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

April 19, 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

Following a marked deterioration in the economic data leading up to the March Tealbook, we have been reassured by the tenor of the data received in recent weeks. Retail sales and payroll employment rebounded from earlier anemic readings, much as we had projected, and the risk that the economy is currently headed into a period of pronounced weakness seems to have diminished.

More generally, the incoming data on spending and production for the first quarter have been consistent with our expectation that GDP growth is slowing this year from its strong 3 percent pace in 2018. We currently project GDP to rise at a 2 percent pace in the first half of this year, 0.2 percentage point higher than the March Tealbook forecast. In contrast, consumer price data have been softer than expected in recent months, leaving our near-term forecast of core PCE inflation well below the March Tealbook projection. We estimate that the 12-month change in core PCE prices was 1.6 percent in March, 0.3 percentage point lower than our previous Tealbook projection, and we expect it to move up to only 1.8 percent by the end of the summer.

We made two important changes in this forecast that have notable effects on our medium-term outlook. First, we adjusted the policy rule that we use to mechanically set the path for the federal funds rate in the Tealbook. (See the box "A New Conditional Baseline Policy Rule" for details.) This change yields a much flatter projected path for the federal funds rate relative to the March Tealbook, which in turn lowers the projected paths of longer-term interest rates, boosts equity prices, and reduces the exchange value of the dollar. By themselves, these new financial assumptions would have raised the projected level of GDP by more than 1 percent at the end of 2021. However, some of this increase was offset in the projection by the effects of a downward revision to household wealth as published in the Financial Accounts of the United States and other modest adjustments to the assumptions underlying our forecast. All told, we project that GDP growth will be about ¼ percentage point faster in each year relative to the March Tealbook: 2.2 percent this year and next, before stepping down to 1.7 percent in 2021. The output gap ends the medium term a little more than ½ percentage point higher than in March, and, accordingly, the unemployment rate forecast is a little lower, bottoming out at 3.5 percent starting late next year.

A New Conditional Baseline Policy Rule

The assumed baseline path for the federal funds rate in the Tealbook has been, for some time, well above the median path for the federal funds rate in the Committee's Summary of Economic Projections (SEP)—even after adjusting for differences in the economic projections in the Tealbook and the SEP—and above the path anticipated by financial market participants. Although that baseline path had the advantage of being a transparent application of an established Taylor rule, it became increasingly improbable over the past year.

To address this tension and provide a federal funds rate path that we think will undergird a more informative and useful forecast for the FOMC, in this Tealbook we have adjusted the assumed policy rule used to mechanically prescribe a path for the federal funds rate. More specifically, for our baseline rule, we have downweighted the response of the federal funds rate to the unemployment rate, or output, gap. This downweighting is one way to capture that the Committee appears to be responding only modestly to the low unemployment rate relative to the reported longer-run normal level, perhaps because inflation shows little sign of persistently and materially exceeding the Committee's 2 percent inflation objective. This approach may reflect a number of rationales, including uncertainty about the unemployment rate consistent with achieving the Committee's inflation objective, uncertainty about the current level of inflation expectations, or risk-management considerations. We recognize that Committee participants may have different views on how the appropriate path for the federal funds rate should respond to changing economic conditions. But we think that the simple adjustment to our assumed baseline rule described here can encompass a wide variety of interpretations of the policy rate paths currently in the SEP.

Two additional points are important: First, we view this adjustment as specific to the current state of the economy, not as a policy rule that we would use in all economic conditions. Indeed, if current and projected conditions for inflation and economic activity were to change materially, then we would change our assumed baseline policy response.[1] Second, the adjustment to our baseline rule is not intended as a prescription of optimal monetary policy. This conditional baseline rule is merely a simple rule that we think roughly captures the recent views of Committee participants for appropriate policy.

The staff has been using an inertial version of the Taylor (1999) rule in the construction of the baseline projection in previous Tealbooks, where the nominal federal funds rate prescribed for quarter t is denoted by R_t:

$$R_t = 0.85R_{t-1} + 0.15[r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + \alpha \times ygap_t].$$

The federal funds rate is assumed to be determined by the longer-run equilibrium real interest rate (r^{LR}), the trailing four-quarter measure of core PCE price inflation (π_t), policymakers' longer-run

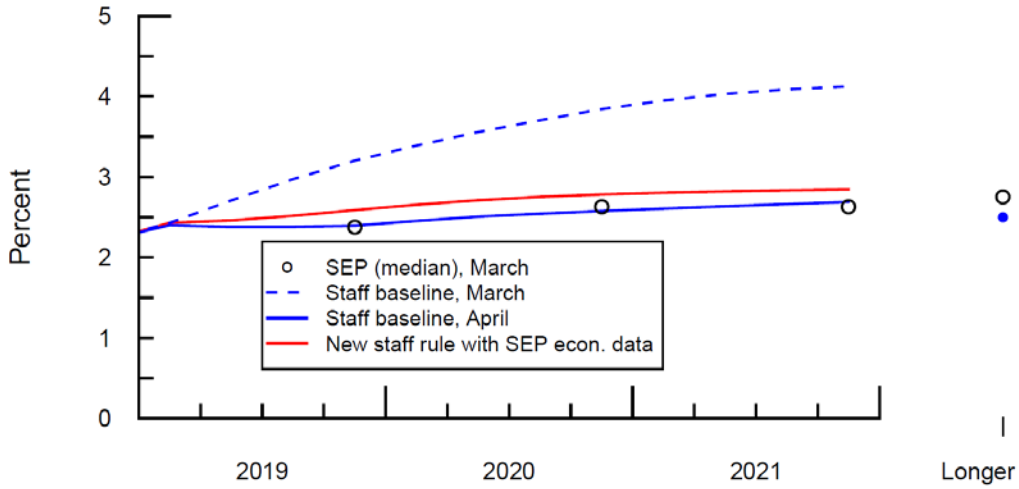
[1] For example, the alternative scenario that features a recession in the Risks and Uncertainty section of this Tealbook assumes a more aggressive monetary policy response than would be prescribed by either the current or the previous version of the baseline policy rule, in line with the FOMC's typical reaction in previous recessions.

inflation objective (π^{LR}), and the current-quarter estimate of the output gap ($ygap_t$). In this rule, policymakers' longer-run inflation objective is equal to the Committee's goal of 2 percent, the total weight on inflation is 1.5 (the sum of the coefficients on π_t in the two places it appears in the rule), and the coefficient on the output gap (α) has previously been assumed to be 1.0.[2]

In this Tealbook, we continue to use this basic framework for our baseline policy rule but have reduced the assumed value for α, the coefficient on the output gap, from 1.0 to 0.2.[3] As shown in the figure, this adjustment to our baseline rule—incorporating the median economic projections from the March SEP—yields an implied path for the federal funds rate (the red line) close to the median federal funds rate path in the SEP (the hollow dots).

With this adjustment to our assumed policy rule, the current baseline path for the federal funds rate (the solid blue line) is much lower than in the previous forecast (the dashed blue line), and it is quite close to the SEP path. The slight difference partly reflects that the assumed longer-run nominal federal funds rate of 2.5 percent in the Tealbook baseline (the blue dot) is a bit below the median in the March SEP of 2.8 percent (the hollow dot to the far right).

Federal Funds Rate Projections



Note: "New staff rule with SEP econ. data" is computed using the new staff rule and the SEP paths for inflation and the inferred output gap. The output gap is inferred from the unemployment rate projection of the SEP using Okun's law. It is assumed that the natural rate of unemployment corresponds to the longer-run normal unemployment rate projection of the SEP, and that the neutral rate of interest corresponds to the longer-run funds rate projection of the SEP.

[2] Alternatively, the output gap can be replaced in the policy rule by the unemployment gap ($ugap_t$), which is defined here as the difference between an estimate of the natural rate of unemployment (u^*_t) and the unemployment rate (u_t):

$$R_t = 0.85R_{t-1} + 0.15[r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + \alpha \times ugap_t].$$

In this case, the coefficient α on the $ugap_t$ would be 2.0—using a typical Okun's law relationship—rather than 1.0 when the rule is described in terms of the $ygap_t$.

[3] With this change, if the rule was described in terms of the $ugap_t$, then the corresponding coefficient α would be 0.4.

Comparing the Staff Projection with Other Forecasts

The staff's projection for GDP growth is close to the projections from both the Survey of Professional Forecasters (SPF) and the Blue Chip consensus in 2019, but it is ½ percentage point higher than the Blue Chip in 2020. Correspondingly, the staff's unemployment rate forecast is similar to the SPF and Blue Chip in 2019 but is 0.3 percentage point below the Blue Chip in 2020.

With regard to inflation, the staff's forecast of CPI inflation in 2019 is a bit higher than outside forecasters. The staff and Blue Chip both project CPI inflation of 2.1 percent in 2020; the projection from the SPF is a touch higher. The staff's projections of both total and core PCE inflation are 0.1 to 0.2 percentage point lower than the SPF in both years.

Comparison of Tealbook and Outside Forecasts

	2019	2020
GDP (Q4/Q4 percent change)		
April Tealbook	2.2	2.2
Blue Chip (04/10/19)	2.1	1.7
SPF median (3/22/19)	2.1	n.a.
Unemployment rate (Q4 level)		
April Tealbook	3.6	3.5
Blue Chip (04/10/19)	3.6	3.8
SPF median (3/22/19)	3.7	n.a.
CPI inflation (Q4/Q4 percent change)		
April Tealbook	2.2	2.1
Blue Chip (04/10/19)	2.1	2.1
SPF median (3/22/19)	2.0	2.2
PCE price inflation (Q4/Q4 percent change)		
April Tealbook	1.8	1.8
SPF median (3/22/19)	1.9	2.0
Core PCE price inflation (Q4/Q4 percent change)		
April Tealbook	1.8	1.9
SPF median (3/22/19)	2.0	2.1

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.

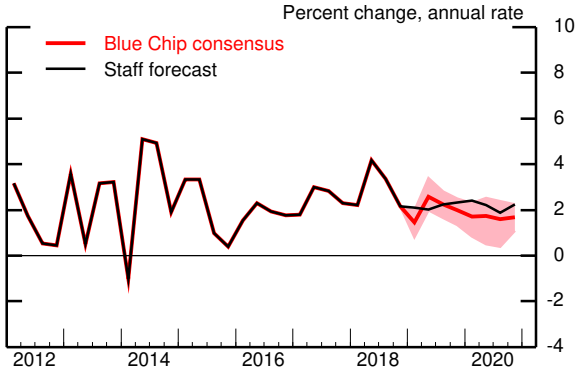
n.a. Not available.

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

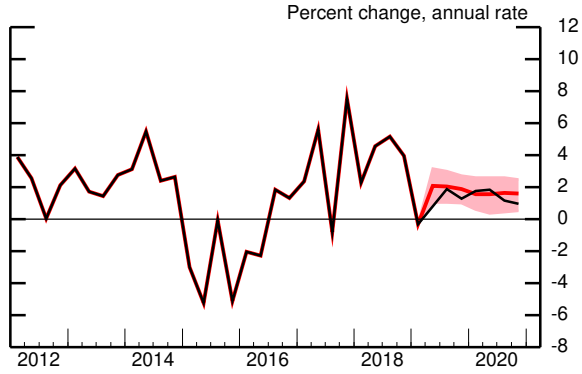
Tealbook Forecast Compared with Blue Chip

(Blue Chip survey released April 10, 2019)

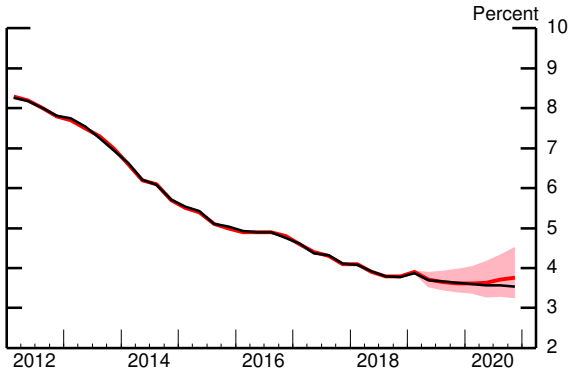
Real GDP



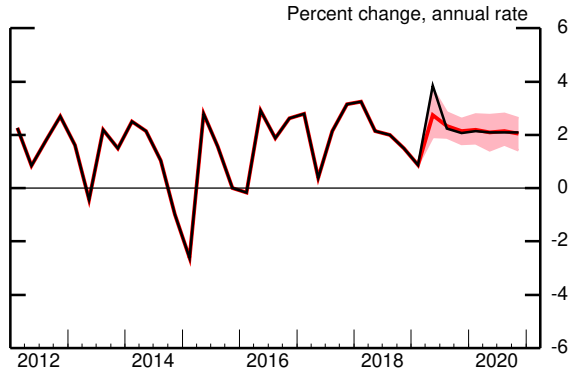
Industrial Production



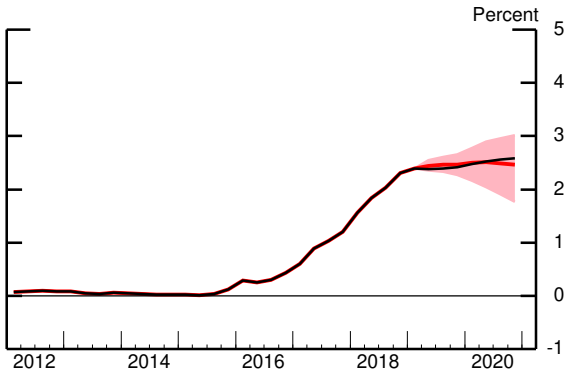
Unemployment Rate



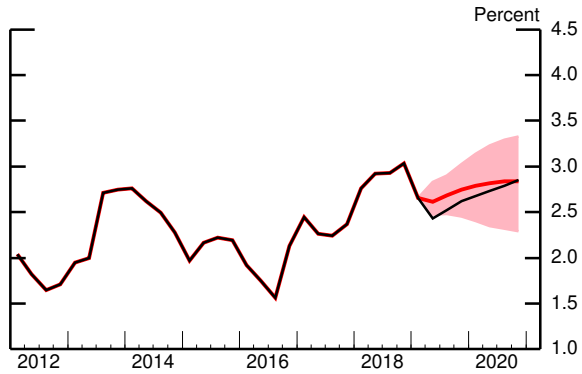
Consumer Price Index



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.

Second, we have reassessed our assumption about the path for underlying inflation—the rate to which inflation eventually returns in the absence of slack or supply shocks. We now assume that underlying inflation will remain at 1.8 percent through 2021, which contrasts with our previous Tealbook assumption that it would inch higher over each of the next three years. Reflecting this change, core PCE price inflation edges up from 1.8 percent this year to only 1.9 percent in 2020 and 2021, compared with 2 percent each year in the March Tealbook. While the tighter resource utilization in this projection provides a small boost to inflation, this impetus is more than offset by our reassessment of underlying inflation. We expect total PCE price inflation to run slightly below core inflation over the next few years, as oil prices are forecast to decline over the medium term.

KEY BACKGROUND FACTORS

Since the March Tealbook, 10-year Treasury yields, mortgage rates, and triple-B corporate bond yields declined slightly, and equity prices increased a touch. More important, the new baseline policy rule implemented in this Tealbook calls for a much lower projected path for the federal funds rate. As a result, financial conditions are significantly more supportive of economic activity throughout the projection.

Monetary Policy

- The new baseline policy rule calls for only a 25 basis point increase in the federal funds rate by the end of 2021, leaving the federal funds rate at the end of the medium term 140 basis points lower than in the March Tealbook.

- We assume that the size of the SOMA portfolio continues a gradual and predictable decline until the end of the third quarter of this year, at which point reserve balances are about $1.3 trillion. Thereafter, reserve balances decline for some time to offset persistent gradual increases in nonreserve liabilities, and the size of the SOMA portfolio remains roughly constant. After reserve balances have declined to $1 trillion, which we expect will occur during the second half of 2021, the SOMA portfolio begins to grow again, roughly in line with nominal GDP. These projections continue to be consistent with the SOMA portfolio exerting less downward pressure over time on the term premium.

Other Interest Rates

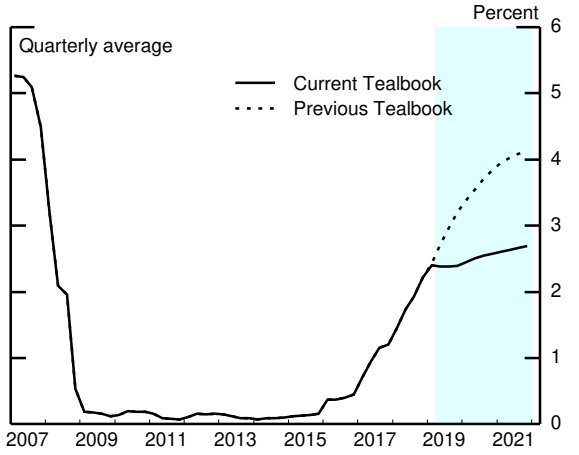
- The 10-year Treasury yield is projected to rise modestly from an average of 2.6 percent this quarter to 3.2 percent by the end of 2021. Most of the projected increase reflects our assumption that the term premium will rise over the forecast horizon. The path for the 10-year Treasury yield is, on average, 50 basis points lower relative to the March Tealbook, mainly because of the lower path of expected future short-term interest rates implied by the new policy rule.
    - In contrast to previous projections, the federal funds rate remains below the 10-year Treasury yield throughout the medium term.
- The projected triple-B corporate bond yield is revised down a bit more than the 10-year Treasury yield over the next two quarters, as corporate bond spreads have narrowed since the March Tealbook. Thereafter, the revision to the triple-B bond yield is in line with the revision to the Treasury yield.
- The 30-year fixed mortgage rate is revised down in line with the revision to the 10-year Treasury yield throughout the projection.

Equity Prices and Home Prices

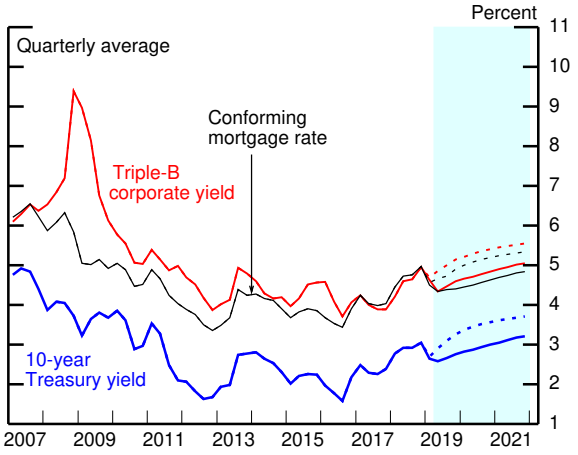
- We project stock prices to be 3.7 percent higher by the end of 2021 than in the March Tealbook, primarily reflecting the lower projected path for the 10-year Treasury yield. Overall, stock prices are projected to increase 1¼ percent per year after the current quarter, compared with 1 percent per year in the March Tealbook.
    - In this projection, we expect the equity risk premium to hold steady over the medium term at its current level, rather than to decline further (as we had expected in March). This revision reduces the significant equity valuation pressures implied by our previous projections. If we had maintained the March contour of the equity premium, the equity price path and the overall economic projection would have been revised somewhat higher than the current projection.
- House prices are expected to increase about 3 percent per year over the next three years, a bit slower than last year's pace of 4¼ percent. This projection is

Key Background Factors underlying the Baseline Staff Projection

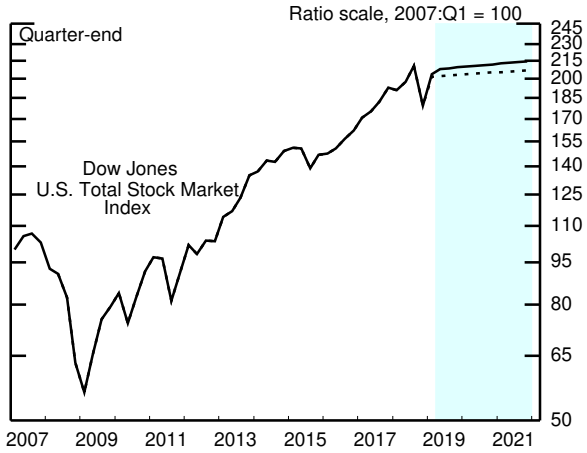
Federal Funds Rate



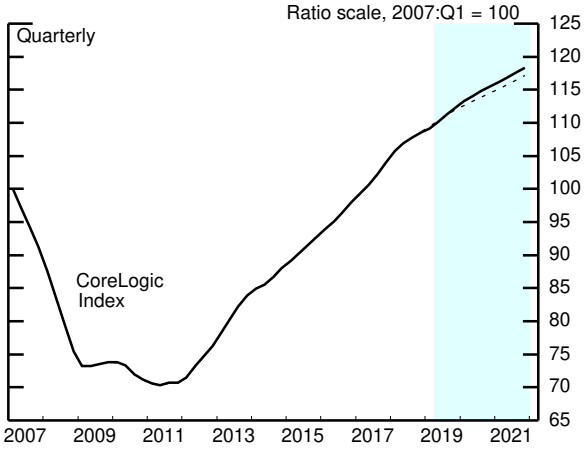
Long-Term Interest Rates



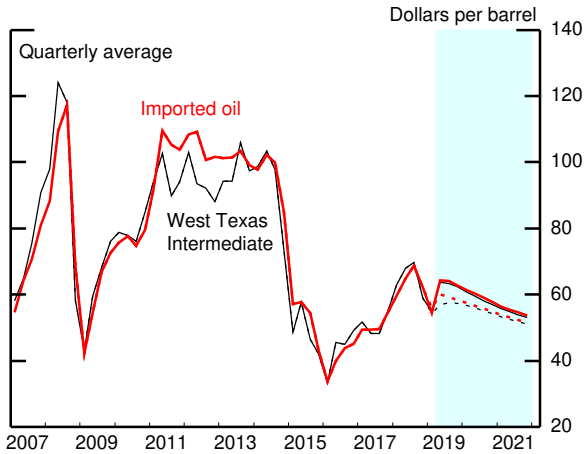
Equity Prices



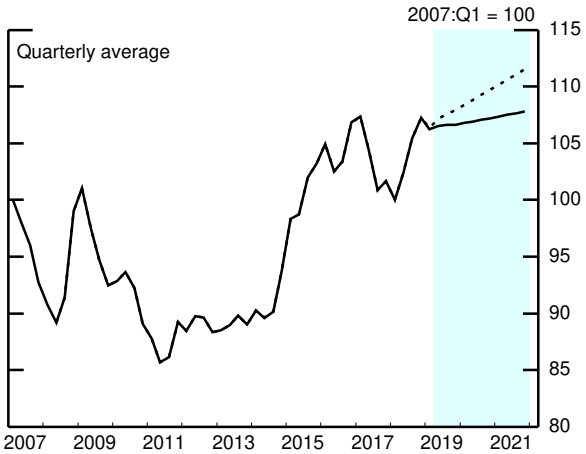
House Prices



Crude Oil Prices



Broad Real Dollar



stronger than in the March Tealbook, largely reflecting the effects of lower projected mortgage rates.

Fiscal Policy

- We assume that the expansionary fiscal policies enacted in 2017 and 2018 will continue through the medium term. In particular, we assume that the current level of discretionary federal spending will be maintained in real terms in fiscal years 2020 and 2021. Realization of this assumption will require fiscal policymakers to lift the discretionary spending caps for those years, consistent with their actions in recent years.[1]

- Under these policy assumptions, the direct fiscal impetus from all levels of government contributes 0.6 percentage point to the growth rate in aggregate demand this year before tapering to 0.5 percentage point in 2020 and 0.2 percentage point in 2021.

- We expect the federal budget deficit, which was 4 percent of GDP in fiscal 2018, to widen to 4¼ percent this fiscal year. Reflecting the downward revision to projected interest rates, which lowers federal debt service costs, the budget deficit is expected to remain flat at 4¼ percent through the medium term, as opposed to rising to 4¾ percent in fiscal 2021 as in our previous forecast.

Trade Policy

- Although trade talks between the United States and China have reportedly been productive, we continue to assume tariff rates on Chinese imports will remain at current levels through the medium term. Given the substantial issues that remain unresolved in the U.S.–China negotiations, the uncertainty related to possible auto tariffs, and the still uncertain prospects for congressional ratification of the USMCA trade pact, trade policy

[1] The federal government entered a debt issuance suspension period on March 4, during which the government will use extraordinary measures to issue additional debt to the public. The anticipated breach date, when the federal government will no longer be able to meet its financial obligations, is expected to occur between late August and the end of November. We anticipate that policymakers will raise the statutory federal debt limit before this breach date.

developments will likely remain a focus of market attention and continue to pose a risk to the economic outlook.

Foreign Economic Activity and the Dollar

- Foreign economic growth is projected to be 2.2 percent in the first half of 2019, below our estimate of foreign potential growth. Because incoming data have been somewhat stronger than expected, on net, we have revised up growth by 0.2 percentage point in the first half of 2019. Supported by accommodative monetary policies, economic growth abroad is expected to step up in the second half of 2019 and settle at a near-potential pace of 2.5 percent by early next year.

- Since the March Tealbook, the broad nominal dollar has changed little. In response to the revised staff outlook for the federal funds rate, the broad real dollar appreciates only 0.6 percent per year, on average, over the medium term, compared with 1.7 percent in the previous forecast. It ends the forecast horizon 3.6 percent lower than in the March Tealbook.

Oil Prices

- The spot price of Brent crude oil is up about $6 per barrel from the March Tealbook, at $72 per barrel. Farther-dated futures prices are also up, but by less than spot prices, resulting in a downward-sloping futures curve. Prices have been boosted by OPEC production cuts by Saudi Arabia and others, along with concerns about potential supply disruptions in Libya.

THE OUTLOOK FOR REAL GDP

Although fourth-quarter GDP growth was revised down nearly ½ percentage point at an annual rate, we think that GDP growth in the first half of this year will be somewhat stronger than we had expected, leaving the level of GDP in the second quarter similar to its level from our March projection. Our forecast for first-quarter GDP growth, 2.1 percent, is about 1 percentage point higher than the March Tealbook projection, reflecting better-than-expected data on net exports, housing, and state and local construction. However, we anticipate that some of these positive surprises will be transitory, which led us to mark down our forecast for second-quarter GDP growth to

2 percent.[2] Turning to the second half of the year, we project that GDP will rise at an annual rate of 2.3 percent, 0.4 percentage point faster than the March Tealbook projection, reflecting the effects of the lower assumed interest rate path. In all, we expect GDP growth to slow from 3 percent last year to 2.2 percent this year.

- We estimate PCE rose just 1.1 percent in the first quarter. However, given the strong readings for retail sales and motor vehicle purchases in March and our expectations for continued solid gains in employment and income, we think that PCE growth will bounce back this quarter and continue at about a 2.7 percent pace through the end of the year.

- Business fixed investment is forecast to slow from its elevated pace of about 7 percent last year to an annual rate of 1½ percent in the first half of this year. Recent readings on capital goods orders and shipments have been weak, and the suspension of deliveries of the Boeing 737 MAX will weigh on aircraft purchases this quarter.[3] Meanwhile, surveys of business are positive, although softer than last year. As for structures, we expect weakness in drilling and mining investment to weigh on spending this year.

- We project that residential investment will decrease modestly in the first half of 2019. The levels of housing starts and existing home sales spiked higher in recent months, leading us to mark up our assessment of residential investment in the first quarter from a sharp decline to about flat. However, single-family permits and pending home sales have remained roughly unchanged, suggesting these upticks will be temporary. In contrast, we believe that mortgage rates, which are about 80 basis points below their recent peak in October 2018 and are expected to remain low, will support a pickup in residential investment in the second half of the year.

[2] We estimate that the partial government shutdown lowered GDP growth 0.3 percentage point in the first quarter of this year. A return of federal government purchases to baseline boosts growth an estimated 0.4 percentage point this quarter.

[3] Specifically, we assume that deliveries of the 737 MAX will be suspended from April through July before resuming in August at an accelerated pace so as to deliver the stockpiled planes by the end of December. Boeing also announced it will temporarily reduce the production rate for 737 models from 53 aircraft per month to 42. This reduction in production will show through to GDP after accounting for offsetting revisions to E&I spending, net exports, and inventory investment. Limited space to park accumulating inventories of finished aircraft represents a downside risk to the company's stated production plans.

Domestic Econ Devel & Outlook

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

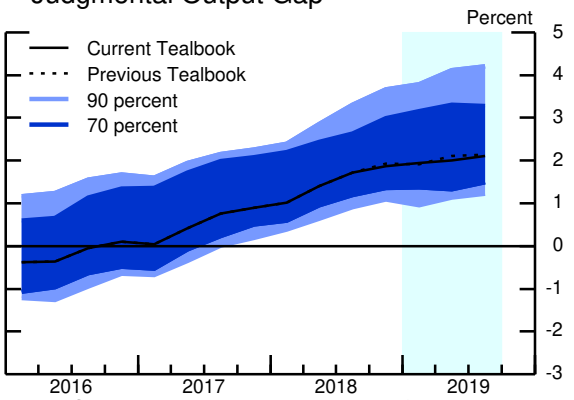
(Percent change at annual rate from final quarter of preceding period except as noted)

Measure	2017	2018	2019	2018 Q4	2019 Q1	2019 Q2
Output gap[1]	**.9**	**1.9**	**2.2**	**1.9**	**1.9**	**2.0**
Previous Tealbook	.9	1.9	2.1	1.9	1.9	2.1
Real GDP	2.5	3.0	2.2	2.2	2.1	2.0
Previous Tealbook	2.5	3.1	1.8	2.6	1.0	2.6
Measurement error in GDP	.0	.2	.0	-.2	.0	.0
Previous Tealbook	.0	.3	-.2	.0	-.8	.0
Potential output	1.7	1.8	1.8	1.8	1.8	1.8
Previous Tealbook	1.7	1.8	1.8	1.8	1.8	1.8

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

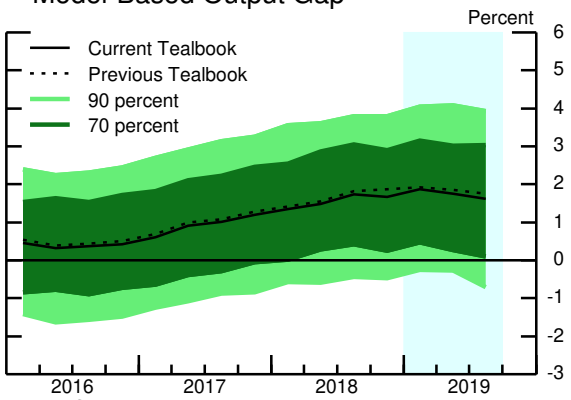
1. Percent, average for the final quarter in the period.

Judgmental Output Gap



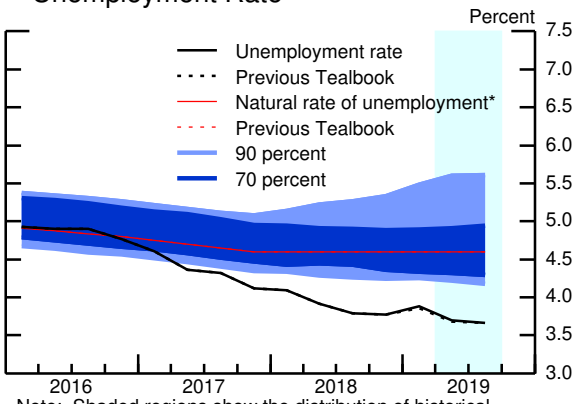
Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Model-Based Output Gap



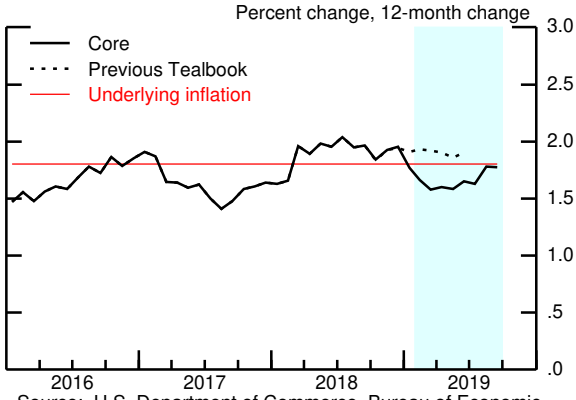
Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



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

Core PCE Price Inflation



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

- The contribution of net exports to GDP growth has been revised up considerably in the first quarter, reflecting weak incoming data on imports. We think the suspension of exports of Boeing 737 MAX airliners will leave a notable imprint on the trade data in the second quarter, although we expect these exports to be made up later in the year. In total, net exports are roughly neutral for GDP growth in the projection for the first half of this year.

- After increasing at a solid pace in the second half of last year, manufacturing production fell at an annual rate of 1.1 percent in the first quarter, owing in part to a decline in motor vehicle production. In the second quarter, factory output will be held down by the lower production at Boeing. More broadly, new orders diffusion indexes in the national and regional surveys of manufacturers have come down from late last year and point to modest increases in manufacturing output in coming months.

We expect GDP growth to slow over the medium term, reflecting the lagged effects of past removal of monetary accommodation and the waning fiscal stimulus further out. After rising 3 percent last year, GDP is projected to expand 2.2 percent in 2019 and 2020 before stepping down to a 1.7 percent pace in 2021.

- By themselves, the more favorable projected paths of interest rates, equity prices, and the dollar associated with the new monetary policy rule would have increased the level of GDP by more than 1 percent at the end of 2021. However, the effects of the downward revision to measured household wealth, as well as a modest rethink of certain aspects of our forecast, especially the evolution of the equity premium, offset some of that boost.[4] All told, GDP growth has been marked up by about ¼ percentage point per year on average.

- GDP growth is a little above that of potential in 2019 and 2020, and the output gap widens further. At the end of 2020, the output gap peaks at 2.6 percent before narrowing somewhat in 2021. The output gap in this projection is a

[4] The level of household wealth reported in the 2018:Q4 release of the Financial Accounts of the United States was $1.5 trillion lower in the fourth quarter of last year than had been projected in the March Tealbook. This downward revision was due to two factors: (1) a change in methodology used in the Financial Accounts to value debt securities held by households and (2) weaker-than-expected household wealth data that were mostly driven by a downwardly revised commercial real estate price index in 2018.

Domestic Econ Devel & Outlook

Summary of the Near-Term Outlook for GDP

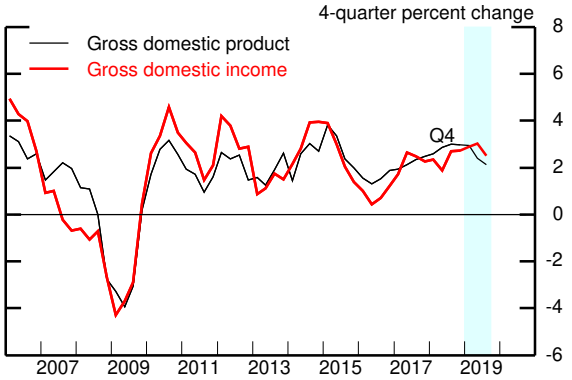
(Percent change at annual rate except as noted)

Measure	2018:Q4		2019:Q1		2019:Q2	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP	**2.6**	**2.2**	**1.0**	**2.1**	**2.6**	**2.0**
Private domestic final purchases	2.9	2.6	1.0	1.0	2.7	2.3
Personal consumption expenditures	2.8	2.5	1.0	1.1	2.8	2.6
Residential investment	-4.9	-4.7	-8.6	-.3	1.3	-2.6
Nonres. private fixed investment	5.5	5.4	3.4	.6	2.1	2.2
Government purchases	.0	-.4	.7	2.6	4.0	2.9
Contributions to change in real GDP						
Inventory investment[1]	.4	.1	.2	.2	-.1	.3
Net exports[1]	-.2	-.1	-.1	.6	-.3	-.7

1. Percentage points.

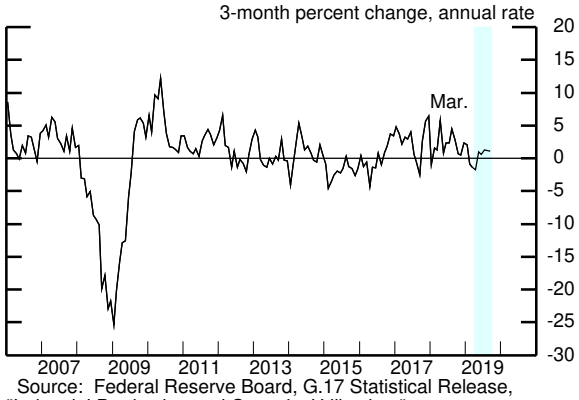
Recent Nonfinancial Developments (1)

Real GDP and GDI



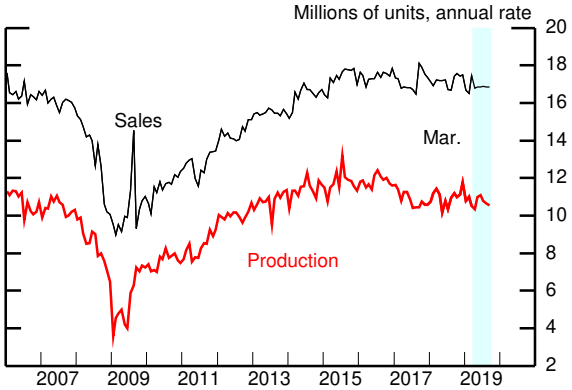
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



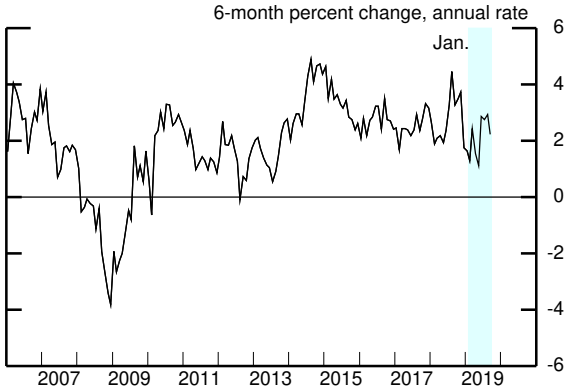
Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles



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

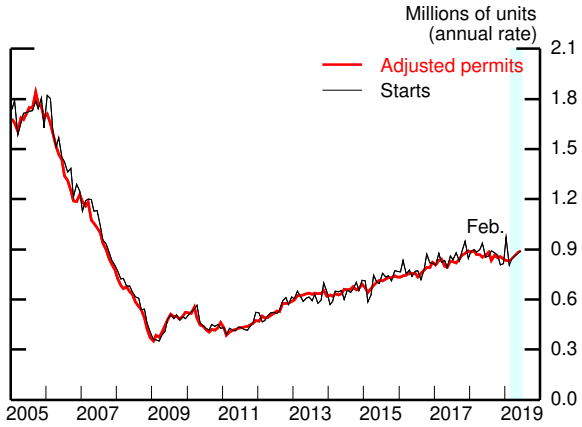
Real PCE Growth



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

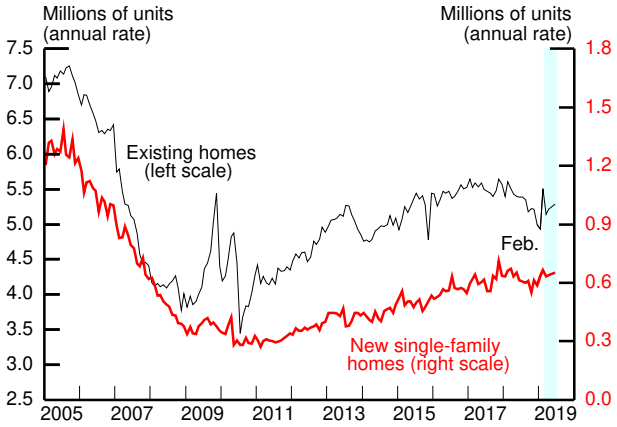
Recent Nonfinancial Developments (2)

Single-Family Housing Starts and Permits



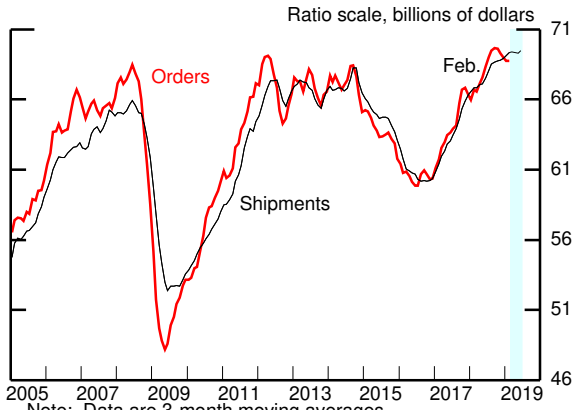
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

Home Sales



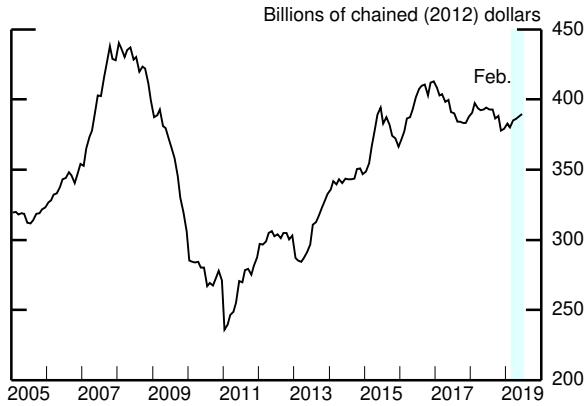
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

Nondefense Capital Goods ex. Aircraft



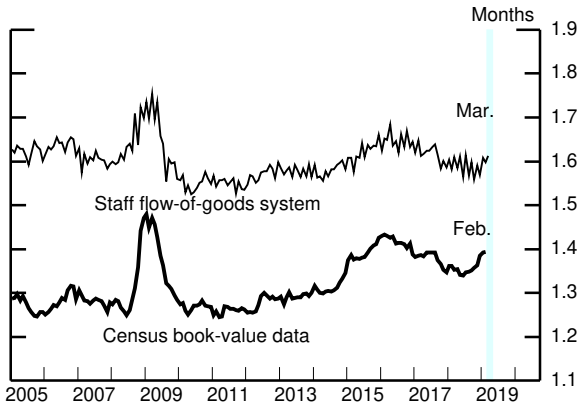
Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

Nonresidential Construction Put in Place



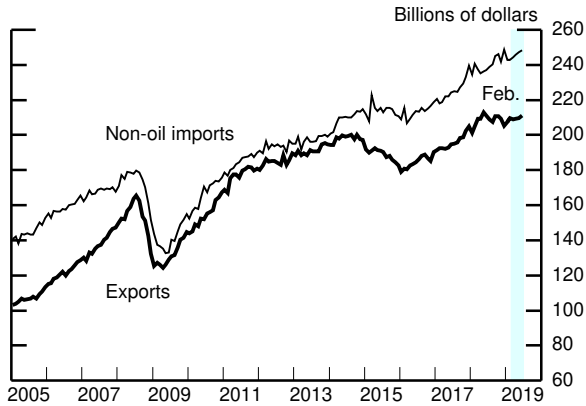
Note: Nominal CPIP deflated by BEA prices through 2018:Q4 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

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:Q1 Real GDP Growth
(Percent change at annual rate from previous quarter)

Federal Reserve Entity	Type of model	Nowcast as of April 17, 2019
Federal Reserve Bank		
Boston	• Mixed-frequency BVAR	2.4
New York	• Factor-augmented autoregressive model combination	3.0
	• Factor-augmented autoregressive model combination, financial factors only	2.4
	• Dynamic factor model	1.3
Cleveland	• Bayesian regressions with stochastic volatility	2.0
	• Tracking model	1.9
Atlanta	• Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow)	2.4
Chicago	• Dynamic factor models	2.7
	• Bayesian VARs	2.1
St. Louis	• Dynamic factor models	1.7
	• News index model	1.9
	• Let-the-data-decide regressions	1.7
Kansas City	• Accounting-based tracking estimate	2.5
Board of Governors	• Tealbook estimate (judgmental)	2.1
	• Monthly dynamic factor models (DFM-45)	2.3
	• Mixed-frequency dynamic factor model (DFM-BM)	1.5
Memo: Median of Federal Reserve System nowcasts		2.1

little more than ½ percentage point larger at the end of the medium term relative to the March Tealbook.

- The box "Tealbook Forecast Errors: An Update through 2018" reviews recent forecast errors for GDP, unemployment, and inflation. A related box in the Risks and Uncertainty section reviews the recent performance of the FRB/US and EDO model forecasts.

THE OUTLOOK FOR THE LABOR MARKET

The labor market continued to improve in the first quarter, though less rapidly than in 2018.

- After nearly stalling in February, total payrolls rose by 196,000 in March. For the first quarter as a whole, total payrolls expanded by 180,000 per month, and we anticipate gains of a similar magnitude in the second quarter. While this pace of job gains is below the average monthly increase of 223,000 in 2018, it is well above the 90,000–120,000 monthly pace that we judge to be consistent with no change in labor utilization.
    - The measure of private-sector employment gains we construct from data provided by the payroll-processing firm ADP suggests employment gains in March similar to those reported by the BLS.
- After moving a bit lower last year, the unemployment rate has held fairly steady so far this year and stood at 3.8 percent in March. We expect the unemployment rate will edge down to 3.7 percent in the second quarter.
- The LFPR ticked down to 63.0 percent in March, still a little above the level of about 62.8 percent that had prevailed for several years despite the downward pull from an aging population. We expect the participation rate to remain flat for the remainder of the year.
- The box "How Have Lower-Educated Workers Fared in the Current Expansion?" compares labor market outcomes over the current economic expansion for lower- and higher-educated workers.

Tealbook Forecast Errors: An Update through 2018

Real activity in 2018 was somewhat stronger than anticipated by Tealbook forecasts, although these forecast errors were generally on the same order of magnitude as in previous years.[1]

The figure on the next page reports forecast errors over the past four years of Tealbook forecasts for real GDP growth, the unemployment rate, and total and core PCE price inflation. The gray bars show the currently published Q4/Q4 percent changes of each economic variable from 2015 to 2018 (or the Q4 level, in the case of the unemployment rate), the green triangles show the forecast from the April Tealbook in the contemporaneous year, and the blue squares indicate the staff forecasts made in the April Tealbook one year before. The whisker bands demarcate 70 percent forecast error bands, so that unusually large forecast errors are represented by cases where the top edge of a gray bar falls outside of the whisker bands. The red dots show the BEA and BLS estimates of the four economic variables from mid-April of the subsequent year, along with 70 percent bands computed from past revisions of those estimates.[2]

Real GDP growth in 2018 is currently estimated to be 3.0 percent, higher than the April 2017 and April 2018 Tealbook forecasts of 2.2 percent and 2.6 percent, respectively. These forecast errors, however, are well within the 70 percent whisker bands. The too-low forecast in the April 2018 Tealbook was largely the result of taking too much signal from weak PCE data early in the year that turned out to be more transitory than anticipated. The forecast error from the April 2017 Tealbook was spread across inventory investment, net exports, and government purchases; the miss in the government sector reflects the unanticipated boost from the Bipartisan Budget Act of 2018. In contrast, our forecast of private domestic final purchases was accurate.

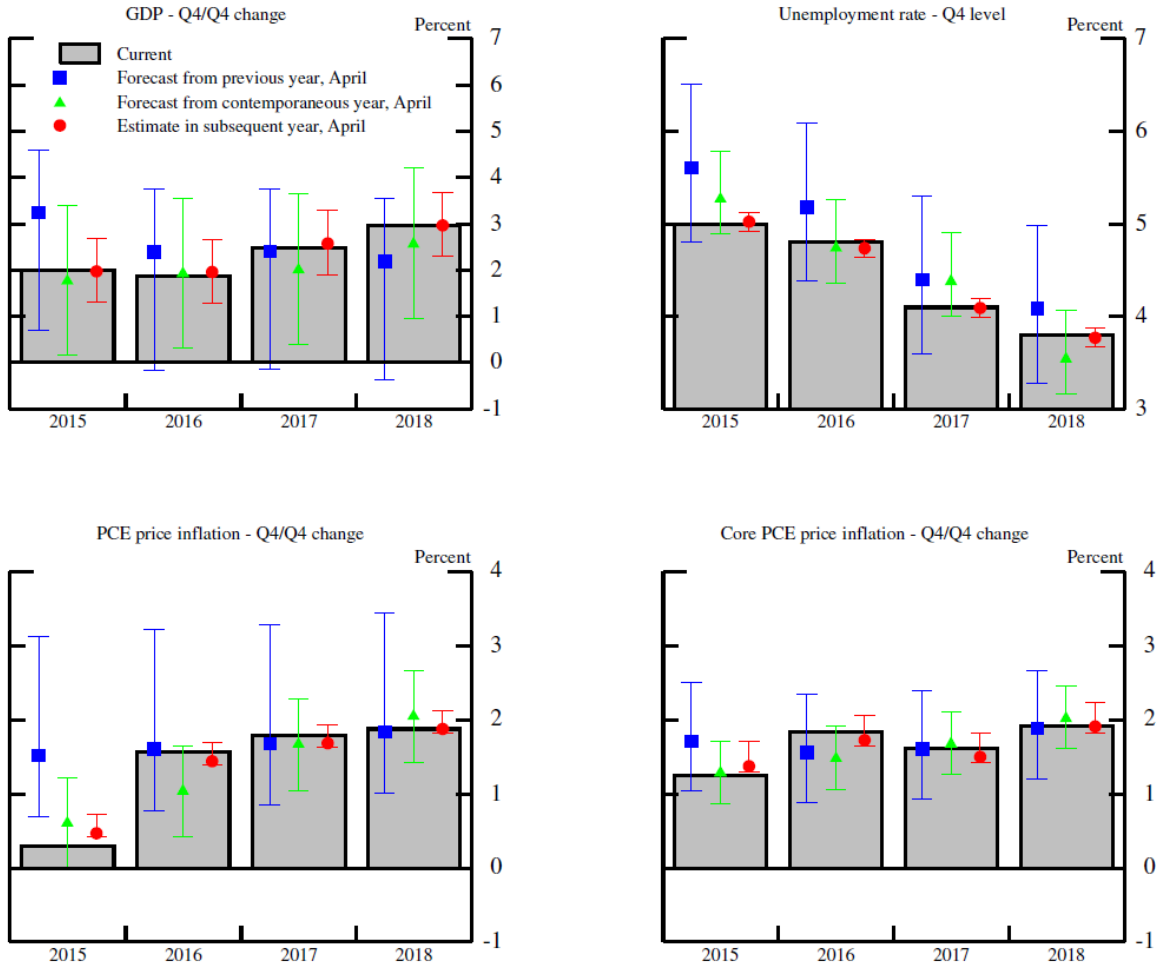
Despite the unexpected strength of real GDP growth last year, the unemployment rate ended the year at a higher level than the staff had forecast last April, as shown in the top-right panel. However, the labor force participation rate also ended the year higher than expected last April, leaving the employment-to-population ratio about in line with expectations (not shown). Although real GDP growth in 2018 was higher than expected, we now think that the economy was less tight at the end of 2018 than we projected a year ago, as we raised our estimate of potential output.

As for inflation, shown in the bottom-right panel, the Q4/Q4 percent change in core PCE prices in 2018 was in line with the staff's expectations in April 2017 and April 2018. The small contemporaneous-year error in forecasting total PCE price inflation (the green triangle in the lower-left panel) is entirely explained by lower-than-expected PCE energy prices.

[1] The box "FRB/US and EDO Forecast Errors" in the Risks and Uncertainty section compares the forecast errors in the judgmental Tealbook projection with the errors for the FRB/US and EDO models.

[2] The red dot and gray bar are the same, by definition, for 2018.

Tealbook Forecasts, 2015 to 2018



Source: Staff forecast; Bureau of Economic Analysis; and Bureau of Labor Statistics.

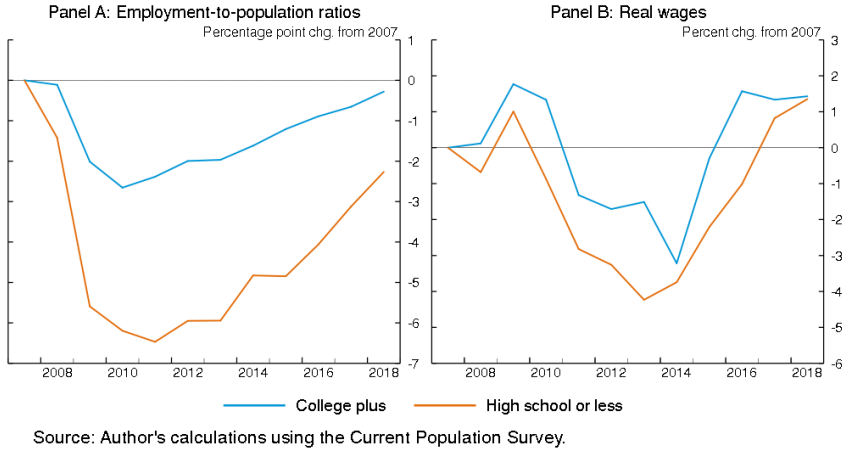
How Have Lower-Educated Workers Fared in the Current Expansion?

Labor market outcomes in the current economic expansion have been quite different for lower- and higher-educated individuals. The employment-to-population ratio (EPOP) for higher-educated workers—namely, college graduates, aged 25 through 54 (prime age)—declined about 2.5 percentage points during the recession but began a steady and sustained recovery in 2010 and was nearly at its pre-recession level by 2018 (see panel A of figure 1). In contrast, the EPOP for lower-educated prime-age individuals—namely, those with a high school degree or less—fell much more sharply during the recession and lingered near its trough for several years before beginning to recover in earnest in 2014. As of 2018, the EPOP of lower-educated workers remained well below its pre-recession level.

At the same time, real hourly wages for lower-educated workers fell more over the 2007–13 period than real wages for college graduates (see panel B of figure 1). Real wages subsequently picked up for both groups, and wages are now above their pre-recession levels for both groups. However, cumulative real wage gains for lower-educated workers have only recently caught up, in percentage terms, to those with college degrees.

The relative underperformance of employment and wages for lower-educated workers has been a characteristic of all business cycles at least since 1978. However, this pattern is likely due, at least in part, to a long-term downward trend in the demand for lower-educated workers that is unrelated to the business cycle and caused, perhaps, by changes in technology and globalization. To isolate the effects of the business cycle and control for changes in the relative demand of lower-educated workers and other long-term trends, we take advantage of the variation from state-level business cycles since 1978 and estimate the "typical" cyclical decline and recovery of employment across education groups. Examining state-level recessions allows us to control for national- and state-level trends and leverages the different severities of business cycles across states to identify the typical patterns of labor market behavior across educational groups.

Figure 1: Prime-Age Employment and Wages by Education, 2007–18

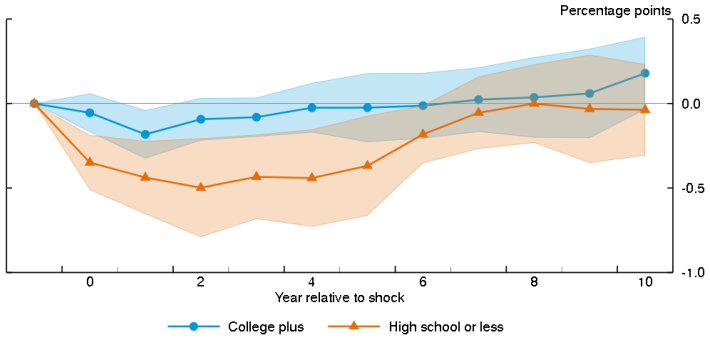


Source: Author's calculations using the Current Population Survey.

We find a starkly different evolution of employment over the business cycle for lower-educated workers compared to those with college degrees even after controlling for national and state trends. In response to a one-time, temporary 1 percent decline in state output growth that returns to normal in the next year, the EPOP declines immediately for both groups.[1] However, that decline is considerably steeper and longer lasting for those with high school degrees or less (see figure 2). Part of this difference is due to the deeper initial decline in lower-educated employment, but part is also due to a delayed start to the recovery for the lower-educated group. Once that group's EPOP begins a sustained recovery, though, it increases at a more rapid pace than the EPOP for those with a college degree. If we extrapolate those estimates to an 8.5 percent output shock, roughly equal to the change in the output gap from peak to trough in the previous recession, the predicted decline and recovery in EPOP would be similar to what was actually observed over the 2007–18 period, suggesting that the recent behavior of EPOPs by educational attainment has been similar to the typical business cycle after controlling for the size of the recessionary shock.

The difference in the magnitude of employment declines and timing of recovery across education groups may be due to employers changing their hiring standards over the business cycle. Evidence from research by Hershbein and Kahn (2018) and Modestino, Shoag, and Ballance (2016) shows that employers raise skill requirements for new hires when an adverse shock hits a local labor market and slowly lower skill requirements as the local labor market recovers.[2] Barnichon and Zylberberg (2019) show that, during recessions, increased competition for high-skilled jobs causes higher-skilled workers to take jobs that require fewer skills, making work more difficult to find for the less skilled.[3] This pattern could explain the differences in labor market outcomes for lower- and higher-educated workers since the previous recession.

Figure 2: Response of EPOP by Education to State-Level Recessions



Note: EPOP refers to the employment-to-population ratio. Shaded areas are 95% confidence bands.
Source: Cajner, Coglianese, and Montes (2019).

[1] We also estimate cumulative wage growth for lower-educated workers to be lower than for higher-educated workers following an adverse shock to output, but these estimates are quite imprecise, and the difference is not statistically significant.

[2] Brad Hershbein and Lisa B. Kahn (2018), "Do Recessions Accelerate Routine-Biased Technological Change? Evidence from Vacancy Postings," *American Economic Review*, vol. 108 (July), pp. 1737–72; Alicia Sasser Modestino, Daniel Shoag, and Joshua Ballance (2016), "Downskilling: Changes in Employer Skill Requirements over the Business Cycle," *Labour Economics*, vol. 41 (August), pp. 333–47.

[3] Regis Barnichon and Yanos Zylberberg (2019), "Underemployment and the Trickle-Down of Unemployment," *American Economic Journal: Macroeconomics*, vol. 11 (April), pp. 40–78.

Labor market conditions are expected to tighten further in 2019 and 2020, in line with our forecast of above-trend GDP growth in those years.

- We continue to assume that, in an extremely tight labor market, a larger-than-usual amount of the further tightening in labor utilization will be manifested as upward pressure on participation relative to its trend (as more workers are pulled into or remain in the labor force) rather than as a decline in the unemployment rate.
    - Consistent with this view, the stronger GDP projection in this Tealbook leads to only a small downward revision to the unemployment rate, which now reaches 3.5 percent the end of 2020—about 1 percentage point below our estimate of its natural rate—and then moves sideways. The participation rate is expected to remain near its current level of 63.0 percent through the end of 2020 before edging down in 2021, at which point we project that the participation rate will stand ½ percentage point above our estimate of its declining trend.
- Average monthly total payroll gains slow over the projection, from 173,000 per month this year to about 150,000 in 2020 and 100,000 in 2021.[5]
- We expect productivity growth to average a little more than 1 percent per year over the medium term, close to its average so far this expansion and a bit below our estimate of its structural trend.

THE OUTLOOK FOR INFLATION

Recent readings on price inflation have been noticeably lower than we had expected. With the March CPI and PPI in hand, we estimate that the 12-month change in core PCE prices was 1.6 percent last month, 0.3 percentage point lower than we projected in the March Tealbook and a notable slowdown from the 12-month change of 2 percent in December 2018. For 2019 as a whole, we now project core PCE prices to rise just 1.8 percent, down from 2 percent in our previous projection.

[5] The payroll forecast is boosted in the first part of 2020 by the government's hiring of temporary census workers.

- Core PCE prices in January, as well as both the February and March CPI readings, came in weaker than we had anticipated. Although inflation in a number of categories was a little softer than what we had been expecting, we can point to a few specific categories with unusual and notable declines in some months.[6] We have penciled in a bounceback in some of these categories, but the 12-month change in core PCE prices is expected to stay around 1.6 percent before moving up to 1.8 percent by the end of the summer.

- Import price inflation also appears to have softened early this year. We estimate that effective import prices—import prices inclusive of tariffs—rose 2.4 percent in 2018, but we expect them to rise only 0.9 percent this year, with no further boost from tariffs.

- We estimate that the 12-month change in total PCE prices was 1.5 percent in March, and we expect this measure will edge up to 1.7 percent by September. Earlier consumer energy price declines are restraining the 12-month change in total PCE inflation relative to core, though this restraint is offset a bit by moderately elevated food price increases.

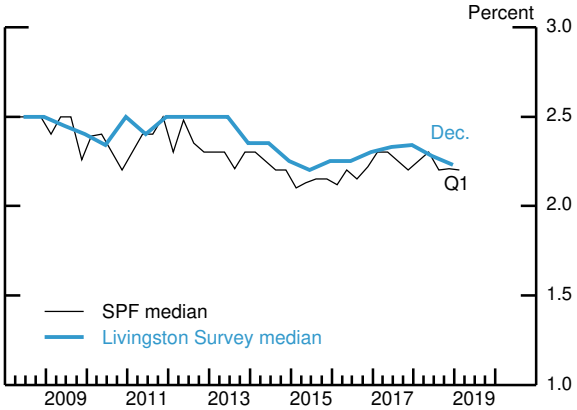
- Measures of longer-term inflation expectations are little changed, on balance, since the March Tealbook.

    - The median of long-term inflation expectations from the University of Michigan Surveys of Consumers moved back down to 2.3 percent in the preliminary reading for April (matching its historical low), while the median inflation expectation over the next 3 years from the Federal Reserve Bank of New York's Survey of Consumer Expectations ticked higher in March. The median expectation for PCE inflation over the next 10 years from the Survey of Professional Forecasters remained at 2 percent.

[6] For example, the downward surprise to core PCE prices in January largely reflected the nonmarket component of prices, especially the imputed prices of financial services. These prices appear to be partly related to changes in equity prices, the recent movements of which have led us to pencil in a rebound to nonmarket prices in February and March. Likewise, the downward surprise to the CPI in March was concentrated in apparel. This series is quite volatile, and a new BLS methodology may have led to difficulty with its seasonal adjustment.

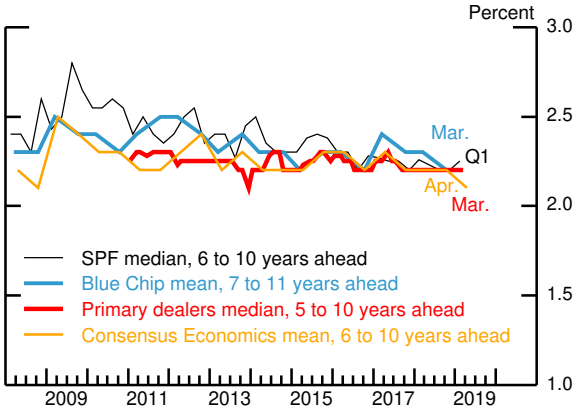
Survey Measures of Longer-Term Inflation Expectations

CPI Next 10 Years



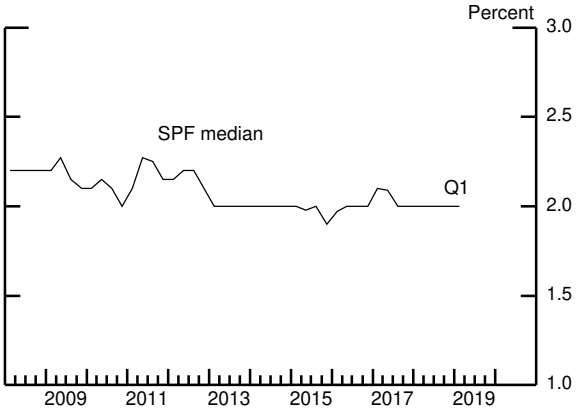
Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations



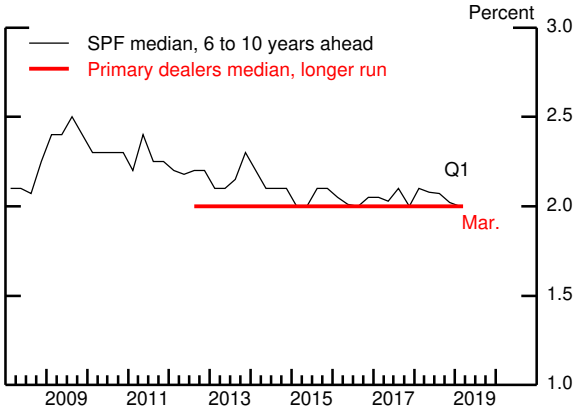
Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

PCE Next 10 Years



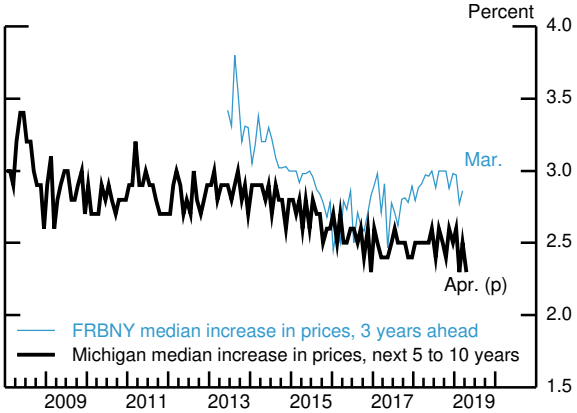
Source: Federal Reserve Bank of Philadelphia.

PCE Forward Expectations



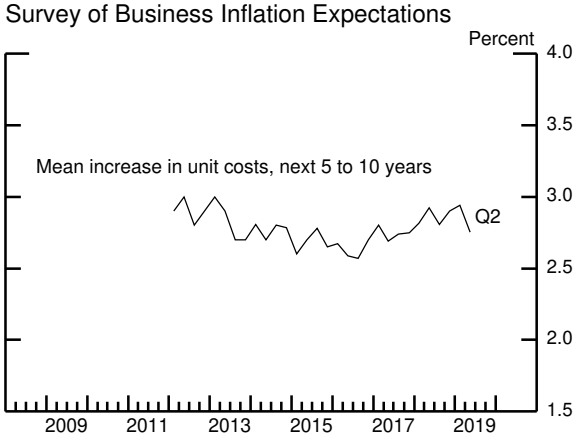
Note: Primary dealers data begin in August 2012.
Source: Federal Reserve Bank of Philadelphia; Federal Reserve Bank of New York.

Surveys of Consumers



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

- TIPS-based measures of longer-term inflation compensation are about unchanged since the March Tealbook.

Beyond this year, we expect core PCE inflation to edge up to 1.9 percent in 2020 and 2021, as this year's unusually low inflation readings are not repeated. We project that total PCE inflation will run a bit below core over the next few years, reflecting our forecast of declining consumer energy prices.

- Our projection of core PCE inflation in 2020 and 2021 is 0.1 percentage point lower relative to the March Tealbook, as tighter resource utilization and a weaker dollar path did not provide enough of a boost to offset our lower estimate of underlying inflation.
  - Previous Tealbook forecasts assumed that underlying inflation was 1.8 percent but would start rising this year, reaching nearly 2 percent at the end of 2021. However, neither market- nor survey-based inflation expectations seem to be moving up, and none of the models we use to inform our judgment about underlying inflation suggest any upward movement over the past year. Given that we appear to have been in a low and stable inflation environment for quite a while, we think that the public will need to see sustained above-trend inflation rates in order for expectations and wage- and price-setting behavior to change in a way that moves underlying inflation higher. As a result, we now assume underlying inflation does not drift up in the medium term, but instead remains at 1.8 percent through 2021.
- We continue to expect that import prices will be a slight drag on core PCE inflation. We anticipate that published core import prices will increase at a modest 1 percent pace over the medium term, consistent with moderate foreign inflation and a gradually appreciating dollar. Since the March Tealbook, import price inflation is revised higher by roughly 0.2 percentage point per year, reflecting our downward revision to the projected pace of dollar appreciation, slightly reducing the drag on core PCE inflation.

We have received little new information on hourly labor compensation since the March Tealbook.

- Average hourly earnings of employees on private nonfarm payrolls rose 3.2 percent over the 12 months ending in March, a touch lower than we had expected but up from 2.8 percent a year earlier.

- The Federal Reserve Bank of Atlanta's Wage Growth Tracker was 3.5 percent in March, a step-down from its readings at the turn of the year but modestly higher than its pace a year ago.

- Looking ahead, we project growth in compensation per hour (CPH) to step up from a pace of 2.9 percent in 2018 to 3.7 percent at the end of the medium term, a pace we think is more in line with our projections of tight labor market conditions, trend price inflation, and trend productivity growth. Growth in the employment cost index is about flat over the projection at 2¾ percent. (Increases in the ECI tend to run a little lower than those in CPH.) Both projections are little changed when compared with the March Tealbook, as upward wage pressure from tighter resource use is roughly offset by our lower assumed underlying inflation rate.

THE LONG-TERM OUTLOOK

- We continue to assume that the natural rate of unemployment will remain at 4.6 percent. We also continue to assume that potential output growth slows after 2021, as the boost to the growth of potential from the 2017 tax policy changes wanes, moving down to 1.7 percent per year in the longer run.

- We have maintained our assumption that the nominal equilibrium federal funds rate in the longer run will be 2.5 percent. The nominal yield on 10-year Treasury securities is 3.4 percent in the longer run.

    - We assume that, in the longer run, fiscal policymakers will eventually start to gradually reduce primary deficits by an amount sufficient to stabilize the debt-to-GDP ratio, although our assumption about when that adjustment will start has been pushed out a couple of years, reflecting the lower path of interest rates in this projection. We continue to expect this ratio to level off at around 105 percent,

20 percentage points higher than would have occurred in the absence of the 2017–18 federal tax and discretionary spending changes (including our assumption about the extension of that spending after the budget legislation expires this year). We assume that the 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 discussed earlier, we have held the underlying trend in inflation at 1.8 percent through 2021, and we now assume that the underlying trend in inflation in the longer run responds more slowly to actual inflation than previously judged. Consequently, underlying inflation edges up only very slowly, from 1.8 percent at the end of the medium term to its long-run value of 2 percent.

- GDP growth slows from 1.5 percent in 2022 to 1.3 percent in 2024, as long-term interest rates rise a little further and the contribution to growth from fiscal stimulus fades.

- With the incorporation of the new baseline policy rule, the labor market is tighter by the end of 2024 than in the previous projection. The unemployment rate is 4 percent, roughly ½ percentage point below its natural rate. As a result, core PCE price inflation moves up from 1.9 percent in 2021 to 2.0 percent at the end of 2024 despite the downward pressures stemming from lower assumed underlying inflation.

- Given this outlook for inflation and resource utilization, the nominal federal funds rate remains close to 2.8 percent from the end of the medium term to the end of 2024, and it returns slowly to its long-run value of 2.5 percent thereafter.

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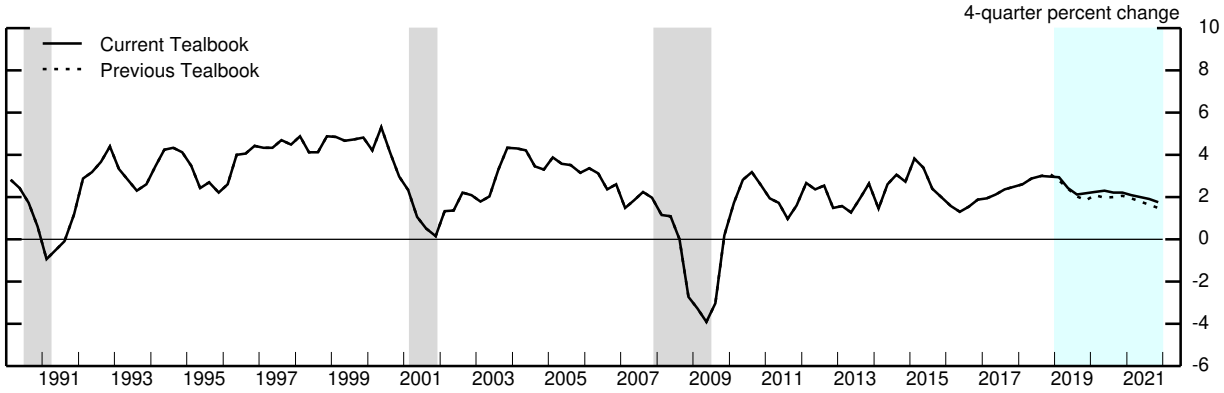
Projections of Real GDP and Related Components

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

Measure	2018	2018 H2	2019 H1	2019	2020	2021
Real GDP	**3.0**	**2.8**	**2.0**	**2.2**	**2.2**	**1.7**
Previous Tealbook	3.1	3.0	1.8	1.8	2.0	1.5
Final sales	2.6	1.5	1.8	2.4	2.2	1.8
Previous Tealbook	2.6	1.6	1.7	2.1	1.9	1.5
Personal consumption expenditures	2.6	3.0	1.8	2.3	2.5	2.2
Previous Tealbook	2.7	3.2	1.9	2.3	2.2	2.0
Residential investment	-3.3	-4.1	-1.5	2.5	2.6	-2.7
Previous Tealbook	-3.3	-4.2	-3.8	-.1	.1	-2.8
Nonresidential structures	4.9	-3.7	2.0	1.8	-.7	-1.5
Previous Tealbook	5.3	-2.9	2.2	2.0	-1.0	-2.3
Equipment and intangibles	7.6	6.3	1.2	3.0	2.8	2.4
Previous Tealbook	7.5	6.1	2.9	2.7	2.5	1.8
Federal purchases	2.7	2.3	4.7	3.6	2.6	1.0
Previous Tealbook	2.8	2.5	4.3	3.5	2.7	1.0
State and local purchases	.8	.3	1.6	1.3	1.0	1.0
Previous Tealbook	1.0	.6	1.2	1.2	1.0	1.0
Exports	2.3	-1.6	.5	2.6	2.4	3.8
Previous Tealbook	2.2	-1.8	1.4	1.7	2.7	3.2
Imports	3.4	5.6	.8	1.7	3.1	3.0
Previous Tealbook	3.5	5.9	2.7	2.6	3.1	2.9
	Contributions to change in real GDP (percentage points)					
Inventory change	.4	1.2	.3	-.3	.0	.0
Previous Tealbook	.5	1.4	.1	-.2	.1	.0
Net exports	-.2	-1.0	-.1	.1	-.2	.0
Previous Tealbook	-.3	-1.1	-.2	-.2	-.1	.0

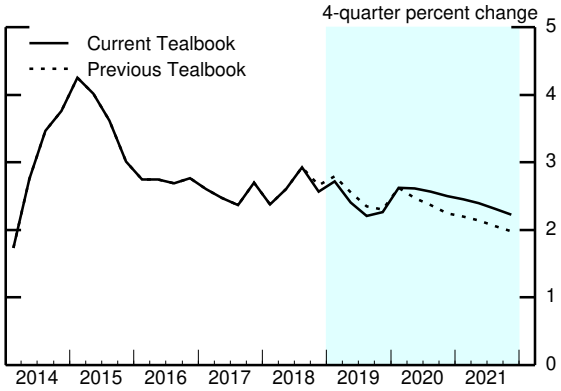
Real GDP



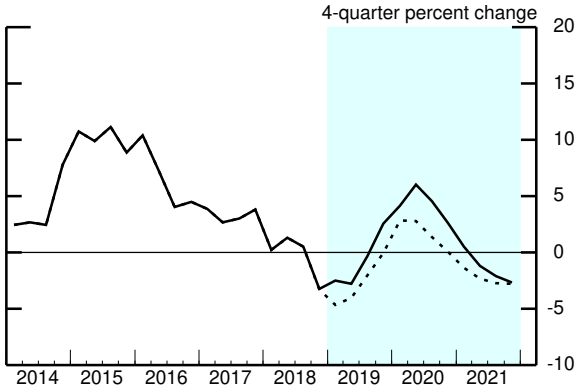
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Components of Final Demand

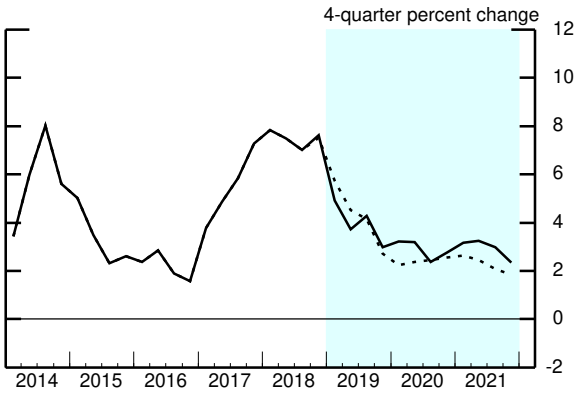
Personal Consumption Expenditures



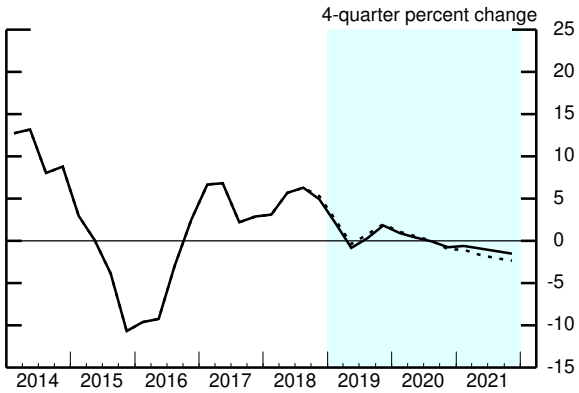
Residential Investment



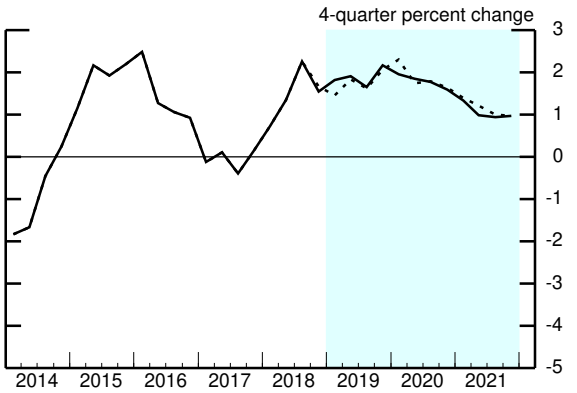
Equipment and Intangibles



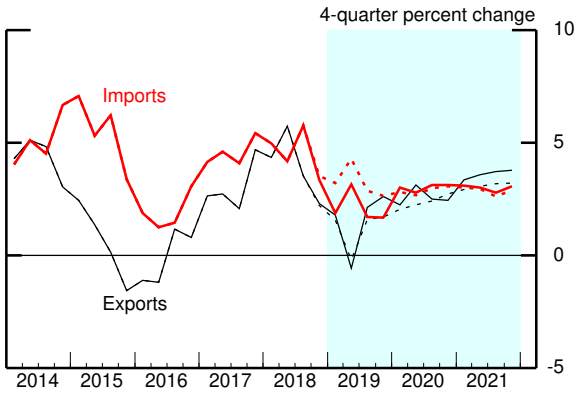
Nonresidential Structures



Government Consumption and Investment



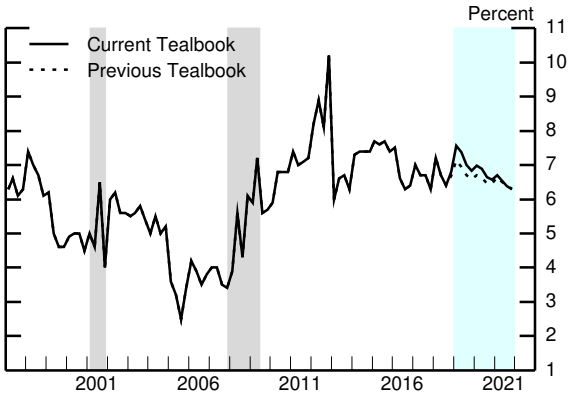
Exports and Imports



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

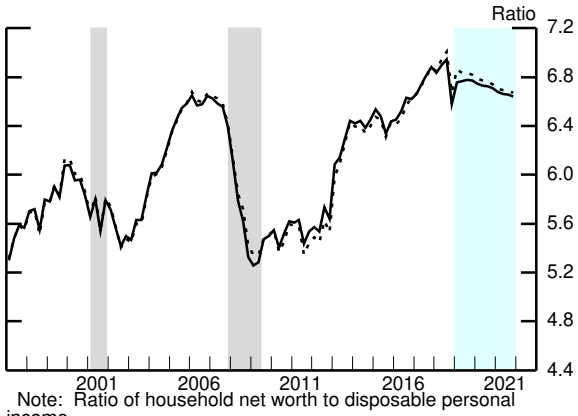
Aspects of the Medium-Term Projection

Personal Saving Rate



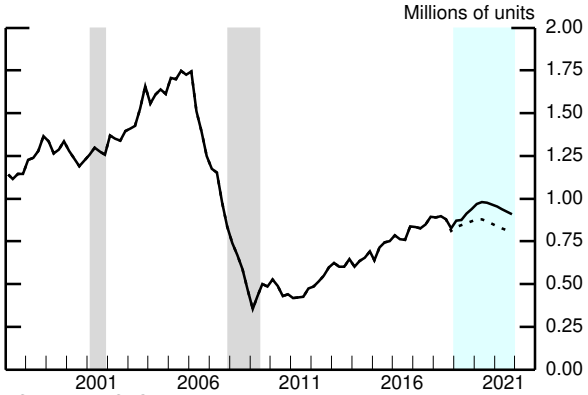
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Wealth-to-Income Ratio



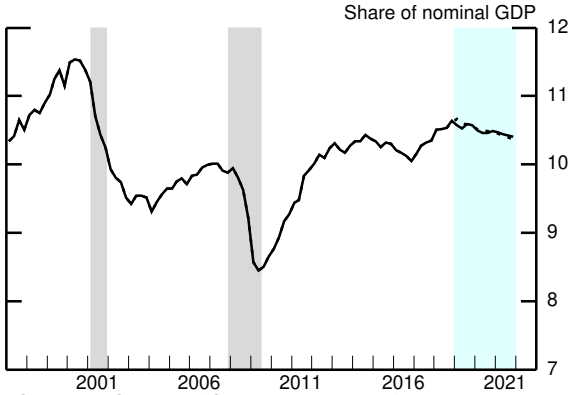
Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

Single-Family Housing Starts



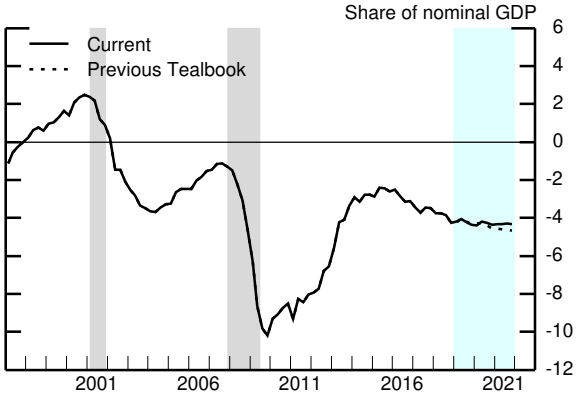
Source: U.S. Census Bureau.

Equipment and Intangibles Spending



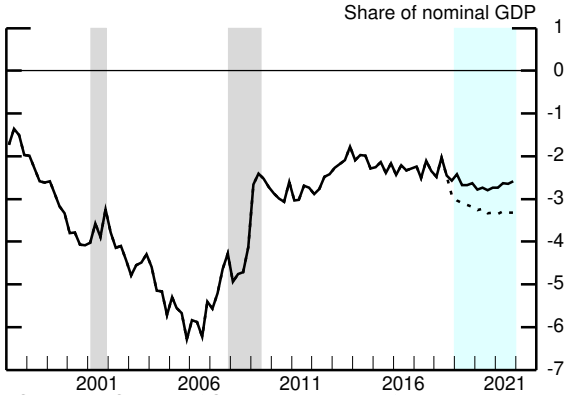
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Federal Surplus/Deficit



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

Current Account Surplus/Deficit



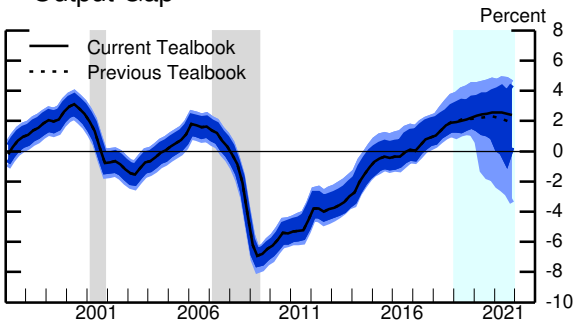
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

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

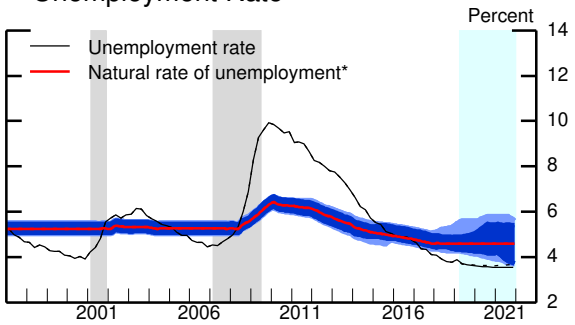
Output Gap



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.

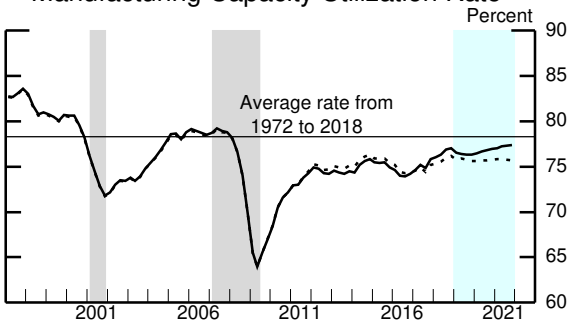
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



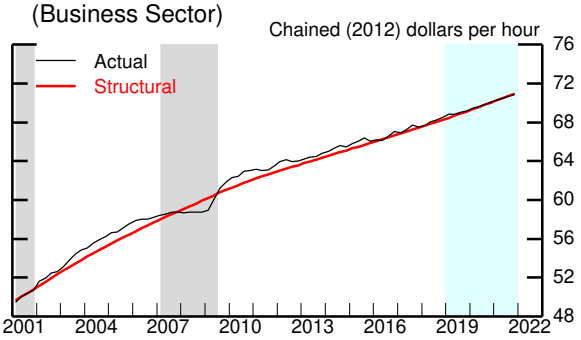
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.
Source: Various macroeconomic data; staff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

Manufacturing Capacity Utilization Rate



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

Actual and Structural 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	2011-16	2017	2018	2019	2020	2021
Potential output	3.1	3.6	2.7	1.9	1.4	1.7	1.8	1.8	1.9	1.9
Previous Tealbook	3.1	3.6	2.7	1.9	1.4	1.7	1.8	1.8	1.9	1.9
Selected contributions[1]										
Structural labor productivity[2]	1.7	2.9	2.7	1.8	1.2	1.2	1.2	1.3	1.3	1.4
Previous Tealbook	1.7	2.9	2.7	1.8	1.2	1.2	1.2	1.3	1.3	1.4
Capital deepening	.7	1.4	1.0	.5	.8	.6	.7	.7	.6	.5
Multifactor productivity	.8	1.1	1.4	1.1	.2	.3	.3	.3	.5	.6
Structural hours	1.5	1.3	.8	.5	.4	.3	.8	.2	.6	.5
Previous Tealbook	1.5	1.3	.8	.5	.4	.3	.8	.2	.6	.5
Labor force participation	.4	-.1	-.2	-.4	-.5	-.3	-.2	-.2	-.2	-.2
Previous Tealbook	.4	-.1	-.2	-.4	-.5	-.3	-.2	-.2	-.2	-.2
Memo:										
Output gap[3]	-1.2	2.5	.3	-5.4	.1	.9	1.9	2.2	2.6	2.4
Previous Tealbook	-1.2	2.5	.3	-5.4	.1	.9	1.9	2.1	2.3	1.9

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	2018 H2	2019 H1	2019	2020	2021
Nonfarm payroll employment[1]	223	211	178	173	151	103
Previous Tealbook	223	211	164	150	131	77
Private employment[1]	215	206	167	162	142	93
Previous Tealbook	215	206	159	143	121	67
Labor force participation rate[2]	63.0	63.0	63.0	63.0	63.0	62.8
Previous Tealbook	63.0	63.0	63.1	63.0	62.9	62.7
Civilian unemployment rate[2]	3.8	3.8	3.7	3.6	3.5	3.5
Previous Tealbook	3.8	3.8	3.7	3.6	3.6	3.7
Employment to population ratio[2]	60.6	60.6	60.7	60.7	60.8	60.6
Previous Tealbook	60.6	60.6	60.8	60.7	60.7	60.4

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	2018 H2	2019 H1	2019	2020	2021
Percent change at annual rate from final quarter of preceding period						
PCE chain-weighted price index	1.9	1.5	1.6	1.8	1.8	1.8
Previous Tealbook	1.9	1.5	1.8	1.8	1.9	1.9
Food and beverages	.5	.3	2.9	2.9	2.6	2.6
Previous Tealbook	.5	.3	2.0	2.2	2.3	2.3
Energy	3.5	.6	1.2	-.4	-1.5	-.9
Previous Tealbook	3.5	.6	-5.0	-2.2	-1.0	-.7
Excluding food and energy	1.9	1.7	1.6	1.8	1.9	1.9
Previous Tealbook	1.9	1.7	2.1	2.0	2.0	2.0
Prices of core goods imports[1]	.5	-.6	.4	.9	1.1	.9
Previous Tealbook	.5	-.6	.4	.6	.8	.7

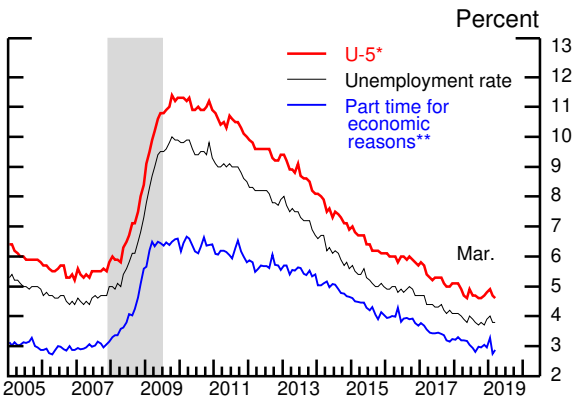
	Mar. 2019[2]	Apr. 2019[2]	May 2019[2]	June 2019[2]	July 2019[2]	Aug. 2019[2]
12-month percent change						
PCE chain-weighted price index	1.5	1.6	1.6	1.6	1.6	1.7
Previous Tealbook	1.7	1.7	1.6	1.7	...	...
Excluding food and energy	1.6	1.6	1.6	1.7	1.6	1.8
Previous Tealbook	1.9	1.9	1.9	1.9	...	...

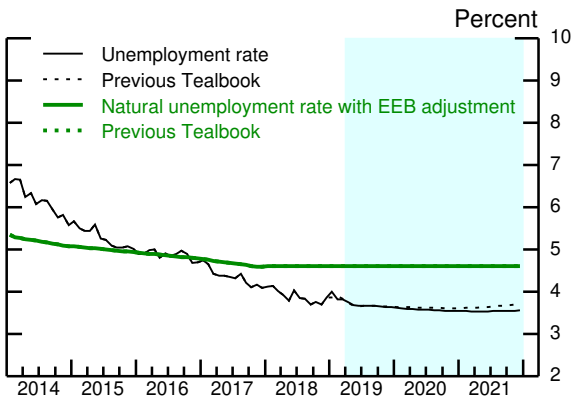
... Not applicable.
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Domestic Econ Devel & Outlook

Labor Market Developments and Outlook (1)

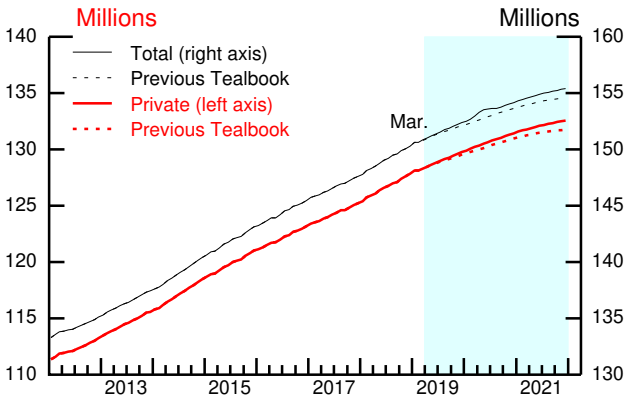
Measures of Labor Underutilization





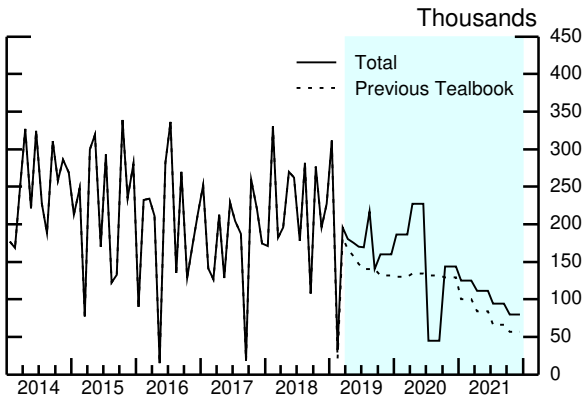
* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
EEB Extended and emergency unemployment benefits.
Source: U.S. Department of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

Level of Payroll Employment



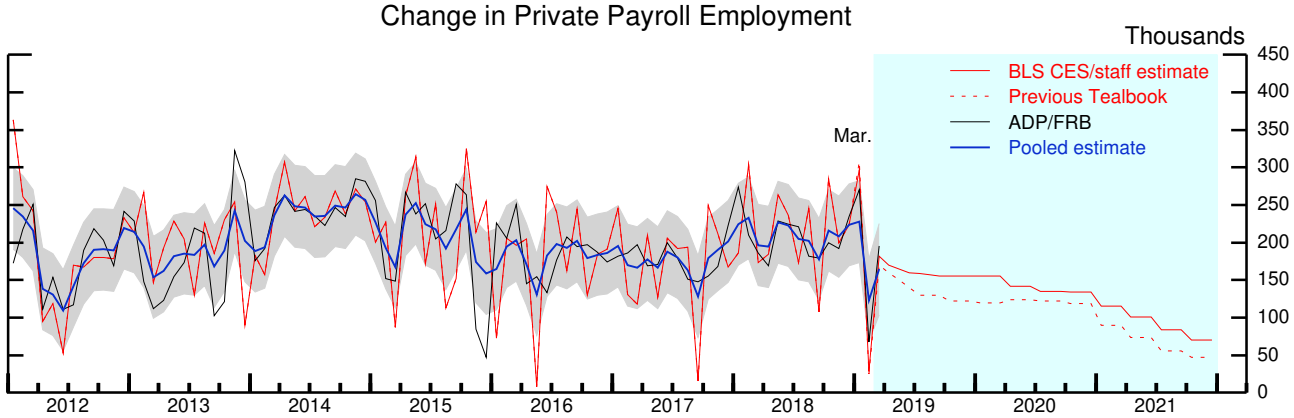
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Change in Total Payroll Employment



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

Change in Private Payroll Employment

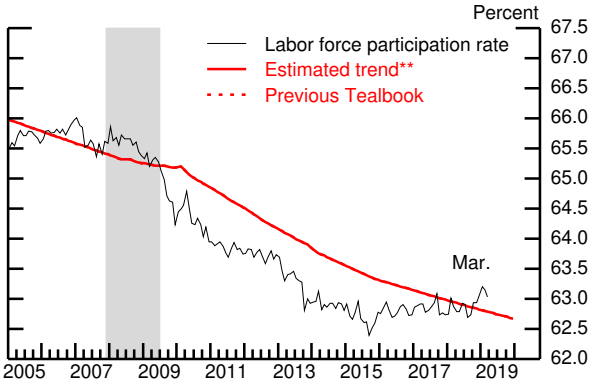


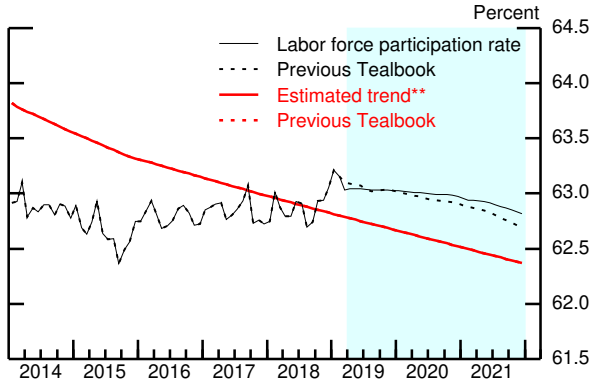
Note: Gray shaded area around blue line is 90 percent confidence interval around pooled estimate.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff calculations using microdata from ADP.

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)

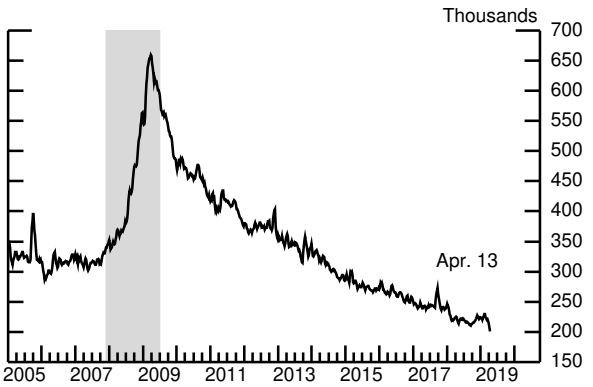
Labor Force Participation Rate*





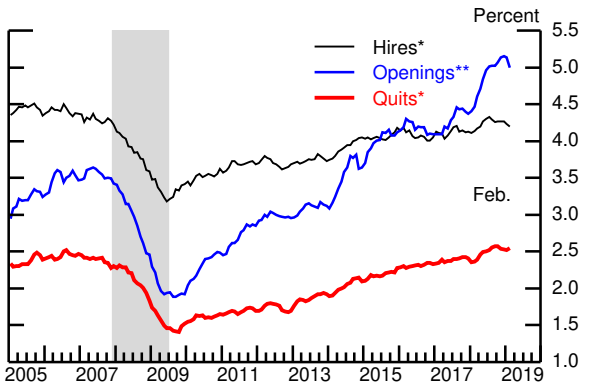
* Published data adjusted by staff to account for changes in population weights.
** Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Initial Unemployment Insurance Claims*



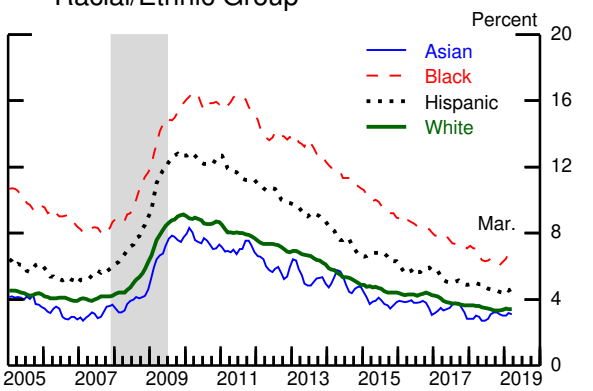
* 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

Hires, Quits, and Job Openings



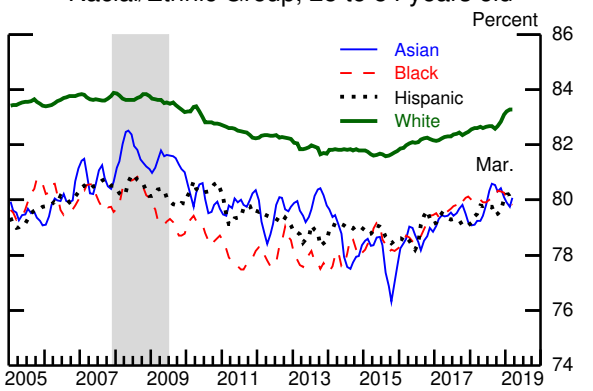
* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

Unemployment Rate by Racial/Ethnic Group



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

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

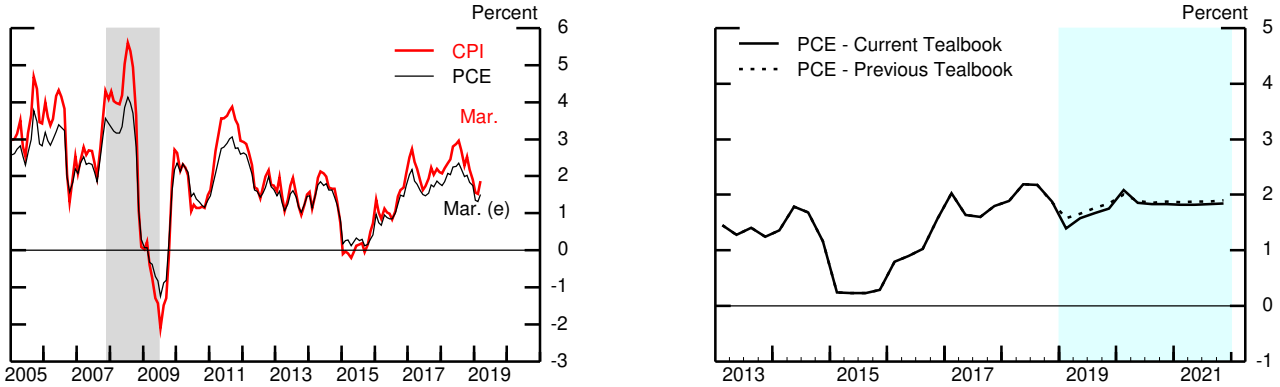


Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

Inflation Developments and Outlook (1)

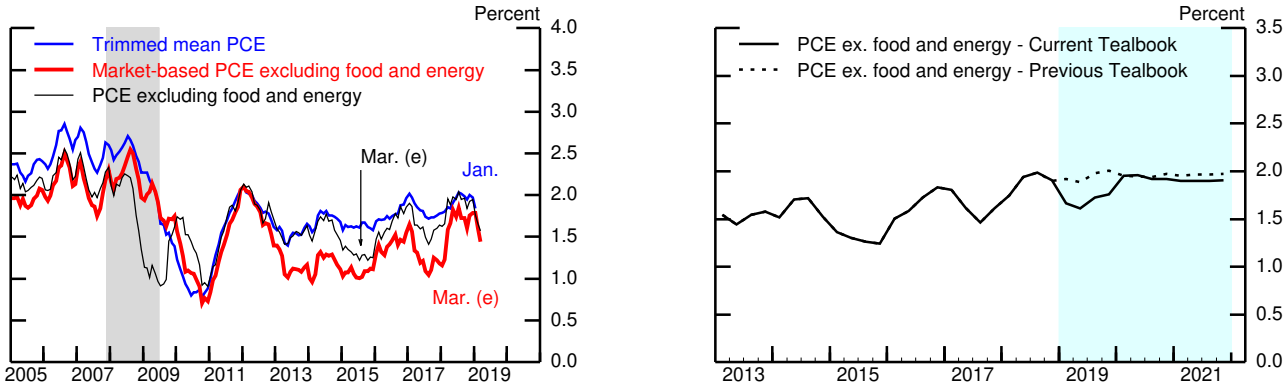
(Percent change from year-earlier period)

Headline Consumer Price Inflation



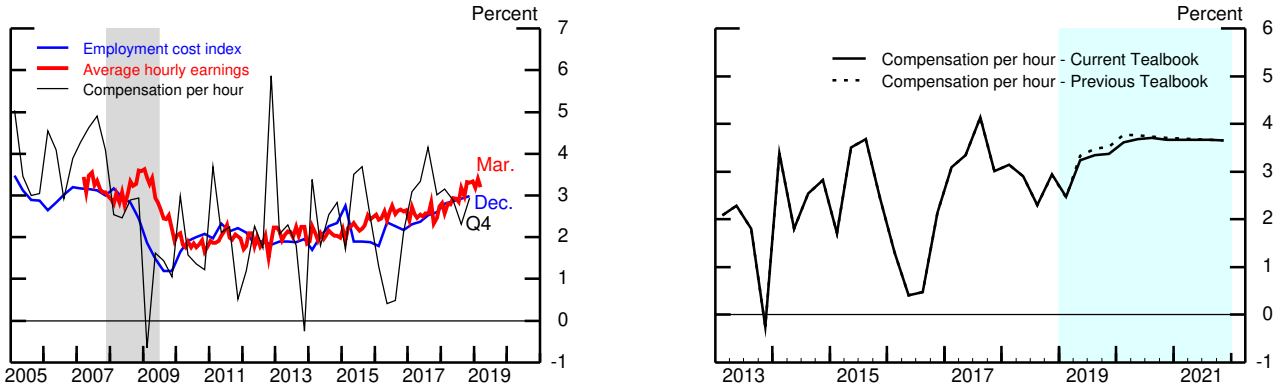
Note: PCE prices from February to March 2019 are staff estimates (e).
Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

Measures of Core PCE Price Inflation



Note: Core PCE prices from February to March 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



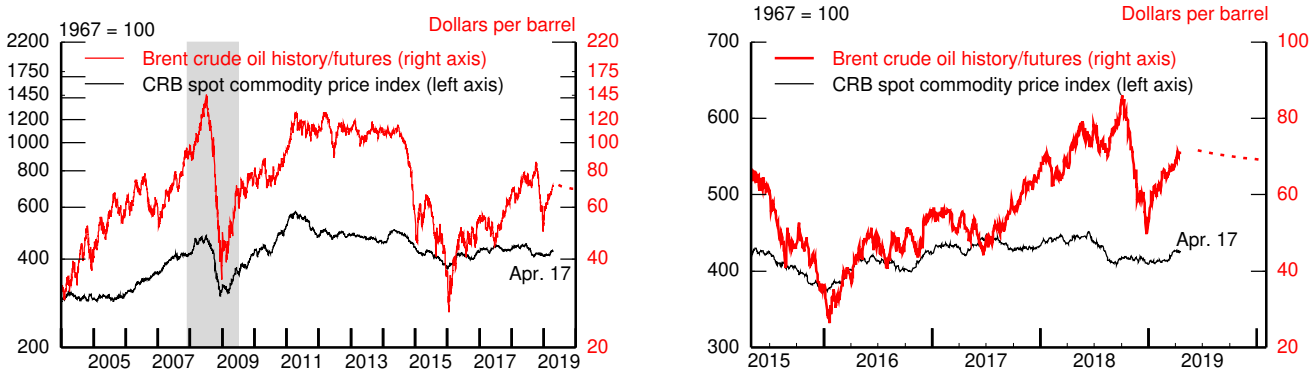
Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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)

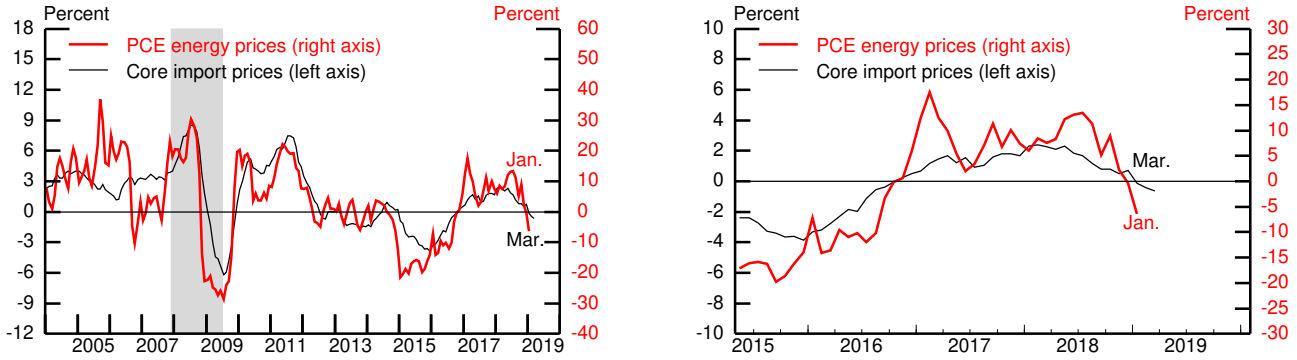
(Percent change from year-earlier period, except as noted)

Commodity and Oil Price Levels



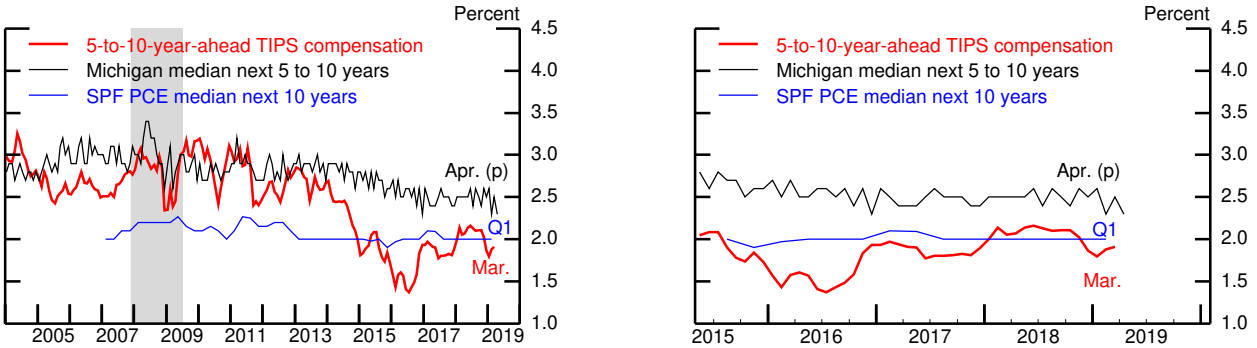
Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

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.

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.
(p) Preliminary.
SPF Survey of Professional Forecasters.
Source: For Michigan, University of Michigan Surveys of Consumers; for SPF, 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.

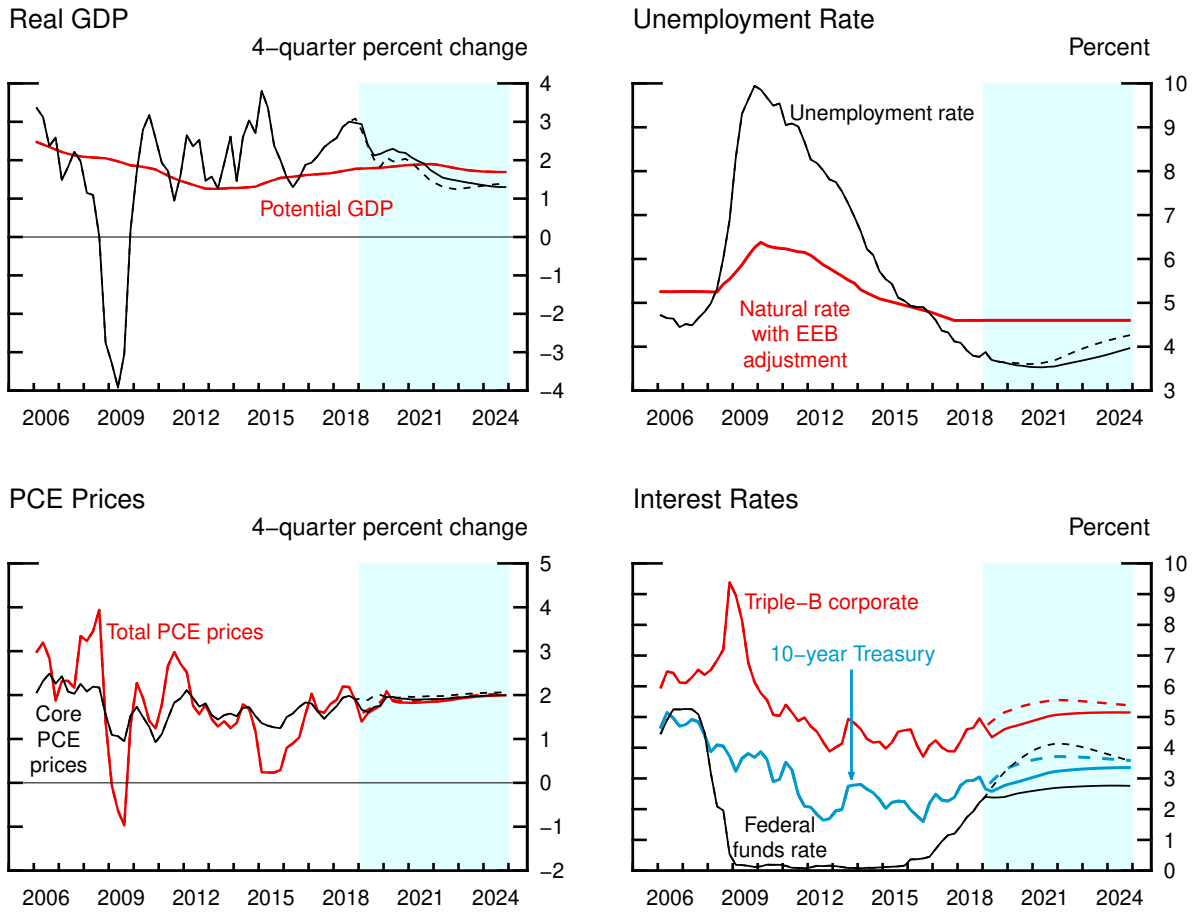
Domestic Econ Devel & Outlook

The Long–Term Outlook

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

Measure	2019	2020	2021	2022	2023	2024	Longer run
Real GDP	2.2	2.2	1.7	1.5	1.4	1.3	1.7
Previous Tealbook	1.8	2.0	1.5	1.2	1.3	1.4	1.7
Civilian unemployment rate[1]	3.6	3.5	3.5	3.7	3.8	4.0	4.6
Previous Tealbook	3.6	3.6	3.7	3.9	4.1	4.3	4.6
PCE prices, total	1.8	1.8	1.8	1.9	2.0	2.0	2.0
Previous Tealbook	1.8	1.9	1.9	1.9	2.0	2.0	2.0
Core PCE prices	1.8	1.9	1.9	1.9	2.0	2.0	2.0
Previous Tealbook	2.0	2.0	2.0	2.0	2.0	2.1	2.0
Federal funds rate[1]	2.39	2.58	2.69	2.74	2.76	2.76	2.50
Previous Tealbook	3.20	3.84	4.12	4.04	3.82	3.57	2.50
10-year Treasury yield[1]	2.8	3.0	3.2	3.3	3.3	3.4	3.4
Previous Tealbook	3.3	3.6	3.7	3.7	3.6	3.6	3.4

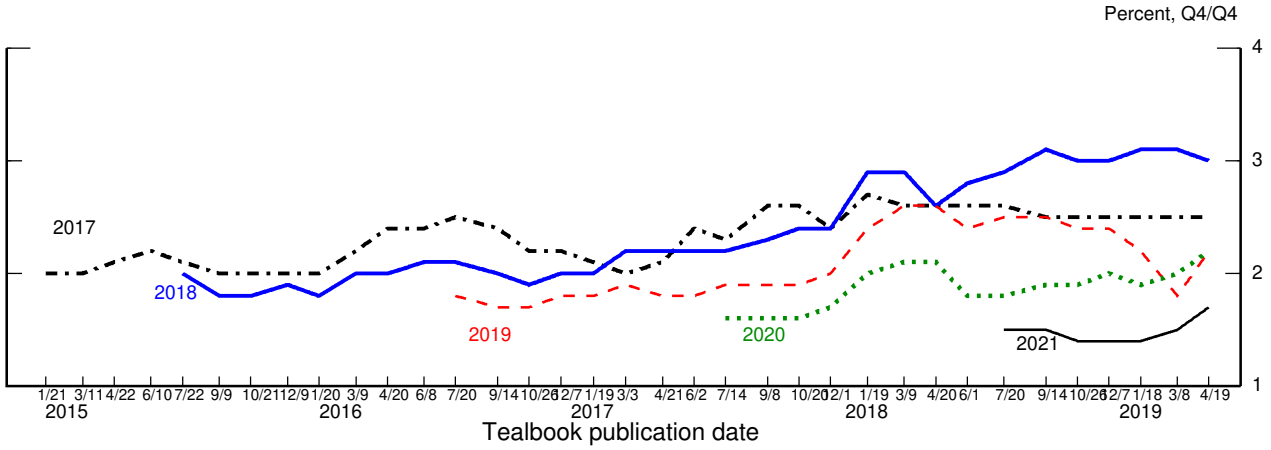
1. Percent, average for the final quarter of the period.



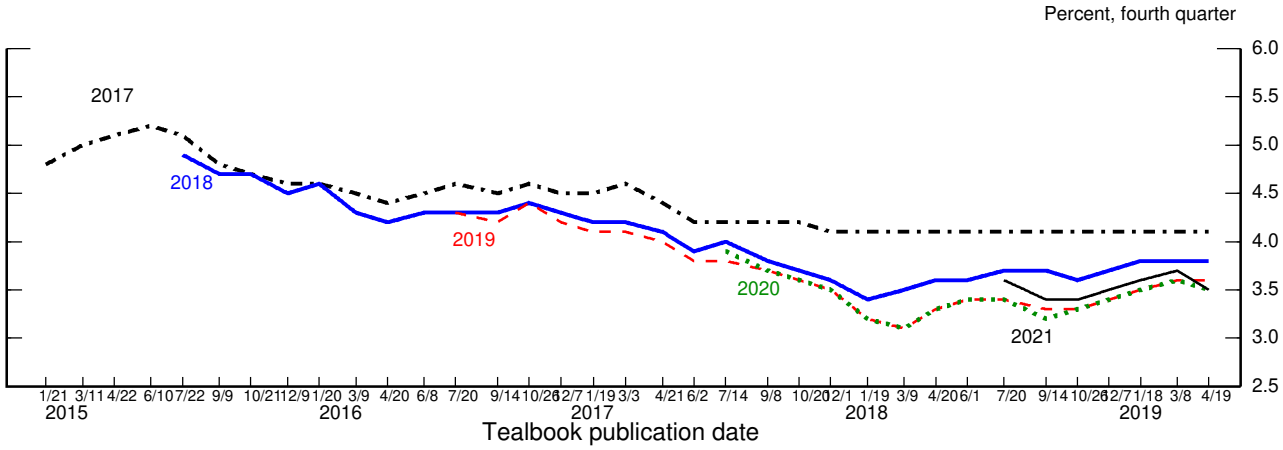
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

Evolution of the Staff Forecast

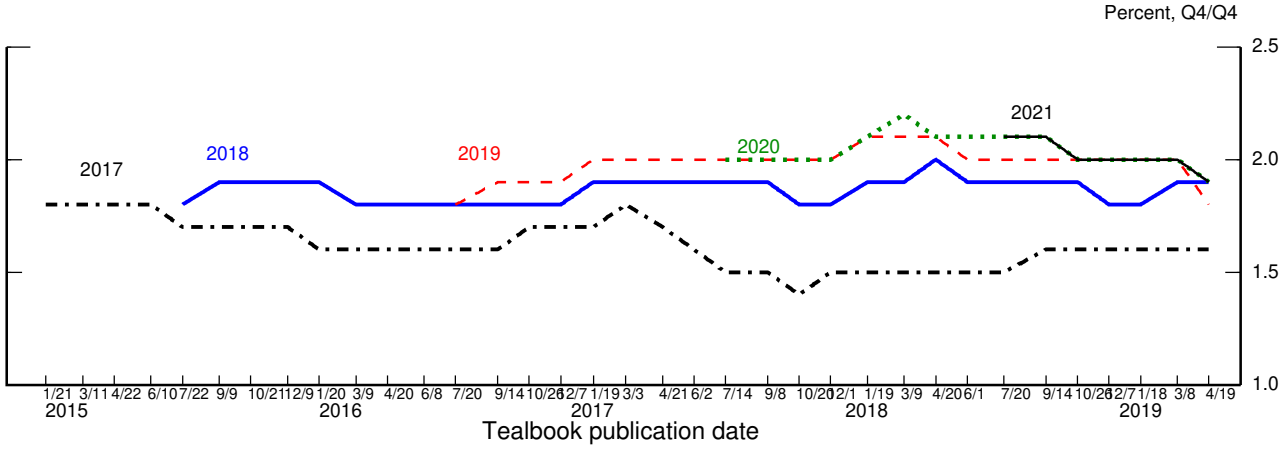
Change in Real GDP



Unemployment Rate



Change in PCE Prices excluding Food and Energy



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International Economic Developments and Outlook

The latest data from the foreign economies have been moderately positive, on net, and we have revised up our estimate of growth abroad in the first quarter by ¼ percentage point to 2 percent at an annual rate from a tepid 1.7 percent in the fourth quarter. The upward revision applied to a number of advanced and emerging economies, including the euro area, Canada, Mexico, and China. This was the first upward revision since the beginning of last year, although the outlook certainly remains weaker than it was projected back then.

We expect foreign growth to improve further, reaching 2.4 percent in the current quarter, close to its potential, and then staying near this pace for the remainder of the forecast period. The pickup this year is largely concentrated in emerging market economies (EMEs). Stimulus in China, along with an apparent bottoming out of the high-tech cycle, should support reasonably solid growth in emerging Asia and other EMEs. We also expect some improvement in Mexico's and Brazil's recent moribund performance. Conversely, growth in most of the advanced foreign economies (AFEs) will likely continue to languish through the rest of the year. In the euro area, PMIs continue to point to pronounced weakness in manufacturing despite better numbers for services and solid employment and wage growth. And in the United Kingdom, while the extension granted by the European Union has warded off the specter of an imminent "no deal" Brexit, the prolongation of Brexit uncertainty will weigh on investment and spending.

With the step-up in growth appearing quite fragile, we remain attentive to the risk of a further loss of momentum in the foreign economies, especially in Europe. Our recession probability model continues to point to a high chance of a downturn in that economy, largely reflecting the continued weakness of manufacturing indicators, and the policy and political situation in the region remains deeply unsettled. We explore the effects on the United States of a "European Recession" scenario in the Risks and Uncertainty section.

Not all risks are to the downside. Progress toward a U.S.–China trade agreement, for example, provides potential for some upside risk. In our baseline, we have built in only a small drag on growth coming from trade tensions, and we would consequently expect only a small boost were there to be a substantial easing of these tensions. However, it is possible that if a successful resolution of the U.S.–China talks took place, coupled with progress toward resolving trade issues in other areas, such a development could alleviate uncertainty about future trade policy and catalyze a rise in confidence worldwide, and thus lead to higher global growth. We discuss this possibility in the "Easing of Trade Tensions" alternative scenario in the Risks and Uncertainty section.

Foreign inflation is estimated to have weakened further, to only 0.7 percent at an annual rate, in the first quarter, held down by the pass-through of earlier declines in energy prices and, in the EMEs, by drops in food prices. We expect headline foreign inflation to pick up to 2.5 percent this quarter as the temporary factors abate. That said, core inflation in the euro area and Japan remains depressed at only around 1 percent. As such, we expect monetary policies in these countries to remain highly accommodative. We continue to expect that the European Central Bank (ECB) will not start raising rates until the third quarter of 2020. Given a weaker U.K. outlook, we postponed the next policy rate hike for the Bank of England to the second quarter of 2020, two quarters later than assumed in the March Tealbook.

Our lower assumed path for the federal funds rate implies less downward pressure on foreign currencies than previously assumed. As such, we lowered our projections for the policy rate paths of the Bank of Canada (BOC) and of several EME central banks. The Reserve Bank of India cut its policy rate by 25 basis points in April following an earlier cut in February, reflecting persistently low inflation and growth concerns.

ADVANCED FOREIGN ECONOMIES

- ***Euro Area.*** Hard indicators through February, such as retail sales and industrial production, point to a modest rebound in economic activity during the first quarter. These readings are consistent with the unwinding of some temporary headwinds, including social unrest in France and disruptions in car production in Germany. Accordingly, we revised up our forecast for the first

quarter to 1.4 percent. Further out, soft indicators through April, such as PMIs, continue to indicate lackluster underlying growth momentum, particularly in the manufacturing sector. Accordingly, we expect GDP growth to move back down to around 1 percent over the rest of this year. Growth should then gradually increase to 1.7 percent in 2021, supported by still-accommodative monetary policy and solid wage growth.

Consumer prices were flat in the first quarter because of subdued core inflation of 1 percent and markedly negative retail energy inflation. With retail energy prices stabilizing and resource utilization rising only very slowly over the forecast horizon, we project that inflation will come in near 1 percent this year before edging up to 1.4 percent by the end of 2021. Against this backdrop, we expect the ECB to start increasing its deposit rate only in the third quarter of 2020, reaching 0 percent in 2021, and to continue reinvesting maturing assets well after that. At its April 10 meeting, the ECB indicated that it would consider measures to mitigate possible side effects of negative policy rates on bank intermediation, consistent with reports that the ECB is considering a system of tiered interest rates on bank reserves.

- ***United Kingdom.*** Real GDP growth is estimated to have increased to 1.5 percent in the first quarter from a tepid 0.9 percent in the fourth. In contrast to other AFEs, the manufacturing sector was the main driver of growth as Brexit-related uncertainty induced stockpiling among households and businesses. We project this unexpected buildup to unwind in the second quarter, with growth falling to only 0.5 percent.

  With the EU granting a Brexit extension until the end of October 2019, we now expect that the United Kingdom will exit the EU without major disruptions by that time and then start a transition period during which it will negotiate its future relationships with the EU and the rest of the world. With Brexit-related uncertainty dissipating more slowly than we expected in March, we now see growth rising more gradually as well, reaching its potential rate of 1.5 percent by the end of 2019 and settling close to this pace thereafter.

- ***Canada.*** First-quarter indicators, such as monthly GDP for January and the manufacturing PMI through March, point to continued sluggish growth, in part reflecting the drag from oil production cuts in Alberta. Accordingly, we

estimate that GDP growth edged up to only 1 percent in the first quarter from 0.4 percent in the fourth. As oil production recovers, we expect growth to rebound to 2.1 percent in the current quarter before settling at a near-potential pace of 1.8 percent thereafter.

Following more dovish communications by the BOC and in response to expected effects on the Canadian dollar from a more accommodative U.S. monetary policy, we now project the BOC to tighten policy more gradually than we assumed in March. We expect the BOC to raise its policy rate from its current level of 1.75 percent to 2.25 percent in 2021, 0.5 percentage point lower than projected in the March Tealbook.

- ***Japan.*** Industrial production, the manufacturing PMI, and retail sales suggest that GDP growth was a subdued 0.3 percent in the first quarter, reflecting a general loss in momentum in the economy. Looking through the volatility from the consumption tax hike scheduled for late 2019, we expect muted 0.2 percent growth for 2019 as a whole. Over the remainder of the forecast period, we expect GDP growth to hover around its potential pace of 0.8 percent, supported by the 2020 Tokyo Olympics and very accommodative monetary policy.

  In light of our subdued outlook for growth and with inflation still quite far away from the Bank of Japan's (BOJ) 2 percent inflation target, we expect the BOJ to keep its deposit rate slightly negative, at minus 0.10 percent, throughout the forecast period, while continued asset purchases keep the long-term yield around 0 percent.

EMERGING MARKET ECONOMIES

- ***China.*** Official GDP growth picked up to 7.1 percent in the first quarter from just under 6 percent in the second half of last year. A pickup in credit growth, industrial production, exports, and a positive PMI reading in March all point to a recovery in the making. However, several other key indicators, including weak automobile sales, softer momentum in imports, and slowing housing sales, suggest that the underlying pace of expansion might be a little weaker than indicated by the first-quarter print. That said, we expect growth to be supported over the course of the year by the continued easing of credit

conditions and tax cuts. For the year as a whole, we see growth coming in at 6.5 percent, at the top of the government's target range of 6 to 6.5 percent. But with several indicators still weak and financial vulnerabilities still very evident, a sharp slowdown remains a significant risk.

- ***Other Emerging Asia.*** The region's manufacturing slump deepened in the first quarter, dragged down by a further contraction in manufacturing and exports of high-tech goods, especially in Korea and Taiwan. However, March data offer a glimmer of hope, as an uptick in exports and manufacturing PMIs suggest that the slowdown may have bottomed out. Thus, after having slowed to 2.6 percent in the first quarter, we see growth picking up to 3.6 percent later this year, driven by renewed external demand for high-tech products, stronger growth in China, and supportive fiscal and monetary policies. This forecast was revised up a touch on stronger U.S. growth.

- ***Mexico.*** Incoming data, including industrial production and manufacturing exports, suggest that growth remained a lackluster 1.3 percent in the first quarter, dragged down by gasoline shortages, labor unrest, and business concerns about the economic policies of the new government. We see growth stepping up to 2.1 percent in the current quarter, as U.S. manufacturing production rebounds and the labor situation stabilizes, before reaching 2.7 percent by 2021. We would have written a stronger forecast for Mexico in light of our upward revision to U.S. manufacturing production, but we offset this upward impulse on account of our greater pessimism regarding government policies. In particular, we expect that a halt to energy reforms and the absence of a plan to improve Pemex's, the Mexican state-owned petroleum company, finances will continue to weigh on business confidence and growth.

  Twelve-month inflation edged up to 4 percent in March, as energy prices rebounded from declines earlier in the quarter. Despite the recent weak pace of growth, the Bank of Mexico kept its policy rate at 8.25 percent at its March meeting, citing concerns that inflation continues to stay at the upper bound of its tolerance range of 2 to 4 percent.

- ***Brazil.*** Brazil's recovery from the worst recession in its history continues to be excruciatingly slow. Retail sales and industrial production remained flat

through February amid double-digit unemployment. Exports were also very weak. All told, real GDP likely stagnated in the first quarter, much weaker than the 1.7 percent growth we estimated in the March Tealbook. With strong business sentiment in expectation of market-friendly government policies, however, we project growth to pick up to 2.4 percent by the end of the year. Our outlook assumes that congress approves the government's ambitious pension reform later this year.

- ***Argentina.*** Argentina has been experiencing renewed financial turmoil in recent weeks amid growing concerns that the policies implemented under its IMF program will fail to stabilize the economy before presidential elections in October. Despite a deep recession, inflation remains stubbornly high at almost 55 percent on a 12-month basis. The central bank initially responded by further tightening its monetary base target and committing to keep the overnight interest rate above 62.5 percent. Subsequently, authorities introduced price controls and eliminated the slow crawl in the exchange rate band. We continue to expect the economy to rebound from last year's deep recession, primarily because of a strong agricultural harvest, but we have penciled in a weaker recovery in light of the deteriorating situation. Political risks are on the rise, and investors are worried by the prospect of the former president, Christina Kirchner, emerging as a major challenger to the current president, Mauricio Macri, whose popularity has declined steadily.

- ***Turkey.*** Economic and financial conditions in Turkey, another vulnerable EME, also deteriorated markedly. Economic activity contracted severely in the second half of last year, and 12-month inflation has remained elevated at around 20 percent. Against this fragile economic backdrop, Turkish financial markets came under renewed pressure in late March as investors and depositors worried that the authorities were unsustainably propping up the currency and loosening fiscal policy in the run-up to local elections. Since then, concerns about the adequacy of Turkey's reserves and sustainability of its fiscal policy have continued to pressure markets.

The Foreign GDP Outlook

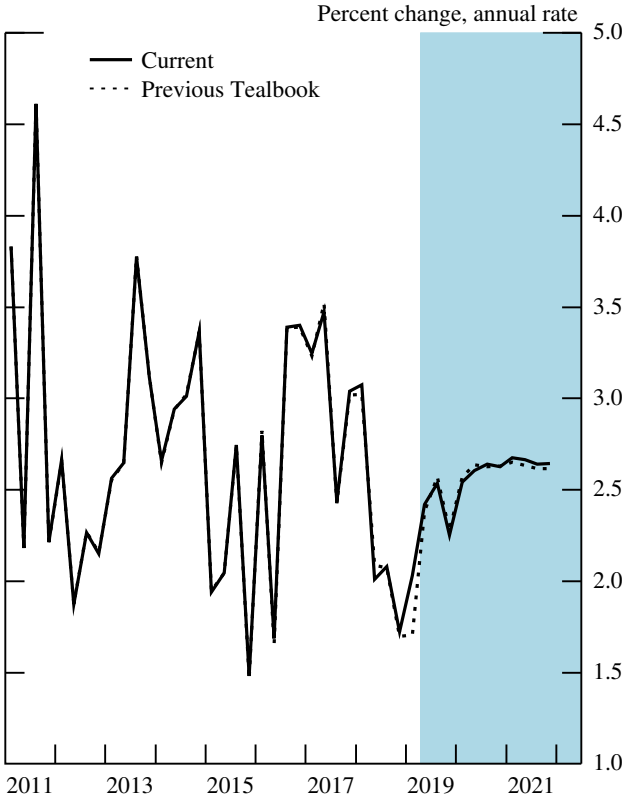
Real GDP* Percent change, annual rate

	2018			2019			2020	2021
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	2.5	2.1	1.7	2.0	2.4	2.4	2.6	2.7
Previous Tealbook	2.6	2.1	1.7	1.7	2.4	2.4	2.6	2.6
2. Advanced Foreign Economies	1.7	1.0	.8	1.2	1.4	1.3	1.6	1.7
Previous Tealbook	1.7	1.0	.8	.9	1.4	1.3	1.6	1.7
3. Canada	1.9	2.0	.4	1.0	2.1	1.7	1.9	1.8
4. Euro Area	1.6	.6	.9	1.4	1.1	1.0	1.4	1.7
5. Japan	.8	-2.4	1.9	.3	.6	-.1	.9	.8
6. United Kingdom	.9	2.8	.9	1.5	.5	1.4	1.7	1.6
7. Emerging Market Economies	3.3	3.1	2.6	2.9	3.4	3.5	3.6	3.6
Previous Tealbook	3.4	3.1	2.6	2.5	3.4	3.5	3.6	3.6
8. China	6.8	5.8	6.0	7.1	6.6	6.1	6.0	5.8
9. Emerging Asia ex. China	4.1	2.6	2.8	2.6	3.3	3.6	3.6	3.5
10. Mexico	1.7	2.4	1.0	1.3	2.1	2.2	2.5	2.7
11. Brazil	.9	2.2	.5	.0	1.5	2.3	2.6	2.8

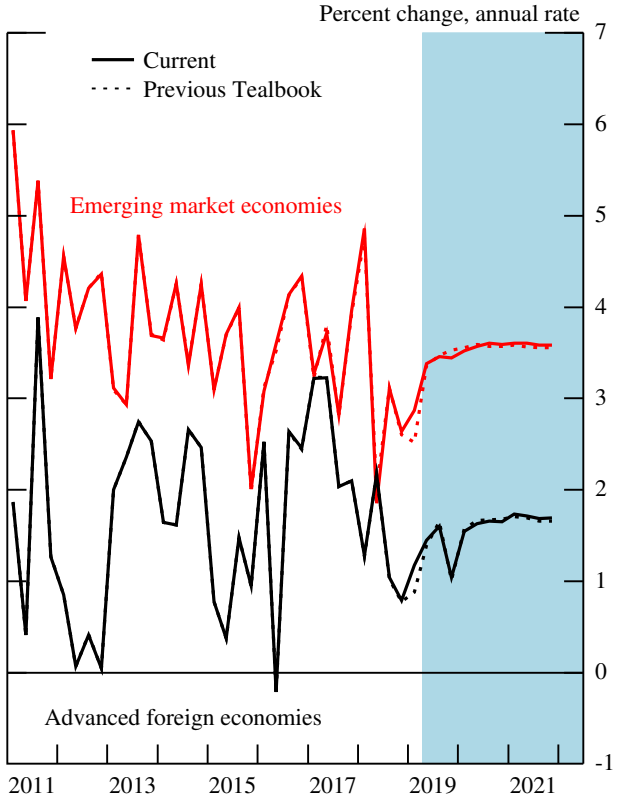
* GDP aggregates weighted by shares of U.S. merchandise exports.

Int'l Econ Devel & Outlook

Total Foreign GDP



Foreign GDP



The Foreign Inflation Outlook

Consumer Prices* Percent change, annual rate

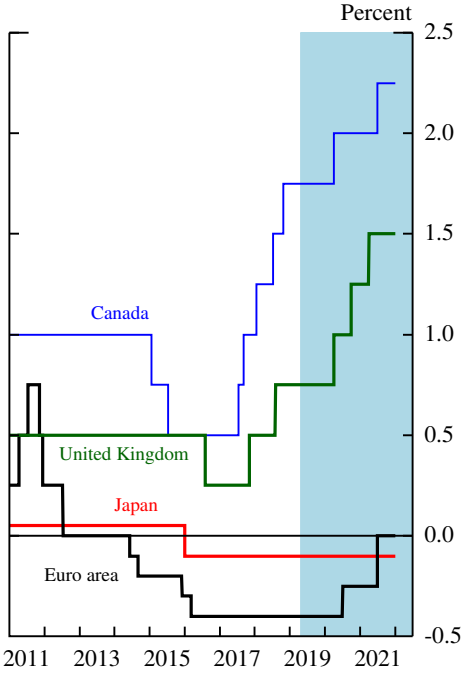
	2018			2019			2020	2021
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	2.2	3.4	1.9	.7	2.5	2.4	2.3	2.3
Previous Tealbook	2.1	3.6	2.0	.5	2.3	2.4	2.3	2.3
2. Advanced Foreign Economies	1.9	2.4	.8	.6	1.6	1.9	1.4	1.5
Previous Tealbook	1.9	2.5	.7	.5	1.6	1.9	1.5	1.5
3. Canada	2.2	2.6	1.1	1.5	3.0	2.0	1.9	1.9
4. Euro Area	2.2	2.6	.7	-.1	1.1	1.3	1.2	1.3
5. Japan	.6	2.0	-.1	.9	.8	3.7	.9	1.0
6. United Kingdom	2.2	2.8	2.0	.7	2.0	2.2	2.2	2.2
7. Emerging Market Economies	2.5	4.1	2.7	.8	3.0	2.7	2.8	2.8
Previous Tealbook	2.3	4.3	2.8	.6	2.7	2.7	2.8	2.8
8. China	1.5	3.7	2.0	.6	3.4	2.1	2.5	2.5
9. Emerging Asia ex. China	2.2	2.0	1.2	-.0	2.1	2.7	2.8	2.7
10. Mexico	4.0	6.5	4.9	1.1	2.8	3.3	3.2	3.2
11. Brazil	3.7	6.6	2.5	2.9	4.8	4.2	4.3	4.3

* CPI aggregates weighted by shares of U.S. non-oil imports.

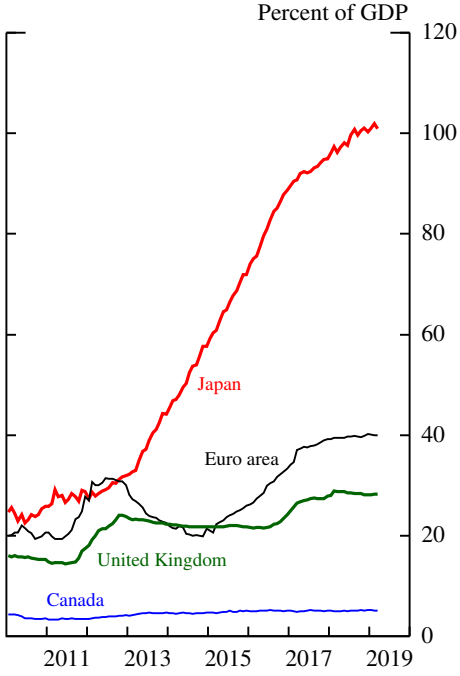
Int'l Econ Devel & Outlook

Foreign Monetary Policy

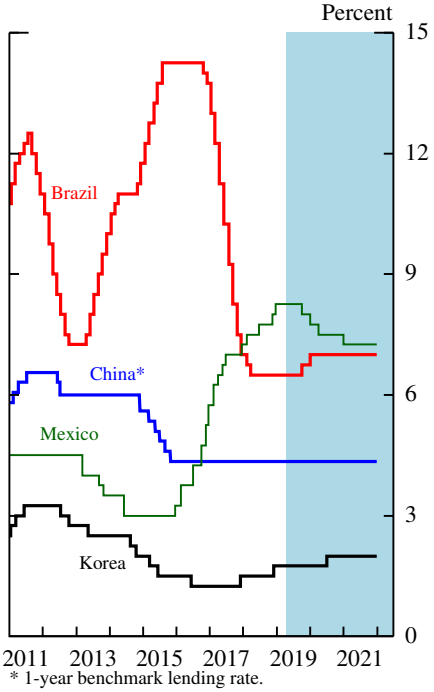
AFE Policy Rates



AFE Central Bank Balance Sheets



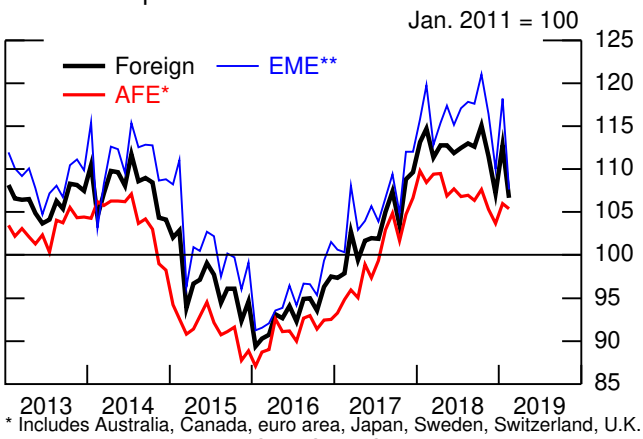
EME Policy Rates



* 1-year benchmark lending rate.

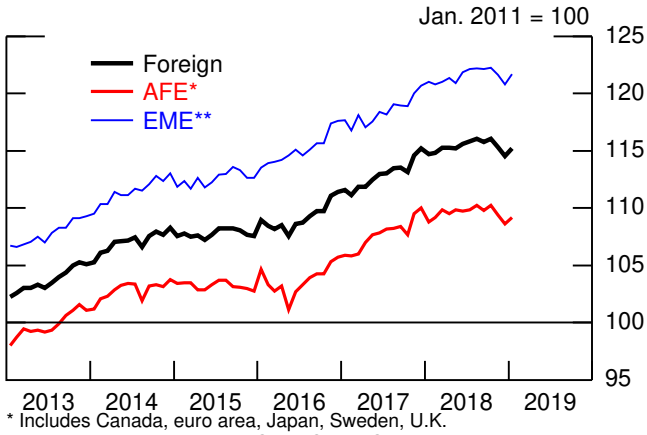
Recent Foreign Indicators

Nominal Exports



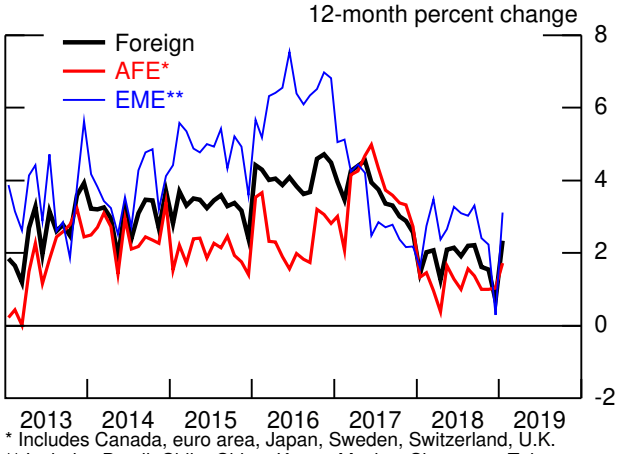
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Singapore, Taiwan, Thailand.

Industrial Production



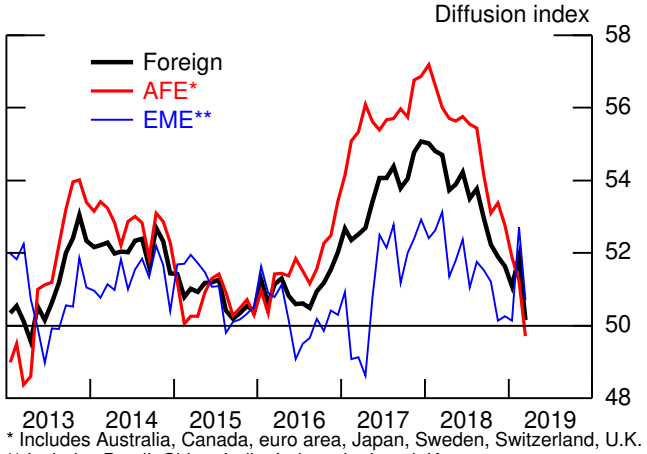
* Includes Canada, euro area, Japan, Sweden, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand.

Retail Sales



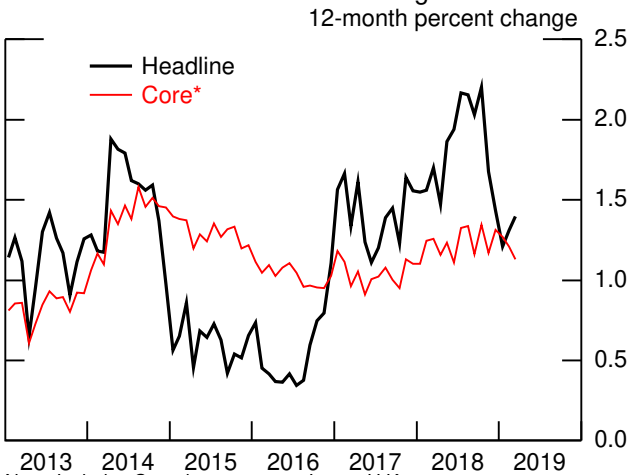
* Includes Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, Chile, China, Korea, Mexico, Singapore, Taiwan.

Manufacturing PMI



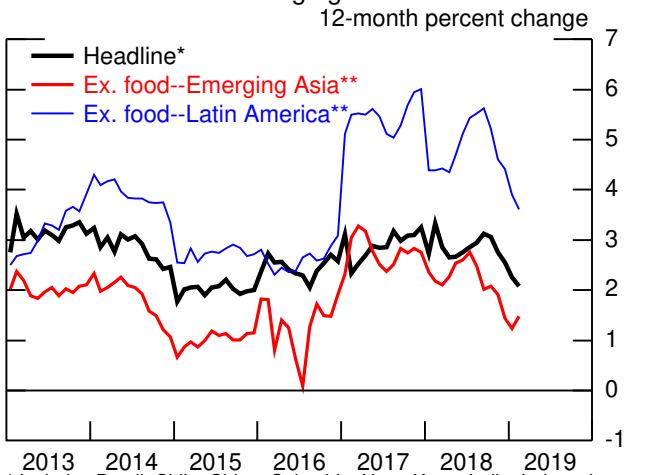
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, China, India, Indonesia, Israel, Korea, Mexico, Russia, Singapore, Taiwan, and Turkey.

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

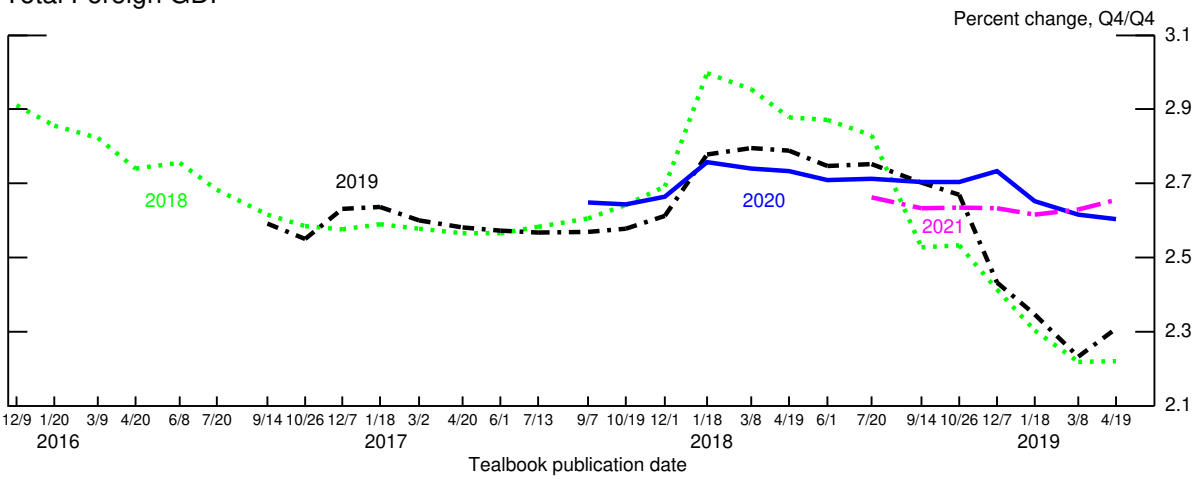


* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Latin America excludes Argentina and Venezuela.

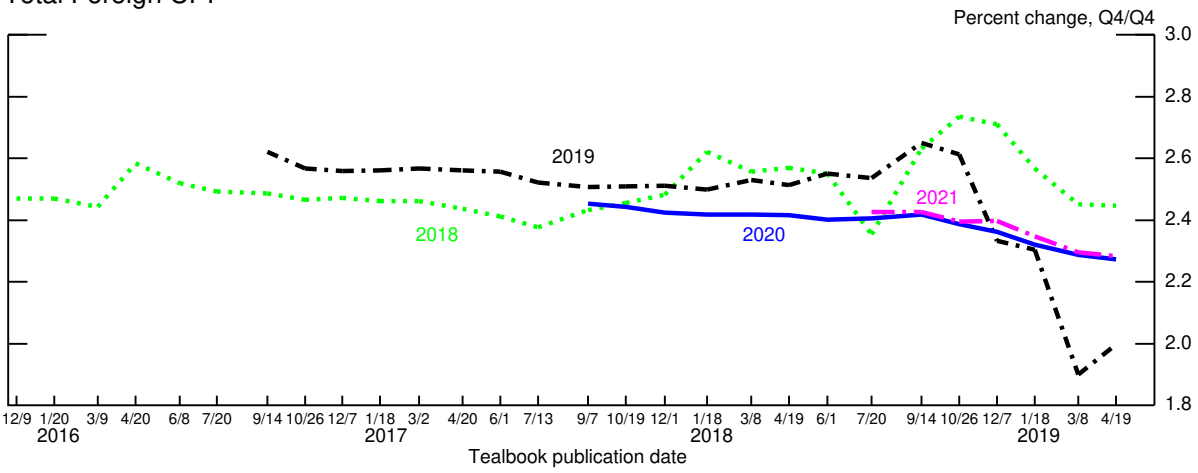
Int'l Econ Devel & Outlook

Evolution of Staff's International Forecast

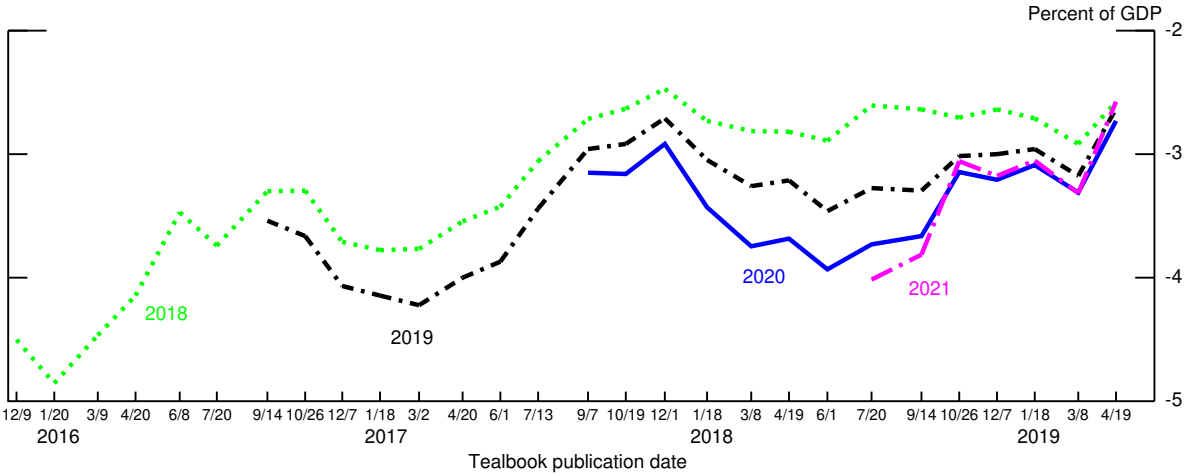
Total Foreign GDP



Total Foreign CPI



U.S. Current Account Balance



Financial Market Developments

Financial market developments over the intermeeting period reflected FOMC communications that were more accommodative than expected, U.S. and Chinese data releases that were on balance stronger than expected, and positive sentiment regarding trade negotiations between the United States and China. On net, nominal Treasury yields decreased slightly, equity prices increased, and corporate bond spreads narrowed.

- Nominal Treasury yields declined about 5 basis points at 2-, 5-, and 10-year maturities on net. Inflation compensation remained relatively unchanged, on net, for both the 5-year and the 5-to-10-year horizons.

- Blue Chip survey responses and a straight read of OIS forward rates both indicate that no change in the target range for the federal funds rate is expected at the next few FOMC meetings. Relative to just before the March FOMC meeting, investors appear to be putting somewhat more weight on lower outcomes for the federal funds rate in early 2020. The path of the federal funds rate at longer horizons implied by a straight read of OIS forward rates shifted down modestly.

- The S&P 500 index increased about 3 percent over the intermeeting period. Option-implied volatility on the S&P 500 index—the VIX—decreased somewhat, and corporate bond spreads narrowed 18 basis points for investment-grade bonds and 20 basis points for speculative-grade bonds.

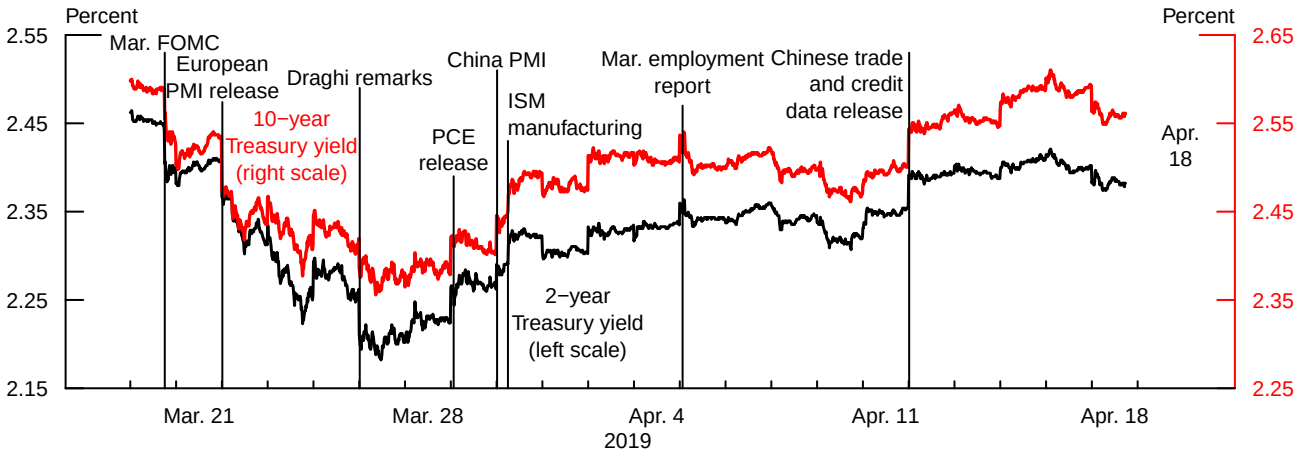
- Foreign equity prices increased modestly on net. Ongoing Brexit developments had limited effects on global asset prices. The staff's broad dollar index was little changed, on balance, over the intermeeting period.

Domestic Developments

Yields on nominal Treasury securities declined notably in the week following the March FOMC meeting. The decline was partially attributed to the downward revisions to FOMC participants' assessments of the appropriate path of the federal funds rate in the March SEP, which were larger than expected, and to the Committee's reaffirmation of its patient approach. Weak euro-area data releases further contributed to the decline in

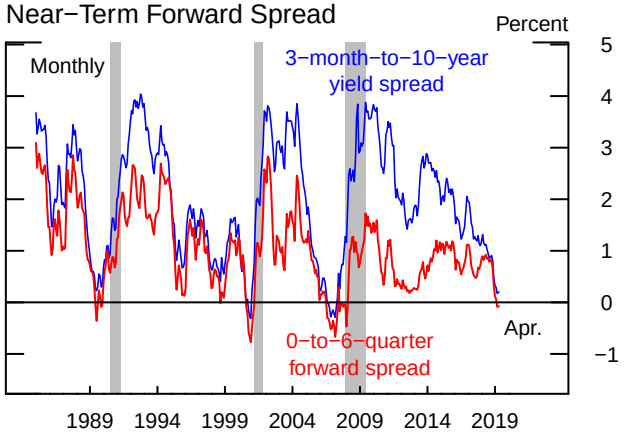
Policy Expectations and Treasury Yields

Selected Interest Rates



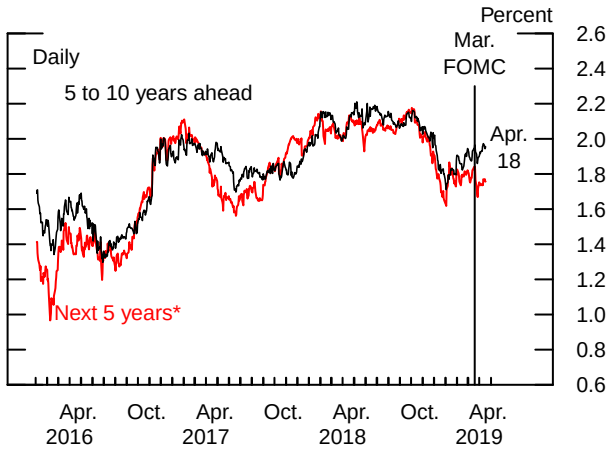
Note: 5−minute intervals, 8:00 a.m. to 4:00 p.m.
Source: Bloomberg.

Long−Term Yield Spread and Near−Term Forward Spread



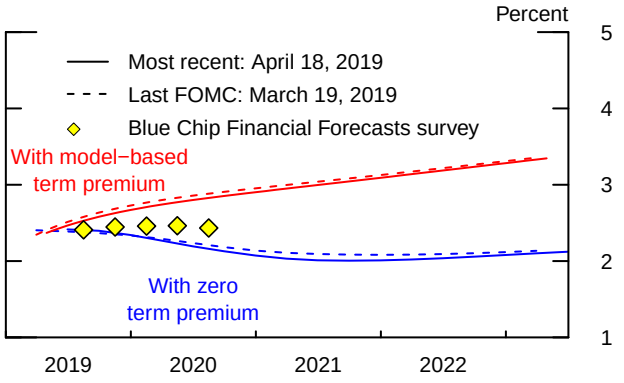
Note: The 0−to−6−quarter forward spread is the difference between the 3−month Treasury bill yield and the implied forward rate between 6 and 7 quarters ahead based on a smoothed Treasury yield curve. Data through March 2019 are monthly averages. Data for April 2019 are based on values for April 18. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.
Source: Federal Reserve Bank of New York; Board staff calculations.

TIPS−Based Inflation Compensation



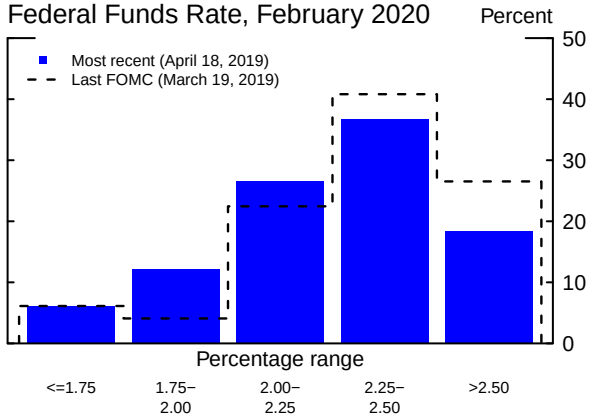
Note: Estimates based on smoothed nominal and inflation−indexed Treasury yield curves.
* Adjusted for lagged indexation of Treasury Inflation−Protected Securities (carry effect).
Source: Federal Reserve Bank of New York; Board staff calculations.

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 zero basis points. Model−based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premium. The Blue Chip path is the average of respondents' expectations for the federal funds rate in the survey published April 1.
Source: Bloomberg; Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Financial Forecasts; Board staff calculations.

Market−Implied Probability Distribution of the Federal Funds Rate, February 2020



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

Financial Markets

yields, and, at one point, 2-, 5-, and 10-year yields were down close to 25 basis points. However, Treasury yields retraced later in the period following stronger-than-expected data on U.S. manufacturing and the Chinese economy as well as positive sentiment from trade negotiations between the United States and China.

The near-term forward spread—the difference between three-month Treasury bill yield and the implied forward rate between six and seven quarters ahead—continued to reflect a relatively flat expected path of policy over the next few quarters and changed little, on net, standing at the 12th percentile of its distribution since 1971.[1] The long-term spread—the difference between 3-month and 10-year Treasury yields—also changed little, on net, after briefly falling into negative territory near the end of March. Meanwhile, 5-year and 5-to-10-year inflation compensation measures based on TIPS were relatively unchanged, on net, despite recent softer inflation readings.

Market quotes and survey responses both suggest that the target range for the federal funds rate was viewed as likely to be maintained at the current level over the next few FOMC meetings. The Blue Chip Financial Forecasts survey suggests a flat policy path through the third quarter of 2020. Probability distributions of the federal funds rate implied by options (without adjusting for risk premiums) indicate that the most likely outcome through early 2020 is no change to the current target range, but that relatively greater probability is assigned to a lower target range than a higher one beyond the next several meetings. A straight read of OIS forward rates implies that the federal funds rate will decline about 15 basis points in 2019 and about 25 basis points in 2020. Over the intermeeting period, the OIS-implied path was little changed for 2019 but declined around 5 to 10 basis points for subsequent years. In contrast, a staff model that adjusts for term premiums projects gradual increases in the target range at a pace of approximately one 25 basis point increase per year over the next several years. An alternative staff model for calculating near-term term premiums projects no change in the target range of the federal funds rate for the remainder of the year (see the box "A Macro-Finance Measure of Term Premiums in Federal Funds Futures Rates").

Broad stock price indexes increased about 3 percent over the intermeeting period, largely as a result of more-accommodative-than-expected FOMC communications and U.S. and Chinese data releases that were, on balance, stronger than expected. Stock

[1] The near-term forward spread has been shown to dominate the spread between the 10- and 2-year Treasury yields for predicting a transition to recession in the subsequent four quarters.

A Macro-Finance Measure of Term Premiums in Federal Funds Futures Rates

Forward rates derived from quotes on overnight index swaps (OIS) or federal funds futures contracts provide a market-based read of the expected path of the federal funds rate. However, such a straight read is contaminated by the presence of unobserved term premiums. Term premium estimates are a model-specific concept; different models will provide different values. This discussion introduces a new and complementary approach, based on the one in Diercks and Carl (2019), to the staff's standard model estimate of the term premium–adjusted path of policy.[1]

The new approach relies on a key economic assumption from conventional asset pricing theory, which suggests that the sign of risk premiums depends on the sign of the covariance of the returns of those assets with the typical investor's consumption growth. For example, stocks require a positive risk premium because equity prices tend to fall during recessions, precisely when consumption also falls. In the case of interest rate securities, investors who position themselves to profit when interest rates fall may expect to realize these gains in the midst of recessions. If there are enough investors willing to accept a negative return, on average, in exchange for this insurance-like feature, then the risk premiums should be negative. In alternative environments in which the federal funds rate may instead be higher than expected during recessions—for instance, if the FOMC raises rates to stem economic activity in an effort to stave off inflation pressures—then the risk premiums should be positive.

Figure 1 shows the key measure of covariance-based risk in this model, which is based on time-varying estimates of the co-movement between real activity and nominal measures.[2] The figure shows that the mean measure of covariance-based risk was positive until 2000, after which it turned negative following the 2001 recession. Following the financial crisis, it declined sharply and has only gradually become less negative since then. The model's term premium estimate, referred to as "macro-finance term premium," is shown by the thick green line in figure 2 at the six-month horizon (expressed in basis points per month). Also shown are term premium estimates from the staff's term structure model (the thin red line) and a survey-based measure (the blue dashed line).[3] The figure shows that the macro-finance term premium was close to 1 basis point per month up until 2000, after which it shifted to negative 1 basis point per month as a result of the shift in covariances shown in figure 1. Currently, the implied term premium is about negative 1½ basis points per month.[4]

Financial Markets

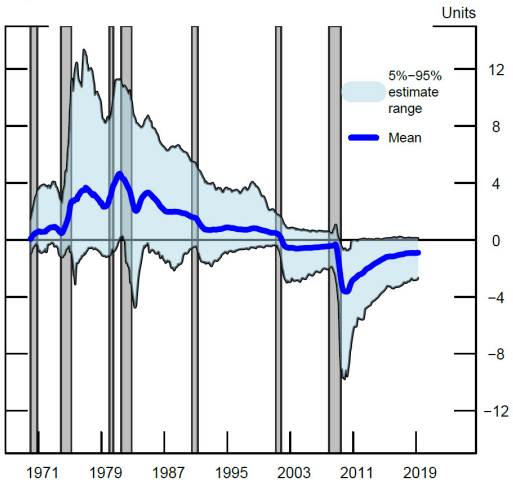
[1] Anthony Diercks and Uri Carl (2019), "A Simple Macro-Finance Measure of Risk Premia in Fed Funds Futures," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, January 8), https://doi.org/10.17016/2380-7172.2305. The staff's standard model is based on Marcel Priebsch (2017), "A Shadow Rate Model of Intermediate-Term Policy Rate Expectations," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, October 4), https://doi.org/10.17016/2380-7172.2056.

[2] The model uses changes in nonfarm payrolls and industrial production as real measures (and as proxies for consumption growth because of their monthly availability) and the federal funds rate and PCE-All and CPI-U measures of inflation as nominal measures. The model consists of a univariate regression framework and averages 120 covariance combinations of these two real and three nominal variables, as well as window lengths of 1 to 20 years over which to compute covariances.

[3] The survey-based term premium is the difference between federal funds futures and Blue Chip survey estimates for the same horizon.

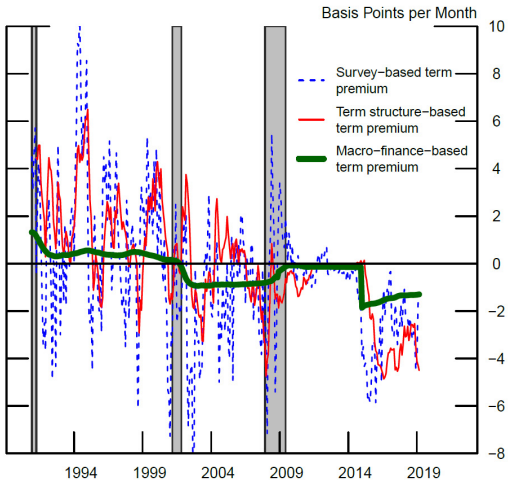
[4] Of note, the individual regressions in the model also include an indicator for the effective lower bound period. Although a zero term premium is not imposed during that period, the model nevertheless estimates a term premium of close to zero between 2010 and 2014. This estimate is consistent with forward guidance essentially pinning down short rates during that time period.

Figure 1: Measure of Covariance-based Risk*



*Covariance-based risk is estimated by the negative covariance between real activity and nominal measures.
Source: BLS; ICM.

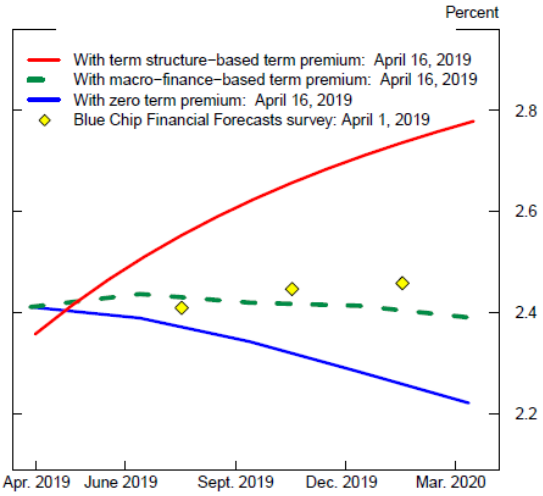
Figure 2: Measures of Term Premiums at 6-Month Horizon



Source: Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Financial Forecasts; CME Group.

Figure 3 shows the implications of the macro-finance model for the current path of the federal funds rate. A straight read from OIS contracts (the blue line) currently implies that the federal funds rate will decline 12 basis points by the end of 2019. In contrast, the staff's standard term structure model (the red line) suggests 29 basis points of tightening. By subtracting the term premium estimates of the macro-finance model from the straight read from OIS contracts, one can obtain an alternative estimate of the term premium–adjusted path for the near term. Such a path (the dashed green line) currently suggests no additional tightening through year-end. That said, the true expected path for the federal funds rate likely lies somewhere in the range of the red and green lines, as both the staff model and the macro-finance model embed model uncertainty. Furthermore, like all models, the macro-finance method is not without drawbacks. In particular, it mainly captures lower-frequency movements based on macro data that are only available monthly. Therefore, it has less to say about movements in risk premiums on a daily or intermeeting period basis than, for example, the staff's standard term structure model.

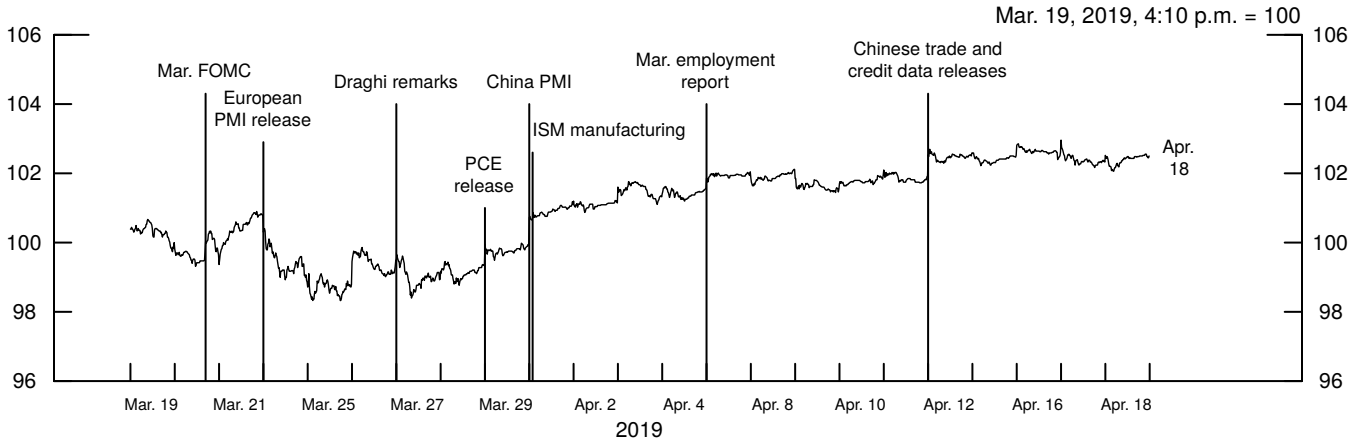
Figure 3: Implied Federal Funds Rate



Note: Zero term premium path is estimated using overnight index swap quotes with a spline approach and a term premium of zero basis points. The Blue Chip path is the average of respondents' expectations for the federal funds rate in the survey published April 1.
Source: Bloomberg; Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Financial Forecasts; Board staff calculations.

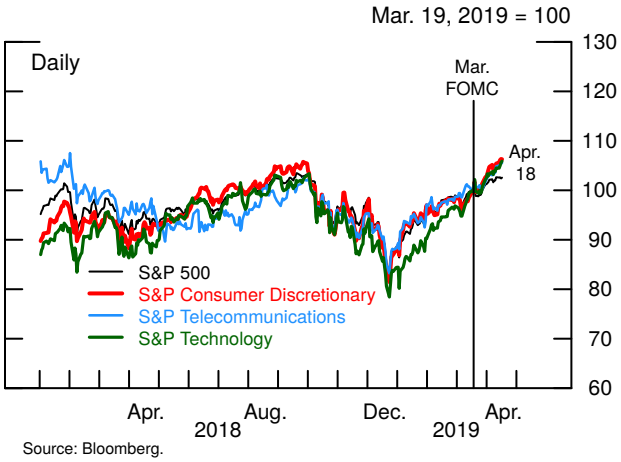
Corporate Asset Market Developments

Intraday S&P 500 Futures



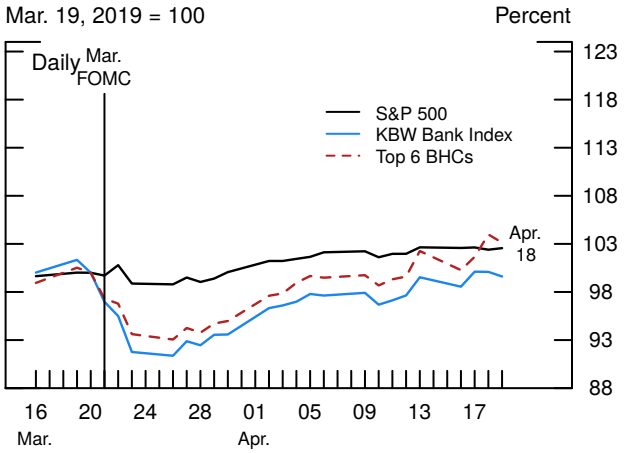
Note: Data are spaced at 5-minute intervals from 9:30 a.m. to 4:10 p.m.
Source: Bloomberg.

Selected S&P 500 Stock Price Indexes



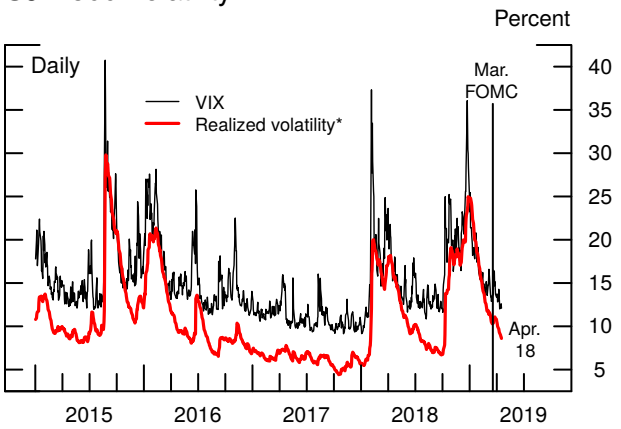
Source: Bloomberg.

Bank Stock Price Indexes



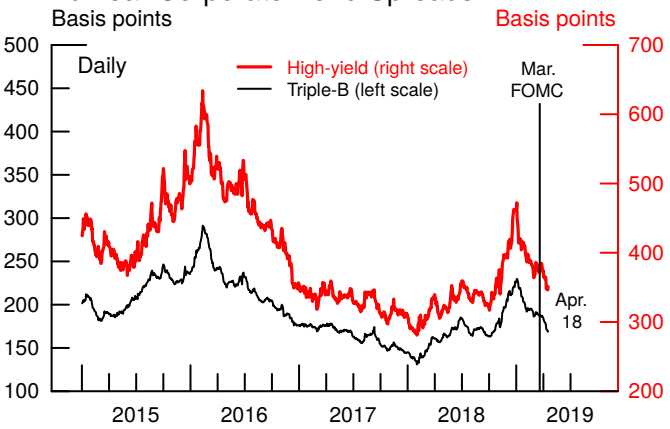
Note: Top 6 bank holding companies (BHCs) are Bank of America, Citi, Goldman Sachs, Morgan Stanley, JPMorgan Chase, and Wells Fargo.
Source: Bloomberg.

S&P 500 Volatility



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

10-Year Corporate Bond Spreads



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

Financial Markets

prices of firms in the consumer discretionary, telecommunications, and technology sectors outperformed the broader market. In the days immediately following the March FOMC meeting, bank stock prices fell markedly, reportedly as a result of increased concerns about yield curve inversion and lower interest rates; however, prices subsequently retraced, partly in response to strong first-quarter earnings reports at some of the largest banks, and ended the intermeeting period a bit higher on net. One-month-ahead option-implied volatility on the S&P 500 index (VIX) decreased over the intermeeting period and now stands near the 17th percentile of its historical range.

Yields on both investment- and speculative-grade corporate bonds continued to decline. Spreads on yields of both investment- and speculative-grade corporate bonds over those of comparable-maturity Treasury securities narrowed 18 basis points and 20 basis points, respectively. Having mostly retraced from their elevated levels late last year, both spreads remained below their respective historical medians.

FOREIGN DEVELOPMENTS

Although disappointing data from the euro area weighed on risk sentiment, foreign equity prices increased modestly, on net, amid optimism around trade negotiations between the United States and China and stronger-than-expected Chinese data. Ongoing Brexit developments had limited effects on global asset prices.

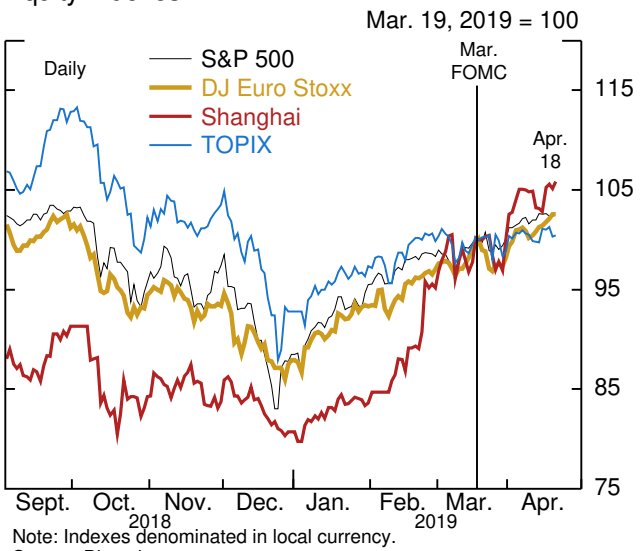
FOMC communications and a significantly worse-than-expected German manufacturing PMI release weighed on government bond yields in advanced foreign economies (AFEs) early in the intermeeting period. Communications by the ECB suggesting that it may consider deposit tiering to mitigate the effect of negative interest rates on bank profitability also contributed to the declines, as this policy could take the ECB deposit rate further into negative territory or imply a longer period of low interest rates. AFE yields largely retraced amid strength in U.S. and Chinese data and, on balance, edged higher, although not in Germany. Additionally, inflation compensation for the 5-to-10-year horizon in the euro area declined 9 basis points and reached its lowest level since 2016, in part reflecting increased downside risks to the outlook, especially given limited policy space for the ECB.

The broad dollar index was little changed, on net, over the intermeeting period. Despite the decline in U.S. interest rates, the dollar rose nearly 1 percent against AFE currencies in light of weak data in those economies. The British pound remained

Recent International Developments

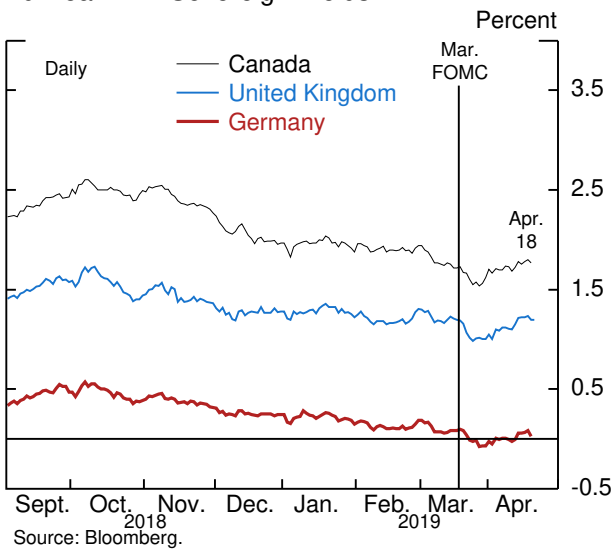
Financial Markets

Equity Indexes



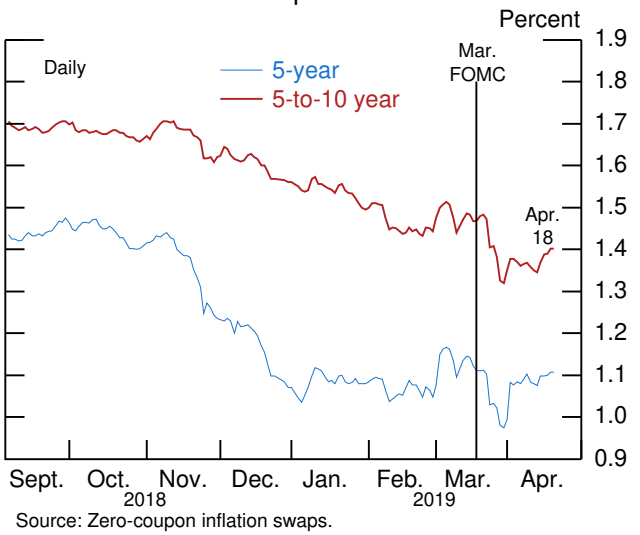
Note: Indexes denominated in local currency.
Source: Bloomberg.

10-Year AFE Sovereign Yields



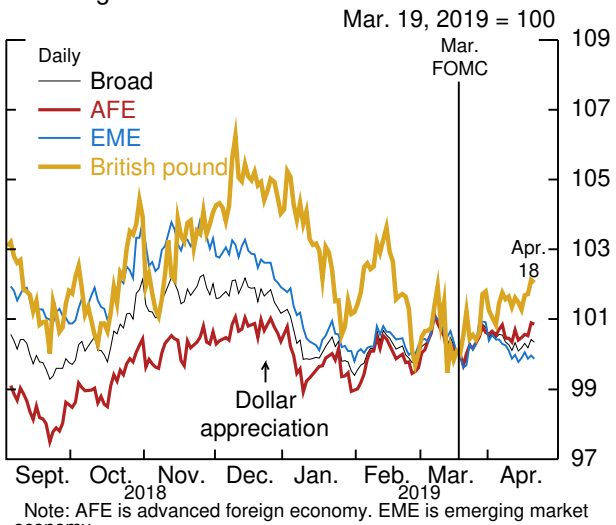
Source: Bloomberg.

Euro-Area Inflation Compensation



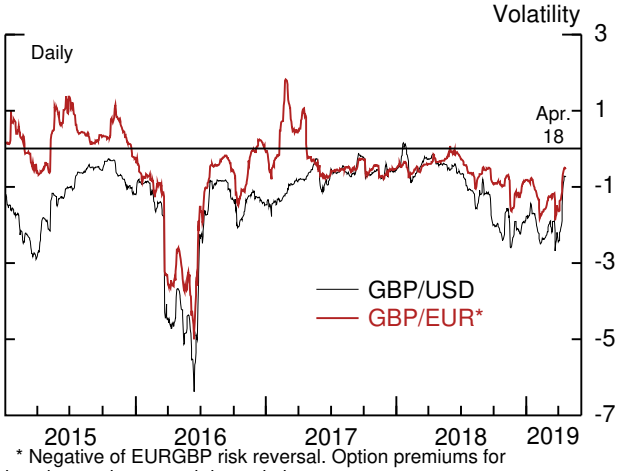
Source: Zero-coupon inflation swaps.

Exchange Rates



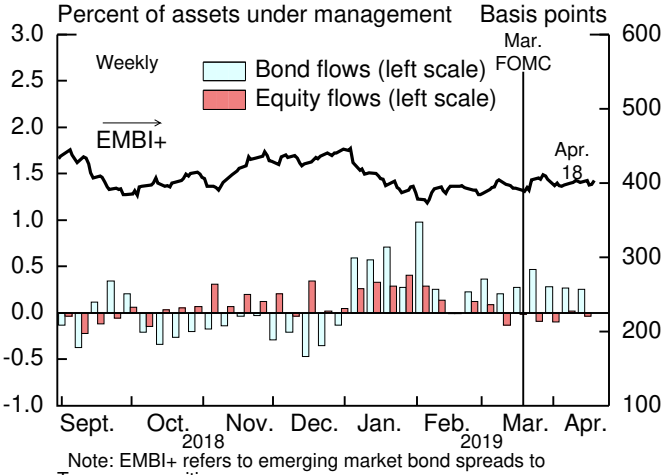
Note: AFE is advanced foreign economy. EME is emerging market economy.
Source: Bloomberg; Federal Reserve Bank of New York; Board staff calculations.

3-Month FX Risk Reversals



* Negative of EURGBP risk reversal. Option premiums for insuring against pound depreciation.
Source: Bloomberg.

EME Spreads and Fund Flows*



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

sensitive to Brexit developments and appreciated modestly in the days leading up to the extension of the Brexit deadline; the pound rose on news of the extension before subsequently drifting down, while option-implied measures of pound volatility declined sharply. On net, the pound weakened about 2 percent over the intermeeting period.

The dollar was little changed, on average, against emerging market economy (EME) currencies, as a small decline against the Mexican peso offset much larger increases against several highly vulnerable EMEs with much smaller weights in our dollar index. Pronounced political and policy uncertainties led to a significant tightening of financial conditions in Turkey, Argentina, and, to a lesser extent, Brazil, but spillovers to other emerging markets were limited, and emerging market credit spreads were little changed. Following strong inflows to dedicated emerging market funds earlier this year, flows slowed over the intermeeting period.

SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Over the intermeeting period, conditions in domestic short-term funding markets remained stable.[2] The effective federal funds rate (EFFR) printed mostly at 2.41 percent, 1 basis point above IOER, but rose a little following the federal income tax deadline on April 15. A similar dynamic has been observed around tax dates in previous years and may be related to banks experiencing temporary deposit outflows. Spreads on commercial paper and negotiable certificates of deposits changed little across most tenors. On the March quarter-end, the EFFR and the secured overnight funding rate rose 2 basis points and 22 basis points, respectively, from the previous day but quickly reverted in the following days.[3]

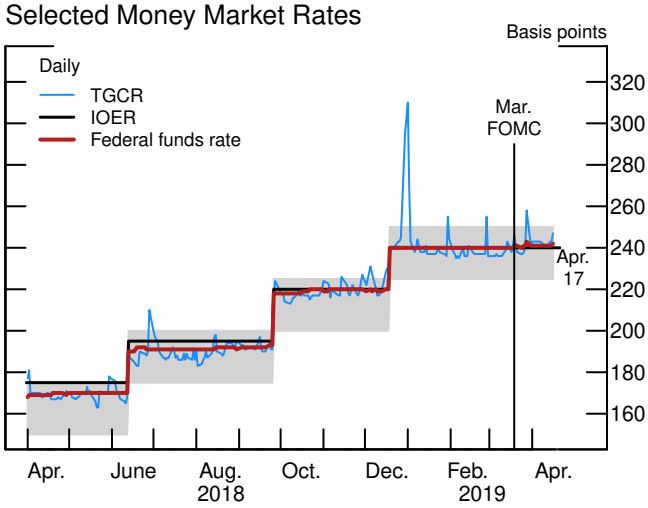
In anticipation of April tax receipts, the Treasury reduced Treasury bills outstanding by $83 billion between April 1 and April 18. The negative net bill issuance had minimal effects on repo rates or Treasury funding costs.

[2] Overnight reverse repo program take-up remained low, averaging less than $1 billion over the intermeeting period. The update to the Policy Normalization Principles and Plans at the March FOMC meeting was forecast to increase reinvestments in Treasury securities by $148 billion in 2019.

[3] This was the first time the EFFR increased on a month-end since 2013. Previous pressure for the EFFR to decline on month-ends was eliminated in 2018, when European regulators reportedly encouraged banks to move to daily averaging of balance sheets rather than month- or quarter-end reporting of balances. Month-end changes may now be partly driven by banks subject to modified LCR calculations on month-ends.

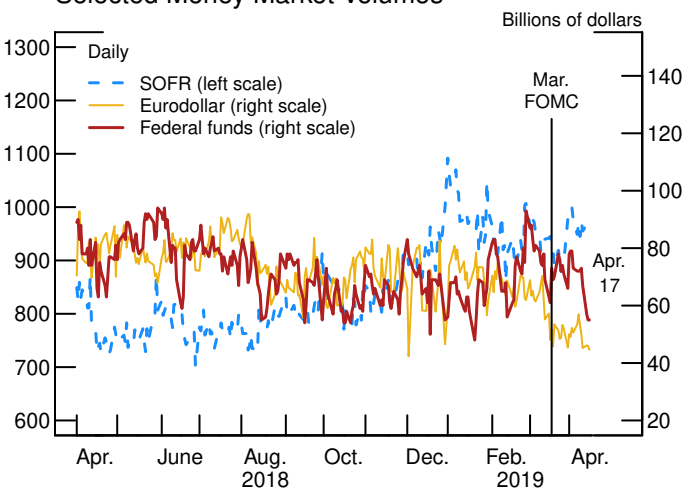
Short–Term Funding Markets

Selected Money Market Rates



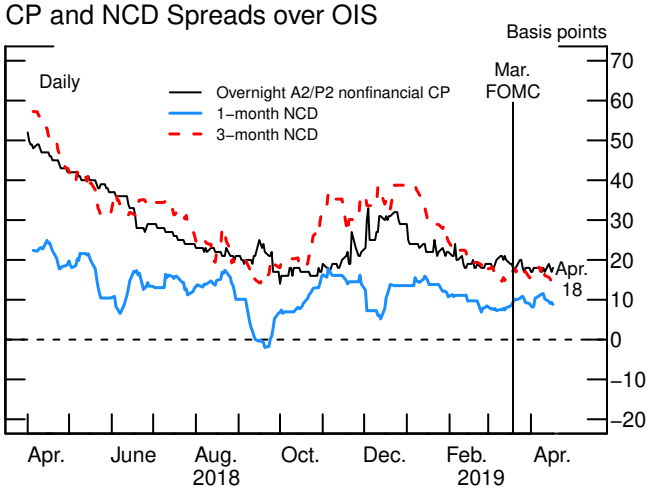
Note: Federal funds rate is a weighted median. Shaded area is the target range for the federal funds rate. IOER is interest on excess reserves. TGCR is triparty general collateral rate.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

Selected Money Market Volumes



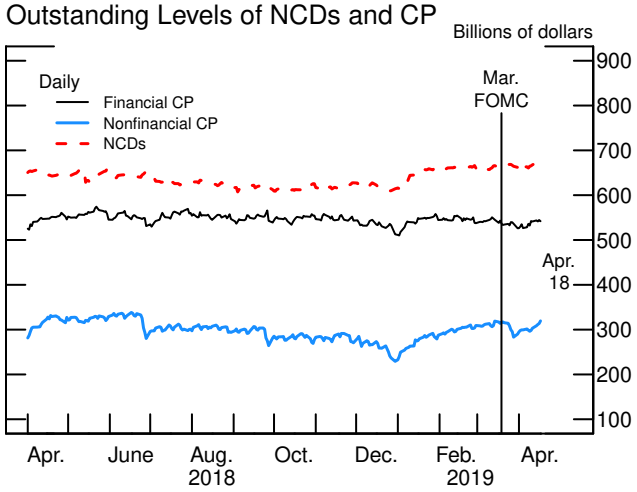
Note: SOFR is Secured Overnight Financing Rate.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

CP and NCD Spreads over OIS



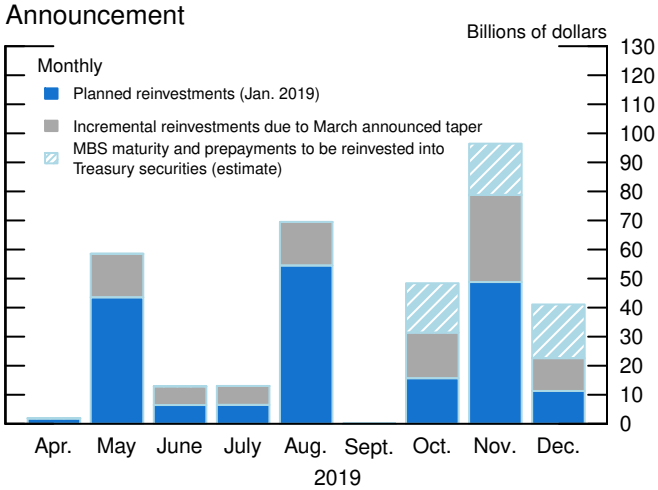
Note: CP is commercial paper; NCD is negotiable certificate of deposit. Overnight CP spread is to federal funds rate. 3–month NCD spread is computed as a 5–day moving average.
Source: Depository Trust & Clearing Corporation.

Outstanding Levels of NCDs and CP



Note: CP is commercial paper; NCD is negotiable certificate of deposit. Levels are not seasonally adjusted and include both foreign and domestic issuers. The chart considers only outstanding NCDs maturing in one year or less.
Source: Depository Trust & Clearing Corporation.

Fed Reinvestments Before and After March 2019 Announcement



Note: There are no anticipated reinvestments in September 2019.
Source: Board staff estimates as of April 2019.

Financial Markets

Financing Conditions for Businesses and Households

Information received over the intermeeting period indicates that financing conditions for businesses and households eased a bit, on balance, and remained generally supportive of spending.

- Gross issuance of corporate bonds and of new-money institutional leveraged loans was strong in March.
- Growth of C&I loans on banks' books remained robust, and, according to the April 2019 SLOOS, large U.S. banks continued to ease their lending standards and terms on C&I loans over the first quarter.
- CMBS issuance and growth of CRE loans on banks' books remained solid through March.
- Home mortgage rates declined about 5 basis points, on net, and home-purchase mortgage originations increased in February.
- Consumer credit conditions remained generally supportive of spending. However, in the credit card market, interest rates rose, and, for some consumers, standards reportedly tightened.
- Measures of financial conditions indexes support our assessment of continued improvement in financial conditions over the intermeeting period.

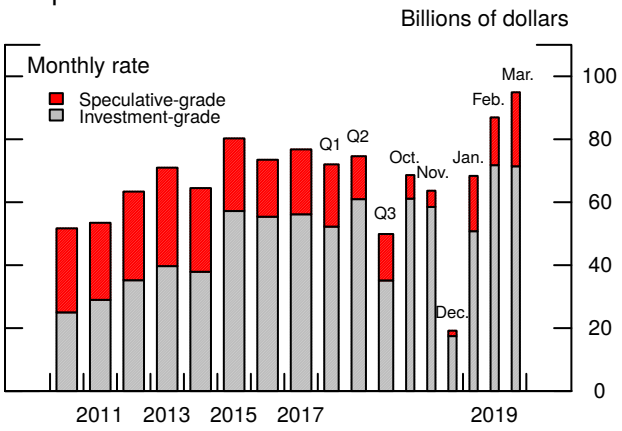
BUSINESS FINANCING CONDITIONS

Nonfinancial Corporations

Financing conditions for nonfinancial firms continued to ease over the intermeeting period and were generally accommodative. Gross issuance of investment- and speculative-grade corporate bonds remained solid in March, as corporate bond spreads narrowed and risk sentiment continued to improve. New-money leveraged loan issuance was also solid in March. However, the volume of leveraged loan refinancings continued to be muted, in line with still somewhat elevated levels of leveraged loan spreads.

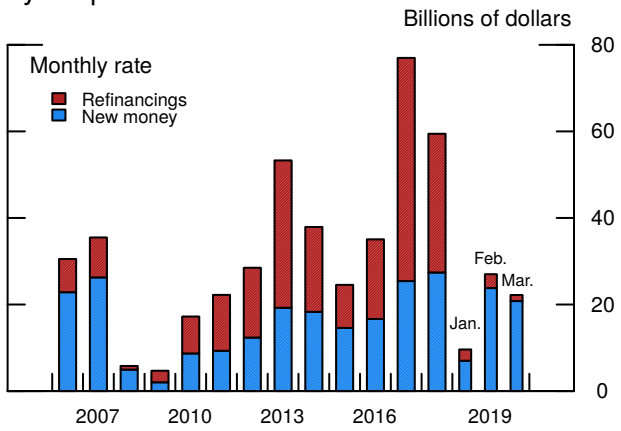
Business Finance

Gross Issuance of Nonfinancial Corporate Bonds



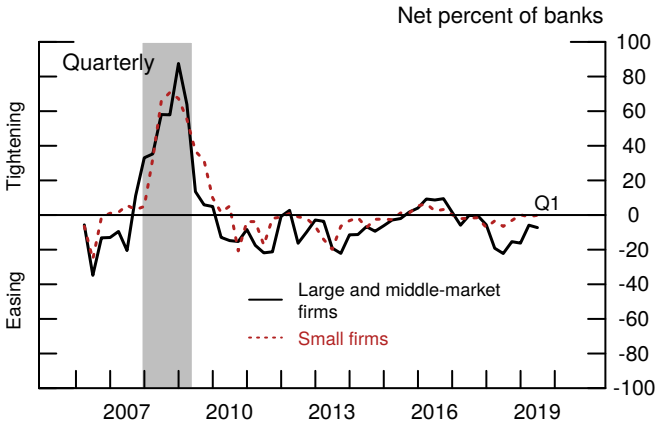
Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
Source: Mergent Fixed Income Securities Database.

Institutional Leveraged Loan Issuance, by Purpose



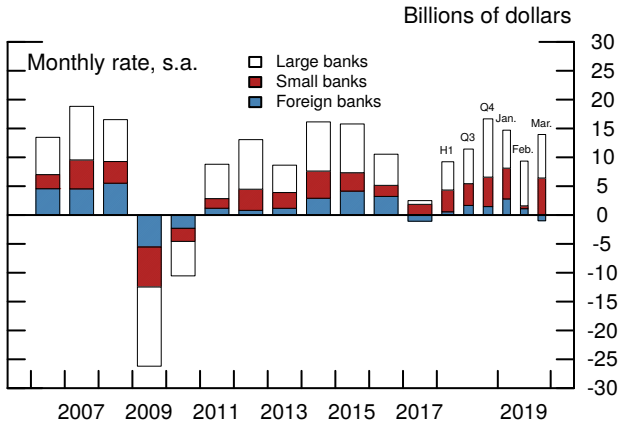
Note: The annual bars are divided by 12 to arrive at monthly averages.
Source: Thomson Reuters LPC.

Standards for C&I Loans



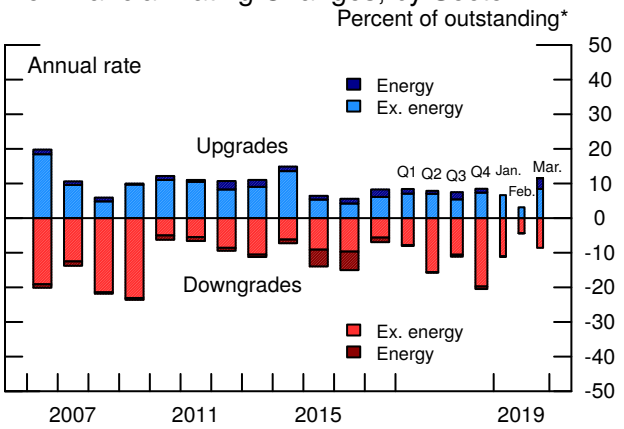
Note: C&I is commercial and industrial. Banks' responses are weighted by the outstanding amount of C&I loans on their balance sheets at the end of the previous quarter. The shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS).

Commercial and Industrial Loans



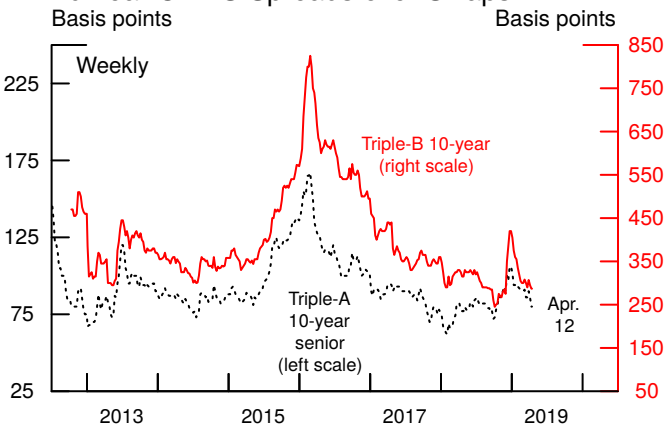
Note: Yearly rates are Q4 to Q4; half-years are based on Q4 and Q2 average levels; quarterly and monthly annual rates use corresponding average levels. Large banks are defined as the largest 25 banks by assets.
Source: Federal Reserve Board, FR 2644, Weekly Report of Selected Assets and Liabilities of Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Nonfinancial Rating Changes, by Sector



* Computed as a percent of nonfinancial bonds outstanding.
Source: Board staff calculations using Moody's ratings from Mergent Fixed Income Securities Database.

10-Year CMBS Spreads over Swaps



Note: CMBS is commercial mortgage-backed securities.
Source: J.P. Morgan.

Financing Conditions

In the April 2019 SLOOS, large U.S. banks indicated that, over the first quarter, they had eased their standards and most terms for C&I loans to large and middle-market firms while experiencing weaker demand for such loans. Meanwhile, growth of C&I loans on banks' books increased over the first quarter from an already robust fourth-quarter pace, reportedly boosted by loans used to complete a large merger.

Gross equity issuance from both initial and seasoned offerings picked up in March following their subdued activity early in the year. The IPO market had a high-profile offering in March, and more IPOs are expected over the next few months.

The credit quality of nonfinancial corporations appears to have improved, on balance, after deteriorating somewhat in recent months. The volume of nonfinancial corporate bond upgrades slightly outpaced that of downgrades in March, and expected year-ahead default rates decreased a bit in March and so far in April.

Small Business

Available data suggest that credit conditions for small businesses remained relatively accommodative. Banks in the SLOOS reported little change in standards on loans to small businesses over the first quarter, on net, while small business loan originations ticked up in February. In addition, survey evidence suggests that small business optimism ticked up in March following several months in which it had declined.

Indicators of recent loan performance remained strong. Delinquencies on small business loans rose a bit over recent months but stayed well below their historical means.

Commercial Real Estate

Financing conditions remained generally accommodative for CRE lending. Agency and non-agency CMBS issuance remained strong through March, and CMBS spreads were about flat over the intermeeting period, with spreads staying near the low end of their post-crisis range.

CRE loans on banks' books continued to grow in the first quarter but at a somewhat slower pace than in recent quarters. Consistent with slower bank loan growth, banks in the April SLOOS reported experiencing weaker demand while tightening credit standards for such loans over the first quarter.

How Did Banks Manage Their Leveraged Loan Pipelines during the Market Turmoil in Late 2018?

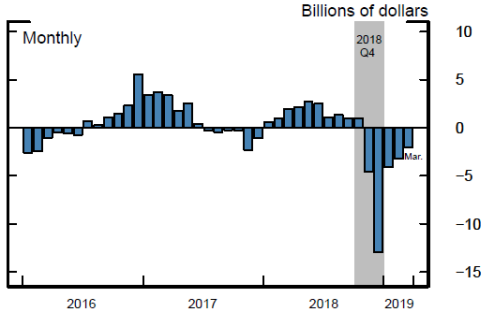
In the primary market for leveraged loans, arranging banks typically form a syndication and place a substantial fraction of loans with institutional investors. When banks struggle to attract enough investor interest for loans they have committed to underwrite, the size of their underwriting pipelines can increase unexpectedly, reducing their balance sheet capacity and potentially discouraging them from arranging new syndicated loans or making other types of loans.[1] Thus, the size of banks' leveraged loan pipelines can have important implications for financing conditions for a wide range of borrowers.

In this discussion we present evidence consistent with arranging banks actively reducing the size of their pipelines toward the end of last year, largely in response to the weakening of the demand for leveraged loans by institutional investors. We argue that, while the reduction in pipelines might have temporarily amplified the price declines in the leveraged loans market, it potentially helped avoid prolonged credit supply disruptions.

In late 2018, credit market conditions worsened considerably and investor risk sentiment deteriorated. Open-ended bank loan mutual funds, which held about 15 percent of institutional leveraged loans outstanding, experienced large net redemptions from investors in the last two months of 2018 (figure 1), leaving investors' demand in the new issue market substantially weaker. Market anecdotes suggest that some banks struggled to place loans, raising concerns of outsized bank pipelines and posing risks to future financing conditions.

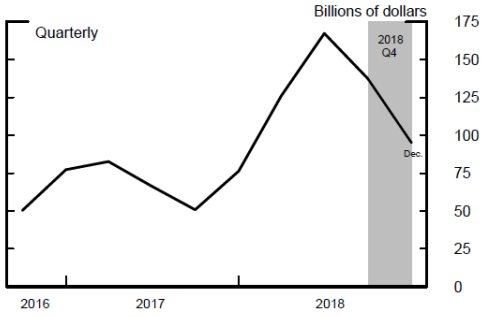
Contrary to these concerns, figure 2 shows that banks managed to end the year with significantly smaller pipeline positions than the levels seen in the middle of the year. In addition to reflecting weaker demand for credit from borrowing firms, the decline in pipelines also appeared to reflect active management of pipeline risks by banks during this period.

Figure 1: Bank Loan Mutual Fund Net Flows



Source: Investment Company Institute.

Figure 2: Leveraged Loan Pipeline



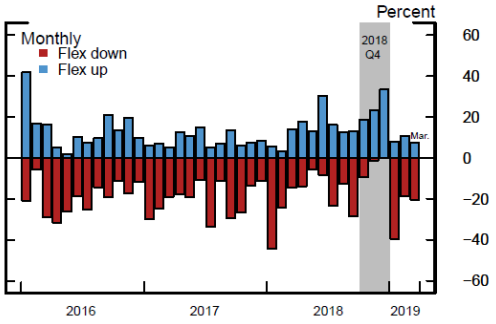
Source: Federal Reserve Board, FR Y−14, Capital Assessments and Stress Testing Information.

[1] Leveraged pipeline loans refer to loans in the syndication process that have not been funded. These loans remain in the pipeline until they are issued or withdrawn from the primary market. Arranging banks often guarantee at least part of these loans, especially for loans related to acquisitions.

Banks that originate leveraged loans with an intent to place some fraction with institutional investors have an obvious incentive to manage pipelines, especially when investor demand for leveraged loans is weakening. Standard origination arrangements often give banks a range of options to do so: They can adjust the spreads on loans (spread flex), mark up or down the issuance prices relative to par (Original Issuance Discounts flex, or OID flex), or pull loans from the market.[2] As shown in figure 3, the fraction of loans with upward spread flexes (blue bars)—those with increases in loan spreads during the syndication process—rose from 13 percent in September 2018 to 33 percent in December 2018. Similarly, the fraction of upward OID flexes increased from 7 percent to 53 percent in the same period (blue bars, figure 4). Moreover, the fraction of pulled loans relative to launched loans (not shown) picked up notably at year-end. A regression analysis suggests that arranging banks that reported more upward spread and OID flexes or pulled more loans from the market also saw larger declines in their pipelines, consistent with them actively managing their pipelines.

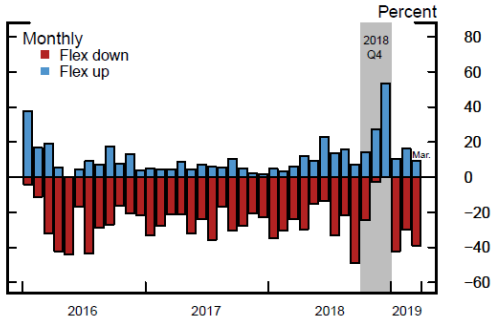
In the short run, banks' active pipeline management may potentially amplify price declines and reduce credit supply during market downturns. For example, the monthly average loan spread for B-rated loans at the time of issuance (not shown) increased to 507 basis points in December 2018 after staying under 400 basis points for over a year. However, this precautionary behavior by banks should help avoid prolonged credit supply disruptions and limit further amplifications of credit cycle fluctuations.

Figure 3: Spread Flex Activity, by Count



Note: Flex down (up) is defined as the fraction of institutional leveraged loans that have a reduction (increase) in spreads during the syndication process.
Source: S&P LCD.

Figure 4: OID Flex Activity, by Count

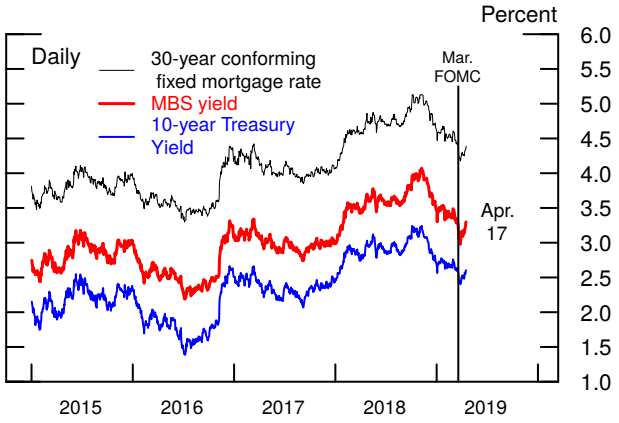


Note: Flex down (up) is defined as the fraction of institutional leveraged loans that have a reduction (increase) in original issue discount (OID) during the syndication process.
Source: S&P LCD.

[2] When investor demand is weak, banks can widen issuance spreads and increase OIDs, which mark down loan prices further away from par value, to help attract investors. Widening of issuance spread and increasing OID is called "flex up," and narrowing of issuance spread and decreasing OID is called "flex down."

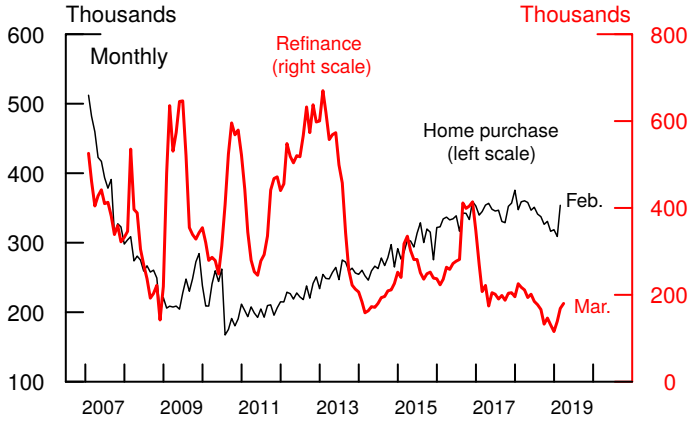
Household Finance

Mortgage Rate and MBS Yield



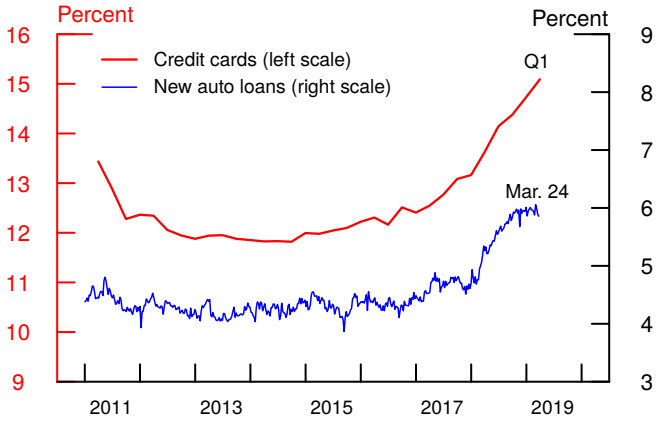
Note: The mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate.
Source: For MBS yield, Barclays; for mortgage rate, Loansifter.

Purchase and Refinance Originations



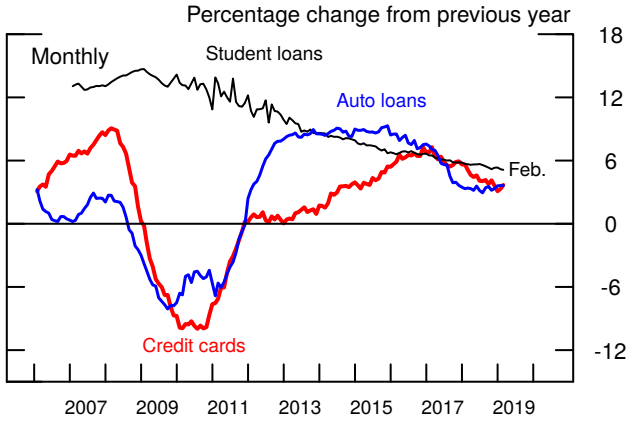
Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values through 2017, data reported under the Home Mortgage Disclosure Act of 1975; for values from 2018 onward, staff estimates.

Consumer Interest Rates



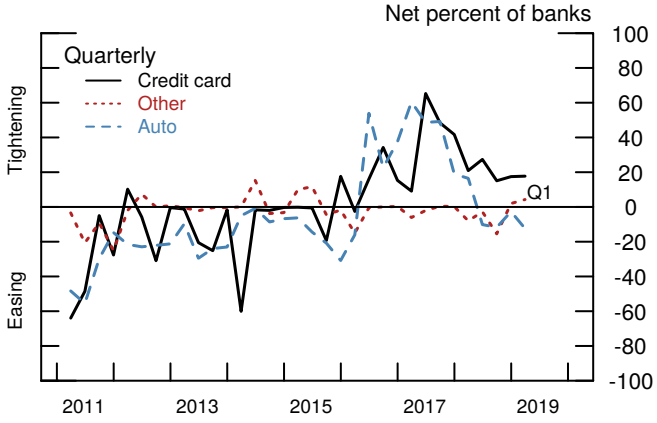
Note: Credit card data reflect rates at commercial banks on all credit card plans; data are reported quarterly and not seasonally adjusted. Auto loans data are reported weekly and seasonally adjusted.
Source: For credit cards, Federal Reserve Board; for auto loans, J.D. Power.

Consumer Credit



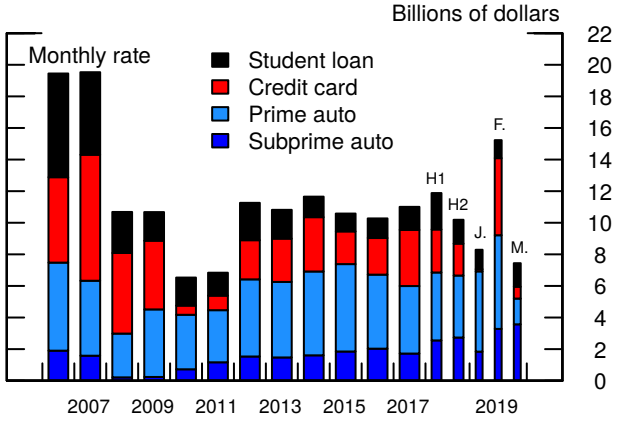
Source: Federal Reserve Board.

Standards for Consumer Loans



Note: Banks' responses are weighted by the outstanding amount of the relevant loan categories on their balance sheets at the end of the previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS).

Gross Consumer ABS Issuance



Source: Merrill Lynch; Bloomberg.

Financing Conditions

However, taking a longer-term view, banks, in response to a set of special questions in the SLOOS regarding changes to their CRE lending policies over the past year, reported easing their terms on CRE loans, including offering lower loan spreads and larger maximum loan sizes on net. The vast majority of banks that eased CRE credit policies over the past year cited more aggressive competition from other institutions as an important reason for doing so.

MUNICIPAL GOVERNMENT FINANCING CONDITIONS

Credit conditions in municipal bond markets remained accommodative over the intermeeting period. Gross issuance of municipal bonds was solid in March, with new capital-raising accounting for the majority of the issuance. Municipal bond yields in both the secondary and primary markets decreased roughly in line with yields on Treasury securities. In March, the credit quality of general obligation bonds continued to improve, as the number of credit rating upgrades strongly outpaced that of downgrades.

HOUSEHOLD FINANCING CONDITIONS

Residential Real Estate

Financing conditions in the residential mortgage market eased a bit over the intermeeting period, as the rate on 30-year conforming mortgages edged down about 5 basis points on net. Mortgage rates have fallen about 75 basis points since their peak in November and are now at levels comparable with those in early 2017. Likely in response to these lower rates, home-purchase mortgage originations increased in February after having declined steadily over the past year. Mortgage refinancing activity also increased, though it remains at historically low levels.

Taking a longer-term view, for borrowers with low credit scores, access to mortgage credit has been gradually improving over the past five years. Loosening standards on government-insured mortgages have raised concerns within the Federal Housing Administration (FHA), which took steps in March to tighten standards on such mortgages. In particular, the FHA will now require a more intensive underwriting process for some loans with higher risk characteristics. One FHA official estimated that the number of affected loans each year would be about 4 to 5 percent of the recent annual volume of FHA mortgage originations, which are themselves about 20 percent of total mortgage originations.

Consumer Credit

Available data continue to suggest that financing conditions in consumer credit markets have generally remained accommodative of growth in consumer spending. Auto loan balances continued to increase at a moderate pace through February, as interest rates on auto loans moved sideways, and a modest net fraction of banks in the SLOOS reported having eased their standards on such loans in the first quarter. Credit card balances grew at a fairly tepid pace over the past few months amid rising credit card interest rates and a reported further tightening of credit card lending standards by banks, as indicated in the April SLOOS.

Consumer ABS markets remained stable over the intermeeting period. Spreads were mostly unchanged, and issuance continued to be robust during the first quarter amid some monthly volatility.

FINANCING CONDITIONS INDEXES

As shown in the appendix to this Tealbook section, a staff index that provides a measure of financing conditions for nonfinancial corporations indicates that conditions continued to ease over the intermeeting period. The staff index is now at a similar level to where it stood before the September 2018 FOMC meeting. The easing in financing conditions since the beginning of the year is consistent with the decline in corporate spreads and the increase in equity prices over the same period. Other publicly available financial conditions indexes, which aggregate a large set of financial variables into a summary series, have also eased, on net, since the beginning of the year. These indexes indicate that broad financial conditions are either accommodative or close to a neutral level relative to historical standards.

Appendix

Technical Note on Financial Conditions Indexes

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

Overview of Selected FCIs

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

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

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

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

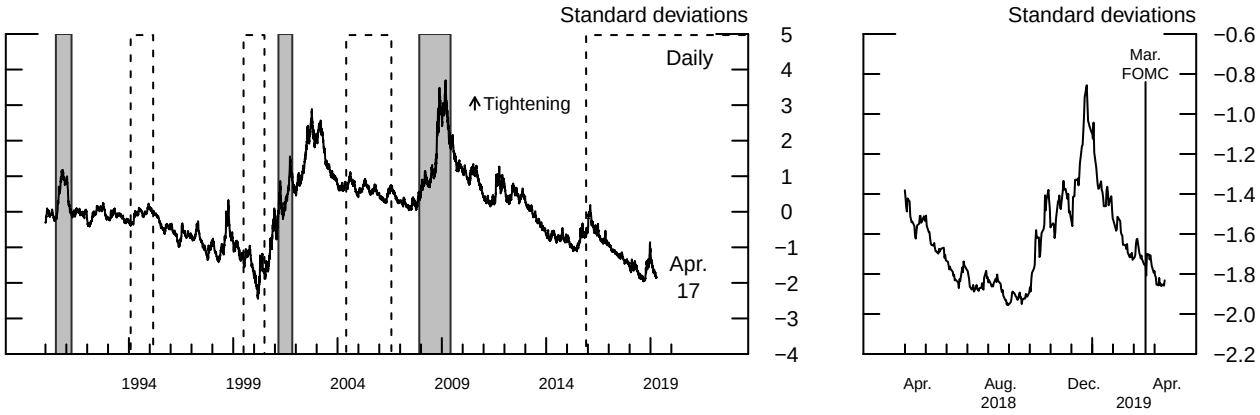
The other FCIs are constructed by aggregating a large set of financial variables into a summary series using various statistical methods. While these indexes provide a useful summary of broad financial market developments, the movements in these indexes may reflect both changes in financing conditions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

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

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

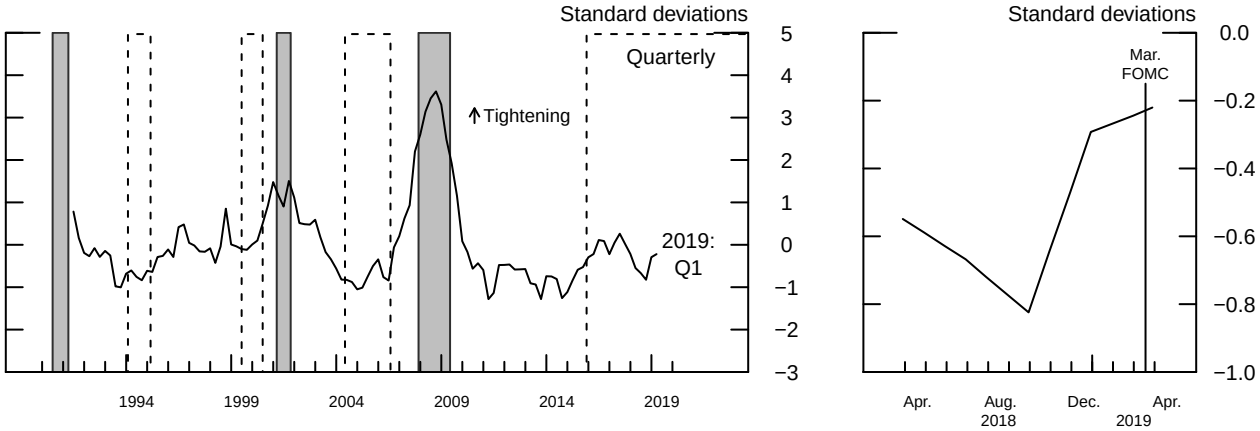
Selected Financial Conditions Indexes

Staff FCI for Nonfinancial Corporations



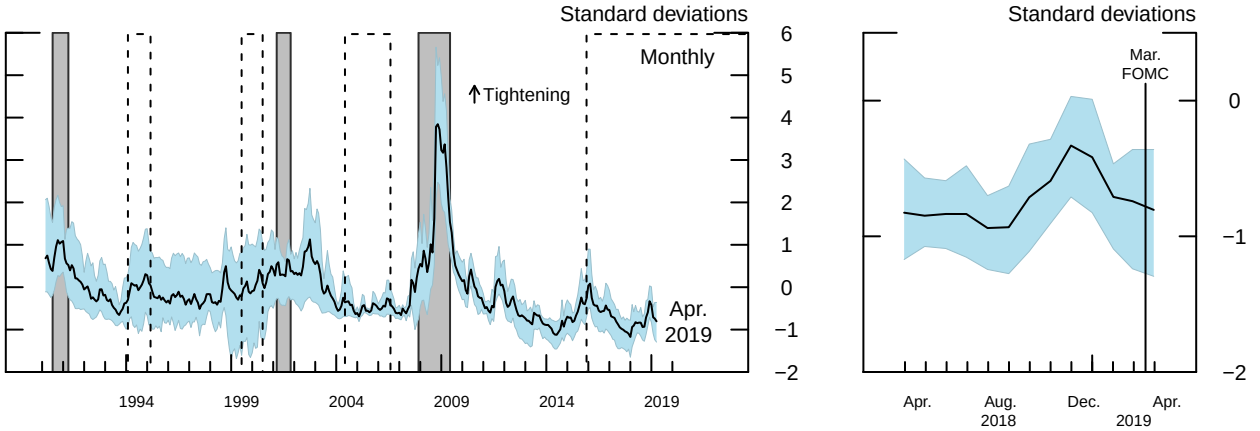
Note: The financial conditions index (FCI) is the deviation from the long−run relation between the systematic components of the cumulative log returns of 2 portfolios of firms with credit ratings above and just below investment grade. The systematic components are derived from the 5−factor Fama−French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

SLOOS Bank Lending Standards Index



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

Mean and Range of External FCIs

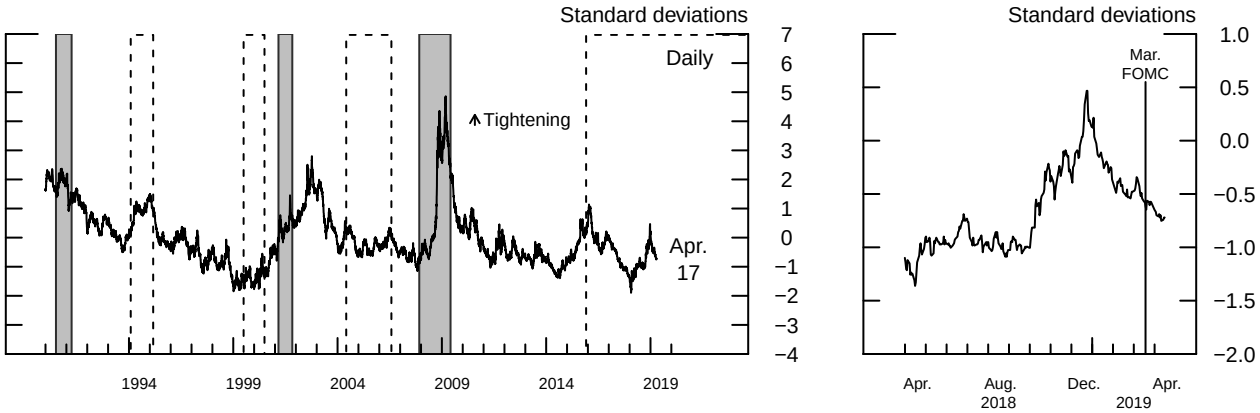


Note: Mean FCI represents the mean of FCIs developed by Goldman Sachs and the Federal Reserve Banks of Chicago, St. Louis, and Kansas City. The blue shaded region represents the range of these 4 standardized FCIs.
Source: Bloomberg; The Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

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.

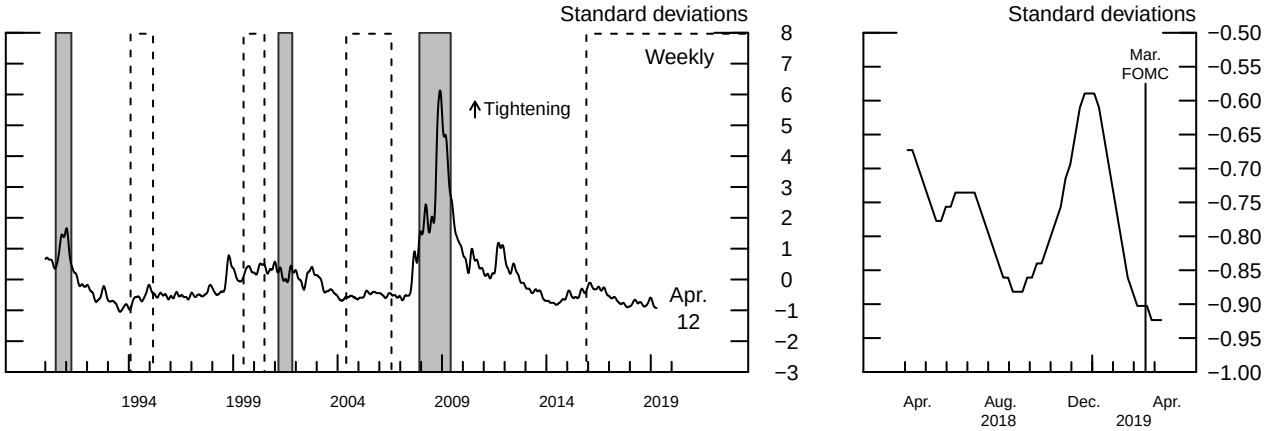
Selected Financial Conditions Indexes (continued)

Goldman Sachs FCI



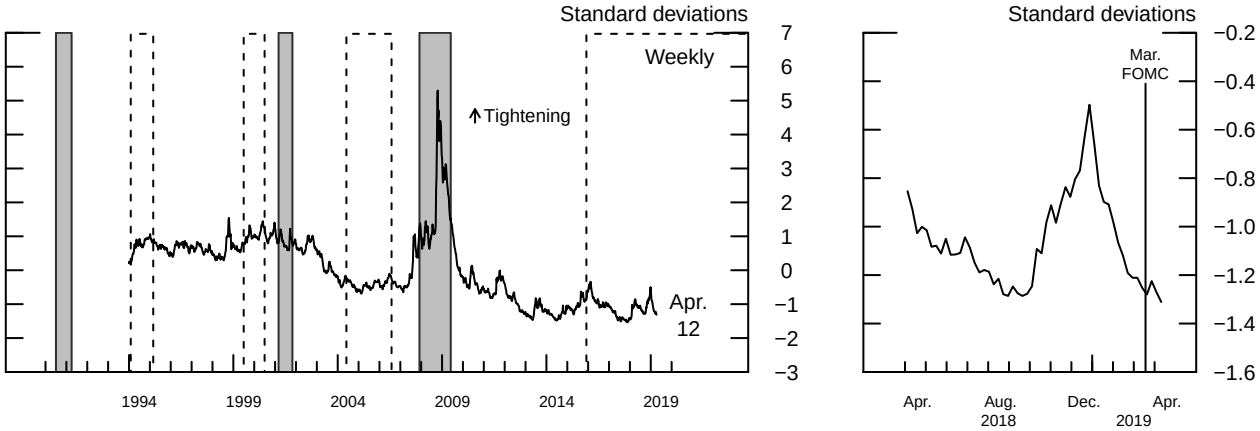
Note: The index is a weighted average of 5 financial variables: the federal funds rate, the 10−year Treasury yield, the triple−B yields spreads to Treasury, the S&P price−to−earnings ratio, the broad value of the U.S. dollar. Weights are pinned down by the contribution of each financial variable on real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

Chicago Fed NFCI



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

St. Louis Fed Financial Stress Index

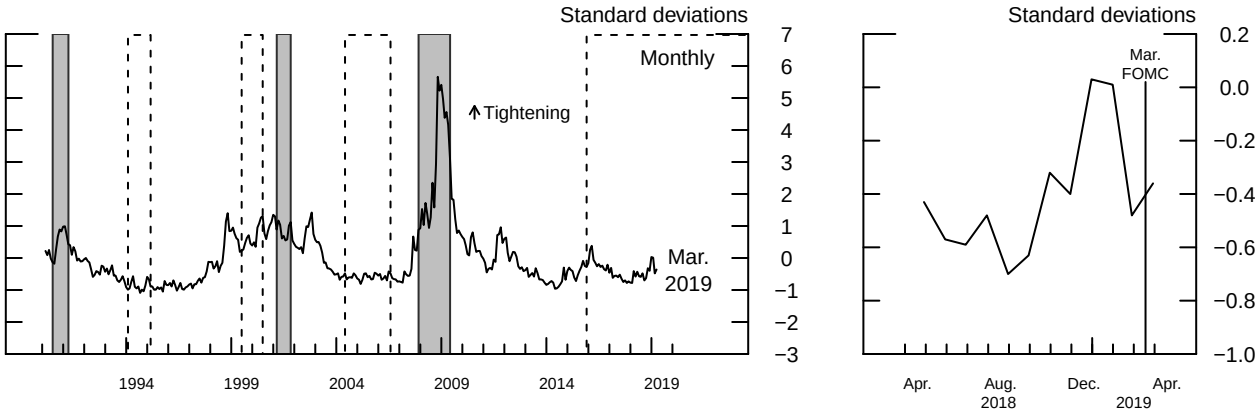


Note: The index is the principal component of 18 variables including short− and long−term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index.
Source: Federal Reserve Bank of St. Louis.

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

Selected Financial Conditions Indexes (continued)

Kansas City Fed Financial Stress Index



Note: The index is the principal component of 11 financial variables including short− and long−term interest rates, corporate and consumer yield spreads, the VIX, and 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

As in past Tealbooks, we view the risks to our forecast for economic activity and inflation as balanced over the next year but skewed to the downside thereafter.

Beginning with our assessment for the next year, we continue to view the uncertainty around the staff forecast of economic activity as being in line with the average over the past 20 years, the benchmark used by the FOMC. In addition, we still judge the upside and downside risks around our modal projections for real GDP growth and the unemployment rate over the next year as being balanced. On the upside, the underlying fundamentals for household spending and business investment remain solid—bolstered, in part, by the 2017 tax cuts—with strong labor market conditions, favorable financial conditions, and upbeat readings on consumer sentiment. In these circumstances, consumer spending and investment could expand at a pace similar to last year, which would be faster than in the staff projection. On the downside, the softening in a number of economic indicators since late last year could be the leading edge of a more persistent and substantial deterioration in economic activity. In addition, foreign economic developments and trade policies could move in directions that have significant negative effects on U.S economic growth.

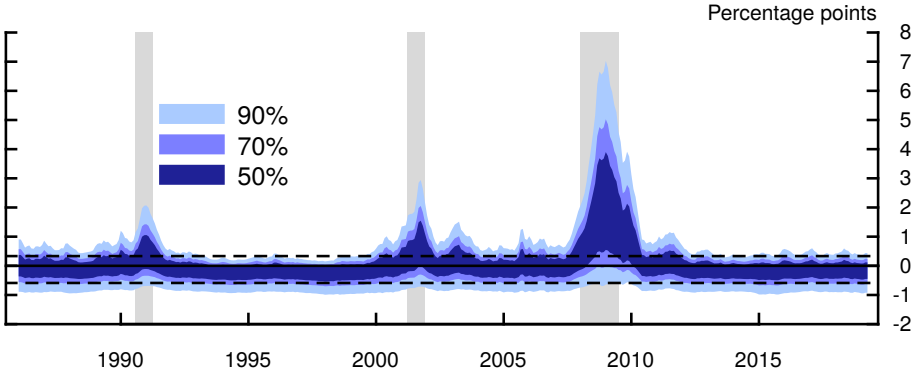
This assessment is consistent with the four-quarter-ahead estimates of forecast risks around GDP growth and the unemployment rate, presented in the exhibit "Time-Varying Macroeconomic Risk 1 Year Ahead," which are not unusually wide or skewed. In addition, as shown in the bottom table of the "Assessment of Key Macroeconomic Risks" exhibit, with the notable exception of the term spread model, estimates of the probability of moving into recession over the next year are lower than the unconditional recession probability of 23 percent.

We remain concerned about downside risks to our economic projection beyond a year ahead, given the historically low unemployment rate projected over the medium term. As discussed in the box "Conditional Distributions of Macroeconomic Variables Two Years Ahead," the estimated distributions are currently skewed to the upside for the unemployment rate

Risks & Uncertainty

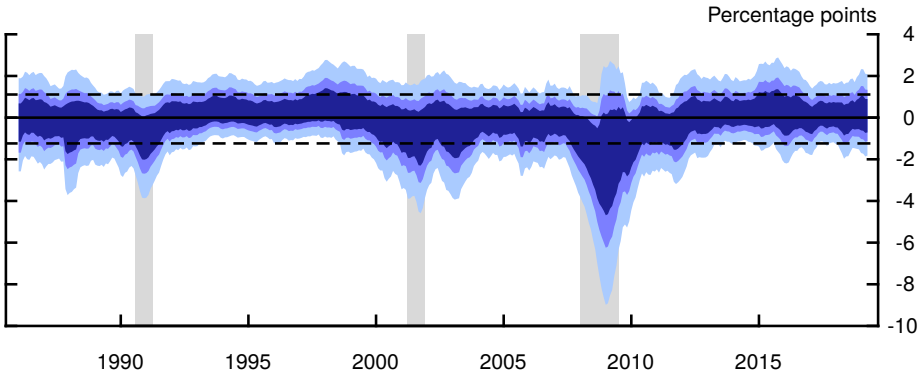
Time-Varying Macroeconomic Risk 1 Year Ahead

Unemployment Rate



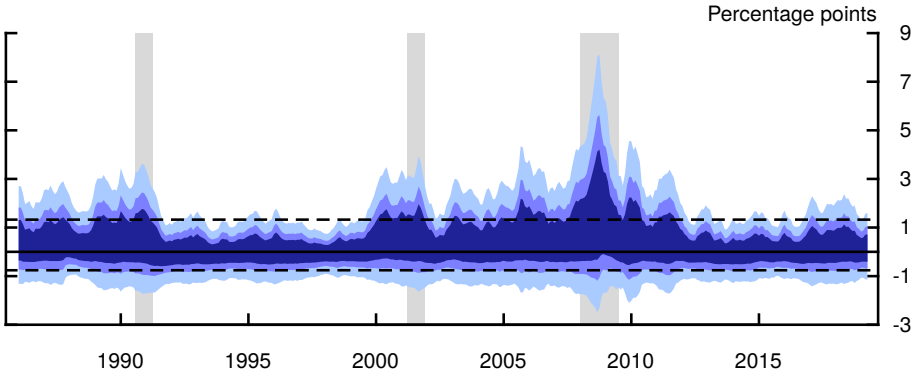
April 2019	
95th	.4
85th	.2
50th	- .1
15th	- .6
5th	- .9

GDP Growth



April 2019	
95th	2.1
85th	1.3
50th	.1
15th	-1.1
5th	-1.8

CPI Inflation

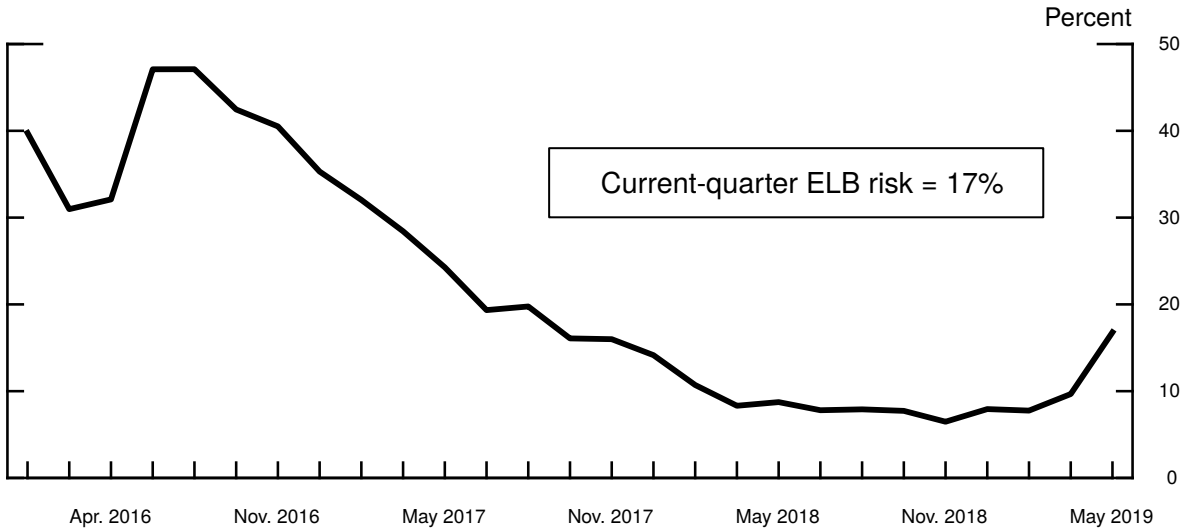


April 2019	
95th	1.6
85th	1.0
50th	.1
15th	- .7
5th	-1.1

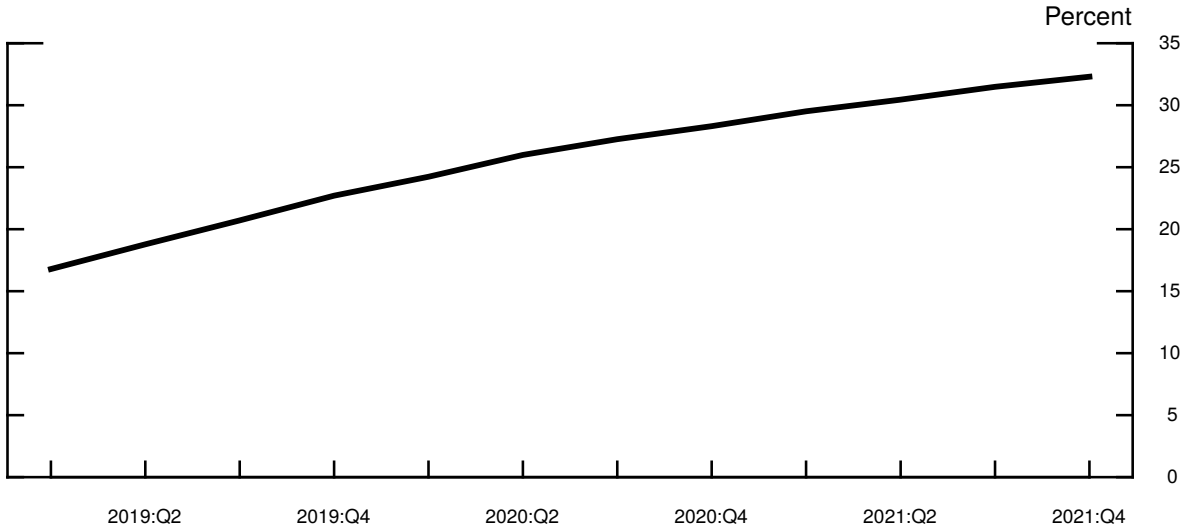
Note: The exhibit shows estimates of quantiles of the distribution of errors for four-quarter-ahead staff forecasts. The estimates are conditioned on indicators of real activity, inflation, financial market strain, and the volatility of high-frequency macroeconomic indicators. The tables show selected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

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.

Conditional Distributions of Macroeconomic Variables Two Years Ahead

In the Risks and Uncertainty section, the staff regularly provides an assessment of the risks to the baseline outlook. For some time, that assessment has been informed by the exhibit "Time-Varying Macroeconomic Risk 1 Year Ahead," which shows model estimates of upside and downside risks to the staff baseline forecast one year ahead, conditional on currently available indicators. Of course, risks may be roughly balanced at the one-year horizon but might be larger or become more skewed further out. For example, the exhibit "Prediction Intervals Derived from Historical Tealbook Forecast Errors" shows that the unconditional distribution of Tealbook forecast errors around the median unemployment rate becomes more skewed to the upside as the forecast horizon moves beyond one year.

In this discussion we introduce a new macro-risk exhibit for the two-year horizon, "Conditional Distribution of Macroeconomic Variables 2 Years Ahead." Specifically, the exhibit shows estimates of the conditional distribution of outcomes two years ahead for the unemployment rate, GDP growth, and CPI inflation. The conditional distribution is inferred from the historical relationships between a set of macroeconomic and financial indicators (including contemporaneous recession probabilities) and realizations of the aforementioned macro variables two years later.[1] We provide estimates for the median of the conditional distribution as well as for tail risks to those macro variables. To be clear, the "Time-Varying Macroeconomic Risk 1 Year Ahead" exhibit describes the conditional distribution of the Tealbook forecast errors, while this new exhibit is focused on the distributions of the actual outcomes for the macro variables.

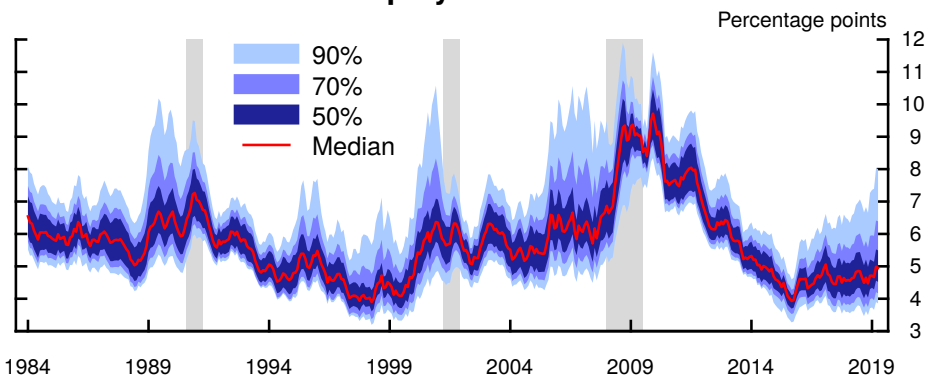
The top panel of the exhibit shows that there is substantial variation over time not only in the median (plotted in red) of the distribution for the unemployment rate two years ahead, but also in the balance of risks around the median. For example, the distribution around the median becomes substantially more skewed to the upside before each of the past three recessions. Similarly, for GDP growth, shown in the middle panel, the downside risk around the median is very cyclical and worsens sharply well before past recessions. This feature is predominantly driven by the recession probability variable. In contrast, upside risk to GDP growth as measured by the 95th percentile moves comparatively little over time. The conditional distribution for CPI inflation two years ahead is much less cyclical than that for the unemployment rate or GDP growth.

For the current month, the quantiles of the conditional distribution two years ahead are provided to the right of each chart. Given the current information, the risks to the unemployment rate are skewed to the upside at the two-year horizon; the 95th percentile is 3 percentage points above the median, whereas the 5th percentile is only about 1 percentage point below. Based on the 85th versus 15th percentile, the skew is less stark. GDP growth two years ahead is currently skewed to the downside, as is inflation (though to a smaller degree). This assessment is consistent with the staff's judgment, as described in the Risks and Uncertainty section in recent Tealbooks, that the risks beyond the 12-month horizon have been tilted toward the downside for GDP growth and toward the upside for the unemployment rate.

[1] The explanatory variables include indexes for inflation, real activity, financial factors, and macro uncertainty that are also used for the "Time-Varying Macroeconomic Risk 1 Year Ahead" exhibit. The estimated recession probability two years ahead is based on the spread between 10-year Treasury and 3-month T-bill yields. Our empirical methodology uses quantile regressions.

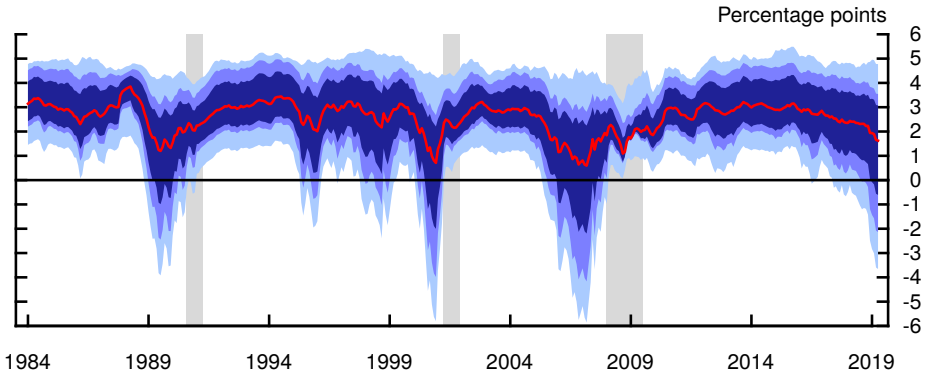
Conditional Distributions of Macroeconomic Variables 2 Years Ahead

Unemployment Rate



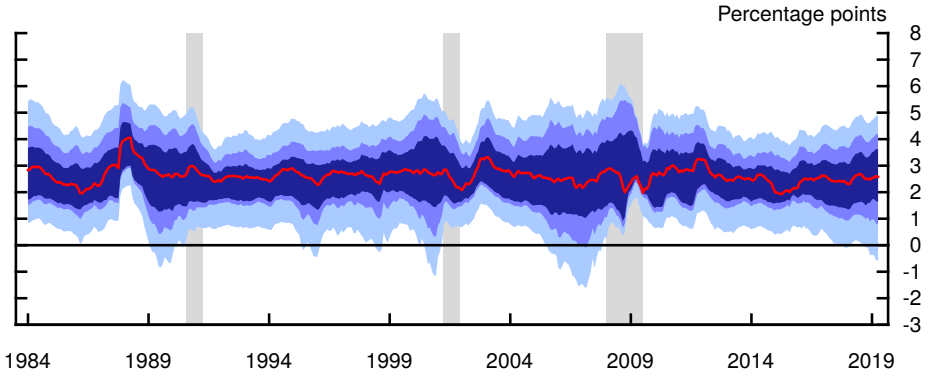
	April 2019
95th	8.0
85th	6.4
50th	5.0
15th	4.2
5th	3.9

GDP Growth



	April 2019
95th	4.8
85th	3.5
50th	1.6
15th	-2.1
5th	-3.7

CPI Inflation



	April 2019
95th	4.9
85th	4.2
50th	2.6
15th	.8
5th	- .6

and skewed to the downside for real GDP growth two years ahead.[1] In addition, as indicated in the "Effective Lower Bound Risk" exhibit, the estimated probability of returning to the effective lower bound (ELB) over the next three years is currently 17 percent—and it rises further to around 32 percent by the end of the medium term—materially higher than in previous forecasts because of the lower baseline federal funds rate path in this Tealbook. Given the proximity of the federal funds rate to the ELB, monetary policy may have less capacity to offset negative economic shocks than positive ones, contributing to a downside skew in economic outcomes.

With regard to inflation, the staff still sees average uncertainty and balanced risks around the projection over the next year. To the downside, the recent soft data on consumer prices could be more persistent than assumed in the baseline. In addition, underlying inflation could currently be even lower than assumed in the baseline. Also, the exchange value of the dollar could appreciate more than expected and put downward pressure on inflation. To the upside, an extended period with unusually tight resource utilization could eventually 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, an unexpectedly widespread and sustained increase in trade barriers could lead to higher inflation. These assessments are consistent with the statistical estimates of the time-varying risks for the inflation forecast over the next year. Of course, if the risks to the forecast for economic activity beyond a year are tilted to the downside, then the risks to the inflation projection would also tend to have a downward skew at that time.

These inflation risks would be of relatively 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 upon themselves and thus lead inflation to deviate more significantly, and more persistently, from 2 percent.

[1] The results shown in the box are consistent with recent research, using quantile regressions, on the distribution of fluctuations in the unemployment rate and in real GDP growth. For the unemployment rate, see Michael Kiley (2018), "Unemployment Risk," Finance and Economics Discussion Series 2018-067 (Washington: Board of Governors of the Federal Reserve System, September), https://doi.org/10.17016/FEDS.2018.067. For real GDP growth, see Tobias Adrian, Federico Grinberg, Nellie Liang, and Sheheryar Malik (2018), "The Term Structure of Growth-at-Risk," Hutchins Center on Fiscal and Monetary Policy Working Paper 42 (Washington: Brookings Institute, August), https://www.brookings.edu/wp-content/uploads/2018/08/WP42-NL-updated.pdf. The results of their research suggest that the upside risk to the unemployment rate and downside risk to GDP growth are more pronounced in the medium term—specifically, two to three years ahead—particularly when the unemployment rate is low or credit growth is high.

Our view of the risks to the economic outlook is informed by the staff's latest quantitative surveillance (QS) assessment, which will be described in the *Financial Stability Report* to be published in May. In that assessment, the staff judges overall financial vulnerabilities in the United States as moderate and little changed since the February 2019 QS assessment. On the one hand, household borrowing remains at a modest level relative to income. In addition, the largest U.S. banks continue to have strong capital positions, and funding risks in the financial system are low, as estimates of total financial system liabilities most vulnerable to runs, including those issued by nonbanks, remain modest. On the other hand, although asset valuation pressures have eased relative to their highs of last summer, they remain elevated in a number of markets. Additionally, borrowing by nonfinancial businesses, as a ratio to nominal GDP, is at a historical high. Reflecting this assessment, existing financial vulnerabilities, particularly in the nonfinancial corporate sector, could amplify shocks emanating from both domestic and foreign developments.

ALTERNATIVE SCENARIOS

To illustrate some of the risks to the outlook, we construct alternatives to the baseline projection using simulations of staff models. The first scenario considers the possibility that the softening in a number of economic indicators early this year could be the leading edge of a more persistent and substantial deterioration in economic activity that results in a recession, which is amplified by elevated leverage in the nonfinancial business sector. The second scenario considers the possibility both that the impetus from the 2017 tax cuts is now behind us and that federal government purchases will decline when the current budget agreement expires later this year. The third scenario assumes that aggregate supply conditions have been stronger than judged in the baseline and that potential GDP growth will be somewhat faster in the coming years. The fourth scenario examines the prospect that consumer spending and business investment could increase this year at a pace comparable with last year, and it further assumes that the response of wages and prices to stronger demand will prove to be greater than in the baseline. The fifth scenario considers the possibility of a recession in Europe and a stronger dollar. The sixth scenario assumes that successful resolution of trade talks results in an alleviation of trade policy uncertainties and a rise in global sentiment.

We simulate each of these scenarios using one of two models maintained by the staff, which embed different macroeconomic structures and dynamics.[2] In three of the scenarios, the

[2] The two models are (1) FRB/US, which is a large-scale macroeconometric model of the U.S. economy, and (2) SIGMA, which is a calibrated multicountry DSGE model.

Alternative Scenarios

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

Measure and scenario	2019		2020	2021	2022	2023-24
	H1	H2				
Real GDP						
Tealbook baseline and extension	2.0	2.3	2.2	1.7	1.5	1.3
Recession with financial amplification	2.0	-.9	-1.4	.5	1.8	2.7
Falloff in fiscal impetus	1.9	1.3	1.6	1.4	1.4	1.5
Stronger aggregate supply	2.4	3.0	3.2	2.9	2.6	2.3
Stronger demand, higher inflation	2.5	3.4	3.0	2.0	1.3	1.0
Recession in Europe	2.0	1.7	.8	1.4	1.7	1.6
Easing of trade tensions	2.1	2.9	2.9	2.0	1.5	1.2
Unemployment rate[1]						
Tealbook baseline and extension	3.7	3.6	3.5	3.5	3.7	4.0
Recession with financial amplification	3.7	4.5	6.3	6.9	6.7	5.1
Falloff in fiscal impetus	3.7	3.9	4.0	4.2	4.4	4.5
Stronger aggregate supply	3.7	3.7	3.5	3.2	3.0	2.8
Stronger demand, higher inflation	3.6	3.3	2.9	2.9	3.1	3.9
Recession in Europe	3.7	3.7	4.1	4.4	4.4	4.5
Easing of trade tensions	3.7	3.5	3.2	3.0	3.1	3.5
Total PCE prices						
Tealbook baseline and extension	1.6	1.9	1.8	1.8	1.9	2.0
Recession with financial amplification	1.6	1.9	1.6	1.5	1.5	1.6
Falloff in fiscal impetus	1.6	1.9	1.8	1.8	1.8	1.9
Stronger aggregate supply	1.6	1.8	1.7	1.7	1.7	1.8
Stronger demand, higher inflation	1.7	2.1	2.3	2.6	2.8	3.0
Recession in Europe	1.6	1.2	1.1	1.5	1.8	1.9
Easing of trade tensions	1.7	2.2	2.2	2.1	2.1	2.1
Core PCE prices						
Tealbook baseline and extension	1.6	2.0	1.9	1.9	1.9	2.0
Recession with financial amplification	1.6	2.0	1.7	1.6	1.6	1.6
Falloff in fiscal impetus	1.6	2.0	1.9	1.9	1.9	1.9
Stronger aggregate supply	1.5	1.9	1.8	1.7	1.8	1.8
Stronger demand, higher inflation	1.6	2.2	2.4	2.7	2.9	3.0
Recession in Europe	1.6	1.6	1.3	1.6	1.7	1.9
Easing of trade tensions	1.6	2.2	2.2	2.2	2.1	2.1
Federal funds rate[1]						
Tealbook baseline and extension	2.4	2.4	2.6	2.7	2.7	2.8
Recession with financial amplification	2.4	1.5	.1	.1	.1	1.0
Falloff in fiscal impetus	2.4	2.4	2.5	2.5	2.5	2.4
Stronger aggregate supply	2.3	2.2	2.3	2.4	2.4	2.6
Stronger demand, higher inflation	2.4	2.6	3.5	4.4	4.8	4.7
Recession in Europe	2.3	2.3	1.8	1.4	1.4	2.0
Easing of trade tensions	2.4	2.5	3.0	3.3	3.4	3.1

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

federal funds rate is governed by the new policy rule used in the baseline. However, the first scenario, which features a recession, allows for a more aggressive monetary policy response than would be prescribed by either the new baseline policy rule or the policy rule used in previous Tealbooks. The fourth and fifth scenarios assume the same parameter values in the policy rule used in previous Tealbooks, which put more weight on the output gap rather than the new specification of the baseline rule. Under the conditions in these two scenarios, we judge it unlikely that monetary policy would react in the manner embodied in the new baseline rule, because either inflation rises materially or output growth slows sharply. Finally, the size and composition of the SOMA portfolio are assumed to follow the baseline paths in all of the scenarios.

Recession with Financial Amplification [FRB/US]

The softness in a number of economic indicators early this year and the recent flatness in the yield curve could be harbingers of a substantial deterioration in economic activity. Indeed, one statistical model based on the term spread in Treasury yields indicates that the probability of a recession over the next year is substantially higher than the unconditional probability; see the bottom table in the "Assessment of Key Macroeconomic Risks" exhibit. Furthermore, as noted earlier, leverage in the nonfinancial business sector is elevated, making firms and their creditors vulnerable to adverse economic shocks. In this scenario, a recession is amplified by highly indebted businesses reducing hiring and investment by more than they would if their debt was not elevated.[3] We assume that monetary policymakers respond to sharp and sustained increases in the unemployment rate more aggressively than prescribed by either the new or old baseline rules, in line with the FOMC's typical reaction in previous recessions.

Real GDP starts to decline in the third quarter of this year and only begins to recover at the start of 2021. The unemployment rate peaks at 7.0 percent in the first quarter of 2022, an increase of more than 3 percentage points from the start of the recession. With substantially lower resource utilization, inflation runs about 0.2 percentage point below the baseline, on average, from the start of the recession through 2021. The federal funds rate reaches its ELB in the second quarter of 2020 and stays there until mid-2023.

[3] Specifically, we assume shocks that are somewhat more severe than those consistent with the recession in the early 1990s.

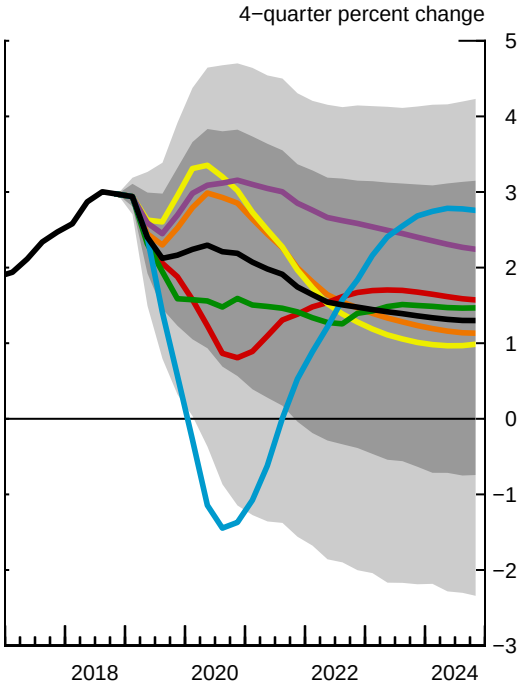
Risks & Uncertainty

Forecast Confidence Intervals and Alternative Scenarios

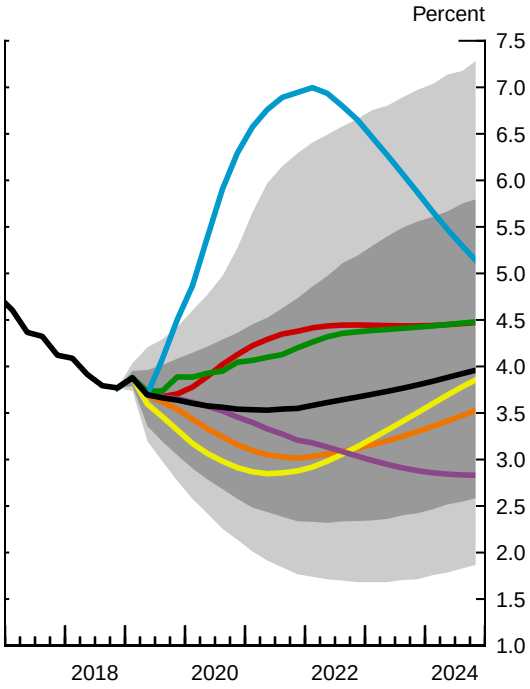
Confidence Intervals Based on FRB/US Stochastic Simulations*

Tealbook baseline and extension
Recession with financial amplification
Falloff in fiscal impetus
Stronger aggregate supply
Stronger demand, higher inflation
Recession in Europe
Easing of trade tensions

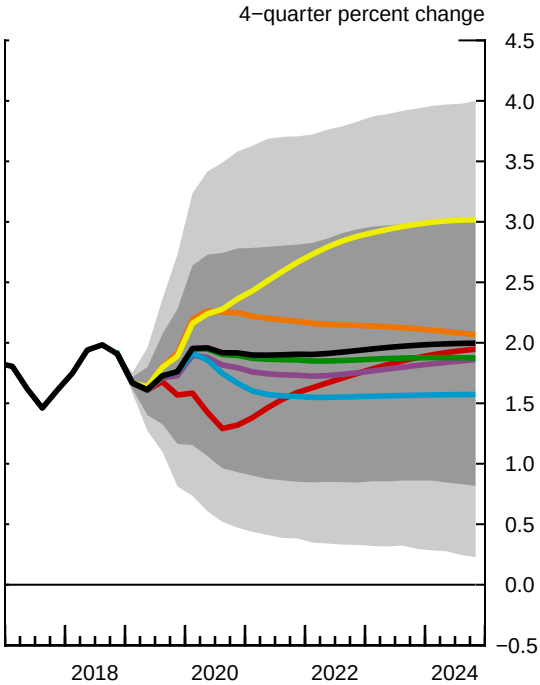
Real GDP



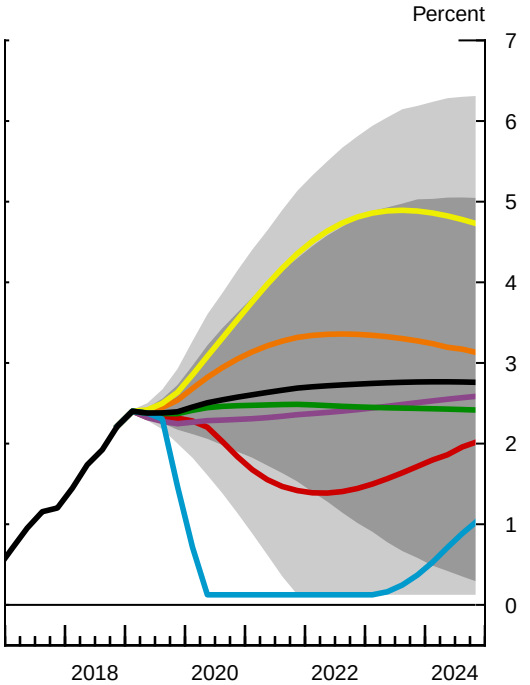
Unemployment Rate



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.

Falloff in Fiscal Impetus [FRB/US]

Real GDP growth last year was boosted by fiscal stimulus. In the baseline projection, the effects of the Tax Cuts and Jobs Act (TCJA) are expected to provide further impetus to real GDP growth this year and next. In addition, while the Bipartisan Budget Act (BBA) of 2018 increased the level of government appropriations in fiscal years 2018 and 2019 only, the staff assumes that appropriations will remain steady in real terms. In this scenario, we assume that the stimulative effects of the TCJA on GDP growth are behind us and that, after the BBA expires this year, appropriations will decline to much lower levels, consistent with the caps in the 2011 Budget Control Act. The reduction in federal purchases, compared with the baseline, widens to about ½ percent of nominal GDP in 2022.

Real GDP growth falls more than ½ percentage point below the baseline this year and next. The unemployment rate increases gradually over the projection period, reaching 4½ percent by the end of 2024. Because the weight on the output gap is small under the new baseline policy rule and the path for inflation is little changed from the baseline, the federal funds rate is only about 20 basis points lower, on average, over the projection horizon.[4]

Stronger Aggregate Supply [FRB/US]

Although the unemployment rate is currently about ¾ percentage point below our estimate of its natural rate, wage gains have remained modest in recent years—in our assessment, because the Phillips curve is relatively flat and productivity growth has been slow. Another way of reconciling modest wage and price inflation with a very low unemployment rate is to consider that resource utilization may be less tight than assumed in the baseline. This scenario assumes that the level of potential output in recent years has been higher than judged in the baseline and that potential output growth in future years is faster than in the baseline. Specifically, it is assumed that the natural rate of unemployment has been lower in the past several years than in the baseline and continues to fall to 4.1 percent at the end of 2019, 0.5 percentage point lower than in the baseline. We also assume that trend labor force participation has been decreasing at a slower rate than in the baseline for the past several years and continues to do so going forward; as a result, the trend participation rate is almost 1 percentage point above the baseline by the end

[4] Alternatively, if we assumed the old policy rule with the output gap coefficient of 1, the federal funds rate would decline gradually to reach 1¾ percent by the end of 2022. In this case, the unemployment rate rises somewhat less and real GDP growth is slightly higher than shown in this scenario.

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
Real GDP						
(percent change, Q4 to Q4)						
Projection	2.2	2.2	1.7	1.5	1.4	1.3
Confidence interval						
Tealbook forecast errors	.5–3.8	-.4–3.5	-1.1–3.0	. . .	. . .	. . .
FRB/US stochastic simulations	1.2–3.3	.6–3.8	.0–3.4	-.4–3.1	-.6–3.1	-.7–3.2
Civilian unemployment rate						
(percent, Q4)						
Projection	3.6	3.5	3.5	3.7	3.8	4.0
Confidence interval						
Tealbook forecast errors	3.2–4.1	2.7–4.4	2.4–4.9	. . .	. . .	. . .
FRB/US stochastic simulations	3.0–4.1	2.6–4.4	2.3–4.7	2.3–5.2	2.4–5.6	2.6–5.8
PCE prices, total						
(percent change, Q4 to Q4)						
Projection	1.8	1.8	1.8	1.9	2.0	2.0
Confidence interval						
Tealbook forecast errors	1.1–2.3	1.0–3.4	1.1–3.3	. . .	. . .	. . .
FRB/US stochastic simulations	1.0–2.4	.7–2.8	.7–2.9	.7–3.0	.8–3.1	.7–3.1
PCE prices excluding						
food and energy						
(percent change, Q4 to Q4)						
Projection	1.8	1.9	1.9	1.9	2.0	2.0
Confidence interval						
Tealbook forecast errors	1.3–2.2	1.2–2.7	. . .	. . .	. . .	. . .
FRB/US stochastic simulations	1.2–2.3	.9–2.8	.9–2.8	.8–2.9	.9–3.0	.8–3.0
Federal funds rate						
(percent, Q4)						
Projection	2.4	2.6	2.7	2.7	2.8	2.8
Confidence interval						
FRB/US stochastic simulations	2.2–2.7	1.9–3.6	1.5–4.3	1.0–4.8	.6–5.0	.3–5.0

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 2021 using information from the Blue Chip survey and forecasts from the CBO and CEA.
. . . Not applicable.

of 2024. In addition, structural productivity is assumed to grow ¼ percentage point faster than in the baseline in the past several years and also going forward.

Because we assume that households and businesses fully recognize the higher potential growth and its implications for income and profits, consumer spending and investment are stronger. Real GDP growth is, on average, almost 1 percentage point per year above the baseline. The unemployment rate falls further than in the baseline and reaches 2¾ percent by the end of 2024, more than a full percentage point below the staff projection. The path for inflation is only 0.1 percentage point below the baseline, on average, over the projection horizon. Because policymakers recognize the supply-side conditions and see the smaller positive output gap persisting for several years, the path of the federal funds rate is lower than in the baseline by about 25 basis points, on average, over the projection horizon.

Stronger Aggregate Demand and Higher Inflation [FRB/US]

The underlying fundamentals for household spending and business investment remain solid, with strong labor market conditions, favorable financial conditions, and upbeat readings on consumer sentiment. In this scenario, we assume that consumer spending and investment expand at a pace similar to last year, a good bit faster than in the baseline. We also assume both that the lower level of the unemployment rate brings us to a steeper portion of the Phillips curve and that inflation expectations turn out to be more responsive to realized inflation than we have assumed.

Under these assumptions, GDP increases 3 percent per year, on average, this year and next, a pace comparable with that in 2018. The unemployment rate declines substantially below the baseline, falling to under 3 percent in 2020. Inflation reaches 2.7 percent by the end of 2021, compared with 1.9 percent in the baseline. We assume that policymakers follow the interest rate rule used in previous Tealbooks and raise the federal funds rate more aggressively than the new baseline rule would prescribe because inflation rises persistently and significantly above the FOMC's 2 percent objective in this scenario.[5] With this assumption, consistent with the markedly higher paths for both inflation and the output gap, the federal funds rate increases steeply and reaches 4.4 percent at the end of 2021.

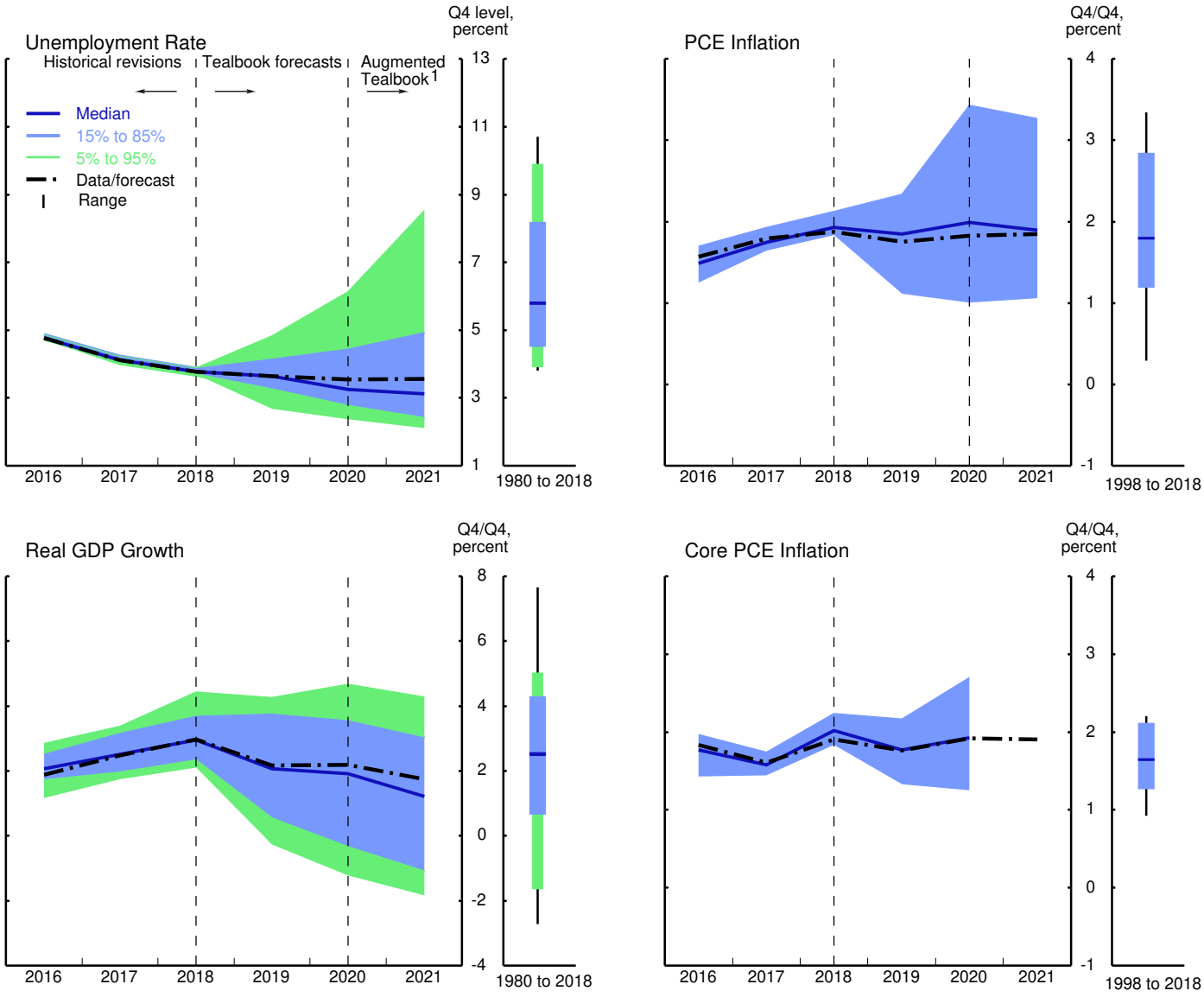
[5] If we instead assume that the federal funds rate is guided by the new baseline policy rule with the output gap coefficient of 0.2, inflation rises more sharply than described in this scenario, reaching 3¼ percent by the end of 2024.

Risks & Uncertainty

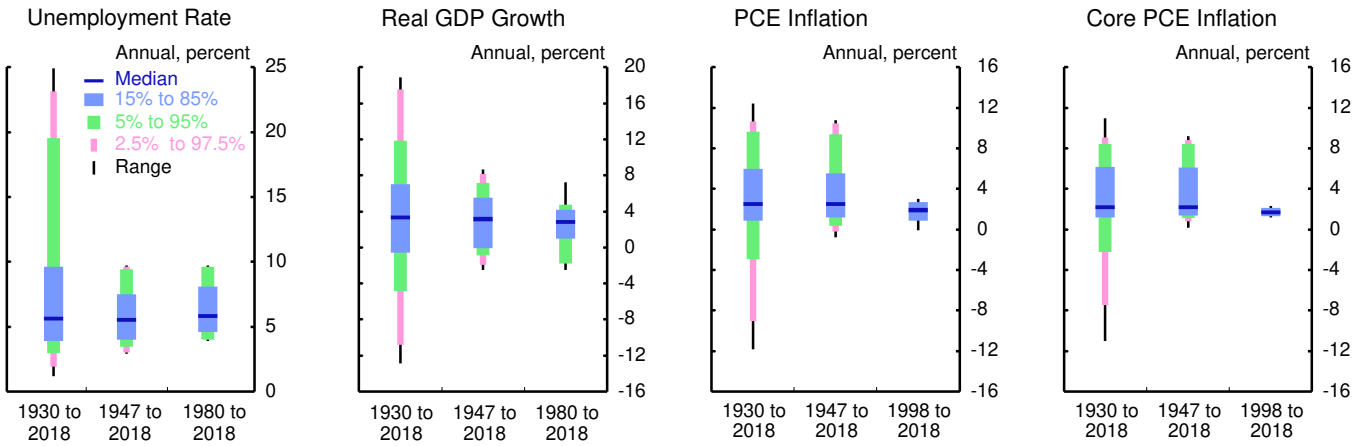
Prediction Intervals Derived from Historical Tealbook Forecast Errors

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 1- and 2-year-ahead forecast errors from Blue Chip, CBO, and CEA to extend the Tealbook prediction intervals through 2021.

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	.13	.09	.00	.06
Previous Tealbook	.10	.14	.09	.10
Between 1 3/4 and 2 1/4 percent				
Current Tealbook	.25	.24	.23	.25
Previous Tealbook	.25	.26	.29	.25
Less than 1 percent				
Current Tealbook	.10	.15	.17	.16
Previous Tealbook	.12	.08	.03	.12

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	.11	.22	.04
Previous Tealbook	.02	.10	.30	.06
Decrease by 1 percentage point				
Current Tealbook	.14	.02	.01	.06
Previous Tealbook	.11	.01	.01	.03

Probability of Recession Over Next 4 Quarters

Probability of transitioning into or remaining in a recession	Staff	FRB/US	BMA	Term Spread	Unconditional
Current Tealbook	.08	.13	.16	.60	.23
Previous Tealbook	.08	.13	.13	.58	.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 "BMA" model uses model averaging techniques 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.

Recession in Europe [SIGMA]

While we expect that growth in the euro area will pick up to close to potential over the forecast horizon—supported by highly accommodative monetary policy and some easing of headwinds—continued soft euro-area data, especially in manufacturing, may be signaling more pronounced weakness. Furthermore, ongoing negotiations between the European Union and the United Kingdom will prolong uncertainty around the outcome of Brexit. In this scenario, we assume that Europe slides into a protracted recession that is exacerbated by its lack of fiscal and monetary space, and which exerts substantial spillovers to the global economy.

Specifically, our scenario envisions that a sharp tightening of financial conditions in Europe causes equity prices to decline sharply and corporate borrowing spreads to widen 150 basis points, with borrowing spreads in the United States and emerging market economies rising 100 basis points. Real GDP growth dips to negative 0.2 percent in advanced economies and to 2.1 percent in emerging economies in the second half of 2019. Flight-to-safety flows cause the broad real dollar to appreciate 8 percent.

Weaker foreign activity, the stronger dollar, and tighter global financial conditions cause U.S. GDP growth to moderate to 1.1 percent, on average, in the second half of 2019 and 2020, about 1 percentage point below the baseline. Core PCE inflation runs at only 1.6 percent in the second half of this year and remains below 2 percent over the projection horizon. Accordingly, the federal funds rate follows a noticeably shallower path than in the baseline.

Easing of Trade Tensions [SIGMA]

Numerous commentators, including the International Monetary Fund's April 2019 *World Economic Outlook* report, have asserted that trade tensions have played a major part in the global slowdown over the past year.[6] Our analysis suggests that other factors—including Chinese deleveraging, problems in Germany's auto industry, and financial stresses in some EMEs—have also been important. Nevertheless, it is possible that a resolution of trade negotiations that substantially alleviates trade uncertainties could catalyze a surge in global sentiment and significantly boost global growth.

[6] International Monetary Fund (2019), *World Economic Outlook: Growth Slowdown, Precarious Recovery*, (Washington: IMF, April), https://www.imf.org/en/Publications/WEO/Issues/2019/03/28/world-economic-outlook-april-2019#Full%20Report%20and%20Executive%20Summary.

This scenario considers such a possibility. In particular, we assume that successful trade talks lead to a reversal of the tariff hikes imposed last year and greatly diminish fears of a trade war. These developments cause global sentiment to improve and financial conditions to ease markedly, with corporate borrowing spreads in both the foreign economies and the United States retracing to early 2018 levels. Foreign GDP growth increases to 3.2 percent by the end of 2020, with the level of foreign GDP about 1 percent above the baseline. The broad real dollar depreciates 3 percent because of some reversal of flight-to-safety flows.

Stronger global confidence and looser financial conditions, coupled with a weaker dollar, boost U.S. economic activity. U.S. GDP expands, on average, in the second half of 2019 and 2020 at an annual rate of 2.9 percent, 0.7 percentage point more than in the baseline. Higher import prices and heightened resource pressures cause core PCE price inflation to reach 2.2 percent by the end of this year. The federal funds rate rises more quickly than in the baseline.

ALTERNATIVE MODEL FORECASTS

As shown in the "Alternative Model Forecasts" exhibit, the FRB/US model projects real GDP growth to slow from 3 percent in 2018 to 1½ percent in 2019 before hovering slightly below 1¾ percent thereafter.[7] Compared with the previous Tealbook, the forecast of real GDP growth is revised up by slightly more than 0.3 percentage point, on average, primarily reflecting the change in the policy rule. The projected deceleration in real GDP mainly reflects the projection that consumption growth falls back from what the model perceives as unusually strong readings in recent years. The model could not explain those positive surprises based on fundamentals (wealth and income) and hence does not carry that strength forward in the projection, but it instead has consumption rising at a rate closer to the model's trend. The model's assessment that asset prices (equity and property wealth) are currently above normal valuations and thus will fall or decelerate markedly over the next year also contributes to the weakening in consumption growth through the wealth channel. The model forecasts the output gap to fall from 1.8 percent at the end of 2018 to a bit more than ½ percent at the end of 2021. The unemployment rate rises from 4.1 percent in 2019 to 4.5 percent at the end of 2021, below its estimate of the natural rate of 4.9 percent. Core inflation increases from 1.6 percent in 2019 to 2.0 percent in 2020 and 2021.

[7] The FRB/US forecast is conditioned on the staff projections for variables from the U.S. government sector, foreign real GDP growth, foreign inflation, and the paths of the U.S. dollar and oil prices.

Alternative Model Forecasts
(Percent change, Q4 to Q4, except as noted)

Measure and projection	2019		2020		2021	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP						
Staff	1.8	2.2	2.0	2.2	1.5	1.7
FRB/US	1.2	1.5	1.3	1.7	1.2	1.5
EDO[1]	1.5	2.1	1.9	2.1	2.2	2.3
Unemployment rate[2]						
Staff	3.6	3.6	3.6	3.5	3.7	3.5
FRB/US	4.1	4.1	4.5	4.3	4.8	4.5
EDO[1]	4.3	4.2	4.7	4.5	4.9	4.8
Total PCE prices						
Staff	1.8	1.8	1.9	1.8	1.9	1.8
FRB/US	2.0	1.6	1.9	1.9	1.9	2.0
EDO[1]	2.0	1.5	2.2	2.1	2.2	2.2
Core PCE prices						
Staff	2.0	1.8	2.0	1.9	2.0	1.9
FRB/US	2.2	1.6	2.0	2.0	1.9	2.0
EDO[1]	2.2	1.6	2.2	2.1	2.2	2.2
Federal funds rate[2]						
Staff	3.2	2.4	3.8	2.6	4.1	2.7
FRB/US	3.0	2.2	3.1	2.3	2.9	2.5
EDO[1]	3.1	2.9	3.5	3.4	3.8	3.8

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

The EDO model projects that real GDP will grow 2.1 percent in 2019, 2.1 percent in 2020, and 2.3 percent in 2021, roughly 0.1 percentage point, on average, below its estimate of potential growth. In contrast to both the staff and the FRB/US projections, the EDO model's concept of the output gap includes a contribution from the gap between actual and potential capital stocks. The model views the current capital stock to be below potential and hence estimates that the output gap is slightly negative this quarter. The output gap is then projected to decline to negative 0.4 percent by the end of the 2021. The EDO model's projection of below-potential real GDP growth is driven by the slow fading of favorable risk premium shocks—the main fundamental driver of aggregate demand in the model—and the waning effects of the current accommodative stance of monetary policy. Core inflation hovers slightly above the Committee's 2 percent objective after 2019. For a number of years, wages have been below the level consistent with the model's wage Phillips curve, holding down marginal costs and depressing inflation over that period. The model expects these wage shocks to fade gradually, which offsets the downward pressure from decreasing resource utilization on the trajectory for inflation.

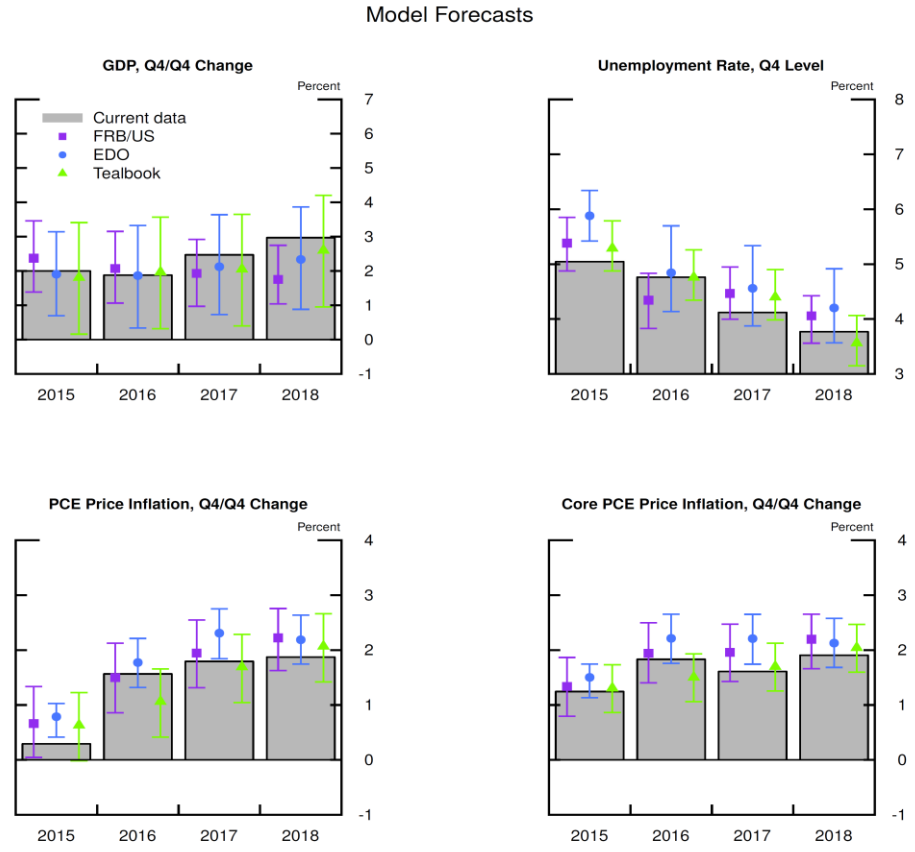
The box "FRB/US and EDO Forecast Errors" reviews recent forecast errors for GDP, the unemployment rate, and inflation from the two models.

FRB/US and EDO Forecast Errors

This discussion reports real-time forecast errors for the FRB/US and EDO models over the past four years and compares them with the errors in the judgmental Tealbook projection.

The figure reports the point forecasts and 70 percent confidence intervals of the Tealbook projection and of the FRB/US and EDO model projections of real GDP growth, the unemployment rate, and total and core PCE price inflation for 2015 through 2018. Unlike the box "Tealbook Forecast Errors: An Update through 2018" in the Domestic Economic Developments and Outlook section, this discussion focuses solely on forecasts for the fourth quarter that were made as of the April Tealbook of the same year.

In the figure, the gray bars represent the currently published data, the purple squares and whisker bands show the forecasts and 70 percent confidence intervals for FRB/US, the blue circles and whisker bands show the counterparts for EDO, and the green triangles and whisker bands show the counterparts for the judgmental Tealbook forecasts.[1]



Note: Green triangles and whisker bands correspond to those shown in the box "Tealbook Forecast Errors: An Update through 2018" in the Domestic Economic Developments and Outlook section.
Source: Staff forecast; Bureau of Economic Analysis; Bureau of Labor Statistics.

[1] The confidence intervals for FRB/US and EDO are generated via stochastic simulations. For FRB/US, the simulations sample from historical equation residuals. For EDO, they draw from the distributions of shocks, model parameters, and latent state variables.

The FRB/US and EDO forecast errors are, on average, somewhat larger than the Tealbook forecast errors over the past four years, and neither model uniformly outperforms the other one in forecasting. Both models underpredicted real GDP growth and overpredicted the unemployment rate in 2018, with FRB/US having the largest error for GDP growth and EDO having the largest error for the unemployment rate. In comparison, the Tealbook forecast slightly underpredicted both real GDP growth and the unemployment rate in 2018.

The errors made by the FRB/US and EDO models in forecasting real GDP growth were particularly large in 2018. In the case of FRB/US, realized real GDP growth is even located above the 70 percent real-time confidence interval around the model forecast, as indicated by the purple whisker bands. GDP growth in 2018 was boosted by the effects of the Tax Cuts and Jobs Act. The EDO and FRB/US models, however, have no or only limited ability to consider such special factors. For instance, while the FRB/US forecast conditions on the staff assumptions for fiscal policy variables such as government spending and average tax rates, changes in future taxes have only small effects on spending due to the backward-looking expectations assumed in the model.[2] Another factor contributing to the large forecast error in FRB/US was the model's estimate that consumption at the time of the forecast was above its trend. As a result, the model predicted counterfactually weak consumption growth in order to close the gap between actual and trend consumption over the medium term.

FRB/US did well in forecasting both core and total PCE price inflation from 2015 through 2018. Its root mean squared errors for total and core inflation are 0.1 percentage point and 0.2 percentage point smaller, respectively, than those of the EDO projection and comparable to those of the Tealbook projection. That said, both EDO and FRB/US viewed inflation as having been surprisingly weak in 2017 and 2018 and to a greater extent than the judgmental projection. It is notable that the two models made forecast errors for total and core PCE price inflation close to the lower bounds of the 70 percent confidence intervals.

Over a longer period (not shown), from 2008 through 2018, the judgmental Tealbook forecast performed better than the FRB/US forecast.[3] The root mean squared forecast errors associated with GDP growth and the unemployment rate are each 35 percent larger, on average, in the FRB/US projection, while those associated with total and core PCE price inflation are, respectively, 15 percent and 47 percent larger.

Over that same period, if we instead look at forecasts made in April for the subsequent year—that is, a forecast horizon of nearly seven quarters—FRB/US did as well as the Tealbook projection in predicting real GDP growth. However, the root mean squared forecast errors associated with the unemployment rate and total and core PCE price inflation are larger in the FRB/US projection.

[2] The FRB/US forecast was also conditioned on the judgmental projections for foreign real GDP growth, foreign inflation, and the paths of the U.S. dollar and oil prices. The federal funds rate was governed by the same policy rule as in the staff projection.

[3] The EDO forecast errors are not available over this longer period.

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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. Starting in this Tealbook, the staff is constructing its baseline projection using a new conditional attenuated rule that responds less strongly to the output gap than does the inertial Taylor (1999) rule used in previous Tealbooks.[1] This change in the baseline rule results in a substantially and persistently lower trajectory for the federal funds rate over the medium term, along with a higher level of GDP, compared with the March Tealbook. Reflecting weaker-than-expected incoming data as well as a change to the staff's assumption for underlying inflation over the medium term, projected inflation is lower than in the March Tealbook. In a special exhibit, we use the FRB/US model to separate the effects of adopting the new baseline policy rule from the effects of other changes in the staff's projection.

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.[2] These near-term prescriptions take as given the Tealbook baseline projections for the output gap and core inflation, shown in the middle panels.[3] The top and middle panels also provide the staff's baseline path for the federal funds rate.

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

[2] Given that the inertial version of the Taylor (1999) rule is no longer the staff baseline rule, starting with this Tealbook, our exhibits report values for the former rule in place of values for the (non-inertial) Taylor (1999) rule. 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 here use intercept terms that are consistent with a real federal funds rate of 50 basis points in the longer run.

[3] 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 of the output gap.

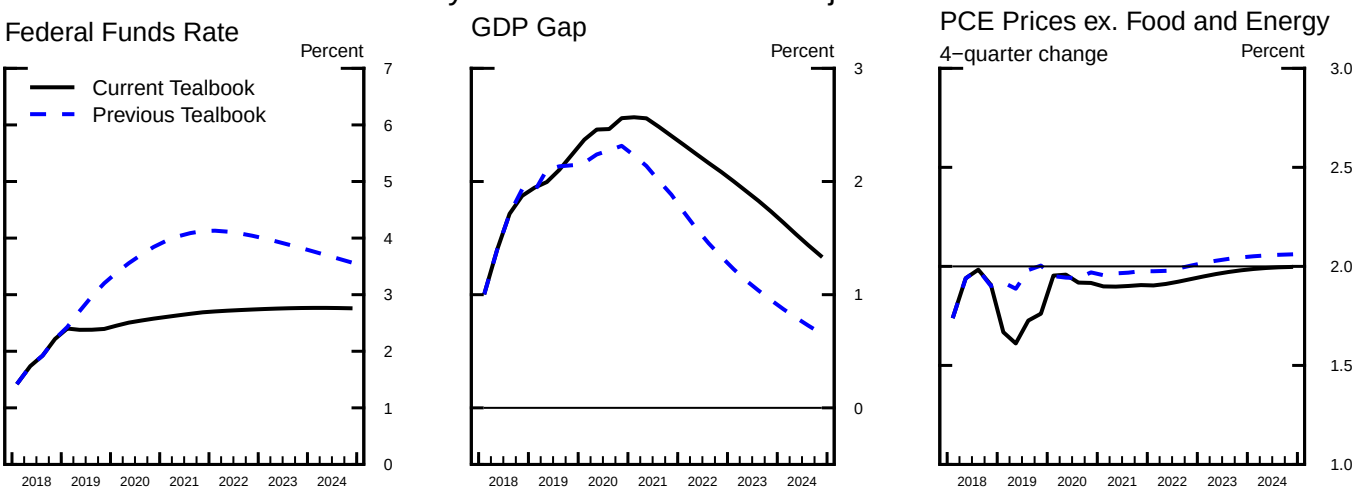
Policy Rules and the Staff Projection

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

(Percent)

	2019:Q2	2019:Q3
Inertial Taylor (1999) rule	**2.63**	**2.86**
Previous Tealbook projection	*2.70*	*2.98*
Taylor (1993) rule	**2.90**	**3.12**
Previous Tealbook projection	*3.36*	*3.51*
First−difference rule	**2.59**	**2.80**
Previous Tealbook projection	*2.50*	*2.54*
Flexible price−level targeting rule	**2.09**	**1.85**
Previous Tealbook projection	*2.17*	*2.00*
Addendum:		
Tealbook baseline	**2.38**	**2.38**

Key Elements of the Staff Projection



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

(Percent)

	Current Value	*Current−Quarter Estimate Based on Previous Tealbook*	*Previous Tealbook*
Tealbook baseline			
FRB/US *r**	2.02	*2.65*	*2.60*
Average projected real federal funds rate	.70	*1.70*	*1.56*
SEP−consistent baseline			
FRB/US *r**	.91		
Average projected real federal funds rate	.54		

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

2. The "FRB/US *r**" is the level of the real federal funds rate that, if maintained over a 12−quarter period (beginning in the current quarter) in the FRB/US model, sets the output gap equal to zero in the final quarter of that period given either the Tealbook or SEP−consistent projection. The SEP−consistent baseline corresponds to the March 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**.

- With the exception of the first-difference rule, the prescriptions of the policy rules are lower than in the March Tealbook, mostly reflecting the downward revision to projected inflation in the current and next quarter.

- The inertial Taylor (1999) rule prescribes higher policy rates than the Tealbook baseline, because it responds more strongly to the positive output gap than the conditional attenuated rule now underlying the Tealbook baseline projection.

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

- The first-difference rule, which responds to the change in the expected output gap, prescribes a slightly higher federal funds rate in the current and next quarter than in the March Tealbook because of a slightly faster projected rise in the output gap.

- The FPLT rule, in an effort to eliminate a cumulative shortfall in the core PCE price index of 2.6 percent since the end of 2011, prescribes an immediate decrease in the federal funds rate and a further decline to less than 2 percent in the third quarter of 2019.

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

The bottom panel of the first exhibit reports estimates of a medium-term concept of the equilibrium real federal funds rate (r^*) generated under two baselines: the Tealbook baseline and a projection consistent with the medians in the March 2019 Summary of Economic Projections (SEP).[4] In both cases, simulations of the FRB/US model are used to generate an estimate of r^*. 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

[4] To construct a baseline projection consistent with median SEP responses for the FRB/US model, the staff interpolated annual SEP information to a quarterly frequency and assumed that, beyond 2021 (the final year reported in the March 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.

period starting in the current quarter, would bring the output gap to zero in the final quarter of that period. This concept of *r** is a summary of the projected underlying strength of the real economy and does not take into account considerations such as achieving the inflation objective or avoiding sharp changes in the federal funds rate.

- The current value of the Tealbook-consistent FRB/US *r**, at 2.02 percent, is 63 basis points lower than its estimate for the same quarter based on the March Tealbook projection. This decrease occurs because the output gap in the current baseline has not been revised up as much as would be implied solely by the more accommodative policy rate path, as discussed in the Domestic Economic Developments and Outlook section of this Tealbook. Consequently, the staff's forecast implicitly contains less underlying strength than in the March Tealbook, which results in a lower FRB/US *r**.

- At 0.91 percent, the corresponding March SEP-consistent FRB/US *r** remains significantly lower than the Tealbook-consistent FRB/US *r**. The difference stems from the fact that the SEP-consistent projection has output exceeding potential by a smaller amount over the medium term than does the current Tealbook forecast, while the paths for the real federal funds rate are similar in both projections. The March 2019 SEP-consistent FRB/US *r** is ¾ percentage point lower than its estimate for the same quarter based on the December 2018 SEP (not shown).[5] As with the staff forecast, this downward revision reflects less underlying strength in the economy than previously projected. In particular, between the December and the March SEP rounds, the median projected unemployment rate through 2021 edged up even though the median projected federal funds rate declined ½ percentage point.

SIMPLE POLICY RULE SIMULATIONS

The second exhibit reports the Tealbook baseline and results from dynamic simulations of the FRB/US model under the inertial Taylor (1999) rule, the Taylor (1993) rule, the first-difference rule, and the FPLT rule. These simulations reflect the endogenous responses of resource utilization and inflation to the different federal funds rate paths implied by the policy rules. The simulations for each rule are carried out under

[5] For comparison, the cumulative decrease in the Tealbook-consistent FRB/US *r** since the December Tealbook is almost 1¼ percentage points.

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. Compared with the previous Tealbook, all of the policy rules prescribe lower paths for the federal funds rate, reflecting the reduced underlying strength in the staff's forecast mentioned earlier.

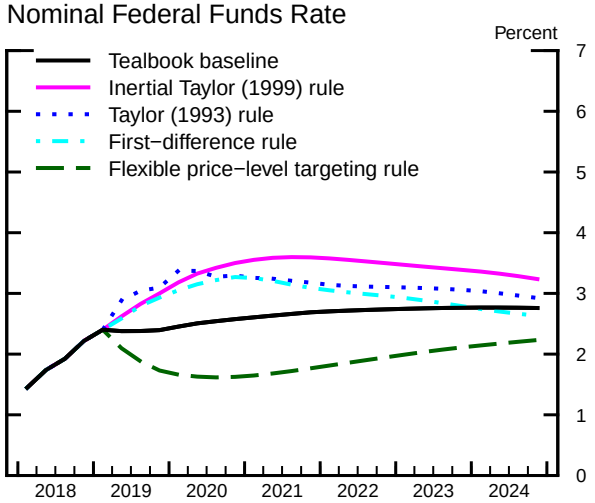
- The new policy rule used to construct the Tealbook baseline calls for only a single ¼ percentage point increase in the federal funds rate in coming years, leaving the policy rate almost 1½ percentage points lower by the end of 2021 than in the March Tealbook. The inertial Taylor (1999) rule, which embodies the same degree of inertia as the new Tealbook baseline rule but responds more strongly to the positive output gap, calls for the federal funds rate to increase at a faster pace and to reach 3½ percent in at the end of 2020, after which it remains above the Tealbook baseline path for an extended period of time. Inflation is lower, and the real 10-year Treasury yield is higher, than their corresponding values in the Tealbook projection. The less accommodative monetary conditions also produce an unemployment rate that, unlike in the Tealbook baseline, rises steadily toward the staff's estimate of the natural rate of unemployment.

- Similarly, the Taylor (1993) rule calls for significant increases in the federal funds rate in coming years. After that, the federal funds rate path prescribed by this rule is below the corresponding path under the inertial Taylor (1999) rule but above the path in the Tealbook baseline. This difference arises because the strength of the output gap response in the Taylor (1993) rule is weaker than in the inertial Taylor (1999) rule but stronger than the baseline rule underlying the staff's projection. As a result, the paths for the real 10-year Treasury yield, unemployment rate, and inflation rate implied by the Taylor (1993) rule are between the corresponding paths under the inertial Taylor (1999) rule and the Tealbook baseline.

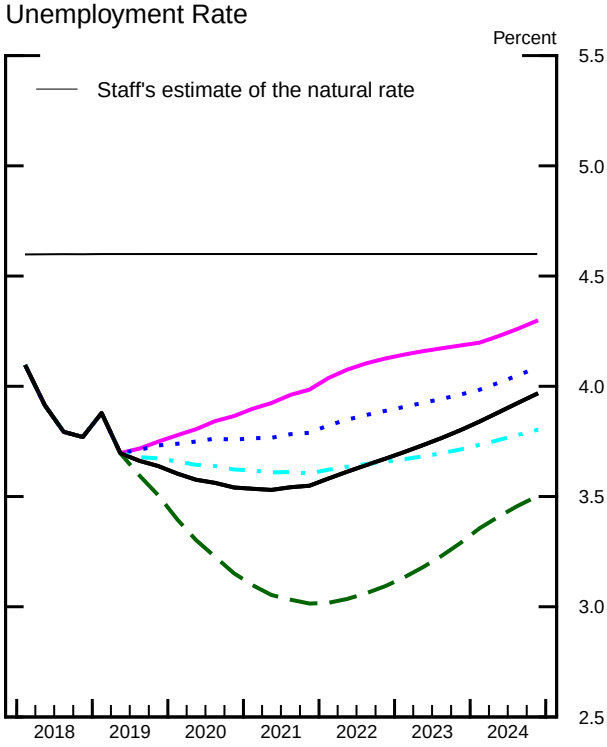
- The first-difference rule, which reacts to the expected change in the output gap rather than its level, prescribes gradual increases in the federal funds rate through 2020, followed by a sequence of reductions when the output gap is projected to narrow. Later in the projection, the federal funds rate path under

Simple Policy Rule Simulations

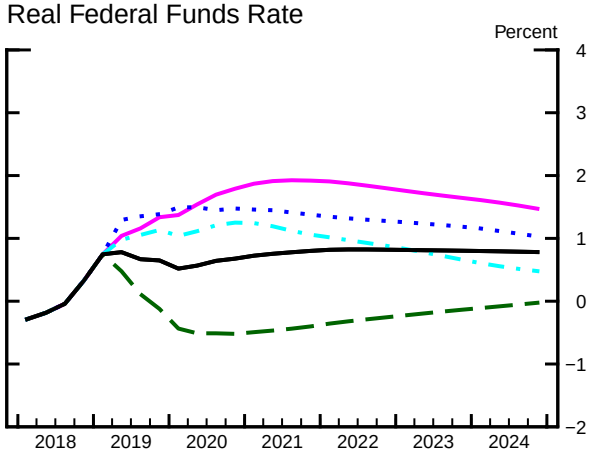
Nominal Federal Funds Rate



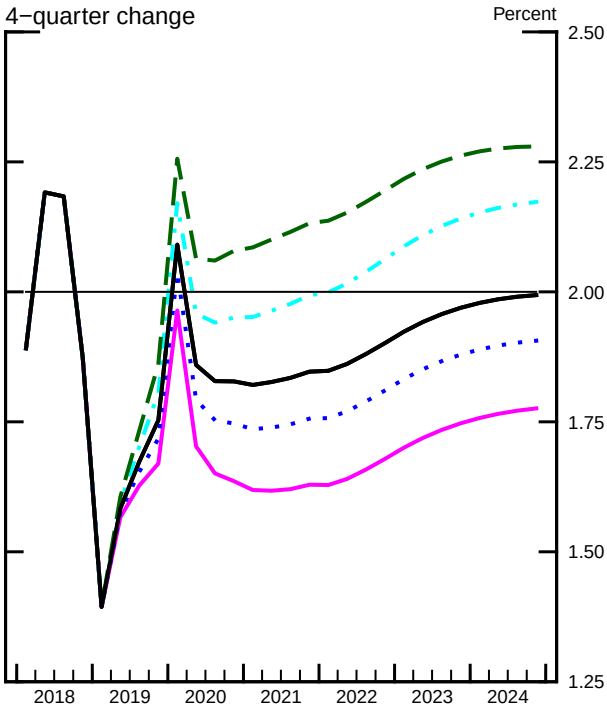
Unemployment Rate



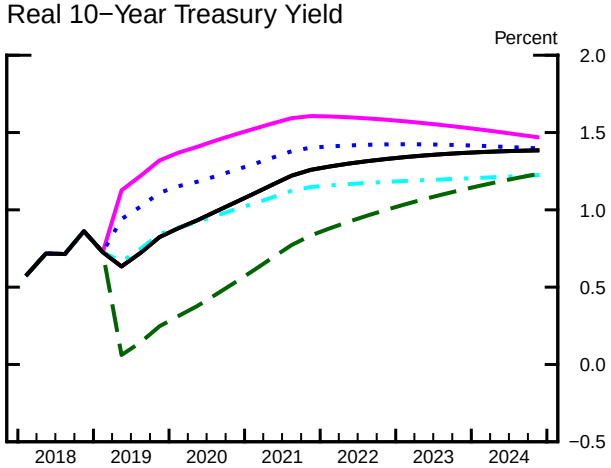
Real Federal Funds Rate



PCE Inflation
4−quarter change



Real 10−Year Treasury Yield



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.

this rule drops below the Tealbook baseline path. This prescription results in a similar unemployment rate path, and somewhat higher inflation, relative to the Tealbook baseline.

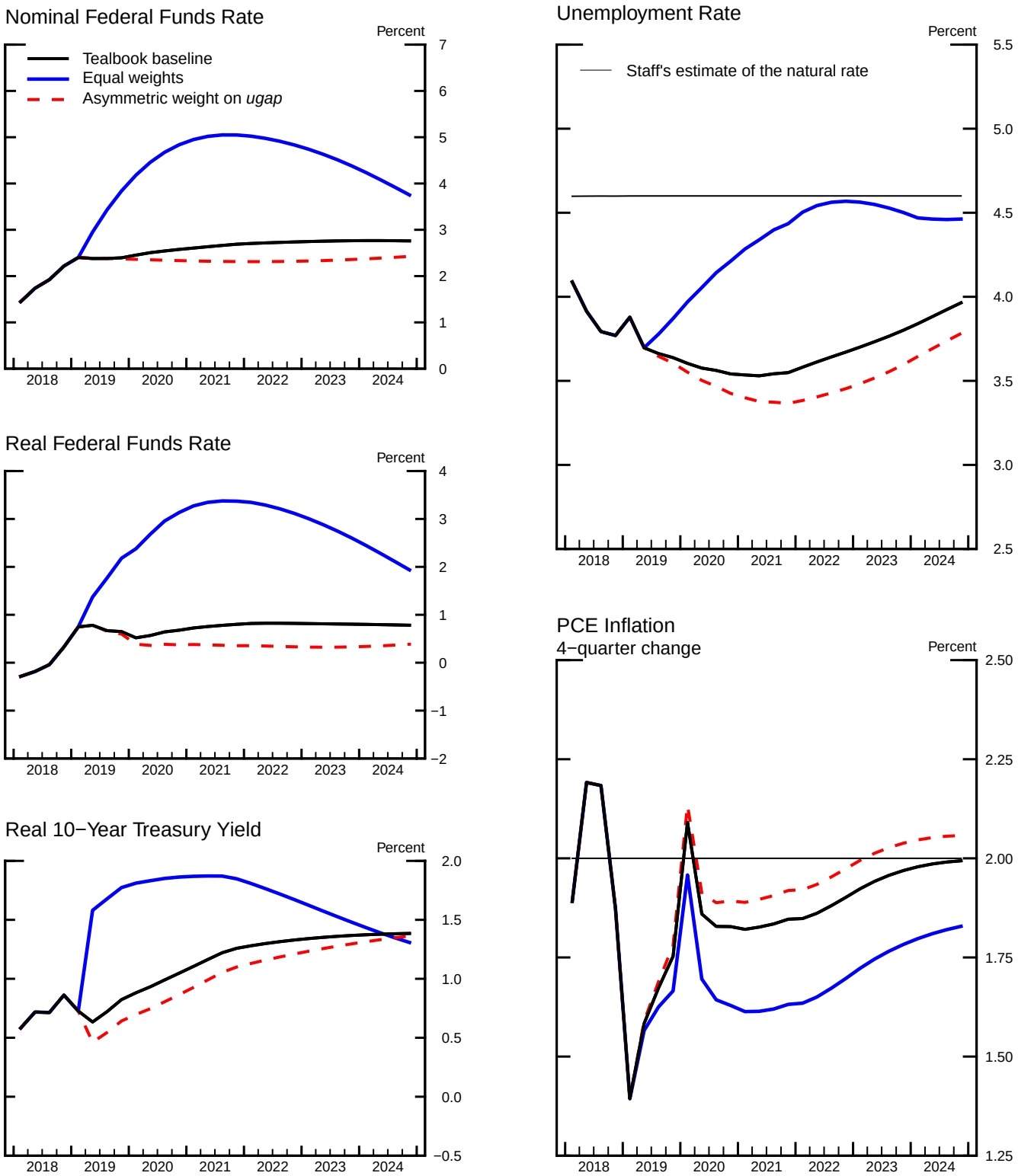
- The FPLT rule responds to, and seeks to eliminate, the cumulative shortfall of the level of core PCE prices from a target path for that price level that grows at an annual rate of 2 percent from the end of 2011 onward. Eliminating the current 2.6 percent shortfall of the core PCE price index requires inflation to run above 2 percent in coming years. To achieve this outcome, the FPLT rule calls for keeping the federal funds rate below the current target range until 2025 (not shown). Because the simulation embeds the assumptions that policymakers can credibly commit to closing this gap over time and that financial market participants, price setters, and wage setters correctly anticipate the ensuing long period of a low federal funds rate, the path of the real 10-year Treasury rate immediately drops and remains below the Tealbook baseline throughout the period shown. As a result, the unemployment rate is substantially lower than in the Tealbook baseline and all other simulations, dropping to 3 percent in 2021. Inflation exceeds 2 percent by ¼ percentage point, on average, over the next decade before slowly returning to 2 percent.

OPTIMAL CONTROL SIMULATIONS UNDER COMMITMENT

The third exhibit displays optimal control simulations under two different assumptions about policymakers' preferences captured by different specifications of the loss function.[6] The concept of optimal control employed here assumes policymakers are able to commit future policymakers to their plans; such a commitment may improve

[6] The box "Optimal Control and the Loss Function" in the Monetary Policy Strategies section of the June 2016 Tealbook B offers motivations for these specifications. The appendix in this Tealbook section provides technical details on the optimal control simulations. In previous Tealbooks, we also showed an optimal control simulation that used a loss function assigning only a very small cost to changes in the federal funds rate. Even though that simulation called for raising the federal funds rate to 10 percent in the near term, it led to unemployment rate and inflation outcomes near long-run levels. Arguably, if implemented, such a dramatic policy rate tightening could lead to less benign outcomes than suggested by the FRB/US model.

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.

economic outcomes.[7] Compared with the previous Tealbook, both optimal control simulations produce lower paths for the federal funds rate.

- The first simulation, labeled "Equal weights," presents the case in which policymakers are assumed to place equal weights on keeping headline PCE inflation close to the Committee's objective of 2 percent, on keeping the unemployment rate close to the staff's estimate of the natural rate of unemployment, and on keeping the federal funds rate close to its previous value. Under this strategy, the path for the federal funds rate is significantly higher than the Tealbook baseline path.[8] This strategy is designed to counter the projected sizable 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 costly. The smaller unemployment gap generates only moderately lower inflation because, in the FRB/US model, the response of inflation to the current level of resource utilization is small.

- The second 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 only a bit below the Tealbook baseline path and considerably below the path under equal weights throughout the period shown. Policymakers choose this more accommodative path for the policy rate because their desire to keep inflation close to 2 percent is not tempered by an aversion to the unemployment rate falling below its natural rate. The tighter labor market pushes inflation more promptly toward 2 percent than in the case of equal weights.

[7] 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.

[8] Because monetary policy actions are assumed to be perfectly understood and fully credible, these dramatic changes in the federal funds rate are not disruptive. In practice, however, if the FOMC were to raise the real federal funds rate as abruptly as in these simulations, wage and price setters and financial market participants could misinterpret policymakers' intentions and may anticipate tighter monetary policy than policymakers envision, leading to less benign macroeconomic outcomes than shown here.

IMPLICATIONS OF ADOPTING THE CONDITIONAL ATTENUATED RULE AND OF OTHER FORECAST REVISIONS

In the next exhibit, we use the FRB/US model to provide a decomposition of the overall revision in the staff's projection into two parts: the effects of adopting a new baseline policy rule and the effects of other revisions to the forecast. The exhibit displays the current-Tealbook simulation of the FRB/US model under the inertial Taylor (1999) rule as well as the current and previous Tealbook baseline projections.

- The March Tealbook baseline projection was constructed using the inertial Taylor (1999) rule. Comparing the March Tealbook baseline to the simulation of the inertial Taylor (1999) rule under the current Tealbook baseline reveals the changes in the staff's projection that the FRB/US model attributes to revisions other than the adoption of the new baseline policy rule.

- In the current Tealbook inertial Taylor (1999) rule simulation, the unemployment rate is significantly higher than in the March Tealbook baseline and rises steadily over the next few years, reflecting lower underlying economic strength in the projection. In addition, inflation is substantially and persistently lower than in the March Tealbook baseline because of the staff's downward revision of underlying inflation.[9] In response to these revisions, the inertial Taylor (1999) rule prescribes a lower path for the federal funds rate than it did in the previous Tealbook.

- Comparing the simulation of the inertial Taylor (1999) rule to the current Tealbook baseline reveals how, in the FRB/US model, the introduction of the conditional attenuated policy rule affects the policy rate path and macroeconomic outcomes holding constant the economic projection.

- The new baseline policy rule responds less strongly to the projected overshooting of potential output over the next several years than the inertial Taylor (1999) rule. Accordingly, it prescribes a substantially lower federal funds rate path than the inertial Taylor (1999) rule for an extended period of

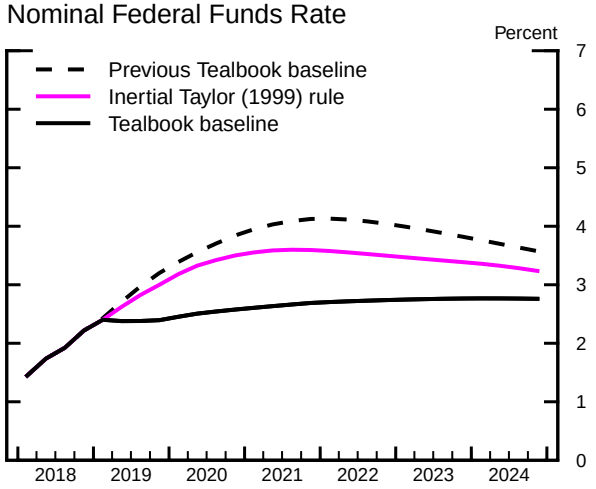
[9] The immediate, significant decline in inflation depends in part on the assumption that price and wage setters perfectly anticipate and understand the effects of lower underlying inflation and of changes in the federal funds rate path, and that they factor these conditions into today's price- and wage-setting decisions.

time. Real 10-year Treasury yields are up to ½ percentage point lower in coming years than under the inertial Taylor (1999) rule. The additional policy accommodation produces a path of the unemployment rate that is substantially lower than under the inertial Taylor (1999) rule. It also produces a path for inflation that is little changed from the March Tealbook despite the staff's assumption of weaker underlying inflation.

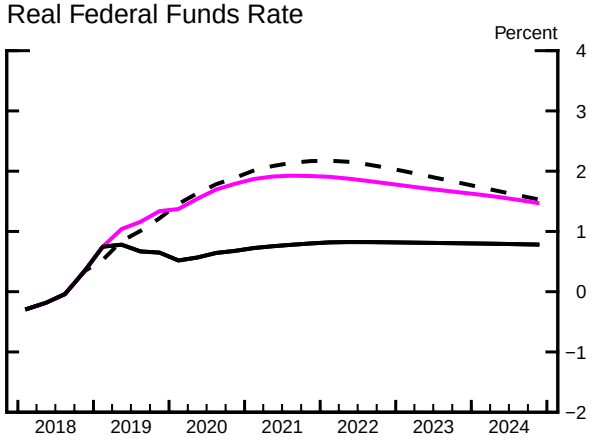
The final four exhibits tabulate the simulation results for key variables under the policy rules shown in the exhibit "Simple Policy Rule Simulations" and optimal control simulations shown in the exhibit "Optimal Control Simulations under Commitment."

Implications of Adopting the Conditional Attenuated Rule and of Other Forecast Revisions

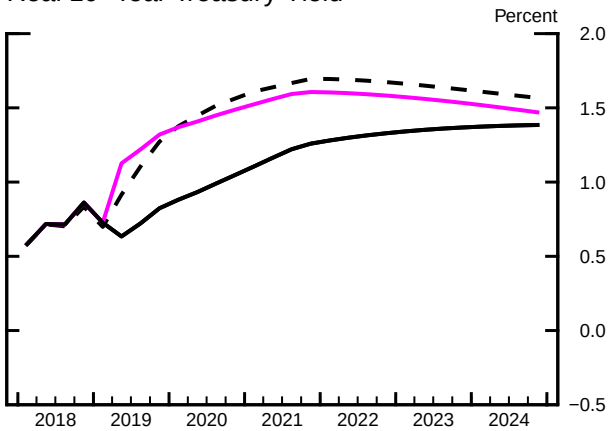
Nominal Federal Funds Rate



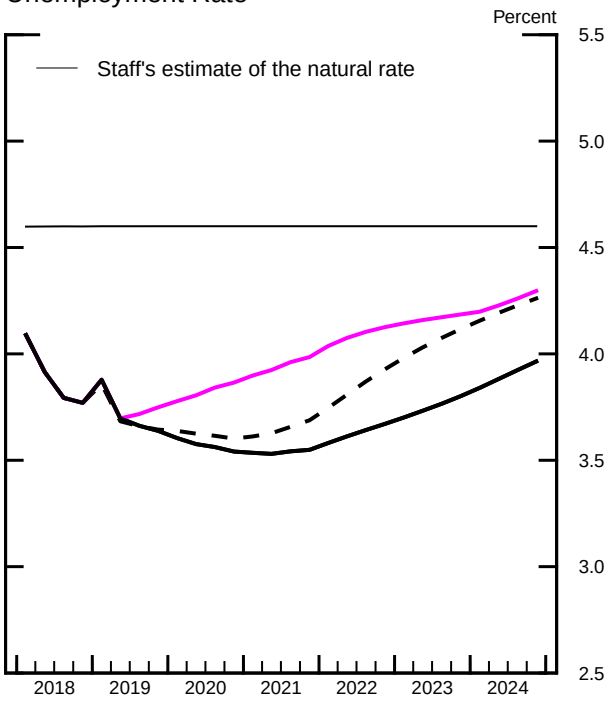
Real Federal Funds Rate



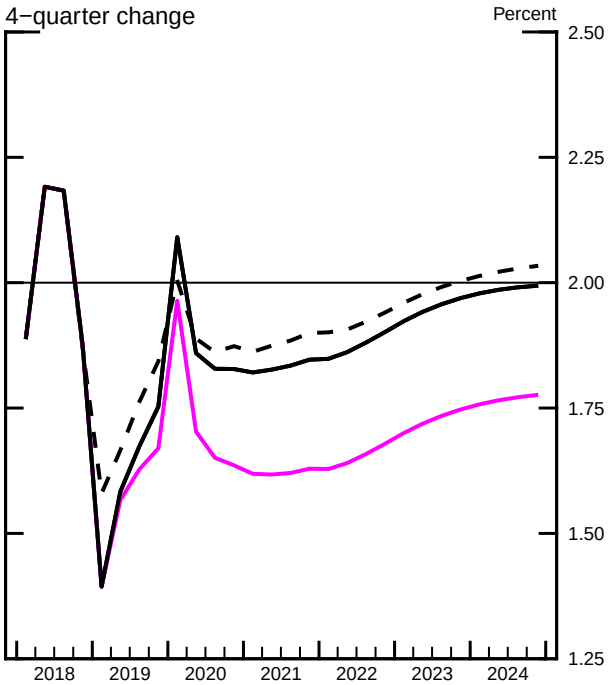
Real 10−Year Treasury Yield



Unemployment Rate



PCE Inflation
4−quarter change



Note: The "Inertial Taylor (1999) rule" simulation uses the current Tealbook baseline projection and is identical to the simulation in the exhibit titled "Simple Policy Rule Simulations."

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)	3.0	3.5	3.6	3.5	3.4	3.2
Taylor (1993)	3.1	3.3	3.2	3.1	3.1	2.9
First-difference	2.9	3.3	3.1	3.0	2.8	2.6
Flexible price-level targeting	1.7	1.6	1.8	1.9	2.1	2.2
Extended Tealbook baseline	2.4	2.6	2.7	2.7	2.8	2.8
Real GDP						
Inertial Taylor (1999)	1.9	1.7	1.5	1.4	1.5	1.3
Taylor (1993)	2.0	1.9	1.7	1.5	1.5	1.3
First-difference	2.1	2.1	1.8	1.6	1.5	1.5
Flexible price-level targeting	2.5	2.8	2.0	1.6	1.3	1.3
Extended Tealbook baseline	2.2	2.2	1.7	1.5	1.4	1.3
Unemployment rate[1]						
Inertial Taylor (1999)	3.7	3.9	4.0	4.1	4.2	4.3
Taylor (1993)	3.7	3.8	3.8	3.9	4.0	4.1
First-difference	3.7	3.6	3.6	3.7	3.7	3.8
Flexible price-level targeting	3.5	3.2	3.0	3.1	3.3	3.5
Extended Tealbook baseline	3.6	3.5	3.5	3.7	3.8	4.0
Total PCE prices						
Inertial Taylor (1999)	1.7	1.6	1.6	1.7	1.7	1.8
Taylor (1993)	1.7	1.7	1.8	1.8	1.9	1.9
First-difference	1.8	2.0	2.0	2.1	2.1	2.2
Flexible price-level targeting	1.9	2.1	2.1	2.2	2.3	2.3
Extended Tealbook baseline	1.8	1.8	1.8	1.9	2.0	2.0
Core PCE prices						
Inertial Taylor (1999)	1.7	1.7	1.7	1.7	1.8	1.8
Taylor (1993)	1.7	1.8	1.8	1.8	1.9	1.9
First-difference	1.8	2.0	2.1	2.1	2.2	2.2
Flexible price-level targeting	1.9	2.2	2.2	2.2	2.3	2.3
Extended Tealbook baseline	1.8	1.9	1.9	1.9	2.0	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			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Inertial Taylor (1999)	2.4	2.6	2.8	3.0	3.2	3.3	3.4	3.5
Taylor (1993)	2.4	2.9	3.0	3.1	3.4	3.4	3.3	3.3
First-difference	2.4	2.6	2.8	2.9	3.1	3.2	3.2	3.3
Flexible price-level targeting	2.4	2.1	1.9	1.7	1.7	1.6	1.6	1.6
Extended Tealbook baseline	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.6
Real GDP								
Inertial Taylor (1999)	2.9	2.4	2.0	1.9	1.9	1.8	1.7	1.7
Taylor (1993)	2.9	2.4	2.0	2.0	2.0	1.9	1.9	1.9
First-difference	2.9	2.4	2.1	2.1	2.2	2.2	2.1	2.1
Flexible price-level targeting	2.9	2.4	2.3	2.5	2.7	2.9	2.8	2.8
Extended Tealbook baseline	2.9	2.4	2.1	2.2	2.2	2.3	2.2	2.2
Unemployment rate[1]								
Inertial Taylor (1999)	3.9	3.7	3.7	3.7	3.8	3.8	3.8	3.9
Taylor (1993)	3.9	3.7	3.7	3.7	3.7	3.7	3.8	3.8
First-difference	3.9	3.7	3.7	3.7	3.7	3.6	3.6	3.6
Flexible price-level targeting	3.9	3.7	3.6	3.5	3.4	3.3	3.2	3.2
Extended Tealbook baseline	3.9	3.7	3.7	3.6	3.6	3.6	3.6	3.5
Total PCE prices								
Inertial Taylor (1999)	1.4	1.6	1.6	1.7	2.0	1.7	1.7	1.6
Taylor (1993)	1.4	1.6	1.7	1.7	2.0	1.8	1.8	1.7
First-difference	1.4	1.6	1.7	1.8	2.2	2.0	1.9	2.0
Flexible price-level targeting	1.4	1.6	1.7	1.9	2.3	2.1	2.1	2.1
Extended Tealbook baseline	1.4	1.6	1.7	1.8	2.1	1.9	1.8	1.8
Core PCE prices								
Inertial Taylor (1999)	1.7	1.6	1.7	1.7	1.8	1.8	1.7	1.7
Taylor (1993)	1.7	1.6	1.7	1.7	1.9	1.9	1.8	1.8
First-difference	1.7	1.6	1.8	1.8	2.0	2.1	2.0	2.0
Flexible price-level targeting	1.7	1.6	1.8	1.9	2.1	2.2	2.2	2.2
Extended Tealbook baseline	1.7	1.6	1.7	1.8	2.0	2.0	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	3.8	4.8	5.0	4.8	4.4	3.8
Asymmetric weight on *ugap*	2.4	2.3	2.3	2.3	2.4	2.4
Extended Tealbook baseline	2.4	2.6	2.7	2.7	2.8	2.8
Real GDP						
Equal weights	1.7	1.2	1.3	1.5	1.7	1.6
Asymmetric weight on *ugap*	2.2	2.4	1.9	1.5	1.3	1.3
Extended Tealbook baseline	2.2	2.2	1.7	1.5	1.4	1.3
Unemployment rate[1]						
Equal weights	3.9	4.2	4.4	4.6	4.5	4.5
Asymmetric weight on *ugap*	3.6	3.4	3.4	3.5	3.6	3.8
Extended Tealbook baseline	3.6	3.5	3.5	3.7	3.8	4.0
Total PCE prices						
Equal weights	1.7	1.6	1.6	1.7	1.8	1.8
Asymmetric weight on *ugap*	1.8	1.9	1.9	2.0	2.0	2.1
Extended Tealbook baseline	1.8	1.8	1.8	1.9	2.0	2.0
Core PCE prices						
Equal weights	1.7	1.7	1.7	1.7	1.8	1.8
Asymmetric weight on *ugap*	1.8	2.0	2.0	2.0	2.0	2.1
Extended Tealbook baseline	1.8	1.9	1.9	1.9	2.0	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			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Equal weights	2.4	3.0	3.4	3.8	4.2	4.5	4.7	4.8
Asymmetric weight on *ugap*	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3
Extended Tealbook baseline	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.6
Real GDP								
Equal weights	2.9	2.4	1.9	1.7	1.4	1.3	1.2	1.2
Asymmetric weight on *ugap*	2.9	2.4	2.2	2.2	2.4	2.5	2.4	2.4
Extended Tealbook baseline	2.9	2.4	2.1	2.2	2.2	2.3	2.2	2.2
Unemployment rate[1]								
Equal weights	3.9	3.7	3.8	3.9	4.0	4.1	4.1	4.2
Asymmetric weight on *ugap*	3.9	3.7	3.6	3.6	3.6	3.5	3.5	3.4
Extended Tealbook baseline	3.9	3.7	3.7	3.6	3.6	3.6	3.6	3.5
Total PCE prices								
Equal weights	1.4	1.6	1.6	1.7	2.0	1.7	1.6	1.6
Asymmetric weight on *ugap*	1.4	1.6	1.7	1.8	2.1	1.9	1.9	1.9
Extended Tealbook baseline	1.4	1.6	1.7	1.8	2.1	1.9	1.8	1.8
Core PCE prices								
Equal weights	1.7	1.6	1.7	1.7	1.8	1.8	1.7	1.7
Asymmetric weight on *ugap*	1.7	1.6	1.7	1.8	2.0	2.0	2.0	2.0
Extended Tealbook baseline	1.7	1.6	1.7	1.8	2.0	2.0	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 for quarter *t;* for quarters prior to the projection period under consideration, R_t corresponds to the historical data in the economic projection. The right-hand-side variables of the first four rules include the staff's projection of trailing four-quarter core PCE price inflation for the current

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

quarter and three quarters ahead (π_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 π^{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	$R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + \alpha\, ygap_t)$
First-difference rule	$R_t = R_{t-1} + 0.5(\pi_{t+3\|t} - \pi^{LR}) + 0.5\Delta^4 ygap_{t+3\|t}$
Flexible price-level targeting rule	$R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + (p_t - p_t^*) - (u_t - u_t^*))$

The first rule in the table was studied by Taylor (1993). The inertial Taylor (1999) rule features more inertia and a stronger response to resource slack over time compared with the Taylor (1993) rule. The inertial Taylor (1999) and rules that depend on a price gap, like the FPLT rule, have been featured prominently in analysis by Board staff.[2] The conditional attenuated rule has the same form as the inertial Taylor (1999) rule but places a coefficient of α on the output gap that is conditional on economic conditions; in the current Tealbook projection, α is set to 0.2. Where applicable, the intercepts of the simple rules, denoted r^{LR}, are constant and chosen so that they are consistent with a 2 percent longer-run inflation objective and an equilibrium real federal funds rate in the longer run of 0.5 percent. The prescriptions of the first-difference rule do not depend on the level of the output gap or the longer-run real interest rate; see Orphanides (2003).

NEAR-TERM PRESCRIPTIONS OF SELECTED POLICY RULES

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

[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 (2014).

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

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

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

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

FRB/US MODEL SIMULATIONS

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

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

COMPUTATION OF OPTIMAL CONTROL POLICIES UNDER COMMITMENT

The optimal control simulations posit that policymakers choose a path for the federal funds rate to minimize a discounted weighted sum of squared inflation gaps (measured as the difference between four-quarter headline PCE price inflation, π_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

	λ_{π}	$\lambda_{u,t+\tau}$		λ_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.

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

Interval	Nominal GDP		Real GDP		PCE price index		Core PCE price index		Unemployment rate[1]	
	03/08/19	04/18/19	03/08/19	04/18/19	03/08/19	04/18/19	03/08/19	04/18/19	03/08/19	04/18/19
Quarterly										
2018:Q1	4.3	4.3	2.2	2.2	2.5	2.5	2.2	2.2	4.1	4.1
Q2	7.6	7.6	4.2	4.2	2.0	2.0	2.1	2.1	3.9	3.9
Q3	4.9	4.9	3.4	3.4	1.6	1.6	1.6	1.6	3.8	3.8
Q4	4.6	4.1	2.6	2.2	1.5	1.5	1.7	1.8	3.8	3.8
2019:Q1	2.7	3.2	1.0	2.1	1.3	.5	2.3	1.2	3.9	3.9
Q2	4.6	4.0	2.6	2.0	2.3	2.7	2.0	1.9	3.7	3.7
Q3	4.1	4.2	1.9	2.2	2.0	1.9	2.0	2.0	3.7	3.7
Q4	3.8	4.3	1.8	2.3	1.8	1.8	1.8	1.9	3.6	3.6
2020:Q1	4.1	4.4	2.0	2.4	1.9	1.9	2.0	2.0	3.6	3.6
Q2	4.4	4.4	2.2	2.2	1.9	1.8	2.0	1.9	3.6	3.6
Q3	4.1	3.9	2.0	1.9	1.8	1.8	1.9	1.9	3.6	3.6
Q4	4.0	4.2	2.0	2.2	1.8	1.8	1.9	1.9	3.6	3.5
Two-quarter[2]										
2018:Q2	5.9	5.9	3.2	3.2	2.2	2.2	2.1	2.1	-.2	-.2
Q4	4.7	4.5	3.0	2.8	1.5	1.5	1.7	1.7	-.1	-.1
2019:Q2	3.6	3.6	1.8	2.0	1.8	1.6	2.1	1.6	-.1	-.1
Q4	3.9	4.2	1.9	2.3	1.9	1.9	1.9	2.0	-.1	-.1
2020:Q2	4.2	4.4	2.1	2.3	1.9	1.9	2.0	1.9	.0	.0
Q4	4.0	4.0	2.0	2.1	1.8	1.8	1.9	1.9	.0	-.1
Four-quarter[3]										
2017:Q4	4.5	4.5	2.5	2.5	1.8	1.8	1.6	1.6	-.7	-.7
2018:Q4	5.3	5.2	3.1	3.0	1.9	1.9	1.9	1.9	-.3	-.3
2019:Q4	3.8	3.9	1.8	2.2	1.8	1.8	2.0	1.8	-.2	-.2
2020:Q4	4.1	4.2	2.0	2.2	1.9	1.8	2.0	1.9	.0	-.1
2021:Q4	3.6	3.8	1.5	1.7	1.9	1.8	2.0	1.9	.1	.0
Annual										
2017	4.2	4.2	2.2	2.2	1.8	1.8	1.6	1.6	4.4	4.4
2018	5.2	5.2	2.9	2.9	2.0	2.0	1.9	1.9	3.9	3.9
2019	4.2	4.2	2.2	2.4	1.7	1.6	1.9	1.7	3.7	3.7
2020	4.1	4.3	2.0	2.2	1.9	1.9	2.0	1.9	3.6	3.6
2021	3.8	3.9	1.7	1.9	1.9	1.8	2.0	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	2018			2019				2020							
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2018[1]	2019[1]	2020[1]	2021[1]
Real GDP	4.2	3.4	2.2	2.1	2.0	2.2	2.3	2.4	2.2	1.9	2.2	3.0	2.2	2.2	1.7
Previous Tealbook	4.2	3.4	2.6	1.0	2.6	1.9	1.8	2.0	2.2	2.0	2.0	3.1	1.8	2.0	1.5
Final sales	5.4	1.0	2.1	1.9	1.7	3.3	2.9	2.0	2.3	2.0	2.4	2.6	2.4	2.2	1.8
Previous Tealbook	5.4	1.0	2.2	.8	2.7	2.4	2.5	2.0	2.0	1.8	1.9	2.6	2.1	1.9	1.5
Priv. dom. final purch.	4.3	3.0	2.6	1.0	2.3	3.3	2.9	2.4	2.4	2.4	2.4	3.0	2.3	2.4	1.9
Previous Tealbook	4.3	3.0	2.9	1.0	2.7	2.7	2.6	2.1	2.2	2.1	1.9	3.1	2.2	2.1	1.6
Personal cons. expend.	3.8	3.5	2.5	1.1	2.6	2.7	2.7	2.6	2.5	2.5	2.4	2.6	2.3	2.5	2.2
Previous Tealbook	3.8	3.5	2.8	1.0	2.8	2.7	2.7	2.3	2.3	2.2	2.2	2.7	2.3	2.2	2.0
Durables	8.6	3.7	3.6	-5.4	6.3	2.7	2.2	2.0	1.9	1.9	1.8	3.4	1.4	1.9	1.6
Nondurables	4.0	4.6	2.1	1.0	2.3	2.9	2.8	2.7	2.6	2.6	2.5	2.7	2.2	2.6	2.3
Services	3.0	3.2	2.4	2.1	2.1	2.7	2.7	2.6	2.6	2.6	2.5	2.4	2.4	2.5	2.3
Residential investment	-1.3	-3.6	-4.7	-.3	-2.6	6.6	6.9	6.2	4.5	.7	-.8	-3.3	2.5	2.6	-2.7
Previous Tealbook	-1.3	-3.6	-4.9	-8.6	1.3	4.5	3.0	2.5	1.0	-1.1	-2.1	-3.3	-.1	.1	-2.8
Nonres. priv. fixed invest.	8.7	2.5	5.4	.6	2.2	5.4	2.7	.5	1.6	2.4	3.4	7.0	2.7	2.0	1.5
Previous Tealbook	8.7	2.5	5.5	3.4	2.1	2.5	2.2	1.0	2.0	2.3	1.5	7.0	2.6	1.7	.9
Equipment & intangibles	7.1	4.4	8.3	.1	2.3	6.7	3.0	1.1	2.1	3.3	4.6	7.6	3.0	2.8	2.4
Previous Tealbook	7.1	4.4	7.9	3.7	2.2	2.9	2.1	1.8	2.6	3.3	2.5	7.5	2.7	2.5	1.8
Nonres. structures	14.5	-3.4	-3.9	2.3	1.8	1.1	1.9	-1.4	-.3	-.6	-.7	4.9	1.8	-.7	-1.5
Previous Tealbook	14.5	-3.4	-2.3	2.3	2.1	1.2	2.4	-1.4	.0	-.9	-1.5	5.3	2.0	-1.0	-2.3
Net exports[2]	-841	-950	-956	-922	-963	-955	-948	-969	-982	-1002	-996	-912	-947	-987	-1000
Previous Tealbook[2]	-841	-950	-964	-973	-992	-1009	-1013	-1020	-1030	-1053	-1053	-914	-997	-1039	-1062
Exports	9.3	-4.9	1.8	1.4	-.4	5.8	3.8	.0	2.9	3.3	3.5	2.3	2.6	2.4	3.8
Imports	-.6	9.3	2.0	-2.8	4.5	3.3	1.9	2.3	3.6	4.7	1.9	3.4	1.7	3.1	3.0
Gov't. cons. & invest.	2.5	2.6	-.4	2.6	2.9	1.6	1.6	1.7	2.5	1.2	.9	1.5	2.2	1.6	1.0
Previous Tealbook	2.5	2.6	.0	.7	4.0	1.8	1.7	1.7	1.8	1.9	1.1	1.7	2.1	1.6	1.0
Federal	3.7	3.5	1.1	1.3	8.1	2.8	2.5	3.0	5.0	1.7	.8	2.7	3.6	2.6	1.0
Defense	6.0	4.9	6.3	7.0	1.9	2.6	2.5	2.7	3.0	3.0	1.3	5.0	3.5	2.5	.6
Nondefense	.5	1.6	-6.1	-6.5	18.0	3.1	2.5	3.3	7.9	-.1	.3	-.5	3.9	2.8	1.5
State & local	1.8	2.0	-1.3	3.4	-.2	.8	1.1	1.0	1.0	1.0	1.0	.8	1.3	1.0	1.0
Change in priv. inventories[2]	-37	90	97	107	124	69	40	61	56	51	45	45	85	53	41
Previous Tealbook[2]	-37	90	97	100	96	72	38	35	43	56	65	45	77	50	60

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real GDP	1.5	2.6	2.7	2.0	1.9	2.5	3.0	2.2	2.2	1.7
Previous Tealbook	1.5	2.6	2.7	2.0	1.9	2.5	3.1	1.8	2.0	1.5
Final sales	1.9	2.0	3.0	1.9	2.1	2.6	2.6	2.4	2.2	1.8
Previous Tealbook	1.9	2.0	3.0	1.9	2.1	2.6	2.6	2.1	1.9	1.5
Priv. dom. final purch.	2.6	2.6	4.3	2.7	2.7	3.3	3.0	2.3	2.4	1.9
Previous Tealbook	2.6	2.6	4.3	2.7	2.7	3.3	3.1	2.2	2.1	1.6
Personal cons. expend.	1.6	1.9	3.8	3.0	2.8	2.7	2.6	2.3	2.5	2.2
Previous Tealbook	1.6	1.9	3.8	3.0	2.8	2.7	2.7	2.3	2.2	2.0
Durables	6.3	5.0	9.2	6.0	6.8	7.7	3.4	1.4	1.9	1.6
Nondurables	.7	2.8	3.0	3.0	2.0	3.0	2.7	2.2	2.6	2.3
Services	1.2	1.1	3.2	2.6	2.4	1.8	2.4	2.4	2.5	2.3
Residential investment	15.4	7.1	7.8	8.9	4.5	3.8	-3.3	2.5	2.6	-2.7
Previous Tealbook	15.4	7.1	7.8	8.9	4.5	3.8	-3.3	-.1	.1	-2.8
Nonres. priv. fixed invest.	5.6	5.4	6.4	-.7	1.8	6.3	7.0	2.7	2.0	1.5
Previous Tealbook	5.6	5.4	6.4	-.7	1.8	6.3	7.0	2.6	1.7	.9
Equipment & intangibles	6.1	5.1	5.6	2.6	1.6	7.3	7.6	3.0	2.8	2.4
Previous Tealbook	6.1	5.1	5.6	2.6	1.6	7.3	7.5	2.7	2.5	1.8
Nonres. structures	4.0	6.7	8.8	-10.7	2.5	2.9	4.9	1.8	-.7	-1.5
Previous Tealbook	4.0	6.7	8.8	-10.7	2.5	2.9	5.3	2.0	-1.0	-2.3
Net exports[1]	-569	-533	-578	-725	-786	-859	-912	-947	-987	-1000
Previous Tealbook[1]	-569	-533	-578	-725	-786	-859	-914	-997	-1039	-1062
Exports	2.1	6.0	3.0	-1.6	.8	4.7	2.3	2.6	2.4	3.8
Imports	.6	3.0	6.7	3.4	3.1	5.4	3.4	1.7	3.1	3.0
Gov't. cons. & invest.	-2.1	-2.4	.2	2.2	.9	.1	1.5	2.2	1.6	1.0
Previous Tealbook	-2.1	-2.4	.2	2.2	.9	.1	1.7	2.1	1.6	1.0
Federal	-2.6	-6.1	-1.2	1.2	.2	1.3	2.7	3.6	2.6	1.0
Defense	-4.7	-6.5	-3.6	-.2	-.7	1.3	5.0	3.5	2.5	.6
Nondefense	1.2	-5.5	2.7	3.4	1.5	1.3	-.5	3.9	2.8	1.5
State & local	-1.7	.2	1.1	2.8	1.4	-.5	.8	1.3	1.0	1.0
Change in priv. inventories[1]	71	109	87	129	23	23	45	85	53	41
Previous Tealbook[1]	71	109	87	129	23	23	45	77	50	60

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	2018			2019				2020							
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2018[1]	2019[1]	2020[1]	2021[1]
Real GDP	4.2	3.4	2.2	2.1	2.0	2.2	2.3	2.4	2.2	1.9	2.2	3.0	2.2	2.2	1.7
Previous Tealbook	4.2	3.4	2.6	1.0	2.6	1.9	1.8	2.0	2.2	2.0	2.0	3.1	1.8	2.0	1.5
Final sales	5.3	1.0	2.1	1.9	1.7	3.3	2.9	2.0	2.3	2.0	2.4	2.6	2.4	2.2	1.8
Previous Tealbook	5.3	1.0	2.2	.8	2.6	2.4	2.5	2.0	2.0	1.8	1.9	2.6	2.1	1.9	1.5
Priv. dom. final purch.	3.7	2.6	2.2	.8	1.9	2.8	2.5	2.1	2.1	2.1	2.1	2.5	2.0	2.1	1.6
Previous Tealbook	3.7	2.6	2.5	.8	2.3	2.3	2.2	1.8	1.9	1.8	1.6	2.6	1.9	1.8	1.4
Personal cons. expend.	2.6	2.4	1.7	.8	1.7	1.8	1.8	1.7	1.7	1.7	1.7	1.8	1.5	1.7	1.5
Previous Tealbook	2.6	2.4	1.9	.7	1.9	1.8	1.8	1.6	1.5	1.5	1.5	1.8	1.6	1.5	1.4
Durables	.6	.3	.3	-.4	.4	.2	.1	.1	.1	.1	.1	.2	.1	.1	.1
Nondurables	.6	.6	.3	.1	.3	.4	.4	.4	.4	.4	.3	.4	.3	.4	.3
Services	1.4	1.5	1.1	1.0	1.0	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.1	1.2	1.1
Residential investment	-.1	-.1	-.2	.0	-.1	.2	.3	.2	.2	.0	.0	-.1	.1	.1	-.1
Previous Tealbook	-.1	-.1	-.2	-.3	.0	.2	.1	.1	.0	.0	-.1	-.1	.0	.0	-.1
Nonres. priv. fixed invest.	1.2	.4	.7	.1	.3	.7	.4	.1	.2	.3	.5	.9	.4	.3	.2
Previous Tealbook	1.2	.4	.7	.5	.3	.3	.3	.1	.3	.3	.2	.9	.3	.2	.1
Equipment & intangibles	.7	.5	.9	.0	.2	.7	.3	.1	.2	.3	.5	.8	.3	.3	.2
Previous Tealbook	.7	.5	.8	.4	.2	.3	.2	.2	.3	.3	.3	.8	.3	.3	.2
Nonres. structures	.4	-.1	-.1	.1	.1	.0	.1	.0	.0	.0	.0	.1	.1	.0	.0
Previous Tealbook	.4	-.1	-.1	.1	.1	.0	.1	.0	.0	.0	.0	.2	.1	.0	-.1
Net exports	1.2	-2.0	-.1	.6	-.7	.2	.2	-.4	-.2	-.3	.1	-.2	.1	-.2	.0
Previous Tealbook	1.2	-2.0	-.2	-.1	-.3	-.3	-.1	-.1	-.1	-.4	.0	-.3	-.2	-.1	.0
Exports	1.1	-.6	.2	.2	-.1	.7	.5	.0	.4	.4	.4	.3	.3	.3	.5
Imports	.1	-1.4	-.3	.4	-.7	-.5	-.3	-.4	-.5	-.7	-.3	-.5	-.3	-.5	-.5
Gov't. cons. & invest.	.4	.4	-.1	.4	.5	.3	.3	.3	.4	.2	.2	.3	.4	.3	.2
Previous Tealbook	.4	.4	.0	.1	.7	.3	.3	.3	.3	.3	.2	.3	.4	.3	.2
Federal	.2	.2	.1	.1	.5	.2	.2	.2	.3	.1	.1	.2	.2	.2	.1
Defense	.2	.2	.2	.3	.1	.1	.1	.1	.1	.1	.0	.2	.1	.1	.0
Nondefense	.0	.0	-.2	-.2	.4	.1	.1	.1	.2	.0	.0	.0	.1	.1	.0
State & local	.2	.2	-.1	.4	.0	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Change in priv. inventories	-1.2	2.3	.1	.2	.3	-1.0	-.6	.4	-.1	-.1	-.1	.4	-.3	.0	.0
Previous Tealbook	-1.2	2.3	.4	.2	-.1	-.4	-.6	-.1	.1	.2	.2	.5	-.2	.1	.0

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

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

Item	2018			2019				2020				2018[1]	2019[1]	2020[1]	2021[1]
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
GDP chain-wt. price index	3.0	1.8	1.7	1.3	2.0	1.9	1.9	2.0	2.2	2.0	1.9	2.1	1.8	2.0	2.0
Previous Tealbook	3.0	1.8	1.8	1.8	2.0	2.1	1.9	2.1	2.2	2.0	1.9	2.2	2.0	2.1	2.1
PCE chain-wt. price index	2.0	1.6	1.5	.5	2.7	1.9	1.8	1.9	1.8	1.8	1.8	1.9	1.8	1.8	1.8
Previous Tealbook	2.0	1.6	1.5	1.3	2.3	2.0	1.8	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.9
Energy	.7	3.3	-2.0	-17.0	23.3	-2.4	-1.4	-1.7	-1.5	-1.3	-1.4	3.5	-.4	-1.5	-.9
Previous Tealbook	.7	3.3	-2.0	-18.5	10.7	1.1	.0	-.8	-1.0	-1.2	-1.2	3.5	-2.2	-1.0	-.7
Food	1.2	.4	.3	3.0	2.9	3.1	2.6	2.6	2.6	2.6	2.6	.5	2.9	2.6	2.6
Previous Tealbook	1.2	.4	.3	1.8	2.1	2.4	2.4	2.3	2.3	2.3	2.3	.5	2.2	2.3	2.3
Ex. food & energy	2.1	1.6	1.8	1.2	1.9	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.8	1.9	1.9
Previous Tealbook	2.1	1.6	1.7	2.3	2.0	2.0	1.8	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0
Ex. food & energy, market based	2.2	1.2	1.5	1.6	1.5	2.0	1.7	1.9	1.8	1.7	1.7	1.7	1.7	1.8	1.8
Previous Tealbook	2.2	1.2	1.5	2.3	1.9	1.8	1.6	1.9	1.8	1.8	1.8	1.7	1.9	1.8	1.8
CPI	2.1	2.0	1.5	.9	3.8	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2
Previous Tealbook	2.1	2.0	1.5	.9	3.0	2.3	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.2
Ex. food & energy	1.9	2.0	2.2	2.3	2.4	2.5	2.3	2.4	2.3	2.3	2.3	2.2	2.4	2.3	2.3
Previous Tealbook	1.9	2.0	2.2	2.6	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.2	2.4	2.4	2.4
ECI, hourly compensation[2]	2.4	3.0	2.4	2.7	2.8	2.8	2.8	2.7	2.7	2.7	2.7	3.0	2.8	2.7	2.7
Previous Tealbook[2]	2.4	3.0	2.4	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.0	2.8	2.8	2.8
Business sector															
Output per hour	3.4	1.4	1.2	1.9	.2	.9	1.1	1.4	1.1	1.1	1.4	1.7	1.0	1.3	1.2
Previous Tealbook	3.4	1.4	1.8	.4	.7	.6	.8	1.2	1.5	1.3	1.3	1.9	.6	1.3	1.1
Compensation per hour	.3	3.2	3.7	2.7	3.4	3.6	3.8	3.7	3.7	3.7	3.7	2.9	3.4	3.7	3.7
Previous Tealbook	.3	3.2	3.6	2.7	3.8	3.8	3.8	3.7	3.7	3.7	3.7	2.9	3.5	3.7	3.7
Unit labor costs	-3.0	1.8	2.4	.8	3.2	2.7	2.7	2.2	2.5	2.5	2.2	1.2	2.3	2.4	2.5
Previous Tealbook	-3.0	1.8	1.8	2.3	3.1	3.2	3.0	2.4	2.2	2.4	2.4	1.0	2.9	2.4	2.5
Core goods imports chain-wt. price index[3]	.6	-1.2	.1	-.5	1.3	1.4	1.2	1.2	1.1	1.0	1.0	.5	.9	1.1	.9
Previous Tealbook[3]	.6	-1.2	.0	-.1	.8	.8	.8	.9	.9	.8	.8	.5	.6	.8	.7

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
GDP chain-wt. price index	2.1	1.8	1.6	.9	1.5	2.0	2.1	1.8	2.0	2.0
Previous Tealbook	2.1	1.8	1.6	.9	1.5	2.0	2.2	2.0	2.1	2.1
PCE chain-wt. price index	1.8	1.2	1.2	.3	1.6	1.8	1.9	1.8	1.8	1.8
Previous Tealbook	1.8	1.2	1.2	.3	1.6	1.8	1.9	1.8	1.9	1.9
Energy	2.1	-2.9	-6.9	-16.4	2.1	8.1	3.5	-.4	-1.5	-.9
Previous Tealbook	2.1	-2.9	-6.9	-16.4	2.1	8.1	3.5	-2.2	-1.0	-.7
Food	1.3	.7	2.8	.3	-1.8	.7	.5	2.9	2.6	2.6
Previous Tealbook	1.3	.7	2.8	.3	-1.8	.7	.5	2.2	2.3	2.3
Ex. food & energy	1.8	1.6	1.5	1.2	1.8	1.6	1.9	1.8	1.9	1.9
Previous Tealbook	1.8	1.6	1.5	1.2	1.8	1.6	1.9	2.0	2.0	2.0
Ex. food & energy, market based	1.5	1.1	1.2	1.1	1.5	1.2	1.7	1.7	1.8	1.8
Previous Tealbook	1.5	1.1	1.2	1.1	1.5	1.2	1.7	1.9	1.8	1.8
CPI	1.9	1.2	1.2	.4	1.8	2.1	2.2	2.2	2.1	2.2
Previous Tealbook	1.9	1.2	1.2	.4	1.8	2.1	2.2	2.1	2.2	2.2
Ex. food & energy	1.9	1.7	1.7	2.0	2.2	1.8	2.2	2.4	2.3	2.3
Previous Tealbook	1.9	1.7	1.7	2.0	2.2	1.8	2.2	2.4	2.4	2.4
ECI, hourly compensation[1]	1.8	2.0	2.3	1.9	2.2	2.6	3.0	2.8	2.7	2.7
Previous Tealbook[1]	1.8	2.0	2.3	1.9	2.2	2.6	3.0	2.8	2.8	2.8
Business sector										
Output per hour	.1	1.8	.2	.7	1.1	.7	1.7	1.0	1.3	1.2
Previous Tealbook	.1	1.8	.2	.7	1.1	.7	1.9	.6	1.3	1.1
Compensation per hour	5.9	-.3	2.8	2.5	2.1	3.0	2.9	3.4	3.7	3.7
Previous Tealbook	5.9	-.3	2.8	2.5	2.1	3.0	2.9	3.5	3.7	3.7
Unit labor costs	5.7	-2.0	2.7	1.8	1.0	2.3	1.2	2.3	2.4	2.5
Previous Tealbook	5.7	-2.0	2.7	1.8	1.0	2.3	1.0	2.9	2.4	2.5
Core goods imports chain-wt. price index[2]	-.4	-2.2	-.4	-4.4	-.7	1.1	.5	.9	1.1	.9
Previous Tealbook[2]	-.4	-2.2	-.4	-4.4	-.7	1.1	.5	.6	.8	.7

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

Other Macroeconomic Indicators

Item	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2018[1]	2019[1]	2020[1]	2021[1]
Employment and production															
Nonfarm payroll employment[2]	243	189	233	180	175	175	160	187	227	45	144	223	173	151	103
Unemployment rate[3]	3.9	3.8	3.8	3.9	3.7	3.7	3.6	3.6	3.6	3.6	3.5	3.8	3.6	3.5	3.5
Previous Tealbook[3]	3.9	3.8	3.8	3.9	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.8	3.6	3.6	3.7
Natural rate of unemployment[3]	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Previous Tealbook[3]	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Employment-to-Population Ratio[3]	60.4	60.4	60.6	60.7	60.7	60.7	60.7	60.7	60.8	60.8	60.8	60.6	60.7	60.8	60.6
Employment-to-Population Trend[3]	60.0	60.0	59.9	59.9	59.9	59.8	59.8	59.8	59.7	59.7	59.7	59.9	59.8	59.7	59.5
Output gap[4]	1.4	1.7	1.9	1.9	2.0	2.1	2.2	2.4	2.5	2.5	2.6	1.9	2.2	2.6	2.4
Previous Tealbook[4]	1.4	1.7	1.9	1.9	2.1	2.1	2.1	2.2	2.2	2.3	2.3	1.9	2.1	2.3	1.9
Industrial production[5]	4.6	5.2	4.0	-.3	.8	1.9	1.3	1.8	1.8	1.1	1.0	4.0	.9	1.4	1.0
Previous Tealbook[5]	5.2	4.9	4.6	.5	2.8	.6	1.0	1.7	1.5	1.1	1.0	4.3	1.2	1.3	.7
Manufacturing industr. prod.[5]	2.0	3.6	1.7	-1.1	.3	1.1	1.2	1.6	1.7	1.6	1.3	2.2	.4	1.6	1.1
Previous Tealbook[5]	2.3	3.8	2.6	-.7	2.0	.5	.9	.9	1.0	1.2	1.1	2.6	.7	1.0	.5
Capacity utilization rate - mfg.[3]	76.4	76.9	77.0	76.6	76.4	76.3	76.3	76.5	76.7	76.8	76.9	77.0	76.3	76.9	77.4
Previous Tealbook[3]	75.5	76.0	76.2	75.8	75.9	75.7	75.7	75.6	75.7	75.7	75.8	76.2	75.7	75.8	75.7
Housing starts[6]	1.3	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.3	1.3
Light motor vehicle sales[6]	17.2	16.9	17.5	16.9	16.8	16.9	17.0	17.0	17.0	16.9	16.9	17.2	16.9	16.9	16.9
Income and saving															
Nominal GDP[5]	7.6	4.9	4.1	3.2	4.0	4.2	4.3	4.4	4.4	3.9	4.2	5.2	3.9	4.2	3.8
Real disposable pers. income[5]	1.8	2.6	4.3	4.9	1.8	1.0	1.9	3.2	2.0	1.4	2.1	3.3	2.4	2.2	1.9
Previous Tealbook[5]	1.8	2.6	4.2	3.3	2.1	1.5	2.2	2.8	1.8	1.5	2.2	3.3	2.3	2.1	1.8
Personal saving rate[3]	6.7	6.4	6.8	7.6	7.4	7.0	6.8	7.0	6.9	6.6	6.6	6.8	6.8	6.6	6.3
Previous Tealbook[3]	6.7	6.4	6.7	7.1	7.0	6.7	6.6	6.7	6.6	6.5	6.5	6.7	6.6	6.5	6.3
Corporate profits[7]	12.5	14.7	-1.7	-3.3	1.4	2.3	-5.1	-3.5	3.3	3.0	4.4	7.4	-1.2	1.7	1.9
Profit share of GNP[3]	10.8	11.1	10.9	10.8	10.7	10.7	10.4	10.2	10.2	10.2	10.2	10.9	10.4	10.2	10.0
Gross national saving rate[3]	18.5	18.8	18.7	19.4	19.0	18.9	18.8	18.7	18.7	18.7	18.7	18.7	18.8	18.7	18.6
Net national saving rate[3]	3.3	3.6	3.4	4.6	4.1	4.0	3.8	3.5	3.6	3.5	3.5	3.4	3.8	3.5	3.2

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Employment and production										
Nonfarm payroll employment[1]	181	192	251	227	193	179	223	173	151	103
Unemployment rate[2]	7.8	7.0	5.7	5.0	4.8	4.1	3.8	3.6	3.5	3.5
Previous Tealbook[2]	7.8	7.0	5.7	5.0	4.8	4.1	3.8	3.6	3.6	3.7
Natural rate of unemployment[2]	5.6	5.4	5.1	4.9	4.8	4.6	4.6	4.6	4.6	4.6
Previous Tealbook[2]	5.6	5.4	5.1	4.9	4.8	4.6	4.6	4.6	4.6	4.6
Employment-to-Population Ratio[2]	58.7	58.5	59.3	59.4	59.8	60.2	60.6	60.7	60.8	60.6
Employment-to-Population Trend[2]	60.5	60.4	60.3	60.2	60.1	60.1	59.9	59.8	59.7	59.5
Output gap[3]	-3.8	-3.0	-1.0	-.4	.1	.9	1.9	2.2	2.6	2.4
Previous Tealbook[3]	-3.8	-3.0	-1.0	-.4	.1	.9	1.9	2.1	2.3	1.9
Industrial production	2.1	2.3	3.4	-3.4	-.3	3.6	4.0	.9	1.4	1.0
Previous Tealbook	2.2	2.3	3.4	-3.3	-.5	3.0	4.3	1.2	1.3	.7
Manufacturing industr. prod.	1.4	1.1	1.4	-1.7	.3	2.5	2.2	.4	1.6	1.1
Previous Tealbook	1.4	1.1	1.4	-1.6	-.1	1.9	2.6	.7	1.0	.5
Capacity utilization rate - mfg.[2]	74.2	74.5	75.8	74.9	74.2	75.8	77.0	76.3	76.9	77.4
Previous Tealbook[2]	74.7	75.1	76.3	75.4	74.4	75.2	76.2	75.7	75.8	75.7
Housing starts[4]	.8	.9	1.0	1.1	1.2	1.2	1.2	1.3	1.3	1.3
Light motor vehicle sales[4]	14.4	15.5	16.5	17.4	17.5	17.1	17.2	16.9	16.9	16.9
Income and saving										
Nominal GDP	3.6	4.4	4.4	2.9	3.4	4.5	5.2	3.9	4.2	3.8
Real disposable pers. income	4.9	-2.5	5.2	3.1	1.6	2.8	3.3	2.4	2.2	1.9
Previous Tealbook	4.9	-2.5	5.2	3.1	1.6	2.8	3.3	2.3	2.1	1.8
Personal saving rate[2]	10.2	6.3	7.4	7.4	6.4	6.3	6.8	6.8	6.6	6.3
Previous Tealbook[2]	10.2	6.3	7.4	7.4	6.4	6.3	6.7	6.6	6.5	6.3
Corporate profits[5]	.7	3.9	5.9	-10.7	7.6	3.3	7.4	-1.2	1.7	1.9
Profit share of GNP[2]	11.9	11.8	12.0	10.4	10.8	10.7	10.9	10.4	10.2	10.0
Gross national saving rate[2]	18.8	19.2	20.2	19.4	18.3	18.3	18.7	18.8	18.7	18.6
Net national saving rate[2]	3.7	4.0	5.1	4.3	3.0	3.1	3.4	3.8	3.5	3.2

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	2016	2017	2018	2019	2020	2021	2018 Q4	2019 Q1	2019 Q2	2019 Q3
Unified federal budget[1]					Nominal dollars, billions					
Receipts	3,268	3,316	3,330	3,482	3,703	3,854	771	736	1,121	854
Outlays	3,853	3,982	4,109	4,376	4,640	4,841	1,090	1,108	1,109	1,069
Surplus/deficit	-585	-665	-779	-895	-937	-987	-319	-372	12	-215
					Percent of GDP					
Surplus/deficit	-3.2	-3.5	-3.9	-4.2	-4.3	-4.3	-6.2	-7.2	.2	-4.1
Previous Tealbook	*-3.2*	*-3.5*	*-3.8*	*-4.2*	*-4.4*	*-4.6*	*-6.2*	*-7.5*	*.6*	*-4.0*
Primary surplus/deficit	-1.9	-2.1	-2.2	-2.5	-2.4	-2.5	-4.3	-5.5	2.3	-2.8
Net interest	1.3	1.4	1.6	1.7	1.8	1.8	1.9	1.7	2.0	1.2
Cyclically adjusted surplus/deficit	-3.0	-3.6	-4.4	-5.1	-5.3	-5.5	-7.0	-8.0	-.7	-5.0
Federal debt held by public	76.4	76.1	77.8	77.0	79.8	81.3	78.5	78.1	77.4	77.0
Government in the NIPA[2]					Real percent change, annual rate					
Purchases	.9	.1	1.5	2.2	1.6	1.0	-.4	2.6	2.9	1.6
Consumption	.9	-.1	1.4	1.6	1.2	.7	.0	.3	3.6	1.2
Investment	.7	1.4	2.3	4.5	3.0	2.1	-1.3	12.6	-.5	2.7
State and local construction	1.8	-2.9	.4	3.3	1.0	1.0	-11.3	20.0	-7.0	.0
Real disposable personal income	1.6	2.8	3.3	2.4	2.2	1.9	4.3	4.8	1.8	1.0
Contribution from transfers[3]	.3	.2	.5	.8	.6	.8	.4	2.3	.3	-.1
Contribution from taxes[3]	-.1	-.6	.0	-.7	-.6	-.5	-.2	-1.5	-.4	-.4
Government employment					Average net change in monthly payrolls, thousands					
Federal	3	-2	0	1	0	1	0	-1	1	9
State and local	14	9	8	10	9	9	-3	12	9	9
Fiscal indicators[2]					Percentage point contribution to change in real GDP, annual rate					
Fiscal effect (FE)[4]	.4	.1	.4	.7	.6	.4	.2	.9	1.0	.5
Discretionary policy actions (FI)	.3	.2	.6	.6	.5	.2	.3	.8	.8	.5
Previous Tealbook	*.3*	*.2*	*.6*	*.6*	*.5*	*.2*	*.4*	*.5*	*1.0*	*.5*
Federal purchases	.0	.1	.2	.2	.2	.1	.1	.1	.5	.2
State and local purchases	.1	-.1	.1	.1	.1	.1	-.1	.4	.0	.1
Taxes and transfers	.1	.1	.3	.3	.2	.0	.3	.3	.3	.2
Cyclical	-.1	-.1	-.2	-.1	-.1	.0	-.2	-.1	-.1	-.1
Other	.2	.1	.0	.2	.2	.2	.1	.3	.3	.1

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

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

Measure and country	2018 Q1	2018 Q2	2018 Q3	2018 Q4	Projected 2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4
***Real GDP*[1]**												
Total foreign	3.1	2.0	2.1	1.7	2.0	2.4	2.5	2.3	2.5	2.6	2.6	2.6
Previous Tealbook	*3.0*	*2.1*	*2.1*	*1.7*	*1.7*	*2.4*	*2.6*	*2.3*	*2.6*	*2.6*	*2.6*	*2.6*
Advanced foreign economies	1.3	2.2	1.0	.8	1.2	1.4	1.6	1.0	1.5	1.6	1.7	1.7
Canada	1.3	2.6	2.0	.4	1.0	2.1	1.7	1.7	1.9	1.9	1.8	1.8
Japan	-.4	1.9	-2.4	1.9	.3	.6	3.0	-3.0	.8	1.0	1.0	.9
United Kingdom	.2	1.6	2.8	.9	1.5	.5	1.3	1.5	1.6	1.7	1.7	1.7
Euro area	1.5	1.7	.6	.9	1.4	1.1	1.0	1.1	1.2	1.4	1.5	1.6
Germany	1.5	1.8	-.8	.1	1.5	1.3	1.3	1.3	1.3	1.3	1.4	1.4
Emerging market economies	4.9	1.9	3.1	2.6	2.9	3.4	3.5	3.4	3.5	3.6	3.6	3.6
Asia	6.0	4.2	3.8	4.0	4.3	4.6	4.6	4.5	4.5	4.5	4.5	4.5
Korea	4.1	2.4	2.3	3.9	1.9	2.2	2.6	2.6	2.6	2.6	2.6	2.6
China	7.1	6.5	5.8	6.0	7.1	6.6	6.2	6.0	6.0	6.0	6.0	6.0
Latin America	3.7	-.8	2.2	1.0	1.3	2.1	2.3	2.3	2.5	2.6	2.7	2.6
Mexico	4.2	-.6	2.4	1.0	1.3	2.1	2.2	2.2	2.4	2.5	2.6	2.5
Brazil	1.7	.2	2.2	.5	.0	1.5	2.2	2.4	2.4	2.6	2.6	2.8
***Consumer prices*[2]**												
Total foreign	2.6	1.9	3.4	1.9	.7	2.5	2.2	2.6	2.3	2.3	2.3	2.3
Previous Tealbook	*2.5*	*1.7*	*3.6*	*2.0*	*.5*	*2.3*	*2.2*	*2.6*	*2.3*	*2.3*	*2.3*	*2.3*
Advanced foreign economies	2.4	1.3	2.4	.8	.6	1.6	1.5	2.4	1.4	1.4	1.4	1.5
Canada	3.3	1.2	2.6	1.1	1.5	3.0	2.0	2.0	1.9	1.9	1.9	1.9
Japan	2.8	-1.6	2.0	-.1	.9	.8	1.1	6.3	.9	.9	1.0	1.0
United Kingdom	2.3	2.1	2.8	2.0	.7	2.0	2.2	2.2	2.3	2.2	2.2	2.2
Euro area	1.8	2.5	2.6	.7	-.1	1.1	1.3	1.3	1.2	1.2	1.2	1.2
Germany	1.9	2.6	2.9	1.2	-.4	1.7	1.7	1.8	1.8	1.9	1.9	2.0
Emerging market economies	2.7	2.2	4.1	2.7	.8	3.0	2.7	2.7	2.8	2.8	2.8	2.8
Asia	2.1	1.4	3.0	1.7	.3	2.9	2.3	2.4	2.6	2.6	2.6	2.6
Korea	1.6	2.2	1.9	1.5	-3.3	.2	1.9	1.9	2.0	2.1	2.1	2.1
China	1.9	1.1	3.7	2.0	.6	3.4	2.1	2.1	2.4	2.5	2.5	2.5
Latin America	4.1	4.2	6.8	5.4	1.7	3.4	3.6	3.6	3.4	3.4	3.4	3.4
Mexico	4.0	4.0	6.5	4.9	1.1	2.8	3.3	3.3	3.2	3.2	3.2	3.2
Brazil	3.1	4.3	6.6	2.5	2.9	4.8	4.1	4.3	4.3	4.3	4.3	4.3

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
								Projected		
***Real GDP*[1]**										
Total foreign	2.2	3.0	3.0	2.1	2.8	3.0	2.2	2.3	2.6	2.7
Previous Tealbook	*2.2*	*3.0*	*3.0*	*2.0*	*2.8*	*3.0*	*2.2*	*2.2*	*2.6*	*2.6*
Advanced foreign economies	.3	2.4	2.1	.9	1.8	2.6	1.3	1.3	1.6	1.7
Canada	.7	3.4	2.8	-.4	1.8	2.9	1.6	1.6	1.9	1.8
Japan	.3	2.8	-.4	1.0	1.2	2.4	.3	.2	.9	.8
United Kingdom	1.6	2.6	3.1	2.2	1.7	1.6	1.4	1.2	1.7	1.6
Euro area	-1.1	.7	1.6	2.0	2.1	2.7	1.2	1.1	1.4	1.7
Germany	.2	1.6	2.3	1.3	1.9	2.8	.6	1.3	1.3	1.5
Emerging market economies	4.2	3.6	3.9	3.2	3.8	3.4	3.1	3.3	3.6	3.6
Asia	5.8	5.4	5.1	4.5	5.1	5.2	4.5	4.5	4.5	4.4
Korea	2.1	3.5	2.8	3.2	2.6	2.8	3.2	2.3	2.6	2.4
China	8.0	7.6	7.1	6.8	6.8	6.7	6.4	6.5	6.0	5.8
Latin America	2.9	1.7	2.8	1.9	2.5	1.7	1.5	2.0	2.6	2.8
Mexico	3.0	1.2	3.4	2.8	3.3	1.5	1.7	1.9	2.5	2.7
Brazil	2.5	2.6	-.1	-5.5	-2.3	2.3	1.1	1.5	2.6	2.8
***Consumer prices*[2]**										
Total foreign	2.3	2.4	2.0	1.4	1.9	2.5	2.4	2.0	2.3	2.3
Previous Tealbook	*2.3*	*2.4*	*2.0*	*1.4*	*1.9*	*2.5*	*2.5*	*1.9*	*2.3*	*2.3*
Advanced foreign economies	1.3	1.0	1.2	.5	.9	1.5	1.7	1.5	1.4	1.5
Canada	1.0	1.0	2.0	1.3	1.4	1.8	2.1	2.1	1.9	1.9
Japan	-.2	1.4	2.6	.1	.3	.6	.8	2.2	.9	1.0
United Kingdom	2.6	2.1	.9	.1	1.2	3.0	2.3	1.8	2.2	2.2
Euro area	2.3	.8	.2	.3	.7	1.4	1.9	.9	1.2	1.3
Germany	2.0	1.4	.4	.5	1.1	1.6	2.2	1.2	1.9	2.1
Emerging market economies	3.1	3.4	2.6	2.0	2.6	3.2	2.9	2.3	2.8	2.8
Asia	2.7	3.2	1.8	1.5	2.1	2.0	2.1	2.0	2.6	2.6
Korea	1.7	1.1	1.0	.9	1.4	1.4	1.8	.2	2.0	2.1
China	2.1	2.9	1.5	1.4	2.1	1.8	2.2	2.1	2.5	2.5
Latin America	4.3	4.0	4.7	3.2	4.0	6.4	5.1	3.1	3.4	3.3
Mexico	4.1	3.6	4.2	2.3	3.3	6.6	4.8	2.6	3.2	3.2
Brazil	5.6	5.8	6.5	10.4	7.1	2.8	4.1	4.0	4.3	4.3

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

	2018				Projected 2019				Projected 2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Billions of dollars, s.a.a.r.											
U.S. current account balance	**-495.7**	**-414.3**	**-506.4**	**-537.5**	**-509.7**	**-569.2**	**-573.5**	**-571.2**	**-610.5**	**-607.3**	**-625.5**	**-617.5**
Previous Tealbook	*-496.7*	*-414.8*	*-509.2*	*-609.3*	*-636.9*	*-656.9*	*-673.8*	*-689.5*	*-713.7*	*-714.1*	*-745.8*	*-748.3*
Current account as percent of GDP	-2.5	-2.0	-2.5	-2.6	-2.4	-2.7	-2.7	-2.6	-2.8	-2.7	-2.8	-2.7
Previous Tealbook	*-2.5*	*-2.0*	*-2.5*	*-2.9*	*-3.0*	*-3.1*	*-3.1*	*-3.2*	*-3.3*	*-3.2*	*-3.3*	*-3.3*
Net goods & services	-625.0	-547.5	-648.1	-667.9	-622.6	-674.8	-660.4	-650.2	-674.2	-670.4	-681.1	-674.7
Investment income, net	258.3	263.2	255.2	255.7	233.8	215.6	202.9	191.0	184.6	173.1	171.6	169.3
Direct, net	310.4	316.3	314.9	314.1	304.5	299.7	301.9	305.0	313.2	315.8	325.1	333.4
Portfolio, net	-52.1	-53.1	-59.6	-58.4	-70.6	-84.1	-99.0	-114.0	-128.6	-142.8	-153.5	-164.2
Other income and transfers, net	-129.0	-129.9	-113.6	-125.4	-120.9	-109.9	-116.0	-112.0	-120.9	-109.9	-116.0	-112.0

Annual Data

	2012	2013	2014	2015	2016	2017	2018	Projected 2019	Projected 2020	Projected 2021
	Billions of dollars									
U.S. current account balance	**-426.8**	**-348.8**	**-365.2**	**-407.8**	**-432.9**	**-449.1**	**-488.5**	**-555.9**	**-615.2**	**-612.0**
Previous Tealbook	*-426.8*	*-348.8*	*-365.2*	*-407.8*	*-432.9*	*-449.1*	*-507.5*	*-664.3*	*-730.5*	*-766.2*
Current account as percent of GDP	-2.6	-2.1	-2.1	-2.2	-2.3	-2.3	-2.4	-2.6	-2.8	-2.6
Previous Tealbook	*-2.6*	*-2.1*	*-2.1*	*-2.2*	*-2.3*	*-2.3*	*-2.5*	*-3.1*	*-3.3*	*-3.3*
Net goods & services	-537.4	-461.1	-489.6	-498.5	-502.0	-552.3	-622.1	-652.0	-675.1	-667.8
Investment income, net	216.1	215.4	229.0	214.7	205.7	235.1	258.1	210.8	174.6	170.6
Direct, net	285.5	283.3	284.2	284.6	272.6	298.4	313.9	302.8	321.9	359.3
Portfolio, net	-69.4	-67.9	-55.3	-70.0	-66.9	-63.3	-55.8	-91.9	-147.3	-188.7
Other income and transfers, net	-105.5	-103.1	-104.6	-123.9	-136.6	-132.0	-124.5	-114.7	-114.7	-114.7

Abbreviations

ABS	asset-backed securities
AFE	advanced foreign economy
BBA	Bipartisan Budget Act of 2018
BLS	Bureau of Labor Statistics
BOC	Bank of Canada
BOJ	Bank of Japan
C&I	commercial and industrial
CMBS	commercial mortgage-backed securities
CPH	compensation per hour
CPI	consumer price index
CRE	commercial real estate
DFM	dynamic factor model
DSGE	dynamic stochastic general equilibrium
ECB	European Central Bank
ECI	employment cost index
EFFR	effective federal funds rate
ELB	effective lower bound
EME	emerging market economy
EPOP	employment-to-population ratio
EU	European Union
FCI	financial conditions index
FHA	Federal Housing Administration
FOMC	Federal Open Market Committee; also, the Committee
FPLT	flexible price-level targeting
FRB/US	A large-scale macroeconometric model of the U.S. economy

GDP	gross domestic product
GNP	gross national product
IMF	International Monetary Fund
IOER	interest on excess reserves
IPO	initial public offering
LCR	liquidity coverage ratio
LFPR	labor force participation rate
OIS	overnight index swap
OPEC	Organization of the Petroleum Exporting Countries
OID	Original Issuance Discounts
PCE	personal consumption expenditures
PMI	purchasing managers index
PPI	producer price index
QS	quantitative surveillance
SEP	Summary of Economic Projections
SIGMA	A calibrated multicountry DSGE model
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
SOMA	System Open Market Account
S&P	Standard & Poor’s
SPF	Survey of Professional Forecasters
TCJA	Tax Cuts and Jobs Act
TIPS	Treasury Inflation-Protected Securities
USMCA	U.S.-Mexico-Canada Agreement
VAR	vector autoregression
VIX	one-month-ahead option-implied volatility on the S&P 500 index