | .0 | .0 | .0 | -.1 | -.1 | .0 | -.1 |
| *Previous Tealbook* | -.3 | .0 | -.1 | -.1 | -.1 | -.1 | .0 | .0 | .0 | .0 | .0 | -.1 | -.1 | .0 | -.1 |
| Net exports | -.7 | -.3 | .1 | .2 | -.2 | -.3 | .1 | .0 | .0 | -.2 | -.1 | -.1 | .0 | -.1 | -.1 |
| *Previous Tealbook* | -.3 | -.3 | .2 | .3 | -.1 | -.2 | .1 | .1 | .0 | -.1 | -.1 | .1 | .0 | -.1 | .0 |
| Exports | -.7 | -.1 | .3 | .4 | .2 | .2 | .3 | .3 | .4 | .4 | .4 | .0 | .3 | .4 | .4 |
| Imports | .0 | -.2 | -.2 | -.2 | -.3 | -.5 | -.2 | -.3 | -.4 | -.5 | -.5 | .0 | -.3 | -.4 | -.5 |
| Gov't. cons. & invest. | .8 | .2 | .3 | .3 | .4 | .1 | .1 | .1 | .2 | .1 | .1 | .4 | .2 | .1 | .2 |
| *Previous Tealbook* | 1.0 | .2 | .2 | .2 | .4 | .1 | .1 | .1 | .2 | .2 | .2 | .5 | .2 | .2 | .1 |
| Federal | .5 | .2 | .2 | .1 | .2 | .0 | -.1 | .0 | .0 | .0 | .0 | .3 | .1 | .0 | .0 |
| Defense | .1 | .1 | .2 | .1 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | .2 | .0 | .0 | .0 |
| Nondefense | .4 | .1 | .0 | .1 | .2 | -.1 | -.1 | -.1 | .0 | .0 | .0 | .1 | .0 | .0 | .0 |
| State & local | .3 | .0 | .0 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .2 | .1 | .1 | .1 |
| Change in priv. inventories | -.9 | -.1 | -.4 | -.3 | -.2 | .3 | -.3 | -.1 | -.1 | .2 | .2 | -.2 | -.1 | .0 | .1 |
| *Previous Tealbook* | -.8 | -.2 | -.4 | -.5 | -.1 | .4 | -.1 | .0 | .0 | .1 | .0 | -.2 | -.1 | .0 | .0 |

1. Change from fourth quarter of previous year to fourth quarter of year indicated.

**Changes in Prices and Costs**
(Percent, annual rate except as noted)

| Item | 2019 | | | 2020 | | | | 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | 2019[1] | 2020[1] | 2021[1] | 2022[1] |
| GDP chain-wt. price index | 2.4 | 2.4 | 1.8 | 1.8 | 2.1 | 2.0 | 1.9 | 1.9 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| *Previous Tealbook* | 2.2 | 2.3 | 1.8 | 1.9 | 2.2 | 2.0 | 1.9 | 1.9 | 2.1 | 2.0 | 1.9 | 1.8 | 2.0 | 2.0 | 2.0 |
| PCE chain-wt. price index | 2.3 | 1.6 | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.8 | 1.8 | 1.5 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | 2.6 | 1.9 | 1.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.7 | 1.8 | 1.8 | 1.9 |
| Energy | 18.4 | -8.6 | -9.6 | -2.5 | -1.0 | -.2 | -.1 | .4 | .5 | .5 | .7 | -5.0 | -1.0 | .5 | 1.0 |
| *Previous Tealbook* | 18.4 | -5.5 | -8.1 | -2.5 | -1.5 | -.9 | -.7 | -.2 | -.2 | .0 | .2 | -3.8 | -1.4 | .0 | .5 |
| Food | .6 | 1.1 | 2.7 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 1.8 | 2.4 | 2.4 | 2.4 |
| *Previous Tealbook* | .6 | 2.5 | 2.7 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.2 | 2.6 | 2.6 | 2.6 |
| Ex. food & energy | 1.7 | 2.1 | 2.1 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | 2.1 | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| Ex. food & energy, market based | 1.4 | 2.0 | 1.9 | 1.8 | 1.7 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| *Previous Tealbook* | 1.5 | 2.1 | 2.0 | 1.9 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.7 | 1.7 |
| CPI | 2.9 | 1.8 | 1.6 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 1.8 | 2.1 | 2.2 | 2.3 |
| *Previous Tealbook* | 2.9 | 2.0 | 1.8 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 1.9 | 2.1 | 2.2 | 2.3 |
| Ex. food & energy | 1.8 | 2.9 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | 1.8 | 2.6 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| ECI, hourly compensation[2] | 2.1 | 2.8 | 2.8 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 | 2.7 | 2.7 | 2.6 |
| *Previous Tealbook*[2] | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 | 2.7 | 2.7 | 2.8 | 2.7 | 2.7 | 2.7 |
| Business sector | | | | | | | | | | | | | | | |
| Output per hour | 2.1 | -.1 | .3 | 1.3 | 1.2 | 1.4 | 1.3 | 1.2 | 1.2 | 1.2 | 1.3 | 1.5 | 1.3 | 1.2 | 1.4 |
| *Previous Tealbook* | 3.5 | -1.0 | .3 | 1.1 | 1.1 | 1.5 | 1.4 | 1.2 | 1.2 | 1.1 | 1.2 | 1.6 | 1.3 | 1.2 | 1.1 |
| Compensation per hour | 5.2 | 3.5 | 3.1 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 5.3 | 3.6 | 3.5 | 3.4 |
| *Previous Tealbook* | 3.6 | 3.0 | 3.9 | 3.7 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.1 | 3.6 | 3.6 | 3.6 |
| Unit labor costs | 3.0 | 3.6 | 2.8 | 2.3 | 2.4 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 3.7 | 2.3 | 2.3 | 2.0 |
| *Previous Tealbook* | .1 | 4.1 | 3.6 | 2.5 | 2.5 | 2.2 | 2.2 | 2.4 | 2.4 | 2.5 | 2.4 | 1.5 | 2.3 | 2.4 | 2.4 |
| Core goods imports chain-wt. price index[3] | -.7 | -1.2 | -.8 | .1 | .9 | .9 | 1.1 | 1.2 | 1.1 | 1.0 | .9 | -1.1 | .7 | 1.0 | .9 |
| *Previous Tealbook*[3] | -.5 | .9 | 1.4 | 1.1 | 1.0 | .7 | .8 | .8 | .8 | .8 | .8 | .3 | .9 | .8 | .8 |

1. Change from fourth quarter of previous year to fourth quarter of year indicated.
2. Private-industry workers.
3. Core goods imports exclude computers, semiconductors, oil, and natural gas.

**Changes in Prices and Costs**

(Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise noted)

| Item | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| GDP chain-wt. price index | 1.8 | 1.5 | .9 | 1.5 | 2.0 | 2.3 | 1.9 | 1.9 | 1.9 | 2.0 |
| *Previous Tealbook* | 1.8 | 1.6 | .9 | 1.5 | 2.0 | 2.1 | 1.8 | 2.0 | 2.0 | 2.0 |
| PCE chain-wt. price index | 1.2 | 1.1 | .3 | 1.5 | 1.8 | 1.9 | 1.5 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | 1.2 | 1.2 | .3 | 1.6 | 1.8 | 1.9 | 1.7 | 1.8 | 1.8 | 1.9 |
| Energy | -2.9 | -7.1 | -16.4 | 2.0 | 8.0 | 3.9 | -5.0 | -1.0 | .5 | 1.0 |
| *Previous Tealbook* | -2.9 | -6.9 | -16.4 | 2.1 | 8.1 | 3.5 | -3.8 | -1.4 | .0 | .5 |
| Food | .7 | 2.8 | .3 | -1.8 | .7 | .5 | 1.8 | 2.4 | 2.4 | 2.4 |
| *Previous Tealbook* | .7 | 2.8 | .3 | -1.8 | .7 | .5 | 2.2 | 2.6 | 2.6 | 2.6 |
| Ex. food & energy | 1.6 | 1.5 | 1.2 | 1.8 | 1.7 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | 1.6 | 1.5 | 1.2 | 1.8 | 1.6 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| Ex. food & energy, market based | 1.1 | 1.1 | 1.1 | 1.4 | 1.2 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| *Previous Tealbook* | 1.1 | 1.2 | 1.1 | 1.5 | 1.2 | 1.7 | 1.8 | 1.8 | 1.7 | 1.7 |
| CPI | 1.2 | 1.2 | .4 | 1.8 | 2.1 | 2.2 | 1.8 | 2.1 | 2.2 | 2.3 |
| *Previous Tealbook* | 1.2 | 1.2 | .4 | 1.8 | 2.1 | 2.2 | 1.9 | 2.1 | 2.2 | 2.3 |
| Ex. food & energy | 1.7 | 1.7 | 2.0 | 2.2 | 1.8 | 2.2 | 2.4 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | 1.7 | 1.7 | 2.0 | 2.2 | 1.8 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 |
| ECI, hourly compensation[1] | 2.0 | 2.3 | 1.9 | 2.2 | 2.6 | 3.0 | 2.6 | 2.7 | 2.7 | 2.6 |
| *Previous Tealbook*[1] | 2.0 | 2.3 | 1.9 | 2.2 | 2.6 | 3.0 | 2.8 | 2.7 | 2.7 | 2.7 |
| Business sector | | | | | | | | | | |
| Output per hour | 1.8 | .3 | .6 | 1.4 | 1.1 | 1.1 | 1.5 | 1.3 | 1.2 | 1.4 |
| *Previous Tealbook* | 1.8 | .2 | .7 | 1.1 | .8 | 1.8 | 1.6 | 1.3 | 1.2 | 1.1 |
| Compensation per hour | -.2 | 3.0 | 2.3 | 2.2 | 3.7 | 2.1 | 5.3 | 3.6 | 3.5 | 3.4 |
| *Previous Tealbook* | -.3 | 2.8 | 2.5 | 2.1 | 3.1 | 2.2 | 3.1 | 3.6 | 3.6 | 3.6 |
| Unit labor costs | -2.0 | 2.7 | 1.7 | .8 | 2.6 | 1.0 | 3.7 | 2.3 | 2.3 | 2.0 |
| *Previous Tealbook* | -2.0 | 2.7 | 1.8 | 1.0 | 2.3 | .5 | 1.5 | 2.3 | 2.4 | 2.4 |
| Core goods imports chain-wt. price index[2] | -2.2 | -.4 | -4.3 | -.9 | .9 | .2 | -1.1 | .7 | 1.0 | .9 |
| *Previous Tealbook*[2] | -2.2 | -.4 | -4.4 | -.7 | 1.1 | .5 | .3 | .9 | .8 | .8 |

1. Private-industry workers.
2. Core goods imports exclude computers, semiconductors, oil, and natural gas.

## Other Macroeconomic Indicators

| Item | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 Q1 | 2020 Q2 | 2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3 | 2021 Q4 | 2019[1] | 2020[1] | 2021[1] | 2022[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Employment and production* | | | | | | | | | | | | | | | |
| Nonfarm payroll employment[2] | 152 | 144 | 127 | 146 | 193 | 14 | 108 | 103 | 93 | 83 | 73 | 149 | 115 | 88 | 65 |
| Unemployment rate[3] | 3.6 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.6 | 3.6 | 3.6 |
| *Previous Tealbook[3]* | 3.6 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.6 | 3.6 | 3.6 |
| Natural rate of unemployment[3] | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 |
| *Previous Tealbook[3]* | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Employment-to-Population Ratio[3] | 60.6 | 60.8 | 60.6 | 60.5 | 60.5 | 60.5 | 60.5 | 60.5 | 60.4 | 60.4 | 60.3 | 60.6 | 60.5 | 60.3 | 60.1 |
| Employment-to-Population Trend[3] | 60.0 | 60.0 | 59.9 | 59.9 | 59.8 | 59.8 | 59.8 | 59.7 | 59.7 | 59.7 | 59.6 | 59.9 | 59.8 | 59.6 | 59.4 |
| Output gap[4] | 1.5 | 1.5 | 1.5 | 1.5 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.6 | 1.6 | 1.5 | 1.7 | 1.6 | 1.4 |
| *Previous Tealbook[4]* | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.1 | 2.4 | 2.3 | 2.1 |
| Industrial production[5] | -2.1 | 1.6 | .7 | .8 | 1.5 | 1.6 | .8 | 1.2 | 1.0 | 1.1 | 1.0 | -.5 | 1.2 | 1.1 | .8 |
| *Previous Tealbook[5]* | -1.2 | 2.1 | .7 | .6 | 1.8 | 2.0 | 1.0 | 1.3 | 1.1 | 1.0 | .9 | -.1 | 1.3 | 1.1 | .7 |
| Manufacturing industr. prod.[5] | -3.1 | 1.2 | -.3 | .7 | 1.1 | 1.3 | 1.0 | .9 | 1.0 | 1.1 | 1.0 | -1.0 | 1.0 | 1.0 | .8 |
| *Previous Tealbook[5]* | -2.2 | 1.4 | .1 | .2 | 1.4 | 1.9 | 1.2 | 1.0 | 1.1 | 1.1 | .9 | -.7 | 1.2 | 1.1 | .7 |
| Capacity utilization rate - mfg.[3] | 75.5 | 75.5 | 75.2 | 75.2 | 75.3 | 75.4 | 75.4 | 75.5 | 75.7 | 75.8 | 75.9 | 75.2 | 75.4 | 75.9 | 76.4 |
| *Previous Tealbook[3]* | 75.7 | 75.7 | 75.4 | 75.4 | 75.5 | 75.7 | 75.8 | 76.0 | 76.1 | 76.3 | 76.4 | 75.4 | 75.8 | 76.4 | 76.8 |
| Housing starts[6] | 1.3 | 1.2 | 1.3 | 1.3 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 |
| Light motor vehicle sales[6] | 17.0 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.8 | 16.8 | 16.8 | 16.8 | 16.9 | 16.9 | 16.8 | 16.8 |
| *Income and saving* | | | | | | | | | | | | | | | |
| Nominal GDP[5] | 4.4 | 4.1 | 3.7 | 4.0 | 4.2 | 3.9 | 3.8 | 3.8 | 3.9 | 3.7 | 3.6 | 4.0 | 4.0 | 3.7 | 3.7 |
| Real disposable pers. income[5] | 2.5 | 3.2 | 2.3 | 2.5 | 1.6 | 1.1 | 2.0 | 2.5 | 1.4 | 1.2 | 1.5 | 3.1 | 1.8 | 1.7 | 1.7 |
| *Previous Tealbook[5]* | 2.4 | 2.2 | 2.0 | 2.7 | 1.7 | 1.3 | 2.1 | 3.0 | 1.6 | 1.4 | 1.7 | 2.2 | 2.0 | 1.9 | 1.5 |
| Personal saving rate[3] | 8.0 | 8.0 | 8.0 | 8.1 | 7.9 | 7.6 | 7.5 | 7.6 | 7.4 | 7.2 | 7.0 | 8.0 | 7.5 | 7.0 | 6.6 |
| *Previous Tealbook[3]* | 6.3 | 6.3 | 6.2 | 6.2 | 6.1 | 5.8 | 5.8 | 5.9 | 5.7 | 5.5 | 5.4 | 6.2 | 5.8 | 5.4 | 4.8 |
| Corporate profits[7] | 22.8 | -3.4 | -1.9 | 2.1 | 3.2 | 3.5 | -.9 | .0 | 2.9 | 2.2 | 1.2 | -.1 | 1.9 | 1.6 | 3.8 |
| Profit share of GNP[3] | 9.8 | 9.6 | 9.5 | 9.4 | 9.4 | 9.4 | 9.3 | 9.2 | 9.2 | 9.2 | 9.1 | 9.5 | 9.3 | 9.1 | 9.1 |
| Gross national saving rate[3] | 18.2 | 18.2 | 17.9 | 17.9 | 17.9 | 17.9 | 17.8 | 17.8 | 17.8 | 17.7 | 17.6 | 17.9 | 17.8 | 17.6 | 17.3 |
| Net national saving rate[3] | 3.2 | 3.0 | 2.6 | 2.6 | 2.6 | 2.6 | 2.5 | 2.4 | 2.3 | 2.2 | 2.0 | 2.6 | 2.5 | 2.0 | 1.7 |

1. Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise indicated.
2. Average monthly change, thousands.
3. Percent; annual values are for the fourth quarter of the year indicated.
4. Percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. Annual values are for the fourth quarter of the year indicated.
5. Percent change, annual rate.
6. Level, millions; annual values are annual averages.
7. Percent change, annual rate, with inventory valuation and capital consumption adjustments.

**Other Macroeconomic Indicators**

(Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise noted)

| Item | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Employment and production* | | | | | | | | | | |
| Nonfarm payroll employment[1] | 192 | 251 | 227 | 193 | 179 | 223 | 149 | 115 | 88 | 65 |
| Unemployment rate[2] | 7.0 | 5.7 | 5.0 | 4.8 | 4.1 | 3.8 | 3.7 | 3.6 | 3.6 | 3.6 |
| *Previous Tealbook*[2] | 7.0 | 5.7 | 5.0 | 4.8 | 4.1 | 3.8 | 3.7 | 3.6 | 3.6 | 3.6 |
| Natural rate of unemployment[2] | 5.4 | 5.1 | 4.9 | 4.8 | 4.6 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 |
| *Previous Tealbook*[2] | 5.4 | 5.1 | 4.9 | 4.8 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Employment-to-Population Ratio[2] | 58.5 | 59.3 | 59.4 | 59.8 | 60.2 | 60.6 | 60.6 | 60.5 | 60.3 | 60.1 |
| Employment-to-Population Trend[2] | 60.4 | 60.3 | 60.2 | 60.1 | 60.1 | 60.1 | 59.9 | 59.8 | 59.6 | 59.4 |
| Output gap[3] | -3.0 | -1.0 | -.5 | -.3 | .6 | 1.4 | 1.5 | 1.7 | 1.6 | 1.4 |
| *Previous Tealbook*[3] | -3.0 | -1.0 | -.4 | .1 | .9 | 1.9 | 2.1 | 2.4 | 2.3 | 2.1 |
| Industrial production | 2.3 | 3.4 | -3.4 | -.3 | 3.6 | 4.0 | -.5 | 1.2 | 1.1 | .8 |
| *Previous Tealbook* | 2.3 | 3.4 | -3.4 | -.3 | 3.6 | 4.0 | -.1 | 1.3 | 1.1 | .7 |
| Manufacturing industr. prod. | 1.1 | 1.4 | -1.7 | .3 | 2.5 | 2.2 | -1.0 | 1.0 | 1.0 | .8 |
| *Previous Tealbook* | 1.1 | 1.4 | -1.7 | .3 | 2.5 | 2.2 | -.7 | 1.2 | 1.1 | .7 |
| Capacity utilization rate - mfg.[2] | 74.5 | 75.8 | 74.9 | 74.2 | 75.8 | 77.0 | 75.2 | 75.4 | 75.9 | 76.4 |
| *Previous Tealbook*[2] | 74.5 | 75.8 | 74.9 | 74.2 | 75.8 | 77.0 | 75.4 | 75.8 | 76.4 | 76.8 |
| Housing starts[4] | .9 | 1.0 | 1.1 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.2 |
| Light motor vehicle sales[4] | 15.5 | 16.5 | 17.4 | 17.5 | 17.1 | 17.2 | 16.9 | 16.9 | 16.8 | 16.8 |
| *Income and saving* | | | | | | | | | | |
| Nominal GDP | 4.4 | 4.5 | 2.8 | 3.5 | 4.9 | 4.9 | 4.0 | 4.0 | 3.7 | 3.7 |
| Real disposable pers. income | -2.5 | 5.3 | 3.0 | 1.6 | 3.4 | 3.9 | 3.1 | 1.8 | 1.7 | 1.7 |
| *Previous Tealbook* | -2.5 | 5.2 | 3.1 | 1.6 | 2.8 | 3.0 | 2.2 | 2.0 | 1.9 | 1.5 |
| Personal saving rate[2] | 6.3 | 7.5 | 7.5 | 6.5 | 6.8 | 7.8 | 8.0 | 7.5 | 7.0 | 6.6 |
| *Previous Tealbook*[2] | 6.3 | 7.4 | 7.4 | 6.4 | 6.3 | 6.5 | 6.2 | 5.8 | 5.4 | 4.8 |
| Corporate profits[5] | 3.9 | 6.7 | -10.8 | 3.3 | -.6 | 4.2 | -.1 | 1.9 | 1.6 | 3.8 |
| Profit share of GNP[2] | 11.8 | 12.1 | 10.5 | 10.5 | 9.9 | 9.9 | 9.5 | 9.3 | 9.1 | 9.1 |
| Gross national saving rate[2] | 19.2 | 20.3 | 19.6 | 18.1 | 18.0 | 17.9 | 17.9 | 17.8 | 17.6 | 17.3 |
| Net national saving rate[2] | 4.0 | 5.3 | 4.5 | 2.7 | 2.7 | 2.4 | 2.6 | 2.5 | 2.0 | 1.7 |

1. Average monthly change, thousands.
2. Percent; values are for the fourth quarter of the year indicated.
3. Percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. Values are for the fourth quarter of the year indicated.
4. Level, millions; values are annual averages.
5. Percent change, with inventory valuation and capital consumption adjustments.

## Staff Projections of Government-Sector Accounts and Related Items

| Item | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 Q1 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Unified federal budget**[1] | | | | Nominal dollars, billions | | | | | | |
| Receipts | 3,316 | 3,330 | 3,459 | 3,708 | 3,855 | 4,018 | 1,102 | 851 | 804 | 794 |
| Outlays | 3,982 | 4,109 | 4,430 | 4,635 | 4,840 | 5,166 | 1,158 | 1,074 | 1,161 | 1,186 |
| Surplus/deficit | -665 | -779 | -970 | -927 | -985 | -1,148 | -56 | -223 | -357 | -391 |
| | | | | Percent of GDP | | | | | | |
| Surplus/deficit | -3.5 | -3.8 | -4.6 | -4.2 | -4.3 | -4.8 | -1.1 | -4.2 | -6.7 | -7.2 |
| *Previous Tealbook* | *-3.5* | *-3.9* | *-4.5* | *-4.3* | *-4.6* | *-4.9* | *-1.1* | *-4.1* | *-6.6* | *-7.2* |
| Primary surplus/deficit | -2.1 | -2.2 | -2.8 | -2.5 | -2.5 | -2.9 | 1.2 | -3.1 | -4.7 | -5.5 |
| Net interest | 1.4 | 1.6 | 1.7 | 1.7 | 1.8 | 1.9 | 2.2 | 1.2 | 2.0 | 1.8 |
| Cyclically adjusted surplus/deficit | -3.5 | -4.2 | -5.2 | -4.9 | -5.1 | -5.6 | -1.7 | -4.9 | -7.4 | -8.0 |
| Federal debt held by public | 76.0 | 77.5 | 78.1 | 79.0 | 78.8 | 81.1 | 77.0 | 78.1 | 79.0 | 79.4 |
| **Government in the NIPA**[2] | | | | Real percent change, annual rate | | | | | | |
| Purchases | .8 | 1.5 | 2.6 | 1.1 | .7 | .9 | 4.6 | 1.5 | 1.5 | 1.5 |
| Consumption | .6 | 1.6 | 2.3 | .8 | .4 | .6 | 3.9 | 2.3 | 1.5 | 1.2 |
| Investment | 2.0 | 1.5 | 5.0 | 2.3 | 2.0 | 2.0 | 6.9 | 2.2 | 1.3 | 2.7 |
| State and local construction | -1.8 | -1.5 | 4.1 | 1.0 | 1.0 | 1.0 | 12.3 | -5.0 | -5.0 | 1.0 |
| Real disposable personal income | 3.5 | 3.9 | 3.1 | 1.8 | 1.7 | 1.7 | 2.5 | 3.2 | 2.2 | 2.5 |
| Contribution from transfers[3] | .2 | .4 | 1.0 | .5 | .6 | .8 | .7 | .3 | .4 | .9 |
| Contribution from taxes[3] | -.9 | .4 | -1.0 | -.5 | -.5 | -.5 | -1.2 | .3 | -.2 | -.5 |
| **Government employment** | | | | Average net change in monthly payrolls, thousands | | | | | | |
| Federal | -2 | 0 | 3 | 0 | 1 | 1 | 5 | 12 | -7 | 23 |
| State and local | 9 | 8 | 8 | 9 | 9 | 9 | 2 | 14 | 9 | 9 |
| **Fiscal indicators**[2] | | | | Percentage point contribution to change in real GDP, annual rate | | | | | | |
| Fiscal effect (FE)[4] | .2 | .4 | .9 | .5 | .4 | .4 | 1.3 | .6 | .5 | .6 |
| Discretionary policy actions (FI) | .3 | .6 | .7 | .4 | .1 | .2 | 1.1 | .5 | .5 | .5 |
| *Previous Tealbook* | *.2* | *.6* | *.7* | *.4* | *.2* | *.2* | *1.3* | *.4* | *.4* | *.4* |
| Federal purchases | .1 | .2 | .3 | .1 | .0 | .0 | .5 | .2 | .2 | .1 |
| State and local purchases | .0 | .1 | .2 | .1 | .1 | .1 | .3 | .0 | .0 | .1 |
| Taxes and transfers | .1 | .3 | .3 | .2 | .0 | .0 | .3 | .2 | .2 | .2 |
| Cyclical | -.1 | -.1 | -.1 | .0 | .0 | .0 | -.1 | -.1 | -.1 | .0 |
| Other | .0 | -.1 | .3 | .1 | .3 | .2 | .4 | .2 | .1 | .1 |

1. Annual values stated on a fiscal year basis. Quarterly values not seasonally adjusted.
2. Annual values refer to the change from fourth quarter of previous year to fourth quarter of year indicated.
3. Percentage point contribution to change in real disposable personal income, annual basis.
4. The FE measure captures the total contribution of the government sector to the growth of aggregate demand (excluding any multiplier effects and financial offsets). It equals the sum of the direct contributions to aggregate demand growth from all changes in federal purchases and state and local purchases, plus the estimated contribution to real household consumption and business investment that is induced by changes in transfer and tax policies. FI (fiscal impetus) is the portion of FE attributable to discretionary fiscal policy actions (for example, a legislated change in tax revenues).

**Foreign Real GDP and Consumer Prices: Selected Countries**
(Quarterly percent changes at an annual rate)

| Measure and country | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 Q1 | 2020 Q2 | 2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3 | 2021 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Projected | | | | | | | | | | | |
| ***Real GDP*[1]** | | | | | | | | | | | | |
| Total foreign | 1.6 | 2.1 | 1.9 | 1.9 | 2.3 | 2.4 | 2.4 | 2.5 | 2.6 | 2.6 | 2.6 | 2.6 |
| *Previous Tealbook* | *1.5* | *2.0* | *2.3* | *2.1* | *2.4* | *2.5* | *2.5* | *2.6* | *2.6* | *2.6* | *2.6* | *2.6* |
| Advanced foreign economies | 1.4 | 2.1 | 1.1 | .8 | 1.3 | 1.5 | 1.5 | 1.5 | 1.6 | 1.7 | 1.7 | 1.7 |
| Canada | .5 | 3.7 | 1.2 | 1.3 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 |
| Japan | 2.8 | 1.8 | 1.8 | -2.3 | .8 | 1.0 | .7 | .7 | .8 | .8 | .7 | .7 |
| United Kingdom | 2.0 | -.8 | .4 | .9 | 1.0 | .9 | .9 | 1.0 | 1.6 | 1.6 | 1.6 | 1.6 |
| Euro area | 1.7 | .8 | .8 | 1.0 | 1.2 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.8 | 1.7 |
| Germany | 1.5 | -.3 | .4 | 1.0 | 1.2 | 1.3 | 1.3 | 1.4 | 1.5 | 1.6 | 1.5 | 1.5 |
| Emerging market economies | 1.8 | 2.2 | 2.7 | 3.0 | 3.3 | 3.3 | 3.4 | 3.4 | 3.5 | 3.5 | 3.5 | 3.5 |
| Asia | 4.3 | 3.6 | 3.9 | 4.2 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 | 4.3 |
| Korea | -1.5 | 4.2 | 2.2 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| China | 7.3 | 5.6 | 5.7 | 5.7 | 5.6 | 5.6 | 5.6 | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 |
| Latin America | -.8 | .6 | 1.4 | 1.7 | 2.1 | 2.2 | 2.4 | 2.4 | 2.6 | 2.6 | 2.6 | 2.6 |
| Mexico | -1.0 | .1 | 1.4 | 1.6 | 2.0 | 2.1 | 2.3 | 2.3 | 2.5 | 2.5 | 2.5 | 2.5 |
| Brazil | -.3 | 1.8 | .8 | 2.3 | 2.0 | 2.3 | 2.5 | 2.6 | 2.8 | 2.8 | 2.8 | 2.8 |
| ***Consumer prices*[2]** | | | | | | | | | | | | |
| Total foreign | .8 | 3.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *.8* | *3.3* | *2.5* | *2.7* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* |
| Advanced foreign economies | .8 | 2.2 | 1.2 | 1.5 | 1.3 | 1.3 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 |
| Canada | 1.6 | 3.4 | 2.1 | 1.9 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Japan | .9 | .3 | .2 | 2.0 | .4 | .4 | .8 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| United Kingdom | .9 | 2.7 | 2.6 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Euro area | .2 | 2.1 | .8 | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 |
| Germany | -.1 | 2.5 | 1.2 | 1.6 | 1.7 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 |
| Emerging market economies | .8 | 4.1 | 3.1 | 2.9 | 2.9 | 2.9 | 2.9 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| Asia | .4 | 3.9 | 2.9 | 2.5 | 2.7 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| Korea | -3.3 | 2.7 | -.5 | 1.7 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| China | .6 | 4.3 | 3.9 | 2.6 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Latin America | 1.7 | 4.9 | 3.9 | 3.7 | 3.6 | 3.5 | 3.4 | 3.4 | 3.4 | 3.3 | 3.3 | 3.3 |
| Mexico | 1.1 | 4.5 | 3.5 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| Brazil | 2.9 | 5.2 | 3.0 | 3.9 | 3.8 | 3.8 | 3.8 | 3.8 | 3.7 | 3.7 | 3.7 | 3.7 |

1. Foreign GDP aggregates calculated using shares of U.S. exports.
2. Foreign CPI aggregates calculated using shares of U.S. non-oil imports.

**Foreign Real GDP and Consumer Prices: Selected Countries**
(Percent change, Q4 to Q4)

| Measure and country | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ----------Projected---------- | | | |
| ***Real GDP*[1]** | | | | | | | | | | |
| Total foreign | 3.0 | 3.0 | 2.1 | 2.8 | 3.1 | 2.2 | 1.9 | 2.4 | 2.6 | 2.6 |
| *Previous Tealbook* | *3.0* | *3.0* | *2.1* | *2.8* | *3.0* | *2.2* | *2.0* | *2.5* | *2.6* | |
| Advanced foreign economies | 2.4 | 2.1 | .9 | 1.9 | 2.7 | 1.3 | 1.3 | 1.4 | 1.7 | 1.7 |
| Canada | 3.4 | 2.8 | -.4 | 1.8 | 2.9 | 1.6 | 1.7 | 1.6 | 1.8 | 1.8 |
| Japan | 2.8 | -.4 | 1.0 | 1.2 | 2.4 | .3 | 1.0 | .8 | .8 | .8 |
| United Kingdom | 2.6 | 3.1 | 2.2 | 1.7 | 1.6 | 1.4 | .6 | .9 | 1.6 | 1.6 |
| Euro area | .7 | 1.6 | 2.0 | 2.1 | 3.0 | 1.2 | 1.1 | 1.4 | 1.8 | 1.7 |
| Germany | 1.5 | 2.3 | 1.3 | 1.9 | 3.4 | .6 | .7 | 1.3 | 1.5 | 1.6 |
| Emerging market economies | 3.6 | 3.9 | 3.2 | 3.8 | 3.4 | 3.1 | 2.4 | 3.3 | 3.5 | 3.4 |
| Asia | 5.4 | 5.1 | 4.6 | 5.1 | 5.2 | 4.4 | 4.0 | 4.3 | 4.3 | 4.2 |
| Korea | 3.7 | 2.6 | 3.4 | 2.7 | 2.8 | 3.0 | 1.8 | 2.4 | 2.4 | 2.3 |
| China | 7.6 | 7.1 | 6.8 | 6.8 | 6.7 | 6.4 | 6.1 | 5.6 | 5.7 | 5.6 |
| Latin America | 1.7 | 2.8 | 1.9 | 2.5 | 1.7 | 1.4 | .7 | 2.3 | 2.6 | 2.6 |
| Mexico | 1.2 | 3.4 | 2.8 | 3.3 | 1.5 | 1.6 | .5 | 2.2 | 2.5 | 2.5 |
| Brazil | 2.6 | -.2 | -5.5 | -2.3 | 2.2 | 1.1 | 1.1 | 2.3 | 2.8 | 2.8 |
| ***Consumer prices*[2]** | | | | | | | | | | |
| Total foreign | 2.4 | 2.0 | 1.4 | 1.9 | 2.5 | 2.4 | 2.2 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *2.4* | *2.0* | *1.4* | *1.9* | *2.5* | *2.4* | *2.3* | *2.3* | *2.3* | |
| Advanced foreign economies | 1.0 | 1.2 | .5 | .9 | 1.5 | 1.7 | 1.4 | 1.4 | 1.6 | 1.6 |
| Canada | 1.0 | 2.0 | 1.3 | 1.4 | 1.8 | 2.1 | 2.2 | 1.9 | 2.0 | 2.0 |
| Japan | 1.4 | 2.6 | .1 | .3 | .6 | .8 | .8 | .7 | 1.0 | 1.1 |
| United Kingdom | 2.1 | .9 | .1 | 1.2 | 3.0 | 2.3 | 2.1 | 2.0 | 2.0 | 1.9 |
| Euro area | .8 | .2 | .3 | .7 | 1.4 | 1.9 | 1.1 | 1.2 | 1.4 | 1.6 |
| Germany | 1.4 | .4 | .5 | 1.0 | 1.6 | 2.2 | 1.3 | 1.8 | 2.1 | 2.0 |
| Emerging market economies | 3.4 | 2.6 | 2.0 | 2.6 | 3.2 | 2.9 | 2.7 | 2.9 | 2.8 | 2.8 |
| Asia | 3.2 | 1.8 | 1.5 | 2.1 | 2.0 | 2.1 | 2.4 | 2.6 | 2.6 | 2.6 |
| Korea | 1.1 | 1.0 | .9 | 1.4 | 1.4 | 1.8 | .1 | 2.0 | 2.1 | 2.1 |
| China | 2.9 | 1.5 | 1.4 | 2.1 | 1.8 | 2.2 | 2.8 | 2.5 | 2.5 | 2.5 |
| Latin America | 4.0 | 4.7 | 3.2 | 4.0 | 6.4 | 5.1 | 3.6 | 3.5 | 3.3 | 3.3 |
| Mexico | 3.6 | 4.2 | 2.3 | 3.3 | 6.6 | 4.8 | 3.1 | 3.2 | 3.2 | 3.2 |
| Brazil | 5.8 | 6.5 | 10.4 | 7.1 | 2.8 | 4.1 | 3.8 | 3.8 | 3.7 | 3.5 |

1. Foreign GDP aggregates calculated using shares of U.S. exports.
2. Foreign CPI aggregates calculated using shares of U.S. non-oil imports.

## U.S. Current Account

### *Quarterly Data*

| | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 Q1 | 2020 Q2 | 2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3 | 2021 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Projected | | | | | | | | | | | |
| | *Billions of dollars, s.a.a.r.* | | | | | | | | | | | |
| **U.S. current account balance** | **-529.1** | **-482.7** | **-501.1** | **-511.7** | **-501.1** | **-496.1** | **-518.4** | **-520.9** | **-524.5** | **-516.6** | **-533.4** | **-556.5** |
| *Previous Tealbook* | *-521.6* | *-508.0* | *-523.9* | *-523.1* | *-517.5* | *-512.0* | *-533.4* | *-526.8* | *-539.7* | *-527.1* | *-539.2* | *-543.8* |
| Current account as percent of GDP | -2.5 | -2.3 | -2.3 | -2.4 | -2.3 | -2.2 | -2.3 | -2.3 | -2.3 | -2.2 | -2.3 | -2.4 |
| *Previous Tealbook* | *-2.5* | *-2.4* | *-2.4* | *-2.4* | *-2.4* | *-2.3* | *-2.4* | *-2.3* | *-2.4* | *-2.3* | *-2.3* | *-2.3* |
| Net goods & services | -625.9 | -653.3 | -638.4 | -624.1 | -613.3 | -610.7 | -621.3 | -617.4 | -618.6 | -613.0 | -619.1 | -629.7 |
| Investment income, net | 257.5 | 317.7 | 291.1 | 273.5 | 271.5 | 261.7 | 256.7 | 257.6 | 253.4 | 243.5 | 239.5 | 234.3 |
| Direct, net | 326.3 | 380.7 | 357.7 | 354.1 | 361.4 | 363.0 | 366.5 | 376.6 | 381.7 | 381.3 | 387.9 | 392.9 |
| Portfolio, net | -68.7 | -63.0 | -66.7 | -80.6 | -89.9 | -101.3 | -109.8 | -119.0 | -128.2 | -137.9 | -148.4 | -158.6 |
| Other income and transfers, net | -160.7 | -147.1 | -153.8 | -161.1 | -159.3 | -147.1 | -153.8 | -161.1 | -159.3 | -147.1 | -153.8 | -161.1 |

### *Annual Data*

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Projected | | | |
| | *Billions of dollars* | | | | | | | | | |
| **U.S. current account balance** | **-348.8** | **-365.2** | **-407.8** | **-428.3** | **-439.6** | **-491.0** | **-506.1** | **-509.1** | **-532.7** | **-561.1** |
| *Previous Tealbook* | *-348.8* | *-365.2* | *-407.8* | *-428.3* | *-439.6* | *-491.0* | *-519.1* | *-522.4* | *-537.4* | *-540.6* |
| Current account as percent of GDP | -2.1 | -2.1 | -2.2 | -2.3 | -2.3 | -2.4 | -2.4 | -2.3 | -2.3 | -2.3 |
| *Previous Tealbook* | *-2.1* | *-2.1* | *-2.2* | *-2.3* | *-2.3* | *-2.4* | *-2.4* | *-2.3* | *-2.3* | *-2.3* |
| Net goods & services | -461.1 | -489.6 | -498.5 | -503.0 | -550.1 | -627.7 | -635.4 | -615.7 | -620.1 | -633.4 |
| Investment income, net | 215.4 | 228.9 | 214.7 | 211.1 | 238.7 | 266.9 | 285.0 | 261.9 | 242.7 | 227.5 |
| Direct, net | 283.3 | 284.2 | 284.6 | 278.0 | 304.0 | 330.3 | 354.7 | 366.9 | 386.0 | 409.3 |
| Portfolio, net | -67.9 | -55.3 | -70.0 | -66.9 | -65.3 | -63.4 | -69.7 | -105.0 | -143.3 | -181.8 |
| Other income and transfers, net | -103.1 | -104.6 | -123.9 | -136.4 | -128.2 | -130.2 | -155.7 | -155.3 | -155.3 | -155.3 |

# Abbreviations

| | |
|---|---|
| ABS | asset-backed securities |
| AFE | advanced foreign economy |
| BBA | Bipartisan Budget Act |
| BFI | business fixed investment |
| BLS | Bureau of Labor Statistics |
| BOJ | Bank of Japan |
| BOM | Bank of Mexico |
| C&I | commercial and industrial |
| CPI | consumer price index |
| CRE | commercial real estate |
| ECB | European Central Bank |
| ECI | employment cost index |
| EFFR | effective federal funds rate |
| ELB | effective lower bound |
| EME | emerging market economy |
| EU | European Union |
| FCI | financial conditions index |
| FOMC | Federal Open Market Committee; also, the Committee |
| FPLT | flexible price-level targeting |
| FRBNY | Federal Reserve Bank of New York |
| FRB/US | A large-scale macroeconometric model of the U.S. economy |
| FX | foreign exchange |
| GDP | gross domestic product |
| GEMUS | a calibrated two-country DSGE model |
| GNP | gross national product |

| | |
|---|---|
| IMF | International Monetary Fund |
| IOER | interest on excess reserves |
| IP | industrial production |
| IRS | Internal Revenue Service |
| LFPR | labor force participation rate |
| MAF | model averaging framework |
| MMF | money market fund |
| NFIB | National Federation of Independent Business |
| OIS | overnight index swap |
| ON RRP | overnight reverse repurchase agreement |
| OPEC | Organization of the Petroleum Exporting Countries |
| PCE | personal consumption expenditures |
| PMI | purchasing managers index |
| SEP | Summary of Economic Projections |
| SHED | Survey of Household Economics and Decisionmaking |
| SIGMA | A calibrated multicountry DSGE model |
| SOMA | System Open Market Account |
| S&P | Standard & Poor's |
| SPF | Survey of Professional Forecasters |
| TDF | Term Deposit Facility |
| TIPS | Treasury Inflation-Protected Securities |
| TPU | trade policy uncertainty |
| USDA | United States Department of Agriculture |
| VAR | vector autoregression |
| VIX | one-month-ahead option-implied volatility on the S&P 500 index |