## 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

November 26, 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

The data released during this short intermeeting period continue to suggest that economic activity has been expanding at a moderate rate in the second half of this year. Growth has been slower than in the first half of the year, in part because trade developments and concerns over global economic prospects have weighed more heavily on business investment and exports. Household spending rose at a strong clip through the third quarter, buoyed by solid job gains and income growth, although recent data indicate some deceleration in spending this quarter. Overall, we expect GDP growth to slow from 2.6 percent in the first half of the year to 1.7 percent in the second half. Although we continue to view the risks to our projection as tilting to the downside, trade policy developments and a more favorable employment report suggest that the downside risks have eased a bit.

We expect economic activity to pick back up next year from its second-half pace but to decelerate modestly over the medium term, mostly reflecting the waning boost from fiscal policy. We anticipate that already enacted tariff increases, uncertainty over future trade policy, and concerns over global growth will continue to restrain economic growth next year and, to a lesser extent, in 2021. All told, GDP growth is projected to decline from 2.1 percent this year and next to 1.7 percent in 2022. This projection is a touch stronger than in the October Tealbook, largely reflecting a higher projected path for equity prices. Accordingly, we now project the labor market to tighten just a little further, with the unemployment rate edging down to 3.5 percent next year and remaining there over the medium term.

The available data on inflation suggest that core PCE prices rose 1.6 percent over the 12 months ending in October, a bit higher than earlier this year but slightly lower than we expected in the October Tealbook. We expect core inflation to hold at this level through December and to move up to 1.9 percent by the end of the first quarter of next year. Core PCE inflation is projected to remain near 1.9 percent over the medium term—a pace that is slightly above our estimate of its underlying trend—as the boost to inflation from high resource utilization is not completely offset by the drag on import prices from a rising dollar. Total PCE price inflation is projected to run below core inflation this year and next owing to falling energy prices and then to move in line with core over the remainder of the medium term.

## Comparing the Staff Projection with Other Forecasts

The staff's projection for GDP growth in 2019 is well aligned with the projections from both the Survey of Professional Forecasters (SPF) and the Blue Chip consensus, but it is a few tenths of a percentage point higher than each in 2020. The staff's unemployment rate forecast is the same as the SPF and Blue Chip projections in 2019, but it is 0.2 percentage point below them in 2020.

The staff's forecast of headline CPI inflation for 2019 is a little higher than the Blue Chip and SPF forecasts but well aligned with them for 2020. With regard to headline PCE price inflation, the staff projection is the same as the SPF consensus projection in 2019 but 0.2 percentage point below it in 2020. The staff's projection for core PCE price inflation is below the SPF forecast in 2019 and 2020.

**Comparison of Tealbook and Outside Forecasts**

| | 2019 | 2020 |
|---|---|---|
| **GDP (Q4/Q4 percent change)** | | |
| November Tealbook | 2.1 | 2.1 |
| Blue Chip (11/10/19) | 2.2 | 1.7 |
| SPF median (11/15/19) | 2.2 | 1.8 |
| **Unemployment rate (Q4 level)** | | |
| November Tealbook | 3.6 | 3.5 |
| Blue Chip (11/10/19) | 3.6 | 3.7 |
| SPF median (11/15/19) | 3.6 | 3.7 |
| **CPI inflation (Q4/Q4 percent change)** | | |
| November Tealbook | 2.0 | 2.0 |
| Blue Chip (11/10/19) | 1.9 | 2.0 |
| SPF median (11/15/19) | 1.8 | 2.1 |
| **PCE price inflation (Q4/Q4 percent change)** | | |
| November Tealbook | 1.5 | 1.7 |
| SPF median (11/15/19) | 1.5 | 1.9 |
| **Core PCE price inflation (Q4/Q4 percent change)** | | |
| November Tealbook | 1.6 | 1.9 |
| SPF median (11/15/19) | 1.8 | 2.0 |

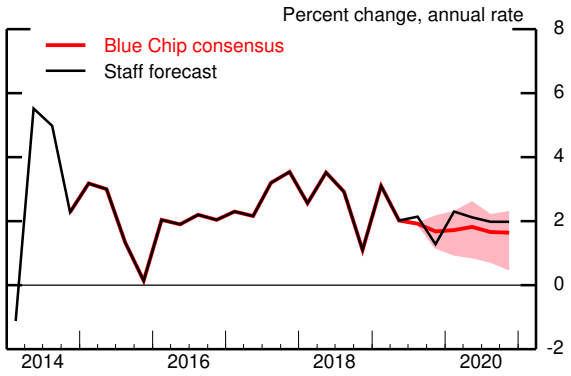
Note: SPF is the Survey of Professional Forecasters, CPI is the consumer price index, and PCE is personal consumption expenditures. Blue Chip does not provide results for overall and core PCE price inflation. The Blue Chip consensus forecast includes input from about 50 panelists, and the SPF about 40. Roughly 20 panelists contribute to both surveys.

Source: Blue Chip Economic Indicators; Federal Reserve Bank of Philadelphia.

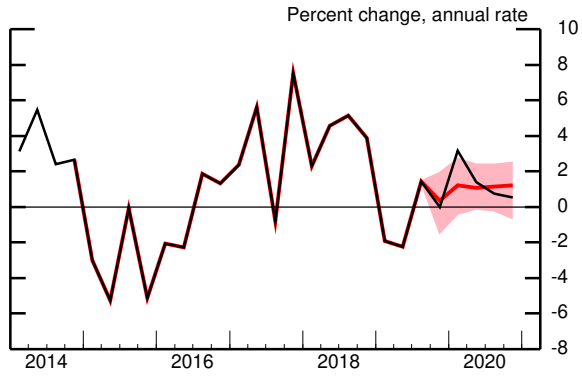
# Tealbook Forecast Compared with Blue Chip

(Blue Chip survey released November 10, 2019)

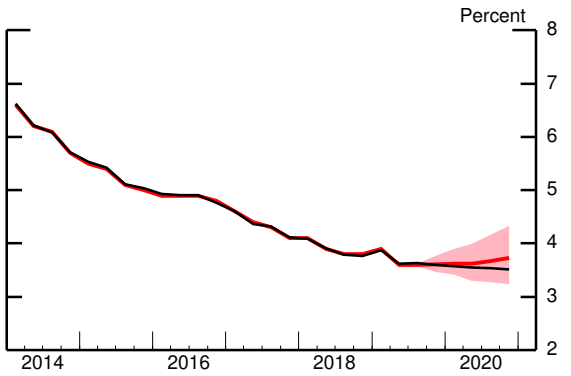
## Real GDP



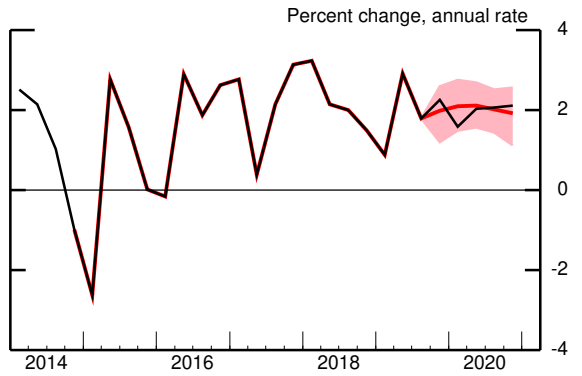

## Industrial Production



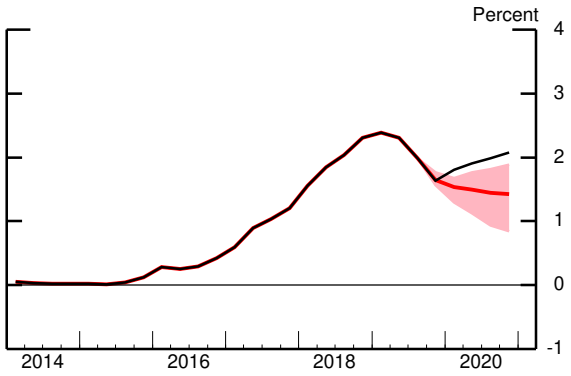

## Unemployment Rate



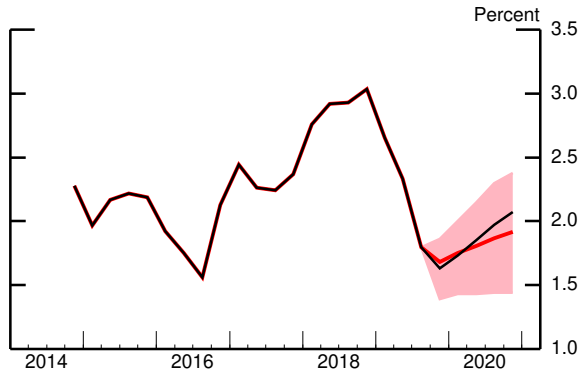

## Consumer Price Index




## 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.

## Revisions to the Staff Projection since the Previous SEP

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

The current projection is very similar to that in the September Teabook. In particular, our projection of slowing GDP growth and an unemployment rate that essentially moves sideways over the medium term remains the same.

Looking more closely at the differences relative to September, in the second half of this year—while both data on GDP and the unemployment rate have come in close to what we expected in September—core PCE inflation has surprised us somewhat to the downside. Beyond this year, output growth is projected to be slightly stronger, the unemployment rate a touch lower, and core PCE inflation a bit higher than in the September Tealbook.

The federal funds rate assumed in our projection is revised lower in the near term to reflect the Committee's recent decisions to lower the federal funds rate target, but that revision fades over time, as the policy rule that we use in our baseline projection calls for the funds rate to increase to about its assumed long-run value by the end of 2022.

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

| Variable | 2019 | | 2019 | 2020 | 2021 | 2022 | Longer run |
|---|---|---|---|---|---|---|---|
| | H1 | H2 | | | | | |
| Real GDP[1] | 2.6 | 1.7 | 2.1 | 2.1 | 1.9 | 1.7 | 1.7 |
| *September Tealbook* | *2.5* | *1.8* | *2.1* | *2.0* | *1.8* | *1.7* | *1.7* |
| Unemployment rate[2] | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 | 4.4 |
| *September Tealbook* | *3.6* | *3.7* | *3.7* | *3.6* | *3.6* | *3.6* | *4.4* |
| PCE inflation[1] | 1.4 | 1.5 | 1.5 | 1.7 | 1.9 | 1.9 | 2.0 |
| *September Tealbook* | *1.3* | *1.6* | *1.5* | *1.8* | *1.8* | *1.8* | *2.0* |
| Core PCE inflation[1] | 1.5 | 1.8 | 1.6 | 1.9 | 1.9 | 1.9 | n.a. |
| *September Tealbook* | *1.4* | *2.1* | *1.8* | *1.8* | *1.8* | *1.8* | *n.a.* |
| Federal funds rate[2] | 2.40 | 1.65 | 1.65 | 2.05 | 2.34 | 2.49 | 2.50 |
| *September Tealbook* | *2.40* | *2.23* | *2.23* | *2.40* | *2.46* | *2.50* | *2.50* |
| Memo: Federal funds rate, end of period | 2.38 | 1.64 | 1.64 | 2.06 | 2.37 | 2.53 | 2.50 |
| *September Tealbook* | *2.38* | *2.24* | *2.24* | *2.40* | *2.47* | *2.50* | *2.50* |
| Output gap[2,3] | 1.6 | 1.5 | 1.5 | 1.8 | 1.8 | 1.7 | n.a. |
| *September Tealbook* | *1.5* | *1.5* | *1.5* | *1.7* | *1.6* | *1.4* | *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.

## KEY BACKGROUND FACTORS

Although the news on trade developments has not led us to make any changes to our trade policy assumptions, sentiment in financial markets fluctuated in recent weeks amid varying reports about U.S.–China trade talks. On net, domestic equity prices are higher, but market-based expectations for U.S. monetary policy and yields on Treasury securities and corporate bonds are little changed from the time of the October Tealbook. All told, our projections for interest rates and the dollar are very little revised, but the higher projected path for stock prices provides a little more impetus to aggregate demand in the current forecast.

### Monetary Policy

- The baseline policy rule calls for the federal funds rate to move up gradually to 2.5 percent by the end of 2022. However, this path starts from a lower level than in the October Tealbook, reflecting the FOMC's decision at the October meeting to lower the target range. Term-premium-adjusted market quotes suggest that market participants expect the federal funds rate to move up by roughly 25 basis points per year through the medium term, a slightly more gradual increase than implied by our baseline path. (See the box "How Sensitive Is the Economy to Interest Rates?" for a discussion of the response of the economy to changes in the federal funds rate.)

### Other Interest Rates

- We project that the 10-year Treasury yield will rise from an average of 1.8 percent this quarter to 2.8 percent by the end of 2022, reflecting our assumption that the term premium will move up to a more normal level over the next few years. This path for the 10-year Treasury yield is nearly unchanged from the projection in the October Tealbook.

- Both corporate bond yields and mortgage rates increase about in line with comparable Treasury securities over the medium term.

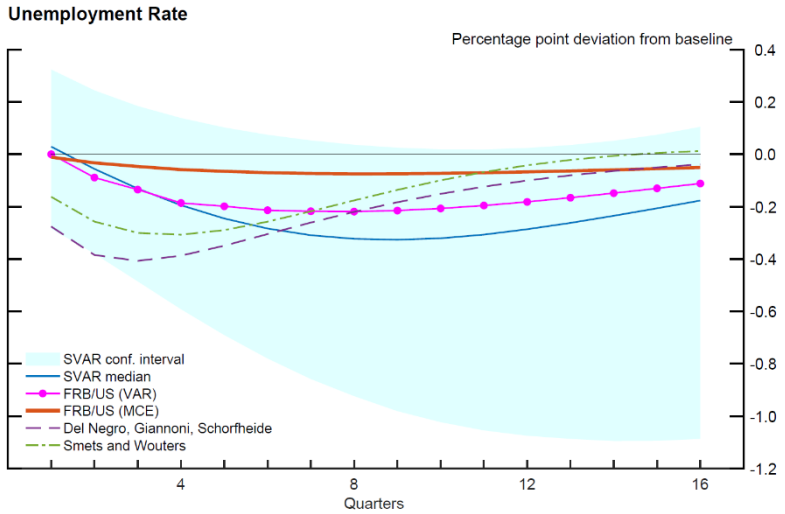
### Equity and House Prices

- Stock prices have increased about 4 percent since the time of the October Tealbook, noticeably above our expectations. We expect equity prices to rise only 0.2 percent per year, on average, over the medium term, 0.7 percentage

## How Sensitive Is the Economy to Interest Rates?

Despite the importance of the question and decades of research, a great deal of uncertainty still surrounds the sensitivity of economic activity to changes in the federal funds rate. This uncertainty is illustrated in the figure by the range of model estimates of the response of the unemployment rate to a reduction in the federal funds rate. Specifically, the figure shows the impulse response of the unemployment rate to an immediate 100 basis point reduction in the federal funds rate that then fades over the next several quarters from four estimated structural models and a time-series structural vector autoregressive (SVAR) model.[1] The choice of the model matters a lot for the speed and magnitude of the response: Across models, the peak response of the unemployment rate ranges between negative 0.1 and negative 0.4 percentage point, with very different timing. The blue shaded area denotes the 90 percent confidence interval from the time-series model, which is very wide. The staff's judgmental projection embeds an overall interest rate sensitivity that is derived from the FRB/US model with VAR expectations. The staff's analysis of monetary strategies such as framework memos and the Monetary Policy Strategies section uses the FRB/US model under model-consistent expectations (MCE).

These models provide a sense of the average reaction of economic activity to interest rates over the sample used in estimation. However, some research has suggested that the economy might have become less interest sensitive over time or that the sensitivity may depend on the state of the economy.[2] For example, secular declines in interest sensitivity could result from declines in the




Note: The models used are FRB/US (a version with model-consistent expectations, MCE, and a version with VAR-based expectations), the Smets and Wouters (2007) model, the Del Negro, Giannoni, and Schorfheide (2015) model, and a Bayesian SVAR model from Caldara and Herbst (2019).
Source: Staff calculations.

[1] The models used are FRB/US (a version with model-consistent expectations, MCE, and a version with VAR-based expectations); the Smets and Wouters (2007) model; the Del Negro, Giannoni, and Schorfheide (2015) model; and a Bayesian SVAR model from Caldara and Herbst (2019).

See Frank Smets and Rafael Wouters (2007), "Shocks and Frictions in U.S. Business Cycles: A Bayesian DSGE Approach," *American Economic Review,* vol. 97 (June), pp. 586–606; Marco Del Negro, Marc P. Giannoni, and Frank Schorfheide (2015), "Inflation in the Great Recession and New Keynesian Models," *American Economic Journal: Macroeconomics,* vol. 7 (January), pp. 168–96; and Dario Caldara and Edward Herbst (2019), "Monetary Policy, Real Activity, and Credit Spreads: Evidence from Bayesian Proxy SVARs," *American Economic Journal: Macroeconomics,* vol. 11 (January), pp. 157–92.

[2] For recent papers, see, for example, Jonathan L. Willis and Guangye Cao (2015), "Has the U.S. Economy Become Less Interest Rate Sensitive?" Federal Reserve Bank of Kansas City, *Economic Review,* vol. 100 (Second

relative size of sectors such as durable goods manufacturing, which are typically particularly responsive to interest rates. In addition, Tenreyro and Thwaites (2016) have found empirically that monetary policy is less powerful in recessions than in expansions, as durable goods expenditures appear to be less responsive when output is low.[3] They argue that standard estimates of the monetary transmission mechanism like those in the figure are mostly picking up the effects of monetary policy during expansions. Thus, accommodative monetary policy could possibly be less powerful in a weak economy than our typical empirical estimates indicate. These empirical findings are consistent with some recent theoretical work. According to this research, monetary policy easing might shift forward the *timing* of lumpy durable goods spending and the refinancing of mortgages.[4] If policy easing in the past has already brought forward a large chunk of spending on durables and mortgage refinancing, additional stimulus will likely have a smaller effect. Finally, other research suggests that businesses may be less sensitive to fundamentals, such as interest rates, in times of heightened uncertainty.[5]

Determining whether policy may be attenuated currently is difficult. Relative to the December 2018 SEP, the federal funds rate shifted down about 1.25 percentage points by the end of 2019, pointing to an increase in GDP growth of about 0.1 percentage point over the course of 2019, according to FRB/US under VAR expectations. FRB/US predicts that the effects would be considerably larger in 2020 and 2021. Because there are many factors influencing the economy, isolating the effect of policy rates is quite challenging.

One way to gauge the effects is to focus on sectors that are typically most sensitive to interest rates. According to the FRB/US model, the lower federal funds rate path would have boosted residential investment by 0.5 percent and the stock market by about 10 percent. Qualitatively, it appears that residential construction and equity prices are behaving in line with the model's predictions: The stock market is up considerably since the December 2018 FOMC meeting, and residential construction rebounded with the decline in mortgage interest rates over the past year. In addition, mortgage-refinancing activity has increased markedly since the beginning of the year. Of course, factors other than a change in the expected funds rate path are also influencing these variables. Overall, the staff judges that the transmission of lower rates to consumption and residential investment appears to have played out in pretty much the same way that staff models for these sectors and the FRB/US model would suggest.

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Quarter), pp. 5–36; and Silvana Tenreyro and Gregory Thwaites (2016), "Pushing on a String: U.S. Monetary Policy Is Less Powerful in Recessions," *American Economic Journal: Macroeconomics,* vol. 8 (October), pp. 43–74.

[3] For additional evidence on the behavior of durable goods spending in recessions, see David Berger and Joseph Vavra (2015), "Consumption Dynamics during Recessions," *Econometrica,* vol. 83 (January), pp. 101–54.

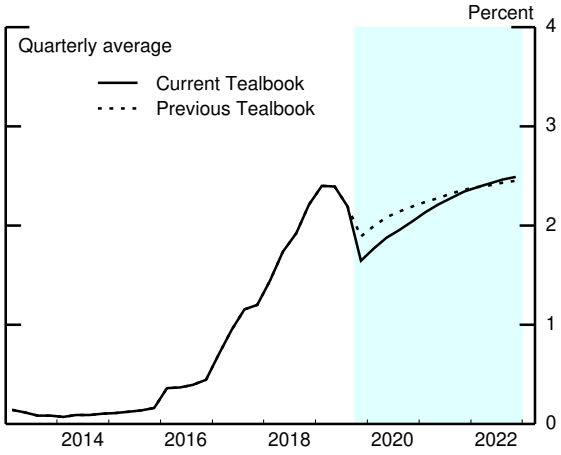
[4] For consumer durables, see Alisdair McKay and Johannes F. Wieland (2019), "Lumpy Durable Consumption Demand and the Limited Ammunition of Monetary Policy," NBER Working Paper Series 26175 (Cambridge, Mass.: National Bureau of Economic Research, August), https://www.nber.org/papers/w26175. State dependency has also been related to mortgage refinancing; see Martin Eichenbaum, Sergio Rebelo, and Arlene Wong (2018), "State Dependent Effects of Monetary Policy: The Refinancing Channel," NBER Working Paper Series 25152 (Cambridge, Mass.: National Bureau of Economic Research, October; revised August 2019), https://www.nber.org/papers/w25152; and David W. Berger, Konstantin Milbradt, Fabrice Tourre, and Joseph Vavra (2018), "Mortgage Prepayment and Path-Dependent Effects of Monetary Policy," NBER Working Paper Series 25157 (Cambridge, Mass.: National Bureau of Economic Research, October; revised December), https://www.nber.org/papers/w25157.

[5] See, for example, Efrem Castelnuovo and Giovanni Pellegrino (2018), "Uncertainty-Dependent Effects of Monetary Policy Shocks: A New-Keynesian Interpretation," *Journal of Economic Dynamics and Control,* vol. 93 (August), pp. 277–96.

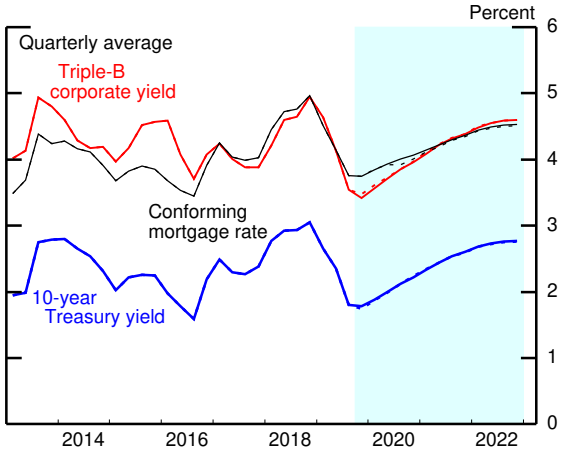
Domestic Econ Devel & Outlook

# Key Background Factors underlying the Baseline Staff Projection

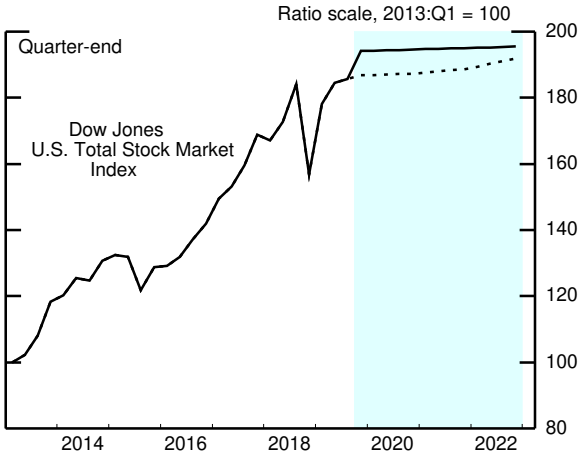
## Federal Funds Rate



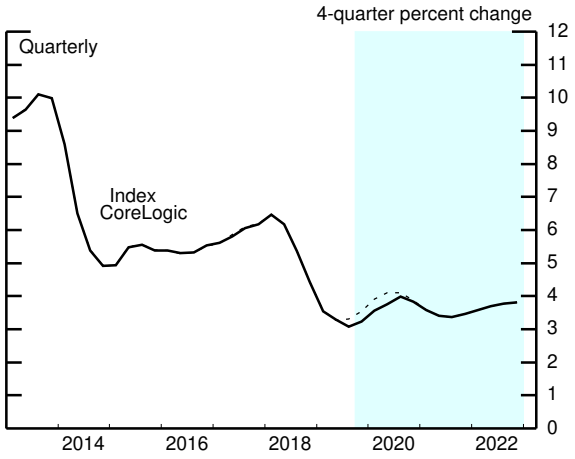

## Long-Term Interest Rates



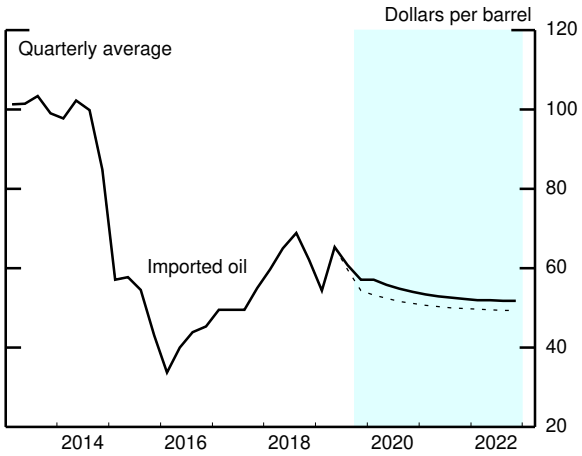

## Equity Prices



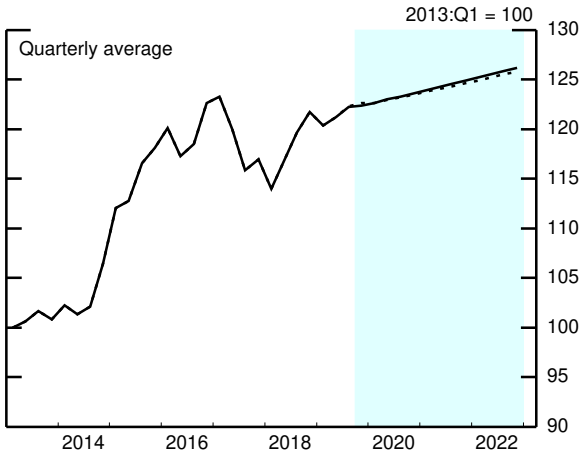

## House Prices




## Oil Prices




## Broad Real Dollar



point less per year than in the October Tealbook. The softer pace of stock price appreciation reflects somewhat higher valuation pressures, as the equity premium has dropped further below its median. All told, we project that stock prices will be about 2 percent higher at the end of 2022 than in the October Tealbook.

- We project that house prices will rise 3.7 percent per year over the medium term, noticeably slower than the average of the past several years.

## Trade Policy

- Discussions continue between the United States and China on a phase-one trade agreement. The specific details of the agreement are still in play, but they are believed to include a further suspension of the 5 percentage point U.S. tariff increase on $230 billion of Chinese imports that was scheduled for October 15, a Chinese pledge to purchase U.S. agricultural products, and agreements on currency and financial services issues. Such an agreement would likely also entail suspending both the 15 percentage point U.S. tariff increase on $150 billion of Chinese imports that is still scheduled for December 15 and China's plan to increase retaliatory tariffs on $45 billion of U.S. exports. Though initially the two sides had hoped to sign an agreement in mid-November, the timeline has slipped as disagreements have arisen concerning the amount of agricultural purchases China would make and whether the United States would roll back existing tariffs. In spite of this delay, market participants appear cautiously optimistic about a partial agreement being reached relatively soon.

- Although neither the postponed October tariff hikes nor those scheduled for December are incorporated in our projection, the tariff changes implemented since the start of 2018 have left a notable imprint on economic activity and our forecast.

    - We continue to estimate that implemented tariffs will collectively boost the level of core PCE prices 30 basis points and directly lower the level of U.S. GDP 30 basis points by the end of 2021. The drag on output growth operates through several channels. An erosion in household purchasing power slows the rise in PCE a little, and higher prices for imported capital goods and lower profit expectations impose

noticeable restraint on business investment. These negative effects on domestic demand are only partially offset by a boost to net exports, as our assumption of less-than-full retaliation by U.S. trading partners implies that exports will be suppressed by foreign tariffs to a lesser degree than imports are restrained by U.S. tariffs.

- In addition to these direct channels, over the course of this year, we have further marked down our GDP projection, mainly this year and next year, by 40 basis points to reflect business uncertainty over both the trade environment and global growth. Finally, trade tensions are also informing our forecast indirectly to the extent that they affect equity prices and the value of the dollar.

## Foreign Economic Activity and the Dollar

- We now see foreign real GDP growth stepping down to an annual rate of 1.3 percent in the second half of 2019, well below our estimate of potential growth and a downward revision of 0.5 percentage point from the October Tealbook. Although much of the revision results from a double-digit contraction in third-quarter GDP in Hong Kong, growth in the second half appears to have remained weak in many economies. Foreign growth has been held down this year by a number of factors, including the global manufacturing slump, political unrest, and trade tensions. We expect the drag from these factors to ease and growth abroad to pick up to a near-potential pace of 2.4 percent by late next year. Indeed, in China and the euro area, growth already appears to be stabilizing.

- We continue to expect that the broad real dollar will appreciate at an annual rate of 1 percent through the forecast horizon as market expectations for the federal funds rate move up toward the staff forecast.

## Fiscal Policy

- Our fiscal policy assumptions are unchanged. We continue to project that the direct fiscal impetus from all levels of government will contribute 0.7 percentage point to aggregate demand growth this year—roughly the same as in 2018. After this year, with the boost from the 2017 tax cuts waning and

federal purchases flattening out, the impetus from fiscal policy tapers to 0.4 percentage point in 2020 and to 0.1 percentage point in 2021 and 2022.

### Oil Prices

- The spot price of Brent crude oil, which peaked at almost $75 per barrel in April, is currently $63 per barrel, up $3 per barrel since the time of the October Tealbook. Oil prices moved up in recent weeks on generally positive news about U.S.–China trade developments and were also supported by expectations that U.S. production growth will slow and that OPEC and its partners are likely to extend production cuts. Consistent with futures prices, the price of imported oil is expected to edge lower over the medium term.

## THE OUTLOOK FOR GDP

GDP growth in the second half of this year appears to be moderating relative to the first half, roughly as expected in the October Tealbook.[1] A decline in business fixed investment (BFI) and a deceleration in PCE contribute to the step-down, but the slowing is exaggerated by a sharp pullback in the pace of government spending and by the recently concluded strike at GM.[2] Indeed, private domestic final purchases, which we think provide a better signal of underlying economic momentum than GDP, look to be decelerating less—from a 2.4 percent growth rate in the first half to 2.1 percent in the second.

Although GDP growth over the second half as a whole is coming in largely as expected, the quarterly pattern is less smooth, with third-quarter growth stronger and fourth-quarter growth, at just 1.3 percent, softer than in the October Tealbook. The sharper slowing this quarter mainly reflects a larger step-down in inventory investment and a greater moderation in PCE growth. We forecast GDP growth to rebound to 2.3 percent in the first quarter as GM's production recovers.

[1] This Tealbook reflects data through Monday, November 25, and thus excludes the GDP, personal income, and prices data published on Wednesday, November 27.

[2] We estimate that the GM strike from mid-September to late October reduced GDP growth around 0.2 percentage point in the third quarter and another 0.1 percentage point in the fourth quarter. GM resumed production in the final week of October, and we expect the return to normal production (plus some makeup production) will boost GDP growth about 0.5 percentage point in the first quarter as GM rebuilds its inventories.

Domestic Econ Devel & Outlook

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

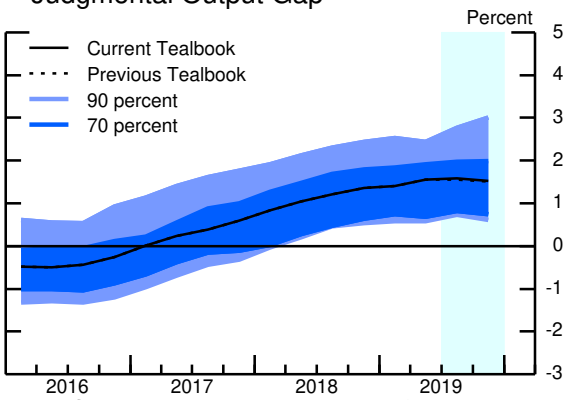
(Percent change at annual rate from final quarter of preceding period except as noted)

| Measure | 2017 | 2018 | 2019 | 2019 Q2 | 2019 Q3 | 2019 Q4 |
|---|---|---|---|---|---|---|
| **Output gap[1]** | **.6** | **1.4** | **1.5** | **1.6** | **1.6** | **1.5** |
| *Previous Tealbook* | *.6* | *1.4* | *1.5* | *1.5* | *1.6* | *1.5* |
| Real GDP | 2.8 | 2.5 | 2.1 | 2.0 | 2.1 | 1.3 |
| *Previous Tealbook* | *2.8* | *2.5* | *2.1* | *2.0* | *1.7* | *1.6* |
| Measurement error in GDP | .1 | -.1 | .2 | -.4 | .2 | -.2 |
| *Previous Tealbook* | *.1* | *-.1* | *.1* | *-.4* | *-.2* | *.0* |
| Potential output | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| *Previous Tealbook* | *1.8* | *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.

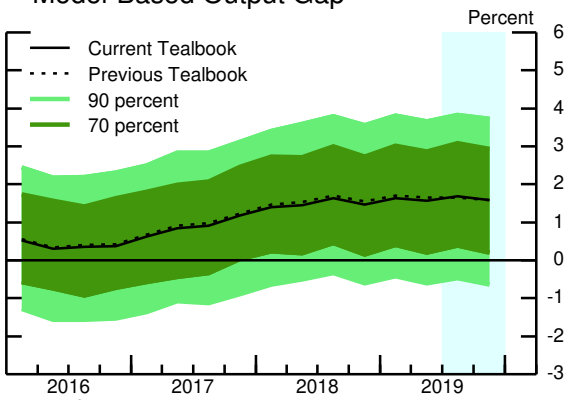
1. Percent, average for the final quarter in the period.

## Judgmental Output Gap



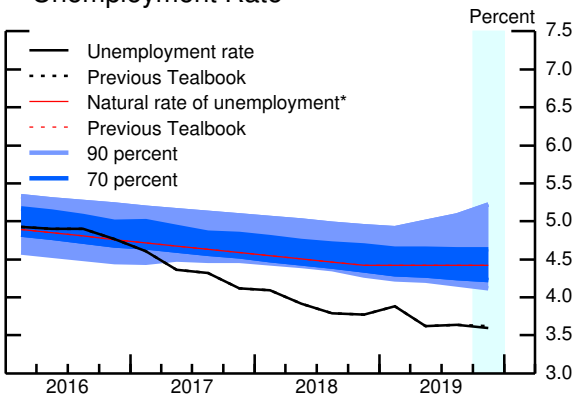

Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

## Model-Based Output Gap



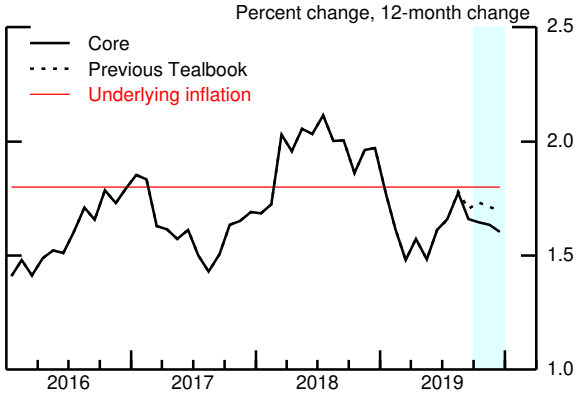

Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

## 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.

- We estimate that PCE increased at a strong rate of 3 percent in the third quarter, a touch faster than in our October projection. However, for the current quarter, incoming data on October retail sales and motor vehicle sales point to a somewhat larger step-down in PCE growth than we had previously projected.[3] On the whole, low unemployment, moderate income growth, high household net worth, and low interest rates provide support for consumer spending and point to solid PCE growth going forward.

- Residential investment increased about 5 percent in the third quarter, its first increase after six consecutive quarters of declines. We expect residential investment to rise at a similar pace this quarter and next: Permits for single-family homes have climbed to post-housing-crash highs in recent months, starts increased for the fifth consecutive month in October, and both pending and existing home sales have moved up after bottoming out earlier this year. We primarily attribute the recovery in housing to the decline in mortgage rates since late 2018.

- After increasing just 1.7 percent in the first half of this year, BFI is projected to decline about 1 percent in the second half and to edge down further in the first quarter of 2020.

    - E&I is expected to only edge up in the second half. Shipments of capital goods, which were roughly flat for most of the year, have declined recently. Moreover, new orders for capital goods continue to run below shipments, and an array of indicators that inform our outlook (such as analysts' expectations for longer-term profit growth) remain notably downbeat. While the deceleration in the first half of the year was concentrated in transportation investment, the slowdown in E&I growth in the second half is widespread across investment categories, and we largely attribute this broad-based weakness to heightened concerns about trade and global growth.

    - Investment in nonresidential structures fell 14 percent in the third quarter. About half of the decline was due to the continued response

[3] Soft vehicle sales in October may have partly reflected shortages of some GM vehicles resulting from the UAW strike.

Domestic Econ Devel & Outlook

## Summary of the Near-Term Outlook for GDP

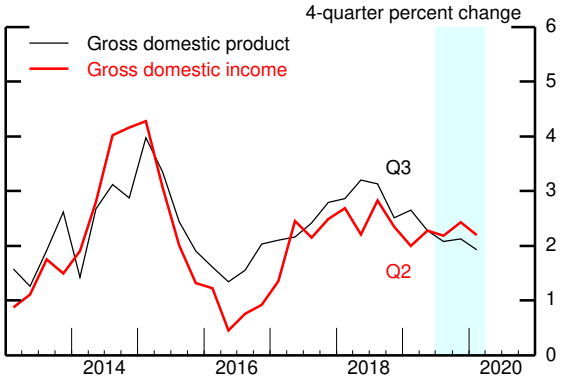
(Percent change at annual rate except as noted)

| Measure | 2019:Q3 | | 2019:Q4 | | 2020:Q1 | |
|---|---|---|---|---|---|---|
| | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook | Previous Tealbook | Current Tealbook |
| **Real GDP** | **1.7** | **2.1** | **1.6** | **1.3** | **2.2** | **2.3** |
| Private domestic final purchases | 2.1 | 2.3 | 2.1 | 1.9 | 2.0 | 2.1 |
| Personal consumption expenditures | 2.8 | 3.0 | 2.3 | 2.1 | 2.4 | 2.4 |
| Residential investment | 4.8 | 4.6 | 5.8 | 5.9 | 7.3 | 7.2 |
| Nonres. private fixed investment | -2.1 | -2.0 | -.2 | -.1 | -1.3 | -.9 |
| Government purchases | 1.3 | 1.6 | .9 | .8 | 2.0 | 1.8 |
| *Contributions to change in real GDP* | | | | | | |
| Inventory investment[1] | -.1 | .1 | -.2 | -.4 | -.2 | -.2 |
| Net exports[1] | -.3 | -.1 | -.1 | -.1 | .3 | .4 |

1. Percentage points.

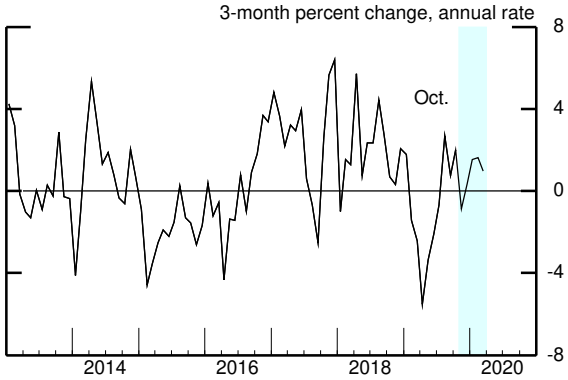
## Recent Nonfinancial Developments (1)

Real GDP and GDI



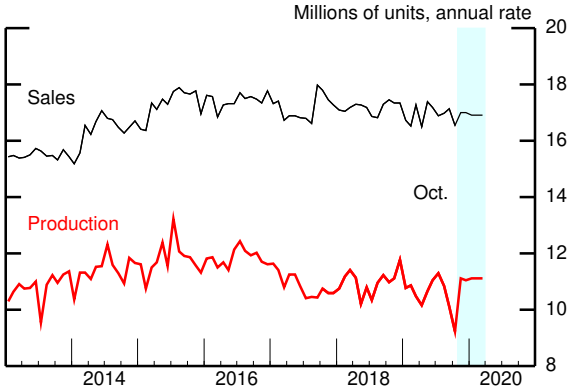

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



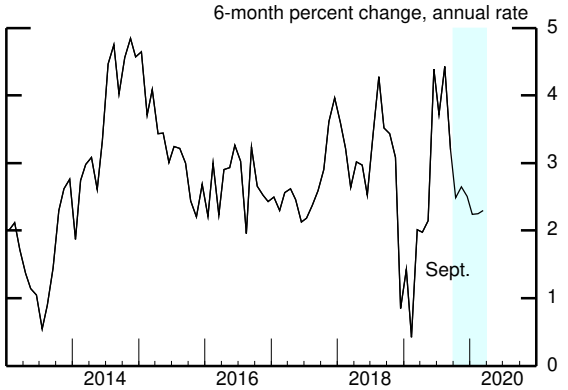

Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles




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

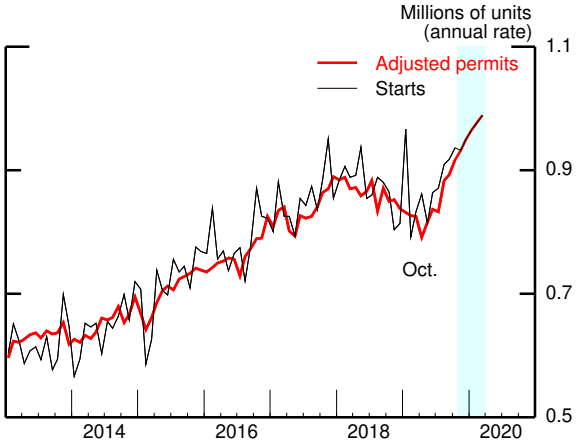
Real PCE Growth




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

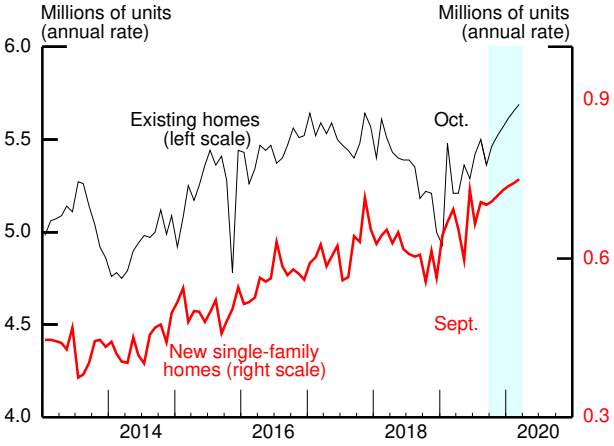
## Recent Nonfinancial Developments (2)

### Single-Family Housing Starts and Permits



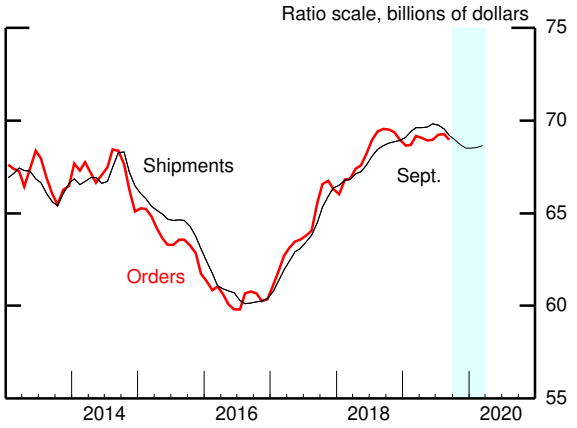

Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

### Home Sales



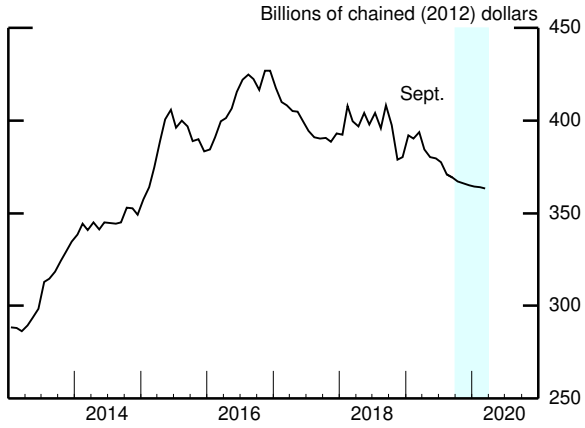

Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

### Nondefense Capital Goods ex. Aircraft



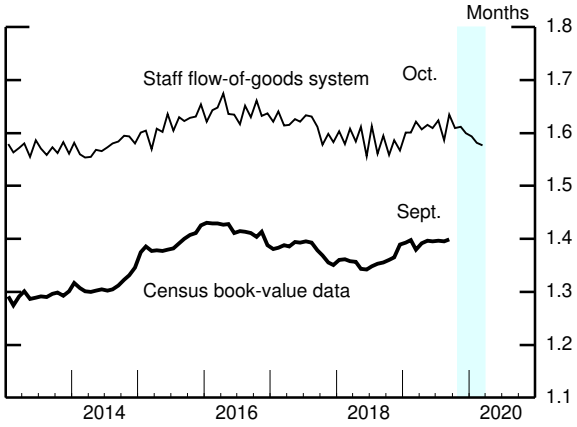

Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

### Nonresidential Construction Put in Place



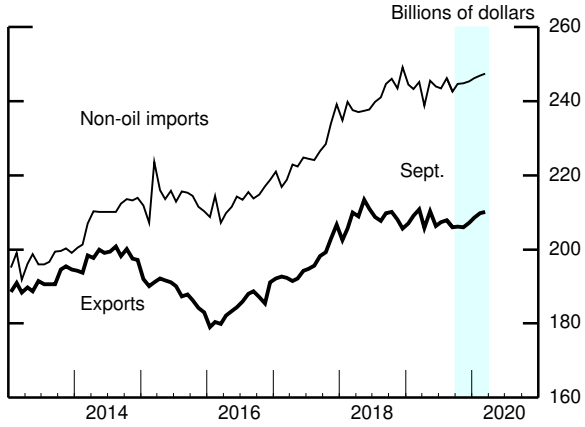

Note: Nominal CPIP deflated by BEA prices through 2019:Q2 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

### 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:Q4 Real GDP Growth**
(Percent change at annual rate from previous quarter)

| Federal Reserve entity | Type of model | Nowcast as of Nov. 26, 2019 |
|---|---|---|
| Federal Reserve Bank | | |
| Boston | • Mixed-frequency BVAR | 2.2 |
| New York | • Factor-augmented autoregressive model combination | 2.6 |
| | • Factor-augmented autoregressive model combination, financial factors only | 2.4 |
| | • Dynamic factor model | .7 |
| Cleveland | • Bayesian regressions with stochastic volatility | 1.2 |
| | • Tracking model | 1.6 |
| Atlanta | • Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow) | .6 |
| Chicago | • Dynamic factor model | 1.8 |
| | • Bayesian VARs | 1.1 |
| St. Louis | • Dynamic factor model | 1.4 |
| | • News index model | 1.6 |
| | • Let-the-data-decide regressions | 2.3 |
| Kansas City | • Accounting-based tracking estimate | 1.7 |
| Board of Governors | • Tealbook estimate (judgmental) | 1.3 |
| | • Mixed-frequency dynamic factor model (DFM-SM) | 1.3 |
| | • Mixed-frequency dynamic factor model (DFM-BM) | 2.3 |
| Memo: Median of Federal Reserve System nowcasts | | 1.6 |

of drilling and mining to the drop in oil prices since the spring. However, investment in other types of structures also decreased last quarter (as it has in all but two quarters since the end of 2016). The latest indicators point to a sizable decline in building this quarter and next, and we expect declines to continue through the rest of 2020, though at a more moderate pace.

- Net exports are expected to be a slight drag for U.S. GDP growth in the second half of this year. Export and import growth both remain weak, weighed down, at least in part, by the tariffs previously implemented by the United States and its trading partners. After flattening out in the third quarter, exports are expected to resume their decline this quarter. However, relative to the October Tealbook, exports were revised up slightly in the current and next quarters, as the ISM new export orders index (which had weighed on our previous Tealbook forecast) rebounded in October.

- Manufacturing production fell 0.6 percent in October and was 2.2 percent below its level at the end of 2018. The decline last month mainly reflected the strike at GM, but factory output excluding motor vehicles and parts also edged down. Although output growth is anticipated to temporarily pop up as GM makes up some of the lost production, factory output outside motor vehicles is forecast to only edge up in coming months. The measures of new orders from national and regional manufacturing surveys are, for the most part, consistent with little change in factory output. Comments in those surveys and in the Beige Book continue to point to past tariff increases, trade policy uncertainty, soft growth abroad, and weak BFI as the principal drags on manufacturing activity. (See the box "Manufacturing Recessions and the Global Economy" in the International Economic Developments and Outlook section for historical evidence that the spillovers from manufacturing to the rest of the economy may be limited.)

The projected gradual decline in GDP growth from 2.1 percent this year and next to 1.7 percent in 2022 is largely due to the waning support from fiscal policy. This outlook for medium-term growth is a little more positive than the October Tealbook, largely reflecting the higher projected path for equity prices. As a result, the output gap widens into the middle of next year and generally moves sideways thereafter such that it is 0.2 percentage point wider at the end of 2022 than in the October Tealbook.

## THE OUTLOOK FOR THE LABOR MARKET

The labor market remains tight. Although the pace of payroll growth has softened this year, it continues to be above the pace consistent with no change in resource utilization. The unemployment rate remains near half-century lows, and the labor force participation rate has continued to increase modestly against the backdrop of its declining trend. Looking ahead, with output growth rising a little faster than its potential rate next year and hovering around its potential rate in 2021 and 2022, we expect just a little further tightening of the labor market in this projection.

- According to currently published data, after rising 223,000 per month in 2018, nonfarm payroll employment rose at an average monthly clip of 167,000 this year through October.[4] The pace of total payroll gains in the published data has increased over the past three months relative to the first half of the year and came in notably stronger than we had been expecting.
  - As indicated in the table below, we expect that the BLS benchmark revision early next year will lower total payroll employment growth by 42,000 per month from the second quarter of 2018 through the first quarter of this year, and we estimate that it will hold down payroll growth by 16,000 per month through the end of this year. (The exhibits elsewhere in the Tealbook are based on the published BLS data.)

| | 2018 | | | | 2019 | | | | Annual averages | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | 2018 | 2019 |
| 1. Currently estimated | 228 | 243 | 189 | 233 | 174 | 152 | 188 | 156 [f] | 223 | 168 [f] |
| 2. Adjusted for expected revision | 228 | 201 | 147 | 191 | 132 | 136 | 172 | 140 | 192 | 145 |
| 3. Expected revision | -- | -42 | -42 | -42 | -42 | -16 | -16 | -16 | -32 | -23 |

- In contrast to the BLS estimate that private payrolls have increased about 150,000 per month throughout the year, our in-house measure of private nonfarm payrolls based on microdata from the payroll-processing firm ADP (which we call ADP-FRB) has shown a marked deceleration recently. This

[4] The strike of UAW workers against GM held down payroll growth by 46,000 in October, and we expect it to boost payroll growth by 46,000 in November.

measure indicates that private payrolls have risen only about 40,000 per month from August to October.

  - See the box "The Labor Market Is in a Precarious Position" for an alternative view that both the BLS methodology for incorporating firm births and deaths and the softness in the recent ADP-FRB data imply the BLS measure of payrolls is currently overstating private job gains.

- Job openings have come down from their highs over the course of the year, and survey measures of hiring conditions have shown signs of weakening relative to last year. Initial claims for unemployment insurance remain at very low levels (though they have edged up in the past couple of weeks).

- Looking ahead, we expect total payroll employment gains to move down to 156,000 per month, on average, in the fourth quarter and then to step down gradually, reaching 74,000 per month in 2022 as output decelerates; this trajectory is similar to that in the previous Tealbook.

- The unemployment rate, which has hovered near 50-year lows since the spring, stood at 3.6 percent in October. With projected output growth a bit above potential in 2020, we expect the unemployment rate to inch down to 3.5 percent by the middle of next year and to remain there through the end of 2022; this forecast is 0.1 percentage point lower than in the October Tealbook.

- The LFPR moved up further to 63.3 percent in October and has risen 0.5 percentage point the past six months. Owing to the surprising ongoing strength in the LFPR, we raised our forecast, but we continue to expect the LFPR to drift lower over the next several years, as the cyclical improvement in participation slows and the aging of the population continues to exert a downward pull.

  - In response to the string of unexpectedly strong LFPR readings, we revised up our estimate of the trend level of participation by 0.2 percentage point in 2019 and over the projection period. However, seeing no material tension between the output gap and the

## Alternative View: The Labor Market Is in a Precarious Position

Recent employment gains, as measured by the Bureau of Labor Statistics Current Employment Statistics (CES), have been strong. In this discussion, we argue that those published readings significantly overstate the health of the labor market and that the true pace of private employment gains is likely close to 70,000 jobs per month; this number is at the bottom of the range of plausible estimates of the pace needed to absorb the trend increase in labor market entrants. With employment gains having slowed sooner than in the staff's baseline forecast, the labor market is in a precarious position, as the economy has less room to weather a negative demand shock without going into a recession.

We make two arguments to support this alternative view. First, independent data from the payroll provider Automatic Data Processing, Inc. (ADP), covering roughly one-fifth of private employment, suggest that job growth has slowed more than indicated by the CES data. We might expect the ADP data to identify a slowdown in job growth more quickly and accurately than the CES, as the growth of new and young firms tends to weaken substantially during slowdowns, and new firms can appear immediately in the ADP data but not in the CES for at least one year. This difference might be why real-time ADP-FRB would have been closer to the final CES data than were real-time CES estimates during the plunge in employment in 2008.[1]

Second, CES estimates might miss a sharp slowing in employment growth in real time because of the way the CES series is constructed. The CES estimate combines job growth information from a sample of continuing establishments with a model forecast of net job creation from newly formed establishments (births) and closing establishments (deaths) based on data from 10 to 12 months earlier; this forecast component introduces lagged data into the CES series. Figure 1 reports annual preliminary birth–death model *forecasts* (in blue) and *actual* net birth–death job creation (in brown); all values are expressed as monthly averages, and a given year represents forecast and actual birth–death job creation in the 12 months leading up to March of that year (for example, the bars for 2008 refer to data from April 2007 to March 2008). Birth–death forecasts show notable persistence, making it considerably more difficult for the CES to capture labor market turning points in real time.[2]

In the 12 months leading up to March 2019, birth–death forecasts implied a contribution of 89,000 jobs per month (solid blue bar for 2019 in figure 1). However, the preliminary benchmark revision reduced the March 2019 employment level by 514,000 jobs, suggesting that forecast jobs did not materialize. If the revision was due entirely to birth–death errors, then the actual contribution of net births and deaths from April 2018 to March 2019 was about 46,000 jobs per month (dashed brown bar).[3]

What has happened since March? We estimate that birth–death forecasts have been contributing 82,000 jobs per month in the published CES data (dashed blue bar in figure 1), just below the previous year's contribution. But if actual birth–death contributions since March 2019 have been similar to the actual pace of 46,000 we have inferred for the previous 12 months—an assumption supported by Census Bureau data on business registrations (not shown)—then post-benchmark CES estimates

Note: This alternative view was prepared by Ryan Decker and Adrian Hamins-Puertolas.

[1] See Tomaz Cajner, Leland Crane, Ryan Decker, Adrian Hamins-Puertolas, and Christopher Kurz (2019), "Improving the Accuracy of Economic Measurement with Multiple Data Sources: The Case of Payroll Employment Data," Finance and Economics Discussion Series 2019-065 (Washington: Board of Governors of the Federal Reserve System, August), https://doi.org/10.17016/FEDS.2019.065. Note that the staff did not have access to ADP data in 2008.

[2] See Mark Loewenstein and Matthew Dey (2017), "A Quarterly Benchmarking Procedure for the Current Employment Statistics Program," *Monthly Labor Review* (Washington: Bureau of Labor Statistics, November), https://doi.org/10.21916/mlr.2017.28.

[3] Birth–death errors often compose a large share of benchmark revisions, but our assumption that the entire 2019 revision is due to birth–death error is intentionally strong.

overstate job growth by about 36,000 jobs per month. Our proposed adjustment of 36,000 is larger than the staff's post-benchmark "guesstimate," which assumes job growth is overstated by just 16,000 jobs per month.

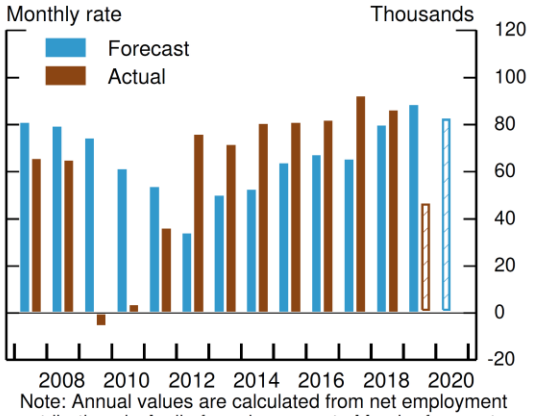
Our alternative view of underlying job growth is informed by the CES preliminary benchmark revision, ADP-FRB data, and the likely revisions to CES data arising from overestimation of birth–death job creation—that is, downward revisions of roughly 36,000 jobs per month since March 2019. Figure 2 shows this alternative view. The black line shows published CES private job growth, adjusted for the October General Motors strike. The dashed red line shows our adjusted CES series, where the March preliminary benchmark revision is taken on board and the data for April through October are reduced by 36,000 per month based on our previously discussed estimates (note that the staff's preliminary benchmark guesstimate would lie between the black and dashed red lines). The dashed green line is an adjusted version of the staff's ADP-FRB series, where we have taken on board the preliminary benchmark revision according to routine staff methods rather than waiting for the official release.

Elsewhere in the Tealbook, the staff reports a "pooled estimate," combining signals from the CES and ADP-FRB without accounting for the preliminary benchmark revision. The blue line in figure 2 is an alternative pooled estimate based on the adjusted CES and ADP-FRB data depicted by the dashed lines. Combining these adjusted signals, we estimate that underlying private employment growth is 71,000 jobs per month (blue line).[4]

Other evidence that there has been a pronounced slowing in job growth is provided by the leisure and hospitality sector, which made the largest contribution to the preliminary benchmark revision. This sector, which is often heavily reliant on birth–death contributions, has been weaker in the ADP data than in the CES data in recent months and has seen a large decline in job openings this year.

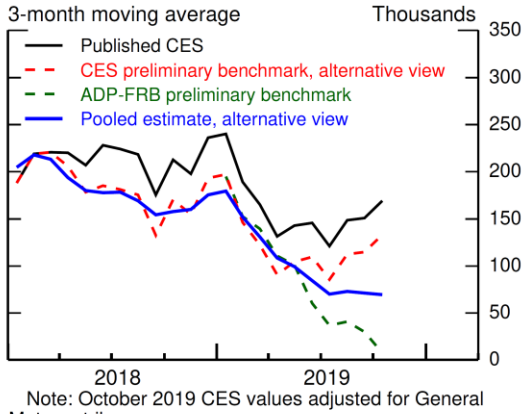
At first glance, recent readings on the unemployment rate and initial unemployment claims suggest a more optimistic view, but these indicators are not dispositive. The unemployment rate is low, but it has been roughly flat for some time—consistent with payroll growth that has not exceeded a breakeven pace. Claims may remain low because employers are acting first on the hiring margin: job openings, although at high levels, have declined markedly in recent months, and hiring has leveled off. The labor market is in a precarious position: True employment growth is barely sufficient to accommodate trend labor force growth, and a negative aggregate demand shock during the next year could swiftly raise unemployment and create significant recession risk.

**Figure 1. CES Net Birth-Death Private Employment Contributions**




Note: Annual values are calculated from net employment contributions in April of previous year to March of current year.
Source: BLS; authors' calculations.

**Figure 2. Alternative View of Private Employment Growth**



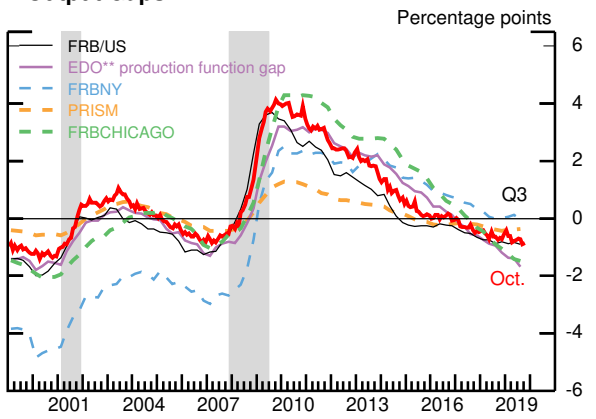

Note: October 2019 CES values adjusted for General Motors strike.
Source: BLS; authors' calculations.

[4] For details on the pooled estimate and evidence that combining the CES and ADP-FRB data improves tracking of the labor market, see Cajner and others (2019) cited in footnote 1.

# Alternative Measures of Slack

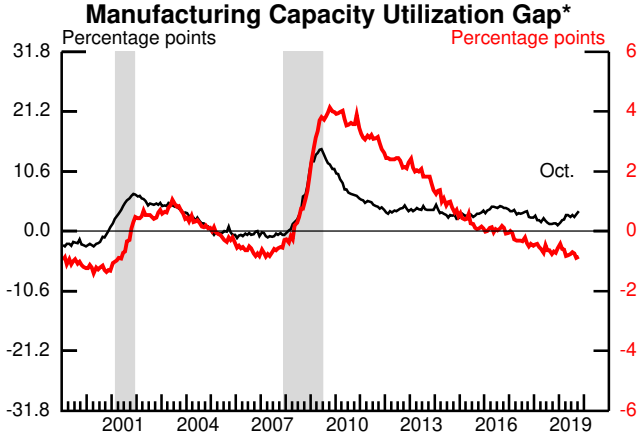
The red line in each panel is the staff's measure of the unemployment rate gap (right axis).

## Output Gaps



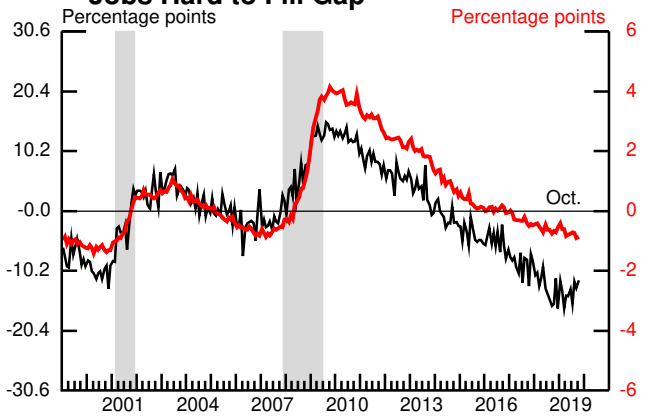

** EDO is Estimated, Dynamic, Optimization-based model.
Source: Federal Reserve Board; PRISM: Federal Reserve Bank of Chicago; Federal Reserve Bank of Philadelphia, PRISM Model Documentation (June 2011); FRBNY: Federal Reserve Bank of New York Staff Report 618 (May 2013, revised April 2014).

## Manufacturing Capacity Utilization Gap*



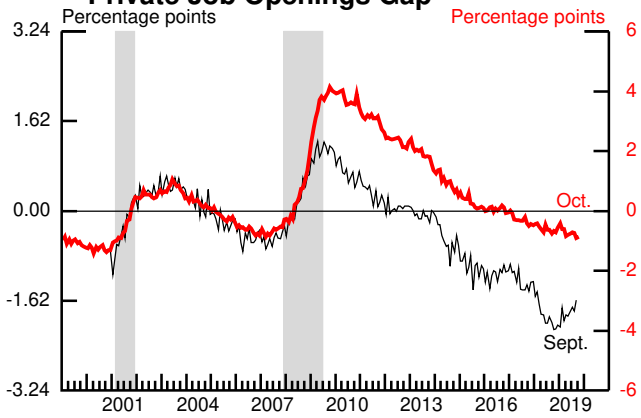

Source: Federal Reserve Board.

## Jobs Hard to Fill Gap*



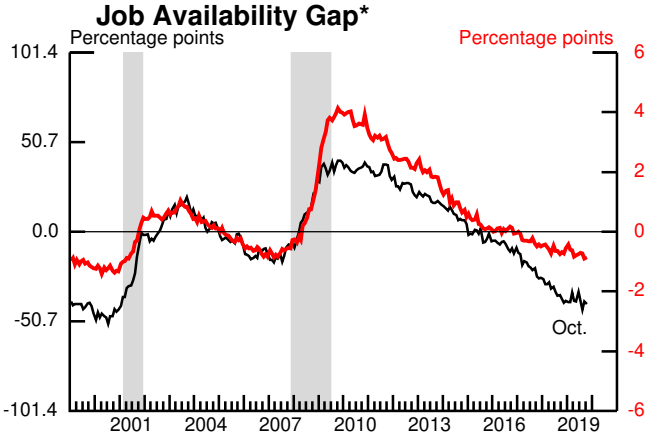

Note: Percent of small businesses surveyed with at least one "hard to fill" job opening. Seasonally adjusted by Federal Reserve Board staff.
Source: National Federation of Independent Business, Small Business Economic Trends Survey.

## Private Job Openings Gap*



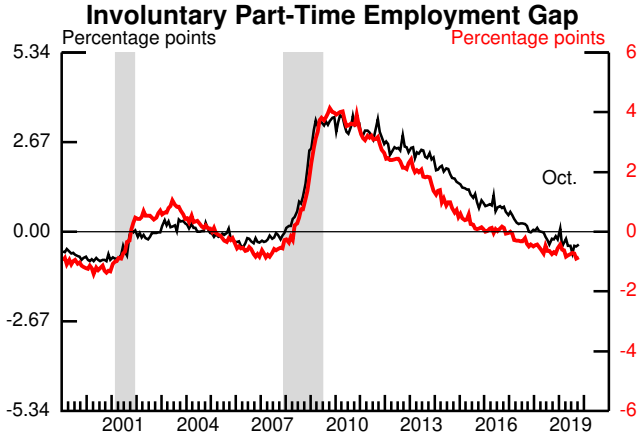

Note: Job openings rate is the number of job openings divided by employment plus job openings.
Source: Job Openings and Labor Turnover Survey; U.S. Department of Labor, Bureau of Labor Statistics, Current Employment Statistics.

## 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.

unemployment rate gap, we opted to leave our assumptions for potential output unrevised.[5]

- After having surged anomalously in the first half of the year, productivity growth in the business sector stalled in the third quarter—largely as expected. Over the four quarters ending in the third quarter, productivity rose 1.6 percent, up from 1.2 percent in the year-earlier period. We expect productivity to rise 1.3 percent per year over the next few years.

## THE OUTLOOK FOR INFLATION

Incoming data on price inflation, including PCE prices through September and the October CPI and PPI, were slightly below our expectations. We now estimate that core PCE prices rose 1.6 percent over the 12 months ending in October, a tenth lower than in the October Tealbook. The downward surprise in September PCE prices and much of the miss in the October CPI were in categories from which we take little signal for our monthly near-term forecast. We expect the 12-month change in core prices to hover around 1.6 percent over the rest of the year and then to pick up to 1.9 percent by March of next year, as the weak readings from early this year drop out of the 12-month calculation. This projection is 0.1 percentage point lower than in the October forecast.

Over the next few years, we expect core PCE price inflation to run at 1.9 percent—a touch higher than both our estimate of its underlying trend of 1.8 percent and our previous forecast—as the boost to inflation from tight resource utilization in this projection is not fully offset by a drag on import prices from the rising dollar. With energy prices projected to fall further next year, total PCE inflation runs a bit below core inflation in 2020 and then is projected to be in line with core inflation through 2022.

- We expect that the effective price for imported core goods—which includes the effects of tariffs—will rise about 1.9 percent in the second half of this year, boosted by past tariff increases.[6] This increase is 0.4 percentage point less than projected in the October Tealbook, reflecting larger-than-expected declines in prices for imported foods and industrial supplies. As a result of an

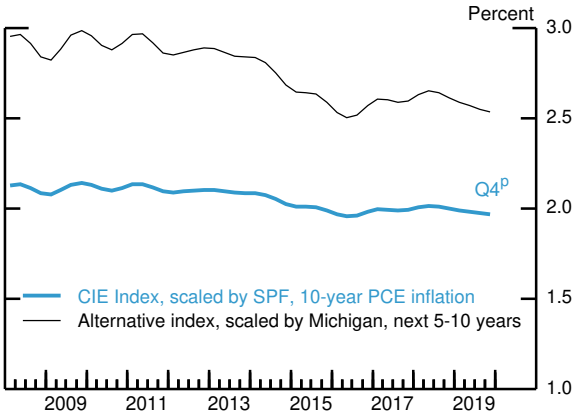
[5] We lowered our estimate of the trend in weekly hours by an amount that offsets the implications of the higher trend LFPR, as the workweek has been somewhat lower than we could explain over the past several quarters.

[6] The middle-right panel of the exhibit "Inflation Developments and Outlook (2)" now shows both core import prices and our estimate of effective core import prices.

Domestic Econ Devel & Outlook

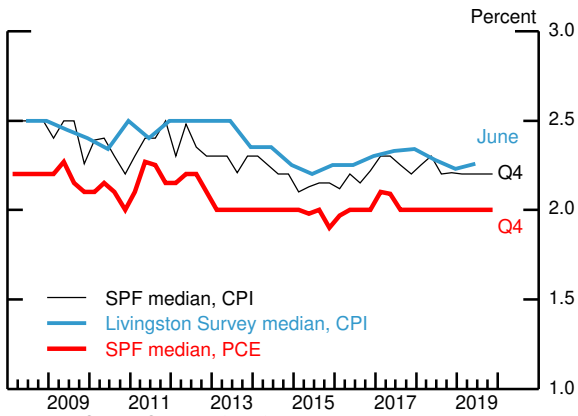
# Survey Measures of Longer-Term Inflation Expectations

## Index of Common Inflation Expectations



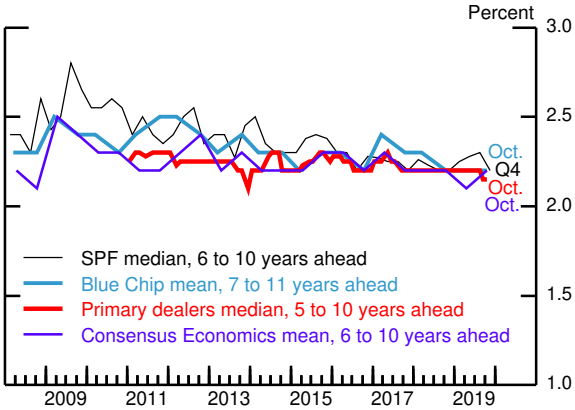

p Preliminary estimate based on data available to date.
Note: Index of 21 inflation expectations indicators.
Source: Staff calculations.

## Next 10 Years



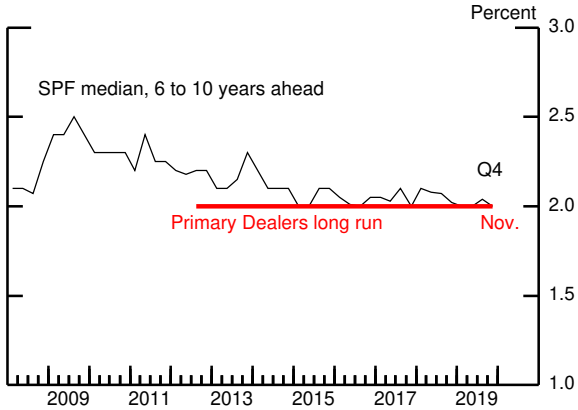

Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

## CPI Forward Expectations



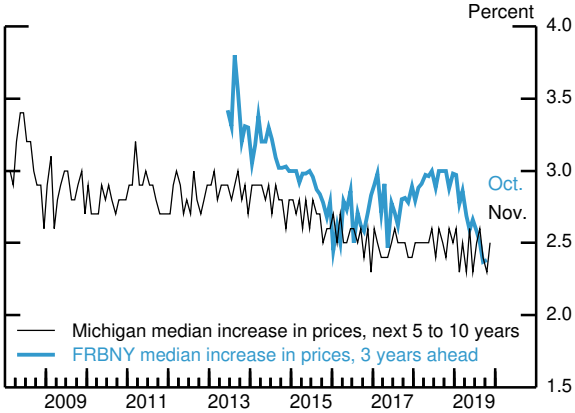

Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

## PCE Forward Expectations



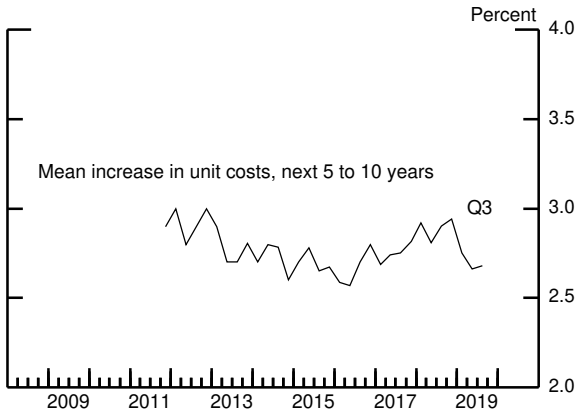

Source: Federal Reserve Bank of Philadelphia; Federal Reserve Bank of New York.

## 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.

appreciating dollar and no further assumed tariff increases, effective core import price inflation after this year is expected to be subdued, running at just 1 percent.

- Median long-run inflation expectations from the Michigan survey rose 0.2 percentage point to 2.5 percent in November, the middle of the narrow band it has traversed the past year. TIPS-based measures of longer-term inflation compensation also moved up a bit since the time of the previous Tealbook. The FRBNY Survey of Consumer Expectations measure of median three-year-ahead expected inflation was unchanged in October at its historical low.

    - The new staff common inflation expectations (CIE) index, which synthesizes these and other measures of inflation expectations, points to expectations as having held fairly steady since 2016. Two variants of the CIE index are now included in the "Survey Measures of Longer-Term Inflation Expectations" Tealbook exhibit.

- The incoming data suggest that labor compensation continues to rise moderately and roughly in line with what we expected in the October Tealbook. Consistent with no material tightening in the labor market over the forecast period, we project further moderate wage growth over the medium term.

    - The employment cost index (ECI) rose 2.7 percent over the 12 months ending in September, in line with the prediction from our model that uses productivity, slack, and inflation. We continue to expect the ECI to rise at that pace over the projection period.

    - Based on the preliminary release, compensation per hour (CPH) in the business sector increased a strong 4.6 percent over the four quarters ending in the third quarter.[7] However, we expect the four-quarter change in CPH to drop back early next year, as the anomalously large

[7] The GDP release on November 27 will include a revision of wages and salaries for the second quarter, which could change the contour (and our interpretation) of compensation. The staff's estimate of compensation gains based on the microdata from ADP has been much more subdued than CPH the past couple of quarters, though we do not yet have a lot of experience analyzing this ADP-based measure in real time.

first-quarter reading drops out, and to rise 3.6 percent per year through the end of the forecast. This pace is a bit faster than in the October Tealbook, reflecting the slightly tighter resource utilization in this forecast.

- The 12-month change in average hourly earnings, at 3 percent in October, has edged down, on net, over the course of this year.

## THE LONG-TERM OUTLOOK

- The natural rate of unemployment is still assumed to remain at 4.4 percent through the long term. Potential output growth is assumed to slow to its long-run value of 1.7 percent in 2023, as the boost to potential growth from the 2017 tax cuts wanes.

- The real long-run equilibrium federal funds rate is still assumed to be 0.5 percent, and the nominal yield on 10-year Treasury securities is 3.0 percent in the longer run.

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

- As monetary policy tightens, GDP growth slows from 1.7 percent in 2022 to 1.4 percent in 2024 and 2025 before rising gradually to its long-run value thereafter. The unemployment rate moves up gradually from 3.5 percent at the end of 2022 toward its assumed natural rate in subsequent years. Core PCE price inflation increases from 1.9 percent at the end of the medium term to its long-run value of 2.0 percent in 2024.

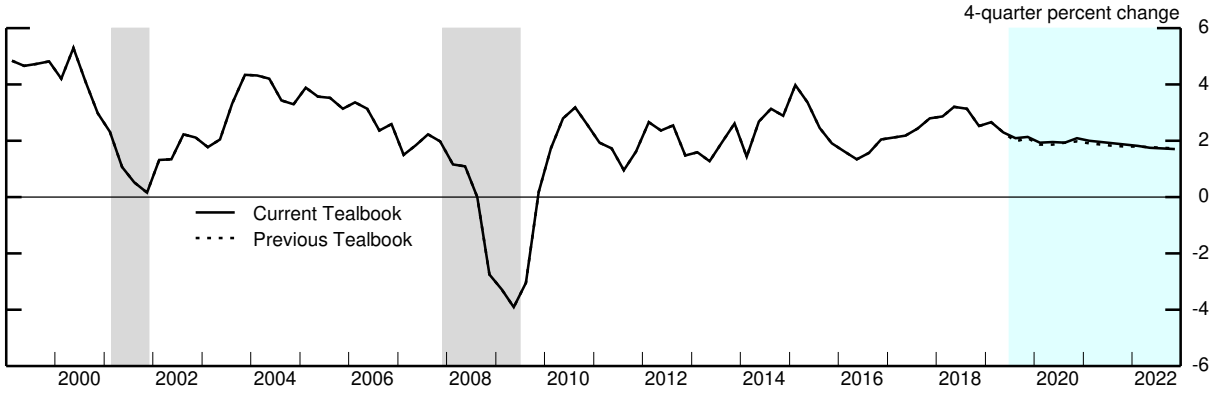
- Given the outlook for inflation and resource utilization, the nominal federal funds rate slightly overshoots its long-run value of 2.5 percent over the 2023–25 period.

## 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** | **2.6** | **1.7** | **2.1** | **2.1** | **1.9** | **1.7** |
| *Previous Tealbook* | *2.5* | *2.6* | *1.6* | *2.1* | *2.0* | *1.8* | *1.7* |
| Final sales | 2.2 | 2.8 | 1.9 | 2.3 | 2.4 | 1.9 | 1.7 |
| *Previous Tealbook* | *2.2* | *2.8* | *1.8* | *2.3* | *2.2* | *1.8* | *1.6* |
| Personal consumption expenditures | 2.6 | 2.8 | 2.5 | 2.7 | 2.6 | 2.4 | 2.3 |
| *Previous Tealbook* | *2.6* | *2.8* | *2.6* | *2.7* | *2.5* | *2.4* | *2.3* |
| Residential investment | -4.4 | -2.0 | 5.2 | 1.6 | 3.9 | -3.0 | -3.7 |
| *Previous Tealbook* | *-4.4* | *-2.0* | *5.3* | *1.6* | *4.6* | *-2.9* | *-3.8* |
| Nonresidential structures | 2.6 | -3.9 | -10.4 | -7.2 | -2.5 | -.8 | -1.8 |
| *Previous Tealbook* | *2.6* | *-3.9* | *-8.5* | *-6.2* | *-2.6* | *-1.3* | *-2.1* |
| Equipment and intangibles | 6.8 | 3.3 | 1.7 | 2.5 | 2.7 | 3.2 | 1.9 |
| *Previous Tealbook* | *6.8* | *3.3* | *1.0* | *2.1* | *2.0* | *3.0* | *1.7* |
| Federal purchases | 2.7 | 5.2 | 2.4 | 3.8 | 1.7 | .2 | .4 |
| *Previous Tealbook* | *2.7* | *5.2* | *2.1* | *3.6* | *1.9* | *.2* | *.7* |
| State and local purchases | .9 | 3.0 | .5 | 1.8 | 1.0 | 1.0 | 1.1 |
| *Previous Tealbook* | *.9* | *3.0* | *.5* | *1.8* | *1.0* | *1.0* | *1.1* |
| Exports | .4 | -.9 | -.2 | -.6 | 2.7 | 3.3 | 3.5 |
| *Previous Tealbook* | *.4* | *-.9* | *-.4* | *-.6* | *2.7* | *3.3* | *3.6* |
| Imports | 3.2 | -.8 | .6 | -.1 | 2.0 | 3.1 | 3.2 |
| *Previous Tealbook* | *3.2* | *-.8* | *1.1* | *.2* | *2.1* | *3.0* | *3.2* |
| | Contributions to change in real GDP (percentage points) | | | | | | |
| Inventory change | .3 | -.2 | -.2 | -.2 | -.3 | .0 | .0 |
| *Previous Tealbook* | *.3* | *-.2* | *-.1* | *-.2* | *-.2* | *.0* | *.1* |
| Net exports | -.4 | .0 | -.1 | -.1 | .0 | -.1 | -.1 |
| *Previous Tealbook* | *-.4* | *.0* | *-.2* | *-.1* | *.0* | *-.1* | *.0* |

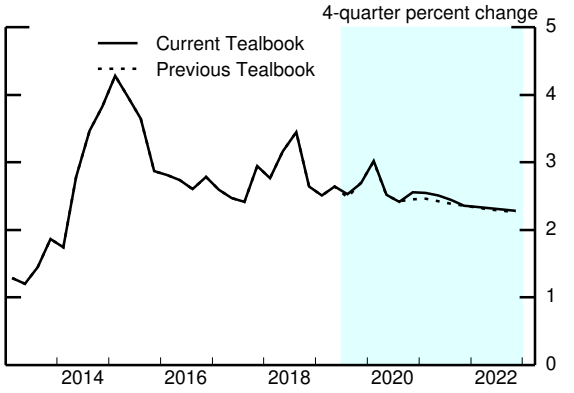
Real GDP



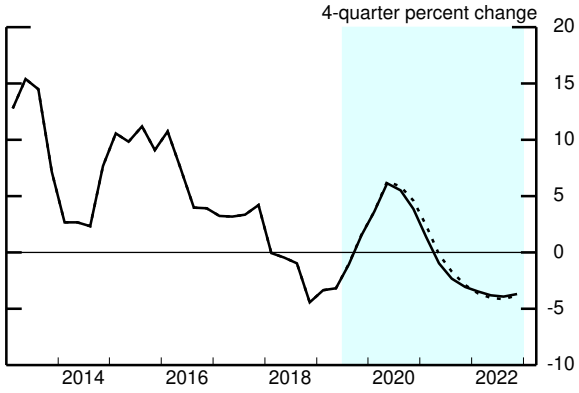

Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

# Components of Final Demand

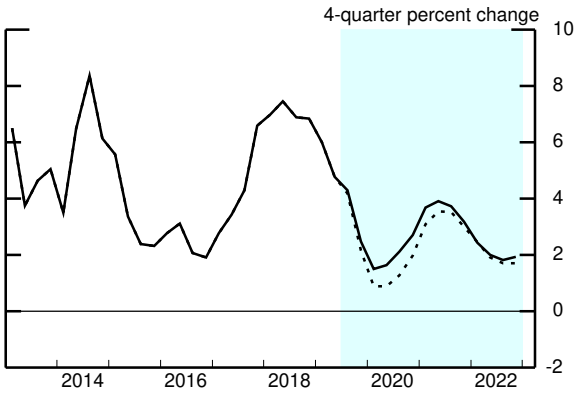
Personal Consumption Expenditures



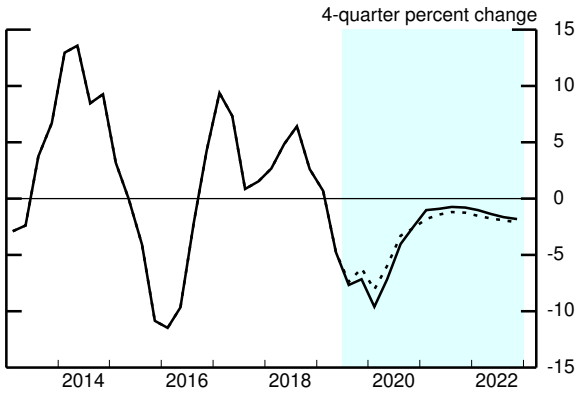

Residential Investment



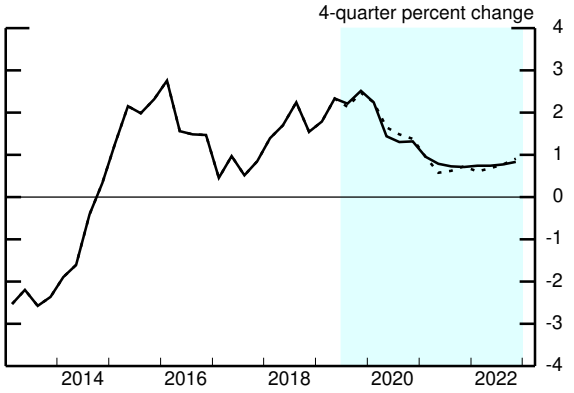

Equipment and Intangibles



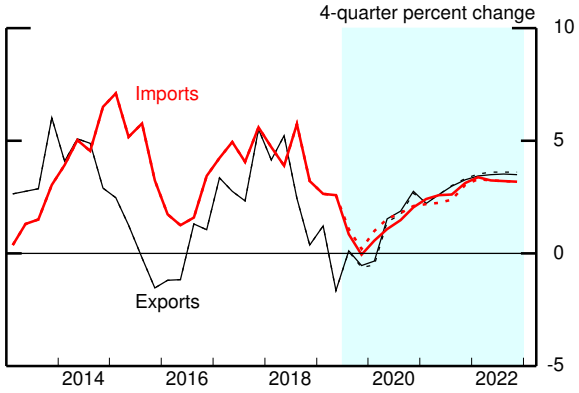

Nonresidential Structures




Government Consumption and Investment



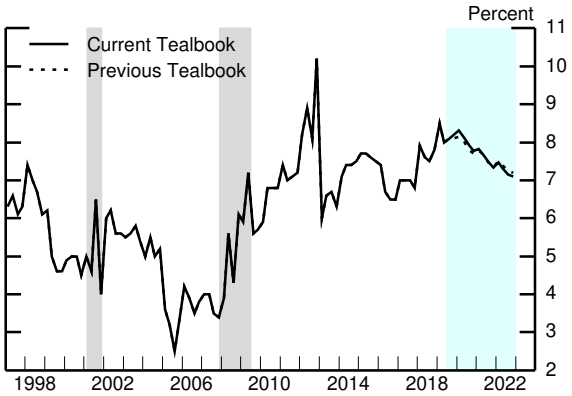

Exports and Imports




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

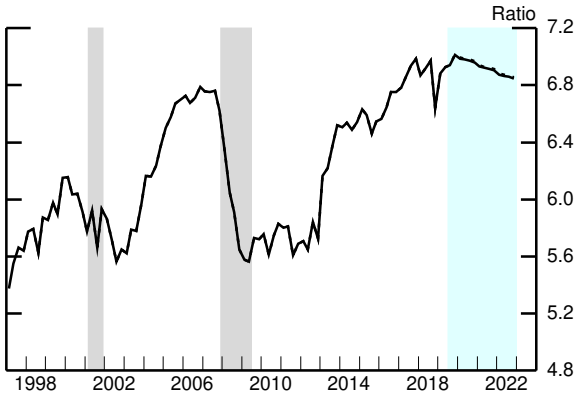
# Aspects of the Medium-Term Projection

## Personal Saving Rate



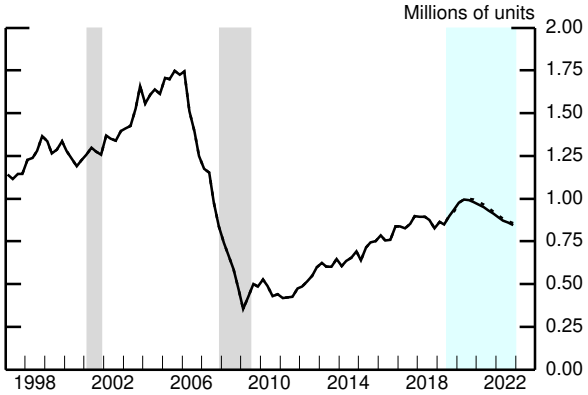

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Wealth-to-Income Ratio



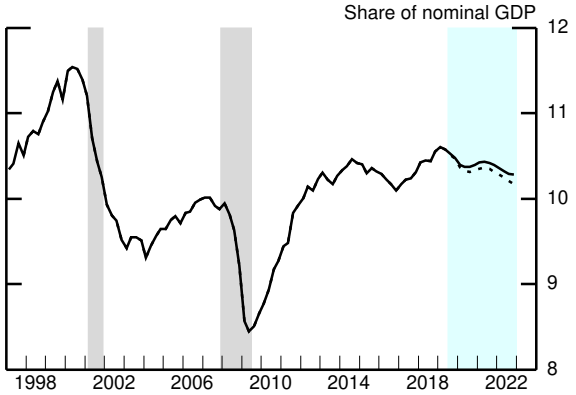

Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Single-Family Housing Starts



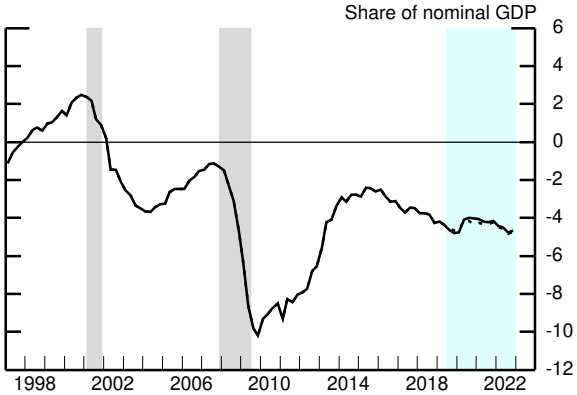

Source: U.S. Census Bureau.

## Equipment and Intangibles Spending



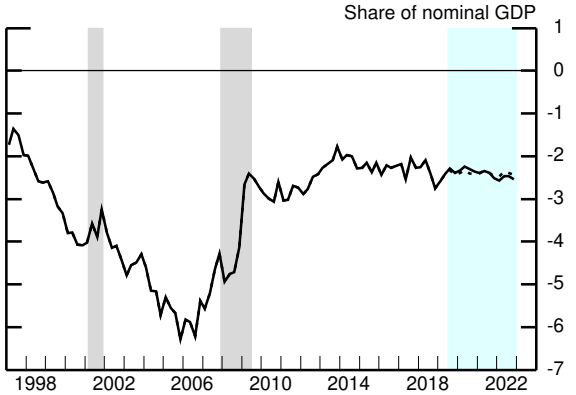

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

## Federal Surplus/Deficit




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

## Current Account Surplus/Deficit



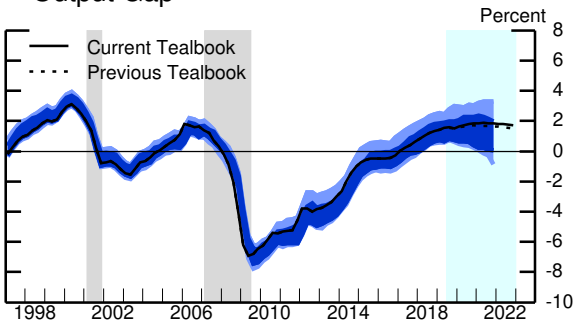

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

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

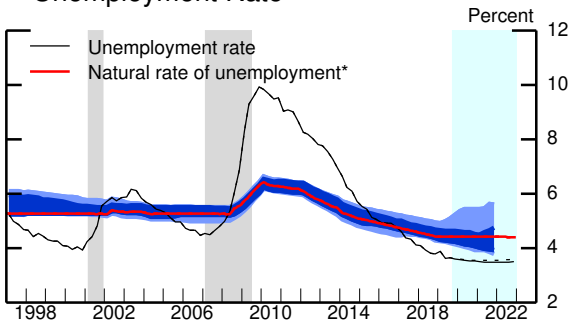
## Output Gap




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.

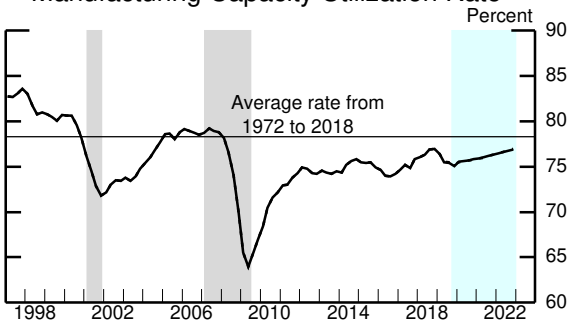
## Unemployment Rate




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.

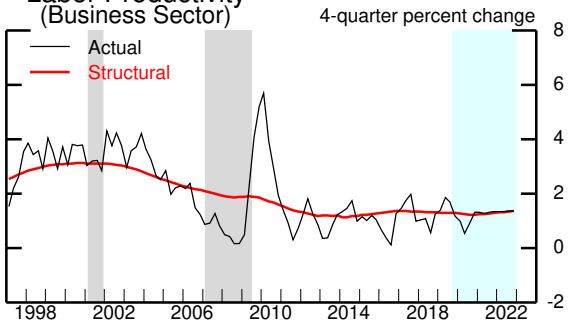
Source: Various macroeconomic data; staff assumptions.

## 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 | 1.8 | 1.8 |
| *Previous Tealbook* | *3.1* | *3.6* | *2.7* | *1.9* | *1.5* | *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* | *1.3* | *1.3* | *1.3* | *1.2* | *1.3* | *1.4* |
| Capital deepening | .7 | 1.4 | 1.0 | .5 | .8 | .7 | .7 | .5 | .5 | .4 |
| 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 | .6 | .5 |
| *Previous Tealbook* | *1.5* | *1.3* | *.8* | *.5* | *.4* | *.9* | *.3* | *.6* | *.5* | *.5* |
| Labor force participation | .4 | -.1 | -.2 | -.4 | -.4 | -.2 | -.1 | -.2 | -.2 | -.3 |
| *Previous Tealbook* | *.4* | *-.1* | *-.2* | *-.4* | *-.5* | *-.2* | *-.2* | *-.2* | *-.2* | *-.3* |
| Memo: | | | | | | | | | | |
| Output gap[3] | -1.2 | 2.5 | .3 | -5.4 | .6 | 1.4 | 1.5 | 1.8 | 1.8 | 1.7 |
| *Previous Tealbook* | *-1.2* | *2.5* | *.3* | *-5.4* | *.6* | *1.4* | *1.5* | *1.7* | *1.6* | *1.5* |

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 | 172 | 168 | 130 | 95 | 74 |
| *Previous Tealbook* | *223* | *163* | *141* | *152* | *116* | *89* | *68* |
| Private employment[1] | 215 | 156 | 151 | 153 | 121 | 85 | 64 |
| *Previous Tealbook* | *215* | *156* | *120* | *138* | *107* | *79* | *58* |
| Labor force participation rate[2] | 63.0 | 62.9 | 63.2 | 63.2 | 63.0 | 62.8 | 62.6 |
| *Previous Tealbook* | *63.0* | *62.9* | *63.1* | *63.1* | *62.8* | *62.6* | *62.3* |
| Civilian unemployment rate[2] | 3.8 | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 |
| *Previous Tealbook* | *3.8* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* |
| Employment-to-population ratio[2] | 60.6 | 60.6 | 60.9 | 60.9 | 60.8 | 60.7 | 60.4 |
| *Previous Tealbook* | *60.6* | *60.6* | *60.8* | *60.8* | *60.5* | *60.3* | *60.1* |

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 | 1.4 | 1.5 | 1.5 | 1.7 | 1.9 | 1.9 |
| *Previous Tealbook* | *1.9* | *1.4* | *1.5* | *1.4* | *1.7* | *1.8* | *1.8* |
| Food and beverages | .5 | 1.8 | .4 | 1.1 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *.5* | *1.8* | *.4* | *1.1* | *2.3* | *2.3* | *2.3* |
| Energy | 3.9 | -.7 | -2.7 | -1.7 | -2.8 | .4 | 1.0 |
| *Previous Tealbook* | *3.9* | *-.7* | *-6.5* | *-3.6* | *-2.9* | *.5* | *1.1* |
| Excluding food and energy | 1.9 | 1.5 | 1.8 | 1.6 | 1.9 | 1.9 | 1.9 |
| *Previous Tealbook* | *1.9* | *1.5* | *2.0* | *1.7* | *1.8* | *1.8* | *1.8* |
| Prices of core goods imports[1] | .2 | -1.1 | -.7 | -.9 | 1.0 | 1.0 | .9 |
| *Previous Tealbook* | *.2* | *-1.1* | *-.3* | *-.7* | *1.0* | *1.0* | *.9* |

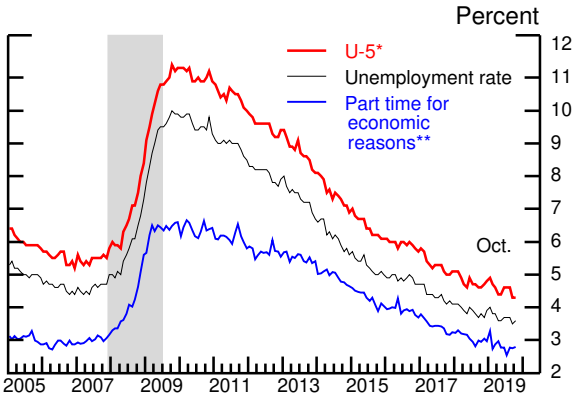
| | Sept. 2019 | Oct. 2019[2] | Nov. 2019[2] | Dec. 2019[2] | Jan. 2020[2] | Feb. 2020[2] | Mar. 2020[2] |
|---|---|---|---|---|---|---|---|
| *12-month percent change* | | | | | | | |
| PCE chain-weighted price index | 1.3 | 1.4 | 1.5 | 1.5 | 1.7 | 1.8 | 1.7 |
| *Previous Tealbook* | *1.4* | *1.4* | *1.5* | *1.5* | *1.7* | *1.8* | *1.7* |
| Excluding food and energy | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 1.8 | 1.9 |
| *Previous Tealbook* | *1.7* | *1.7* | *1.7* | *1.7* | *1.8* | *1.9* | *2.0* |

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

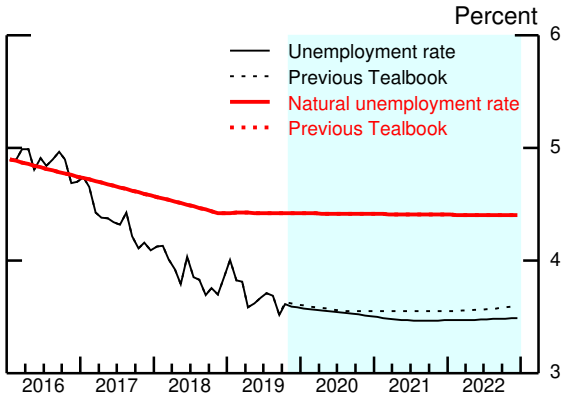
# Labor Market Developments and Outlook (1)

## Measures of Labor Underutilization



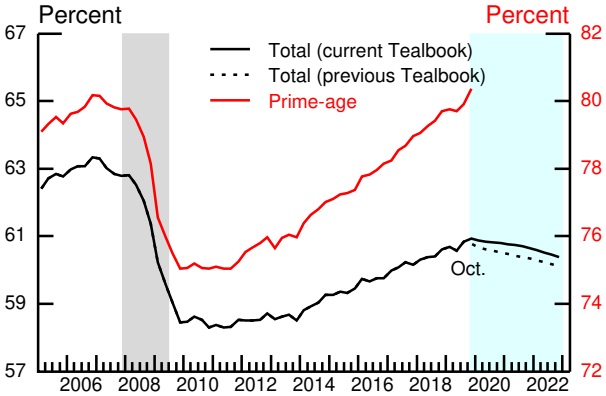

* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Unemployment Rate



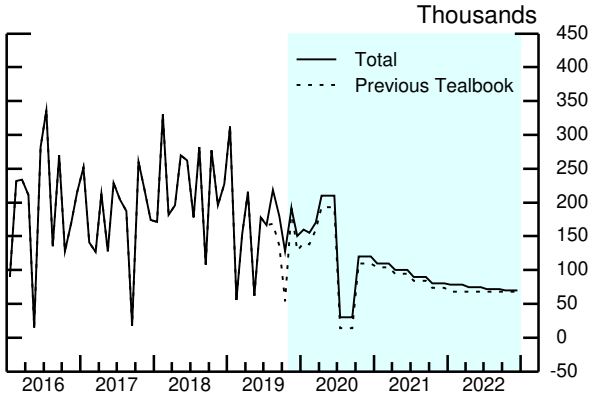

Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Employment-to-Population Ratio



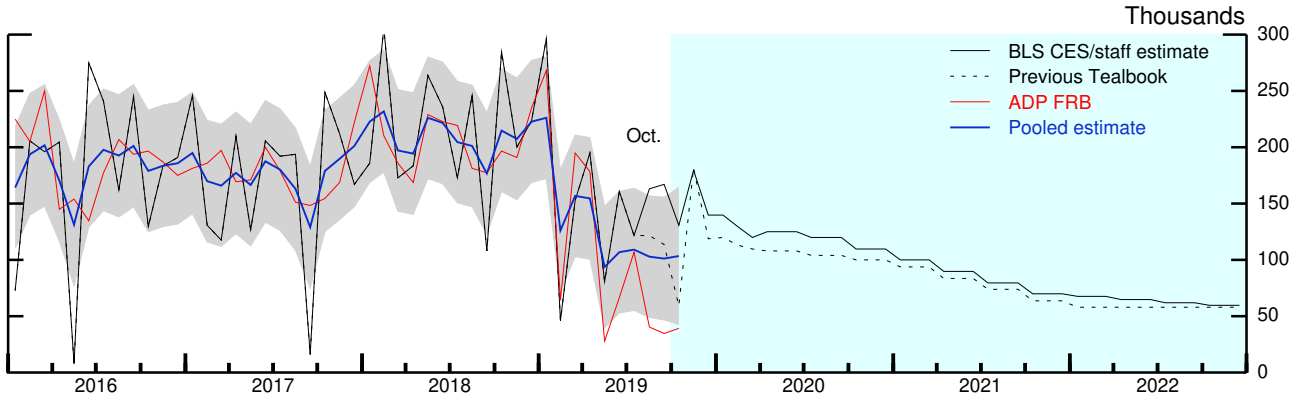

Note: Every curve except the one for the prime-age population corresponds with the left axis.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

## Change in Total Payroll Employment




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

## Change in Private Payroll Employment

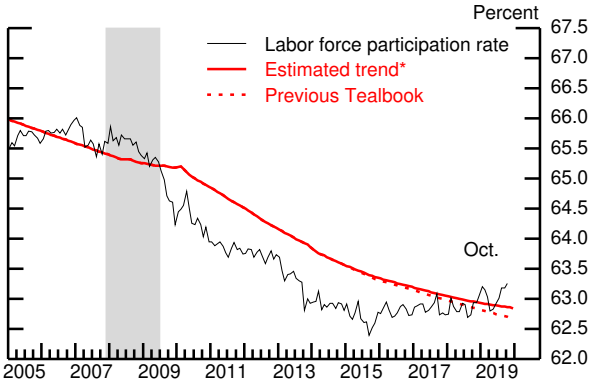


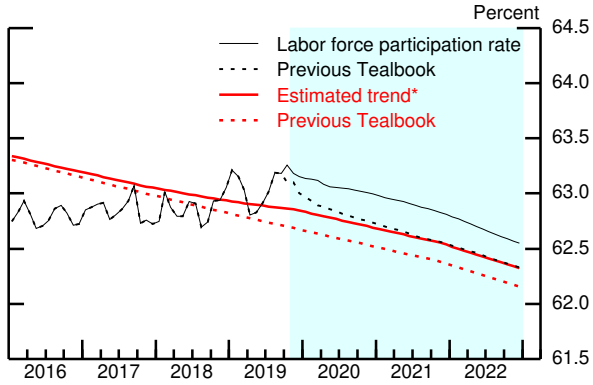

Note: Gray shaded area around blue line is 90 percent confidence interval around pooled estimate.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff calculations using microdata from ADP.

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)

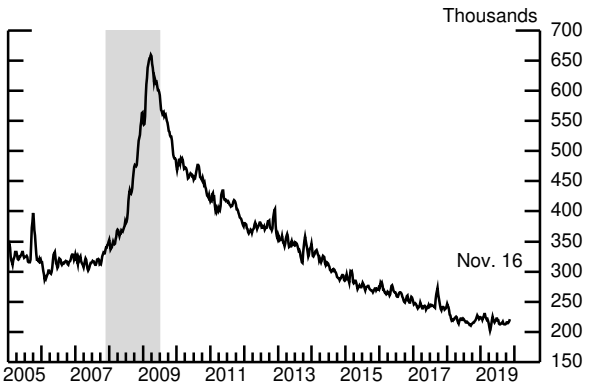
## Labor Force Participation Rate



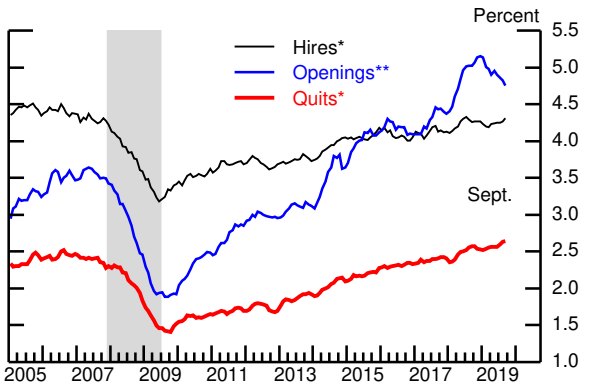

Note: Published data adjusted by staff to account for changes in population weights.
* Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

## Initial Unemployment Insurance Claims



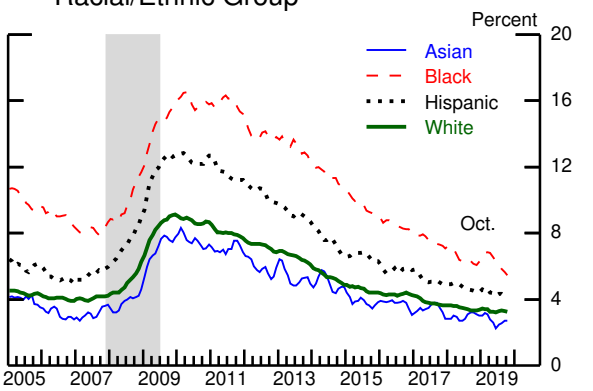

Note: 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

## Hires, Quits, and Job Openings



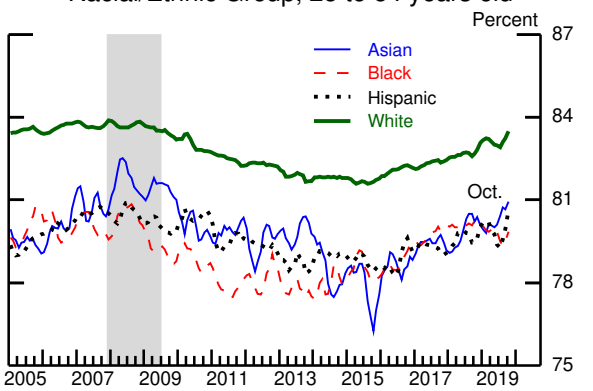

* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

## 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

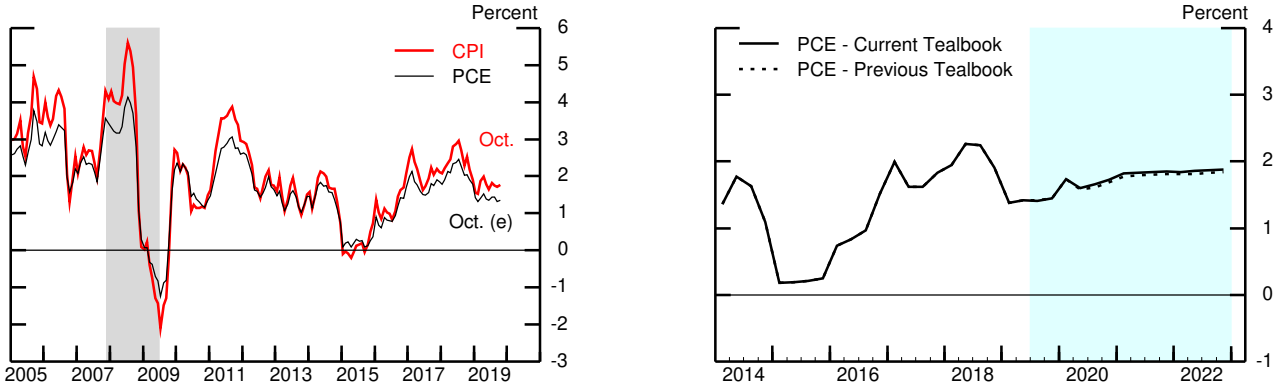



Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

# Inflation Developments and Outlook (1)

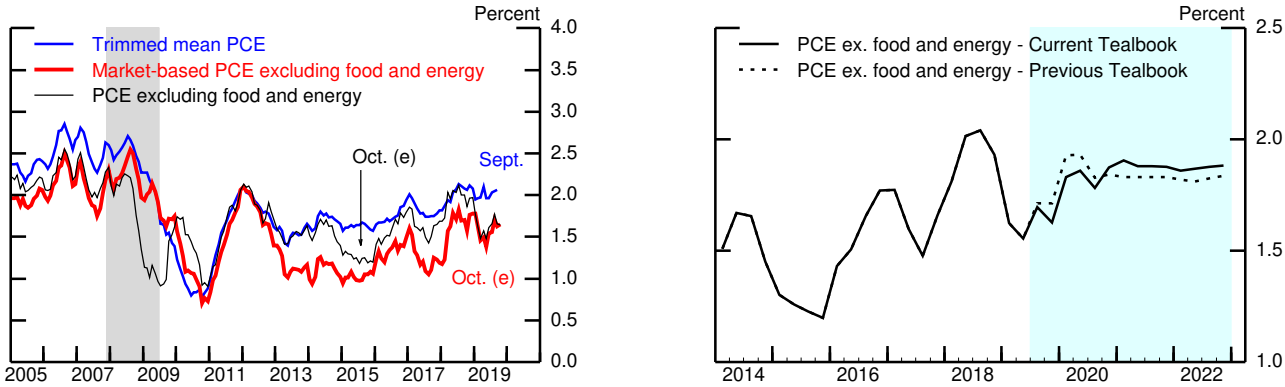
(Percent change from year-earlier period)

## Headline Consumer Price Inflation



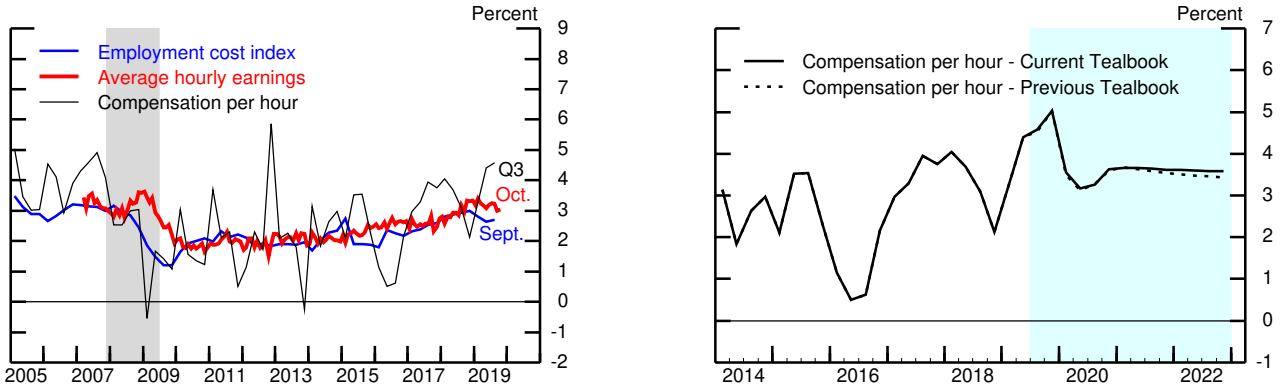

Note: PCE prices from August to October 2019 are staff estimates (e).
Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

## Measures of Core PCE Price Inflation




Note: Core PCE prices from August to October 2019 are staff estimates (e).
Source: For trimmed mean PCE, Federal Reserve Bank of Dallas; otherwise, U.S. Department of Commerce, Bureau of Economic Analysis.

## Labor Cost Growth



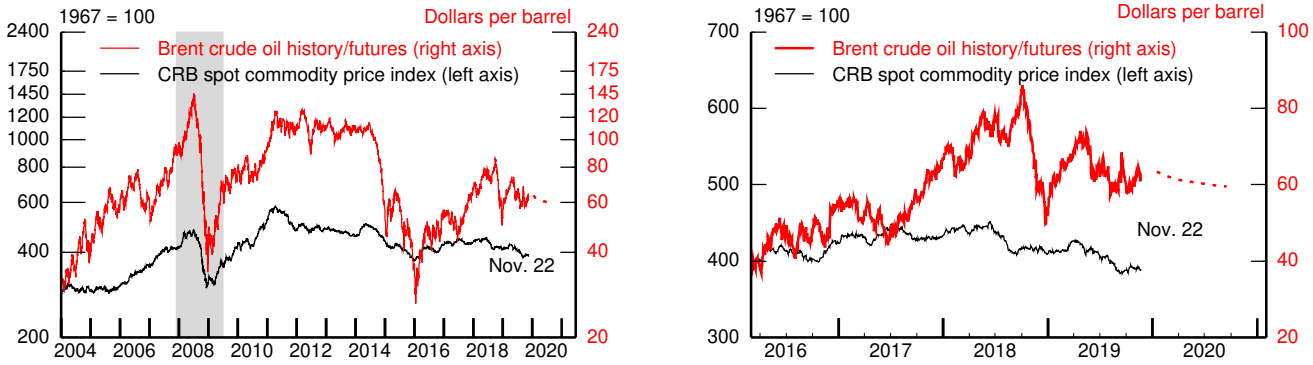

Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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)

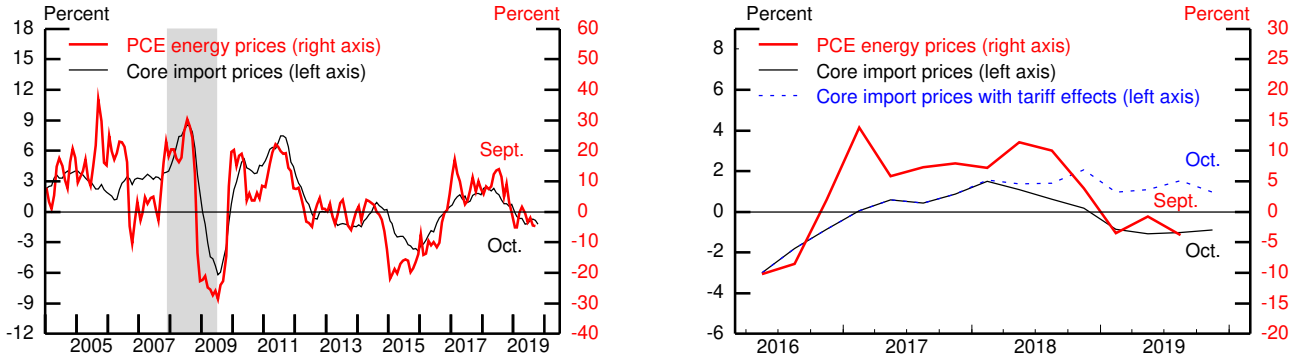
(Percent change from year-earlier period, except as noted)

## Commodity and Oil Price Levels



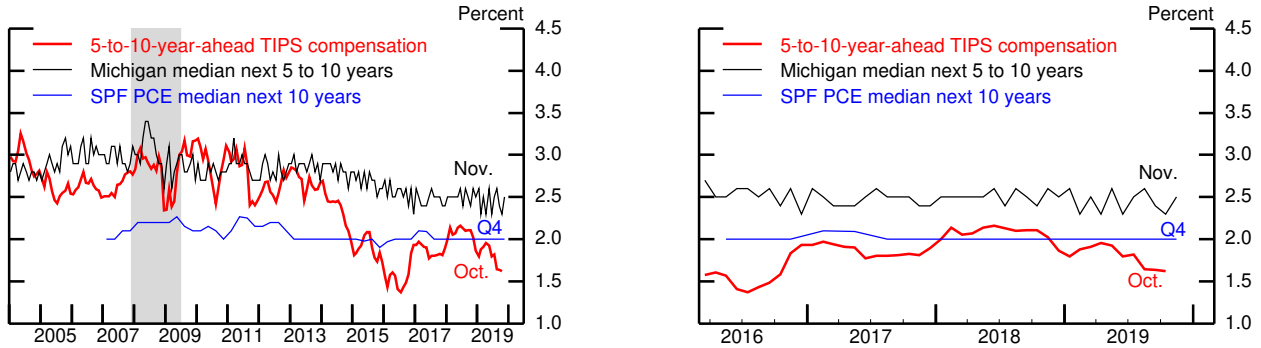

Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

## 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. For core import prices with a tariff effect, Federal Reserve Board staff calculations.

## 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.

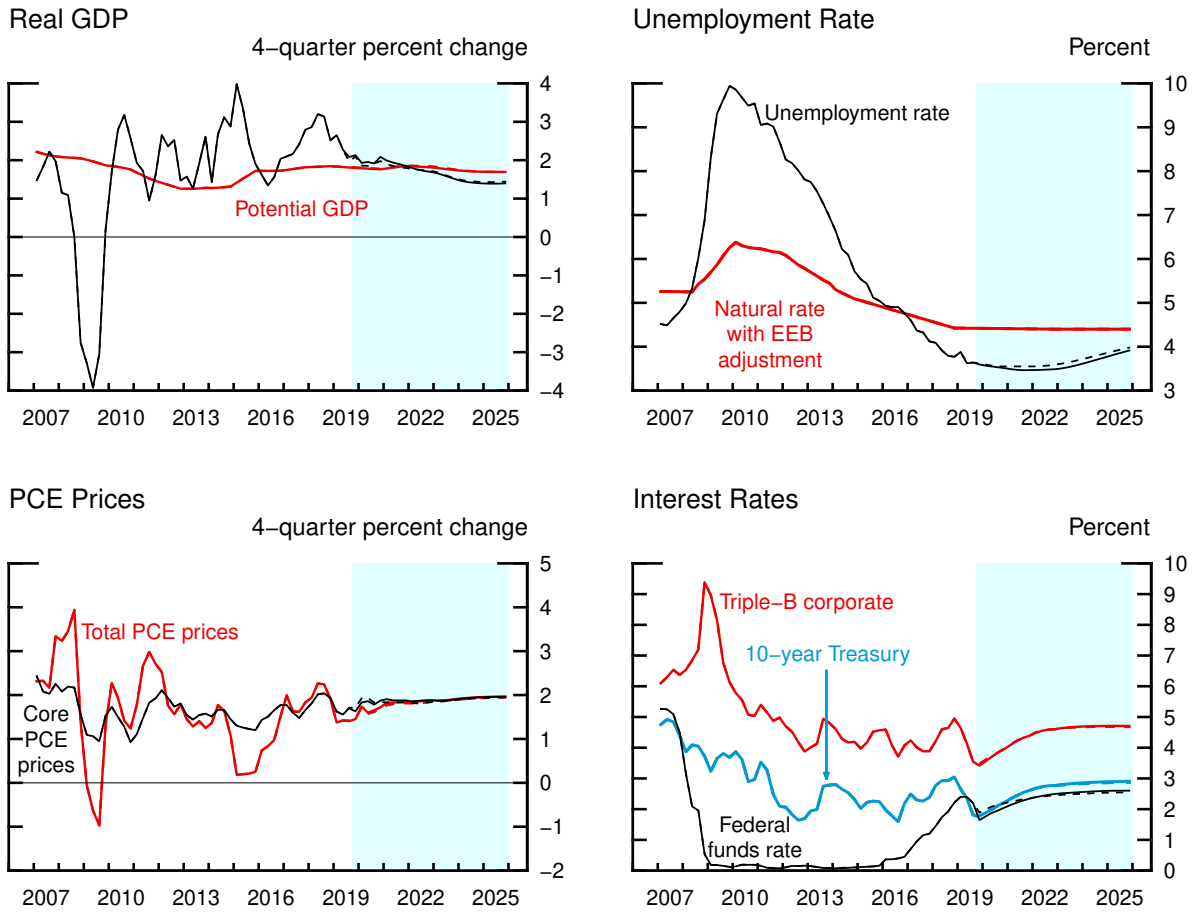
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

# 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 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.4 | 1.7 |
| Previous Tealbook | 2.1 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.4 | 1.7 |
| Civilian unemployment rate[1] | 3.6 | 3.5 | 3.5 | 3.5 | 3.6 | 3.8 | 3.9 | 4.4 |
| Previous Tealbook | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.8 | 4.0 | 4.4 |
| PCE prices, total | 1.5 | 1.7 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 |
| Previous Tealbook | 1.4 | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 |
| Core PCE prices | 1.6 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 |
| Previous Tealbook | 1.7 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 |
| Federal funds rate[1] | 1.65 | 2.05 | 2.34 | 2.49 | 2.55 | 2.59 | 2.60 | 2.50 |
| Previous Tealbook | 1.89 | 2.19 | 2.36 | 2.45 | 2.50 | 2.53 | 2.54 | 2.50 |
| 10-year Treasury yield[1] | 1.8 | 2.2 | 2.6 | 2.8 | 2.8 | 2.9 | 2.9 | 3.0 |
| Previous Tealbook | 1.7 | 2.2 | 2.6 | 2.8 | 2.8 | 2.9 | 2.9 | 3.0 |

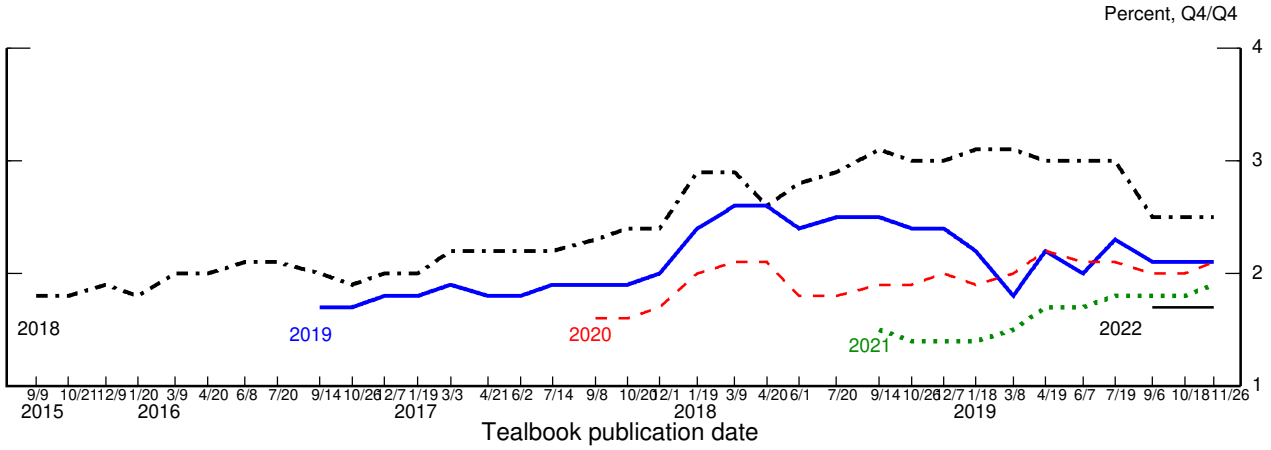
1. Percent, average for the final quarter of the period.



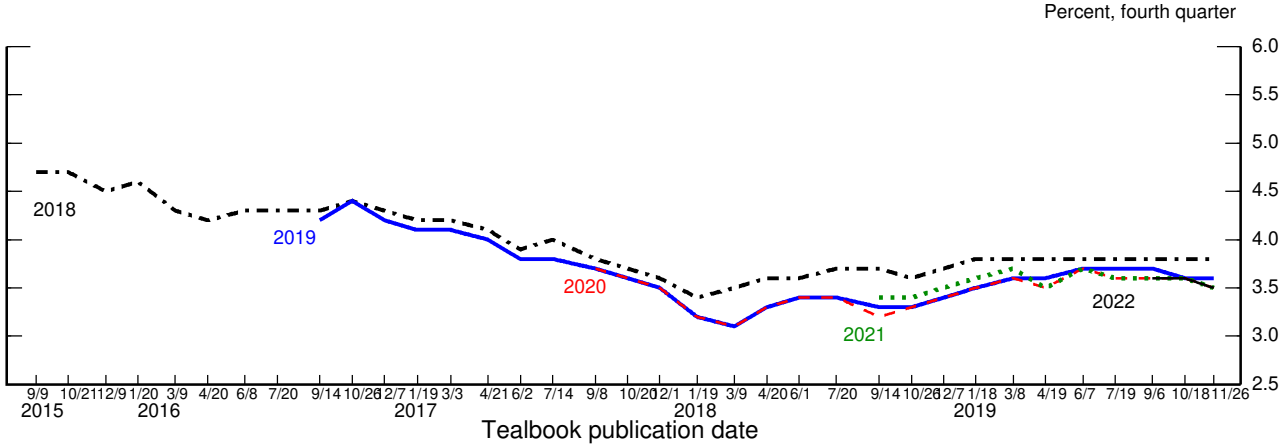

Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

# Evolution of the Staff Forecast

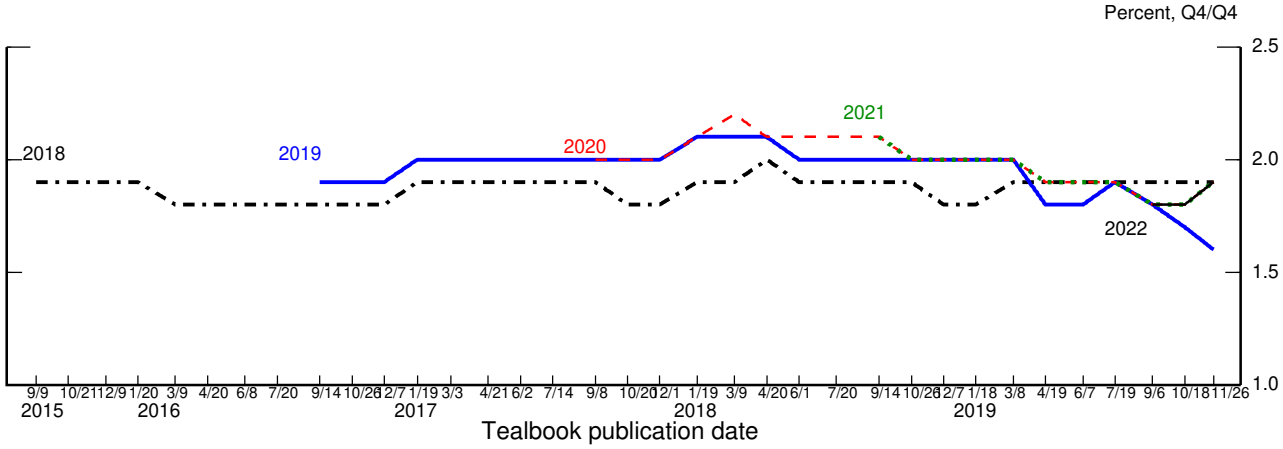
Change in Real GDP




Unemployment Rate




Change in PCE Prices excluding Food and Energy



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# International Economic Developments and Outlook



Foreign economic growth appears to have remained weak in the second half of this year, but we still see a rebound next year as the most likely outcome. On the positive side, in some important regions, such as China and the euro area, incoming data suggest these economies are stabilizing. Euro-area third-quarter GDP surprised on the upside, and survey-based indicators have edged up. Recent Chinese indicators are also consistent with a modest pickup in growth. On the negative side, manufacturing remains weak throughout much of the world, and GDP data have disappointed in several economies. We now see aggregate foreign growth at an annual rate of 1.3 percent in the second half of this year, down from its pace in the first half and ½ percentage point below our October Tealbook forecast. However, much of this markdown results from a double-digit contraction in third-quarter GDP in Hong Kong, where social unrest has depressed activity. Although our conviction is not strong, we expect growth abroad to pick up to 2.3 percent next year and 2.5 percent further out. This outlook is predicated on assumptions that the global manufacturing slump will fade, trade and political tensions will ease somewhat, and highly accommodative policies will remain in place.

Although the continued weakness in manufacturing is worrying, as we discuss in the box "Manufacturing Recessions and the Global Economy," significant declines of industrial production historically have not always been followed by global GDP recessions. With consumer spending, services activity, and financial conditions around the world holding up better, our expectation is that the current situation is one of these episodes. That said, the weakness in global manufacturing could prove deeper and more protracted than we are anticipating, spilling over more broadly to consumer and business confidence and weighing on foreign and U.S. economic activity. We highlight this risk in our "Foreign Slowdown" scenario in the Risks and Uncertainty section.

While momentum in foreign economies remains fragile, some risks have actually diminished. Importantly, the risk of a no-deal Brexit in the near term has receded. And, although significant differences remain, there has been some progress on the U.S.–China phase-one trade agreement. There is some possibility that trade policy outcomes could be more favorable than we and other observers are expecting. For example, we could see rapid passage of the U.S.–Mexico–Canada Agreement, an agreement to forgo tariffs on imported autos, and a more substantial U.S.–China deal that includes the rollback of

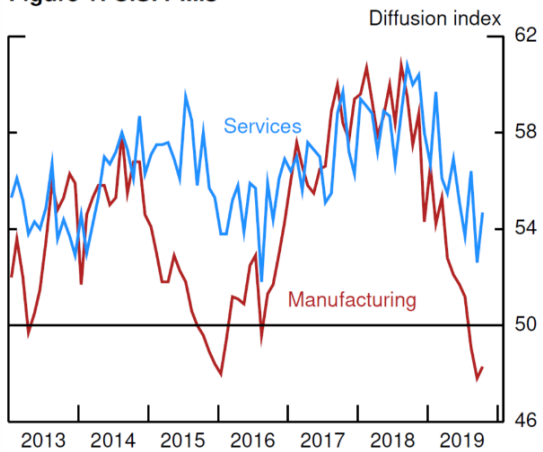
## Manufacturing Recessions and the Global Economy

Global manufacturing output has been stagnating for almost one year, raising concerns that this sector's weakness may presage a broader downturn in economic activity. In this discussion, we review evidence of the extent to which weakness in manufacturing spills over to the broader economy or provides a warning signal of recession.

We first examine the historical correlation of manufacturing and services purchasing managers indexes (PMIs), survey-based indicators that provide early information on economic activity in the two sectors. Over the past 18 months, manufacturing PMIs for the United States and the foreign economy have declined, with both indexes falling to levels below 50 this year and thus indicating contraction (figures 1 and 2). In contrast, services PMIs, while also declining, have remained in expansionary territory. Looking at the relationship between manufacturing and services over the past two decades, we find that manufacturing PMIs help forecast services PMIs, such that a slowdown in manufacturing is generally followed by a slowdown in services. This finding would seem to justify concerns about manufacturing weakness spilling over to the broader economy. However, services also help forecast manufacturing, implying that if services PMIs continue to remain in the expansionary range, they may lift up manufacturing.[1] In several episodes, such as in late 2015 and early 2016, the manufacturing PMI indicated contraction, but the services PMI held up above the 50 threshold.

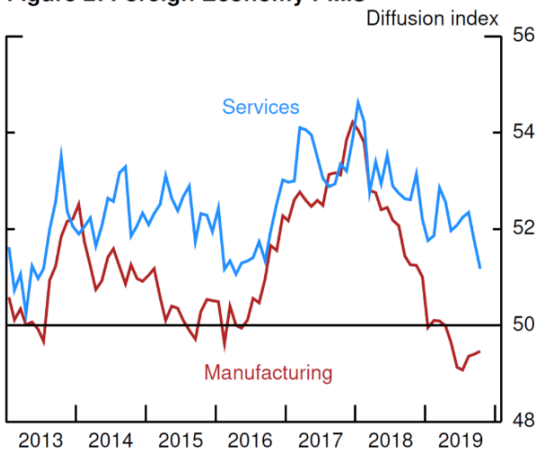
Another approach to addressing the risks to the broader economy posed by weakness in manufacturing is to examine whether declines in industrial production (IP)—which includes output of the manufacturing, mining, and utility industries—have historically heralded recessions. Table 1 reports changes in IP relative to its trend over the four quarters preceding each recession

**Figure 1: U.S. PMIs**




Source: Institute for Supply Management.

**Figure 2: Foreign Economy PMIs**




Source: IHS Markit.

[1] Using both the U.S. and foreign economy PMI series over 2000:M1–2019:M10, the Granger-causality tests reject the null hypothesis that manufacturing does not Granger-cause services PMI with a *p* value lower than 5 percent at 4 and 6 lags. We find similar results for the null hypothesis that services do not Granger-cause manufacturing PMI. Thus, Granger causality appears to run in both directions.

since 1970, together with GDP growth relative to its trend during each recession.[2] Over the past 50 years, IP growth rates fell well below trend the year preceding each of the five recessions in the foreign economy and seven recessions in the United States, by 1.8 and 2.4 percentage points, on average, respectively (line 8). Given this evidence, the fact that over the past year IP growth has fallen 2.0 percentage points relative to trend in the United States and abroad points to elevated recession risks. That said, the foreign economy also had nine episodes and the U.S. economy had seven episodes during which IP growth fell considerably below trend, but no GDP recession followed. During these "false alarms," IP growth rates were somewhat weaker, on average, than they were before the realized recessions (line 9).

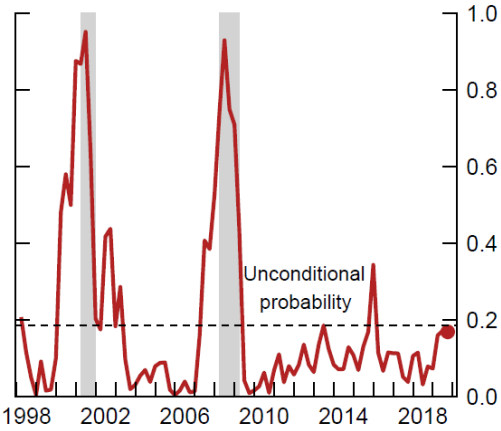
Our assessment is that the recent weakness in manufacturing activity, though weighing on growth, will not tip the global economy into recession. In part, this view reflects the fact that other data have held up better, including consumption indicators and financial conditions. Indeed, recession prediction models—which use a broader range of information such as PMIs, IP, retail sales, and financial conditions—estimate that the probability of recession in the world economy over the next 12 months has increased in recent quarters but remains near its unconditional average of about 20 percent (figure 3).[3] In our Tealbook forecast, we expect that manufacturing will gradually recover as global GDP growth picks up and trade tensions cool. This forecast is predicated on the view that, amid solid labor market conditions and accommodative monetary policy actions, household demand will be resilient and financial conditions will remain favorable. However, we cannot rule out less favorable outcomes.

**Table 1: IP and GDP Growth During Recession Episodes**
(percentage point deviation from trend)

| | | Foreign Economy | | United States | |
|---|---|---|---|---|---|
| | Recession episode | IP, 1 year before | GDP | IP, 1 year before | GDP |
| 1. | 1970 | - | - | -2.4 | -2.9 |
| 2. | 1974 | -2.2 | -4.6 | -1.5 | -5.6 |
| 3. | 1980 | -1.6 | -1.6 | -3.3 | -3.2 |
| 4. | 1982 | -4.1 | -.5 | -3.7 | -5.5 |
| 5. | 1990 | - | - | -.8 | -3.8 |
| 6. | 2001 | -.3 | -1.1 | -4.6 | -3.3 |
| 7. | 2008 | -1.0 | -6.6 | -.7 | -5.6 |
| 8. | Recessions, average | -1.8 | -2.9 | -2.4 | -4.3 |
| 9. | "False alarms" | -2.5 | 0.0 | -2.7 | -.3 |

Note: Line 8 reports the average of lines 1–7. Line 9 reports the average for non-recession episodes, excluding the year of recovery from recessions, in which IP growth declined more than 2 percentage points relative to trend over the preceding four quarters.
Source: Staff calculations.

**Figure 3: Estimated Probability of Recession in the World Economy over the Next 12 Months**




Note: Shading indicates that countries representing 65 percent of world GDP are classified in recession.
Source: Staff calculations.

[2] Our sample covers 1972:M1–2019:M7 and includes data for Australia, Brazil, Canada, China, the euro area, India, Indonesia, Japan, Korea, Mexico, Russia, Spain, the United Kingdom, and the United States. We use time-varying GDP weights at purchasing-power-parity dollar values to construct global IP. IP and GDP trends are 10-year moving averages of these series. We define *global recessions* as periods in which 65 percent of countries are classified as in recession. For the United States, we follow the National Bureau of Economic Research classification.

[3] The methodology follows Pablo Cuba-Borda, Andrea Raffo, and Alexander Mechanick (2018), "Monitoring the World Economy: A Global Conditions Index," IFDP Notes (Washington: Board of Governors of the Federal Reserve System, June 15), https://www.federalreserve.gov/econres/notes/ifdp-notes/monitoring-the-world-economy-a-global-conditions-index-20180615.htm.

some recently introduced tariffs. Such developments could significantly alleviate trade policy uncertainty and, as we discuss in the "Easing of Trade Tensions" alternative scenario in the Risks and Uncertainty section, provide some boost to the global economy. However, given past experience, we remain cognizant that trade tensions could resurge.

Foreign headline inflation is estimated to pick up in the fourth quarter, driven by higher energy prices and soaring food prices in the case of emerging market economies (EMEs) due to shortages of pigs in China and onions in India. However, underlying inflation pressures remain subdued in many countries; 12-month core inflation in the euro area and Japan came in at 1 percent and 0.3 percent, respectively, in October. Amid a lack of inflation pressures and fragile growth, we continue to anticipate monetary policy abroad to remain highly accommodative throughout the forecast period. Since the previous Tealbook, there has been further monetary policy easing in several EMEs, including in Brazil, Chile, China, Indonesia, Mexico, Russia, Thailand, and Turkey.



## ADVANCED FOREIGN ECONOMIES

- ***Euro Area.*** Economic activity appears to have stabilized, though the underlying pace of growth remains subdued and risks remain tilted to the downside. Real GDP growth for the third quarter came in at 0.9 percent, 0.5 percentage point higher than estimated in the October Tealbook and up a touch from the previous quarter. Although official estimates for the expenditure components have not yet been released, it seems that the third-quarter GDP expansion was supported by household demand and exports. Germany avoided a technical recession in the third quarter, with its GDP growth printing at 0.3 percent. Indicators for the fourth quarter also surprised on the upside, on net, and suggest that manufacturing output has bottomed out, leading us to mark up the near-term outlook for the region, though only slightly. Over the medium term, we continue to project euro-area growth to increase to 1.3 percent in 2020 (about potential) and 1.8 percent in 2021, supported by a gradual recovery in global manufacturing and highly accommodative monetary policy.

  Twelve-month headline inflation edged down to 0.7 percent in October, while core inflation continued to hover at around 1 percent. We expect inflation to gradually rise to 1.6 percent by 2022, in line with the projected narrowing of the output gap. The weak outlook for inflation and fragility of the prospects for growth could be seen as calling for some further loosening of monetary policy. However, based on the opposition within the Governing Council to additional stimulus, we anticipate the

European Central Bank will not implement new measures but will continue to run its Asset Purchase Program until the second quarter of 2021 and maintain its deposit rate at the current record low level of negative 0.5 percent until the end of 2021.

- ***Japan.*** The pace of economic activity slowed more than expected in the third quarter, despite some front-running of consumption ahead of October's tax hike. Real GDP grew only 0.2 percent, significantly below the robust 1.9 percent pace of the first half of the year. The slowdown is largely attributable to a drawdown of inventories, as firms satisfied the rush demand ahead of the tax hike out of existing supplies rather than by boosting production. The expectation that firms will rebuild their inventories led us to mark up our current-quarter estimate, but we still expect that the tax hike will contribute to a 2 percent contraction of GDP. Thereafter, we see GDP growth recovering to a bit above its potential pace of 0.7 percent, in part supported by spending related to the 2020 Tokyo Olympics.

  In October, with the tax hike boosting prices less than expected, 12-month total inflation stayed flat at 0.2 percent and core inflation remained at 0.3 percent. We forecast that inflation will gradually pick up to 1 percent by 2022, as a highly expansionary monetary policy and a persistently positive output gap gradually lift inflation expectations. At its October meeting, the Bank of Japan (BOJ) updated its forward guidance, indicating a bias for lowering policy rates and replacing its calendar-based commitment to keeping rates low through spring of 2020, with a state-based commitment to keeping them low long enough to maintain progress toward achieving the target. Even so, we do not assume any easing in our baseline, as our outlook for Japanese growth is relatively benign and the BOJ is concerned that more-negative interest rates could put additional pressure on financial institutions' profits, intermediation, and vulnerabilities.

- ***United Kingdom.*** Brexit-related uncertainty has continued to weigh on the U.K. economy. After contracting 0.9 percent in the second quarter, real GDP rose 1.2 percent in the third. However, worse-than-expected incoming data suggest that the rebound was temporary, leading us to mark down the growth forecast for the current quarter to a meager 0.1 percent. Despite a new Brexit deal agreed to with the European Union (EU), Prime Minister Johnson did not secure enough support in the U.K. Parliament for immediate approval of the deal. As a result, the EU granted the United Kingdom another extension through January 31, 2020, and Johnson called for new elections to take place on December 12. The Conservatives are ahead in the

polls, and we assume that they will gain the majority to form a government and pass the earlier-negotiated Brexit deal by the end-January deadline. Once that is behind them, a transition period starts in which the United Kingdom has until the end of next year to negotiate its new trade arrangement with the EU, as well as with all of its other trading partners. Thus, we expect Brexit uncertainty to persist for some time amid contentious negotiations, and we project a subdued pace of growth in 2020 at 0.7 percent, well below potential of 1.2 percent. Accommodative monetary policy, together with some fiscal stimulus (pledged by both Conservative and Labour parties), should lift growth to 1.4 percent in 2021 and 2022.

Twelve-month headline inflation in October declined to 1.5 percent, mainly reflecting mandated cuts in utility prices, while core inflation was 1.7 percent. As retail energy prices stabilize, we expect inflation to pick up next year and stay close to the Bank of England's (BOE's) 2 percent target through the forecast period. With inflation under control and growth persistently weak, we assume that the BOE will cut its policy rate from 0.75 percent to 0.5 percent in the third quarter of 2020. Assuming successful completion of trade negotiations by the end of 2020, we expect the BOE to gradually normalize its policy stance, raising the Bank Rate to 1 percent by mid-2022.

- ***Canada.*** After a strong second quarter, driven by a rebound in oil production, we estimate that real GDP growth slowed to 1.4 percent in the third. Incoming data, such as employment for October, suggest that the soft patch has extended into the fourth quarter. Even so, improvement in business sentiment indicators and signs of recovery in the housing market point to a pickup in domestic demand. Accordingly, we project that growth will gradually rise to its potential pace of 1.8 percent by the second half of 2020 and remain about there over the forecast period. Relative to the October Tealbook, the projections for higher oil prices and faster U.S. growth led us to slightly revise up the Canadian outlook over the next two years. Still, given the relatively subdued near-term outlook and the dovish tone of its most recent monetary policy statement, we expect the Bank of Canada to cut its policy rate 25 basis points to 1.5 percent early next year before increasing rates in the second half of 2021.

## EMERGING MARKET ECONOMIES

- ***China.*** Growth in China had slowed to a 5.5 percent pace in the second quarter and remained about there in the third. We see some modest improvement in growth in the current quarter to 5.7 percent. Although manufacturing exports and production point

to some recent strengthening in external demand, indicators of domestic demand remain weak, suggesting that the deleveraging campaign continues to exert a drag on the economy. Going forward, the outlook faces several headwinds. First, financial conditions remain tight because of concerns about the health of China's small banks, with runs on two rural lenders during the intermeeting period underlining this risk. Second, the property market should slow as authorities take measures to cool it. Finally, despite optimism about a potential phase-one trade deal, trade tensions with the United States will likely remain and could even resurge. We see growth holding at about its fourth-quarter pace over the forecast period, with the authorities offsetting some of these headwinds with limited policy stimulus.

Inflation has jumped notably in recent months, almost entirely because of the effect of African swine flu on pork prices. We expect some further pressure in the coming months but then see inflation falling back to 2.5 percent by the end of next year.

- ***Other Emerging Asia.*** GDP growth in the region was dragged down in the third quarter by a sharp contraction (12.1 percent at an annual rate) in Hong Kong. Elsewhere in the region, economies continue to tread water in choppy conditions, with growth, on balance, holding steady at a slightly below-trend 3.5 percent pace in the third quarter. Although manufacturing production in parts of the region has already rebounded substantially from its slump, we see the recovery in manufacturing gaining some additional traction over time, which, together with easing monetary and fiscal policies in many economies in the region, should support a modest further pickup in the region's growth.

  *Hong Kong.* Increasingly violent protests have resulted in serious disruptions to the city's transport system, emergency evacuations of Chinese students to the Mainland, and a plunge in tourism. These developments have already led to a nearly 20 percent drop in retail sales in the third quarter. In contrast, exports have been holding up somewhat better, and the trade and logistics sector does not appear to be materially affected by the protests. For now, our baseline outlook assumes that the situation will eventually be brought under control by some combination of more aggressive police tactics, further concessions to protestors, and fading support among the local population amid escalating violence. Even so, we expect GDP to contract again at a double-digit pace in the fourth quarter, with the economy returning to positive growth next year.

In mid-November, the U.S. Congress approved the Hong Kong Human Rights and Democracy Act, which, if signed by the President, would require the U.S. State Department to recommend annually whether Hong Kong should continue to enjoy separate and more favorable trading status with the United States than does Mainland China. The direct effects of revoking Hong Kong's special status would likely be limited (given that exports account for relatively little valued added in the economy), but such a move could potentially weigh on investor sentiment and undermine Hong Kong's role as a major financial and trade center.



- ***Mexico.*** The malaise afflicting the Mexican economy extended into the third quarter, with GDP remaining flat after contracting in the first half of the year. The poor performance of the Mexican economy reflects domestic factors—including a crackdown on corruption that has delayed government spending, concerns about the government's market-unfriendly policies, and problems at Pemex—and external factors, notably weakness in U.S. manufacturing production. Construction activity, in particular, has continued to slide, and exports to the United States have weakened. As such, we expect growth to remain below 0.5 percent in the fourth quarter. However, the projected pickup in U.S. manufacturing, together with monetary policy easing and a gradual turnaround in public investment, should support a pickup in Mexican growth, albeit to a still-mediocre 2 percent by the second half of 2020. Our forecast is down in the near term—which, in part, reflects a larger-than-expected effect of the GM strike on Mexican manufacturing activity—and a bit in the longer-term as well.

  Twelve-month inflation remained at the target rate of 3 percent in October, but core inflation is still running high at 3.7 percent. Citing weak growth, and given headline inflation at target and benign global financial conditions, the Bank of Mexico decreased its policy rate 25 basis points for a third time in a row to 7.5 percent.

- ***Brazil.*** Incoming data for the third quarter suggest that the recovery is gaining a foothold. Industrial output gained traction, which partly reflects a continued rebound in mining production following a dam collapse early this year. Buoyant retail sales throughout the third quarter suggest that household demand is also improving, supported in part by low inflation, declining interest rates, and a mini fiscal stimulus that allows even employed workers to draw on their unemployment funds. Accordingly, we now estimate that real GDP grew 1.5 percent in the third quarter,

somewhat above our forecast in the October Tealbook. We have growth picking up to 2.6 percent by the end of 2020, supported by monetary policy easing and the boost to business confidence following the passage of the long-awaited pension reform last month. With growth still relatively weak and 12-month inflation at an extremely subdued 2.5 percent in October, the Brazilian central bank cut the benchmark Selic rate another 50 basis points, to 5.5 percent, and signaled another cut at its next meeting.

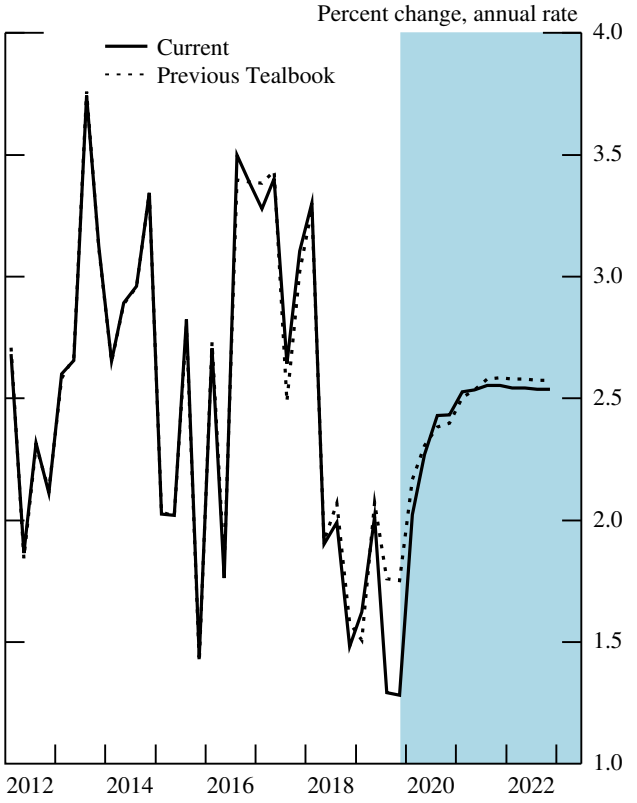
# The Foreign GDP Outlook

Real GDP* Percent change, annual rate**

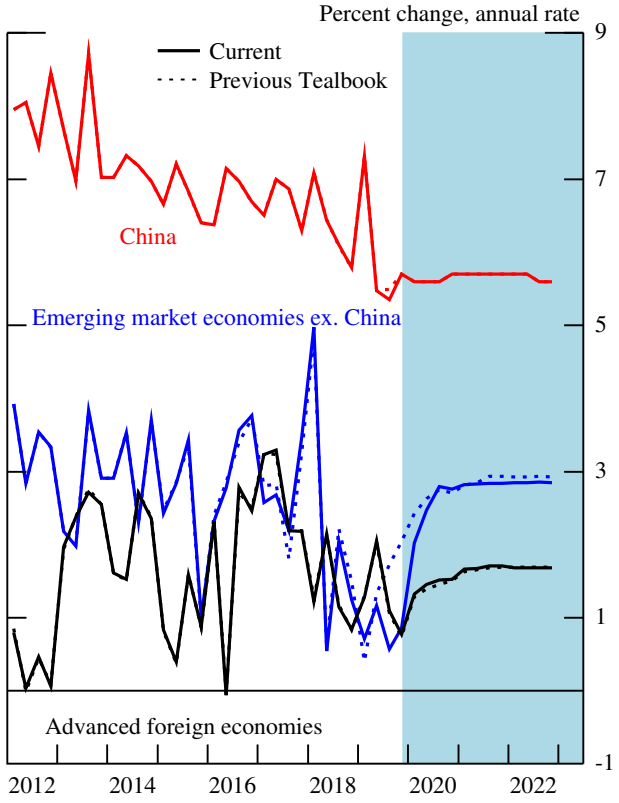
| | 2018 | 2019 Q1 | 2019 Q2 | 2019 Q3 | 2019 Q4 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|
| 1. Total foreign | 2.2 | 1.6 | 2.0 | 1.3 | 1.3 | 2.3 | 2.5 | 2.5 |
| *Previous Tealbook* | *2.2* | *1.5* | *2.1* | *1.8* | *1.8* | *2.3* | *2.6* | *2.6* |
| 2. Advanced foreign economies | 1.3 | 1.3 | 2.1 | 1.1 | .8 | 1.5 | 1.7 | 1.7 |
| *Previous Tealbook* | *1.4* | *1.3* | *2.0* | *1.1* | *.7* | *1.4* | *1.7* | *1.7* |
| 3. Canada | 1.6 | .5 | 3.7 | 1.4 | 1.4 | 1.7 | 1.8 | 1.8 |
| 4. Euro area | 1.2 | 1.7 | .8 | .9 | .9 | 1.3 | 1.8 | 1.7 |
| 5. Japan | .3 | 2.0 | 1.8 | .2 | -2.0 | 1.0 | .8 | .8 |
| 6. United Kingdom | 1.5 | 2.3 | -.9 | 1.2 | .1 | .7 | 1.4 | 1.4 |
| 7. Emerging market economies | 3.0 | 2.0 | 2.0 | 1.5 | 1.8 | 3.1 | 3.4 | 3.4 |
| *Previous Tealbook* | *3.1* | *1.7* | *2.1* | *2.4* | *2.7* | *3.2* | *3.4* | *3.4* |
| 8. China | 6.4 | 7.3 | 5.5 | 5.4 | 5.7 | 5.6 | 5.7 | 5.6 |
| 9. Emerging Asia ex. China | 3.3 | 2.3 | 2.6 | .4 | .8 | 3.5 | 3.4 | 3.4 |
| 10. Mexico | 1.4 | -.4 | -.2 | .1 | .4 | 1.6 | 2.3 | 2.3 |
| 11. Brazil | 1.1 | -.3 | 1.8 | 1.5 | 2.3 | 2.3 | 2.8 | 2.8 |
| *Memo* | | | | | | | | |
| Emerging market economies ex. China | 2.2 | .7 | 1.2 | .6 | .9 | 2.5 | 2.8 | 2.8 |

* GDP aggregates weighted by shares of U.S. merchandise exports.
** Annual data are Q4/Q4.

**Total Foreign GDP**




**Foreign GDP**



# The Foreign Inflation Outlook

Consumer Prices* Percent change, annual rate**

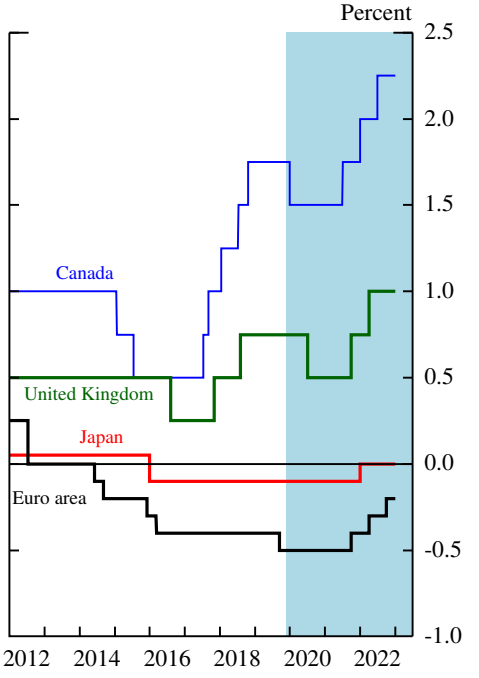
| | 2018 | 2019 | | | | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | | | |
| 1. Total foreign | 2.4 | .8 | 3.3 | 2.3 | 3.3 | 2.2 | 2.3 | 2.3 |
| *Previous Tealbook* | *2.4* | *.8* | *3.3* | *2.3* | *2.6* | *2.3* | *2.3* | *2.3* |
| 2. Advanced foreign economies | 1.7 | .8 | 2.2 | .9 | 1.3 | 1.4 | 1.5 | 1.6 |
| *Previous Tealbook* | *1.7* | *.8* | *2.1* | *.9* | *1.5* | *1.4* | *1.5* | *1.6* |
| 3. Canada | 2.1 | 1.6 | 3.4 | 1.7 | 2.2 | 2.0 | 2.0 | 2.0 |
| 4. Euro area | 1.9 | .3 | 2.1 | .7 | 1.1 | 1.2 | 1.4 | 1.6 |
| 5. Japan | .8 | .9 | .3 | .3 | 1.1 | .6 | .8 | 1.0 |
| 6. United Kingdom | 2.3 | 1.1 | 2.6 | 1.7 | .7 | 1.8 | 1.9 | 1.9 |
| 7. Emerging market economies | 2.9 | .8 | 4.1 | 3.2 | 4.6 | 2.8 | 2.8 | 2.8 |
| *Previous Tealbook* | *2.9* | *.8* | *4.1* | *3.2* | *3.3* | *2.9* | *2.8* | *2.8* |
| 8. China | 2.2 | .6 | 4.3 | 4.6 | 6.9 | 2.4 | 2.5 | 2.5 |
| 9. Emerging Asia ex. China | 1.9 | .2 | 3.1 | 1.2 | 2.3 | 2.7 | 2.7 | 2.7 |
| 10. Mexico | 4.8 | 1.1 | 4.5 | 2.8 | 3.2 | 3.2 | 3.2 | 3.2 |
| 11. Brazil | 4.1 | 2.9 | 5.2 | 2.2 | 1.8 | 3.8 | 3.7 | 3.5 |
| *Memo* | | | | | | | | |
| Emerging market economies ex. China | 3.5 | 1.0 | 3.9 | 2.1 | 3.0 | 3.1 | 3.0 | 3.0 |

* CPI aggregates weighted by shares of U.S. non-oil imports.
** Annual data are Q4/Q4.

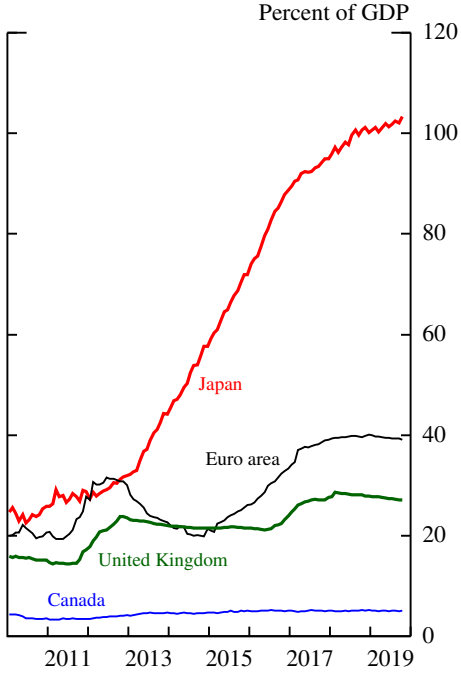
Int'l Econ Devel & Outlook

# Foreign Monetary Policy

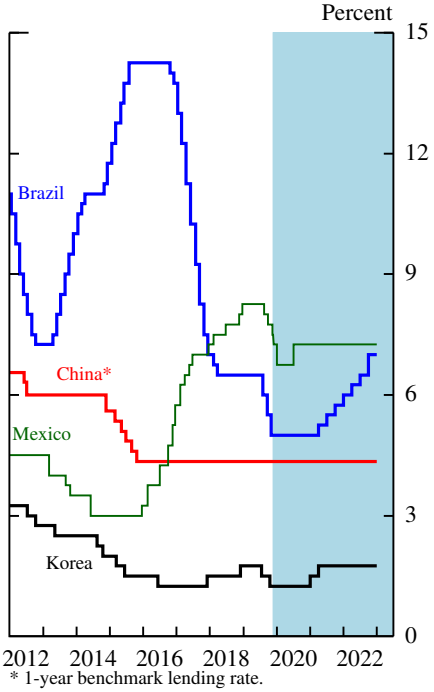
**AFE Policy Rates**




**AFE Central Bank Balance Sheets**




**EME Policy Rates**

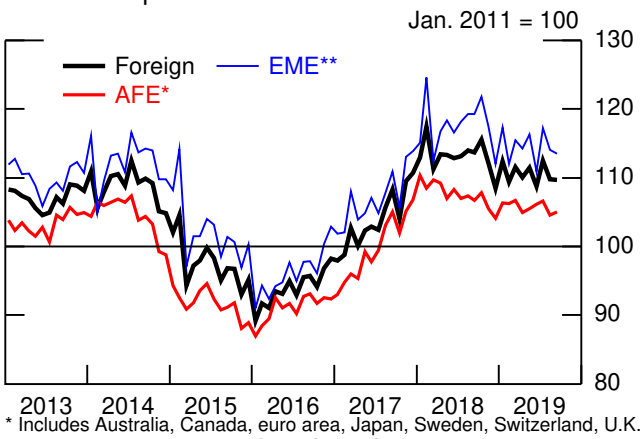



* 1-year benchmark lending rate.

# Recent Foreign Indicators

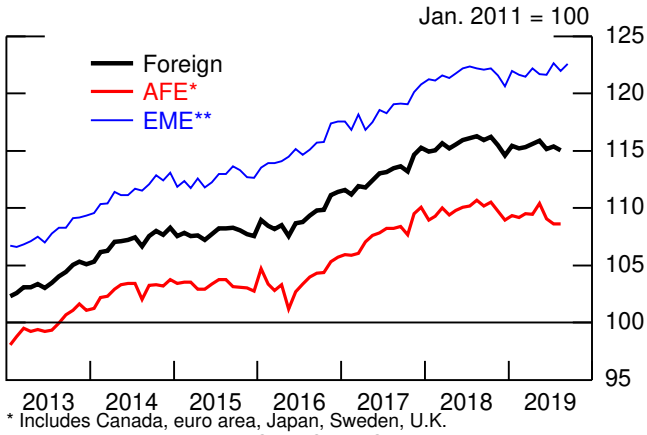


## Nominal Exports



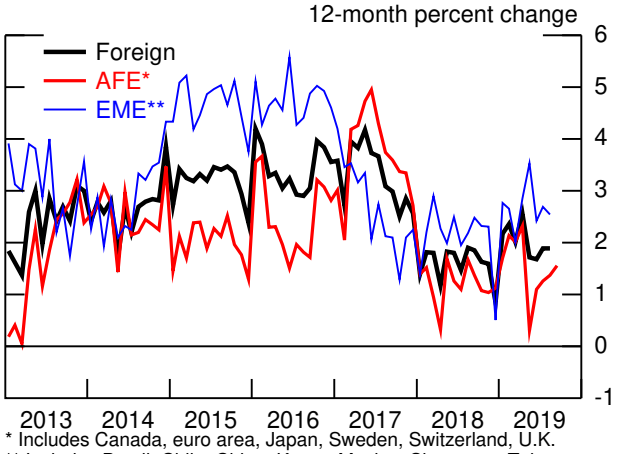

* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Singapore, Taiwan, Thailand.

## Industrial Production



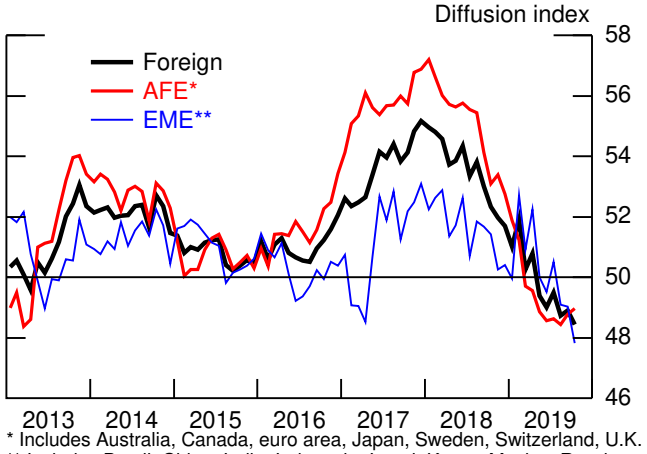

* Includes Canada, euro area, Japan, Sweden, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand.

## Retail Sales



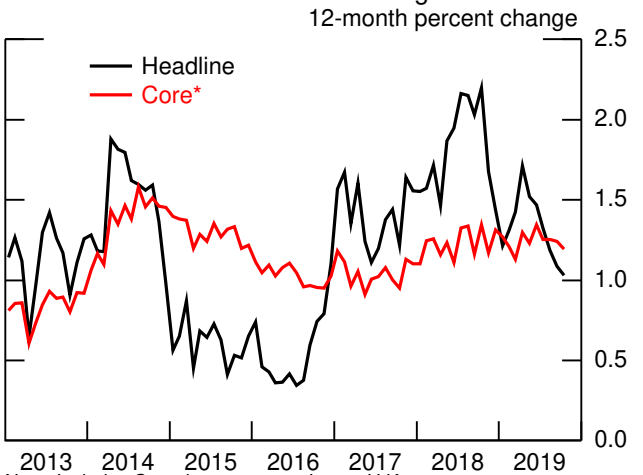

* Includes Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, Chile, China, Korea, Mexico, Singapore, Taiwan.

## Manufacturing PMI



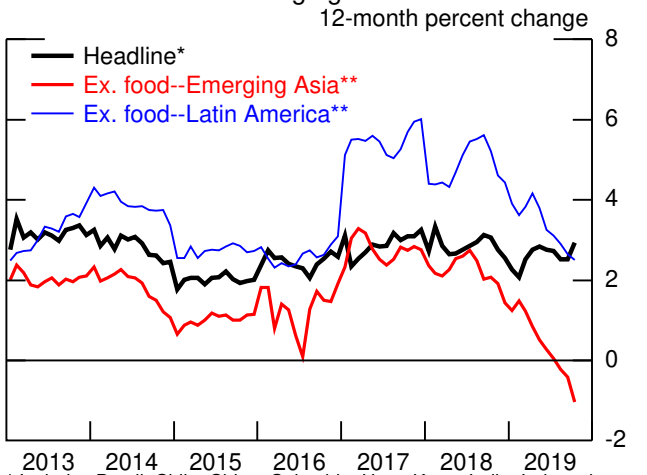

* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, China, India, Indonesia, Israel, Korea, Mexico, Russia, Singapore, Taiwan, Turkey.

## Consumer Prices: Advanced Foreign Economies




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

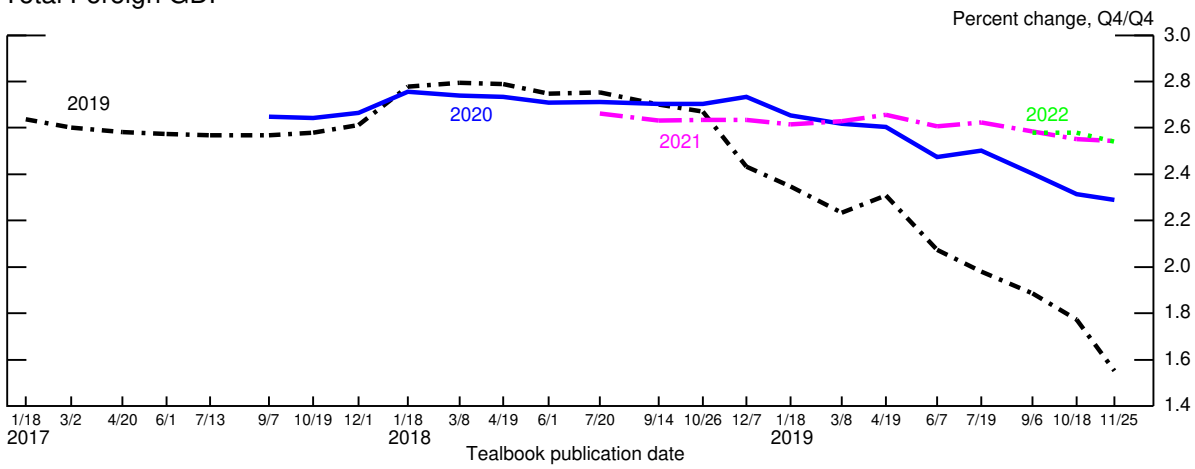
## Consumer Prices: Emerging Market Economies



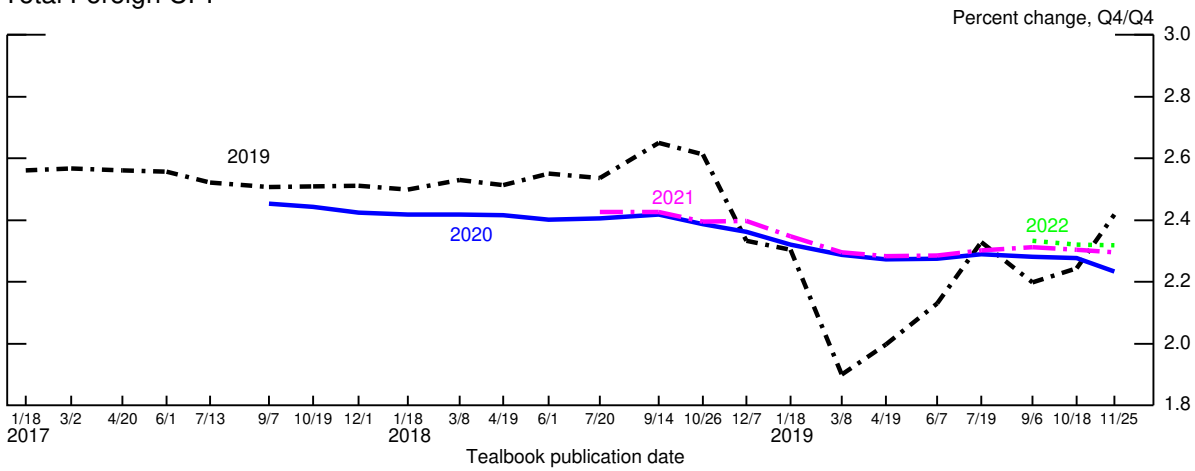

* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Latin America excludes Argentina and Venezuela.

# Evolution of Staff's International Forecast

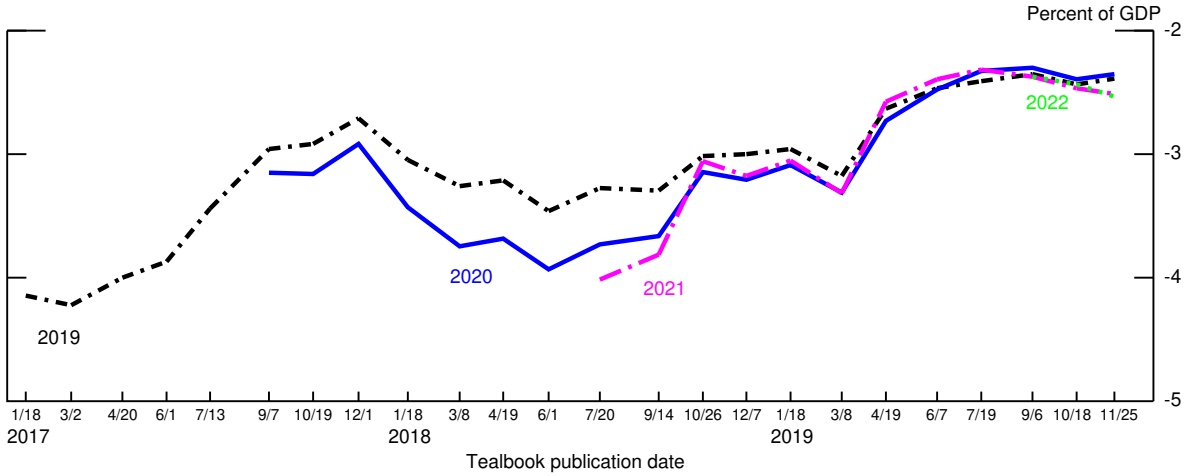
Total Foreign GDP




Total Foreign CPI




U.S. Current Account Balance




Int'l Econ Devel & Outlook

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# Financial Market Developments

Over the intermeeting period, asset prices moved with the waxing and waning of sentiment regarding prospects for a "phase one" interim trade deal between the United States and China. Treasury yields ended the period down somewhat, while broad equity price indexes gained on net. Foreign markets followed a similar pattern. Short-term funding markets were stable over the period.

- On net, nominal 2-, 10-, and 30-year Treasury yields fell 3 basis points, 5 basis points, and 14 basis points, respectively. Inflation compensation was little changed at both the 5-year and 5-to-10-year horizons.

- A straight read of federal funds futures options quotes implies that investors assign around an 85 percent probability to the federal funds target range remaining unchanged following the December FOMC meeting. OIS quotes, unadjusted for term premiums, imply a 30 basis point decline in the federal funds rate by the end of 2020. In contrast, adjusting for staff term premium estimates suggests some ambiguity regarding the direction of the expected path.

- Broad equity price indexes increased about 3 percent. Spreads on investment-grade corporate bonds were little changed, while spreads on speculative-grade bonds widened slightly.

- On net, most foreign equity indexes posted slight increases, the broad dollar index edged higher, and long-term AFE sovereign yields were little changed.

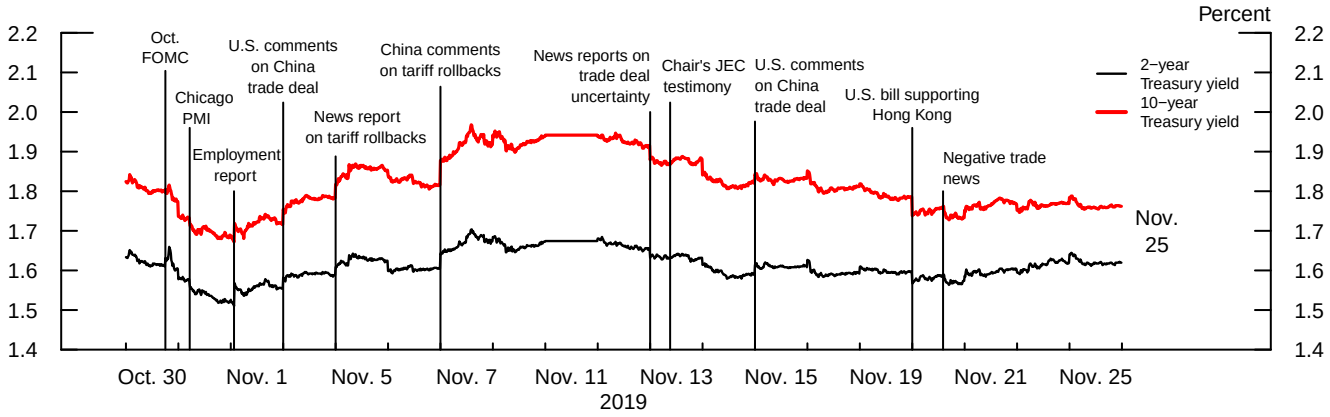


## Domestic Developments

Nominal U.S. Treasury yields were sensitive to news reports related to trade negotiations between the United States and China, as they have been for much of the year. Early in the intermeeting period, yields rose amid growing optimism about the outlook for the negotiations; however, as the prospect of an agreement in the near term became more uncertain, yields fell. Domestic and foreign economic data releases were in line with market expectations, on balance, and appeared to have had little effect on Treasury yields on net. Over the period, nominal 2-, 10-, and 30-year Treasury yields fell

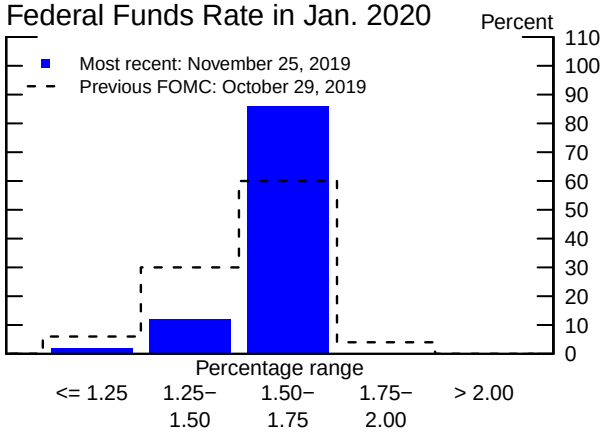
# Policy Expectations and Treasury Yields

## Intraday Treasury Yields



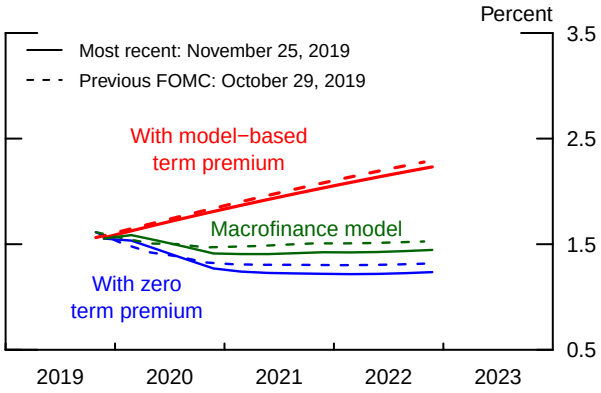

Note: Data are spaced at 5−minute intervals from 8:00 a.m. to 4:00 p.m.
Source: Bloomberg.

## Market−Implied Probability Distribution of the Federal Funds Rate in Jan. 2020



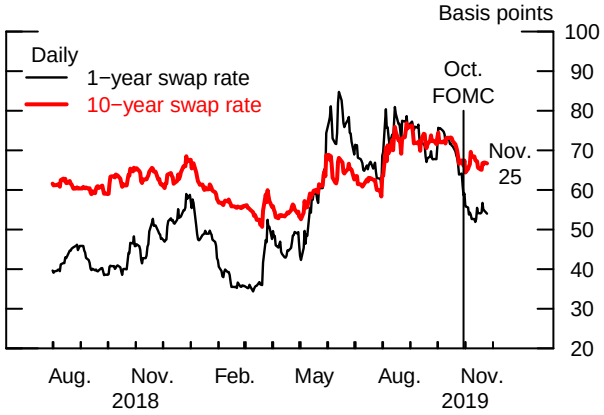

Note: Estimated from federal funds futures options; not adjusted for risk premiums.
Source: CME Group; Board staff calculations.

## Implied Federal Funds Rate



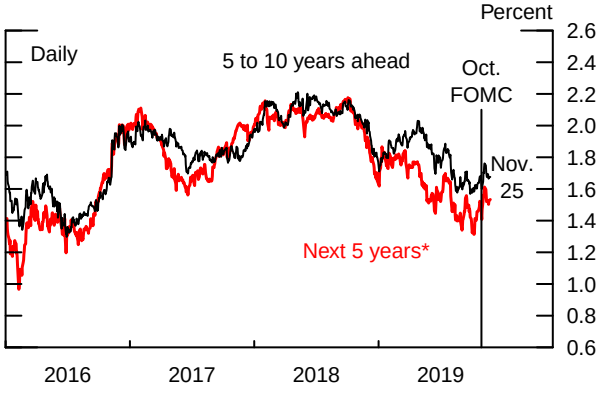

Note: Zero term premium path is estimated using overnight index swap quotes with a spline approach and a term premium of 0 basis points. Model−based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premiums. Macrofinance model path is estimated using regressions of risk premiums on the covariances between real and nominal variables.
Source: Bloomberg; 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.

Financial Markets

3 basis points, 5 basis points, and 14 basis points, respectively, while the 5-year and 5-to-10-year TIPS-based measures of inflation compensation were little changed. The spread between 10-year and three-month Treasury yields and the near-term forward spread were also little changed. Both spreads stand around 70 basis points above their respective early September lows.

Relative to their recent peak around the time of the November 2018 FOMC meeting, 5-to-10-year forward interest rates and inflation compensation are down about 1.4 percentage points and 0.4 percentage point, respectively. The box "Financial Market Measures of the Neutral Real Rate and Inflation Expectations since November 2018" examines those moves in more detail.

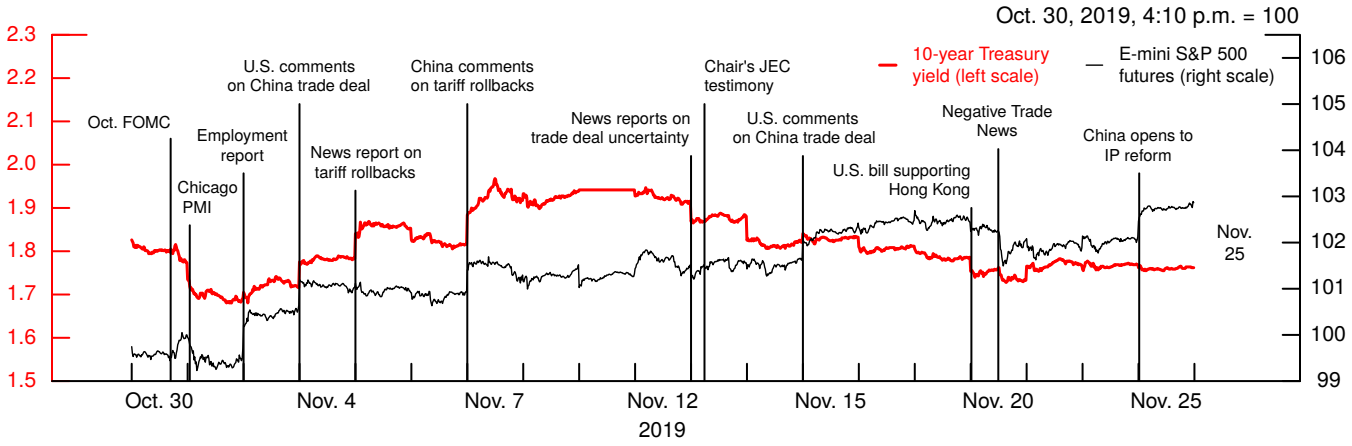
Federal Reserve communications over the period were interpreted by market participants as suggesting that additional near-term changes to the target range for the federal funds rate are somewhat less likely than had previously been expected. A straight read of the probability distribution for the federal funds rate implied by options prices suggests that investors now assign a probability of around 85 percent to the target range remaining unchanged at the December FOMC meeting. Looking further ahead, forward rates implied by OIS quotes declined modestly on net. Unadjusted for term premiums, the quotes imply about a 30 basis point decline in the federal funds rate by the end of 2020. In contrast, quotes adjusted for staff term premium estimates suggest some ambiguity regarding the direction of the expected path. The staff's most commonly used term premium model suggests the market expects about a ¼ percentage point increase over that period.

The implied volatility of the one-year swap rate derived from six-month swaptions quotes declined over the intermeeting period, reaching its lowest level since May. The implied volatility of the 10-year swap rate was little changed. Treasury cash market depth recovered somewhat from its trough in October but remains below its average level over recent years.

Like Treasury yields, stock price movements were largely attributed to news about trade negotiations. The third-quarter earnings season nearly wrapped up over the period and had little apparent effect on the overall market. Consistent with the waxing and waning of perceived prospects for an interim deal, stock prices of firms with greater exposure to China outperformed early in the period before retracing some of those gains. The S&P index increased 3.2 percent on net. One-month option-implied volatility on the

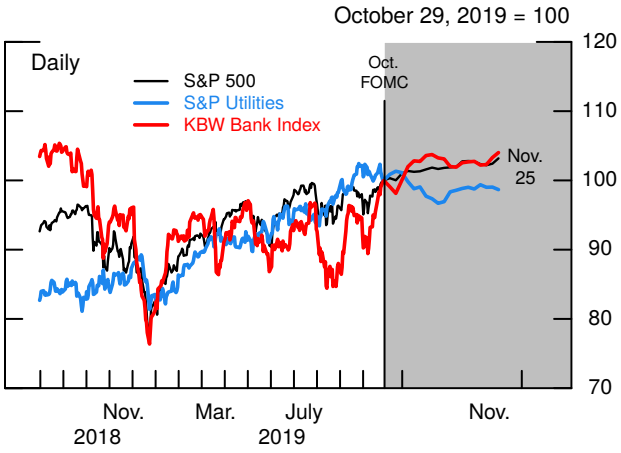
# Corporate Asset Market Developments

## Intraday S&P 500 Futures and 10-Year Treasury Yield



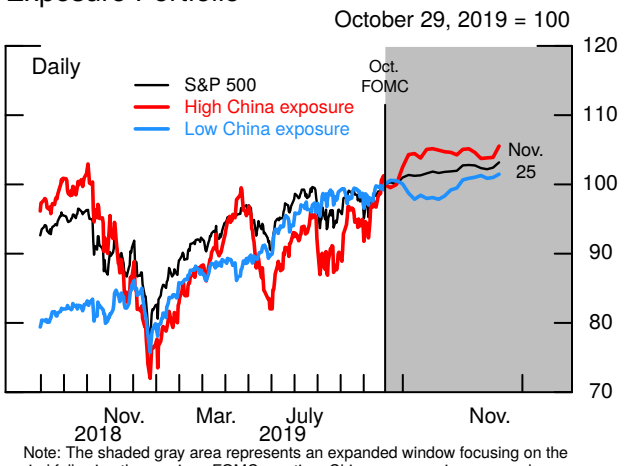

Note: Data are spaced at 5-minute intervals from 9:30 a.m. to 4:10 p.m.
Source: Bloomberg.

## Selected S&P 500 Stock Price Indexes



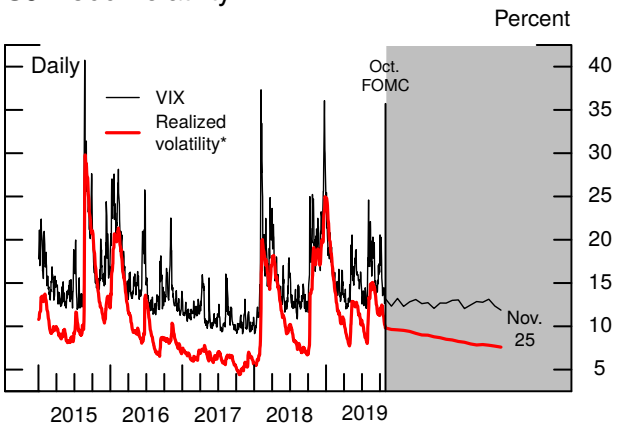

Note: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting.
Source: Bloomberg.

## S&P 500 Index and China Exposure Portfolio



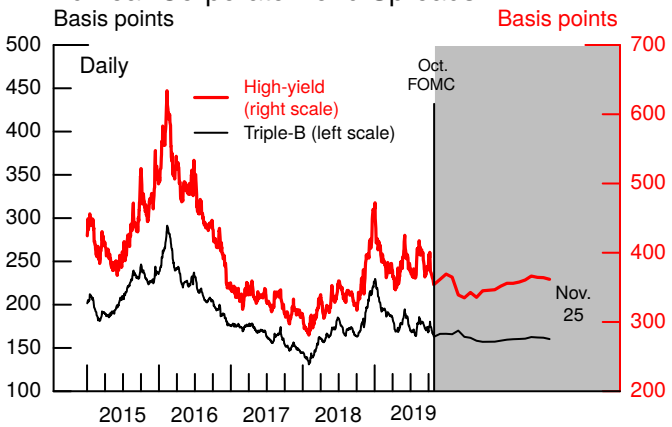

Note: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting. China exposure is measured based on Board staff calculations of stock price sensitivity to the ASHR China A-Shares exchange-traded fund.
Source: Bloomberg; Compustat; Yahoo Finance.

## S&P 500 Volatility




Note: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting.
* 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: The shaded gray area represents an expanded window focusing on the period following the previous FOMC meeting. Spreads over 10-year Treasury yield.
Source: Merrill Lynch; Federal Reserve Bank of New York; Board staff calculations.

Financial Markets

## Financial Market Measures of the Neutral Real Rate and Inflation Expectations since November 2018

The 5-to-10-year nominal forward interest rate implied by the prices of U.S. Treasury securities has risen about 0.3 percentage point, on net, since its trough in late August. However, it remains about 1.4 percentage points lower than its peak around the November 2018 FOMC meeting. About 1 percentage point of the net decline since November 2018 reflects a lower real forward rate, with the remainder reflecting lower forward inflation compensation. This discussion examines what these developments tell us about perceptions of the longer-run neutral real interest rate and longer-run expected inflation.

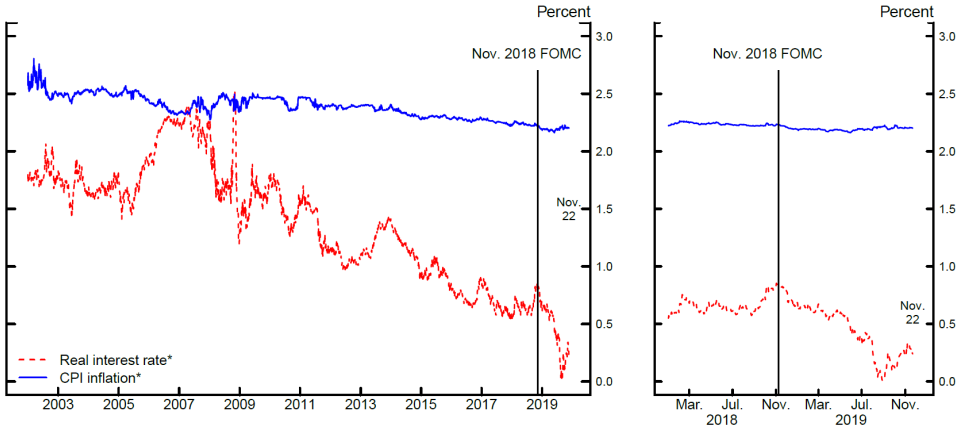
In the absence of risk premiums, 5-to-10-year-forward real rates and inflation compensation would be equal to expectations of average short-term real rates and inflation, respectively. If we additionally assume that investors expect the economy to be operating at potential and the effects of transitory shocks to have abated within 5 years, then the 5-to-10-year-forward real rate also provides a measure of the perceived longer-run neutral real interest rate. In practice, however, risk premiums can be sizable and vary over time, which means that forward rates do not provide clean measures of expectations. An alternative measure of expectations that should be free of risk premiums is provided by survey forecasts. However, surveys are published infrequently and may measure financial market participants' expectations with errors (because expectations reported by survey respondents may not always be representative of the views of market participants).

This discussion introduces a new method for gauging expected real interest rates and inflation rates based on nonlinear regressions of Blue Chip survey forecasts of Treasury bill yields and CPI inflation on Treasury yields.[1] The parts of survey forecasts that are explained by the level of Treasury yields provide measures of expected interest rates and inflation, while the unexplained parts are assumed to be measurement errors. Thus, the benefit of this new approach is that it produces estimates of longer-run expectations that account for term premiums and measurement errors. Moreover, these regression-based expectations can be estimated at a much higher frequency (daily).

Between November 2018 and late August 2019, the estimated expected short-term real interest rate from 5 to 10 years ahead adjusted for term premiums using the regression-based approach (the dashed red line in figure 1) fell about

[1] The regressions are local linear regressions of Blue Chip survey expectations on 6-month, 5-year, and 10-year yields. Further details are provided in Andrew Meldrum (2019), "New Estimates of the Natural Real Rate, Inflation Expectations, and Term Premiums," memorandum, Board of Governors of the Federal Reserve System, Division of Monetary Affairs, October 8.

Figure 1: 5-to-10-Year-Ahead Real Rate and CPI Inflation Expectations




* Estimated using local linear regressions of interest rate and inflation survey forecasts on Treasury yields.
Source: Federal Reserve Bank of New York; Wolters Kluwer Legal and Regulatory Solutions U.S.: Blue Chip Economic Indicators and Blue Chip Financial Forecasts; Board staff calculations.

0.8 percentage point on net. That decline followed a general downward trend since the Global Financial Crisis. Since August, the rate has risen about 0.2 percentage point as Treasury yields have recovered somewhat, and it currently stands at 0.2 percent. The average CPI inflation expectation (the solid blue line) from the regression-based approach is little changed, on net, since November 2018, at 2.2 percent.[2] However, it has edged down 0.2 percentage point since early 2014.

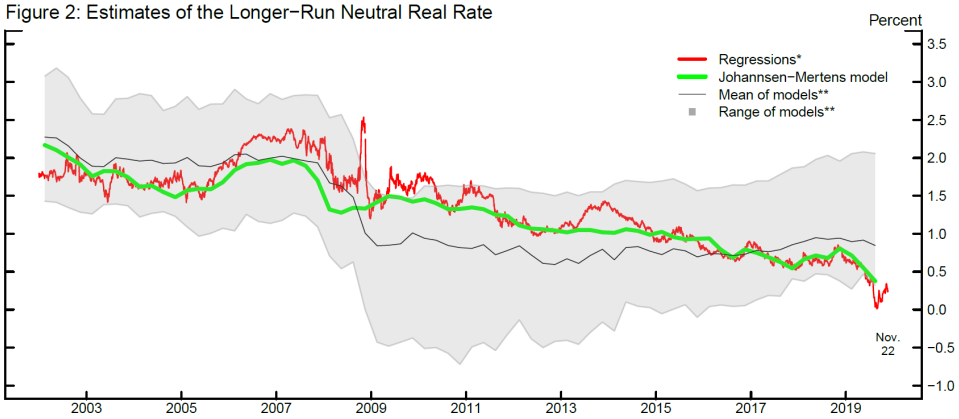
Another measure of long-horizon interest rate and CPI inflation expectations is provided by the staff's term structure model of Treasury yields.[3] The term structure model also assumes that the part of survey forecasts that cannot be explained by the yield curve is measurement error. The principal differences compared with the regression approach are that the term structure model imposes theoretical restrictions and has less flexibility to explain variation in the surveys, so it can struggle at times to capture the broad movements in the surveys. Since November 2018, the term structure model points to a somewhat smaller decline in real interest rate expectations (0.3 percentage point) than the regressions and a somewhat larger decline in inflation expectations (0.2 percentage point).

As can be seen in the gray region in figure 2, estimates of the longer-run neutral real rate from eight models, as reported in the Monetary Policy Strategies (MPS) section, have also been low since the financial crisis. However, the average of

[2] This level of CPI inflation expectations corresponds to PCE inflation expectations slightly below 2 percent, based on the average historical spread between core CPI and PCE inflation.

[3] The staff model is explained in Don Kim, Cait Walsh, and Min Wei (2019), "Tips from TIPS: Update and Discussions," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, May 21), https://www.federalreserve.gov/econres/notes/feds-notes/tips-from-tips-update-and-discussions-20190521.htm.

Figure 2: Estimates of the Longer-Run Neutral Real Rate




* Estimated using local linear regressions of interest rate and inflation survey forecasts on Treasury yields.
** Mean and range of quarterly point estimates from eight models reported in the Monetary Policy Strategies section: Christensen and Rudebusch (forthcoming), Del Negro and others (2017), Holston and others (2017), Johannsen and Mertens (2016), Kiley (2015), Laubach and Williams (2003), Lewis and Vazquez-Grande (2019), and Lubik and Matthes (2015). The final data point is 2019:Q3.
Source: Federal Reserve Bank of New York; Wolters Kluwer Legal and Regulatory Solutions U.S.: Blue Chip Economic Indicators and Blue Chip Financial Forecasts; Board staff calculations.

those estimates (the black line) declined sharply after the crisis and has since remained fairly flat, whereas the regression-based estimate has declined more steadily since the crisis. That difference may be because most of the models reported in the MPS section incorporate macroeconomic data such as real activity and inflation measures, whereas financial market participants may have been slower to take those data into account after the crisis. That said, there are also notable differences among the estimates from the models reported in the MPS section. For example, the model of Johannsen and Mertens (2016) (the green line) tracks the regression-based measure (the red line) relatively closely and both were at similarly low levels in the third quarter of 2019, which may be because both models capture the low levels of long-term Treasury yields.[4]

In conclusion, market participants' perceptions of the longer-run neutral real interest rate appear to have declined, on net, since November 2018, even as the average of the model-based estimates reported in the MPS section remained fairly flat. Evidence on long-horizon CPI inflation expectations since November 2018 is more mixed, although they may have edged down since 2014.

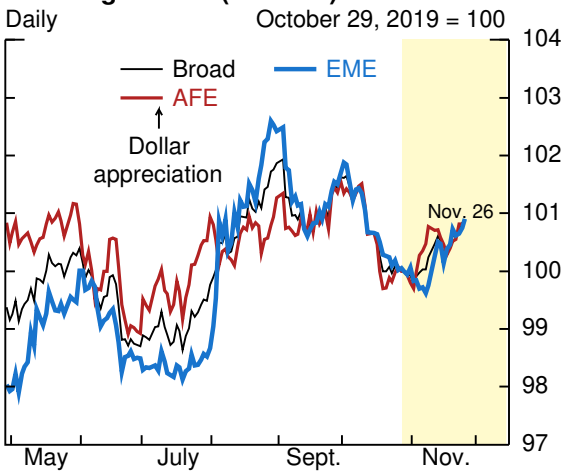


[4] Benjamin K. Johannsen and Elmar Mertens (2016), "A Time Series Model of Interest Rates with the Effective Lower Bound," Finance and Economics Discussion Series 2016-033 (Washington: Board of Governors of the Federal Reserve System, April), https://dx.doi.org/10.17016/FEDS.2016.033.

# Foreign Developments

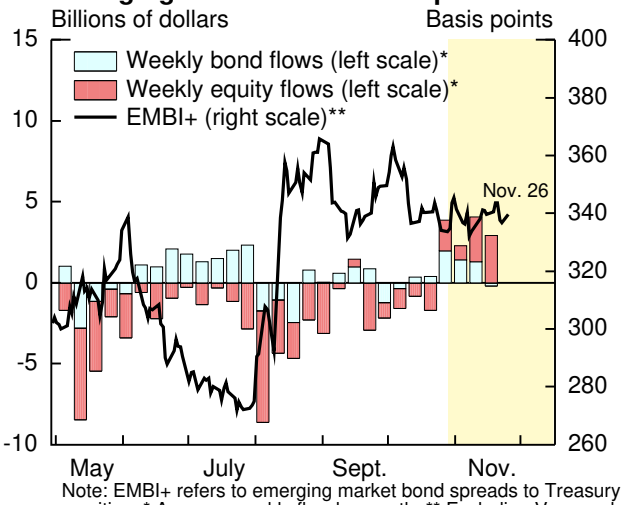


## Exchange Rates (Indexes)



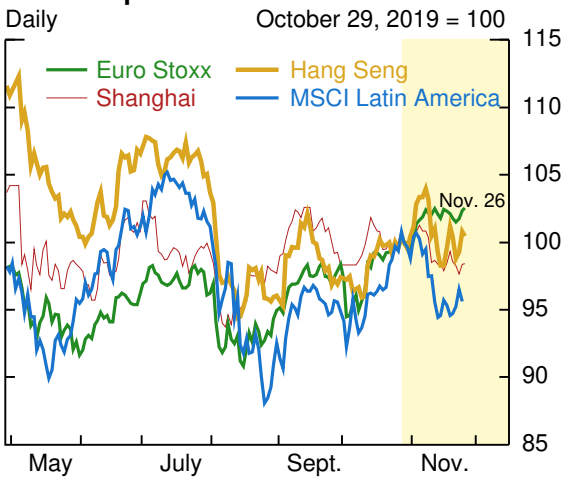

Source: Bloomberg; Federal Reserve Bank of New York; Board staff calculations.
Yellow shaded area marks time period from previous FOMC.

## Emerging Market Flows and Spreads



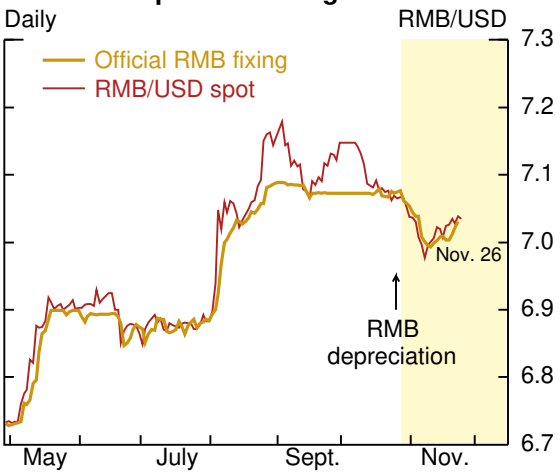

Note: EMBI+ refers to emerging market bond spreads to Treasury securities. * Average weekly flow by month. ** Excluding Venezuela.
Source: Emerging Portfolio Fund Research. Excludes intra-China flows. Yellow shaded area marks time period from previous FOMC.

## Global Equities



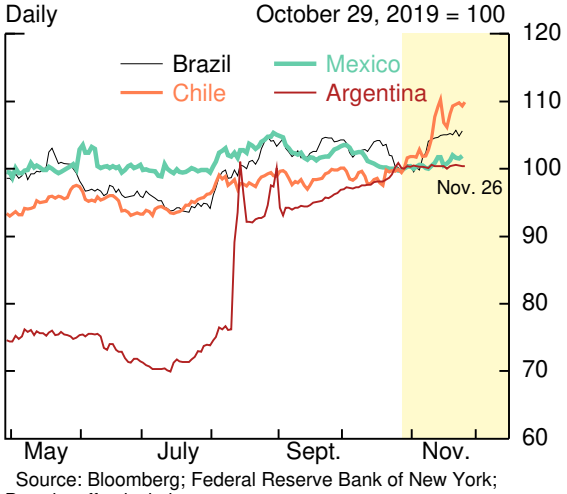

Note: Indexes denominated in local currency.
Source: Bloomberg.
Yellow shaded area marks time period from previous FOMC.

## RMB/USD Spot and Fixing



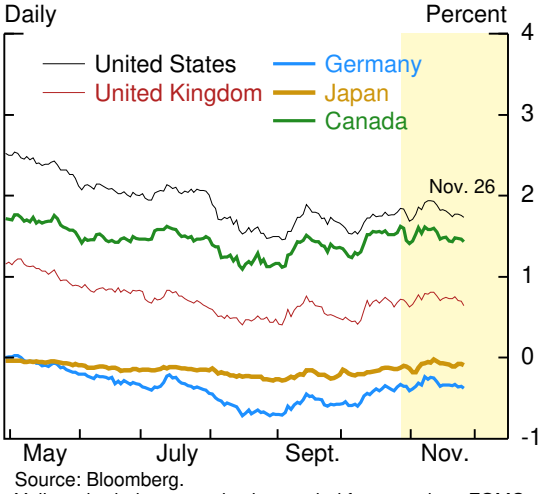

Source: Bloomberg.
Yellow shaded area marks time period from previous FOMC.

## Exchange Rates (Latin America)




Source: Bloomberg; Federal Reserve Bank of New York; Board staff calculations.
Yellow shaded area marks time period from previous FOMC.

## U.S. and AFE 10-year Sovereign Yields




Source: Bloomberg.
Yellow shaded area marks time period from previous FOMC.

S&P 500 index (the VIX) decreased somewhat and remains in the low end of its historical distribution. Yields on investment-grade corporate bonds moved down along with Treasury yields, while yields on speculative-grade bonds rose a bit, leaving their spreads over comparable-maturity Treasury securities a tad wider.

## FOREIGN DEVELOPMENTS

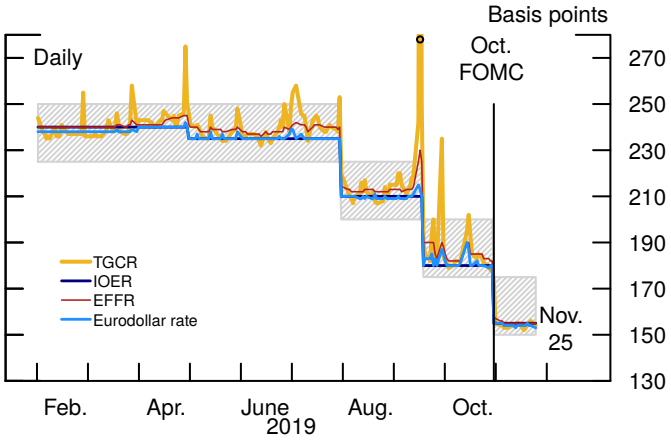
Over the intermeeting period, sentiment in foreign financial markets fluctuated in response to headlines related to the U.S.–China trade negotiations. Rising unrest in Hong Kong and Latin America garnered market attention but left limited imprint on broad financial markets. On net, most foreign equity indexes posted slight increases, the broad dollar index edged higher, and long-term AFE sovereign yields were generally little changed. Sentiment toward emerging market (EM) assets improved somewhat, and flows into EM-dedicated bond and equity mutual funds turned positive following several months of outflows.

The ongoing U.S.–China trade negotiations and political unrest in Hong Kong prompted some financial market volatility in China and Hong Kong, but the net changes in these markets' asset prices were modest and mixed. Chinese equity indexes decreased somewhat but the currency appreciated 0.5 percent against the dollar, temporarily strengthening past the psychologically important threshold of 7 yuan per dollar for the first time since the escalation of trade tensions in early August. Chinese assets were reportedly supported by a cut of 5 basis points in the lending facility rates as well as a series of liquidity injections by the central bank. Protests intensified in Hong Kong, leading to swings in financial markets, but asset prices were little changed on net. The Hong Kong Hang Seng equity index was roughly flat, reflecting the limited direct exposure to Hong Kong of the large global firms composing the index.

Political unrest intensified in several Latin American countries as well, but financial market effects were also contained. Intensifying protests initially sparked by metro fare increases in Chile weighed on the Chilean peso, which depreciated almost 10 percent. In Brazil, disappointing results of oil field auctions, which damped investor optimism for the economy's oil industry, pushed the *real* about 7 percent lower, offsetting the earlier boost from the passage of pension reforms. Another sovereign default appears imminent in Argentina, where the price of CDS on sovereign bonds spiked and implies around a 96 percent probability of default (over a five-year horizon). Spillovers outside of Latin America have been limited so far.

# Short-Term Funding Markets

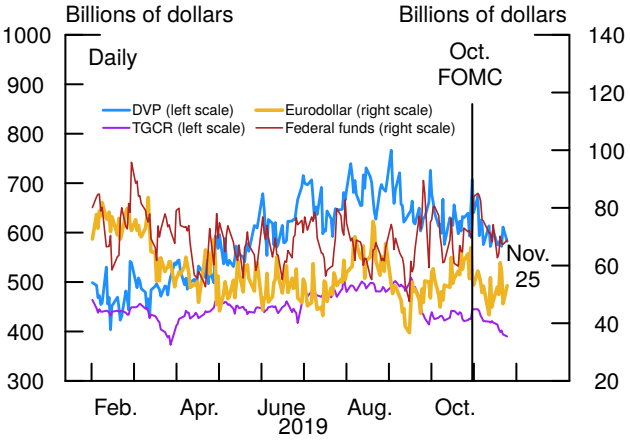
## Selected Money Market Rates




Note: These data points are not shown: TGCR: Sept. 17 = 525 basis points. Shaded area is the target range for the federal funds rate. IOER is interest on excess reserves; TGCR is triparty general collateral rate; EFFR is effective federal funds rate.

Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

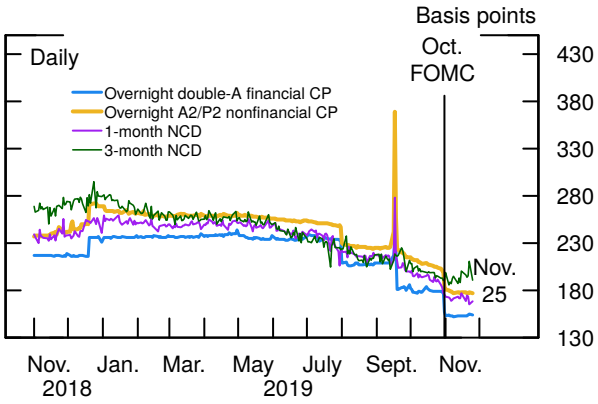
## Selected Money Market Volumes




Note: DVP is delivery-versus-payment repurchase agreement; TGCR is triparty general collateral rate.

Source: Federal Reserve Bank of New York; Federal Reserve Board.

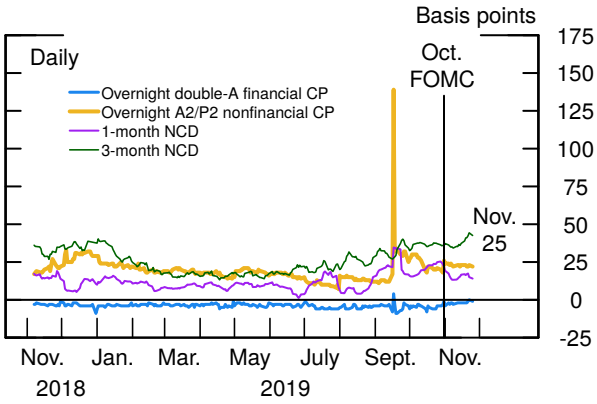
## CP and NCD Rates




Note: CP is commercial paper; NCD is negotiable certificate of deposit.

Source: Depository Trust & Clearing Corporation.

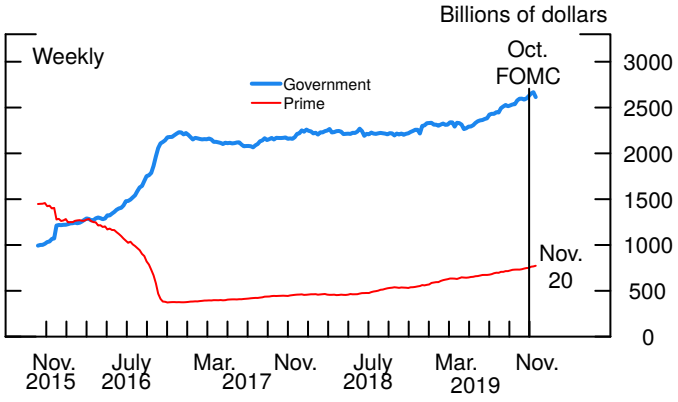
## CP and NCD Spreads




Note: CP is commercial paper; NCD is negotiable certificate of deposit. Overnight CP spreads are to the effective federal funds rate and NCD spreads to the overnight index swap rate. NCD spreads are 5-day moving averages.

Source: Depository Trust & Clearing Corporation.

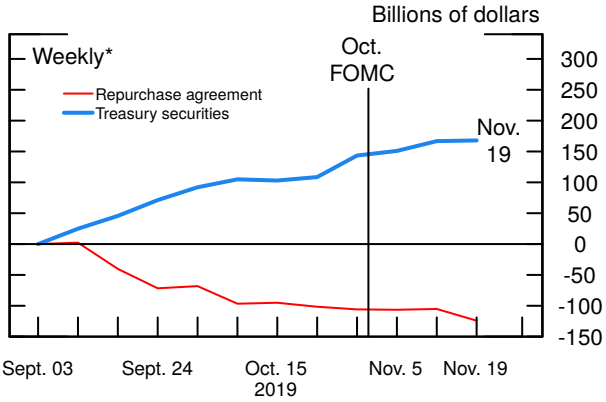
## MMF Assets under Management




Note: MMF is money market fund. Data are updated every Thursday.

Source: Investment Company Institute.

## Recent Cumulative Changes in MMF Holdings




* Data are for holdings as of Tuesday of each week.

Source: iMoneyNet.

Prices of AFE risky assets and sovereign bonds broadly tracked the moves in similar U.S. assets. Major AFE equity indexes increased modestly, on net, and AFE long-term sovereign yields ended the period little changed. Canadian sovereign yields were an exception; the 10-year yield declined 16 basis points, as market participants interpreted the Bank of Canada's domestic economic projections and communications as pointing to a more accommodative policy stance than was expected.

## SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Money markets were stable over the intermeeting period. Interest rates for overnight secured and unsecured loans fell in line with the 25 basis point decrease in the target range for the federal funds rate at the October FOMC meeting. Trading in money markets has been orderly amid volumes within normal ranges, and rates declined further relative to the IOER rate, likely reflecting an increase in liquidity through the Desk's overnight and term repo operations. The effective federal funds rate and the secured overnight financing rate averaged 1.57 percent and 1.60 percent, respectively. Pressures on these rates at October month-end and November mid-month were muted compared with recent Treasury issuance days. To date, spreads on unsecured private short-term instruments have not yet shown any notable imprint from year-end pressures, and FX swap bases have remained low relative to recent year-ends. (The box "Year-End Effects in Short-Term Funding Markets in Recent Years" provides additional analysis.)

The Desk continued to conduct both temporary and permanent open market operations aimed at maintaining ample reserves and addressing money market pressures that could adversely affect policy implementation. These operations have proceeded smoothly. On November 14, the Desk also announced three longer-term repo operations with maturities extending beyond year-end as an additional step to alleviate potential year-end pressures in money markets. The first of these operations, conducted on November 25, had a $25 billion limit and was oversubscribed.

Total assets held by money market funds were stable over the intermeeting period. These funds continued to increase their Treasury holdings, but their holdings of repos edged down.

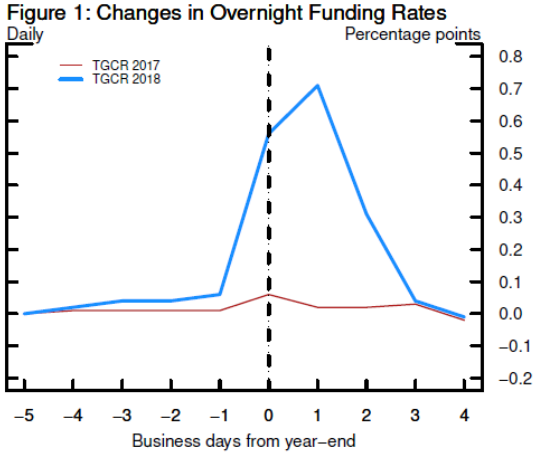
## Year-End Effects in Short-Term Funding Markets in Recent Years

At recent year-ends, certain money market segments have exhibited unusual volatility and elevated funding costs, which have the potential to affect market functioning and credit provision. Historically, year-end effects have reflected a combination of factors, including balance sheet management ("window dressing") for financial and regulatory reporting and the potential for coordination failures in these markets during the holidays, as well as special factors that vary from year to year.[1] Given the unexpected volatility in money markets in September 2019, there are heightened concerns about potential pressures going into the upcoming year-end, even as the Federal Reserve is providing additional liquidity.

Year-end funding pressures materialized somewhat differently in 2017 and in 2018. For example, while Treasury GC repo rates moved little at the end of 2017, they spiked substantially—far more than anticipated—at the end of 2018 (figure 1), reportedly in part because of funding demands arising from a Treasury auction settlement on December 31. In contrast, three-month FX swap bases rose sharply at the end of 2017 but were more subdued at the end of 2018 (figure 2), perhaps as firms obtained funding early in anticipation of year-end pressures.[2] Other segments, such as markets for commercial paper (CP) and certificates of deposit (CDs), have exhibited more consistent behavior from year to year. Money market funds and other investors typically pull back from CP and CDs leading up to year-end, putting upward pressure on rates, particularly in A2/P2-rated CP (figure 3).

Market commentary indicates some money market participants are on edge heading into the end of 2019, in part because of concerns raised by the mid-September

Figure 1: Changes in Overnight Funding Rates

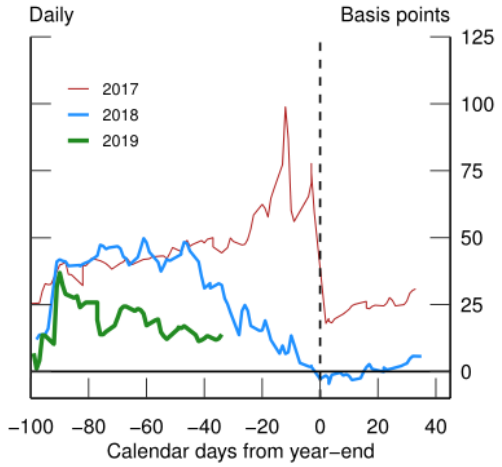



Note: TGCR is triparty general collateral rate.
Source: Federal Reserve Board.

[1] While money markets tend to exhibit such dynamics around other financial reporting dates, such as quarter-ends, the effects are typically more pronounced around year-ends.

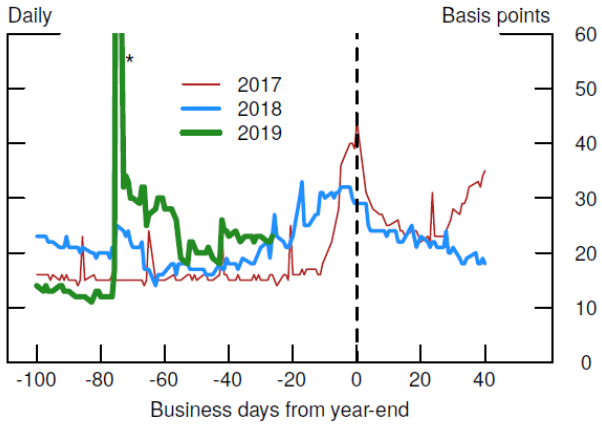
[2] EUR–USD and JPN–USD FX swap basis. The FX swap basis, usually calculated as the difference between the dollar funding cost via an FX swap and LIBOR, reflects the costliness of "offshore" dollar funding relative to the domestic money market.

**Figure 2: EUR Three–Month FX Swap Basis**




Source: Bloomberg and staff calculations.

**Figure 3: Overnight A2/P2 Nonfinancial Commercial Paper Spreads**




* Series peaked at 139 basis points on September 17, 2019.
Source: Depository Trust & Clearing Corporation.

volatility in these markets. Indeed, several of the factors that contributed to the volatility at the end of 2018 and in September of this year will be in play again. Dealer positions in Treasury securities remain elevated, and there will again be a sizable Treasury auction settlement on December 31. In addition, market participants have stated that regulatory constraints diminish their ability to supply dollar liquidity.

Market participants and the Federal Reserve have undertaken some extra preparations for this year-end amid the heightened uncertainty. For example, the share of nonfinancial CP that currently matures after year-end is about 15 percentage points higher than is typical at this time of year, and other segments of the CP and CD markets show slightly elevated shares of pre-funding. In addition, dealers have reportedly been more proactive than usual in pressing clients to seek alternative sources of funding at year-end. Finally, Federal Reserve open market operations—Treasury bill purchases and repo operations—will increase the availability of financing to securities dealers and help to maintain ample levels of reserves through year-end. The first operation offering term repo maturing beyond year-end was conducted on November 25 and was significantly oversubscribed. Market participants have noted that these operations have helped ease some concerns about year-end pressures.

Thus far, we have seen only limited evidence of heightened year-end funding pressures. Anecdotal reports suggest term repo rates are slightly elevated compared with this time last year. In contrast, increases in three-month FX swap bases and three-month CD spreads have so far been smaller than is typical for this time of year. To be sure, the illiquidity of some term money markets limits their reliability in indicating pressures until closer to year-end. While issuers are being more proactive than usual in obtaining funding ahead of year-end, it is too early to predict the extent of potential year-end funding pressures.

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# Financing Conditions for Businesses and Households

Information received over the intermeeting period suggests that financing conditions for businesses and households remain supportive of spending and economic activity on balance. While there is some evidence that demand for financing by businesses may have weakened, borrowing volumes generally remained solid, likely supported by the decline in borrowing costs witnessed over the past year.

- Gross issuance of investment- and speculative-grade corporate bonds declined in October after a strong September but has returned to a robust pace thus far in November. Institutional leveraged loan issuance continued to be solid.
- C&I loans held by banks contracted in October, likely reflecting a decline in borrower demand reported in the October SLOOS.
- CMBS issuance reached a post-crisis high in October, as declining interest rates have increased the incentive of mortgage borrowers to refinance. CRE loan growth at banks picked up relative to recent quarters.
- Home-purchase mortgage originations remained near the post-crisis high in September, and refinancing increased again in October to a multiyear high.
- Consumer credit conditions remained supportive of spending overall, although supply conditions continued to be tight for nonprime borrowers.

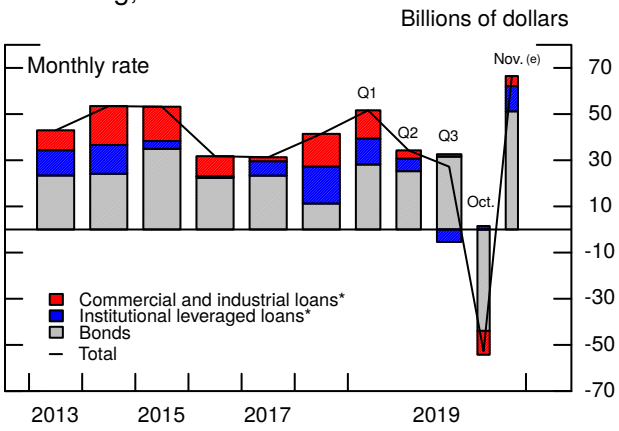
## BUSINESS FINANCING CONDITIONS

### Nonfinancial Businesses

Financing conditions for nonfinancial firms remain accommodative on balance. Yields on investment-grade corporate bonds declined mostly in line with comparable-maturity Treasury yields over the intermeeting period, while yields on speculative-grade corporate bonds increased modestly. Both are near historical lows and are substantially lower than the recent peaks in late 2018. Spreads for investment-grade bonds were little changed, while spreads for speculative-grade corporate bonds increased somewhat. Gross issuance of both investment- and speculative-grade corporate bonds declined in October after a strong September but have returned to robust levels in November. Net

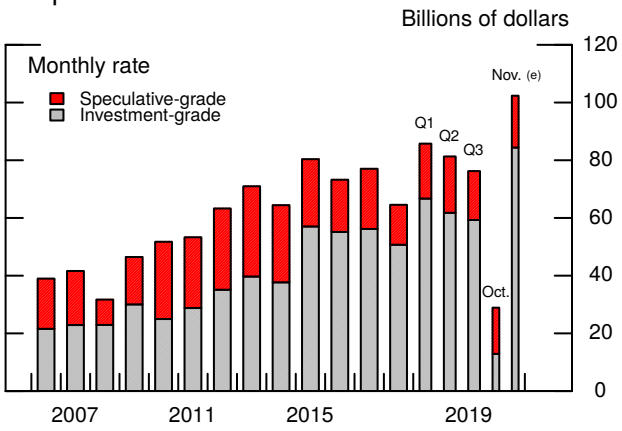
# Business Finance

## Selected Components of Net Debt Financing, Nonfinancial Firms



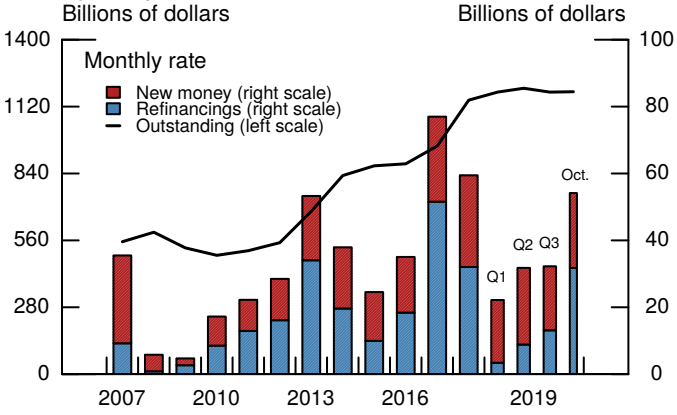

* Period-end basis.
e Estimate.
Source: Mergent Fixed Income Securities Database; Thomson Reuters LPC; Federal Reserve Board.

## Gross Issuance of Nonfinancial Corporate Bonds



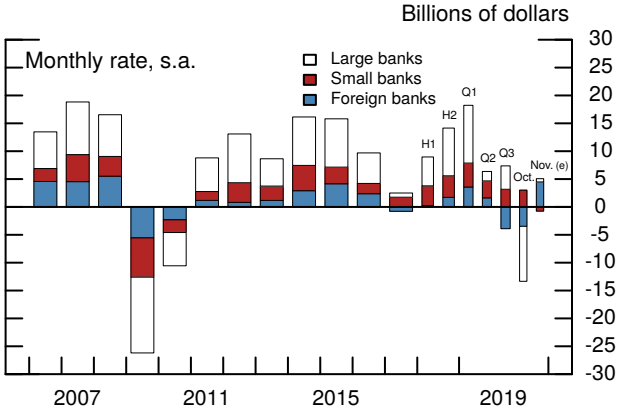

Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
e Estimate (month to date).
Source: Mergent Fixed Income Securities Database.

## Institutional Leveraged Loan Issuance, by Purpose



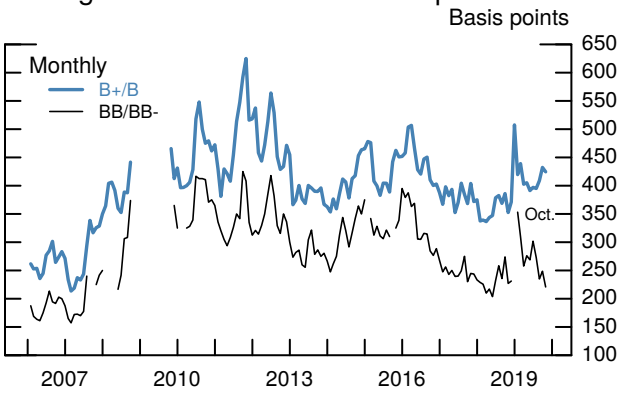

Source: Thomson Reuters LPC LoanConnector.

## Commercial and Industrial Loans



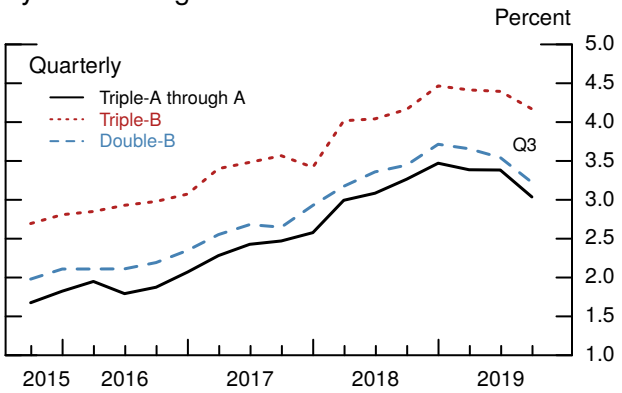

e Estimate.
Source: Federal Reserve Board staff calculations; Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

## Average New-Issue Institutional Spreads




Note: Breaks in the series represent periods with no issuance. Spreads are calculated against 3-month LIBOR. The spreads do not include up-front fees.
Source: S&P LCD.

## Weighted-Average Interest Rates for C&I Loans, by Risk Rating




Note: With respect to newly originated commercial and industrial (C&I) loans and drawdowns.
Source: Federal Reserve Board Form FR Y-14Q, Capital Assessments and Stress Testing.

Financing Conditions

corporate bond issuance so far in 2019 has been substantially above that for 2018 and comparable with the large volumes seen from 2015 to 2017.

Interest rate spreads for newly issued lower-rated institutional loans were roughly unchanged, while spreads for higher-rated loans tightened somewhat. Both remain well below their levels early in 2019. New money institutional leveraged loan issuance in October was solid, remaining near 2019 monthly averages and slightly below the rate for 2017 and 2018. The majority of new money issuance was driven by acquisition activity, while refinancing volume increased to the highest level since 2017.

Interest rates on C&I loans declined notably in the third quarter after being flat in the first half of 2019. C&I loans held by banks contracted in October after growing slowly in the third quarter, consistent with the weaker demand for C&I loans reported in the October SLOOS. Available data suggest that C&I loans will grow modestly in November.

The credit quality of nonfinancial corporations has deteriorated slightly in recent months but remains solid overall. The volume of nonfinancial corporate bond upgrades slightly outpaced that of downgrades in October, and the KMV expected year-ahead default rate stayed near the midpoint of its historical distribution. Leveraged loan rating downgrades to triple-C have also trended up since the beginning of this year.

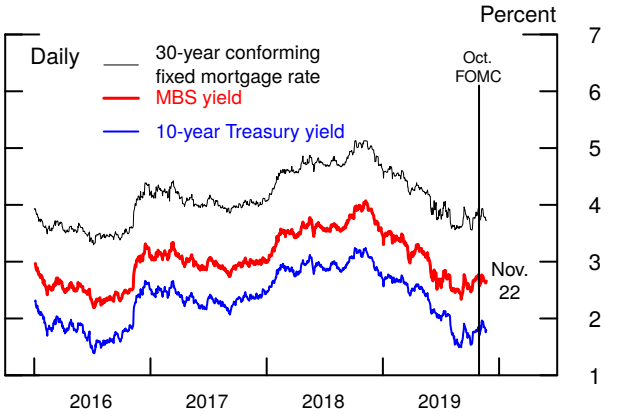
Gross equity issuance of both initial and seasoned offerings declined in October after a particularly strong September but were only slightly below the average volumes over the past few years. Preliminary data from November show a more pronounced decline. Reports suggest that sentiment in the initial public offerings (IPOs) market has turned more negative following the withdrawal of a high-profile IPO in September and the poor performance of several others earlier in the year.

## Small Businesses

After having fallen from May through August, loan volumes to small businesses were stable in September at a level that was only slightly above that from a year ago. Data suggest that demand for credit from small businesses has weakened in recent months, with the share of firms not interested in borrowing rising slightly over the past year. Moreover, small business optimism is well below levels from a year ago. Meanwhile, credit supply to small businesses remained stable and relatively accommodative. The share of firms reporting that it was somewhat or very difficult to

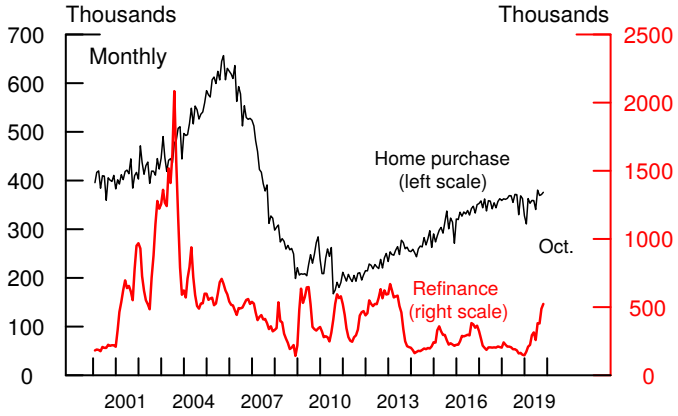
# Household Finance

## Mortgage Rate and MBS Yield



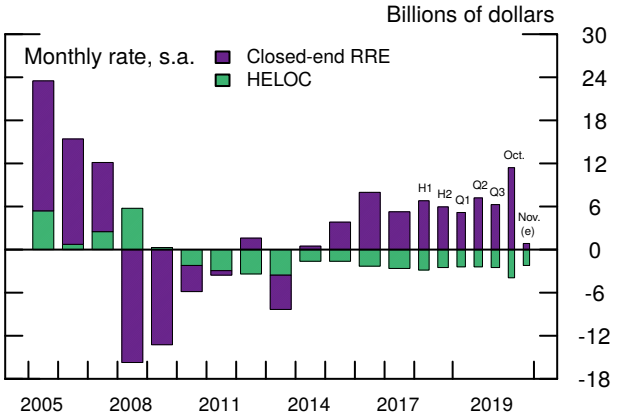

Note: Through May 31, 2019, the mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate. From June 3, 2019, forward, the MBS yield is the uniform MBS 30-year current-coupon rate.
Source: For MBS yield, Barclays; for mortgage rate, Loansifter; for Treasury yield, Federal Reserve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

## Purchase and Refinance Originations



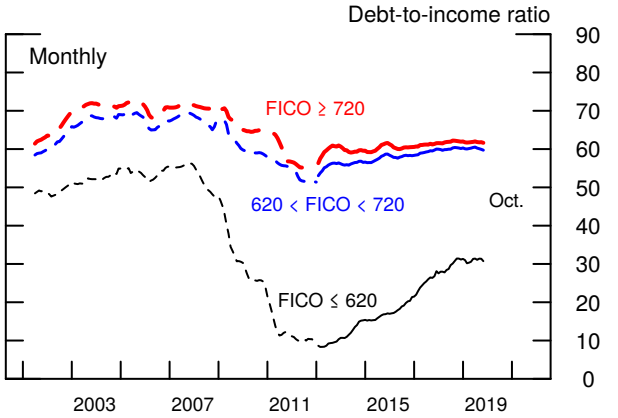

Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values before 2019, data reported under the Home Mortgage Disclosure Act of 1975; for values in 2019, Federal Reserve Board staff estimates.

## Residential Real Estate Lending



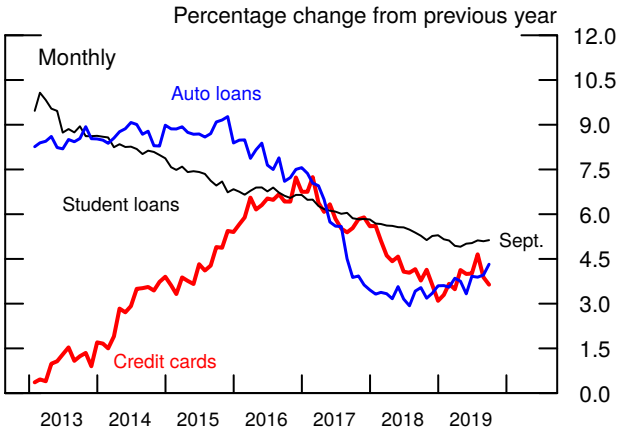

Note: RRE is residential real estate; HELOC is home equity line of credit.
e Estimate.
Source: Federal Reserve Board staff calculations; Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

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



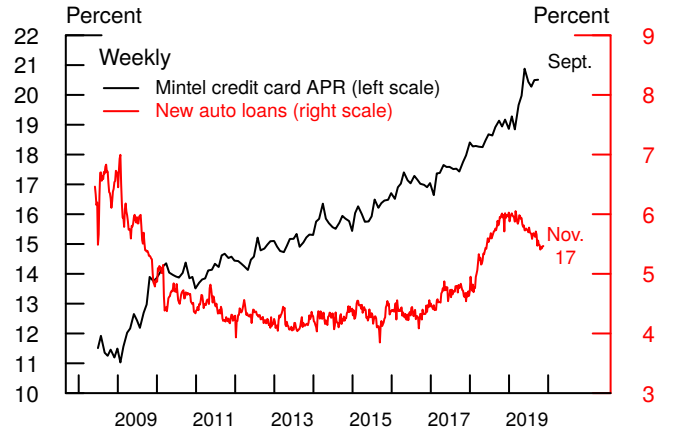

Note: Weighted average of maximums by borrower and loan type, where types are defined by loan-to-value ratio, property location, and credit score.
Source: For frontiers shown with dashed lines, McDash and CoreLogic; for frontiers shown with solid lines, Optimal Blue.

## Consumer Credit




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

## Consumer Interest Rates




Note: Series are seasonally adjusted.
Source: Mintel data are reported monthly; J.D. Power.

Financing Conditions

obtain credit over the past 12 months ticked down to a post-crisis low. Recent loan performance continues to deteriorate slightly but remains strong by historical standards.

### Commercial Real Estate

Financing conditions for CRE remained generally accommodative. Triple-B CMBS spreads widened slightly but remained near the low end of their post-crisis range. Declining interest rates have supported strong CMBS issuance, in part because the incentive of mortgage borrowers to refinance has increased. Agency and non-agency CMBS issuance continued to increase in October and reached a post-crisis high. CRE loan growth at banks also picked up in October relative to recent quarters, boosted by growth in the nonfarm nonresidential and construction and land development categories.

### Municipal Government Financing Conditions

Credit conditions in municipal bond markets remained accommodative. Gross issuance of municipal bonds was strong in October, with refinancing accounting for the majority of the issuance. Municipal bond yields and spreads in both the secondary and primary markets were little changed, though it bears noting that the municipal yields remain near the record-low levels reached this summer. The credit quality of general obligation bonds has improved in recent months, with the number of credit rating upgrades continuing to outpace that of downgrades.

## HOUSEHOLD FINANCING CONDITIONS

### Residential Real Estate

Financing conditions in the residential mortgage market were little changed, on balance, over the intermeeting period. Home mortgage interest rates moved down 13 basis points, slightly more than yields on 10-year Treasury securities. Mortgage rates are 17 basis points above their early October lows but still about 60 basis points below their average of the first half of the year and about 140 basis points below last November. This year's decline in rates has boosted home-purchase originations and refinancing. Mortgage credit standards—as measured by staff estimates of lenders' maximum available debt-to-income ratios—were little changed at somewhat tighter levels than in the early 2000s.

## Consumer Credit

Overall, financing conditions in consumer credit markets continued to be supportive of growth in consumer spending. Credit card debt grew at a solid pace as interest rates began to fall in the third quarter. Auto loan growth has picked up in 2019, coinciding with a significant decline in auto loan interest rates this year. Student loan growth remained solid through September. (See the box "The Effect of Student Debt on Borrowing in Other Credit Markets" for a discussion of how student loan debt affects access to and demand for other forms of household credit.) Consumer ABS issuance was strong through October as spreads remained at levels that are somewhat above their post-crisis averages. While conditions are generally supportive, supply remains tight for nonprime borrowers. For example, credit card limits are well below the pre-crisis level, and credit scores on used auto loan originations are significantly higher than a few years ago.

## FINANCING AND FINANCIAL CONDITIONS INDEXES

A staff index that provides a measure of financing conditions for nonfinancial corporations indicates that financing conditions eased modestly as equity prices increased over the intermeeting period and has remained accommodative relative to historical standards. As shown in the appendix to this Tealbook section, the average reading of other publicly available financial conditions indexes, which aggregate a large set of financial variables into summary series, also points to slightly easier financial conditions over the intermeeting period. Overall, these indexes indicate that broad financial conditions are either accommodative or close to a neutral level relative to historical standards and are signaling considerably easier conditions than at the start of the year.

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## The Effect of Student Debt on Borrowing in Other Credit Markets

Student loan borrowing has risen rapidly in recent years. Outstanding student loan balances owed by U.S. households now stand at approximately $1.6 trillion, the second largest category of household debt behind residential mortgages. This increasingly burdensome form of debt has the potential to markedly change borrowers' financial behavior and outcomes. For example, Mezza, Ringo, Sherlund, and Sommer show that increased student loan debt causes a reduction in access to mortgage loans, which is at least partly driven by negative effects of increased student loan delinquencies on credit scores.[1] In this discussion, we show that, while increased student loan debt reduces borrowing in more tightly underwritten credit markets (such as those for mortgages and credit card debt), all else being equal, it leads to additional borrowing in credit markets with easier credit standards (such as those for auto and other nonhousing collateralized debts).

The effect of early-life student loan debt on borrowing in other forms of consumer credit later in life is theoretically ambiguous. On the demand side, larger student loan debt service payments mean that a lesser amount of borrowers' income is available for other uses, so households making student loan payments may limit their other spending and borrow less to finance outlays, thereby reducing their demand for nonstudent debt. However, having lower disposable income (all else being equal) due to student loan payments also means that households choosing to maintain a given level of spending may rely more on debt financing than cash financing for their purchases, thereby increasing their demand for debt.

On the supply side, if increased student loan borrowing leads to a deterioration of borrowers' credit profiles, then higher student loan obligations could reduce willingness to supply other forms of consumer credit to these borrowers. For example, lenders focused on debt-to-income ratios may ration credit more tightly to individuals with higher levels of student loan debts on their credit records. Moreover, if higher student loan payments result in borrowers being delinquent on any of their debt obligations, some lenders are likely to restrict their willingness to extend additional credit to these individuals.[2] Either way, taking on student loan debts early in life could end up restricting borrowers' access to credit later on, presumably to a greater extent in more tightly underwritten markets.[3]

In the figure, we show the estimated effect of a 10 percent increase in student loans disbursed early in life (that is, by age 22) on the probability of a person having other types of debt from ages 22 to 32, holding other factors constant.[4] The top panels plot estimated effects for the more tightly underwritten forms of debt—home mortgages (top left) and credit cards (top right). The bottom two panels show estimated effects on the less tightly underwritten forms—auto loans (bottom

[1] See Alvaro Mezza, Daniel Ringo, Shane Sherlund, and Kamila Sommer (forthcoming), "Student Loans and Homeownership," *Journal of Labor Economics.*

[2] Mezza and others (forthcoming) find that increased student loan balances increase the likelihood borrowers will become delinquent on their student loans (all else being equal), but the authors find no evidence of an effect on the probability of becoming delinquent on other forms of consumer debt.

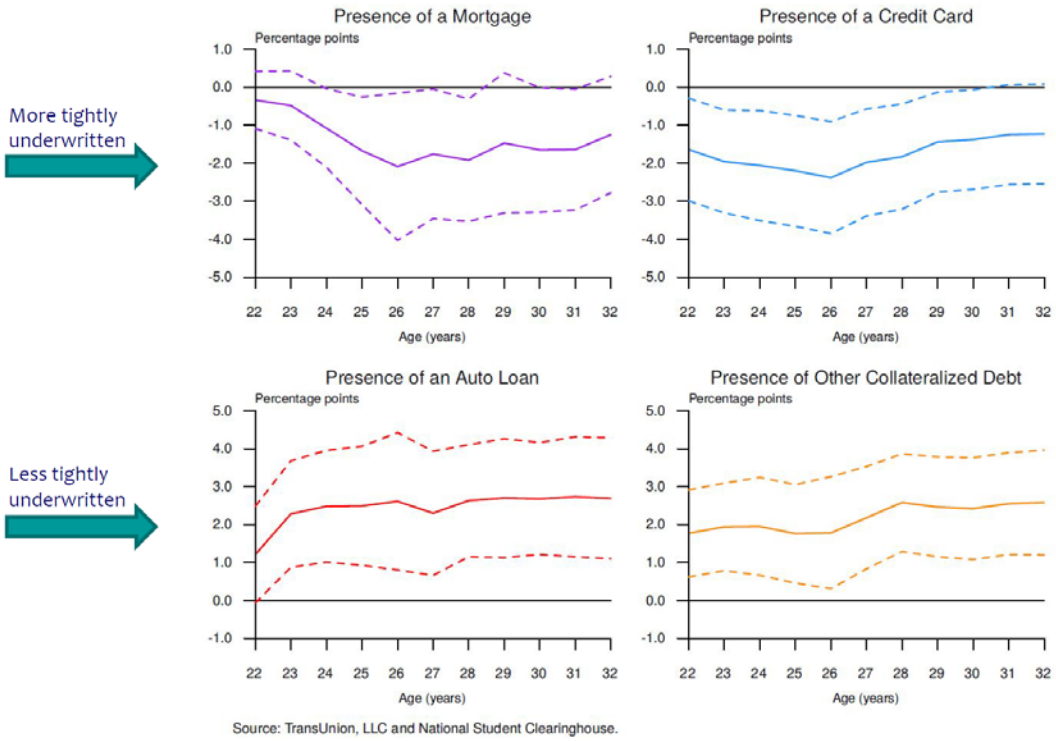
[3] There are potential countervailing forces to these mechanisms as well, however. A change in the supply of credit could also cause consumers to substitute the form of their borrowing. For example, if credit card borrowing becomes less available to those with low credit scores, applicants with derogatory information on their credit record may choose more easily accessible forms of borrowing, such as goods-secured loans, to maintain the desired level of consumption.

[4] Results are based on a nationally representative sample of individuals who turned 22 between 1995 and 2003 and include data through 2014.

left) and other collateralized consumer loans (bottom right), that is, loans secured by goods or an installment sales contract.[5] For each type of debt, the solid lines represent the estimated effect, while the dashed lines show 90 percent confidence intervals. A 10 percent increase in early-life student loan borrowing reduces the age-specific probability of having a mortgage about 1.5 percentage points on average. The effect is also negative for credit cards and is of a similar size. In marked contrast, the same increase in student loans increases the probability of a person having an auto loan or other collateralized consumer debt about 2 to 2.5 percentage points on average. In additional analysis (not shown), we find that increased student loan debt causes a decline in limits on credit card accounts but an increase in the utilization rates of credit cards. This finding supports the premise that higher student debt could reduce the supply of credit available from credit cards but stimulates to some extent the demand for such credit.

In summary, our analysis suggests that increased student loan obligations result in differential effects on total borrowing by market segment by interacting differentially with the demand and supply of credit. In credit markets with more stringent underwriting, increasing student loan burdens can lead to a reduction in borrowing, likely because of a contraction in credit supply (that is, either through a reduction in entry to the credit market or through a reduction in credit limits). In contrast, in credit markets where underwriting is less tight, higher levels of student debt can lead to additional borrowing. As such, the ready availability of credit in these markets mitigates any potential contractionary effect that student loan debt service might have on borrowers' spending.

**Effect of a 10 Percent Increase in Early Life Student Debt, by Age**




Source: TransUnion, LLC and National Student Clearinghouse.

[5] For example, these debts are used to finance furniture and household appliances. These loans have an average maturity of one to three years, and the average loan size is about $3,000.

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# 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.

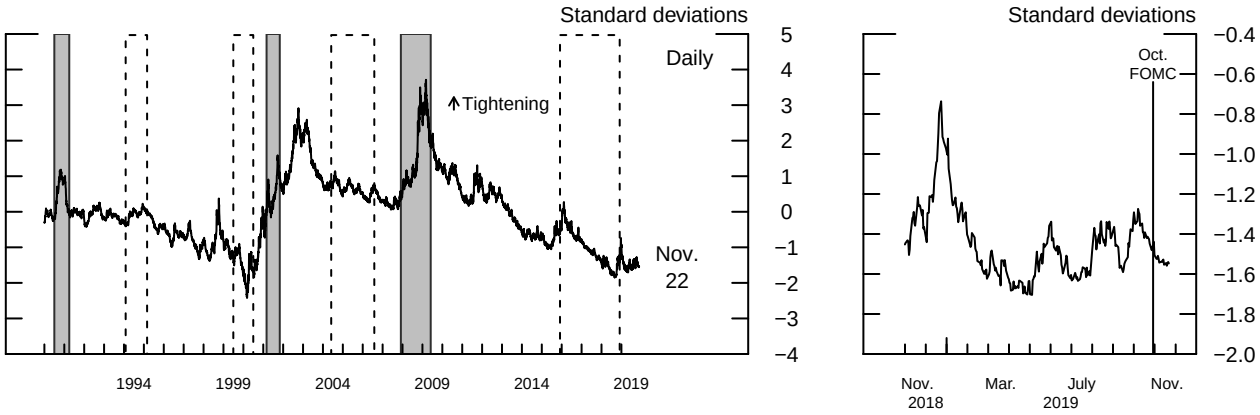


[1] This index was first discussed in the box "Financial Conditions Indexes" in the Financing Conditions for Businesses and Households section of the September 2018 Tealbook A.

[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.

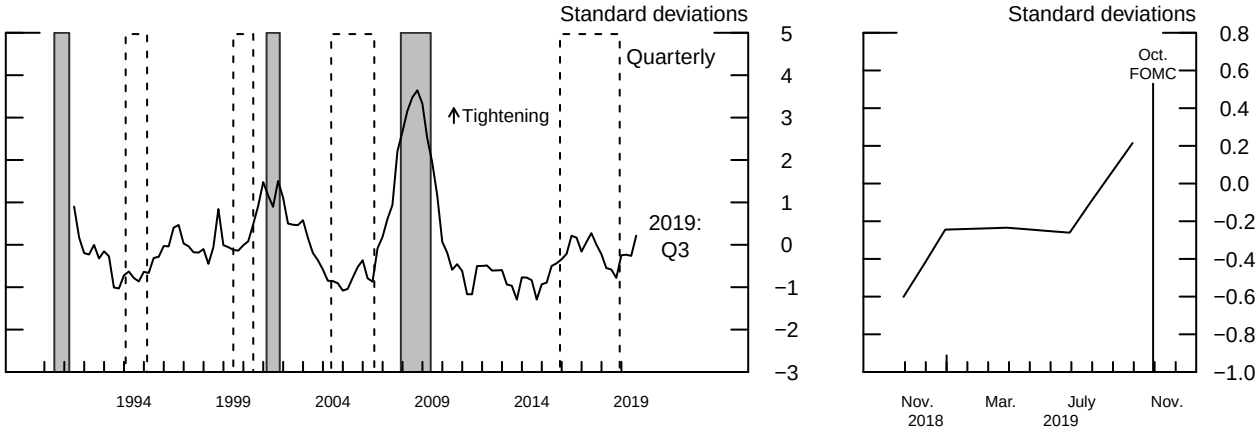
# Selected Financial Conditions Indexes

## Staff FCI for Nonfinancial Corporations



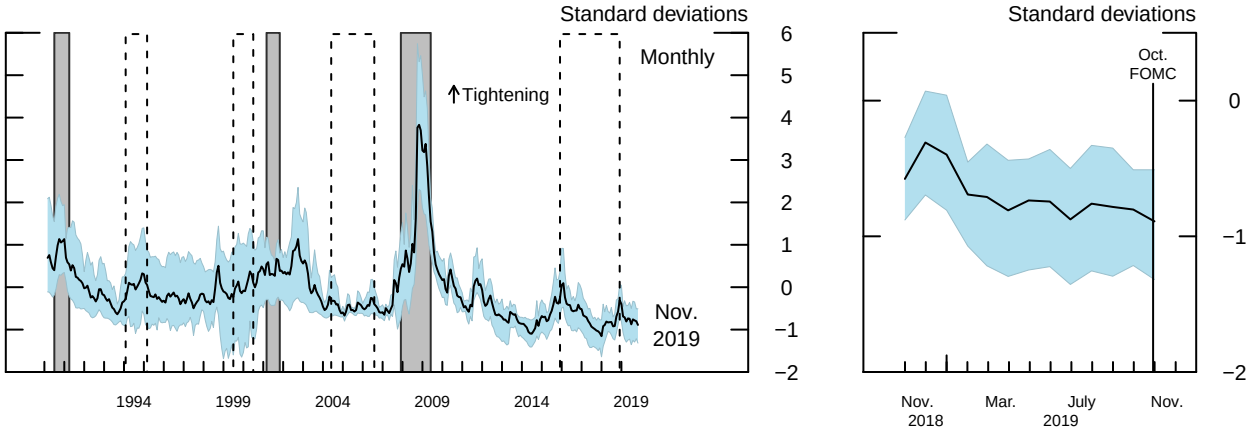

Note: The financial conditions index (FCI) is the deviation from the long−run relation between the systematic components of the cumulative log returns of 2 portfolios of firms with credit ratings above and just below investment grade. The systematic components are derived from the 5−factor Fama−French 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

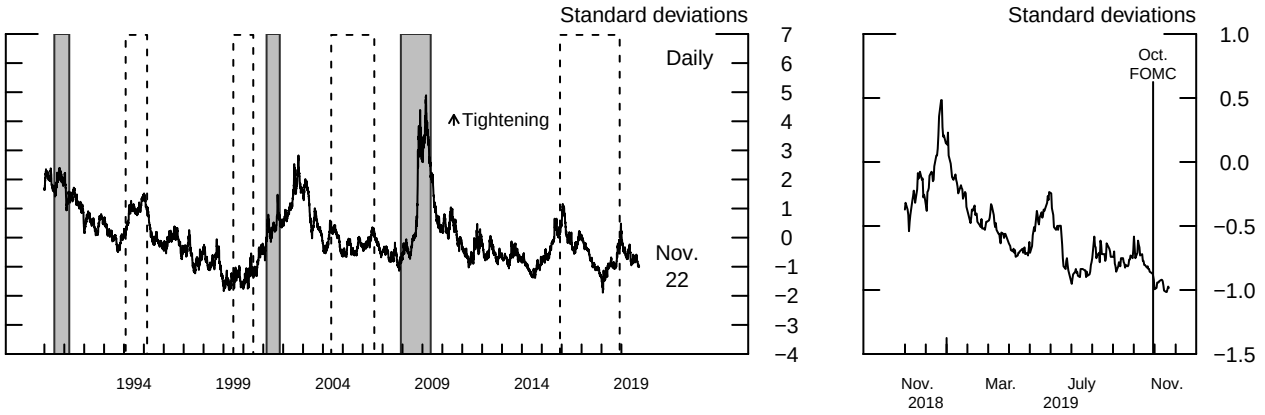



Note: Mean FCI represents the mean of FCIs developed by Goldman Sachs and the Federal Reserve Banks of Chicago, St. Louis, and Kansas City. The blue shaded region represents the range of these 4 standardized FCIs.
Source: Bloomberg; Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

**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.**

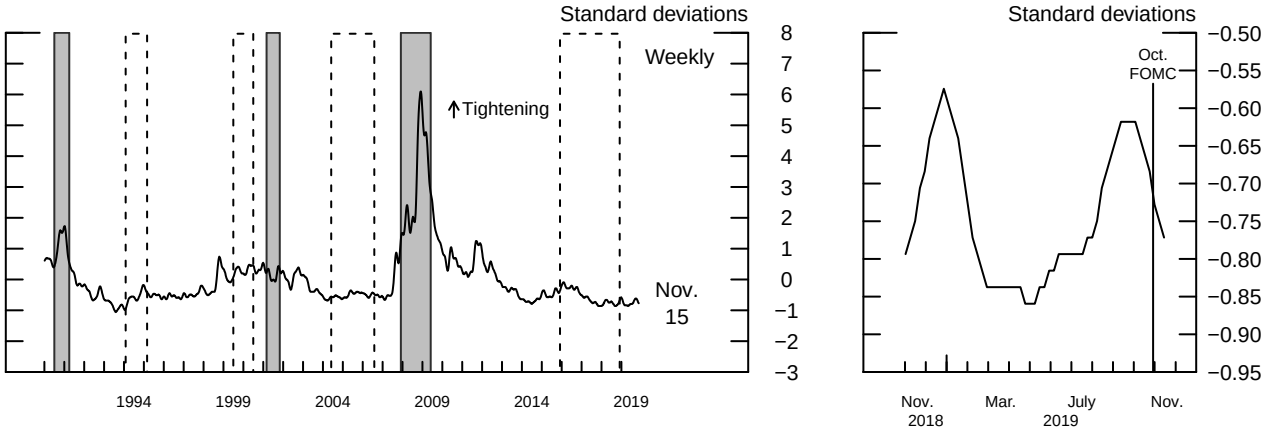
# Selected Financial Conditions Indexes (continued)

## Goldman Sachs FCI



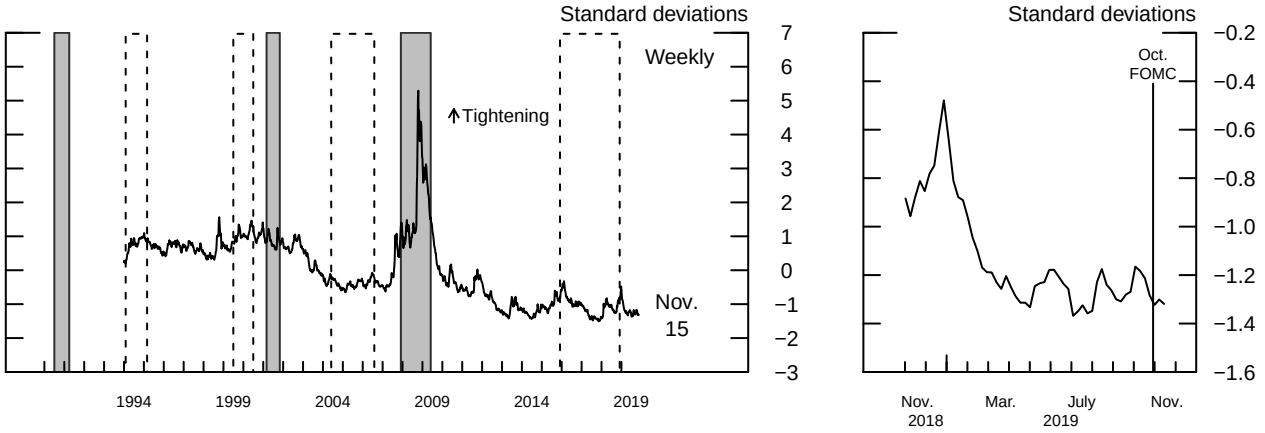

Note: The index is a weighted average of 5 financial variables: the federal funds rate, the 10−year Treasury yield, the triple−B yield spreads to Treasury, the S&P price−to−earnings ratio, and the broad value of the U.S. dollar. Weights are pinned down by the contribution of each financial variable on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

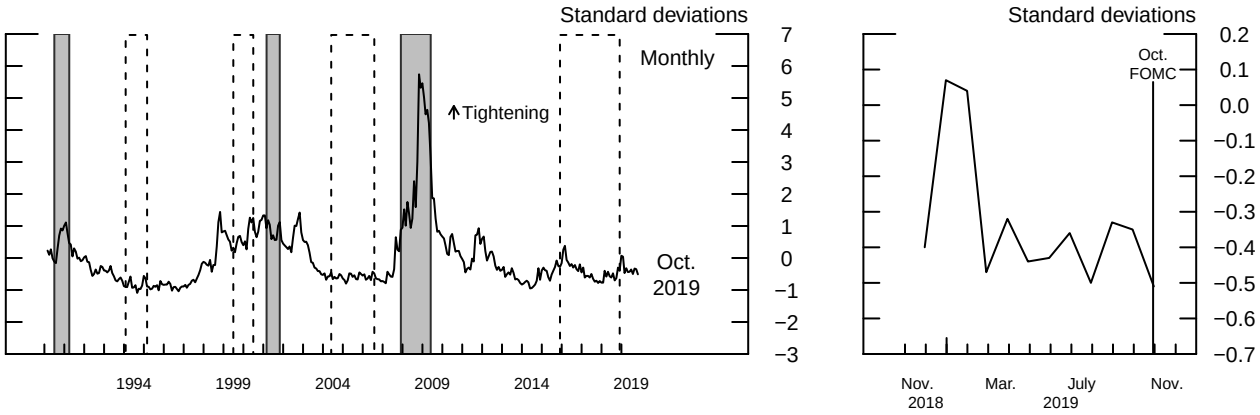



Note: The index is the principal component of 18 variables, including short− and long−term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index.
Source: Federal Reserve Bank of St. Louis.

**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

We continue to judge that the risks around our baseline projection for GDP are tilted to the downside. However, as we will discuss, we see the downside risks as having diminished somewhat over the past month. 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 more substantial slowing in economic growth than we currently recognize. Among risks to the upside, many of the underlying fundamentals for household spending and business investment remain solid, and financial conditions 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); notably, that period includes the most recent two recessions along with a number of other episodes with elevated uncertainty and market volatility.

Model-based measures of recession risks have fallen noticeably since the October Tealbook. 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 down to 49 percent from 57 percent. However, these estimates 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 8 percent, compared with 22 percent in the October Tealbook, and is now notably lower than the unconditional probability. The increase in the term spread is an important factor behind the decline in the recession risk for both models.

The exhibits on the next two pages provide alternative perspectives on the chance of an adverse outcome in the period ahead. According to the exhibit "Time-Varying Macroeconomic Risk 1 Year Ahead," the projected distribution of misses around the Tealbook forecast over the next four quarters does not appear particularly wide or skewed. In contrast, the exhibit "Conditional Distributions of Macroeconomic Variables 2 Years Ahead" shows that, at the two-

# 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 | .04 | .01 | .02 |
| *Previous Tealbook* | *.05* | *.09* | *.05* | *.09* |
| *Between 1 3/4 and 2 1/4 percent* | | | | |
| Current Tealbook | .24 | .23 | .41 | .21 |
| *Previous Tealbook* | *.20* | *.23* | *.36* | *.24* |
| *Less than 1 percent* | | | | |
| Current Tealbook | .19 | .18 | .02 | .28 |
| *Previous Tealbook* | *.25* | *.16* | *.00* | *.14* |

## 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 | .03 | .03 | .23 | .04 |
| *Previous Tealbook* | *.04* | *.09* | *.23* | *.02* |
| *Decrease by 1 percentage point* | | | | |
| Current Tealbook | .05 | .03 | .00 | .07 |
| *Previous Tealbook* | *.08* | *.03* | *.00* | *.14* |

## 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 | .08 | .49 | .23 |
| *Previous Tealbook* | *.09* | *.10* | *.22* | *.57* | *.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.

year horizon, current conditions suggest that the risks are skewed to the downside for GDP growth and to the upside for the unemployment rate, albeit to a lesser extent than in recent months. The narrowing of the two-year-ahead distributions is driven primarily by the decline in the term-spread-based recession probability, which is used as an input into the conditional distribution model.

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 is 24 percent, similar to the estimate in recent Tealbooks. The probability rises to 36 percent by the end of the medium term as the distribution of outcomes around the baseline naturally widens farther into the future. A return of the federal funds rate to the ELB may leave monetary policy with less capacity to offset significant negative economic shocks than positive ones, contributing to the downside skew in economic outcomes.

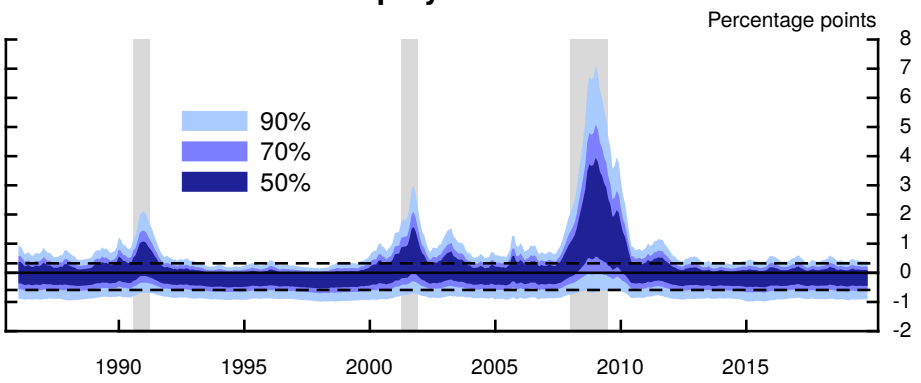
With regard to inflation, we view the risks to the projection as slanted to the downside—in part because of the downside risks to economic activity. Moreover, inflation has been running low over the past year, and longer-run inflation expectations could currently be lower than we recognize. Also, if downside risks abroad materialize, 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, further increases 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. 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 these concerns, we judge the overall degree of uncertainty to be about the same as over the past 20 years.

Risks & Uncertainty

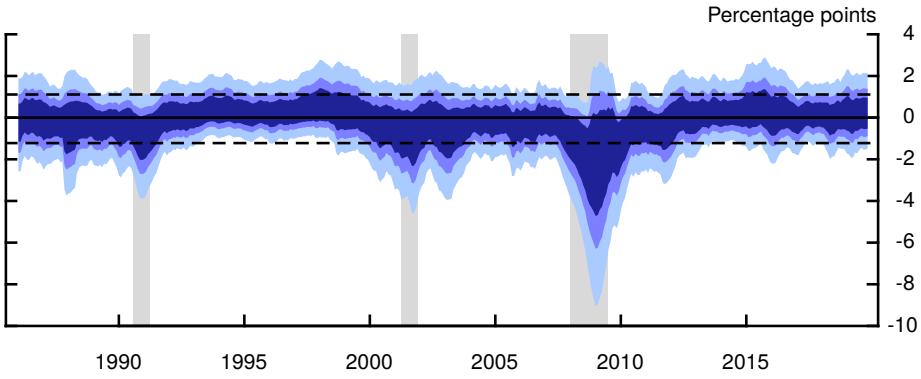
# Time-Varying Macroeconomic Risk 1 Year Ahead

## Unemployment Rate



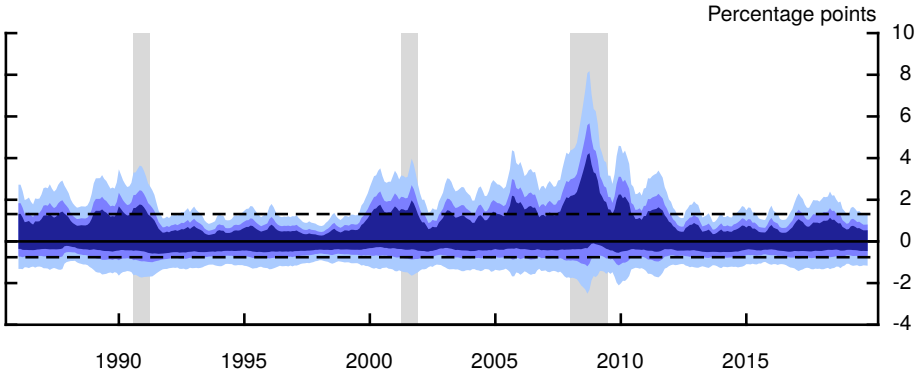

| November 2019 | |
|---|---|
| 95th | .4 |
| 85th | .2 |
| 50th | - .2 |
| 15th | - .6 |
| 5th | - .9 |

## GDP Growth




| November 2019 | |
|---|---|
| 95th | 2.1 |
| 85th | 1.4 |
| 50th | .2 |
| 15th | - .9 |
| 5th | -1.5 |

## CPI Inflation

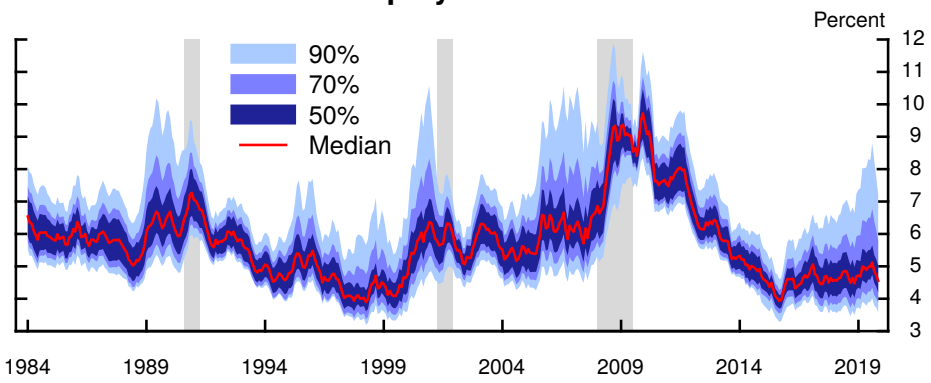



| November 2019 | |
|---|---|
| 95th | 1.3 |
| 85th | .8 |
| 50th | 0 |
| 15th | - .7 |
| 5th | -1.2 |

Note: The exhibit shows estimates of quantiles of the distribution of errors for 4-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.

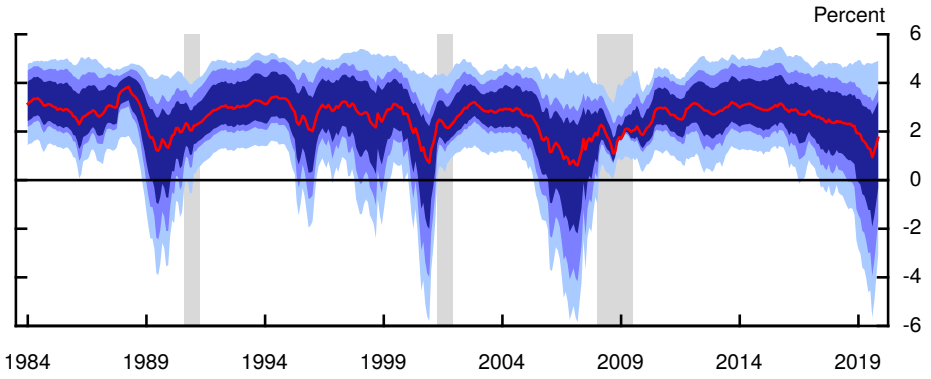
# Conditional Distributions of Macroeconomic Variables 2 Years Ahead

## Unemployment Rate



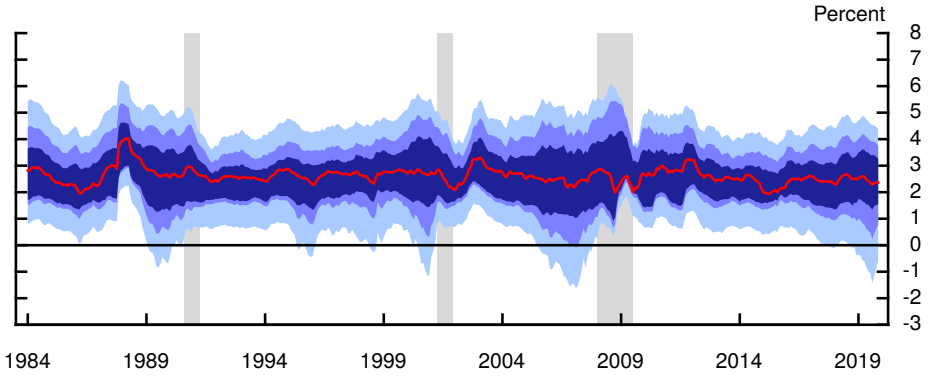

| November 2019 | |
|---|---|
| 95th | 7.2 |
| 85th | 5.8 |
| 50th | 4.6 |
| 15th | 3.9 |
| 5th | 3.6 |

## GDP Growth




| November 2019 | |
|---|---|
| 95th | 4.9 |
| 85th | 3.8 |
| 50th | 1.7 |
| 15th | -1.7 |
| 5th | -3.1 |

## CPI Inflation

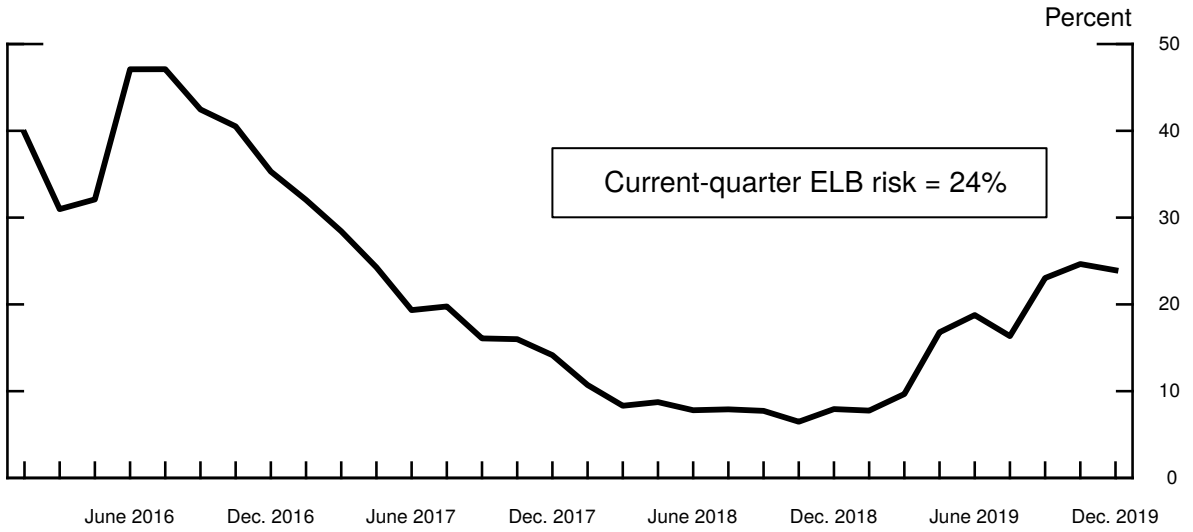



| November 2019 | |
|---|---|
| 95th | 4.4 |
| 85th | 3.8 |
| 50th | 2.4 |
| 15th | .8 |
| 5th | - .6 |

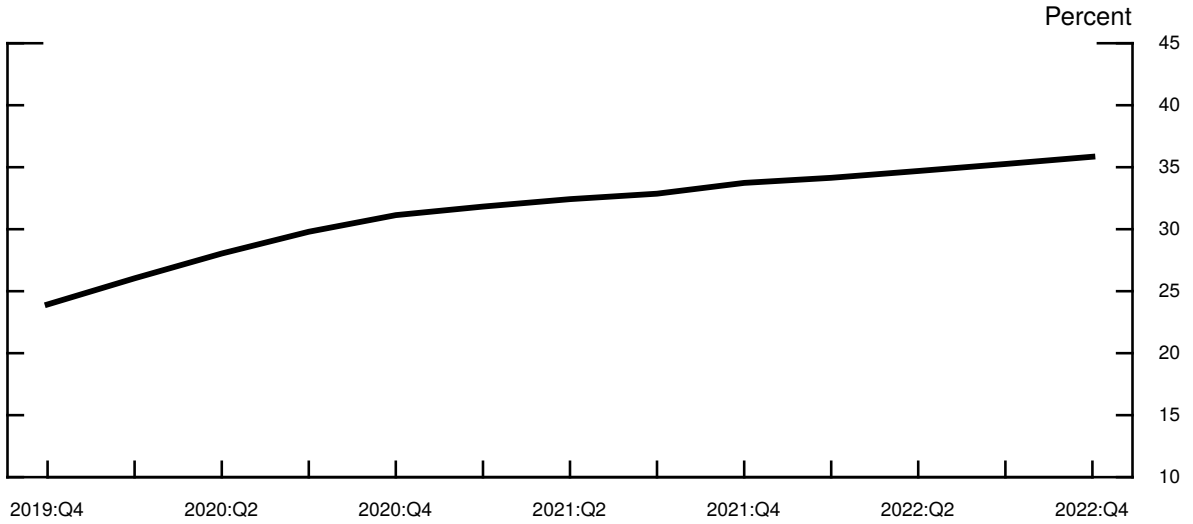
Note: The exhibit shows estimates of quantiles of the conditional distribution of the respective macro variables 2 years ahead. The estimates are conditioned on indicators of real activity, inflation, financial market strain, the volatility of high-frequency macroeconomic indicators, and a term-spread-based recession probability. The tables show selected quantiles of the predictive distributions for the respective variables as of the current Tealbook. Gray shaded bars indicate recession periods as defined by the National Bureau of Economic Research.

# 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

To illustrate some of the risks to the outlook, we construct alternatives to the baseline projection using simulations of staff models.[1]

### Weaker Labor Demand [GST model]

Published private employment gains have slowed from 215,000 between April 2018 and March 2019 to an average of 133,000 jobs per month between April and October 2019. While such employment gains remain above the pace consistent with a stable unemployment rate, the box "Alternative View: The Labor Market Is in a Precarious Position" in the Domestic Economic Developments and Outlook section suggests that the gains may have been smaller still. Based on their analysis of data from the payroll processing firm ADP, the authors of the box argue that the true underlying pace of recent employment gains could be closer to 70,000 jobs per month. In this scenario, we consider the implications of this risk and assume that labor demand is weaker than in the staff projection, primarily because aggregate demand growth is slower than we currently recognize and remains soft through next year. We assume that employment gains are about 50 percent lower than in the staff baseline projection over the next four quarters and slowly converge to the staff projection thereafter.

Under these assumptions, GDP growth slows to 1.8 percent in 2020. The unemployment rate gradually moves up to 3.9 percent by mid 2021, an increase that has often been associated with a fragile economy. Core PCE inflation fails to move back toward 2 percent and stands at 1.7 percent in 2022. With inflation and the output gap both running below the staff forecast, the federal funds rate fluctuates around 2 percent until 2025, 0.6 percentage point lower than in the staff forecast.

### Positive Hysteresis [FRB/US model]

In contrast to the previous scenario, here we assume not only that the labor market is quite strong, but also that the very tight labor conditions in the baseline projection have persistent

[1] The models used are (1) GST, a calibrated New Keynesian DSGE model with search and matching frictions in the labor market based on Mark L. Gertler, Luca Sala, and Antonella Trigari (2008), "An Estimated Monetary DSGE Model with Unemployment and Staggered Nominal Wage Bargaining," *Journal of Money, Credit and Banking*, vol. 40 (December), pp. 1713–64; (2) FRB/US, a large-scale macroeconometric model of the U.S. economy developed by Board staff; (3) SW, an estimated medium-scale New Keynesian DSGE model of the U.S. economy based on Frank Smets and Rafael Wouters (2007), "Shocks and Frictions in U.S. Business Cycles: A Bayesian DSGE Approach," *American Economic Review*, vol. 97 (June), pp. 586–606; and (4) SIGMA, a calibrated multicountry DSGE model developed by Board staff.

## 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 | 1.7 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 |
| Weaker labor demand | 1.7 | 1.8 | 1.8 | 1.8 | 1.6 | 1.5 |
| Positive hysteresis | 1.7 | 2.3 | 2.1 | 2.0 | 1.8 | 1.5 |
| Lower long-run equilibrium FF rate | 1.7 | 1.9 | 1.8 | 1.5 | 1.1 | .9 |
| Stronger demand | 1.7 | 3.1 | 2.4 | 2.1 | 1.8 | 1.5 |
| Foreign slowdown | 1.7 | 1.4 | 1.4 | 1.7 | 1.7 | 1.6 |
| Easing of trade tensions | 1.7 | 2.5 | 2.0 | 1.6 | 1.4 | 1.3 |
| *Unemployment rate*[1] | | | | | | |
| Tealbook baseline and extension | 3.6 | 3.5 | 3.5 | 3.5 | 3.6 | 3.9 |
| Weaker labor demand | 3.6 | 3.8 | 3.9 | 3.9 | 4.0 | 4.2 |
| Positive hysteresis | 3.6 | 3.5 | 3.4 | 3.3 | 3.4 | 3.7 |
| Lower long-run equilibrium FF rate | 3.6 | 3.5 | 3.4 | 3.3 | 3.4 | 3.8 |
| Stronger demand | 3.6 | 3.2 | 3.0 | 3.0 | 3.0 | 3.5 |
| Foreign slowdown | 3.6 | 3.7 | 3.9 | 4.0 | 4.0 | 4.2 |
| Easing of trade tensions | 3.6 | 3.4 | 3.2 | 3.3 | 3.4 | 3.8 |
| *Total PCE prices* | | | | | | |
| Tealbook baseline and extension | 1.5 | 1.7 | 1.9 | 1.9 | 1.9 | 2.0 |
| Weaker labor demand | 1.5 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Positive hysteresis | 1.5 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 |
| Lower long-run equilibrium FF rate | 1.5 | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 |
| Stronger demand | 1.5 | 1.7 | 1.9 | 1.9 | 2.0 | 2.1 |
| Foreign slowdown | 1.5 | 1.1 | 1.5 | 1.7 | 1.8 | 1.9 |
| Easing of trade tensions | 1.5 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| *Core PCE prices* | | | | | | |
| Tealbook baseline and extension | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| Weaker labor demand | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.7 |
| Positive hysteresis | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| Lower long-run equilibrium FF rate | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Stronger demand | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 |
| Foreign slowdown | 1.8 | 1.4 | 1.5 | 1.7 | 1.8 | 1.9 |
| Easing of trade tensions | 1.8 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 |
| *Federal funds rate*[1] | | | | | | |
| Tealbook baseline and extension | 1.6 | 2.0 | 2.3 | 2.5 | 2.6 | 2.6 |
| Weaker labor demand | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| Positive hysteresis | 1.6 | 2.0 | 2.3 | 2.5 | 2.5 | 2.5 |
| Lower long-run equilibrium FF rate | 1.6 | 1.9 | 2.1 | 2.2 | 2.3 | 2.3 |
| Stronger demand | 1.6 | 2.1 | 2.5 | 2.7 | 2.9 | 3.0 |
| Foreign slowdown | 1.6 | 1.5 | 1.3 | 1.6 | 1.8 | 2.1 |
| Easing of trade tensions | 1.6 | 2.2 | 2.6 | 2.7 | 2.7 | 2.6 |

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

positive effects on the productive capacity of the economy, a phenomenon often referred to as "positive hysteresis."[2] Exposure to a hot economy encourages workers to remain in the labor force and motivates others to join, which could persistently increase labor force attachment. In this scenario, we assume that the trend labor-force participation rate rises about 1 percentage point above the baseline by the end of 2025. Furthermore, we assume that the experience that workers gain through greater employment lowers the natural rate of unemployment 0.5 percentage point over that period. We assume that policymakers recognize both of these favorable developments in real time.

As a result of these developments, potential output rises, on average, 0.3 percentage point more per year through 2025 than in the baseline. This additional room to grow allows GDP to expand faster. The initial increase in GDP growth is slightly below the pickup in potential growth because the inertial monetary policy rule does not ease the funds rate quickly enough relative to baseline in response to the improvements in the supply-side conditions. Initially, the unemployment rate remains close to baseline because increases in labor force participation offset the effect of greater gains in employment. The unemployment rate eventually follows a lower trajectory and is about 0.2 percentage point below the staff projection by 2025. With inflation roughly at the baseline and with the muted response to the output gap from the staff policy rule, the federal funds rate is little changed.

## Lower Long-Run Equilibrium Federal Funds Rate [SW model]

While the staff assumes that the long-run equilibrium real federal funds rate, $r^{LR}$, has declined over the past two decades, some estimates suggest it may be even lower than we currently assume. Competing explanations for the decline in $r^{LR}$ have different implications for the baseline projection. In this scenario, we posit that structural productivity growth is 0.5 percentage point below baseline over the projection period, which, according to the Smets-Wouters model that we use for this scenario, will result in a 70 basis point decline in $r^{LR}$. We also assume that policymakers only gradually recognize that $r^{LR}$ is lower.[3]

[2] See, for example, Dave Reifschneider, William L. Wascher, and David Wilcox (2015), "Aggregate Supply in the United States: Recent Developments and Implications for the Conduct of Monetary Policy," *IMF Economic Review*, vol. 63 (May), pp. 71–109; and Stephanie R. Aaronson, Mary C. Daly, William L. Wascher, and David W. Wilcox (2019) "Okun Revisited: Who Benefits Most from a Strong Economy," Finance and Economics Discussion Series 2019-072 (Washington: Board of Governors of the Federal Reserve System, September), https://doi.org/10.17016/FEDS.2019.072.

[3] In this scenario, the intercept in the baseline policy rule moves down gradually as policymakers learn about the new value of the long-run equilibrium real rate.

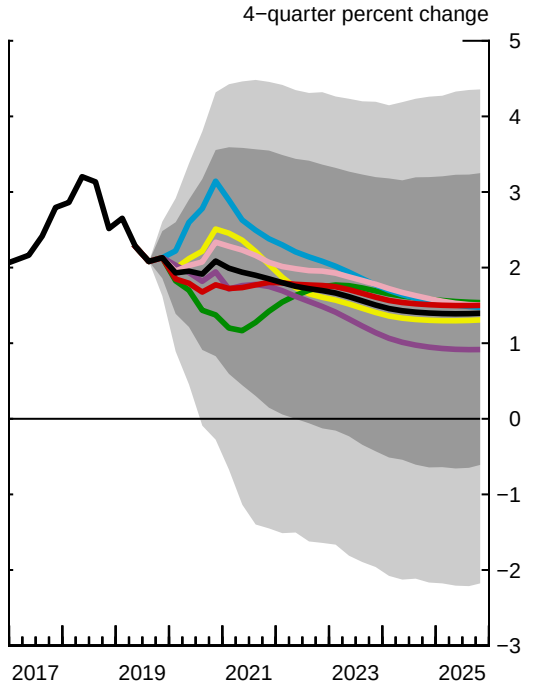
Risks & Uncertainty

# Forecast Confidence Intervals and Alternative Scenarios

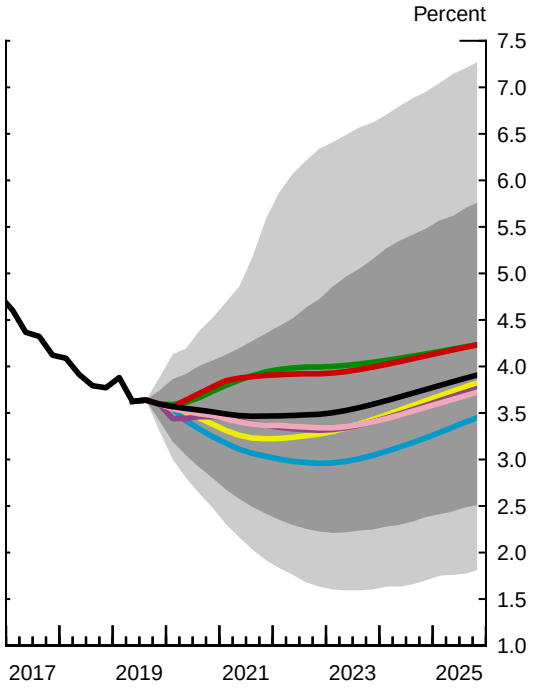
## Confidence Intervals Based on FRB/US Stochastic Simulations*

Tealbook baseline and extension
Lower long−run equilibrium FF rate
Foreign slowdown
Weaker labor demand
Stronger demand
Easing of trade tensions
Positive hysteresis

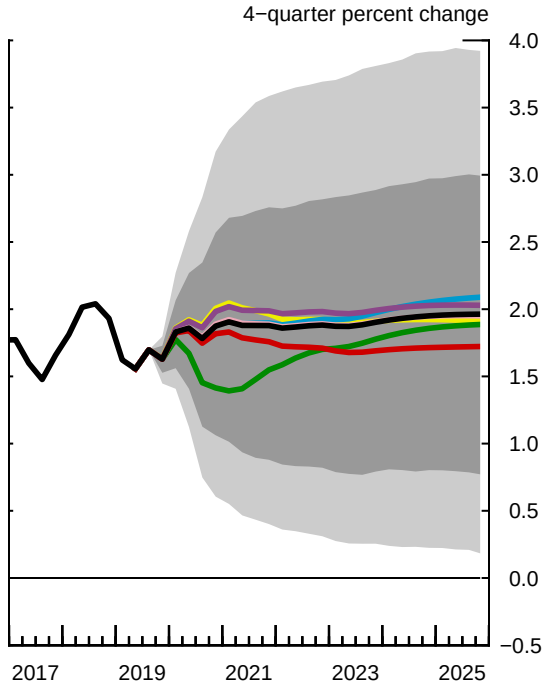
### Real GDP



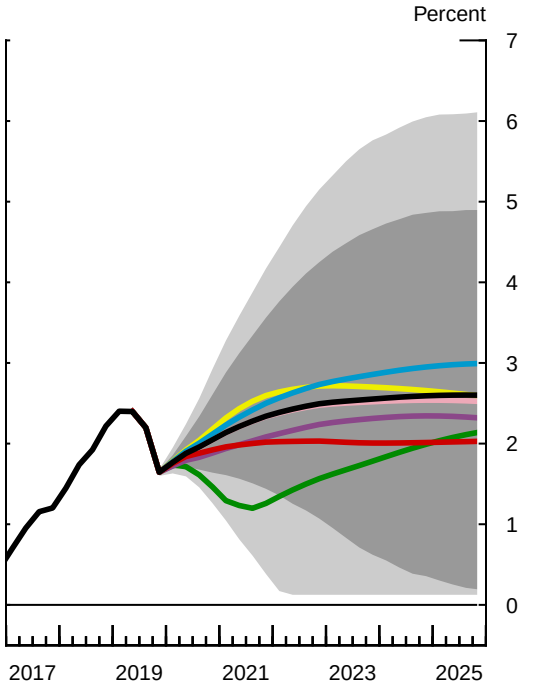

### Unemployment Rate




### 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 initial effects of the assumed productivity slowdown are relatively benign. Because businesses are less productive, they initially hire more workers to meet demand, and the unemployment rate declines to 3.3 percent by the end of 2022. The lower pace of productivity growth puts upward pressure on firms' marginal costs, and inflation is slightly above baseline, running at 2.0 percent in 2021 and 2022. GDP rises only 1.8 percent in 2021 and 1.5 percent in 2022, as the slower pace of productivity growth is not completely offset by the gains in employment. The unemployment rate remains below baseline, but real wages are lower. The federal funds rate path is only 0.2 percentage point below baseline at the beginning of 2021, because policymakers do not recognize the tightness of their policy stance for a while and respond to the higher inflation and lower unemployment rate by raising rates.

By 2025, GDP growth is 0.5 percentage point below baseline and monetary policymakers have fully learned about the lower $r^{LR}$. However, inflation remains at 2 percent, and the output gap remains positive. Because of this drawn-out adjustment process, the federal funds rate is still above its new long-run value by the end of 2025, though it is down 0.3 percentage point relative to baseline. In the longer run, the economy converges to its new less-favorable steady state, where households have a lower standard of living and policymakers have less space to ease in the event of an adverse shock.

## Stronger Aggregate Demand [FRB/US model]

While we view aggregate risk as remaining skewed to the downside, the downside risk appears to have eased in recent months. Moreover, many of the underlying fundamentals for household spending remain solid, including strong labor market conditions, low interest rates, and high levels of net wealth. And it is possible that the recent weakness in business investment, which can be quite volatile from quarter to quarter, will turn out to be more transitory than projected. 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 in the baseline, which attenuates somewhat the decline in the unemployment rate.

Under these assumptions, GDP increases 2.8 percent, on average, in 2020 and 2021, a pace comparable with that in 2017 and 2018, and the unemployment rate declines to 3 percent by the end of 2021. Inflation increases slightly, reaching 2.1 percent in 2025. In response to the stronger economy, the federal funds rate rises relative to the baseline, reaching 3 percent in 2025.

## Foreign Slowdown [SIGMA model]

Foreign growth this year is expected to be the weakest since the global financial crisis, held down by trade tensions, a global manufacturing slump, and political developments in a number of economies. In our baseline, we see foreign growth picking up as these headwinds ease and monetary policy abroad remains highly accommodative. However, trade and political tensions could intensify and the global manufacturing weakness could persist, weighing on consumer and business confidence and resulting in a deterioration of financial conditions.

This scenario envisions that in both the AFEs and the EMEs, aggregate demand weakens, corporate borrowing spreads widen 100 basis points, and equity prices decline sharply. Foreign GDP growth steps down to a meager 1 percent in 2020, 1.2 percentage points below baseline. The financial tightening abroad and concerns about the foreign outlook prompt a 50 basis point rise in corporate borrowing spreads in the United States, while flight-to-safety flows lead to a 7 percent appreciation of the dollar.

Weaker foreign demand, the stronger dollar, and the adverse financial spillovers cause U.S. economic activity to slow. In particular, GDP growth falls to 1.4 percent in 2020, 0.7 percentage point below the baseline, and the unemployment rate rises to 4 percent in 2022. Lower resource utilization and falling import prices reduce core PCE inflation to 1.4 percent in 2020. In response to modest output growth and muted inflation, the federal funds rate runs about 1 percentage point below the baseline through 2023.

## Easing of Trade Tensions [SIGMA model]

The projected pickup in global activity in the baseline builds on the assumption that some of the heat of trade tensions will dissipate. However, positive news on trade policy, such as the ratification of a phase-one trade deal between the United States and China, may spur a somewhat faster cooling of trade tensions and reduction in trade uncertainty than envisioned in our baseline and result in an improvement of business and consumer sentiment around the world.

In this scenario, we assume that the United States and China agree to a truce and roll back the tariffs announced in early September (that is, the United States removes the 15 percent tariff imposed on $100 billion of imports from China, and China removes its retaliatory measures). In addition, we assume no new tariffs are imposed on imports from China, Congress ratifies the United States–Mexico–Canada trade agreement, and an agreement to forgo tariffs on imported autos is reached; as a result, uncertainty about trade policy diminishes. These developments lessen somewhat the drag on economic activity and lead to some improvement in global

sentiment and asset prices, with stock prices around the world increasing about 5 percent by early 2020. Optimism about the global outlook also contributes to a moderate depreciation of the dollar. All told, the level of foreign GDP is 0.5 percent above the baseline through 2021.

Stronger foreign demand and the depreciation of the dollar cause U.S. GDP growth to edge up to 2.5 percent in 2020, 0.4 percentage point above the baseline. The U.S. unemployment rate declines about 0.2 percentage point below the baseline over the forecast period. With a tighter labor market and a depreciating dollar, core PCE inflation reaches 2 percent in 2020. Accordingly, the federal funds rate is a tad higher than in the baseline, reaching 2.6 percent by 2021. The relatively modest effects of this easing of trade tensions on the U.S. economy reflect the assumption that, in this scenario, the majority of the recently enacted tariffs remain in place and some trade policy uncertainty persists.

## ALTERNATIVE MODEL FORECASTS

As shown in the "Alternative Model Forecasts" exhibit, the FRB/US model projects that GDP will grow 1.9 percent, on average, over the next three years, similar to the Tealbook baseline outlook.[4] This projection represents an upward revision of 0.3 percentage point, on average, relative to the FRB/US projection shown in the previous Tealbook. The stronger forecast is largely the consequence of rolling forward the initial forecast period (now 2020:Q1) by one quarter and hence taking on board key macroeconomic variables from the judgmental forecast for the fourth quarter (rather than the third quarter, as last round). Importantly, the model projection now fully incorporates the recent cuts in the federal funds rate and jumps off from the staff forecast of inflation for the end of this year, which is noticeably lower than the model's predicted value in October.[5] These changes imply a more accommodative monetary policy going forward. The model's projection of potential output growth is also revised up a touch.

This brighter constellation of easier financial conditions and a slightly stronger supply side, in turn, support higher equity prices over the projection period. A resilient stock market

[4] We condition the FRB/US forecast on staff projections for federal government spending and tax policies, foreign 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.

[5] The model forecast now fully incorporates the 50 basis point decline from the September and October FOMC meetings. In the previous Tealbook, the model's third-quarter observation of the federal funds rate was based on an average of daily observations over the whole quarter and, hence, hardly reflected the rate cut from the September meeting.

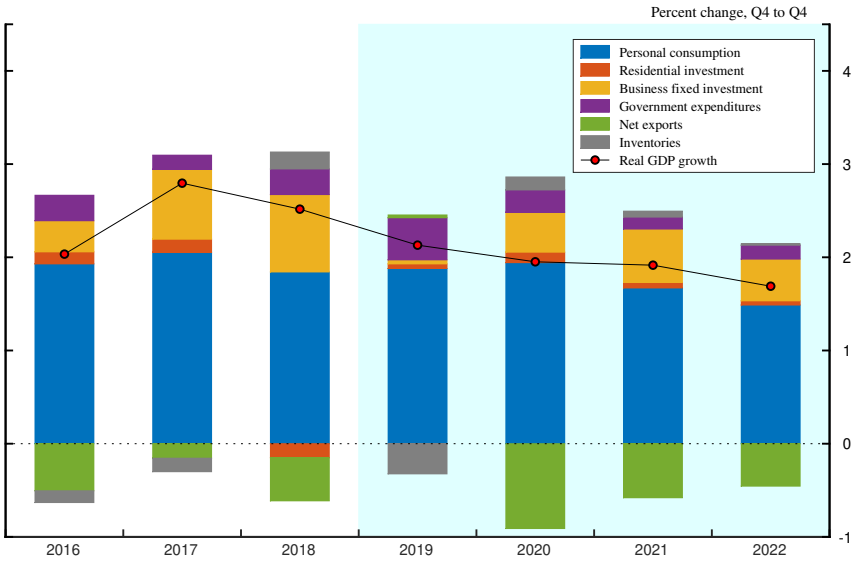
## Alternative Model Forecasts

(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 | *2.1* | 2.1 | *2.0* | 2.1 | *1.8* | 1.9 | *1.7* | 1.7 |
| FRB/US | *2.1* | 2.1 | *1.7* | 2.0 | *1.6* | 1.9 | *1.4* | 1.7 |
| EDO[1] | *2.3* | 2.1 | *1.7* | 1.6 | *1.9* | 1.7 | *2.4* | 2.2 |
| *Unemployment rate*[2] | | | | | | | | |
| Staff | *3.6* | 3.6 | *3.6* | 3.5 | *3.6* | 3.5 | *3.6* | 3.5 |
| FRB/US | *3.6* | 3.6 | *3.9* | 3.7 | *4.2* | 3.8 | *4.4* | 4.1 |
| EDO[1] | *3.9* | 3.8 | *4.4* | 4.3 | *4.8* | 4.7 | *5.0* | 5.0 |
| *Total PCE prices* | | | | | | | | |
| Staff | *1.4* | 1.5 | *1.7* | 1.7 | *1.8* | 1.9 | *1.8* | 1.9 |
| FRB/US | *1.5* | 1.5 | *1.9* | 1.8 | *2.0* | 2.1 | *2.0* | 2.0 |
| EDO[1] | *1.7* | 1.4 | *2.6* | 2.2 | *2.5* | 2.5 | *2.3* | 2.4 |
| *Core PCE prices* | | | | | | | | |
| Staff | *1.7* | 1.6 | *1.8* | 1.9 | *1.8* | 1.9 | *1.8* | 1.9 |
| FRB/US | *1.8* | 1.6 | *2.1* | 1.9 | *2.1* | 2.1 | *2.0* | 2.0 |
| EDO[1] | *1.9* | 1.6 | *2.6* | 2.2 | *2.5* | 2.5 | *2.3* | 2.4 |
| *Federal funds rate*[2] | | | | | | | | |
| Staff | *1.9* | 1.6 | *2.2* | 2.0 | *2.4* | 2.3 | *2.5* | 2.5 |
| FRB/US | *2.4* | 1.6 | *2.6* | 2.0 | *2.7* | 2.4 | *2.6* | 2.6 |
| EDO[1] | *2.7* | 1.6 | *3.7* | 3.0 | *4.0* | 3.6 | *4.1* | 3.9 |

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

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




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

and solid momentum in consumption growth during 2019 are sufficient for the model to predict that consumption will grow 2.4 percent, on average, over the next few years. Significantly weighing against robust private domestic demand is the model's negative outlook for net exports, as growth in the U.S. economy is relatively strong compared with growth in the rest of the world and the model's forecasting procedure carries forward some of the recent weakness in exports. On net, GDP rises at close to its potential pace of about 2.0 percent over the next two years and, consequently, the estimate of the output gap hovers around 1.6 percent during that period. The unemployment rate moves up gradually and reaches 4.1 percent by the end of 2022, well below the model's natural rate estimate of 4.6 percent. Core inflation increases from 1.6 percent in 2019 to 2.0 percent, on average, over the next three years.

The EDO model projects GDP growth to average 1.8 percent over the next three years, a touch below the model's estimate of the growth in potential output. Favorable risk premiums and accommodative monetary policy have boosted the level of aggregate demand over the past few years, and the waning support from those factors causes growth to fall below its potential pace over 2020 and 2021.

The EDO model predicts core inflation will rise to 2.2 percent in 2020 and 2.5 percent in 2021 before moving down to 2.4 at the end of the medium term. From the model's perspective, wage gains have been surprisingly weak given the strength of aggregate demand, and the sluggish wage gains have, in turn, held down inflation. In the forecast, the model predicts wage growth to step up, causing inflation to overshoot its longer-run level. Over the medium term, inflation remains above the FOMC's 2 percent objective because of the previously mentioned supportive aggregate demand conditions.

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

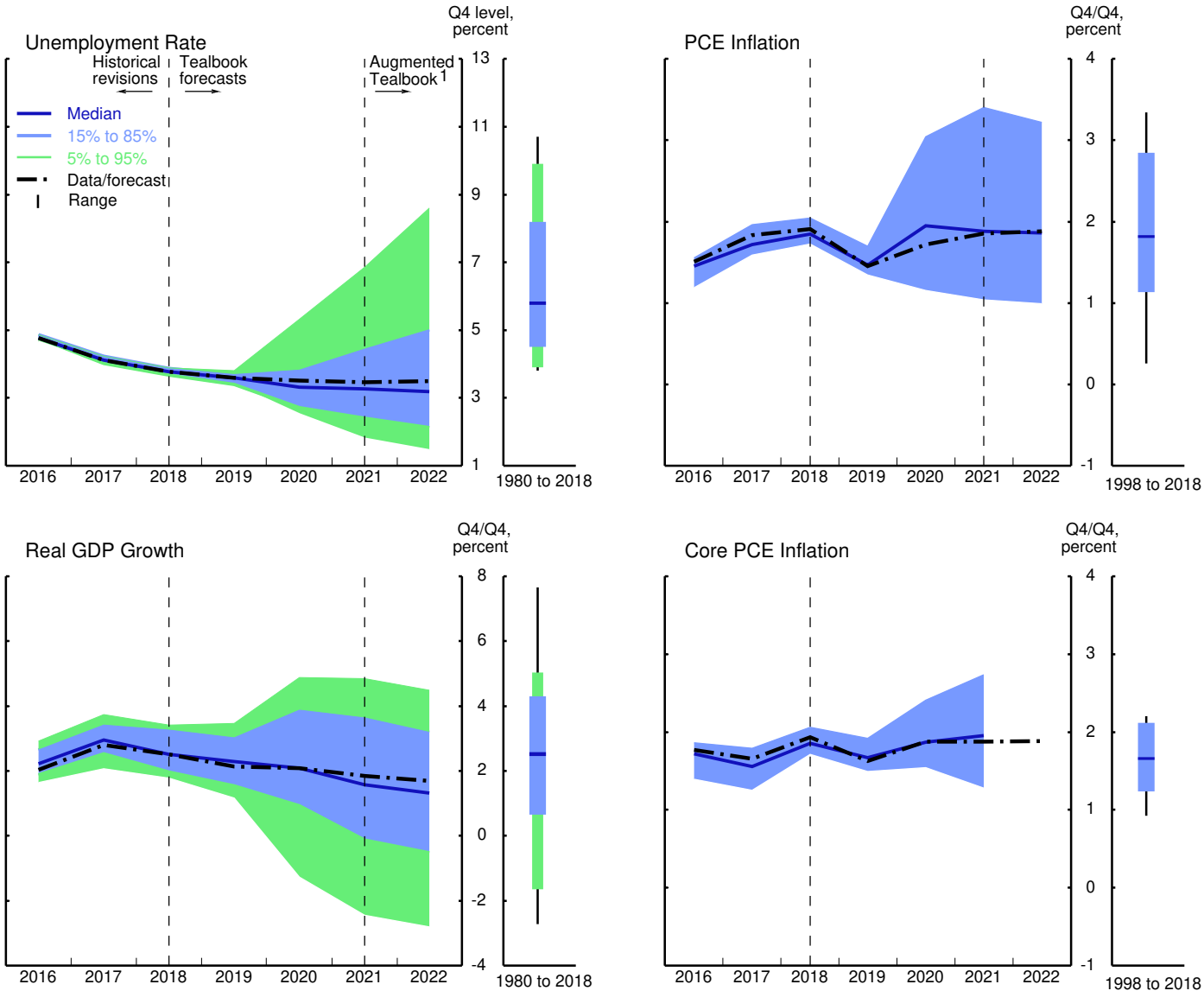
| Measure | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|
| *Real GDP* | | | | | | | |
| *(percent change, Q4 to Q4)* | | | | | | | |
| Projection | 2.1 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.4 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 1.5–3.0 | .9–3.9 | -.1–3.6 | -.5–3.2 | . . . | . . . | . . . |
| FRB/US stochastic simulations | 1.9–2.5 | .8–3.6 | .1–3.5 | -.1–3.4 | -.4–3.2 | -.6–3.2 | -.6–3.3 |
| *Civilian unemployment rate* | | | | | | | |
| *(percent, Q4)* | | | | | | | |
| Projection | 3.6 | 3.5 | 3.5 | 3.5 | 3.6 | 3.8 | 3.9 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 3.4–3.7 | 2.7–3.8 | 2.4–4.4 | 2.1–5.0 | . . . | . . . | . . . |
| FRB/US stochastic simulations | 3.4–3.7 | 2.8–4.1 | 2.4–4.4 | 2.2–4.7 | 2.2–5.2 | 2.4–5.5 | 2.5–5.8 |
| *PCE prices, total* | | | | | | | |
| *(percent change, Q4 to Q4)* | | | | | | | |
| Projection | 1.5 | 1.7 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 1.3–1.7 | 1.2–3.0 | 1.0–3.4 | 1.0–3.2 | . . . | . . . | . . . |
| FRB/US stochastic simulations | 1.3–1.6 | .8–2.5 | .8–2.9 | .7–2.9 | .7–3.0 | .7–3.1 | .7–3.1 |
| *PCE prices excluding* | | | | | | | |
| *food and energy* | | | | | | | |
| *(percent change, Q4 to Q4)* | | | | | | | |
| Projection | 1.6 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 |
| Confidence interval | | | | | | | |
| Tealbook forecast errors | 1.5–1.9 | 1.5–2.4 | 1.3–2.7 | . . . | . . . | . . . | . . . |
| FRB/US stochastic simulations | 1.5–1.7 | 1.1–2.6 | .9–2.8 | .8–2.8 | .8–2.9 | .8–3.0 | .8–3.0 |
| *Federal funds rate* | | | | | | | |
| *(percent, Q4)* | | | | | | | |
| Projection | 1.6 | 2.0 | 2.3 | 2.5 | 2.6 | 2.6 | 2.6 |
| Confidence interval | | | | | | | |
| FRB/US stochastic simulations | 1.6–1.7 | 1.6–2.6 | 1.4–3.6 | 1.1–4.3 | .6–4.7 | .4–4.9 | .2–4.9 |

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.

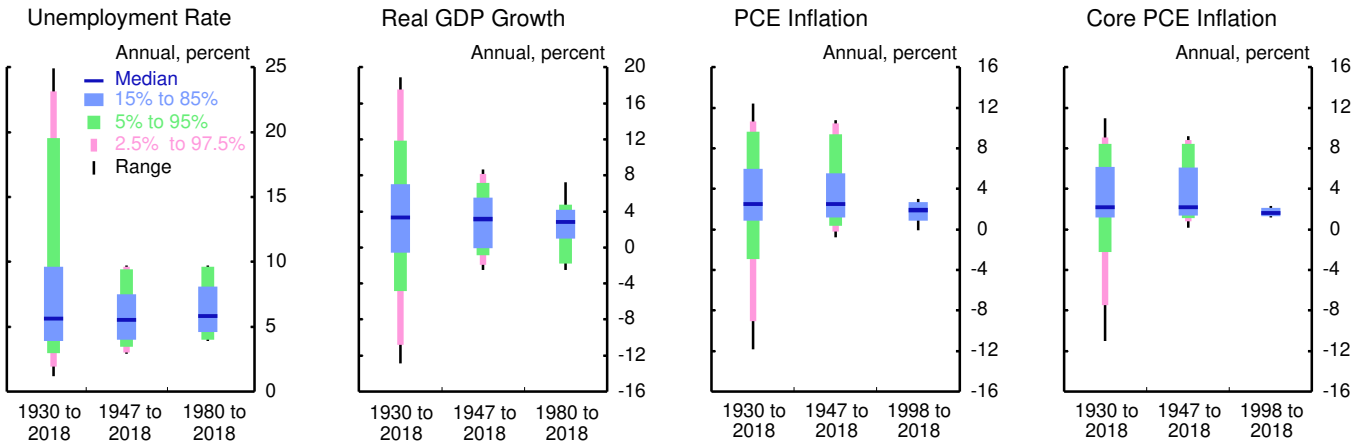
# Prediction Intervals Derived from Historical Tealbook Forecast Errors

## 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. In the near term, reflecting recent reductions in the federal funds rate, those policy strategies that incorporate interest rate inertia prescribe lower values of the federal funds rate than in the October Tealbook. Over the medium term, the policy strategies generally prescribe somewhat higher policy rates than in the October Tealbook, mainly because of the upwardly revised level of resource utilization over the forecast period. 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] The top and middle panels also provide the staff's baseline path for the federal funds rate.

- The current near-term prescriptions are lower than those reported in the October Tealbook, especially for rules that display interest rate inertia. For those inertial rules, the lower initial level of the federal funds rate, which reflects recent policy actions, largely passes through to the near-term prescriptions. In addition, over the next two quarters, the staff projects slightly higher resource utilization and slightly lower core PCE inflation than in the October Tealbook. However, these latter revisions, by themselves, imply small and mostly offsetting effects on the rules' prescriptions.

[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

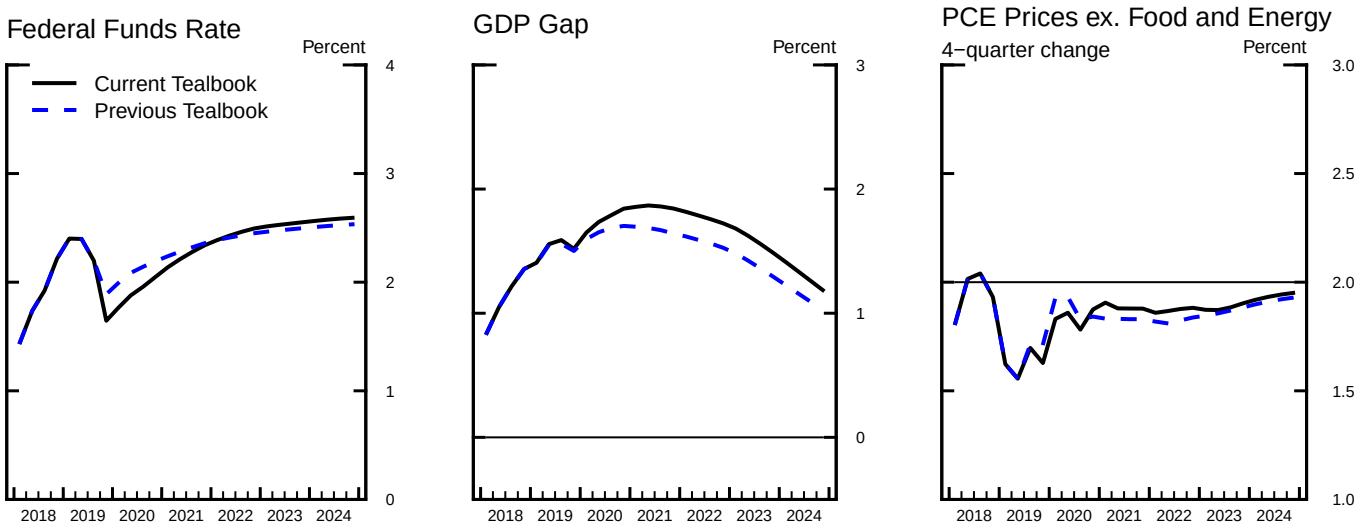
## Near−Term Prescriptions of Selected Simple Policy Rules

(Percent)

| | 2020:Q1 | 2020:Q2 |
|---|---|---|
| Inertial Taylor (1999) rule | **1.98** | **2.28** |
| *Previous Tealbook* | *2.63* | *...* |
| Taylor (1993) rule | **3.05** | **3.13** |
| *Previous Tealbook* | *3.16* | *...* |
| First−difference rule | **1.74** | **1.80** |
| *Previous Tealbook* | *2.20* | *...* |
| Flexible price−level targeting rule | **1.43** | **1.25** |
| *Previous Tealbook* | *1.66* | *...* |
| *Addendum:* | | |
| Tealbook baseline | **1.77** | **1.88** |

... Not applicable.

## Key Elements of the Staff Projection




## A Medium−Term Notion of the Equilibrium Real Federal Funds Rate[1]

(Percent)

| | Current Value | *Previous Tealbook* |
|---|---|---|
| Tealbook baseline | | |
| FRB/US *r** | 1.27 | *1.28* |
| Average projected real federal funds rate | .30 | *.41* |
| SEP−consistent baseline | | |
| FRB/US *r** | .33 | |
| Average projected real federal funds rate | .06 | |

1. 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 September 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**.

- The inertial Taylor (1999) rule responds more strongly to the output gap than the conditional attenuated rule used in the Tealbook baseline projection. Consequently, over the next two quarters, the inertial Taylor (1999) rule prescribes higher policy rates than those in the Tealbook baseline.

- The Taylor (1993) rule, which does not feature an interest rate smoothing term, calls for higher policy rates than any of the other simple policy rules and the Tealbook baseline projection.

- The first-difference rule, which responds to the expected change in the output gap, prescribes gradually increasing the federal funds rate from its current level because of the projected widening of the output gap over the next year.

- The FPLT rule calls for holding the federal funds rate well below the other rules in an effort to eliminate a cumulative shortfall in the core PCE price index of almost 3 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 ($r^*$). These estimates arise from two baseline projections: the Tealbook baseline and a projection consistent with the medians of the September 2019 Summary of Economic Projections (SEP).[3] 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 from the current quarter onward, would, according to the FRB/US model, bring the output gap to zero in the final quarter of that period. This measure summarizes the projected underlying strength of the real economy but does not take into account other considerations such as achieving the inflation objective or avoiding sharp changes in the federal funds rate.

[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 2022 (the final year reported in the September 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.

- At 1.27 percent, the current value of the Tealbook-consistent FRB/US *r** is essentially unchanged from the value consistent with the October Tealbook projection and is about 1 percentage point above the average level of the real federal funds rate in the baseline. Through the lens of the FRB/US model, the staff's upward revision to the level of resource utilization fully reflects the modestly lower path for the real federal funds rate—as opposed to greater underlying strength in the projection.

- At 0.33 percent, the September 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—because the level of resource utilization over the coming years consistent with median SEP responses is lower than the staff's outlook for resource utilization.

## 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 incorporate 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 edges up gradually from its current level, reaching 2½ percent by the end of 2022.

- The inertial Taylor (1999) rule, which embodies the same degree of inertia as the Tealbook baseline rule but responds more strongly to the output gap, calls for the federal funds rate to increase at a faster pace than the Tealbook baseline path in 2020 before plateauing near 3 percent in 2021. The less accommodative monetary conditions result in higher unemployment rates than in the Tealbook baseline over the period shown. Under this rule, inflation is

lower and the real 10-year Treasury yield is higher than the corresponding values in the Tealbook baseline projection.

- The Taylor (1993) rule, which features no interest rate smoothing, calls for an immediate increase in the federal funds rate to 3 percent. The prescribed policy rate remains near that level throughout the period shown and well above the baseline policy rate path. Nonetheless, the unemployment rate under the Taylor (1993) rule runs only a little above the corresponding Tealbook baseline path. The reason is that, beyond the period shown, the Taylor (1993) rule prescribes values that are similar to, or somewhat lower than, those in the staff projection, thus containing the increase in the real long-term rates that drive real activity in the model.

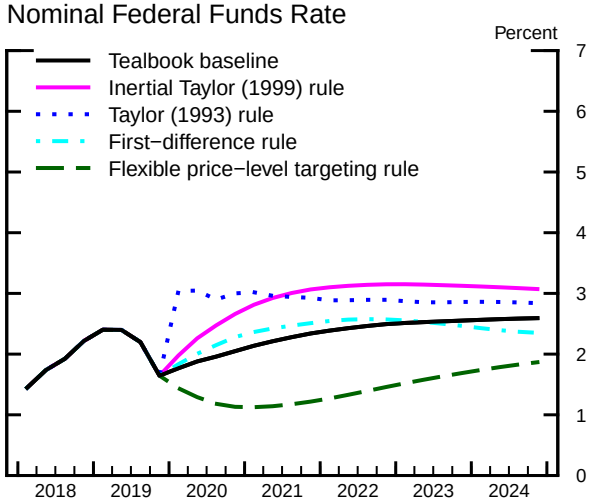
- The first-difference rule, which reacts to the expected change in the output gap rather than its level, calls for a gradual increase in the federal funds rate, reaching nearly 2¾ percent in 2022. The federal funds rate subsequently runs below the path in the Tealbook baseline for an extended period. Because of the forward-looking nature of financial market participants, price setters, and wage setters in the model, this strategy generates lower unemployment and higher inflation than in the staff projection—even in the early years of the simulation.

- 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 shortfall of almost 3 percent requires inflation to run above 2 percent in coming years, which, in turn, calls for a significantly easier stance of monetary policy than is prescribed by the other rules shown here. With financial market participants, price setters, and wage setters correctly anticipating the ensuing long period of a low federal funds rate, the path of the real 10-year Treasury rate immediately drops to nearly negative 0.75 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 below 3 percent in late 2021. Inflation exceeds 2 percent by about 20 basis points, on average, over the coming decade.

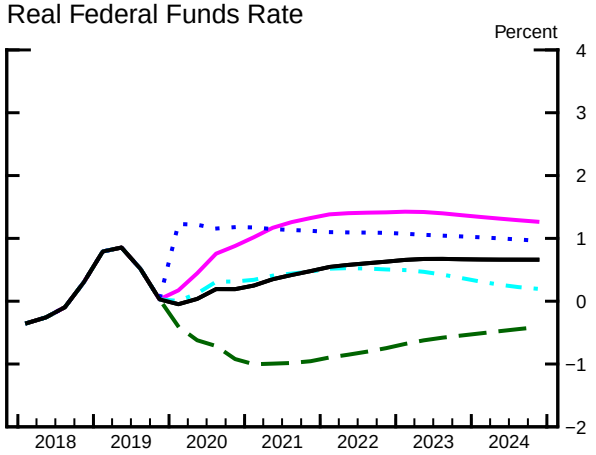
# Simple Policy Rule Simulations



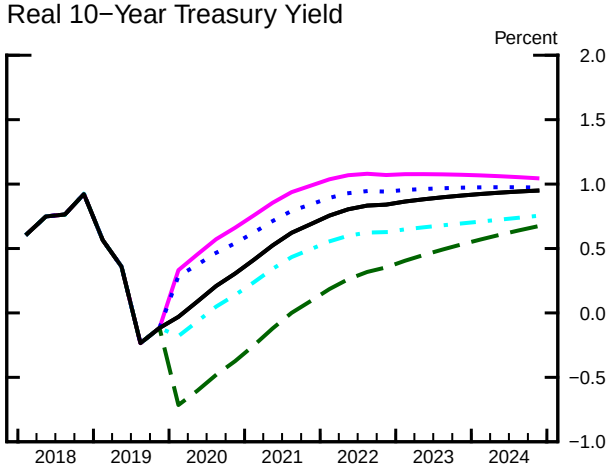
## Nominal Federal Funds Rate



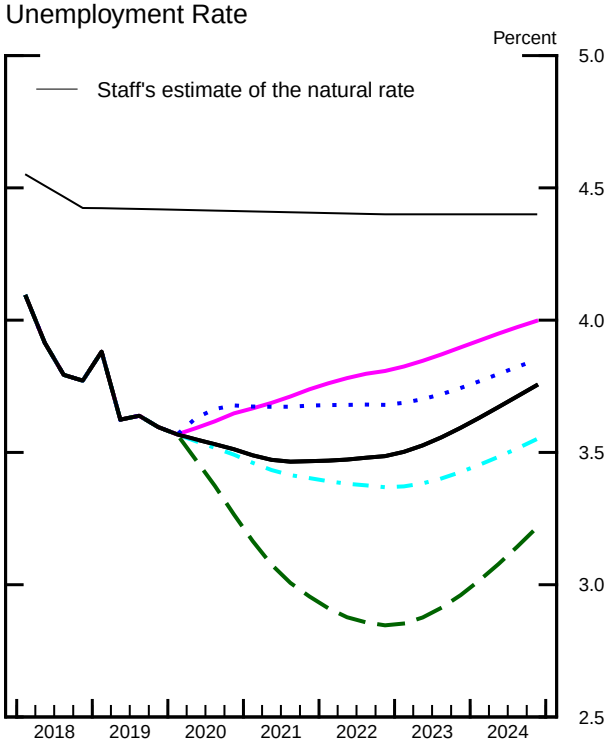

## Real Federal Funds Rate



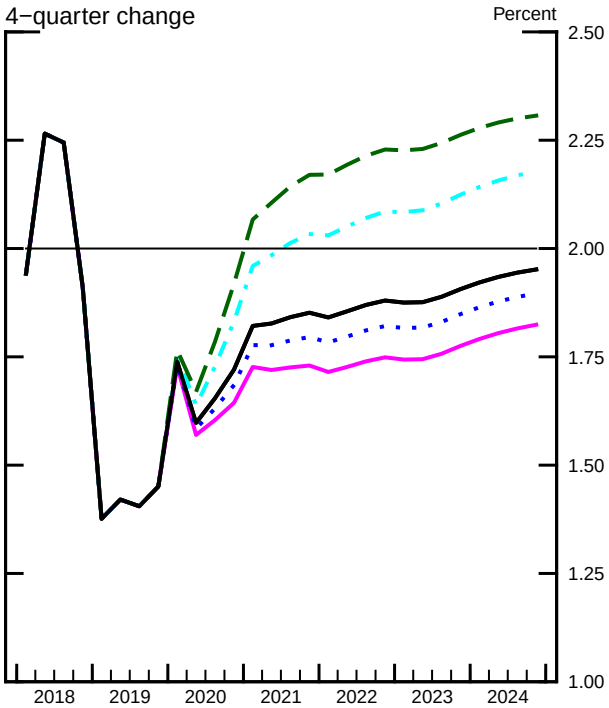

## Real 10−Year Treasury Yield




## Unemployment Rate




## PCE Inflation
4−quarter change




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.

- With the exception of the Taylor (1993) rule, which features no interest rate smoothing, the lower initial level of the federal funds rate implies that the near-term policy rate prescriptions from the simple policy rules are lower than those in the October Tealbook. By contrast, the medium-term policy rate prescriptions from all the simple rules under consideration here are higher than those in the October Tealbook because of the greater resource tightness in the staff projection.

## 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]

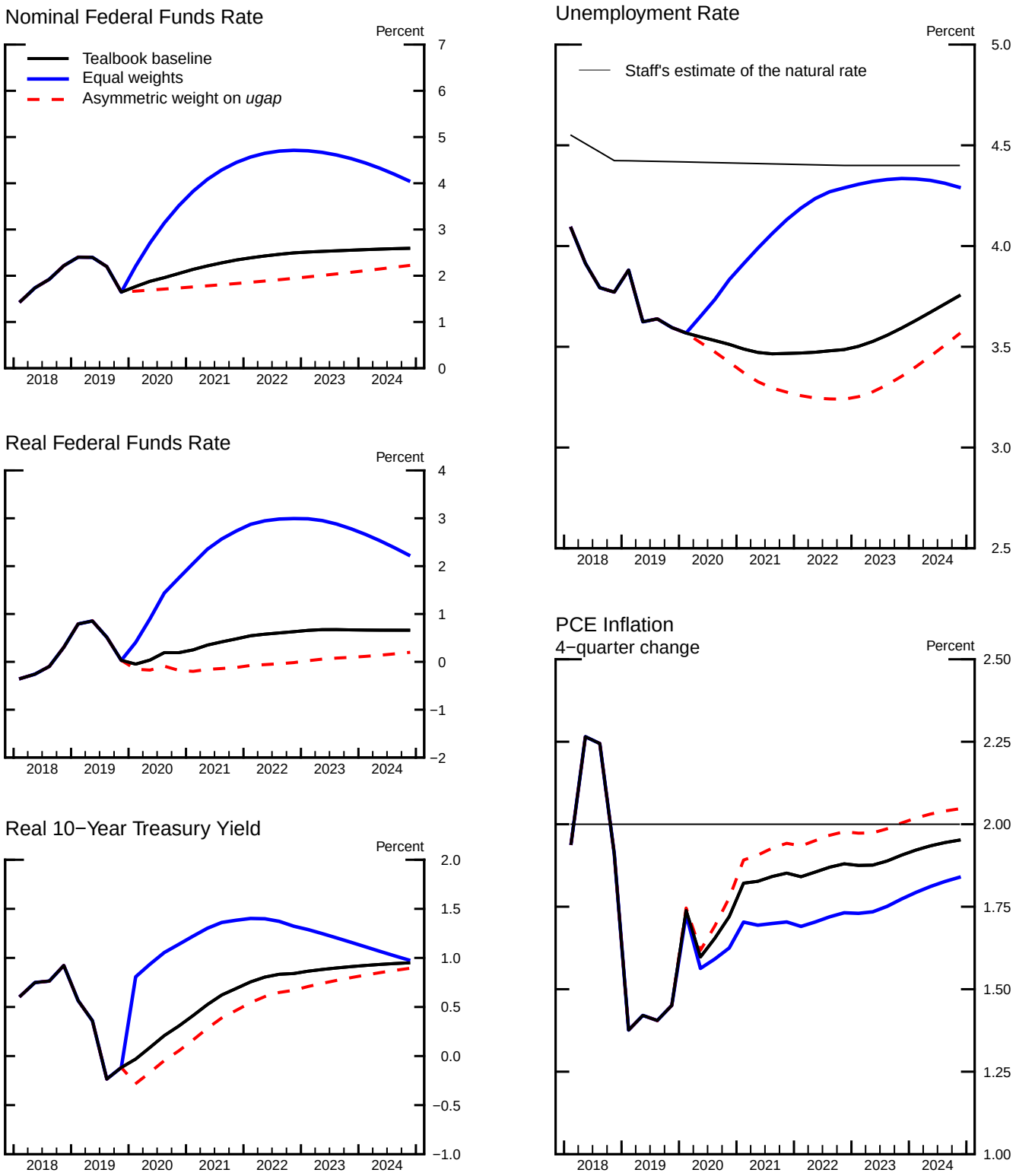
- The simulation labeled "Equal weights" presents the case in which policymakers, by assumption, place equal weights on keeping headline PCE inflation close to the Committee's objective of 2 percent, on keeping the unemployment rate close to the staff's estimate of the natural rate of unemployment, and 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 about 4¾ percent in 2022. 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.

[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.

- 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 for the federal funds rate is lower than the Tealbook baseline because policymakers' desire to raise inflation to 2 percent is not accompanied by a desire to prevent the unemployment rate from falling below its natural rate in the next few years. Nonetheless, policymakers choose a modestly increasing policy rate path in anticipation of the inflation overshoot of 2 percent starting in 2024.

- Compared with the optimal control simulations in the October Tealbook, the prescriptions from the equal-weights and asymmetric specifications conditional on the current Tealbook projection are lower in the near term because of the lower starting level of the federal funds rate and the interest rate smoothing motive. By contrast, because of tighter resource utilization in the current projection, the medium-term prescriptions are higher than the corresponding prescriptions in the October Tealbook.

- The prescriptions of the equal-weights specification under a baseline consistent with the September 2019 SEP (not shown) are well below those under the same loss function using the current Tealbook. The main reason for this difference is that unemployment gaps in the SEP-consistent baseline are only about half as large as those in the Tealbook baseline. Hence, the federal funds rate, which peaks at 3¼ percent in the SEP-consistent baseline, does not need to rise as much to close those gaps. The policy rate prescriptions under the asymmetric loss function using the SEP-consistent baseline are similar to those derived using the current Tealbook projections.

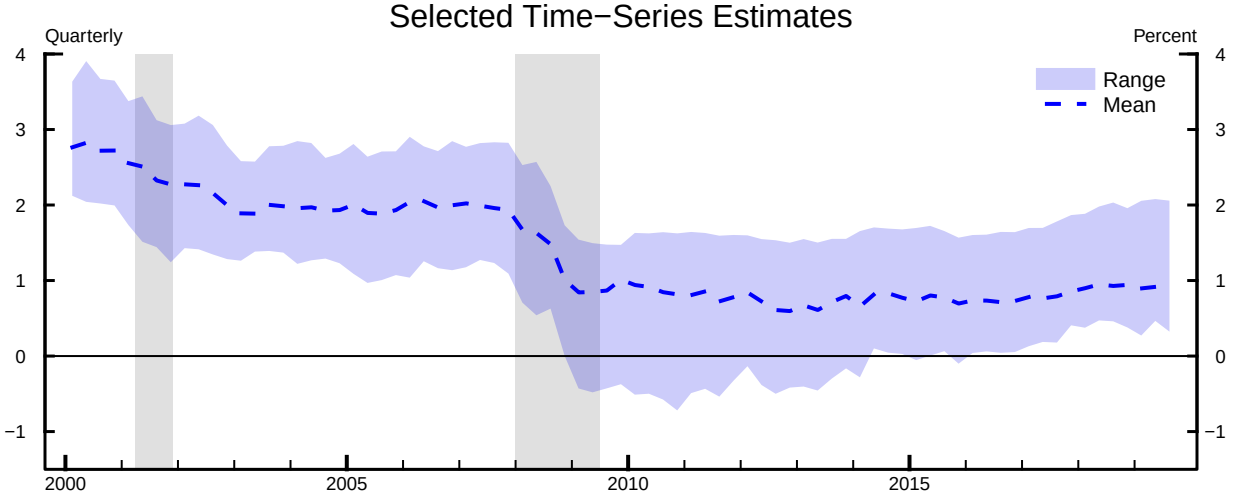


## ESTIMATES OF THE EQUILIBRIUM REAL FEDERAL FUNDS RATE IN THE LONGER RUN

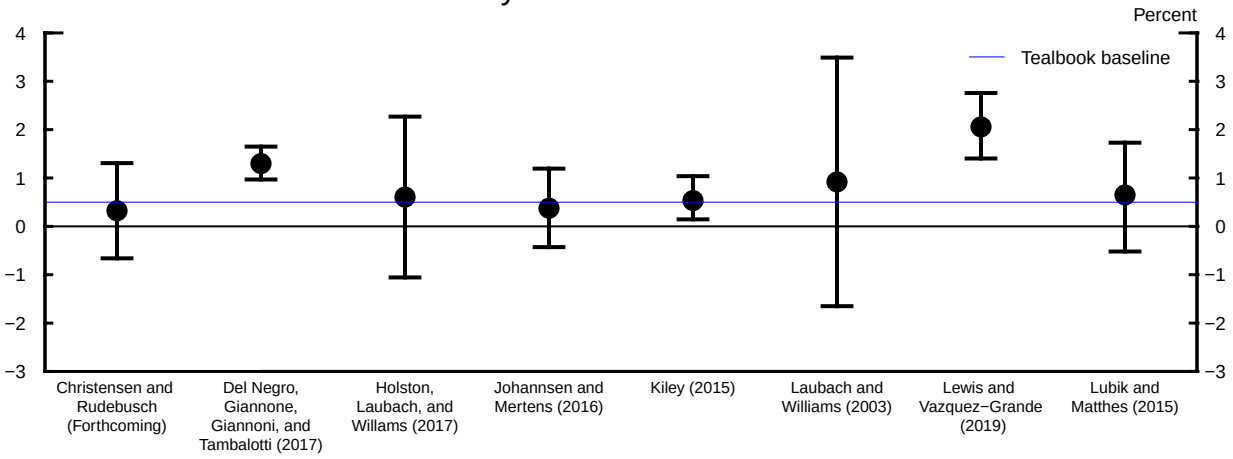
The next exhibit updates selected estimates of the equilibrium real federal funds rate in the longer run, denoted $r^{LR}$. This concept is the rate consistent with the economy operating at its potential once the transitory effects of economic shocks have abated. This rate, along with the Committee's inflation objective, determines the longer-run level of the nominal federal funds rate and other interest rates in the staff's projection and

# 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 | Nov. 2019 | .50 |
| Median SEP | Sept. 2019 | .50 |
| Median Survey of Primary Dealers | Oct. 2019 | .50 |
| Median Blue Chip (6−to−10−year) | Oct. 2019 | .29 |
| Congressional Budget Office (10−year) | Aug. 2019 | .74 |

The latest time−series estimates are for 2019:Q3. The shaded vertical areas in the top panel are NBER recessions. See the technical appendix for sources.

economic models. In addition, $r^{LR}$ is 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:Q3 from several model-based time-series estimates of $r^{LR}$.[6] The values for 2019:Q3 range from 0.3 to 2.1 percent, with a mean of about 0.8 percent. These statistics are slightly lower than those reported for 2019:Q2 in the September Tealbook.[7]
- 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 between the median values reported in a number of surveys as well as the most recent estimate by the Congressional Budget Office.
- The median estimate of $r^{LR}$ from the October 2019 Blue Chip survey is nearly 50 basis points lower than when the survey was conducted in March 2019 (value not shown).

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

[6] 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. 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, interest rates, and output) or both macroeconomic and financial data (like TIPS yields). See the appendix to this section for sources and methodology.

[7] The downward revision to the mean is mainly attributed to lower estimates from the models of Christensen and Rudebusch (forthcoming) and Lubik and Matthes (2015).

## 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) | 1.6 | 2.7 | 3.1 | 3.2 | 3.1 | 3.1 |
| Taylor (1993) | 1.6 | 3.0 | 2.9 | 2.9 | 2.9 | 2.8 |
| First-difference | 1.6 | 2.3 | 2.5 | 2.6 | 2.5 | 2.4 |
| Flexible price-level targeting | 1.6 | 1.1 | 1.2 | 1.5 | 1.7 | 1.9 |
| Extended Tealbook baseline | 1.6 | 2.0 | 2.3 | 2.5 | 2.6 | 2.6 |
| *Real GDP* | | | | | | |
| Inertial Taylor (1999) | 2.1 | 1.8 | 1.5 | 1.6 | 1.5 | 1.5 |
| Taylor (1993) | 2.1 | 1.8 | 1.7 | 1.7 | 1.6 | 1.5 |
| First-difference | 2.1 | 2.2 | 2.0 | 1.8 | 1.6 | 1.5 |
| Flexible price-level targeting | 2.1 | 2.6 | 2.5 | 2.0 | 1.5 | 1.3 |
| Extended Tealbook baseline | 2.1 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 |
| *Unemployment rate*[1] | | | | | | |
| Inertial Taylor (1999) | 3.6 | 3.6 | 3.7 | 3.8 | 3.9 | 4.0 |
| Taylor (1993) | 3.6 | 3.7 | 3.7 | 3.7 | 3.7 | 3.8 |
| First-difference | 3.6 | 3.5 | 3.4 | 3.4 | 3.4 | 3.5 |
| Flexible price-level targeting | 3.6 | 3.3 | 3.0 | 2.8 | 3.0 | 3.2 |
| Extended Tealbook baseline | 3.6 | 3.5 | 3.5 | 3.5 | 3.6 | 3.8 |
| *Total PCE prices* | | | | | | |
| Inertial Taylor (1999) | 1.5 | 1.6 | 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 | 1.8 | 2.0 | 2.1 | 2.1 | 2.2 |
| Flexible price-level targeting | 1.5 | 1.9 | 2.2 | 2.2 | 2.3 | 2.3 |
| Extended Tealbook baseline | 1.5 | 1.7 | 1.9 | 1.9 | 1.9 | 2.0 |
| *Core PCE prices* | | | | | | |
| Inertial Taylor (1999) | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Taylor (1993) | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 |
| First-difference | 1.6 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 |
| Flexible price-level targeting | 1.6 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 |
| Extended Tealbook baseline | 1.6 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |

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 | 1.6 | 2.0 | 2.3 | 2.5 | 2.7 | 2.8 | 2.9 |
| Taylor (1993) | 2.2 | 1.6 | 3.0 | 3.0 | 2.9 | 3.0 | 3.0 | 3.0 |
| First-difference | 2.2 | 1.6 | 1.8 | 2.0 | 2.1 | 2.3 | 2.4 | 2.4 |
| Flexible price-level targeting | 2.2 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.1 |
| Extended Tealbook baseline | 2.2 | 1.6 | 1.8 | 1.9 | 2.0 | 2.0 | 2.1 | 2.2 |
| *Real GDP* | | | | | | | | |
| Inertial Taylor (1999) | 2.1 | 2.1 | 1.9 | 1.9 | 1.7 | 1.8 | 1.6 | 1.6 |
| Taylor (1993) | 2.1 | 2.1 | 1.9 | 1.8 | 1.7 | 1.8 | 1.6 | 1.7 |
| First-difference | 2.1 | 2.1 | 1.9 | 2.0 | 2.0 | 2.2 | 2.1 | 2.0 |
| Flexible price-level targeting | 2.1 | 2.1 | 1.9 | 2.1 | 2.3 | 2.6 | 2.7 | 2.7 |
| Extended Tealbook baseline | 2.1 | 2.1 | 1.9 | 2.0 | 1.9 | 2.1 | 2.0 | 1.9 |
| *Unemployment rate*[1] | | | | | | | | |
| Inertial Taylor (1999) | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.7 |
| Taylor (1993) | 3.6 | 3.6 | 3.6 | 3.6 | 3.7 | 3.7 | 3.7 | 3.7 |
| First-difference | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.4 |
| Flexible price-level targeting | 3.6 | 3.6 | 3.6 | 3.5 | 3.4 | 3.3 | 3.2 | 3.1 |
| Extended Tealbook baseline | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| *Total PCE prices* | | | | | | | | |
| Inertial Taylor (1999) | 1.4 | 1.5 | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 |
| Taylor (1993) | 1.4 | 1.5 | 1.7 | 1.6 | 1.6 | 1.7 | 1.8 | 1.8 |
| First-difference | 1.4 | 1.5 | 1.8 | 1.6 | 1.7 | 1.8 | 2.0 | 2.0 |
| Flexible price-level targeting | 1.4 | 1.5 | 1.8 | 1.7 | 1.8 | 1.9 | 2.1 | 2.1 |
| Extended Tealbook baseline | 1.4 | 1.5 | 1.7 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 |
| *Core PCE prices* | | | | | | | | |
| Inertial Taylor (1999) | 1.7 | 1.6 | 1.8 | 1.8 | 1.7 | 1.8 | 1.8 | 1.8 |
| Taylor (1993) | 1.7 | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 |
| First-difference | 1.7 | 1.6 | 1.8 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 |
| Flexible price-level targeting | 1.7 | 1.6 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.2 |
| Extended Tealbook baseline | 1.7 | 1.6 | 1.8 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 |

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 | 1.6 | 3.5 | 4.4 | 4.7 | 4.5 | 4.1 |
| Asymmetric weight on *ugap* | 1.6 | 1.7 | 1.8 | 1.9 | 2.1 | 2.2 |
| Extended Tealbook baseline | 1.6 | 2.0 | 2.3 | 2.5 | 2.6 | 2.6 |
| *Real GDP* | | | | | | |
| Equal weights | 2.1 | 1.4 | 1.1 | 1.4 | 1.6 | 1.8 |
| Asymmetric weight on *ugap* | 2.1 | 2.3 | 2.1 | 1.8 | 1.5 | 1.3 |
| Extended Tealbook baseline | 2.1 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 |
| *Unemployment rate*[1] | | | | | | |
| Equal weights | 3.6 | 3.8 | 4.1 | 4.3 | 4.3 | 4.3 |
| Asymmetric weight on *ugap* | 3.6 | 3.4 | 3.3 | 3.2 | 3.4 | 3.6 |
| Extended Tealbook baseline | 3.6 | 3.5 | 3.5 | 3.5 | 3.6 | 3.8 |
| *Total PCE prices* | | | | | | |
| Equal weights | 1.5 | 1.6 | 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 | 1.7 | 1.9 | 1.9 | 1.9 | 2.0 |
| *Core PCE prices* | | | | | | |
| Equal weights | 1.6 | 1.8 | 1.7 | 1.7 | 1.8 | 1.8 |
| Asymmetric weight on *ugap* | 1.6 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| Extended Tealbook baseline | 1.6 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |

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 | 1.6 | 2.2 | 2.7 | 3.1 | 3.5 | 3.8 | 4.1 |
| Asymmetric weight on *ugap* | 2.2 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 |
| Extended Tealbook baseline | 2.2 | 1.6 | 1.8 | 1.9 | 2.0 | 2.0 | 2.1 | 2.2 |
| *Real GDP* | | | | | | | | |
| Equal weights | 2.1 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.1 | 1.0 |
| Asymmetric weight on *ugap* | 2.1 | 2.1 | 1.9 | 2.0 | 2.0 | 2.3 | 2.3 | 2.2 |
| Extended Tealbook baseline | 2.1 | 2.1 | 1.9 | 2.0 | 1.9 | 2.1 | 2.0 | 1.9 |
| *Unemployment rate*[1] | | | | | | | | |
| Equal weights | 3.6 | 3.6 | 3.6 | 3.7 | 3.7 | 3.8 | 3.9 | 4.0 |
| Asymmetric weight on *ugap* | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.4 | 3.4 | 3.3 |
| Extended Tealbook baseline | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| *Total PCE prices* | | | | | | | | |
| Equal weights | 1.4 | 1.5 | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 |
| Asymmetric weight on *ugap* | 1.4 | 1.5 | 1.7 | 1.6 | 1.7 | 1.8 | 1.9 | 1.9 |
| Extended Tealbook baseline | 1.4 | 1.5 | 1.7 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 |
| *Core PCE prices* | | | | | | | | |
| Equal weights | 1.7 | 1.6 | 1.8 | 1.8 | 1.7 | 1.8 | 1.8 | 1.7 |
| Asymmetric weight on *ugap* | 1.7 | 1.6 | 1.8 | 1.9 | 1.8 | 1.9 | 2.0 | 2.0 |
| Extended Tealbook baseline | 1.7 | 1.6 | 1.8 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 |

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

[1] In constructing the baseline projection, the staff estimates the level of the federal funds rate in the current quarter using a weighted average of daily quarter-to-date realized values and expected values, inferred from financial markets, over the remainder of the quarter. Thereafter, the staff uses the conditional attenuated rule to project the path of the federal funds rate. The box "A New Conditional Baseline Policy

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 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 4.6 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** | $R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.2ygap_t)$ |
| **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

Rule" in the Domestic Economic Developments and Outlook section of the April 2019 Tealbook A describes this policy rule in detail.

[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).

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.

## 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:Q3. 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:Q3. 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 September 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 October 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 October 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)

| | Nominal GDP | | Real GDP | | PCE price index | | Core PCE price index | | Unemployment rate[1] | |
|---|---|---|---|---|---|---|---|---|---|---|
| Interval | 10/18/19 | 11/25/19 | 10/18/19 | 11/25/19 | 10/18/19 | 11/25/19 | 10/18/19 | 11/25/19 | 10/18/19 | 11/25/19 |
| *Quarterly* | | | | | | | | | | |
| 2019:Q1 | 3.9 | 3.9 | 3.1 | 3.1 | .4 | .4 | 1.1 | 1.1 | 3.9 | 3.9 |
| Q2 | 4.7 | 4.7 | 2.0 | 2.0 | 2.4 | 2.4 | 1.9 | 1.9 | 3.6 | 3.6 |
| Q3 | 3.7 | 3.8 | 1.7 | 2.1 | 1.6 | 1.5 | 2.2 | 2.1 | 3.6 | 3.6 |
| Q4 | 3.3 | 2.8 | 1.6 | 1.3 | 1.4 | 1.5 | 1.7 | 1.5 | 3.6 | 3.6 |
| 2020:Q1 | 3.7 | 3.7 | 2.2 | 2.3 | 1.5 | 1.5 | 1.9 | 1.9 | 3.6 | 3.6 |
| Q2 | 4.1 | 4.2 | 2.0 | 2.1 | 1.7 | 1.8 | 1.9 | 2.0 | 3.6 | 3.5 |
| Q3 | 3.9 | 3.9 | 1.9 | 2.0 | 1.7 | 1.7 | 1.8 | 1.8 | 3.6 | 3.5 |
| Q4 | 3.7 | 3.9 | 1.8 | 2.0 | 1.8 | 1.8 | 1.8 | 1.8 | 3.6 | 3.5 |
| 2021:Q1 | 3.7 | 3.9 | 1.8 | 1.9 | 1.8 | 1.9 | 1.9 | 2.0 | 3.6 | 3.5 |
| Q2 | 3.9 | 4.0 | 1.8 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 3.6 | 3.5 |
| Q3 | 3.7 | 3.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 3.6 | 3.5 |
| Q4 | 3.6 | 3.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 3.6 | 3.5 |
| *Two-quarter*[2] | | | | | | | | | | |
| 2019:Q2 | 4.3 | 4.3 | 2.6 | 2.6 | 1.4 | 1.4 | 1.5 | 1.5 | -.2 | -.2 |
| Q4 | 3.5 | 3.3 | 1.6 | 1.7 | 1.5 | 1.5 | 2.0 | 1.8 | .0 | .0 |
| 2020:Q2 | 3.9 | 4.0 | 2.1 | 2.2 | 1.6 | 1.7 | 1.9 | 1.9 | .0 | -.1 |
| Q4 | 3.8 | 3.9 | 1.9 | 2.0 | 1.7 | 1.8 | 1.8 | 1.8 | .0 | .0 |
| 2021:Q2 | 3.8 | 3.9 | 1.8 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | .0 | .0 |
| Q4 | 3.7 | 3.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | .0 | .0 |
| *Four-quarter*[3] | | | | | | | | | | |
| 2018:Q4 | 4.9 | 4.9 | 2.5 | 2.5 | 1.9 | 1.9 | 1.9 | 1.9 | -.3 | -.3 |
| 2019:Q4 | 3.9 | 3.8 | 2.1 | 2.1 | 1.4 | 1.5 | 1.7 | 1.6 | -.2 | -.2 |
| 2020:Q4 | 3.9 | 3.9 | 2.0 | 2.1 | 1.7 | 1.7 | 1.8 | 1.9 | .0 | -.1 |
| 2021:Q4 | 3.8 | 3.8 | 1.8 | 1.9 | 1.8 | 1.9 | 1.8 | 1.9 | .0 | .0 |
| 2022:Q4 | 3.7 | 3.7 | 1.7 | 1.7 | 1.8 | 1.9 | 1.8 | 1.9 | .0 | .0 |
| *Annual* | | | | | | | | | | |
| 2018 | 5.4 | 5.4 | 2.9 | 2.9 | 2.1 | 2.1 | 1.9 | 1.9 | 3.9 | 3.9 |
| 2019 | 4.1 | 4.1 | 2.2 | 2.3 | 1.4 | 1.4 | 1.7 | 1.6 | 3.7 | 3.7 |
| 2020 | 3.8 | 3.7 | 1.9 | 2.0 | 1.7 | 1.7 | 1.9 | 1.8 | 3.6 | 3.5 |
| 2021 | 3.8 | 3.9 | 1.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.9 | 3.6 | 3.5 |
| 2022 | 3.7 | 3.7 | 1.7 | 1.7 | 1.8 | 1.9 | 1.8 | 1.9 | 3.6 | 3.5 |

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 | 2.0 | 2.1 | 1.3 | 2.3 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 2.1 | 2.1 | 1.9 | 1.7 |
| *Previous Tealbook* | *2.0* | *1.7* | *1.6* | *2.2* | *2.0* | *1.9* | *1.8* | *1.8* | *1.8* | *1.8* | *1.8* | *2.1* | *2.0* | *1.8* | *1.7* |
| Final sales | 3.0 | 2.1 | 1.7 | 2.5 | 2.4 | 2.2 | 2.3 | 2.0 | 2.0 | 1.8 | 1.6 | 2.3 | 2.4 | 1.9 | 1.7 |
| *Previous Tealbook* | *3.0* | *1.8* | *1.8* | *2.4* | *2.4* | *1.9* | *2.2* | *2.1* | *2.0* | *1.7* | *1.6* | *2.3* | *2.2* | *1.8* | *1.6* |
| Priv. dom. final purch. | 3.3 | 2.3 | 1.9 | 2.1 | 2.6 | 2.6 | 2.6 | 2.3 | 2.2 | 2.0 | 1.9 | 2.3 | 2.5 | 2.1 | 1.8 |
| *Previous Tealbook* | *3.3* | *2.1* | *2.1* | *2.0* | *2.5* | *2.4* | *2.4* | *2.3* | *2.2* | *2.0* | *1.8* | *2.3* | *2.3* | *2.1* | *1.8* |
| Personal cons. expend. | 4.6 | 3.0 | 2.1 | 2.4 | 2.5 | 2.6 | 2.6 | 2.4 | 2.4 | 2.3 | 2.3 | 2.7 | 2.6 | 2.4 | 2.3 |
| *Previous Tealbook* | *4.6* | *2.8* | *2.3* | *2.4* | *2.5* | *2.5* | *2.4* | *2.4* | *2.4* | *2.3* | *2.3* | *2.7* | *2.5* | *2.4* | *2.3* |
| Durables | 13.0 | 7.3 | 2.4 | 3.3 | 5.0 | 5.1 | 5.2 | 5.0 | 5.0 | 5.0 | 5.0 | 5.6 | 4.6 | 5.0 | 5.0 |
| Nondurables | 6.5 | 4.1 | 2.7 | 3.3 | 3.1 | 3.0 | 2.9 | 2.5 | 2.4 | 2.5 | 2.4 | 3.8 | 3.1 | 2.5 | 2.5 |
| Services | 2.8 | 2.1 | 1.9 | 2.0 | 2.0 | 2.1 | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.1 | 2.0 | 1.8 |
| Residential investment | -3.0 | 4.6 | 5.9 | 7.2 | 6.8 | 2.4 | -.6 | -2.7 | -2.7 | -3.3 | -3.4 | 1.6 | 3.9 | -3.0 | -3.7 |
| *Previous Tealbook* | *-3.0* | *4.8* | *5.8* | *7.3* | *7.3* | *3.1* | *.9* | *-1.7* | *-2.8* | *-3.2* | *-3.8* | *1.6* | *4.6* | *-2.9* | *-3.8* |
| Nonres. priv. fixed invest. | -1.0 | -2.0 | -.1 | -.9 | 1.8 | 2.4 | 3.1 | 3.4 | 2.6 | 2.0 | 1.4 | .3 | 1.6 | 2.3 | 1.1 |
| *Previous Tealbook* | *-1.0* | *-2.1* | *-.2* | *-1.3* | *1.0* | *1.6* | *2.7* | *2.9* | *2.8* | *1.7* | *1.0* | *.3* | *1.0* | *2.1* | *.9* |
| Equipment & intangibles | 2.1 | 1.5 | 1.8 | .6 | 2.6 | 3.5 | 4.2 | 4.5 | 3.4 | 2.8 | 2.0 | 2.5 | 2.7 | 3.2 | 1.9 |
| *Previous Tealbook* | *2.1* | *1.0* | *1.0* | *-.5* | *2.0* | *2.6* | *3.8* | *3.9* | *3.8* | *2.6* | *1.7* | *2.1* | *2.0* | *3.0* | *1.7* |
| Nonres. structures | -11.1 | -13.6 | -7.0 | -6.5 | -1.1 | -1.4 | -.9 | -.8 | -.6 | -.8 | -1.1 | -7.2 | -2.5 | -.8 | -1.8 |
| *Previous Tealbook* | *-11.1* | *-12.6* | *-4.2* | *-4.0* | *-2.8* | *-2.2* | *-1.4* | *-.9* | *-1.2* | *-1.3* | *-1.6* | *-6.2* | *-2.6* | *-1.3* | *-2.1* |
| Net exports[2] | -981 | -989 | -994 | -973 | -980 | -994 | -996 | -1001 | -1005 | -1011 | -1024 | -977 | -986 | -1010 | -1037 |
| *Previous Tealbook[2]* | *-981* | *-998* | *-1005* | *-991* | *-999* | *-1017* | *-1012* | *-1012* | *-1012* | *-1025* | *-1036* | *-982* | *-1005* | *-1021* | *-1045* |
| Exports | -5.7 | .7 | -1.1 | 5.0 | 1.7 | 2.0 | 2.4 | 2.8 | 3.3 | 3.4 | 3.5 | -.6 | 2.7 | 3.3 | 3.5 |
| Imports | .0 | 1.5 | -.2 | 1.0 | 2.0 | 3.1 | 1.9 | 2.5 | 2.8 | 3.1 | 4.1 | -.1 | 2.0 | 3.1 | 3.2 |
| Gov't. cons. & invest. | 4.8 | 1.6 | .8 | 1.8 | 1.5 | 1.0 | .9 | .4 | .9 | .8 | .8 | 2.5 | 1.3 | .7 | .8 |
| *Previous Tealbook* | *4.8* | *1.3* | *.9* | *2.0* | *2.4* | *.6* | *.5* | *.4* | *.9* | *.8* | *.9* | *2.5* | *1.4* | *.7* | *.9* |
| Federal | 8.3 | 3.4 | 1.4 | 3.1 | 2.3 | 1.0 | .6 | -.7 | .5 | .3 | .5 | 3.8 | 1.7 | .2 | .4 |
| Defense | 3.3 | 2.2 | 1.6 | 3.5 | 2.1 | 1.4 | .7 | .1 | .3 | .4 | .0 | 3.7 | 1.9 | .2 | .6 |
| Nondefense | 16.1 | 5.2 | 1.0 | 2.5 | 2.6 | .5 | .4 | -1.9 | .9 | .2 | 1.3 | 3.9 | 1.5 | .1 | .2 |
| State & local | 2.7 | .4 | .5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.8 | 1.0 | 1.0 | 1.1 |
| Change in priv. inventories[2] | 69 | 75 | 55 | 41 | 26 | 16 | -3 | -8 | -14 | -14 | -4 | 79 | 20 | -10 | 3 |
| *Previous Tealbook[2]* | *69* | *66* | *55* | *45* | *20* | *23* | *1* | *-11* | *-24* | *-18* | *-8* | *76* | *22* | *-15* | *7* |

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 | 2.1 | 1.9 | 1.7 |
| *Previous Tealbook* | *2.6* | *2.9* | *1.9* | *2.0* | *2.8* | *2.5* | *2.1* | *2.0* | *1.8* | *1.7* |
| Final sales | 2.0 | 3.2 | 1.8 | 2.2 | 2.9 | 2.2 | 2.3 | 2.4 | 1.9 | 1.7 |
| *Previous Tealbook* | *2.0* | *3.2* | *1.8* | *2.2* | *2.9* | *2.2* | *2.3* | *2.2* | *1.8* | *1.6* |
| Priv. dom. final purch. | 2.6 | 4.5 | 2.5 | 2.8 | 3.4 | 2.8 | 2.3 | 2.5 | 2.1 | 1.8 |
| *Previous Tealbook* | *2.6* | *4.5* | *2.5* | *2.8* | *3.4* | *2.8* | *2.3* | *2.3* | *2.1* | *1.8* |
| Personal cons. expend. | 1.9 | 3.8 | 2.9 | 2.8 | 2.9 | 2.6 | 2.7 | 2.6 | 2.4 | 2.3 |
| *Previous Tealbook* | *1.9* | *3.8* | *2.9* | *2.8* | *2.9* | *2.6* | *2.7* | *2.5* | *2.4* | *2.3* |
| Durables | 5.0 | 9.2 | 5.8 | 7.3 | 7.7 | 3.8 | 5.6 | 4.6 | 5.0 | 5.0 |
| Nondurables | 2.8 | 3.2 | 2.8 | 1.8 | 3.7 | 2.5 | 3.8 | 3.1 | 2.5 | 2.5 |
| Services | 1.1 | 3.2 | 2.5 | 2.4 | 2.0 | 2.5 | 1.9 | 2.1 | 2.0 | 1.8 |
| Residential investment | 7.1 | 7.7 | 9.1 | 3.9 | 4.2 | -4.4 | 1.6 | 3.9 | -3.0 | -3.7 |
| *Previous Tealbook* | *7.1* | *7.7* | *9.1* | *3.9* | *4.2* | *-4.4* | *1.6* | *4.6* | *-2.9* | *-3.8* |
| Nonres. priv. fixed invest. | 5.4 | 6.9 | -.9 | 2.4 | 5.4 | 5.9 | .3 | 1.6 | 2.3 | 1.1 |
| *Previous Tealbook* | *5.4* | *6.9* | *-.9* | *2.4* | *5.4* | *5.9* | *.3* | *1.0* | *2.1* | *.9* |
| Equipment & intangibles | 5.1 | 6.1 | 2.3 | 1.9 | 6.6 | 6.8 | 2.5 | 2.7 | 3.2 | 1.9 |
| *Previous Tealbook* | 5.1 | 6.1 | 2.3 | 1.9 | 6.6 | 6.8 | 2.1 | 2.0 | 3.0 | 1.7 |
| Nonres. structures | 6.7 | 9.3 | -10.9 | 4.3 | 1.5 | 2.6 | -7.2 | -2.5 | -.8 | -1.8 |
| *Previous Tealbook* | *6.7* | *9.3* | *-10.9* | *4.3* | *1.5* | *2.6* | *-6.2* | *-2.6* | *-1.3* | *-2.1* |
| Net exports[1] | -533 | -577 | -722 | -784 | -850 | -920 | -977 | -986 | -1010 | -1037 |
| *Previous Tealbook*[1] | *-533* | *-577* | *-722* | *-784* | *-850* | *-920* | *-982* | *-1005* | *-1021* | *-1045* |
| Exports | 6.0 | 2.9 | -1.5 | 1.1 | 5.5 | .4 | -.6 | 2.7 | 3.3 | 3.5 |
| Imports | 3.0 | 6.5 | 3.2 | 3.4 | 5.6 | 3.2 | -.1 | 2.0 | 3.1 | 3.2 |
| Gov't. cons. & invest. | -2.4 | .3 | 2.3 | 1.5 | .8 | 1.5 | 2.5 | 1.3 | .7 | .8 |
| *Previous Tealbook* | *-2.4* | *.3* | *2.3* | *1.5* | *.8* | *1.5* | *2.5* | *1.4* | *.7* | *.9* |
| Federal | -6.1 | -1.1 | 1.1 | .1 | 1.7 | 2.7 | 3.8 | 1.7 | .2 | .4 |
| Defense | -6.5 | -3.4 | -.4 | -.8 | 1.9 | 4.0 | 3.7 | 1.9 | .2 | .6 |
| Nondefense | -5.5 | 2.7 | 3.4 | 1.5 | 1.4 | .7 | 3.9 | 1.5 | .1 | .2 |
| State & local | .2 | 1.2 | 3.0 | 2.3 | .4 | .9 | 1.8 | 1.0 | 1.0 | 1.1 |
| Change in priv. inventories[1] | 109 | 86 | 132 | 23 | 32 | 48 | 79 | 20 | -10 | 3 |
| *Previous Tealbook*[1] | *109* | *86* | *132* | *23* | *32* | *48* | *76* | *22* | *-15* | *7* |

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 | 2.0 | 2.1 | 1.3 | 2.3 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 2.1 | 2.1 | 1.9 | 1.7 |
| *Previous Tealbook* | *2.0* | *1.7* | *1.6* | *2.2* | *2.0* | *1.9* | *1.8* | *1.8* | *1.8* | *1.8* | *1.8* | *2.1* | *2.0* | *1.8* | *1.7* |
| Final sales | 2.9 | 2.1 | 1.7 | 2.5 | 2.4 | 2.2 | 2.3 | 2.0 | 2.0 | 1.8 | 1.6 | 2.3 | 2.4 | 1.9 | 1.7 |
| *Previous Tealbook* | *2.9* | *1.7* | *1.8* | *2.3* | *2.4* | *1.9* | *2.2* | *2.1* | *2.0* | *1.7* | *1.6* | *2.3* | *2.2* | *1.8* | *1.6* |
| Priv. dom. final purch. | 2.8 | 1.9 | 1.6 | 1.8 | 2.2 | 2.2 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.9 | 2.1 | 1.8 | 1.6 |
| *Previous Tealbook* | *2.8* | *1.8* | *1.8* | *1.7* | *2.1* | *2.0* | *2.0* | *1.9* | *1.9* | *1.7* | *1.6* | *1.9* | *2.0* | *1.8* | *1.5* |
| Personal cons. expend. | 3.0 | 2.0 | 1.4 | 1.7 | 1.7 | 1.8 | 1.8 | 1.6 | 1.6 | 1.6 | 1.6 | 1.8 | 1.7 | 1.6 | 1.6 |
| *Previous Tealbook* | *3.0* | *1.9* | *1.6* | *1.6* | *1.7* | *1.7* | *1.7* | *1.6* | *1.6* | *1.6* | *1.6* | *1.8* | *1.7* | *1.6* | *1.6* |
| Durables | .9 | .5 | .2 | .2 | .3 | .4 | .4 | .3 | .3 | .3 | .3 | .4 | .3 | .3 | .3 |
| Nondurables | .9 | .6 | .4 | .5 | .4 | .4 | .4 | .3 | .3 | .4 | .3 | .5 | .4 | .3 | .3 |
| Services | 1.3 | 1.0 | .9 | 1.0 | .9 | 1.0 | 1.0 | 1.0 | 1.0 | .9 | .9 | .9 | 1.0 | .9 | .9 |
| Residential investment | -.1 | .2 | .2 | .3 | .3 | .1 | .0 | -.1 | -.1 | -.1 | -.1 | .1 | .1 | -.1 | -.1 |
| *Previous Tealbook* | *-.1* | *.2* | *.2* | *.3* | *.3* | *.1* | *.0* | *-.1* | *-.1* | *-.1* | *-.1* | *.1* | *.2* | *-.1* | *-.1* |
| Nonres. priv. fixed invest. | -.1 | -.3 | .0 | -.1 | .2 | .3 | .4 | .4 | .3 | .3 | .2 | .0 | .2 | .3 | .1 |
| *Previous Tealbook* | *-.1* | *-.3* | *.0* | *-.2* | *.1* | *.2* | *.4* | *.4* | *.4* | *.2* | *.1* | *.0* | *.1* | *.3* | *.1* |
| Equipment & intangibles | .2 | .2 | .2 | .1 | .3 | .4 | .4 | .5 | .4 | .3 | .2 | .3 | .3 | .3 | .2 |
| *Previous Tealbook* | *.2* | *.1* | *.1* | *-.1* | *.2* | *.3* | *.4* | *.4* | *.4* | *.3* | *.2* | *.2* | *.2* | *.3* | *.2* |
| Nonres. structures | -.4 | -.4 | -.2 | -.2 | .0 | .0 | .0 | .0 | .0 | .0 | .0 | -.2 | -.1 | .0 | .0 |
| *Previous Tealbook* | *-.4* | *-.4* | *-.1* | *-.1* | *-.1* | *-.1* | *.0* | *.0* | *.0* | *.0* | *.0* | *-.2* | *-.1* | *.0* | *-.1* |
| Net exports | -.7 | -.1 | -.1 | .4 | -.1 | -.2 | .0 | .0 | .0 | -.1 | -.2 | -.1 | .0 | -.1 | -.1 |
| *Previous Tealbook* | *-.7* | *-.3* | *-.1* | *.3* | *-.1* | *-.3* | *.1* | *.0* | *.0* | *-.2* | *-.1* | *-.1* | *.0* | *-.1* | *.0* |
| Exports | -.7 | .1 | -.1 | .6 | .2 | .2 | .3 | .3 | .4 | .4 | .4 | -.1 | .3 | .4 | .4 |
| Imports | .0 | -.2 | .0 | -.1 | -.3 | -.4 | -.3 | -.4 | -.4 | -.4 | -.6 | .0 | -.3 | -.4 | -.4 |
| Gov't. cons. & invest. | .8 | .3 | .1 | .3 | .3 | .2 | .2 | .1 | .2 | .1 | .1 | .4 | .2 | .1 | .1 |
| *Previous Tealbook* | *.8* | *.2* | *.2* | *.4* | *.4* | *.1* | *.1* | *.1* | *.2* | *.1* | *.1* | *.4* | *.2* | *.1* | *.2* |
| Federal | .5 | .2 | .1 | .2 | .2 | .1 | .0 | .0 | .0 | .0 | .0 | .2 | .1 | .0 | .0 |
| Defense | .1 | .1 | .1 | .1 | .1 | .1 | .0 | .0 | .0 | .0 | .0 | .1 | .1 | .0 | .0 |
| Nondefense | .4 | .1 | .0 | .1 | .1 | .0 | .0 | -.1 | .0 | .0 | .0 | .1 | .0 | .0 | .0 |
| State & local | .3 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .2 | .1 | .1 | .1 |
| Change in priv. inventories | -.9 | .1 | -.4 | -.2 | -.3 | -.2 | -.4 | -.1 | -.1 | .0 | .2 | -.2 | -.3 | .0 | .0 |
| *Previous Tealbook* | *-.9* | *-.1* | *-.2* | *-.2* | *-.4* | *.1* | *-.4* | *-.2* | *-.2* | *.1* | *.2* | *-.2* | *-.2* | *.0* | *.1* |

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 | 1.7 | 1.5 | 1.4 | 2.1 | 1.9 | 1.8 | 1.9 | 2.0 | 1.9 | 1.9 | 1.7 | 1.8 | 1.9 | 2.0 |
| *Previous Tealbook* | *2.4* | *2.1* | *1.7* | *1.5* | *2.0* | *1.9* | *1.9* | *1.9* | *2.1* | *1.9* | *1.8* | *1.8* | *1.8* | *1.9* | *2.0* |
| PCE chain-wt. price index | 2.4 | 1.5 | 1.5 | 1.5 | 1.8 | 1.7 | 1.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.5 | 1.7 | 1.9 | 1.9 |
| *Previous Tealbook* | *2.4* | *1.6* | *1.4* | *1.5* | *1.7* | *1.7* | *1.8* | *1.8* | *1.8* | *1.8* | *1.8* | *1.4* | *1.7* | *1.8* | *1.8* |
| Energy | 18.4 | -8.2 | 3.2 | -7.0 | -2.6 | -1.1 | -.5 | .2 | .3 | .4 | .6 | -1.7 | -2.8 | .4 | 1.0 |
| *Previous Tealbook* | *18.4* | *-8.2* | *-4.8* | *-8.1* | *-2.2* | *-.9* | *-.3* | *.4* | *.5* | *.5* | *.7* | *-3.6* | *-2.9* | *.5* | *1.1* |
| Food | .6 | -.5 | 1.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 1.1 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *.6* | *-.4* | *1.2* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *1.1* | *2.3* | *2.3* | *2.3* |
| Ex. food & energy | 1.9 | 2.1 | 1.5 | 1.9 | 2.0 | 1.8 | 1.8 | 2.0 | 1.9 | 1.8 | 1.8 | 1.6 | 1.9 | 1.9 | 1.9 |
| *Previous Tealbook* | *1.9* | *2.2* | *1.7* | *1.9* | *1.9* | *1.8* | *1.8* | *1.9* | *1.9* | *1.8* | *1.8* | *1.7* | *1.8* | *1.8* | *1.8* |
| Ex. food & energy, market based | 1.4 | 1.9 | 1.5 | 1.8 | 1.8 | 1.7 | 1.7 | 1.8 | 1.7 | 1.7 | 1.7 | 1.6 | 1.7 | 1.7 | 1.7 |
| *Previous Tealbook* | *1.4* | *1.9* | *1.6* | *1.8* | *1.7* | *1.7* | *1.7* | *1.7* | *1.7* | *1.6* | *1.7* | *1.7* | *1.7* | *1.7* | *1.7* |
| CPI | 2.9 | 1.8 | 2.3 | 1.6 | 2.0 | 2.1 | 2.1 | 2.3 | 2.2 | 2.2 | 2.2 | 2.0 | 2.0 | 2.2 | 2.3 |
| *Previous Tealbook* | *2.9* | *1.8* | *1.7* | *1.6* | *2.0* | *2.1* | *2.1* | *2.2* | *2.2* | *2.2* | *2.2* | *1.8* | *2.0* | *2.2* | *2.3* |
| Ex. food & energy | 1.8 | 3.0 | 2.1 | 2.2 | 2.4 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 |
| *Previous Tealbook* | *1.8* | *3.0* | *2.3* | *2.3* | *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 | 3.3 | 2.8 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 |
| *Previous Tealbook[2]* | *2.1* | *2.8* | *2.8* | *2.7* | *2.7* | *2.7* | *2.7* | *2.7* | *2.7* | *2.7* | *2.6* | *2.6* | *2.7* | *2.7* | *2.6* |
| Business sector | | | | | | | | | | | | | | | |
| Output per hour | 2.8 | -.1 | -.6 | 1.4 | 1.4 | 1.2 | 1.3 | 1.4 | 1.3 | 1.4 | 1.3 | 1.4 | 1.3 | 1.3 | 1.4 |
| *Previous Tealbook* | *2.6* | *-.4* | *.0* | *1.4* | *1.2* | *1.3* | *1.3* | *1.3* | *1.3* | *1.3* | *1.3* | *1.4* | *1.3* | *1.3* | *1.4* |
| Compensation per hour | 5.2 | 3.3 | 2.3 | 3.5 | 3.6 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 3.6 | 5.0 | 3.6 | 3.6 | 3.6 |
| *Previous Tealbook* | *5.2* | *3.1* | *2.4* | *3.3* | *3.7* | *3.7* | *3.7* | *3.6* | *3.6* | *3.5* | *3.5* | *5.0* | *3.6* | *3.5* | *3.4* |
| Unit labor costs | 2.3 | 3.3 | 2.9 | 2.1 | 2.2 | 2.5 | 2.4 | 2.2 | 2.3 | 2.2 | 2.3 | 3.6 | 2.3 | 2.3 | 2.2 |
| *Previous Tealbook* | *2.5* | *3.5* | *2.4* | *1.9* | *2.5* | *2.4* | *2.4* | *2.3* | *2.2* | *2.2* | *2.2* | *3.5* | *2.3* | *2.2* | *2.0* |
| Core goods imports chain-wt. price index[3] | -.6 | -.9 | -.5 | 1.1 | 1.0 | .8 | .9 | 1.1 | 1.0 | .9 | 1.0 | -.9 | 1.0 | 1.0 | .9 |
| *Previous Tealbook[3]* | *-.6* | *-1.0* | *.4* | *1.0* | *1.1* | *.9* | *.9* | *1.0* | *1.0* | *.9* | *1.0* | *-.7* | *1.0* | *1.0* | *.9* |

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 | 1.7 | 1.8 | 1.9 | 2.0 |
| *Previous Tealbook* | *1.8* | *1.5* | *.9* | *1.5* | *2.0* | *2.3* | *1.8* | *1.8* | *1.9* | *2.0* |
| PCE chain-wt. price index | 1.2 | 1.1 | .3 | 1.5 | 1.8 | 1.9 | 1.5 | 1.7 | 1.9 | 1.9 |
| *Previous Tealbook* | *1.2* | *1.1* | *.3* | *1.5* | *1.8* | *1.9* | *1.4* | *1.7* | *1.8* | *1.8* |
| Energy | -2.9 | -7.1 | -16.4 | 2.0 | 8.0 | 3.9 | -1.7 | -2.8 | .4 | 1.0 |
| *Previous Tealbook* | *-2.9* | *-7.1* | *-16.4* | *2.0* | *8.0* | *3.9* | *-3.6* | *-2.9* | *.5* | *1.1* |
| Food | .7 | 2.8 | .3 | -1.8 | .7 | .5 | 1.1 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *.7* | *2.8* | *.3* | *-1.8* | *.7* | *.5* | *1.1* | *2.3* | *2.3* | *2.3* |
| Ex. food & energy | 1.6 | 1.5 | 1.2 | 1.8 | 1.7 | 1.9 | 1.6 | 1.9 | 1.9 | 1.9 |
| *Previous Tealbook* | *1.6* | *1.5* | *1.2* | *1.8* | *1.7* | *1.9* | *1.7* | *1.8* | *1.8* | *1.8* |
| Ex. food & energy, market based | 1.1 | 1.1 | 1.1 | 1.4 | 1.2 | 1.7 | 1.6 | 1.7 | 1.7 | 1.7 |
| *Previous Tealbook* | *1.1* | *1.1* | *1.1* | *1.4* | *1.2* | *1.7* | *1.7* | *1.7* | *1.7* | *1.7* |
| CPI | 1.2 | 1.2 | .4 | 1.8 | 2.1 | 2.2 | 2.0 | 2.0 | 2.2 | 2.3 |
| *Previous Tealbook* | *1.2* | *1.2* | *.4* | *1.8* | *2.1* | *2.2* | *1.8* | *2.0* | *2.2* | *2.3* |
| Ex. food & energy | 1.7 | 1.7 | 2.0 | 2.2 | 1.8 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 |
| *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 | 2.7 | 2.7 | 2.7 | 2.7 |
| *Previous Tealbook*[1] | *2.0* | *2.3* | *1.9* | *2.2* | *2.6* | *3.0* | *2.6* | *2.7* | *2.7* | *2.6* |
| Business sector | | | | | | | | | | |
| Output per hour | 1.8 | .3 | .6 | 1.4 | 1.1 | 1.1 | 1.4 | 1.3 | 1.3 | 1.4 |
| *Previous Tealbook* | *1.8* | *.3* | *.6* | *1.4* | *1.1* | *1.1* | *1.4* | *1.3* | *1.3* | *1.4* |
| Compensation per hour | -.2 | 3.0 | 2.3 | 2.2 | 3.7 | 2.1 | 5.0 | 3.6 | 3.6 | 3.6 |
| *Previous Tealbook* | *-.2* | *3.0* | *2.3* | *2.2* | *3.7* | *2.1* | *5.0* | *3.6* | *3.5* | *3.4* |
| Unit labor costs | -2.0 | 2.7 | 1.7 | .8 | 2.6 | 1.0 | 3.6 | 2.3 | 2.3 | 2.2 |
| *Previous Tealbook* | *-2.0* | *2.7* | *1.7* | *.8* | *2.6* | *1.0* | *3.5* | *2.3* | *2.2* | *2.0* |
| Core goods imports chain-wt. price index[2] | -2.2 | -.4 | -4.3 | -.9 | .9 | .2 | -.9 | 1.0 | 1.0 | .9 |
| *Previous Tealbook*[2] | *-2.2* | *-.4* | *-4.3* | *-.9* | *.9* | *.2* | *-.7* | *1.0* | *1.0* | *.9* |

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 | 188 | 156 | 162 | 210 | 30 | 120 | 110 | 100 | 90 | 80 | 168 | 130 | 95 | 74 |
| Unemployment rate[3] | 3.6 | 3.6 | 3.6 | 3.6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.5 | 3.5 | 3.5 |
| *Previous Tealbook[3]* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *3.6* | *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]* | *4.4* | *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* |
| Employment-to-Population Ratio[3] | 60.6 | 60.8 | 60.9 | 60.9 | 60.8 | 60.8 | 60.8 | 60.8 | 60.7 | 60.7 | 60.7 | 60.9 | 60.8 | 60.7 | 60.4 |
| Employment-to-Population Trend[3] | 60.1 | 60.1 | 60.1 | 60.0 | 60.0 | 60.0 | 59.9 | 59.9 | 59.9 | 59.8 | 59.8 | 60.1 | 59.9 | 59.8 | 59.6 |
| Output gap[4] | 1.6 | 1.6 | 1.5 | 1.6 | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.8 | 1.5 | 1.8 | 1.8 | 1.7 |
| *Previous Tealbook[4]* | *1.5* | *1.6* | *1.5* | *1.6* | *1.7* | *1.7* | *1.7* | *1.7* | *1.7* | *1.7* | *1.6* | *1.5* | *1.7* | *1.6* | *1.5* |
| Industrial production[5] | -2.3 | 1.4 | .0 | 3.2 | 1.4 | .7 | .5 | 1.2 | 1.0 | .9 | 1.0 | -.7 | 1.4 | 1.0 | .8 |
| *Previous Tealbook[5]* | *-2.2* | *1.2* | *1.2* | *1.6* | *1.3* | *1.0* | *.7* | *1.2* | *1.0* | *1.1* | *1.0* | *-.4* | *1.1* | *1.1* | *.8* |
| Manufacturing industr. prod.[5] | -3.3 | 1.1 | -.5 | 2.9 | 1.1 | .9 | 1.0 | .9 | 1.0 | .9 | 1.0 | -1.1 | 1.5 | .9 | .8 |
| *Previous Tealbook[5]* | *-3.2* | *1.1* | *.3* | *1.9* | *1.2* | *1.0* | *.9* | *.8* | *.9* | *1.2* | *1.0* | *-.9* | *1.2* | *1.0* | *.8* |
| Capacity utilization rate - mfg.[3] | 75.5 | 75.4 | 75.1 | 75.5 | 75.6 | 75.7 | 75.8 | 75.9 | 76.1 | 76.2 | 76.3 | 75.1 | 75.8 | 76.3 | 76.9 |
| *Previous Tealbook[3]* | *75.5* | *75.5* | *75.2* | *75.5* | *75.6* | *75.7* | *75.8* | *75.9* | *76.0* | *76.2* | *76.3* | *75.2* | *75.8* | *76.3* | *77.0* |
| Housing starts[6] | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 | 1.2 |
| Light motor vehicle sales[6] | 17.0 | 17.0 | 16.8 | 16.9 | 16.9 | 16.9 | 16.9 | 16.8 | 16.8 | 16.8 | 16.8 | 16.9 | 16.9 | 16.8 | 16.6 |
| *Income and saving* | | | | | | | | | | | | | | | |
| Nominal GDP[5] | 4.7 | 3.8 | 2.8 | 3.7 | 4.2 | 3.9 | 3.9 | 3.9 | 4.0 | 3.8 | 3.7 | 3.8 | 3.9 | 3.8 | 3.7 |
| Real disposable pers. income[5] | 2.4 | 3.1 | 2.5 | 2.9 | 1.6 | 1.7 | 2.0 | 2.6 | 1.7 | 1.6 | 1.7 | 3.1 | 2.0 | 1.9 | 2.0 |
| *Previous Tealbook[5]* | *2.4* | *3.1* | *2.3* | *2.6* | *1.9* | *1.5* | *2.0* | *2.7* | *1.7* | *1.5* | *1.7* | *3.1* | *2.0* | *1.9* | *2.1* |
| Personal saving rate[3] | 8.0 | 8.1 | 8.2 | 8.3 | 8.1 | 7.9 | 7.8 | 7.8 | 7.7 | 7.5 | 7.3 | 8.2 | 7.8 | 7.3 | 7.1 |
| *Previous Tealbook[3]* | *8.0* | *8.1* | *8.1* | *8.2* | *8.0* | *7.8* | *7.7* | *7.8* | *7.7* | *7.5* | *7.3* | *8.1* | *7.7* | *7.3* | *7.2* |
| Corporate profits[7] | 16.0 | 6.0 | -1.9 | 2.5 | 3.7 | 1.8 | -1.4 | 2.2 | .9 | 1.6 | .2 | .8 | 1.6 | 1.2 | 2.9 |
| Profit share of GNP[3] | 9.6 | 9.7 | 9.6 | 9.5 | 9.5 | 9.5 | 9.4 | 9.3 | 9.3 | 9.2 | 9.2 | 9.6 | 9.4 | 9.2 | 9.1 |
| Gross national saving rate[3] | 18.1 | 18.2 | 18.1 | 18.0 | 18.1 | 18.0 | 17.9 | 17.8 | 17.8 | 17.7 | 17.6 | 18.1 | 17.9 | 17.6 | 17.3 |
| Net national saving rate[3] | 2.6 | 3.0 | 2.8 | 2.8 | 2.8 | 2.7 | 2.5 | 2.4 | 2.3 | 2.2 | 2.0 | 2.8 | 2.5 | 2.0 | 1.5 |

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 | 168 | 130 | 95 | 74 |
| Unemployment rate[2] | 7.0 | 5.7 | 5.0 | 4.8 | 4.1 | 3.8 | 3.6 | 3.5 | 3.5 | 3.5 |
| *Previous Tealbook[2]* | *7.0* | *5.7* | *5.0* | *4.8* | *4.1* | *3.8* | *3.6* | *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* | *4.4* | *4.4* | *4.4* | *4.4* | *4.4* |
| Employment-to-Population Ratio[2] | 58.5 | 59.3 | 59.4 | 59.8 | 60.2 | 60.6 | 60.9 | 60.8 | 60.7 | 60.4 |
| Employment-to-Population Trend[2] | 60.4 | 60.3 | 60.2 | 60.2 | 60.2 | 60.2 | 60.1 | 59.9 | 59.8 | 59.6 |
| Output gap[3] | -3.0 | -1.0 | -.5 | -.3 | .6 | 1.4 | 1.5 | 1.8 | 1.8 | 1.7 |
| *Previous Tealbook[3]* | *-3.0* | *-1.0* | *-.5* | *-.3* | *.6* | *1.4* | *1.5* | *1.7* | *1.6* | *1.5* |
| Industrial production | 2.3 | 3.4 | -3.4 | -.3 | 3.6 | 4.0 | -.7 | 1.4 | 1.0 | .8 |
| *Previous Tealbook* | *2.3* | *3.4* | *-3.4* | *-.3* | *3.6* | *4.0* | *-.4* | *1.1* | *1.1* | *.8* |
| Manufacturing industr. prod. | 1.1 | 1.4 | -1.7 | .3 | 2.5 | 2.2 | -1.1 | 1.5 | .9 | .8 |
| *Previous Tealbook* | *1.1* | *1.4* | *-1.7* | *.3* | *2.5* | *2.2* | *-.9* | *1.2* | *1.0* | *.8* |
| Capacity utilization rate - mfg.[2] | 74.5 | 75.8 | 74.9 | 74.2 | 75.8 | 77.0 | 75.1 | 75.8 | 76.3 | 76.9 |
| *Previous Tealbook[2]* | *74.5* | *75.8* | *74.9* | *74.2* | *75.8* | *77.0* | *75.2* | *75.8* | *76.3* | *77.0* |
| Housing starts[4] | .9 | 1.0 | 1.1 | 1.2 | 1.2 | 1.2 | 1.3 | 1.4 | 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 | 16.6 |
| *Income and saving* | | | | | | | | | | |
| Nominal GDP | 4.4 | 4.5 | 2.8 | 3.5 | 4.9 | 4.9 | 3.8 | 3.9 | 3.8 | 3.7 |
| Real disposable pers. income | -2.5 | 5.3 | 3.0 | 1.6 | 3.4 | 3.9 | 3.1 | 2.0 | 1.9 | 2.0 |
| *Previous Tealbook* | *-2.5* | *5.3* | *3.0* | *1.6* | *3.4* | *3.9* | *3.1* | *2.0* | *1.9* | *2.1* |
| Personal saving rate[2] | 6.3 | 7.5 | 7.5 | 6.5 | 6.8 | 7.8 | 8.2 | 7.8 | 7.3 | 7.1 |
| *Previous Tealbook[2]* | *6.3* | *7.5* | *7.5* | *6.5* | *6.8* | *7.8* | *8.1* | *7.7* | *7.3* | *7.2* |
| Corporate profits[5] | 3.9 | 6.7 | -10.8 | 3.3 | -.6 | 4.2 | .8 | 1.6 | 1.2 | 2.9 |
| Profit share of GNP[2] | 11.8 | 12.1 | 10.5 | 10.5 | 9.9 | 9.9 | 9.6 | 9.4 | 9.2 | 9.1 |
| Gross national saving rate[2] | 19.2 | 20.3 | 19.6 | 18.1 | 18.0 | 17.9 | 18.1 | 17.9 | 17.6 | 17.3 |
| Net national saving rate[2] | 4.0 | 5.3 | 4.5 | 2.7 | 2.7 | 2.4 | 2.8 | 2.5 | 2.0 | 1.5 |

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 Q3 | 2019 Q4 | 2020 Q1 | 2020 Q2 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Unified federal budget**[1] | | | | Nominal dollars, billions | | | | | | |
| Receipts | 3,316 | 3,330 | 3,462 | 3,714 | 3,859 | 4,031 | 853 | 793 | 802 | 1,236 |
| Outlays | 3,982 | 4,109 | 4,447 | 4,590 | 4,828 | 5,159 | 1,091 | 1,157 | 1,171 | 1,156 |
| Surplus/deficit | -665 | -779 | -984 | -876 | -970 | -1,128 | -237 | -364 | -369 | 80 |
| | | | | Percent of GDP | | | | | | |
| Surplus/deficit | -3.5 | -3.8 | -4.6 | -4.0 | -4.2 | -4.8 | -4.5 | -6.8 | -6.8 | 1.5 |
| *Previous Tealbook* | *-3.5* | *-3.8* | *-4.6* | *-4.1* | *-4.3* | *-4.8* | *-4.2* | *-6.5* | *-7.1* | *1.1* |
| Primary surplus/deficit | -2.1 | -2.2 | -2.9 | -2.3 | -2.5 | -2.9 | -3.2 | -4.9 | -5.1 | 3.6 |
| Net interest | 1.4 | 1.6 | 1.8 | 1.7 | 1.7 | 1.9 | 1.3 | 1.9 | 1.7 | 2.1 |
| Cyclically adjusted surplus/deficit | -3.5 | -4.2 | -5.3 | -4.8 | -5.1 | -5.6 | -5.2 | -7.5 | -7.6 | .6 |
| Federal debt held by public | 76.0 | 77.5 | 79.2 | 80.8 | 81.6 | 83.7 | 79.2 | 80.3 | 81.3 | 80.3 |
| **Government in the NIPA**[2] | | | | Real percent change, annual rate | | | | | | |
| Purchases | .8 | 1.5 | 2.5 | 1.3 | .7 | .8 | 1.6 | .8 | 1.8 | 1.5 |
| Consumption | .6 | 1.6 | 2.1 | .9 | .4 | .5 | 2.0 | .9 | 1.4 | 1.2 |
| Investment | 2.0 | 1.5 | 4.4 | 2.9 | 2.0 | 2.0 | .0 | .7 | 3.7 | 3.0 |
| State and local construction | -1.8 | -1.5 | 4.4 | 1.0 | 1.0 | 1.0 | -7.0 | -4.0 | 1.0 | 1.0 |
| Real disposable personal income | 3.5 | 3.9 | 3.1 | 2.0 | 1.9 | 2.0 | 3.1 | 2.5 | 2.9 | 1.6 |
| Contribution from transfers[3] | .2 | .4 | 1.1 | .5 | .6 | .8 | .6 | .3 | 1.1 | .3 |
| Contribution from taxes[3] | -.9 | .4 | -.9 | -.5 | -.5 | -.6 | .2 | .0 | -.5 | -.5 |
| **Government employment** | | | | Average net change in monthly payrolls, thousands | | | | | | |
| Federal | -2 | 0 | 3 | 0 | 1 | 1 | 9 | -5 | 23 | 76 |
| State and local | 9 | 8 | 12 | 9 | 9 | 9 | 29 | 11 | 9 | 9 |
| **Fiscal indicators**[2] | | | | Percentage point contribution to change in real GDP, annual rate | | | | | | |
| Fiscal effect (FE)[4] | .2 | .4 | .9 | .6 | .4 | .4 | .7 | .5 | .7 | .7 |
| Discretionary policy actions (FI) | .3 | .6 | .7 | .4 | .1 | .1 | .5 | .4 | .5 | .5 |
| *Previous Tealbook* | *.3* | *.6* | *.7* | *.4* | *.1* | *.2* | *.5* | *.4* | *.6* | *.6* |
| Federal purchases | .1 | .2 | .2 | .1 | .0 | .0 | .2 | .1 | .2 | .2 |
| State and local purchases | .0 | .1 | .2 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| Taxes and transfers | .1 | .3 | .3 | .2 | .0 | .0 | .2 | .2 | .2 | .2 |
| Cyclical | -.1 | -.1 | -.1 | .0 | .0 | .0 | -.1 | -.1 | -.1 | -.1 |
| Other | .0 | -.1 | .3 | .2 | .3 | .2 | .3 | .2 | .2 | .2 |

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 | Projected 2020 Q1 | 2020 Q2 | 2020 Q3 | 2020 Q4 | 2021 Q1 | 2021 Q2 | 2021 Q3 | 2021 Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Real GDP*[1]** | | | | | | | | | | | | |
| Total foreign | 1.6 | 2.0 | 1.3 | 1.3 | 2.0 | 2.3 | 2.4 | 2.4 | 2.5 | 2.5 | 2.6 | 2.6 |
| *Previous Tealbook* | *1.5* | *2.1* | *1.8* | *1.8* | *2.2* | *2.3* | *2.4* | *2.4* | *2.5* | *2.5* | *2.6* | *2.6* |
| Advanced foreign economies | 1.3 | 2.1 | 1.1 | .8 | 1.3 | 1.5 | 1.5 | 1.5 | 1.7 | 1.7 | 1.7 | 1.7 |
| Canada | .5 | 3.7 | 1.4 | 1.4 | 1.6 | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Japan | 2.0 | 1.8 | .2 | -2.0 | 1.1 | 1.2 | 1.0 | .8 | .8 | .8 | .8 | .8 |
| United Kingdom | 2.3 | -.9 | 1.2 | .1 | .6 | .7 | .8 | .8 | 1.4 | 1.4 | 1.4 | 1.4 |
| Euro area | 1.7 | .8 | .9 | .9 | 1.1 | 1.3 | 1.3 | 1.5 | 1.7 | 1.8 | 1.8 | 1.8 |
| Germany | 1.9 | -1.0 | .3 | .5 | 1.1 | 1.2 | 1.2 | 1.4 | 1.5 | 1.6 | 1.5 | 1.5 |
| Emerging market economies | 2.0 | 2.0 | 1.5 | 1.8 | 2.7 | 3.1 | 3.3 | 3.3 | 3.4 | 3.4 | 3.4 | 3.4 |
| Asia | 4.2 | 3.7 | 2.3 | 2.7 | 4.1 | 4.4 | 4.5 | 4.4 | 4.3 | 4.3 | 4.3 | 4.3 |
| Korea | -1.5 | 4.2 | 1.6 | 2.2 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| China | 7.3 | 5.5 | 5.4 | 5.7 | 5.6 | 5.6 | 5.6 | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 |
| Latin America | -.2 | .3 | .3 | .7 | 1.2 | 1.6 | 2.1 | 2.1 | 2.3 | 2.4 | 2.4 | 2.4 |
| Mexico | -.4 | -.2 | .1 | .4 | 1.0 | 1.5 | 2.0 | 2.0 | 2.2 | 2.3 | 2.3 | 2.3 |
| Brazil | -.3 | 1.8 | 1.5 | 2.3 | 2.0 | 2.3 | 2.5 | 2.6 | 2.8 | 2.8 | 2.8 | 2.8 |
| **Addendum** | | | | | | | | | | | | |
| Emerging market economies ex. China | .7 | 1.2 | .6 | .9 | 2.0 | 2.5 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| ***Consumer prices*[2]** | | | | | | | | | | | | |
| Total foreign | .8 | 3.3 | 2.3 | 3.3 | 2.4 | 2.0 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| *Previous Tealbook* | *.8* | *3.3* | *2.3* | *2.6* | *2.3* | *2.2* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* | *2.3* |
| Advanced foreign economies | .8 | 2.2 | .9 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.5 | 1.5 | 1.6 |
| Canada | 1.6 | 3.4 | 1.7 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Japan | .9 | .3 | .3 | 1.1 | .7 | .5 | .6 | .6 | .7 | .8 | .8 | .9 |
| United Kingdom | 1.1 | 2.6 | 1.7 | .7 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| Euro area | .3 | 2.1 | .7 | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.5 |
| Germany | .2 | 2.5 | .3 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 | 1.9 | 2.0 | 2.1 | 2.1 |
| Emerging market economies | .8 | 4.1 | 3.2 | 4.6 | 3.1 | 2.4 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| Asia | .4 | 3.9 | 3.2 | 5.1 | 3.0 | 1.9 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| Korea | -3.3 | 2.7 | -.6 | 2.9 | 1.3 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| China | .6 | 4.3 | 4.6 | 6.9 | 3.2 | 1.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Latin America | 1.7 | 4.9 | 3.3 | 3.7 | 3.6 | 3.5 | 3.4 | 3.4 | 3.4 | 3.3 | 3.3 | 3.3 |
| Mexico | 1.1 | 4.5 | 2.8 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| Brazil | 2.9 | 5.2 | 2.2 | 1.8 | 3.8 | 3.8 | 3.8 | 3.8 | 3.7 | 3.7 | 3.7 | 3.7 |
| **Addendum** | | | | | | | | | | | | |
| Emerging market economies ex. China | 1.0 | 3.9 | 2.1 | 3.0 | 3.1 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 | 3.0 |

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 | 1.6 | 2.3 | 2.5 | 2.5 |
| *Previous Tealbook* | *3.0* | *3.0* | *2.1* | *2.8* | *3.1* | *2.2* | *1.8* | *2.3* | *2.6* | *2.6* |
| Advanced foreign economies | 2.4 | 2.0 | .9 | 1.9 | 2.7 | 1.3 | 1.3 | 1.5 | 1.7 | 1.7 |
| Canada | 3.4 | 2.8 | -.4 | 1.8 | 2.9 | 1.6 | 1.8 | 1.7 | 1.8 | 1.8 |
| Japan | 2.8 | -.4 | 1.0 | 1.2 | 2.4 | .3 | .5 | 1.0 | .8 | .8 |
| United Kingdom | 2.7 | 2.5 | 2.4 | 1.8 | 1.6 | 1.5 | .7 | .7 | 1.4 | 1.4 |
| Euro area | .7 | 1.6 | 2.0 | 2.1 | 3.0 | 1.2 | 1.1 | 1.3 | 1.8 | 1.7 |
| Germany | 1.5 | 2.3 | 1.3 | 1.9 | 3.4 | .6 | .4 | 1.2 | 1.5 | 1.6 |
| Emerging market economies | 3.6 | 3.9 | 3.2 | 3.8 | 3.5 | 3.0 | 1.8 | 3.1 | 3.4 | 3.4 |
| Asia | 5.4 | 5.1 | 4.6 | 5.1 | 5.2 | 4.4 | 3.2 | 4.3 | 4.3 | 4.3 |
| Korea | 3.7 | 2.6 | 3.4 | 2.7 | 2.8 | 3.0 | 1.6 | 2.4 | 2.4 | 2.3 |
| China | 7.6 | 7.1 | 6.8 | 6.8 | 6.7 | 6.4 | 6.0 | 5.6 | 5.7 | 5.6 |
| Latin America | 1.7 | 2.8 | 1.9 | 2.5 | 1.8 | 1.3 | .3 | 1.8 | 2.4 | 2.4 |
| Mexico | 1.2 | 3.4 | 2.8 | 3.3 | 1.6 | 1.4 | .0 | 1.6 | 2.3 | 2.3 |
| Brazil | 2.6 | -.2 | -5.5 | -2.3 | 2.2 | 1.1 | 1.3 | 2.3 | 2.8 | 2.8 |
| **Addendum** | | | | | | | | | | |
| Emerging market economies ex. China | 2.7 | 3.1 | 2.4 | 3.1 | 2.7 | 2.2 | .8 | 2.5 | 2.8 | 2.8 |
| ***Consumer prices[2]*** | | | | | | | | | | |
| Total foreign | 2.4 | 2.0 | 1.4 | 1.9 | 2.5 | 2.4 | 2.4 | 2.2 | 2.3 | 2.3 |
| *Previous Tealbook* | *2.4* | *2.0* | *1.4* | *1.9* | *2.5* | *2.4* | *2.2* | *2.3* | *2.3* | *2.3* |
| Advanced foreign economies | 1.0 | 1.2 | .5 | .9 | 1.5 | 1.7 | 1.3 | 1.4 | 1.5 | 1.6 |
| Canada | 1.0 | 2.0 | 1.3 | 1.4 | 1.8 | 2.1 | 2.2 | 2.0 | 2.0 | 2.0 |
| Japan | 1.4 | 2.6 | .1 | .3 | .6 | .8 | .6 | .6 | .8 | 1.0 |
| United Kingdom | 2.1 | .9 | .1 | 1.2 | 3.0 | 2.3 | 1.5 | 1.8 | 1.9 | 1.9 |
| Euro area | .8 | .2 | .3 | .7 | 1.4 | 1.9 | 1.0 | 1.2 | 1.4 | 1.6 |
| Germany | 1.4 | .4 | .5 | 1.0 | 1.6 | 2.1 | 1.1 | 1.7 | 2.0 | 2.0 |
| Emerging market economies | 3.4 | 2.6 | 2.0 | 2.6 | 3.2 | 2.9 | 3.2 | 2.8 | 2.8 | 2.8 |
| Asia | 3.2 | 1.8 | 1.5 | 2.1 | 2.0 | 2.1 | 3.1 | 2.5 | 2.6 | 2.6 |
| Korea | 1.1 | 1.0 | .9 | 1.4 | 1.4 | 1.8 | .4 | 1.8 | 2.1 | 2.1 |
| China | 2.9 | 1.5 | 1.4 | 2.1 | 1.8 | 2.2 | 4.1 | 2.4 | 2.5 | 2.5 |
| Latin America | 4.0 | 4.7 | 3.2 | 4.0 | 6.4 | 5.1 | 3.4 | 3.5 | 3.3 | 3.2 |
| Mexico | 3.6 | 4.2 | 2.3 | 3.3 | 6.6 | 4.8 | 2.9 | 3.2 | 3.2 | 3.2 |
| Brazil | 5.8 | 6.5 | 10.4 | 7.1 | 2.8 | 4.1 | 3.0 | 3.8 | 3.7 | 3.5 |
| **Addendum** | | | | | | | | | | |
| Emerging market economies ex. China | 3.8 | 3.5 | 2.4 | 3.0 | 4.2 | 3.5 | 2.5 | 3.1 | 3.0 | 3.0 |

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** | **-544.8** | **-512.8** | **-493.7** | **-518.9** | **-509.9** | **-494.0** | **-514.2** | **-530.6** | **-545.0** | **-538.0** | **-553.3** | **-588.3** |
| *Previous Tealbook* | *-544.8* | *-512.8* | *-502.0* | *-529.0* | *-525.1* | *-511.9* | *-537.2* | *-540.9* | *-547.5* | *-534.6* | *-553.0* | *-577.5* |
| Current account as percent of GDP | -2.6 | -2.4 | -2.3 | -2.4 | -2.3 | -2.2 | -2.3 | -2.4 | -2.4 | -2.3 | -2.4 | -2.5 |
| *Previous Tealbook* | *-2.6* | *-2.4* | *-2.3* | *-2.4* | *-2.4* | *-2.3* | *-2.4* | *-2.4* | *-2.4* | *-2.3* | *-2.4* | *-2.5* |
| Net goods & services | -625.9 | -653.3 | -646.1 | -645.8 | -632.4 | -626.7 | -633.9 | -636.2 | -642.8 | -637.3 | -639.0 | -653.0 |
| Investment income, net | 240.4 | 283.4 | 299.3 | 283.4 | 277.3 | 275.3 | 266.6 | 262.2 | 252.6 | 241.8 | 232.6 | 221.4 |
| Direct, net | 312.9 | 346.1 | 364.4 | 354.3 | 364.2 | 372.4 | 372.5 | 378.5 | 379.5 | 379.8 | 382.9 | 383.9 |
| Portfolio, net | -72.5 | -62.7 | -65.1 | -70.9 | -86.9 | -97.1 | -105.9 | -116.3 | -126.9 | -138.1 | -150.3 | -162.5 |
| Other income and transfers, net | -159.3 | -142.8 | -146.9 | -156.6 | -154.8 | -142.5 | -146.9 | -156.6 | -154.8 | -142.5 | -146.9 | -156.6 |

### *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** | **-517.5** | **-512.2** | **-556.2** | **-600.5** |
| *Previous Tealbook* | *-348.8* | *-365.2* | *-407.8* | *-428.3* | *-439.6* | *-491.0* | *-522.2* | *-528.8* | *-553.2* | *-578.3* |
| Current account as percent of GDP | -2.1 | -2.1 | -2.2 | -2.3 | -2.3 | -2.4 | -2.4 | -2.3 | -2.4 | -2.5 |
| *Previous Tealbook* | *-2.1* | *-2.1* | *-2.2* | *-2.3* | *-2.3* | *-2.4* | *-2.4* | *-2.4* | *-2.4* | *-2.4* |
| Net goods & services | -461.1 | -489.6 | -498.5 | -503.0 | -550.1 | -627.7 | -642.8 | -632.3 | -643.0 | -657.6 |
| Investment income, net | 215.4 | 228.9 | 214.7 | 211.1 | 238.7 | 266.9 | 276.6 | 270.4 | 237.1 | 207.4 |
| Direct, net | 283.3 | 284.2 | 284.6 | 278.0 | 304.0 | 330.3 | 344.4 | 371.9 | 381.5 | 397.6 |
| Portfolio, net | -67.9 | -55.3 | -70.0 | -66.9 | -65.3 | -63.4 | -67.8 | -101.5 | -144.4 | -190.3 |
| Other income and transfers, net | -103.1 | -104.6 | -123.9 | -136.4 | -128.2 | -130.2 | -151.4 | -150.2 | -150.2 | -150.2 |

# Abbreviations

| | |
|---|---|
| ABS | asset-backed securities |
| ADP | Automatic Data Processing, Inc. |
| AFE | advanced foreign economy |
| BFI | business fixed investment |
| BLS | Bureau of Labor Statistics |
| BOE | Bank of England |
| BOJ | Bank of Japan |
| CD | certificate of deposit |
| CDS | credit default swaps |
| CES | Current Employment Statistics |
| C&I | commercial and industrial |
| CIE | common inflation expectations |
| CMBS | commercial mortgage-backed securities |
| CP | commercial paper |
| CPH | compensation per hour |
| CPI | consumer price index |
| CRE | commercial real estate |
| DSGE | dynamic stochastic general equilibrium |
| ECI | employment cost index |
| E&I | equipment and intellectual property products |
| ELB | effective lower bound |
| EM | emerging market |
| 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 |
| GC | general collateral |
| GDP | gross domestic product |
| GM | General Motors |
| GNP | gross national product |
| GST | a calibrated New Keynesian DSGE model based on Gertler, Sala, and Trigari (2008) |
| IOER | interest on excess reserves |
| IP | industrial production |
| IPO | initial public offering |
| ISM | Institute for Supply Management |
| LFPR | labor force participation rate |
| LIBOR | London interbank offered rate |
| MCE | model-consistent expectations |
| OIS | overnight index swap |
| OPEC | Organization of the Petroleum Exporting Countries |
| PCE | personal consumption expenditures |
| PMI | purchasing managers index |
| PPI | producer price index |
| SEP | Summary of Economic Projections |
| SIGMA | A calibrated multicountry DSGE |
| SLOOS | Senior Loan Officer Opinion Survey on Bank Lending Practices |
| S&P | Standard & Poor’s |
| SPF | Survey of Professional Forecasters |

| | |
|---|---|
| SVAR | structural vector autoregressive |
| SW | DSGE model based on Smets and Wouters (2007) |
| TIPS | Treasury Inflation-Protected Securities |
| UAW | United Auto Workers |
| VAR | vector autoregression |
| VIX | one-month-ahead option-implied volatility on the S&P 500 index |

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