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

January 18, 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

Despite the wide swings in financial markets in recent months, the latest economic news suggests that real activity continued to increase at a solid pace through the end of last year. Based on the data we have in hand, we estimate that real GDP rose 2.8 percent at an annual rate last quarter, led by a 4 percent annualized increase in private domestic final purchases. Moreover, job growth has shown no sign of slowing. That said, we judge that some of the strength in economic activity at year-end will prove transitory, and the tightening in financial conditions in recent months and moderation in some measures of business and consumer sentiment lead us to project a slower pace of growth this quarter. Our current forecast also assumes the federal government shutdown will hold back GDP growth in the first quarter. In all, real GDP is now projected to increase at a 2.3 percent pace this quarter and a 2.6 percent pace next quarter, with the overall first-half gain similar to our December Tealbook forecast.

A key question for our projection is how to interpret the financial market movements over the past several months. Among possible interpretations, one is that financial market participants are more attuned to an underlying weakness in the economy than we are, that the nonfinancial indicators we monitor are just lagging behind, and that the prospective slowing in economic activity will be sharper than we are projecting. A second possibility is that financial market participants are only now coming to grips with the idea that waning fiscal and monetary policy stimulus will cause economic activity to decelerate. This second interpretation suggests that a soft landing can be a little bumpy if not everyone has anticipated it, but it would not suggest a need for a major recalibration of the forecast. We are currently placing more weight on the second interpretation, and our baseline projection reflects that judgment. This assessment is in line with the predictions of near-term GDP growth from statistical models that take into account the conflicting signals from a broad set of financial and nonfinancial variables (see the box "Recent Financial Market Movements and GDP Nowcasting").

That said, we have reduced our projection of GDP growth a little this year in response to lower projected stock prices, a widening in corporate bond spreads, and our judgment that concerns about the fiscal impasse, trade policy, and the global economic outlook will restrain investment and consumer spending by somewhat more than we had previously anticipated. Although the effect of these influences is cushioned somewhat by

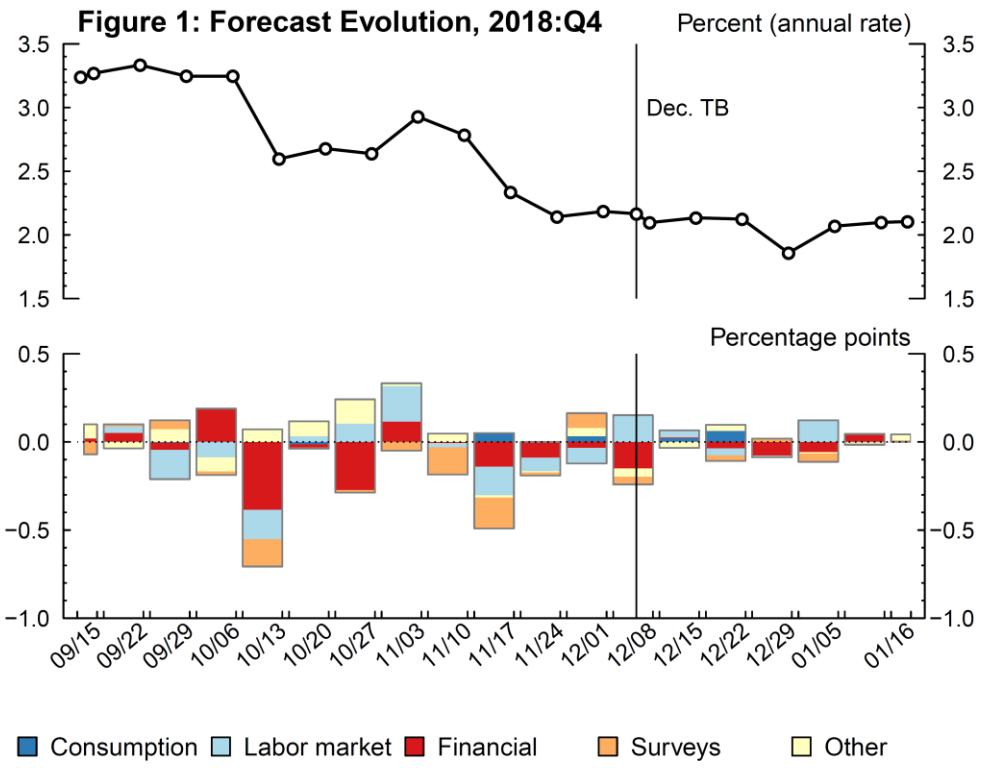
Recent Financial Market Movements and GDP Nowcasting

Since the close of the December Tealbook, various indicators of economic activity have been sending divergent signals about near-term economic growth. On the one hand, financial market indicators, including equity market indexes, the VIX, and corporate bond spreads, deteriorated in December, though they have somewhat recovered since. On the other hand, data on labor market conditions and consumption spending have been persistently upbeat. Because the Board staff's dynamic factor model (DFM) incorporates a broad variety of economic indicators into its estimates, it is a useful tool to evaluate what these divergent signals might imply for near-term economic growth. On net, the DFM estimates of GDP growth for the fourth quarter of 2018 and the first quarter of 2019 have changed little since the December Tealbook, as downward contributions from financial variables have been offset by the positive news from consumption and labor indicators.

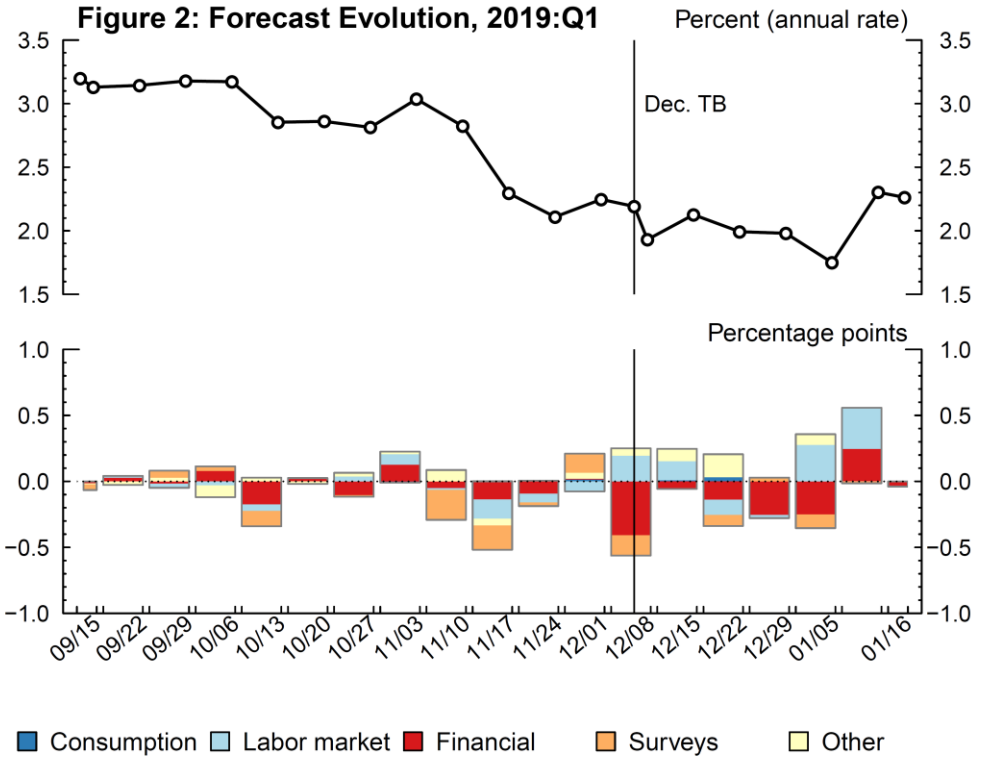
The figures on the following page display the weekly evolution of the DFM forecasts of real GDP growth for 2018:Q4 and 2019:Q1 since the September Tealbook, as well as the contributions to the DFM forecast revisions from various sources. The black lines indicate that, on net, the forecasts have changed little since early December (though they are down materially since September). The forecast for the fourth quarter has revised down from 2.2 percent on December 6 (the last time we ran the model before the December Tealbook closed) to 2.1 percent on January 16, while the forecast for the first quarter has revised up from 2.2 percent to 2.3 percent.

These small net changes reflect the offsetting signals from financial and nonfinancial indicators. The red bars represent the contribution of financial variables to the forecast revisions, which, taken together, have lowered the forecast for Q4 0.2 percentage point and the forecast for Q1 0.6 percentage point since the December Tealbook. In contrast, nonfinancial variables, including both official releases and survey data, boosted the model's fourth-quarter forecast 0.1 percentage point and the first-quarter forecast 0.7 percentage point, as the data on consumption (the dark blue portion of the bars) and labor markets (the light blue portion of the bars) have generally been positive.

The ongoing partial government shutdown has been affecting the data flow that we rely on for our factor model estimates. When we do not receive economic data produced by federal statistical agencies, the model places more weight on the available information, including financial data and survey data. Since the December Tealbook, survey data from manufacturing firms and consumers have come in worse than expected by the model, leading the model to revise down the current quarter 0.4 percentage point (the orange portion of the bars).



Source: Staff calculations.



Source: Staff calculations.

Comparing the Staff Projection with Other Forecasts

The staff's projection for real GDP growth in 2019 is close to the Blue Chip consensus forecast and below the median projection from the Survey of Professional Forecasters, although the latter dates from mid-November. The staff's GDP forecast is ¼ percentage point higher than the Blue Chip consensus forecast in 2020. The staff's unemployment rate forecast is below the Blue Chip in both 2019 and 2020. The staff's projection for CPI inflation is below the Blue Chip in 2019 but above it in 2020.

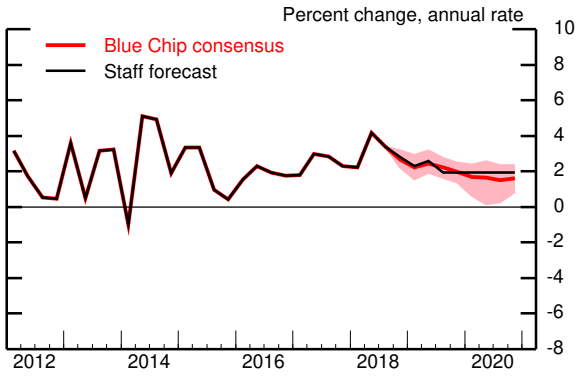
Comparison of Tealbook and Outside Forecasts

	2018	2019	2020
GDP (Q4/Q4 percent change)			
January Tealbook	3.1	2.2	1.9
Blue Chip (01/10/19)	3.1	2.2	1.6
SPF median (11/13/18)	3.1	2.4	n.a.
Unemployment rate (Q4 level)			
January Tealbook	3.8	3.5	3.5
Blue Chip (01/10/19)	3.8	3.6	3.8
SPF median (11/13/18)	3.7	3.6	n.a.
CPI inflation (Q4/Q4 percent change)			
January Tealbook	2.2	2.0	2.3
Blue Chip (01/10/19)	2.2	2.1	2.2
SPF median (11/13/18)	2.4	2.3	2.3
PCE price inflation (Q4/Q4 percent change)			
January Tealbook	1.8	1.8	1.9
SPF median (11/13/18)	2.1	2.1	2.1
Core PCE price inflation (Q4/Q4 percent change)			
January Tealbook	1.8	2.0	2.0
SPF median (11/13/18)	2.0	2.1	2.1

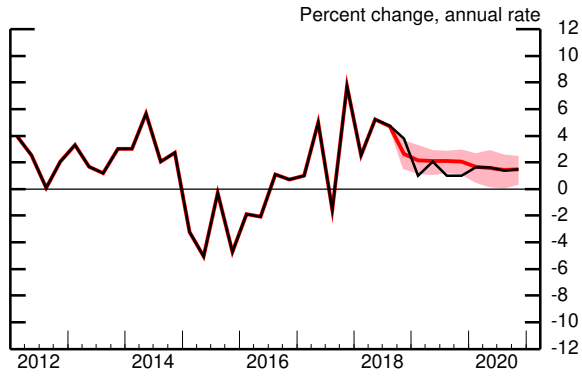
Note: SPF is the Survey of Professional Forecasters, CPI is the consumer price index, and PCE is personal consumption expenditures. Blue Chip does not provide results for overall and core PCE price inflation. The Blue Chip consensus forecast includes input from about 50 panelists, and the SPF about 40.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

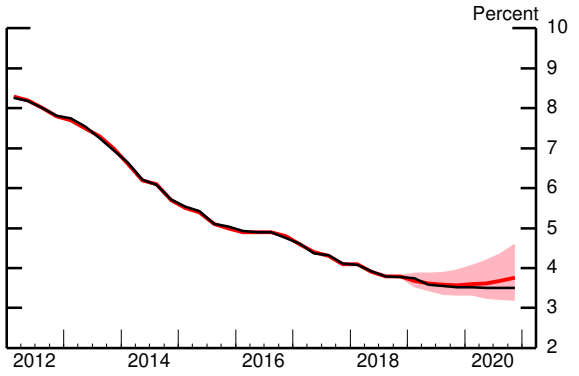
Real GDP



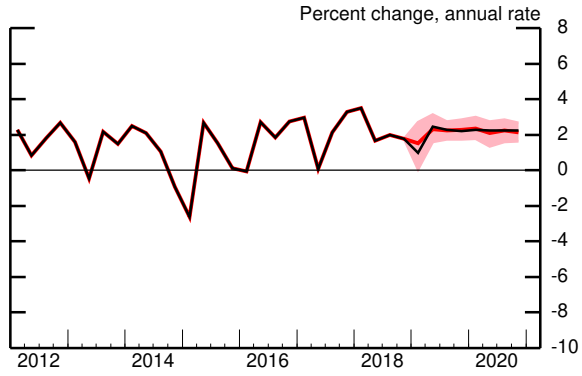
Industrial Production



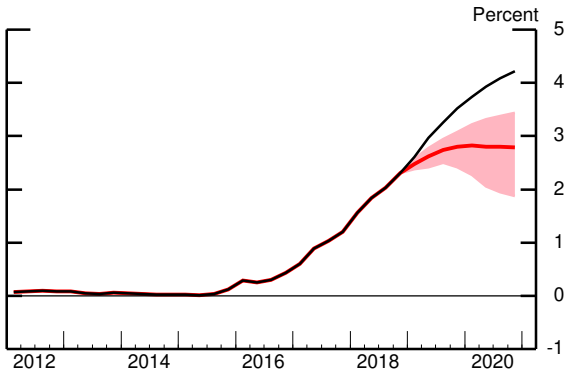
Unemployment Rate



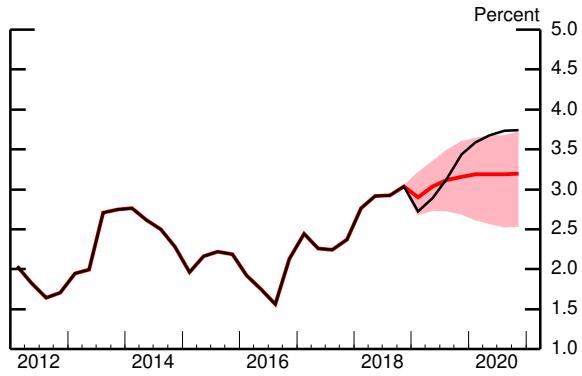
Consumer Price Index



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.

lower paths for interest rates and the dollar, the GDP growth projection for 2019, at 2.2 percent, is 0.2 percentage point weaker than in the December Tealbook. GDP growth in 2020 is also revised down slightly.

Even so, the broad contour of our forecast remains close to that in the December Tealbook. GDP is projected to decelerate noticeably over the forecast period, largely because of the effects of tighter monetary policy and waning fiscal stimulus. Enacted tariffs also impinge on growth slightly. With GDP growth above trend this year, the output gap is projected to widen to 2.7 percent in 2020 before starting to narrow in 2021. As a result, we expect the unemployment rate to fall to 3.5 percent this year, remain at that level in 2020, and then edge up to 3.6 percent in 2021, still 1 percentage point below our estimate of its natural rate.

The data on inflation have come in largely as expected. Over the 12 months ending in December, we estimate that total PCE prices rose 1.7 percent and core PCE prices increased 1.9 percent, both the same as in the December Tealbook forecast. As resource utilization tightens somewhat further, year-over-year changes in core PCE prices are projected to reach 2 percent by the third quarter and to hold steady thereafter. Reflecting movements in oil prices, total PCE inflation is projected to dip further below core inflation in the near term but to move back in line with it over the medium term.

KEY BACKGROUND FACTORS

In the period between the December Tealbook and the December FOMC meeting, stock prices declined and corporate bond spreads widened. Although they subsequently reversed a portion of those moves, relative to the assumptions embedded in the December Tealbook projection, equity prices and corporate bond spreads are a bit less supportive of economic activity in this forecast.

Monetary Policy

- The inertial version of the Taylor (1999) rule that we use to mechanically set our assumed path for the federal funds rate continues to project a substantial increase over the next three years—one that we recognize is out of line with the expectations of most private forecasters. We assume the federal funds rate will increase 1¼ percentage points this year, ¾ percentage point in 2020, and ¼ percentage point in 2021, reaching 4.5 percent in the fourth quarter of 2021.

This trajectory is a bit lower than in the December Tealbook due to a slightly lower projected output gap.

- We assume that the size of the SOMA portfolio continues a gradual and predictable decline until early 2020 and that the level of reserve balances in the longer run will be $1 trillion.

Other Interest Rates

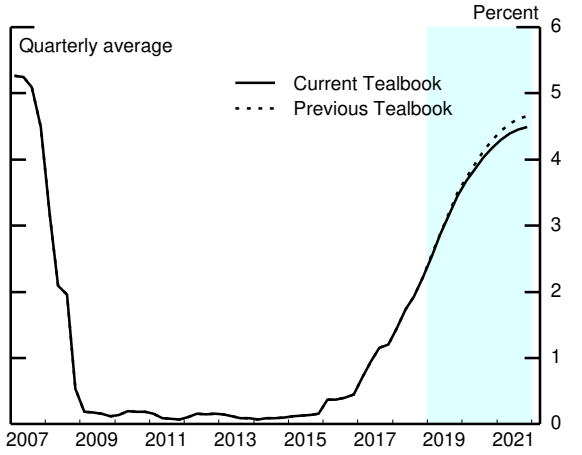
- The 10-year Treasury yield is projected to rise from an average of 2.9 percent in the current quarter to 4 percent by the end of 2021. About half of the projected increase reflects our assumption that market participants will revise up their expectation of short rates relative to what is currently embedded in longer-term yields. The remainder is due to our assumption that downward pressures on the term premium will diminish over time. Relative to the December Tealbook, the path for the 10-year Treasury yield is revised down an average of 35 basis points this year, reflecting the lower path of the federal funds rate over the valuation window as well as our assumption that the recent decrease in the term premium will unwind only gradually. In 2020 and 2021, the lower federal funds rate in this projection shows through to about a 15 basis point downward revision to the 10-year Treasury yield.
  - The federal funds rate is projected to rise above the 10-year Treasury rate in the second quarter of 2020, a quarter earlier than was projected in the December Tealbook.

- Corporate bond spreads have widened, as triple-B corporate yields have not mirrored the declines in comparable-maturity Treasury securities since the time of the December Tealbook. We expect that a more pessimistic outlook for business-sector activity will keep corporate bond spreads elevated through the end of 2019, a little longer than in the December Tealbook.

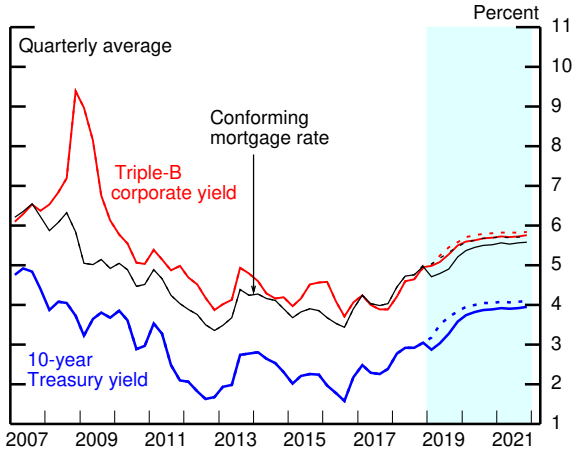
- In contrast, spreads on mortgage rates have not widened, and the 30-year fixed mortgage rate is revised lower, essentially in line with the 10-year Treasury yield.

Key Background Factors underlying the Baseline Staff Projection

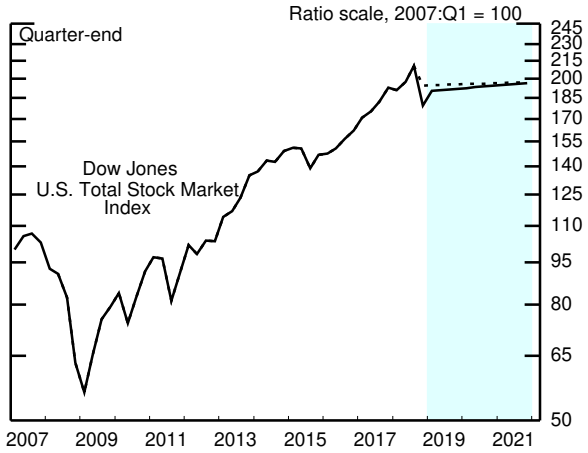
Federal Funds Rate



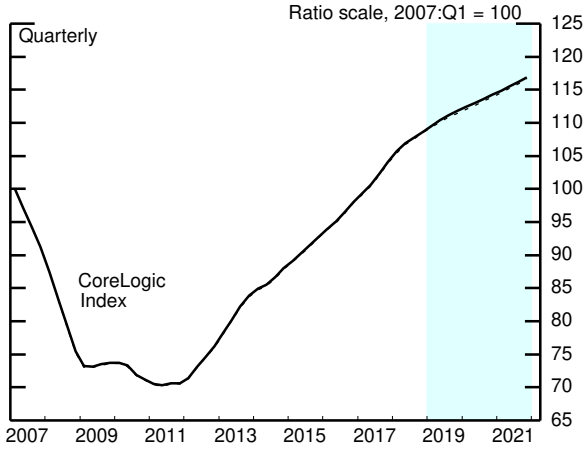
Long-Term Interest Rates



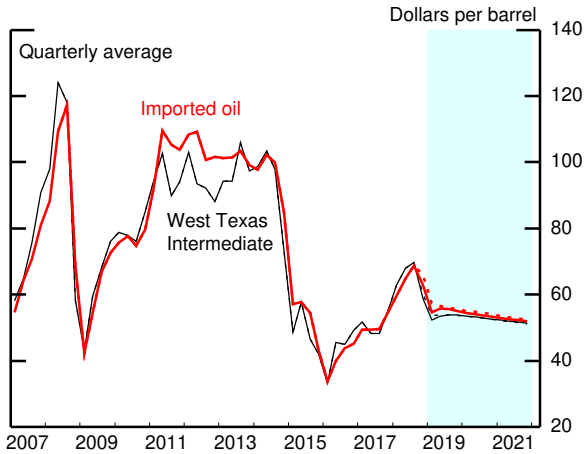
Equity Prices



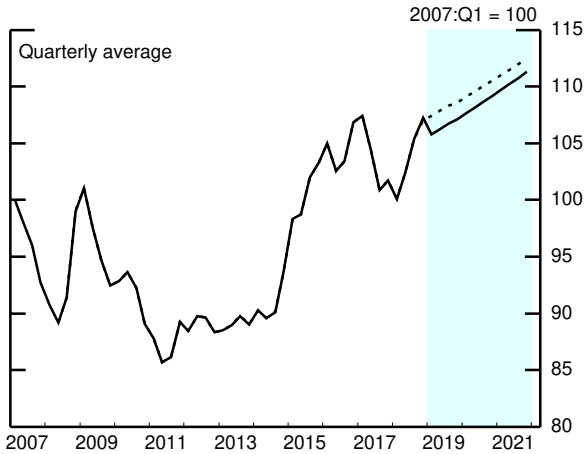
House Prices



Crude Oil Prices



Broad Real Dollar



Equity Prices and Home Prices

- In the current quarter, equity prices are projected to be 2.3 percent lower than in the December Tealbook. Taken together with the lower path for 10-year Treasury yields, stock market valuation pressures now appear to be less than in December. Accordingly, we have nudged up our assumed annualized stock price appreciation going forward to 1.2 percent per year, compared with 0.4 percent per year in the previous Tealbook.

- The rate of increase in house prices slowed from 6 percent in 2017 to 4.5 percent last year, and we project a further slowing to an average pace of about 2.5 percent per year over the next three years. That expectation reflects both our assessment that house prices currently are modestly elevated relative to rents and the projected rise in mortgage rates.

Fiscal Policy

- We assume that the partial government shutdown that began on December 22 will last until the end of January and that it will push down first-quarter GDP growth a few tenths, with an offsetting boost to growth in the second quarter after the shutdown has ended (see the box "The 2018–19 Federal Government Shutdown"). If the shutdown continues much longer than we have assumed, the consequences would likely be substantially larger.

- We assume that the expansionary fiscal policies enacted over the past year and a half will continue through the medium term.[1] Given these policy assumptions, we continue to project that discretionary fiscal policy actions across all levels of government (exclusive of any multiplier effects and financial offsets) contributed 0.7 percentage point to the rate of growth in aggregate demand last year and will contribute 0.6 percentage point this year, 0.5 percentage point in 2020, and 0.2 percentage point in 2021.

- We expect the federal budget deficit, which stood at 3¾ percent of GDP in fiscal year 2018, to widen to just over 5½ percent by fiscal 2021, primarily

[1] In particular, our forecast assumes that the current level of discretionary spending will be maintained in real terms in fiscal years 2020 and 2021; realization of that forecast will require lawmakers to lift the discretionary spending caps for those years, which would be consistent with fiscal policymaker actions in recent years.

The 2018–19 Federal Government Shutdown

A partial shutdown of the federal government began on December 22, 2018, because 7 of the 12 annual appropriations bills that fund government operations had not been enacted and temporary funding provisions had expired. This funding lapse affects agencies that were expected to account for about one-fourth of federal discretionary spending in fiscal year 2019. Since the shutdown began, roughly 400,000 federal employees deemed nonessential have been furloughed, and an additional 400,000 employees deemed essential have been working without pay.[1] As in previous shutdowns, both furloughed and nonfurloughed employees will receive back pay after the shutdown is resolved.[2] As of January 18, 2019 (the Tealbook publication date), the current shutdown has lasted 28 days, the longest funding gap since the Congress created the current budget process in 1976.[3]

Although there is substantial uncertainty regarding when the current shutdown will end, we assume the government will fully reopen on February 1 (a shutdown length of six weeks). The direct effect of a shutdown on GDP is the value of lost government production that results from furloughing workers and forgoing the purchase of other goods and services (such as pay for contractors).[4] We estimate that each additional week of the current shutdown lowers real GDP growth around 0.05 percentage point at an annual rate (a.r.) through this channel, mostly reflecting lost government production from furloughed workers.

The shutdown could also affect real economic activity through spillover effects on private-sector demand as a result of lower consumer and business confidence; delayed government payments, including pay for federal workers; and delayed issuance of permits, regulations, and processing of information required for private-sector transactions. Although difficult to quantify, we assume these effects will reduce real GDP growth about 0.10 percentage point (a.r.) in the first quarter. If the shutdown persists beyond our assumed end date of February 1, the spillover effects to the private sector could become substantially larger.

We project that the current funding lapse lowered real GDP growth 0.05 percentage point (a.r.) in the fourth quarter, largely reflecting the effect of furloughed workers.

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[1] Affected agencies account for roughly one-third of nondefense civilian employment. Some federal agencies may change their classification of employees as the shutdown continues. For example, since the shutdown began, the Treasury reclassified about 50,000 IRS employees from nonessential to essential so that tax returns can be issued. For a discussion of the effect of the shutdown on the labor market, see "The Outlook for the Labor Market and Aggregate Supply" in this section.

[2] The Congress has passed, and the President has signed, legislation that will provide back pay for all federal workers affected by the shutdown.

[3] By comparison, the October 2013 shutdown lasted 16 days but affected more agencies and employees than the current one.

[4] Federal employees who remain on the job without pay do not contribute to the reduction in real GDP through this channel.

In the first quarter, we project growth will be 0.35 percentage point (a.r.) lower, as workers remain furloughed, other government purchases are held down, and as the spillovers to households and businesses further reduce growth. We project output growth will be boosted 0.40 percentage point (a.r.) in the second quarter as government production and private sector activity return to baseline levels.

The shutdown has also delayed data releases from affected federal agencies (primarily, the Census Bureau and the BEA). As shown in the following table, a number of government data series that would typically inform the staff projection have not yet been released, and other series will likely be delayed even if the shutdown ends before their scheduled release. Once the government reopens, we will learn about the schedule for publication of these data releases.

Federal Government Shutdown and Government Data Releases through January 2019

Date	Not affected by shutdown	Affected by shutdown
12/27/2018	Unemployment insurance claims	New residential sales (November)
12/28/2018		Advance economic indicators (November)
1/3/2019	Unemployment insurance claims	Construction put in place (November)
1/4/2019	Employment situation (December)	
1/7/2019		Manufacturers' shipments, inventories, and orders (November)
1/8/2019	Job openings and labor turnover (November)	Foreign trade (November)
1/10/2019	Unemployment insurance claims	Wholesale trade (November)
1/11/2019	Consumer price index (December)	Monthly Treasury statement (December)
1/15/2019	Producer price index (December)	
1/16/2019	Import/export prices (December)	Retail sales (December) Retail inventories (November)
1/17/2019	Unemployment insurance claims	Housing starts and permits (December)
1/18/2019	Industrial production (December)	
1/24/2019	Unemployment insurance claims	
1/25/2019		Advance durables (December) New residential sales (December)
1/29/2019		Advance economic indicators (December)
1/30/2019		GDP (Q4, advance)
1/31/2019	Employment cost index (December) Unemployment insurance claims	PCE and PCE prices (December) GDP detail (Q4)

Note: Table includes government data releases only. Private data are not affected. The affected government data could be of lower reliability to the extent that collection was hampered by the shutdown.

reflecting recent fiscal policy actions and the effects of higher interest rates on debt service costs.

- We continue to assume that, in the longer run, policymakers will gradually reduce deficits by an amount sufficient to stabilize the debt-to-GDP ratio. We expect this ratio to level off at around 105 percent of GDP, 20 percentage points higher than would have occurred in the absence of recent and projected policy actions. We anticipate that this increment to the debt-to-GDP ratio will push up the term premium on 10-year Treasury yields 50 basis points in the longer run.

Trade Policy

- Since the December Tealbook, trade talks between the United States and China have resumed, and no new tariffs have been imposed. In particular, the additional 15 percent tariff increase on many imports from China has been postponed to at least March 2. We continue to assume tariff rates on Chinese imports will remain at current levels through the medium term. We have also not adjusted our forecast to reflect any developments concerning the recently signed trade deal between the United States, Mexico, and Canada, which still must be ratified by each country's legislature. Given the ongoing uncertainty about trade policy, trade 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

- We estimate that foreign GDP growth remained at around 2 percent in the fourth quarter of last year, noticeably below its potential rate of 2.5 percent for the third consecutive quarter. The fourth-quarter estimate is 0.3 percentage point lower than projected in the December Tealbook, as data came in weaker than expected in the euro area and China. Part of the weakness is likely attributable to temporary factors, such as transportation disruptions in the euro area. As such, we expect growth to edge up to 2.3 percent this year and then to run close to potential in 2020 and 2021.

- Since the December Tealbook, the broad nominal dollar has depreciated 1.5 percent as U.S. interest rates moved down relative to foreign rates. Looking ahead, we expect the broad real dollar to appreciate at an annual rate

of almost 2 percent through 2021, as market expectations for the federal funds rate move up toward the staff forecast. This rate of appreciation is slightly higher than in the December Tealbook, and, on net, our projection for the broad real dollar at the end of the forecast horizon is revised down 1.1 percent.

Oil Prices

- Despite some recent swings, the spot price of Brent crude oil is unchanged, on net, since the December Tealbook, at $61 per barrel. Farther-dated futures prices are also unchanged, and the futures path through 2021 remains flat. After declining by almost one-third between mid-October and mid-December, largely in response to supply developments, prices declined further to $50 per barrel in late December, as concerns about the strength of global demand intensified. Global demand concerns continue to weigh on oil prices as well as on nonfuel commodities prices, which are down slightly since the December Tealbook.

THE OUTLOOK FOR REAL GDP

We currently estimate that real GDP increased at an annual rate of 2.8 percent in the fourth quarter of 2018, ½ percentage point faster than in the December Tealbook.[2] We continue to expect some moderation in the pace of activity this quarter. The median prediction of first-quarter GDP growth from the Federal Reserve System's suite of nowcasting models—which condition on a wide assortment of indicators, including financial market variables—is well aligned with the 2.3 percent pace we are currently projecting.

- Consumer spending growth appears to have remained strong toward the end of 2018. Upward-revised retail sales figures show outsized gains in both October and November, and the available indicators for December—including motor vehicle sales, credit and debit card transactions, and chain-store sales—point to another increase in overall consumer spending in December. Even after conditioning on the robust labor market, consumer spending growth in recent quarters has been unusually buoyant, and we expect to see some

[2] The BEA's advance NIPA estimate for the fourth quarter was originally scheduled to be published on January 30, the second day of the FOMC meeting. Due to the government shutdown, this release will likely be delayed. We expect the BEA to issue a revised schedule for data releases after the government reopens.

Domestic Econ Devel & Outlook

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

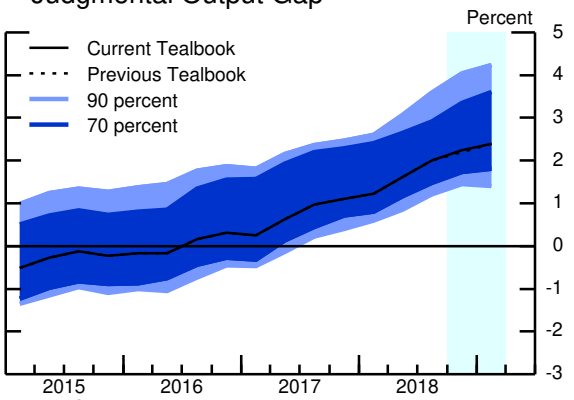
(Percent change at annual rate from final quarter of preceding period except as noted)

Measure	2016	2017	2018	2018 Q3	2018 Q4	2019 Q1
Output gap[1]	**.3**	**1.1**	**2.2**	**2.0**	**2.2**	**2.4**
Previous Tealbook	.3	1.1	2.2	2.0	2.2	2.4
Real GDP	1.9	2.5	3.1	3.4	2.8	2.3
Previous Tealbook	1.9	2.5	3.0	3.5	2.3	2.6
Measurement error in GDP	-.3	.0	.2	.0	.1	-.1
Previous Tealbook	-.3	.0	.2	.2	-.3	.0
Potential output	1.6	1.7	1.8	1.8	1.8	1.8
Previous Tealbook	1.6	1.7	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.

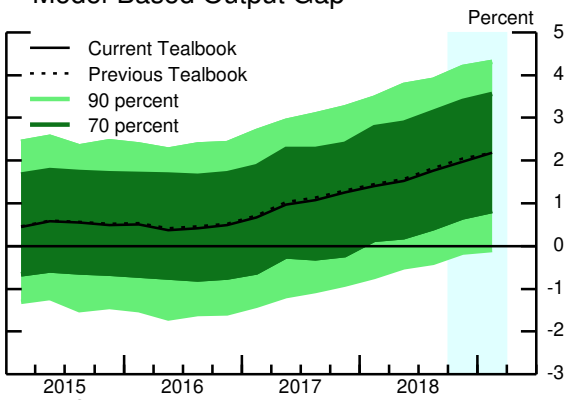
1. Percent, average for the final quarter in the period.

Judgmental Output Gap



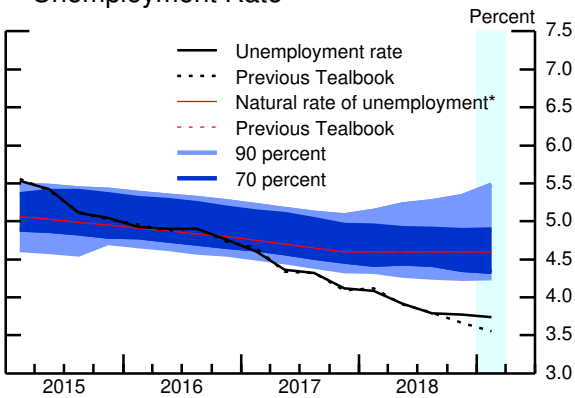
Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Model-Based Output Gap



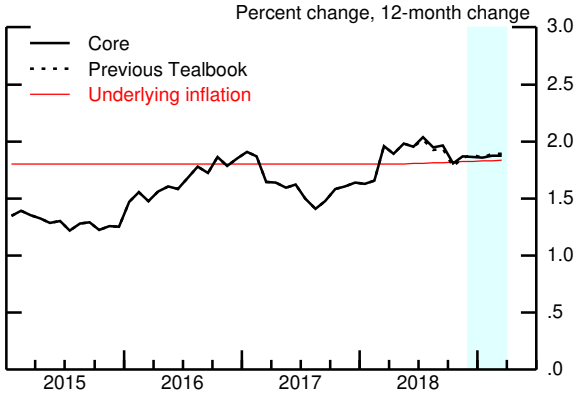
Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

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.

moderation to a pace more in line with the growth in real disposable personal income. In addition, the recent declines in equity prices and softening in sentiment will likely weigh on spending growth. In all, we now project PCE growth will slow from a rate of 3¾ percent in the second half of 2018 to a still-solid pace of 2½ percent in the first half of this year.

- We currently estimate that business fixed investment bounced back last quarter after a third-quarter slowdown and increased at an annual rate of almost 5 percent in the second half of last year, faster than our projection in the December Tealbook. As before, we expect the pace of investment growth to soften this year as interest rates rise further and business output growth slows from an elevated pace in 2018. Contrary to our expectation, corporate bond spreads have risen further since the December Tealbook, a sign that perceived risks to the outlook for business-sector activity have increased. In addition, capital goods orders excluding aircraft were weak in November, and a number of recent readings on business sentiment have deteriorated, although they still appear broadly consistent with growth in investment in the near term. Taking all of these factors into account, we downgraded our forecast for growth in business fixed investment in 2019 from 3½ percent to 2½ percent.

- The limited incoming data on housing activity since the December Tealbook have been about as we had expected. We currently estimate that residential investment moved down at an annual rate of more than 4 percent in the second half of 2018. We project a further decline in the first half of this year, consistent with downbeat indicators of housing demand.

- Smoothing through some wide quarter-to-quarter swings, we now estimate that net exports subtracted about ¼ percentage point from GDP growth last year. As domestic demand slows this year, import growth is expected to decline. With export growth expected to remain at its subdued 2018 pace, net exports are projected to reduce GDP growth by just 0.1 percentage point this year.

- Manufacturing output decelerated in the fourth quarter but still recorded a solid gain for 2018 as a whole. Regarding the outlook, automakers' production plans imply a decline in motor vehicle assemblies in the first quarter, and the latest readings on new orders from the national and regional

Domestic Econ Devel & Outlook

Summary of the Near-Term Outlook for GDP

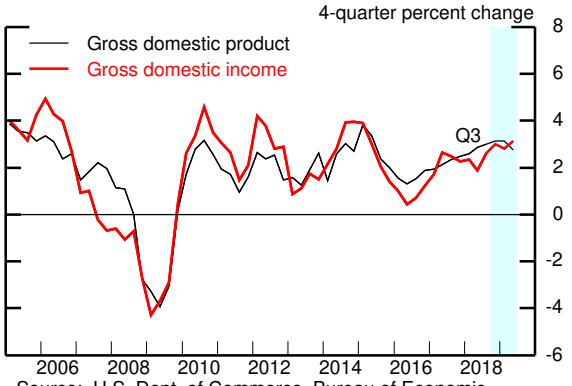
(Percent change at annual rate except as noted)

Measure	2018:Q3		2018:Q4		2019:Q1	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP	**3.5**	**3.4**	**2.3**	**2.8**	**2.6**	**2.3**
Private domestic final purchases	3.2	3.0	2.9	4.0	2.6	2.3
Personal consumption expenditures	3.7	3.5	3.0	3.8	2.5	2.4
Residential investment	-2.9	-3.6	-5.4	-4.4	-2.6	-3.4
Nonres. private fixed investment	2.1	2.5	5.1	7.1	4.8	3.2
Government purchases	2.5	2.6	1.5	1.7	1.9	.4
Contributions to change in real GDP						
Inventory investment[1]	2.3	2.3	-.6	-.7	.0	.1
Net exports[1]	-1.9	-2.0	.1	-.2	.0	.1

1. Percentage points.

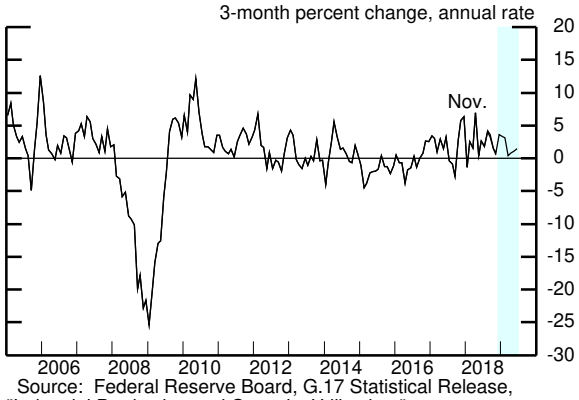
Recent Nonfinancial Developments (1)

Real GDP and GDI



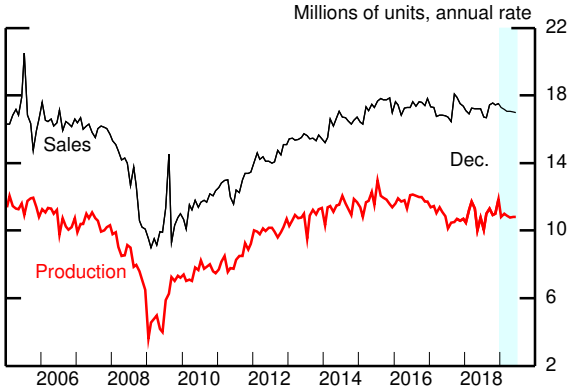
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



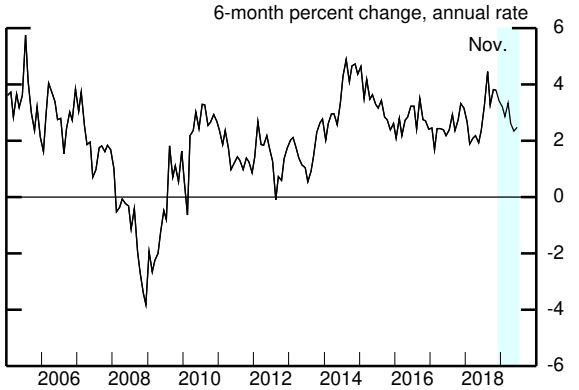
Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles



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

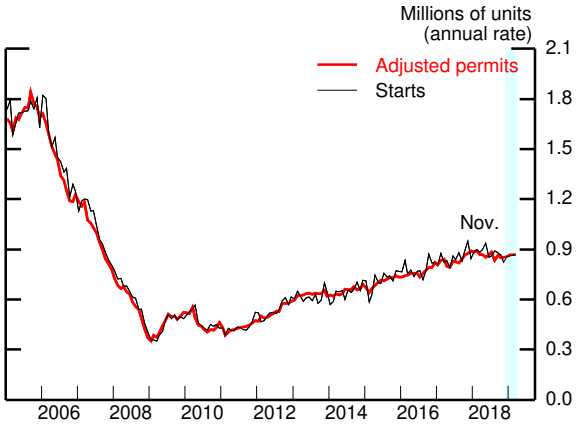
Real PCE Growth



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

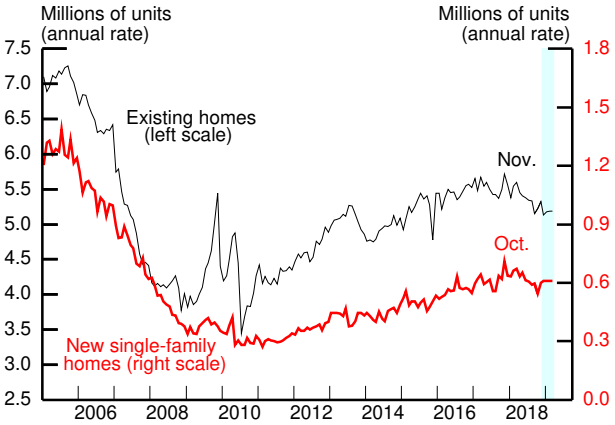
Recent Nonfinancial Developments (2)

Single-Family Housing Starts and Permits



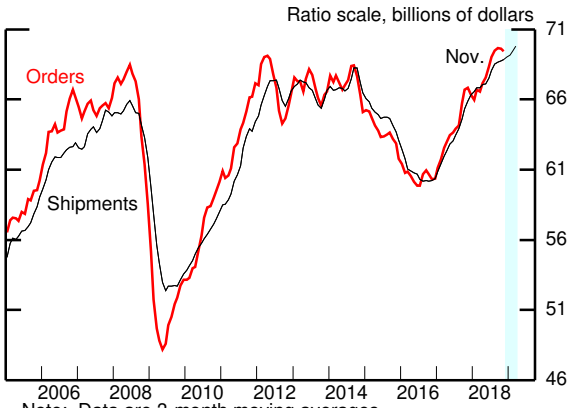
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

Home Sales



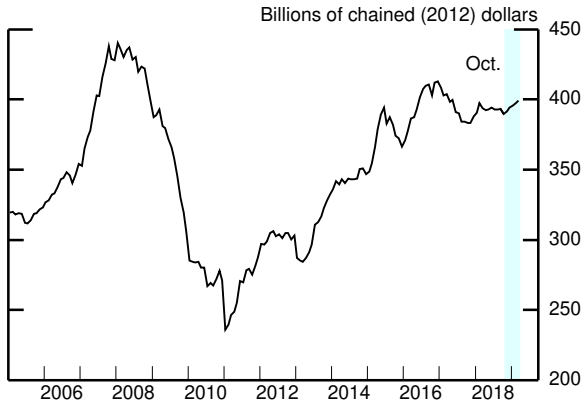
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

Nondefense Capital Goods ex. Aircraft



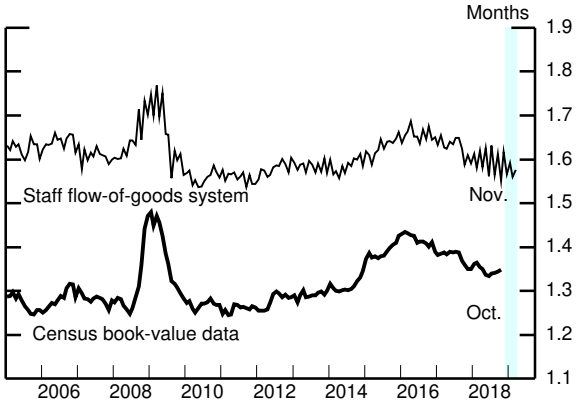
Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

Nonresidential Construction Put in Place



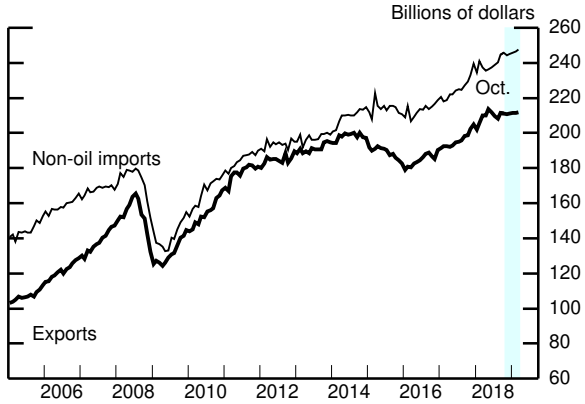
Note: Nominal CPIP deflated by BEA prices through 2018:Q3 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

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 2018:Q4 Real GDP Growth
(Percent change at annual rate from previous quarter)

Federal Reserve Entity	Type of model	Nowcast as of Jan. 16, 2019
Federal Reserve Bank		
Boston	• Mixed-frequency BVAR	0.9
New York	• Factor-augmented autoregressive model combination	3.3
	• Factor-augmented autoregressive model combination, financial factors only	2.0
	• Dynamic factor model	2.5
Cleveland	• Bayesian regressions with stochastic volatility	2.3
	• Tracking model	1.3
Atlanta	• Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow)	2.8
Chicago	• Dynamic factor models	2.2
	• Bayesian VARs	2.6
St. Louis	• Dynamic factor models	2.0
	• News index model	2.8
	• Let-the-data-decide regressions	2.1
Kansas City	• Accounting-based tracking estimate	1.9
Board of Governors	• Tealbook estimate (judgmental)	2.8
	• Monthly dynamic factor models (DFM-45)	2.9
	• Mixed-frequency dynamic factor model (DFM-BM)[1]	2.1
Memo: Median of Federal Reserve System nowcasts		2.3

[1] Our standard DFM-BM has been modified to include the VIX, corporate bond spreads, and the slope of the yield curve on government securities.

manufacturing surveys have softened a bit, though in general they remain at healthy levels. In all, the general tenor of the indicators is consistent with a modest expansion in factory output in the near term.

We nudged down our medium-term forecast for GDP growth in response to lower equity prices and our judgment that heightened concerns about the economic outlook will weigh more on business investment and consumer spending than we had previously anticipated. The effect on growth from these influences was cushioned by the lower paths for interest rates and the dollar. We now project that real GDP growth will slow to 2.2 percent this year, down from 2.4 percent in the December Tealbook. Thereafter, we continue to forecast a gradual deceleration in economic activity amid the ongoing tightening of monetary policy and waning fiscal support.

- The output gap is projected to widen further this year, peak in 2020, and then gradually narrow in 2021, ending the projection at 2¼ percent, ¼ percentage point less than in the December Tealbook.

THE OUTLOOK FOR THE LABOR MARKET AND AGGREGATE SUPPLY

The incoming data indicate that the labor market remains strong. Private payrolls jumped in December and the gains in previous months were revised up, leaving the level of total payroll employment at year-end well above our December Tealbook projection. In the household survey, the unemployment rate moved up to 3.9 percent in December, but the rise was accompanied by an outsized increase in labor force participation. As a result, the employment-to-population ratio held steady at 60.6 percent, in line with our previous projection.

- In the establishment survey, private nonfarm payrolls jumped by about 300,000 in December. Our translation of the microdata from the payroll-processing firm ADP also pointed to a large increase, and the pooled estimate of private employment growth that combines the signals from the BLS and ADP/FRB payroll estimates stood at 270,000 in December. For the fourth quarter as a whole, private payroll growth in the BLS data averaged about 250,000 per month, up from 195,000 in the December Tealbook projection.

- December payroll gains appear to have been boosted by unusually strong seasonal hiring and some improvement in weather conditions relative to

earlier months. Partly as a result, we expect a noticeable step-down in payroll growth in January.[3] Even so, we took some signal from the positive payroll surprises and continued strength in other labor market indicators and raised our near-term projection of monthly employment gains to a solid average pace of 190,000 per month in the first half of this year.

- The unemployment rate increased from 3.7 percent in November to 3.9 percent in December, whereas we had expected it to edge down. However, the increase mostly reflected unusually high labor force entry (from nonparticipation into unemployment) and unusually low labor force exit (from unemployment into nonparticipation), patterns that often unwind in the subsequent few months. Partly as a result, we expect the unemployment rate to edge down over the next few months. Nevertheless, given the persistent string of upside surprises to both unemployment and participation over the past year, we took some further signal from the December surprises and raised our near-term projections for the unemployment and labor force participation rates slightly.[4]

We expect labor market conditions to remain tight throughout the medium term.

- We project the unemployment rate will move down to 3.5 percent by the end of this year and then remain there until 2021, when below-trend GDP growth eventually brings about a small uptick, to 3.6 percent. The path of the unemployment rate is a touch higher than in the December Tealbook projection but is still about 1 percentage point lower than our estimate of the natural rate.

[3] For instance, general merchandise stores reportedly added a total of 52,000 employees in November and December, compared with an essentially zero average gain during the holiday months in the past few years. We therefore expect to see larger-than-usual layoffs in January. Moreover, we expect that layoffs at private federal contractors during the partial government shutdown will temporarily depress private employment in January. However, because legislation has already been enacted to restore back pay for furloughed federal government employees, we do not anticipate that the shutdown will have any effect on the government employment figures.

[4] In the household survey, furloughed federal government employees should be classified as unemployed on temporary layoff regardless of whether they eventually receive back pay. Nevertheless, during past shutdowns, about half of furloughed employees were misclassified as employed, and, assuming that remains true this time, we expect that the unemployment rate in January will be temporarily boosted 0.1 percentage point.

- Strong job gains and rising real wages are expected to continue to draw individuals into the labor force while also damping outflows, and thus we project the LFPR to remain well above our estimate of its trend over the medium term.

- Average monthly total payroll gains slow over the projection, from about 170,000 this year to about 70,000 in 2021.

- We estimate that labor productivity rose about 2 percent last year, well above the average pace of increases during the recovery. However, productivity data are quite volatile, even year to year. For now, we have taken little signal from last year's increase, and we expect productivity growth to average a more moderate annual rate of just above 1 percent over the medium term.

THE OUTLOOK FOR INFLATION

The incoming information regarding core consumer prices has been in line with our expectations, and we continue to expect the 12-month change in core PCE prices to remain near 1.9 percent through the near term. A decline in consumer energy prices, in response to the fall in crude oil prices over the past 2 months, is expected to lower the 12-month change in total PCE prices from 1.7 percent in December to 1.5 percent early this year.

- Consumer energy prices moved down at the end of last year and appear on track for another large decline in January. Thereafter, we project consumer energy prices will move roughly sideways over the medium term, consistent with the flat projection for oil prices.

- We estimate that the level of effective import prices—that is, the sum of published core import prices and tariffs levied on imports—will increase 1.3 percent in 2019 after rising at an annual rate of 1.6 percent in the second half of 2018. We estimate that the direct effects of last year's tariff increases will boost the level of core PCE prices between 0.1 and 0.2 percent by 2020. With no additional tariff changes in our forecast, import prices are expected to rise less than 1 percent per year in 2020 and 2021, restrained by the gradual appreciation of the dollar and consistent with moderate foreign inflation.

- The latest readings on survey- and market-based measures of longer-term inflation expectations suggest that expectations remain well anchored.
    - Incoming data on inflation expectations from the University of Michigan Surveys of Consumers, the Survey of Professional Forecasters, and the Federal Reserve Bank of New York's Survey of Consumer Expectations have all been within their ranges of readings in recent years.
    - TIPS-based measures of inflation compensation have moved down somewhat further since the December Tealbook. As discussed in the box "The Decline in Longer-Horizon Inflation Compensation" in the Financial Market Developments section, staff models attribute most of the sizable decline since September to inflation risk premiums or other risk premiums, with 5-to-10-year inflation expectations little changed.

We continue to project that the four-quarter change in core PCE prices will rise to 2 percent by mid-2019 and will remain at that level over the medium term. This step-up in inflation reflects the further tightening of resource utilization and our assumption of a gradual increase in the underlying trend. Given the assumed trajectory of oil prices, total PCE inflation is projected to run slightly below core inflation in 2019 and 2020 but in line with core inflation in 2021.

The limited new data on labor compensation have been a touch higher than we expected but still consistent with the gradual firming we have been projecting.

- The average hourly earnings of employees on private nonfarm payrolls rose 3.2 percent over the 12 months ending in December, a little above our forecast. In the near term, we project a further uptick in the 12-month change in this measure of wage growth.
- We estimate that compensation per hour in the business sector rose 2.7 percent over the four quarters of 2018. Over the remainder of the forecast, we project gains of 3¾ percent per year, a pace more in line with tight labor market conditions.
- The employment cost index (ECI) rose 3 percent over the 12 months ending in September. Because the ECI is somewhat less cyclically sensitive than other

wage measures, we expect it will continue rising at a similar pace over the medium term.[5]

- The Federal Reserve Bank of Atlanta's Wage Growth Tracker was 3.9 percent in November, at the upper end of the range observed in recent years.

THE LONG-TERM OUTLOOK

- We continue to assume that the natural rate of unemployment will remain at 4.6 percent. Also, as in the previous Tealbooks, we assume that potential output growth slows after 2021, as the boost to potential from fiscal policy wanes, and that growth converges to 1.7 percent per year in the longer run.

- We have maintained our assumption that the real equilibrium federal funds rate that will prevail in the longer run will be ½ percent. The nominal yield on 10-year Treasury securities is assumed to be 3.4 percent in the longer run.

- We expect that the Federal Reserve's holdings of securities will continue to put downward pressure on longer-term interest rates, though to a diminishing extent over time.

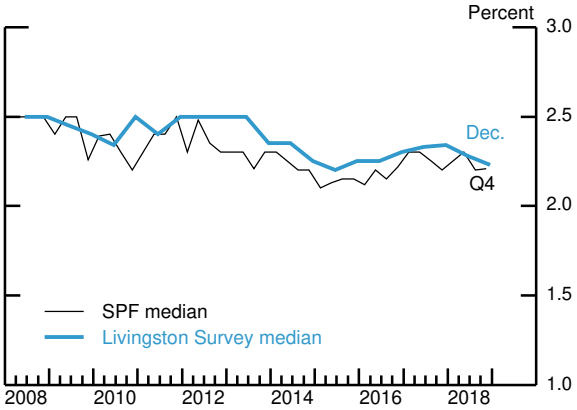
- With these assumptions, GDP growth slows to about 1¼ percent from 2022 to 2024, as the federal funds rate is above its neutral level and the contribution to growth from fiscal policy fades. The unemployment rate moves up gradually from 3.6 percent at the end of 2021 toward its assumed natural rate in subsequent years. PCE price inflation remains close to 2 percent throughout.

- With resource utilization easing only slowly and inflation remaining close to the Committee's 2 percent objective, the nominal federal funds rate moves down gradually from 4½ percent at the end of the medium term toward its longer-run value of 2½ percent.

[5] The ECI for the period ending in December will be published on January 31, the day after the January FOMC meeting.

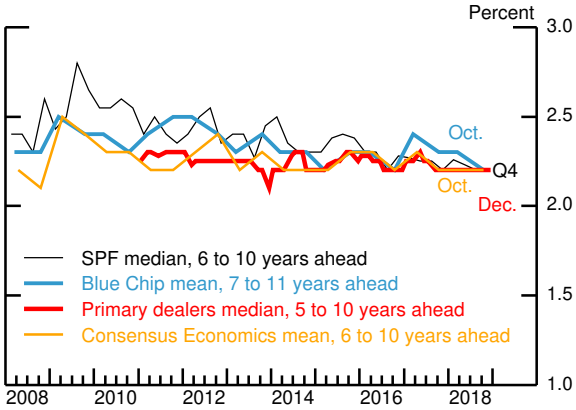
Survey Measures of Longer-Term Inflation Expectations

CPI Next 10 Years



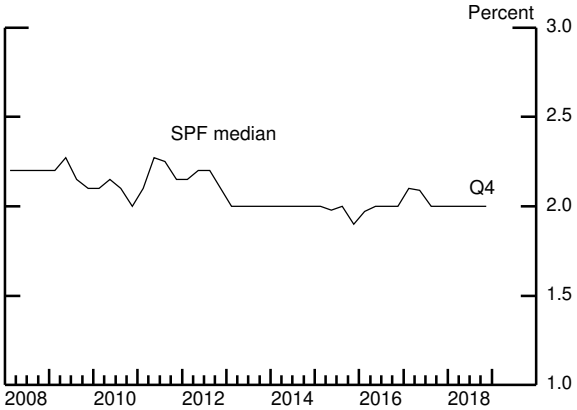
Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations



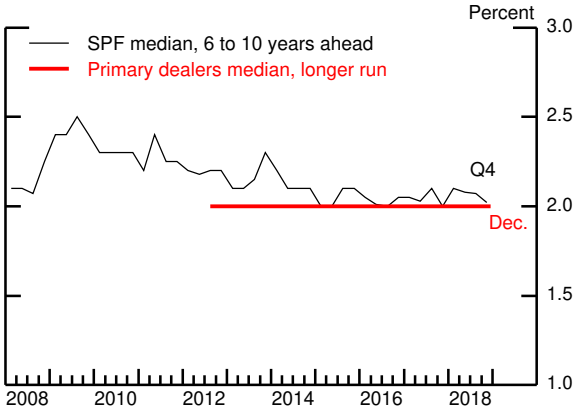
Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

PCE Next 10 Years



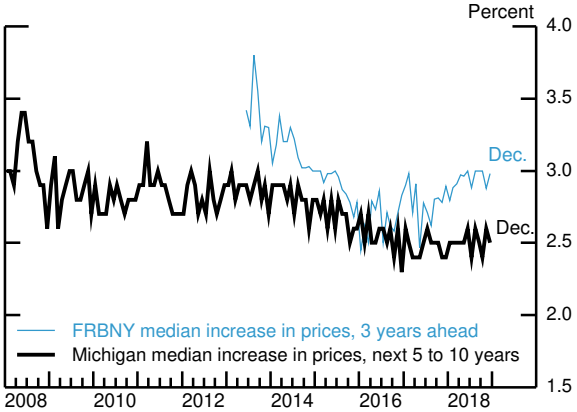
Source: Federal Reserve Bank of Philadelphia.

PCE Forward Expectations



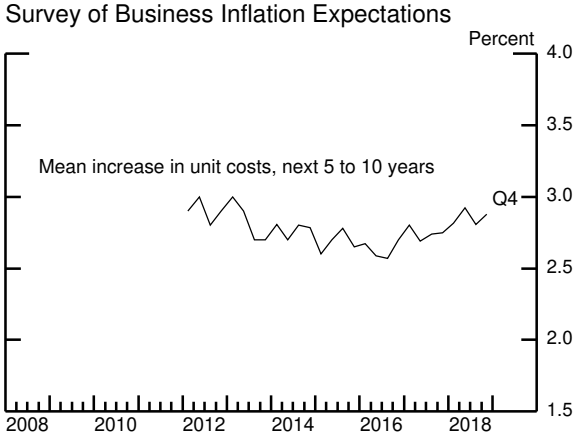
Note: Primary dealers data begin in August 2012.
Source: Federal Reserve Bank of Philadelphia; Federal Reserve Bank of New York.

Surveys of Consumers



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

Survey of Business Inflation Expectations

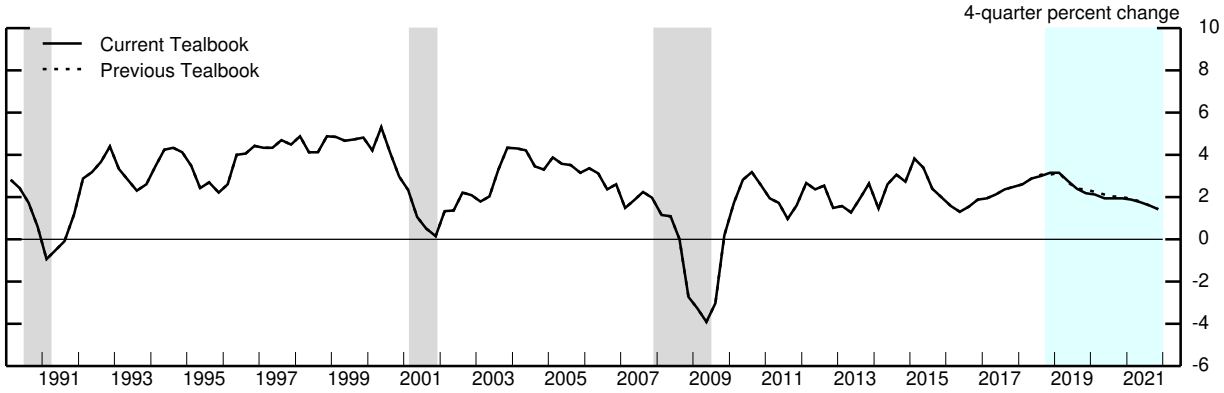


Note: Survey of businesses in the Sixth Federal Reserve District. Data begin in February 2012.
Source: Federal Reserve Bank of Atlanta.

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	**3.1**	**3.1**	**2.4**	**2.2**	**1.9**	**1.4**
Previous Tealbook	3.0	2.9	2.5	2.4	2.0	1.4
Final sales	3.0	2.2	2.3	2.3	1.9	1.5
Previous Tealbook	2.8	2.0	2.5	2.3	2.0	1.6
Personal consumption expenditures	2.9	3.7	2.5	2.4	2.2	1.9
Previous Tealbook	2.8	3.4	2.5	2.5	2.3	1.9
Residential investment	-3.2	-4.0	-1.1	.7	-.6	-.4
Previous Tealbook	-3.3	-4.2	-.8	.0	.2	.2
Nonresidential structures	5.9	-1.8	2.8	1.9	-.8	-2.0
Previous Tealbook	5.6	-2.3	2.8	2.4	-.7	-1.7
Equipment and intangibles	7.9	6.8	3.3	2.8	2.2	1.6
Previous Tealbook	7.2	5.4	4.9	3.9	2.2	1.6
Federal purchases	3.2	3.3	3.3	3.4	2.9	.9
Previous Tealbook	3.2	3.2	3.0	3.2	2.9	1.0
State and local purchases	1.4	1.4	1.2	1.2	1.0	1.0
Previous Tealbook	1.3	1.3	1.2	1.2	1.0	1.0
Exports	2.3	-1.6	2.4	2.3	3.0	3.1
Previous Tealbook	3.2	.2	2.3	2.3	3.0	3.2
Imports	3.5	5.9	2.4	2.5	2.9	2.6
Previous Tealbook	3.7	6.4	2.6	3.1	3.2	2.8
	Contributions to change in real GDP (percentage points)					
Inventory change	.2	.8	.1	-.1	.1	-.1
Previous Tealbook	.2	.9	.0	.0	.0	-.2
Net exports	-.3	-1.1	-.1	-.1	-.1	.0
Previous Tealbook	-.2	-.9	-.1	-.2	-.1	.0

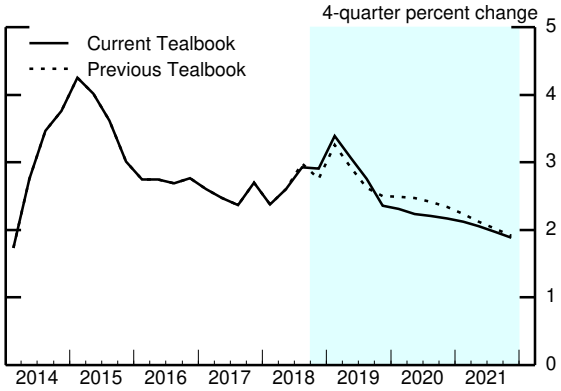
Real GDP



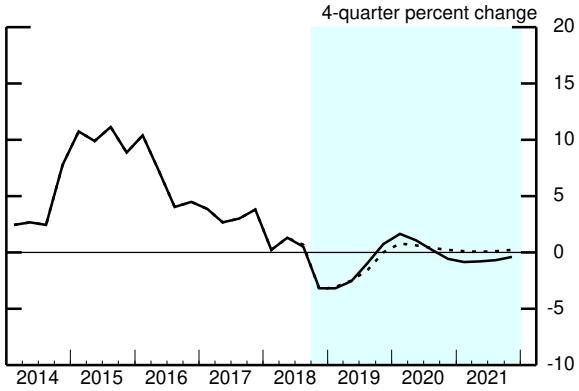
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Components of Final Demand

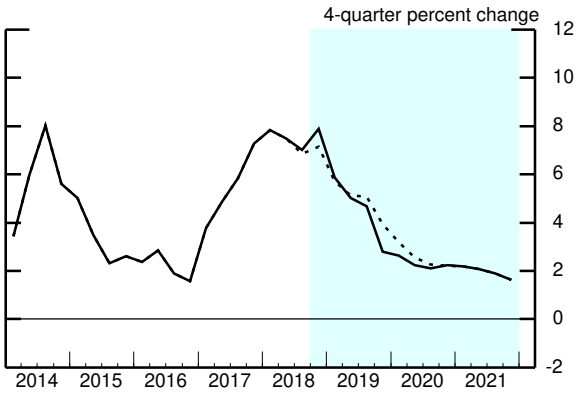
Personal Consumption Expenditures



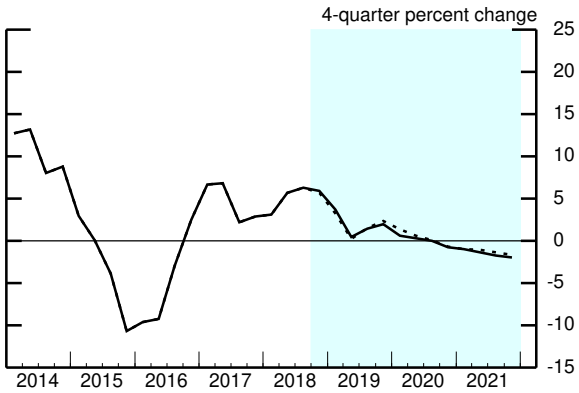
Residential Investment



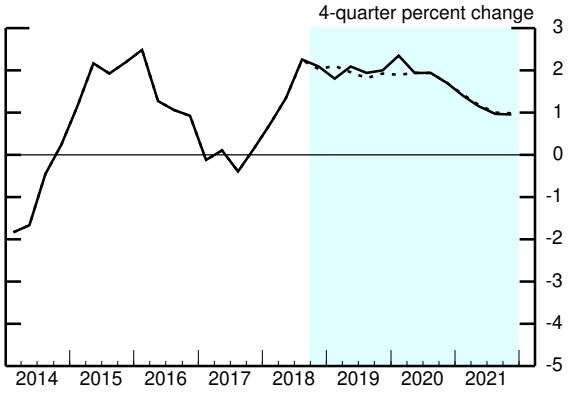
Equipment and Intangibles



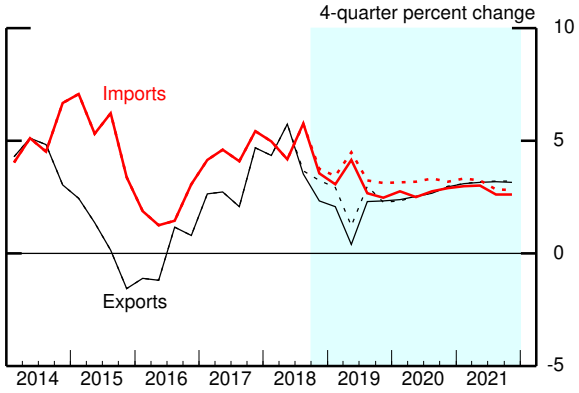
Nonresidential Structures



Government Consumption and Investment



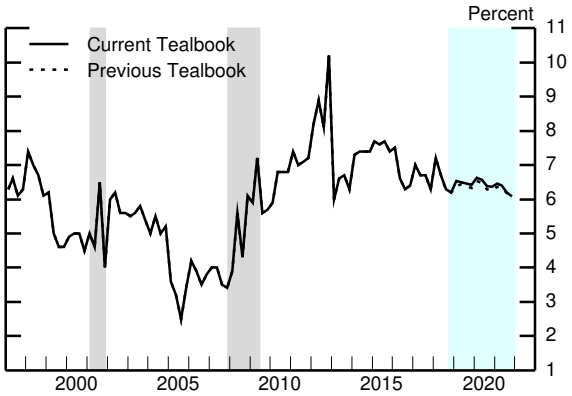
Exports and Imports



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

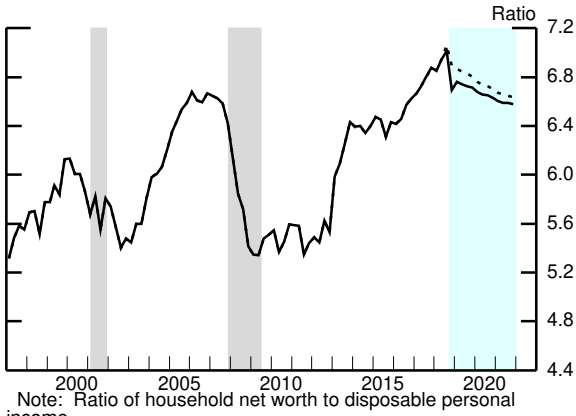
Aspects of the Medium-Term Projection

Personal Saving Rate



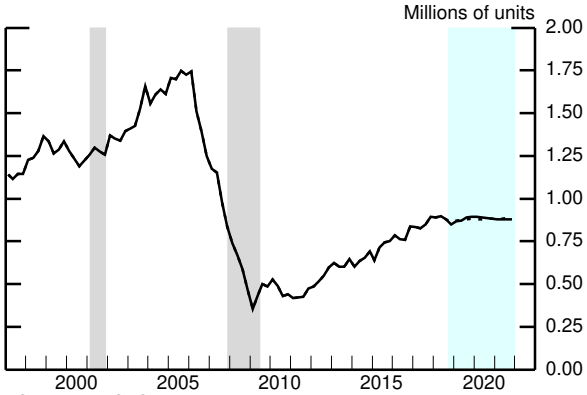
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Wealth-to-Income Ratio



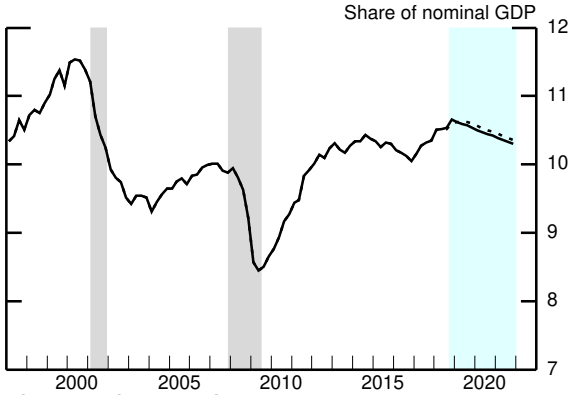
Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

Single-Family Housing Starts



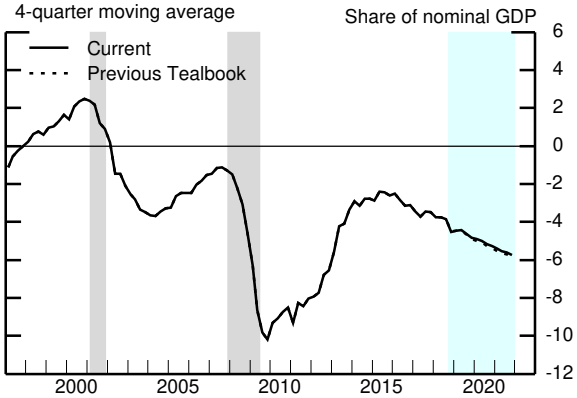
Source: U.S. Census Bureau.

Equipment and Intangibles Spending



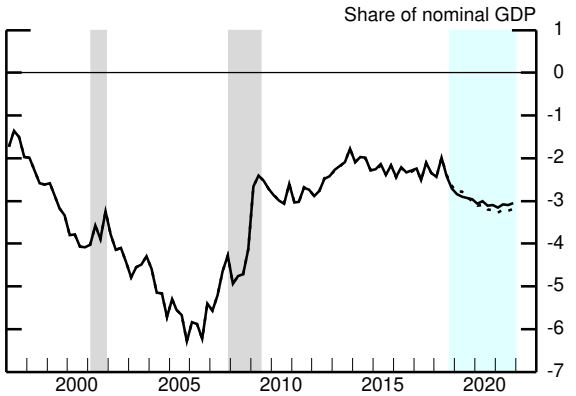
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Federal Surplus/Deficit



Source: *Monthly Treasury Statement.*

Current Account Surplus/Deficit



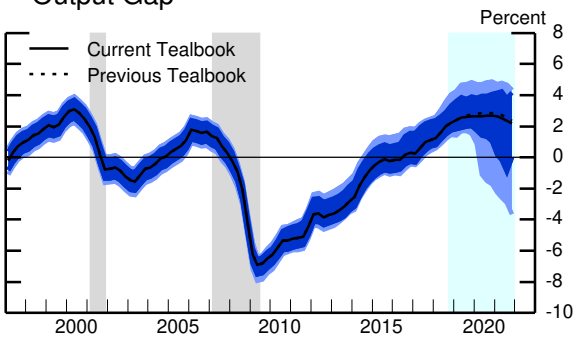
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

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

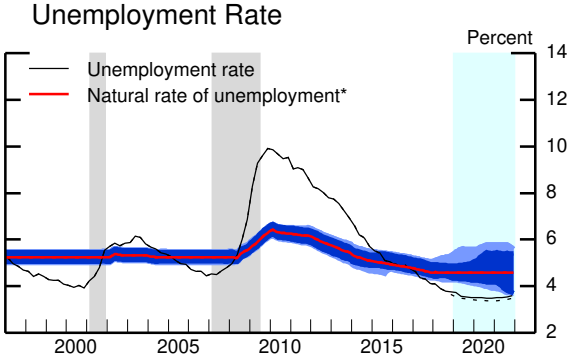
Output Gap



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.

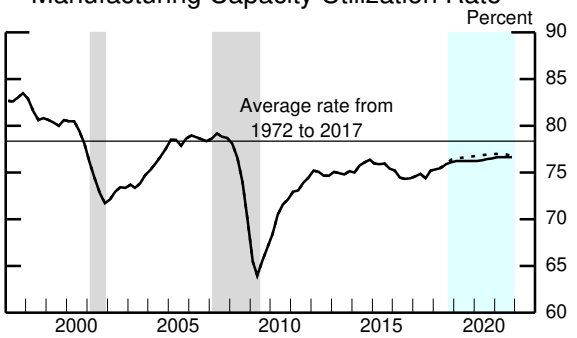
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



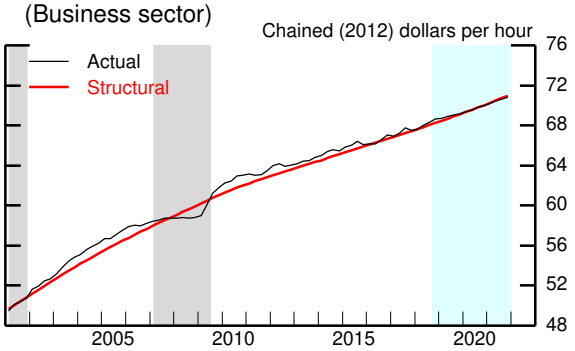
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.
Source: Various macroeconomic data; staff 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	.7	.6
Multifactor productivity	.8	1.1	1.4	1.1	.2	.3	.3	.3	.5	.6
Structural hours	1.5	1.3	.8	.4	.4	.3	.8	.6	.6	.5
Previous Tealbook	1.5	1.3	.8	.4	.4	.3	.7	.6	.6	.5
Labor force participation	.4	-.1	-.2	-.5	-.5	-.3	-.2	-.2	-.2	-.2
Previous Tealbook	.4	-.1	-.2	-.5	-.5	-.3	-.2	-.2	-.2	-.2
Memo:										
Output gap[3]	-1.2	2.5	.3	-5.3	.3	1.1	2.2	2.6	2.7	2.2
Previous Tealbook	-1.2	2.5	.3	-5.3	.3	1.1	2.2	2.8	2.9	2.4

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]	220	222	192	171	120	70
Previous Tealbook	204	191	179	167	128	87
Private employment[1]	214	213	180	160	110	60
Previous Tealbook	200	185	168	156	118	77
Labor force participation rate[2]	63.0	63.0	63.0	63.0	62.8	62.6
Previous Tealbook	62.9	62.9	62.9	62.9	62.8	62.6
Civilian unemployment rate[2]	3.8	3.8	3.6	3.5	3.5	3.6
Previous Tealbook	3.7	3.7	3.5	3.4	3.4	3.5
Employment to population ratio[2]	60.6	60.6	60.7	60.7	60.6	60.4
Previous Tealbook	60.6	60.6	60.7	60.8	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	1.8	1.5	1.7	1.8	1.9	2.0
Previous Tealbook	1.8	1.4	1.8	1.8	2.0	2.0
Food and beverages	.5	.4	2.2	2.3	2.3	2.3
Previous Tealbook	.5	.3	2.2	2.3	2.3	2.3
Energy	4.2	1.8	-8.5	-4.1	-.1	.5
Previous Tealbook	4.0	1.5	-7.0	-3.5	-.2	.5
Excluding food and energy	1.8	1.5	2.2	2.0	2.0	2.0
Previous Tealbook	1.8	1.5	2.2	2.0	2.0	2.0
Prices of core goods imports[1]	.5	-.7	.9	.9	.9	.8
Previous Tealbook	.7	-.1	.6	.8	1.0	.9

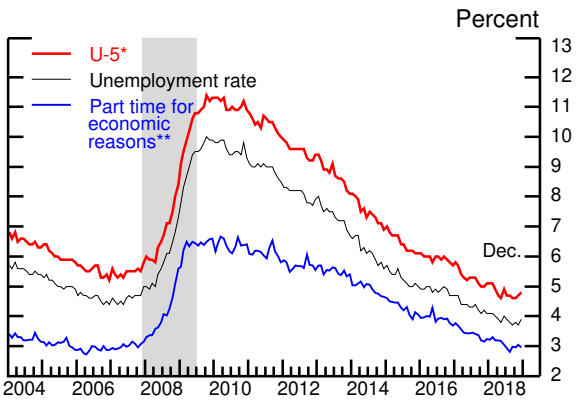
	Dec. 2018[2]	Jan. 2019[2]	Feb. 2019[2]	Mar. 2019[2]	Apr. 2019[2]	May 2019[2]
12-month percent change						
PCE chain-weighted price index	1.7	1.5	1.5	1.7	1.6	1.6
Previous Tealbook	1.7	1.6	1.6	1.7	...	...
Excluding food and energy	1.9	1.9	1.9	1.9	1.9	1.8
Previous Tealbook	1.9	1.9	1.9	1.9	...	...

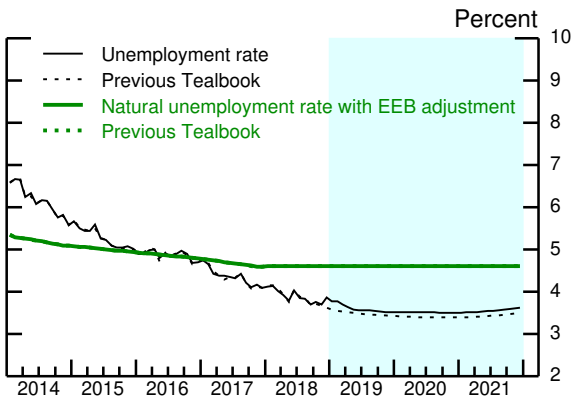
... Not applicable.
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Domestic Econ Devel & Outlook

Labor Market Developments and Outlook (1)

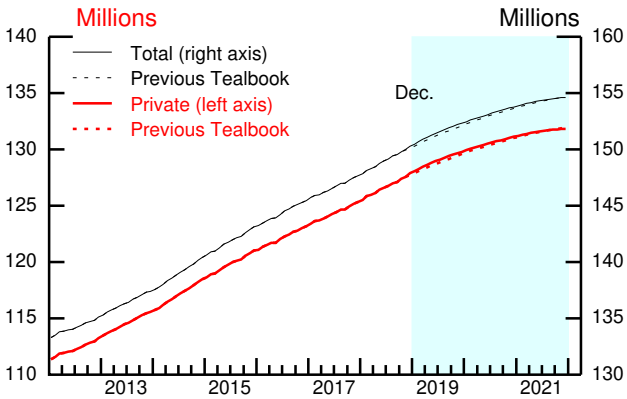
Measures of Labor Underutilization





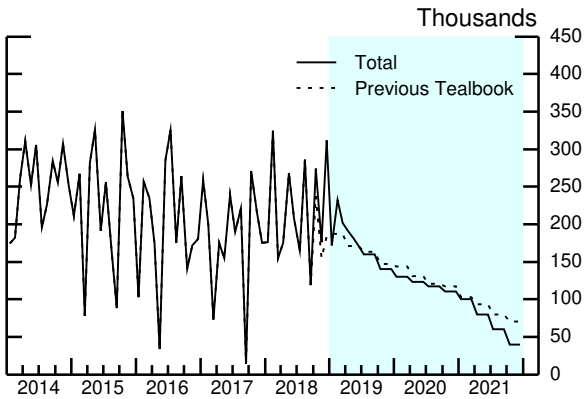
* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
EEB Extended and emergency unemployment benefits.
Source: U.S. Department of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

Level of Payroll Employment



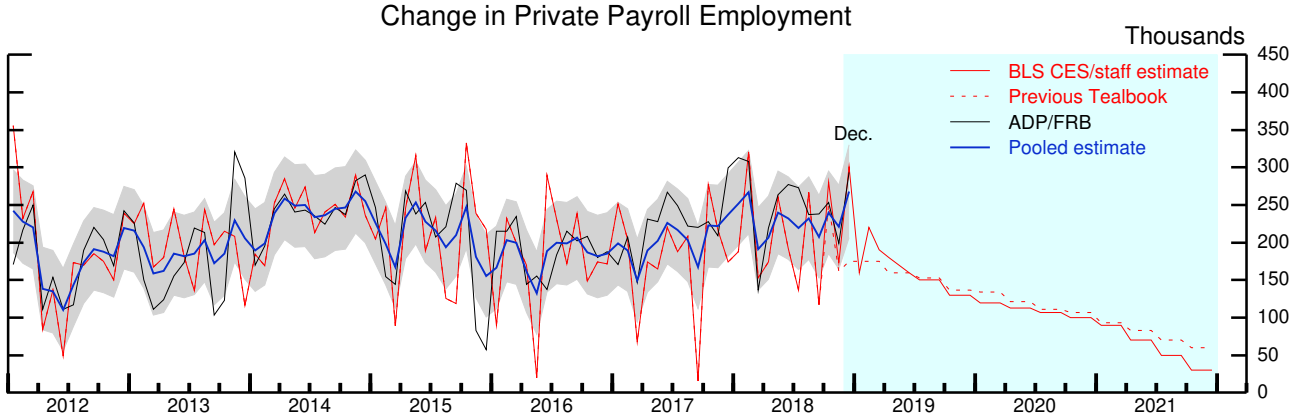
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Change in Total Payroll Employment



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

Change in Private Payroll Employment

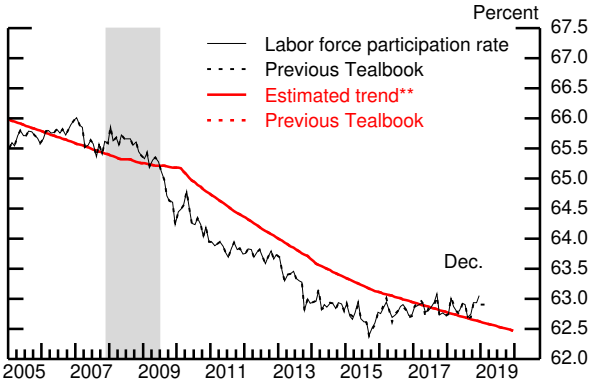


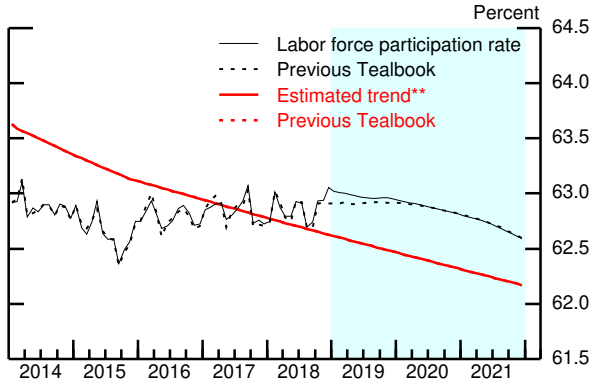
Note: Gray shaded area around blue line is 90 percent confidence interval around pooled estimate.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff calculations using microdata from ADP.

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)

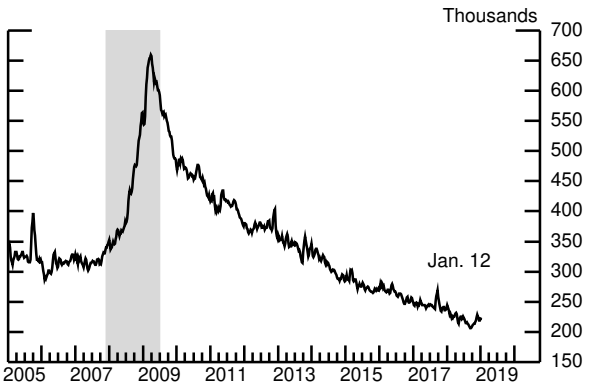
Labor Force Participation Rate*





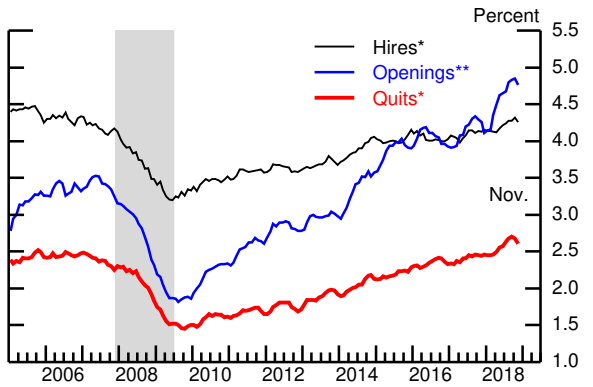
* Published data adjusted by staff to account for changes in population weights.
** Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Initial Unemployment Insurance Claims*



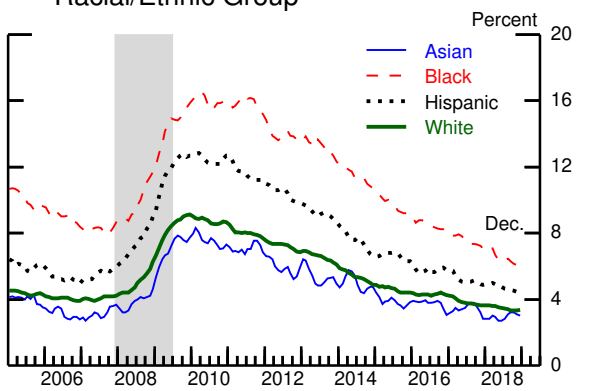
* 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

Hires, Quits, and Job Openings



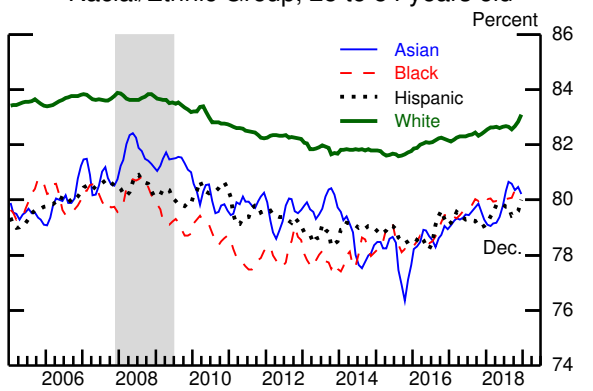
* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

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

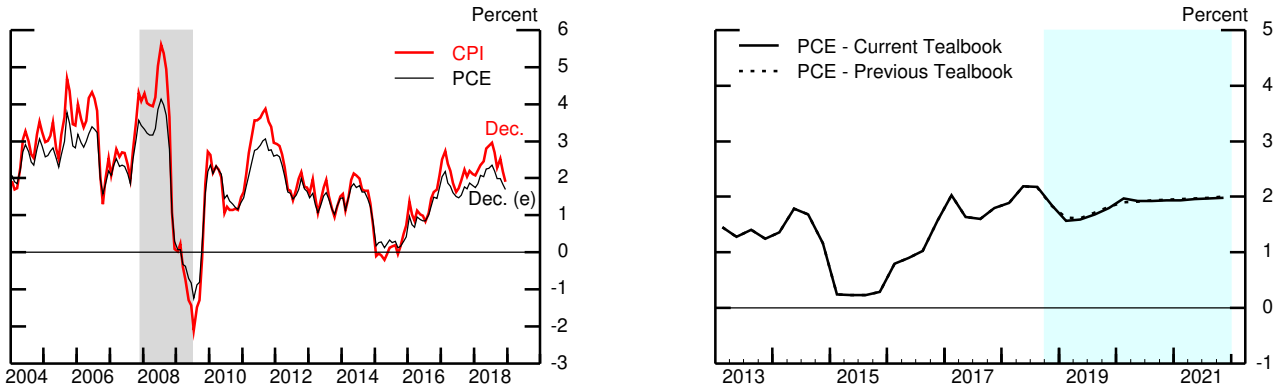


Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

Inflation Developments and Outlook (1)

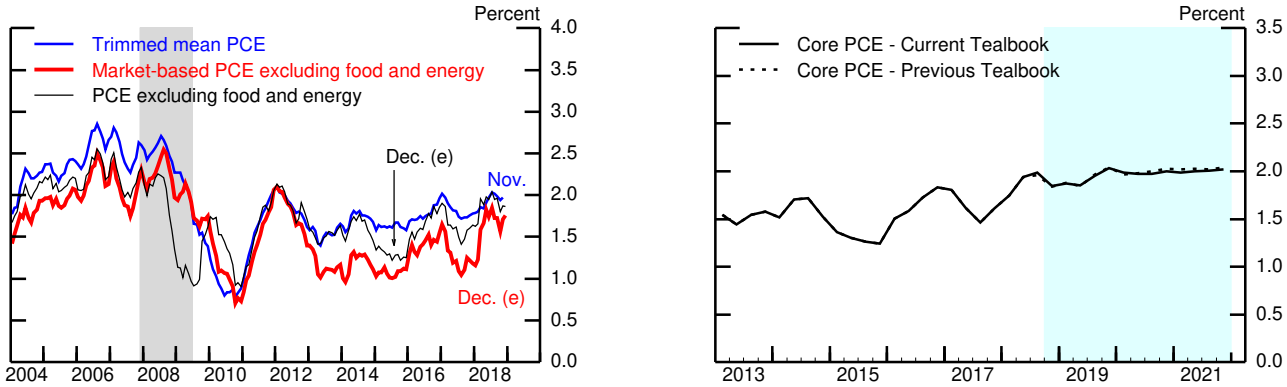
(Percent change from year-earlier period)

Headline Consumer Price Inflation



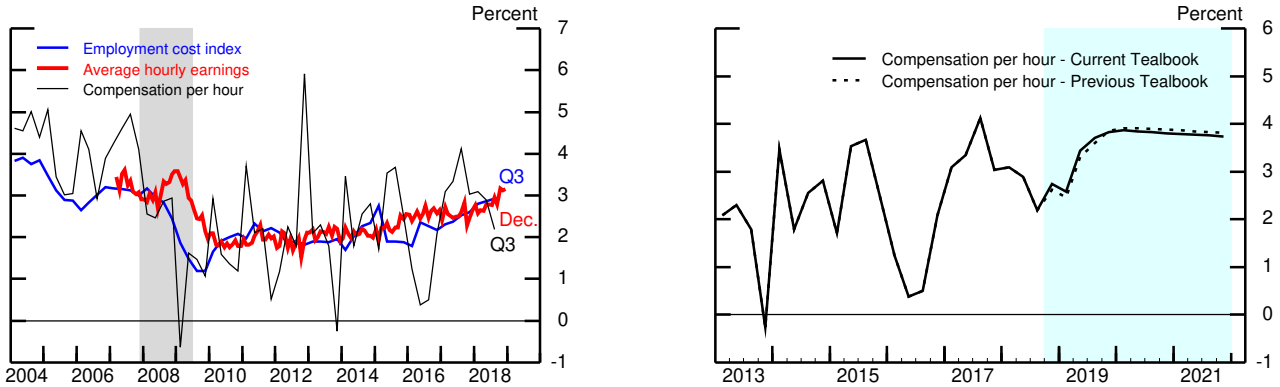
Note: PCE prices from October to December 2018 are staff estimates (e).
Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

Measures of Underlying PCE Price Inflation



Note: Core PCE prices from October to December 2018 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



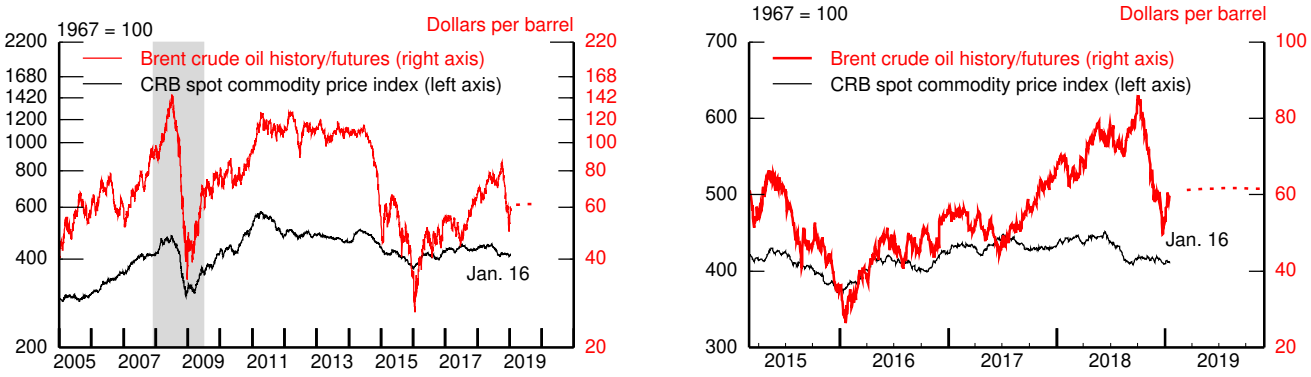
Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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)

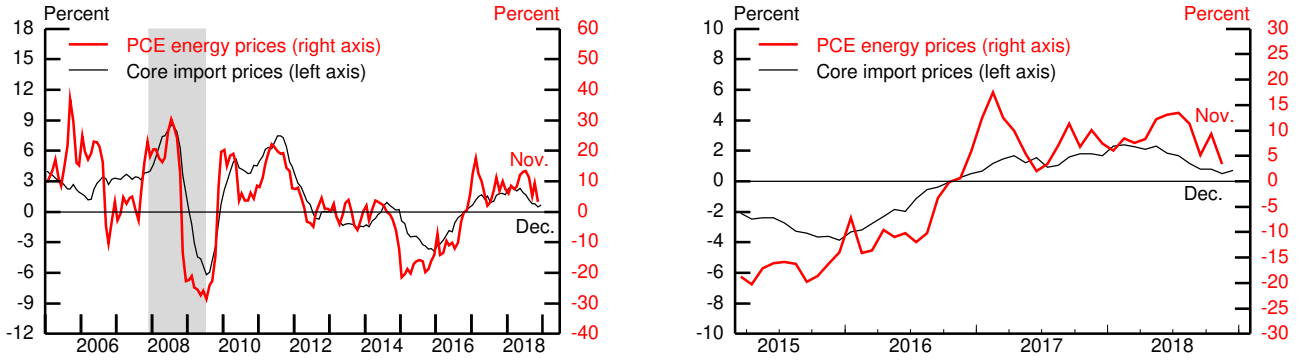
(Percent change from year-earlier period, except as noted)

Commodity and Oil Price Levels



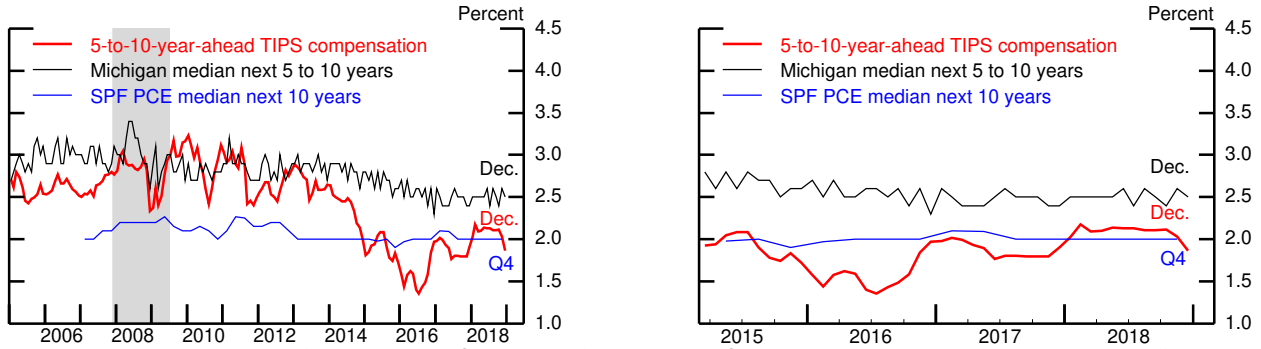
Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

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.
SPF Survey of Professional Forecasters.
Source: For Michigan, University of Michigan Surveys of Consumers; for SPF, the Federal Reserve Bank of Philadelphia; for TIPS, Federal Reserve Board staff calculations.

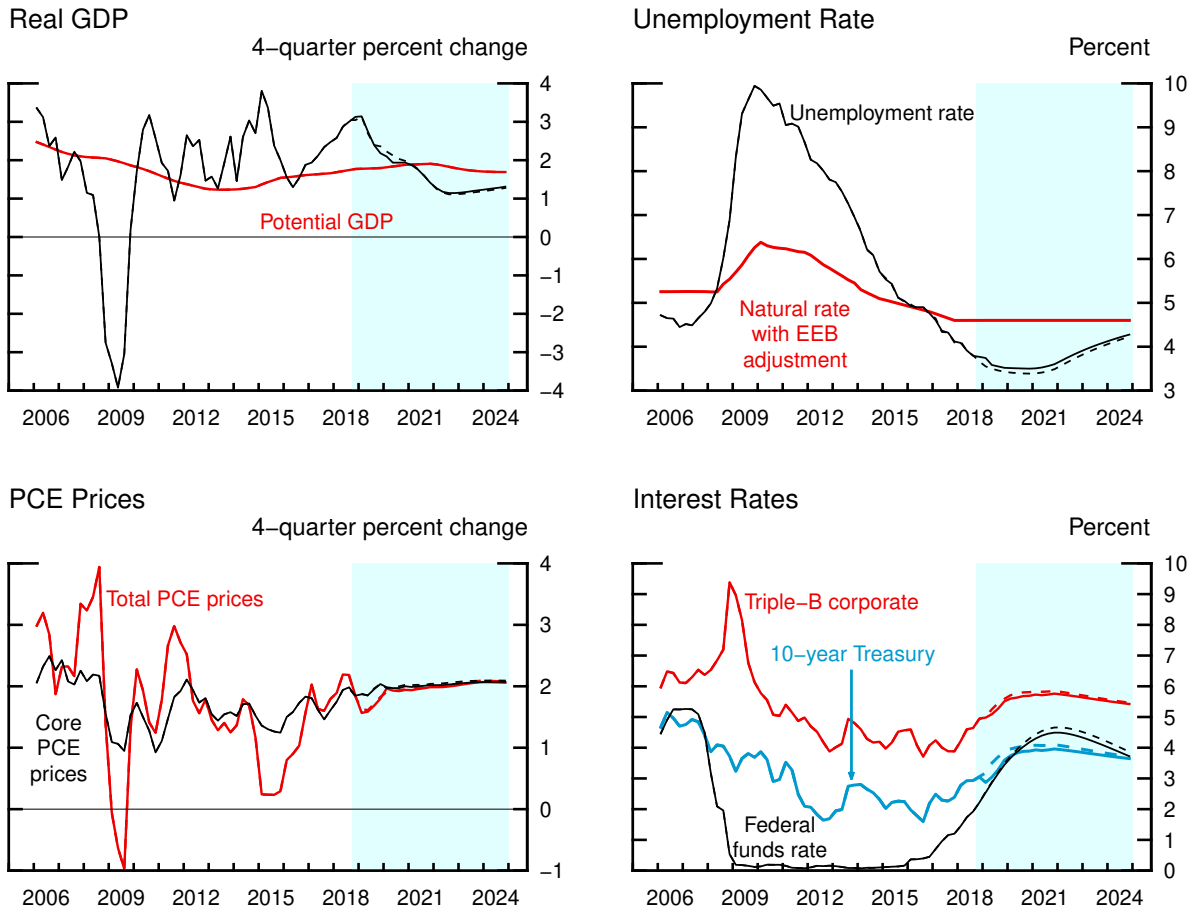
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

The Long–Term Outlook

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

Measure	2018	2019	2020	2021	2022	2023	2024	Longer run
Real GDP	3.1	2.2	1.9	1.4	1.1	1.2	1.3	1.7
Previous Tealbook	3.0	2.4	2.0	1.4	1.1	1.2	1.3	1.7
Civilian unemployment rate[1]	3.8	3.5	3.5	3.6	3.9	4.1	4.3	4.6
Previous Tealbook	3.7	3.4	3.4	3.5	3.8	4.0	4.2	4.6
PCE prices, total	1.8	1.8	1.9	2.0	2.0	2.1	2.1	2.0
Previous Tealbook	1.8	1.8	2.0	2.0	2.0	2.1	2.1	2.0
Core PCE prices	1.8	2.0	2.0	2.0	2.0	2.1	2.1	2.0
Previous Tealbook	1.8	2.0	2.0	2.0	2.1	2.1	2.1	2.0
Federal funds rate[1]	2.22	3.44	4.18	4.49	4.36	4.07	3.72	2.50
Previous Tealbook	2.22	3.49	4.30	4.66	4.55	4.24	3.87	2.50
10-year Treasury yield[1]	3.0	3.6	3.9	4.0	3.9	3.7	3.6	3.4
Previous Tealbook	3.1	3.8	4.1	4.1	4.0	3.8	3.7	3.4

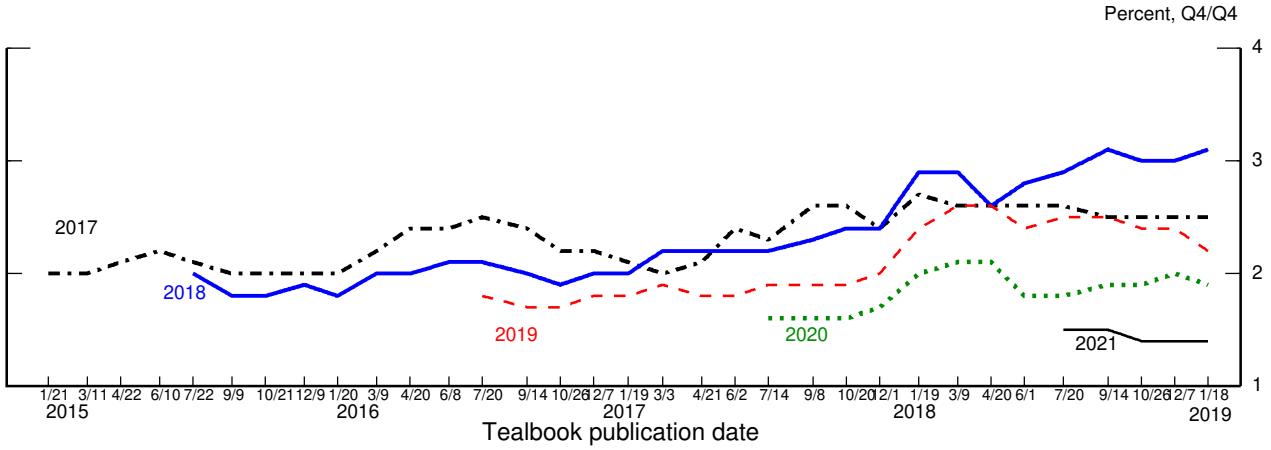
1. Percent, average for the final quarter of the period.



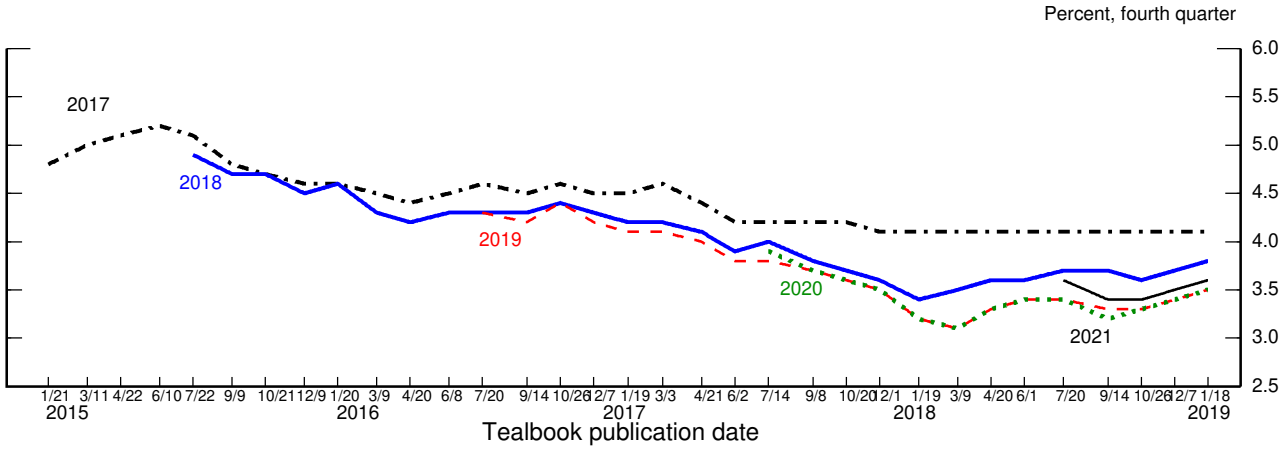
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

Evolution of the Staff Forecast

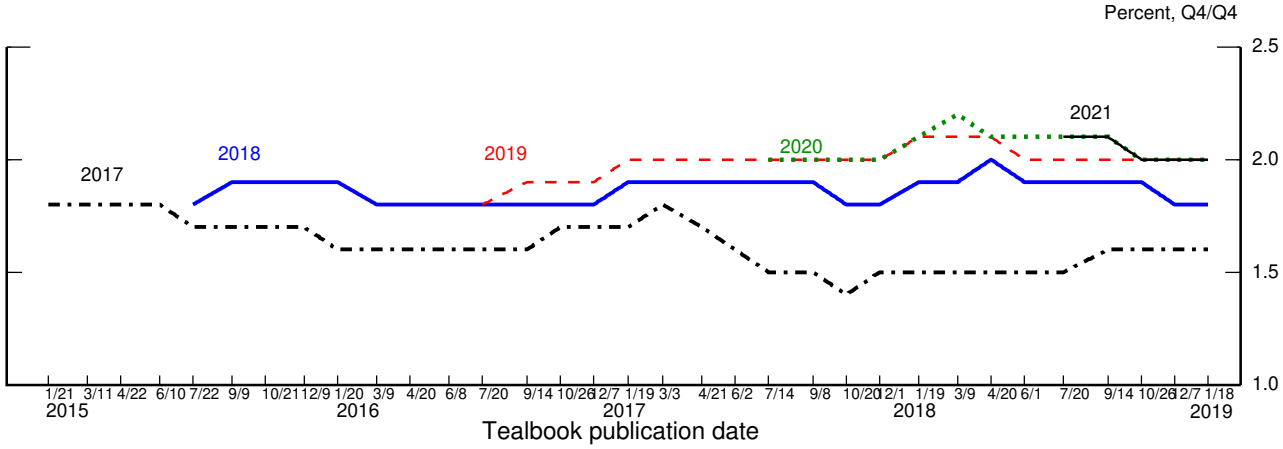
Change in Real GDP



Unemployment Rate



Change in PCE Prices excluding Food and Energy



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International Economic Developments and Outlook

Concerns about the health of the global economy have persisted, fueled by a steady stream of downbeat foreign economic data—especially from China and Europe. We estimate that economic growth remained relatively subdued in the fourth quarter in both the euro area and in China. As a result, aggregate foreign growth is estimated to have stayed around 2 percent at an annual rate in the fourth quarter (noticeably below potential for the third consecutive quarter) rather than picking up as projected in the December Tealbook.

Despite this substantial fourth-quarter markdown and the recession fears swirling through the financial markets and media, we are not projecting a further slowing of growth abroad going forward. While underlying momentum has slowed somewhat, our assessment is that temporary factors (such as social unrest in France and disruptions of shipping on the Rhine River) account for much of the shortfall in foreign growth in the fourth quarter. Moreover, our recession models, which take as inputs both economic activity data and financial market developments, continue to put the probability of a foreign downturn near its unconditional historical average. So our baseline scenario is one in which the foreign economies grow at a subpar pace of 2¼ percent in 2019, held down by financial market stresses, policy uncertainty, and debt deleveraging. Foreign growth is then projected to rise to a little above its potential pace of 2½ percent in 2020, as monetary policies remain accommodative, policy uncertainty moderates in Europe, and Latin America emerges from its doldrums. Compared to the more dire outcomes highlighted by market commentary in recent weeks, this projection may appear somewhat sanguine, but it is weaker than that of many outside forecasters.

Although our foreign outlook for 2019 is just a touch weaker than in December, the series of markdowns in previous Tealbooks, along with the heightened volatility in financial markets, suggest that the balance of risks around our baseline projection has shifted further to the downside. A hard landing in China, whether triggered by a property market correction, a further escalation of U.S.–China trade disputes, or some other factor, remains among the most prominent of these risks. As discussed in our two "China Slowdown" alternative scenarios in the Risks and Uncertainty section, a hard landing in China would be damaging for the U.S. economy, especially if it triggered turbulence in

global financial markets similar to the volatility seen in 2015 and 2016. (The box in this section also discusses the long-run spillovers on foreign economies from U.S.–China tariff hikes.)

Given the jittery tone of financial markets, shocks coming from Europe could also be consequential. In the wake of the U.K. Parliament's recent rejection of Prime Minister May's proposed agreement with the European Union (EU), the risk of a disorderly no-deal Brexit persists. Meanwhile, Italy remains vulnerable to a loss of confidence despite its recent budget compromise with the European Commission. Finally, even though the tone of financial markets in EMEs has improved in recent weeks, these economies remain vulnerable to a tightening of financial conditions in the context of rising global interest rates. Should any of these risks materialize, elevated public debt and still very low policy rates limit scope for foreign economic policy to respond.

We estimate that headline inflation declined sharply to just 1 percent in the major AFEs at the end of 2018, reflecting drag from lower oil prices. In addition, core inflation in the euro area and Japan remain depressed (below 1 percent in both economies in the fourth quarter). Against a background of subdued inflation and a modest pace of economic activity, we expect AFE monetary policy to remain accommodative throughout the forecast period. Indeed, given our dimmer outlook for euro-area growth and inflation, we now expect the European Central Bank (ECB) to proceed more cautiously with its policy normalization, waiting until mid-2020 before raising its policy rate. We also pushed back our assumptions of the next rate hikes in Canada and the United Kingdom.

Although headline inflation also declined in the EMEs in late 2018, several EME central banks, notably those of Mexico and Russia, tightened monetary policy to contain inflation risks. In contrast, the People's Bank of China eased monetary policy in response to weakening domestic demand and concerns about the effects of trade tensions with the United States.

ADVANCED FOREIGN ECONOMIES

- ***Euro Area.*** The soft patch in the euro area appeared to persist in the fourth quarter. Industrial production fell further through November despite a stabilization of German car production following the slump triggered by the EU's introduction of tighter emission standards in September. Accordingly, we now estimate that GDP grew just ¾ percent in the fourth quarter, with output contracting in Italy for the second

consecutive quarter. Because the fourth-quarter weakness partly reflects temporary effects of widespread social unrest in France and disruptions to shipping from low water levels on the Rhine River (an important transportation artery for German industry), we project growth to rebound in the current quarter. Nevertheless, the disappointing data suggest that underlying growth momentum has weakened as well, likely reflecting weaker external demand and tighter domestic financial conditions. Therefore, we expect growth to remain below potential for much of 2019 and then to rise just above 1½ percent by 2021, supported by still-accommodative monetary policy, solid real wage growth, and a gradual reduction of uncertainty related to Brexit and Italy.

Core inflation fell below 1 percent in the fourth quarter, and some market-based measures of long-term inflation expectations have been drifting back down. Accordingly, we now project that core inflation will remain mired around 1 percent this year and will rise only very gradually to 1½ percent by late 2021. In light of our subdued outlook for growth and inflation, we now expect the ECB to wait until mid-2020 to first hike its deposit rate and then lift it to only 0 percent in 2021. The ECB will likely continue reinvesting maturing assets well after that, having just stopped its asset purchase program last month.

- ***United Kingdom.*** Brexit uncertainty continues to weigh on the U.K. economy, as evidenced by the recent weakening of business and consumer confidence, industrial production, and PMIs. After an unusually strong third quarter (partly reflecting favorable weather conditions), real GDP growth is estimated to have slowed sharply, to 1.1 percent in the fourth quarter.

  We assume that the U.K. Parliament will ultimately ratify a Brexit deal with the EU. This result will likely involve the renegotiation of some parts of the deal and an extension of the Article 50 withdrawal date beyond the current March 29 deadline. As such, we continue to assume the United Kingdom will exit the EU without major disruptions (probably by midyear) and then start a transition period during which it will negotiate its future relationships with the EU and the rest of the world. Of course, other outcomes—including a no-deal Brexit, a second Brexit referendum, or even the U.K. Parliament pulling the country out of the Brexit process—are also possible.

Long-Run Spillovers on Foreign Economies from U.S.–China Tariff Hikes

Trade tensions between the United States and China have featured prominently in fears of a global downturn. In the near-to-medium term, there are several channels through which increased tariffs and continued uncertainty could affect global growth. First, higher tariffs are equivalent to a tax increase, with negative effects on consumption and investment. Second, given China's important role in global value chains, an increase in bilateral tariffs could disrupt supply chains, with significant negative effects on output. Third, increased uncertainty could weaken GDP if firms delay investment and hiring. Finally, increased trade tensions could negatively affect sentiment and roil international financial markets.

Outside of these immediate though eventually temporary effects, a persistent increase in tariffs would likely negatively affect the long-run productive capacity of the economy. Higher tariffs could slow the accumulation of capital, shift resources into less-productive sectors, reduce the extent of competition, or interfere with the dissemination of technological advances. In this discussion, we employ a particular model of trade policy effects following Caliendo and Parro (2015) to quantify the long-run losses of permanent increases in U.S.–China import tariffs on GDP in the United States and China as well as the spillover effects on other foreign economies.[1] The model, which includes multiple countries and sectors and accounts for input–output linkages, focuses on the role of tariffs in spurring adverse resource reallocations.[2] Higher U.S. tariffs on imports from China raise the price of those goods, increasing the production cost for U.S. firms as intermediate inputs become more expensive, thus lowering U.S. productivity and GDP. In China, tariffs decrease demand for those products for which China is most productive, pushing resources into less-productive sectors and lowering overall GDP.

An important model feature is trade diversion—exporters can divert their goods to other destinations and importers can switch suppliers—thereby mitigating the negative effect of higher import prices. This approach highlights the main offsetting forces in analyzing the spillovers of a U.S.–China trade war. On the one hand, countries could lose as China and the United States push resources into less-productive sectors. On the other hand, countries could gain via trade diversion.

Panel A in table 1 summarizes the bilateral tariffs implemented by the United States and China in 2018. To date, the United States has raised tariffs on about $235 billion of Chinese goods and China has retaliated on about $113 billion of U.S. goods (lines 1–4). While the United States and China agreed on a 90-day truce to negotiate a deal in late 2018, trade tensions could escalate further this year, as shown in panel B. In particular, the United States could raise the 10 percent tariff already in effect on $180 billion of Chinese goods to 25 percent (line 5) or target a greater amount of Chinese imports. If the totality of tariffs enumerated (lines 1–6) were implemented, they would cover 23 percent of U.S. non-oil goods imports and 2.6 percent of U.S. GDP and would raise the average U.S. tariff on imports from China by 15.3 percentage points. Similarly, a retaliation by China on all imports from the United States would cover 8 percent of all Chinese non-oil goods imports and 1 percent of Chinese GDP.

1 Lorenzo Caliendo and Fernando Parro (2015), "Estimates of the Trade and Welfare Effects of NAFTA," *Review of Economic Studies*, vol. 82 (January), pp. 1–44.

2 We include 30 countries—Argentina, Australia, Austria, Brazil, Canada, Chile, China, Denmark, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Italy, Japan, Mexico, the Netherlands, New Zealand, Norway, Portugal, South Africa, South Korea, Spain, Sweden, Turkey, the United Kingdom, and the United States—and the remaining countries as one block.

Table 1: Trade Policy Developments

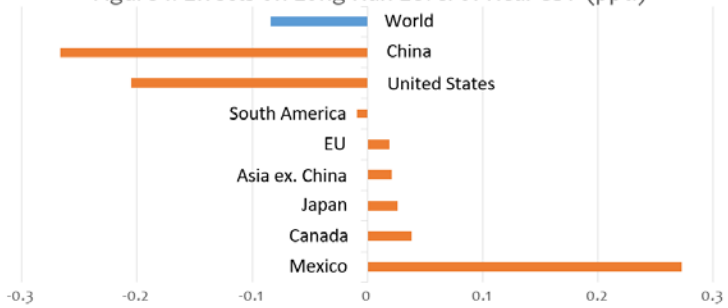
		United States			China		
		Effective date	Tariff rise (ppt.)	Imports from China affected ($ in billions)	Effective date	Tariff rise (ppt.)	Imports from U.S. affected ($ in billions)
A. Implemented (2018)							
1	Solar & wash. mach.	1/22	28	1.4	-	-	-
2	Steel and aluminum	3/23	25; 10	3.2	4/2	15-25	3
3	Sec. 301: $50 bn (part 1)	7/6	25	34	7/6	25	34
	Sec. 301: $50 bn (part 2)	8/23	25	16	8/23	25	16
4	Sec. 301: $180 bn	9/24	10	180	9/24	5-10	60
	Total (1–4)		**13.4**	**234.6**		**15.5**	**113**
B. Proposed (2019)							
5	Sec. 301: $180 bn	3/2	15	180	3/2	10-15	60
6	Remaining $275 bn	TBD	10	275	TBD	10	17
	Total (1–6)		**15.3**	**509.6**		**18.4**	**130**

Note: The tariff increases are denoted in percentage points (ppt).
Source: Staff calculations.

Figure 1 shows the estimated effect of the totality of tariffs shown in table 1 (lines 1–6) on real GDP in the world, China, the United States, and other countries or regions. Our estimates suggest that a permanent increase in tariffs would reduce the long-run level of real world GDP by about 0.1 percentage point as global productivity declines. For China and the United States, the tariffs reduce the long-run level of real GDP by a modest 0.27 percentage point and 0.2 percentage point, respectively. Generally, we find negligible spillover effects to other countries. For most countries, the positive spillover effect of U.S. import diversion is diminished by the negative spillover effect from lower Chinese demand. However, Mexico gains as U.S. import demand is diverted from China, thereby pushing resources into the relatively more-productive sectors.

All told, the model suggests a limited long-run imprint from an increase in trade barriers between the United States and China. As such, this analysis suggests that the current heightened concerns regarding the potential economic effects of a trade war are likely related to fears of temporary disruptions (for example, confidence effects, supply chain disruptions, financial market volatility) or other long-run factors that are not captured in our model, such as reduced innovation from less competition or technology effects. As such, we view these estimates as a likely lower bound.[3]

Figure 1: Effects on Long-Run Level of Real GDP (ppt.)



Note: The effects on long-run GDP are denoted in percentage points (ppt).
Source: Staff calculations.

[3] The small long-run effect of tariffs discussed here contrasts with the large negative estimated effects of Brexit on long-run GDP in the United Kingdom, which are between 5 and 10 percent of GDP. The larger estimated effect of Brexit can largely be attributed to the greater importance of the EU for U.K. trade and to increased nontariff barriers as a result of leaving the EU.

We predict that the Brexit-related uncertainty will weigh on economic activity in the near term, with U.K. growth averaging around 1¼ percent in the first half of this year before bouncing back to almost 2 percent by the end of the year. We expect that as Brexit-related uncertainty moderates, the Bank of England will raise its policy rate in the third quarter of 2019, one quarter later than anticipated in the December Tealbook.

- ***Canada.*** A glut of Canadian oil in late 2018, resulting from transportation bottlenecks that restrained exports, is leading to deep production cuts. Moreover, PMIs and labor market data through December point to weaker growth momentum. Accordingly, we estimate that GDP growth slowed to 1¾ percent in the fourth quarter, and we expect growth to further decline to 1 percent in the current quarter, both significantly below our December projections. Going forward, as oil production recovers, growth should rebound to 2 percent in the second quarter before settling at a near-potential pace of 1¾ percent thereafter. Citing low oil prices and slowing global demand, the Bank of Canada (BOC) kept its policy rate at 1.75 percent on January 9. With a more dovish tone in recent BOC communications, we now expect only two rate hikes in 2019, one less than predicted in the December Tealbook.

- ***Japan.*** Following a 2.5 percent contraction (at an annual rate) in real GDP in the third quarter due to a series of natural disasters, October data suggested the Japanese economy was quickly rebounding. However, more recent data, including November exports, have been weak. All told, although real GDP growth appears to have increased to 2¼ percent in the fourth quarter, growth for 2018 as a whole is estimated to have slowed to just ¼ percent. Going forward, we project that growth, supported by a highly accommodative monetary stance and next year's Tokyo Olympics, will linger just above its potential pace of ¾ percent over much of the forecast period. We still expect a mild contraction in the second half of this year following the implementation of a long-planned consumption tax hike in October.

EMERGING MARKET ECONOMIES

- ***China.*** A string of disappointing data releases together with weak results from the Chinese operations of a number of multinational companies have led to growing concerns about a sharp slowdown in Chinese growth. Indeed, the pace of expansion has already slowed from about 6.8 percent in the first half of 2018 to just under

6 percent in the second. However, we had been anticipating slowing for some time now, and we do not expect growth to deteriorate substantially further going forward.

We attribute the slowdown largely to authorities' efforts to reduce credit growth, which have weighed heavily on infrastructure investment and retail sales (particularly autos). These factors should abate going forward, as the authorities have eased credit conditions and relaxed constraints on local government financing. Indeed, growth rates of credit, industrial production, and investment appear to be stabilizing. And auto sales should bottom out this year as the temporary drag from the expiration of tax incentives fades. That said, a cooling property market will continue to restrain household spending, though we judge that limited inventories should reduce the likelihood of a sharp housing price correction. Furthermore, we expect exports to weaken amid ongoing trade tensions with the United States. Indeed, the most recent trade data showed a widespread decline in Chinese exports, especially to the United States.

All told, we see growth holding steady at a little below 6 percent in the current quarter, rising to about 6½ percent by midyear as stimulus kicks in and then slowing gradually thereafter in line with potential growth.

- ***Other Emerging Asia.*** The dissipation of idiosyncratic shocks in several economies likely lifted regional growth in the fourth quarter. However, growth has slowed from the above-potential pace of the past few years amid headwinds from moderating global growth, a downturn in the high-tech cycle, and U.S.–China trade tensions. Indeed, exports slowed notably in the fourth quarter, especially for high-tech goods and autos, and especially to China. We expect growth to remain steady at a little under 3½ percent through the end of the forecast period, with the export slowdown offset by supportive fiscal and monetary policies and lower oil prices. This forecast is down about ¼ percentage point relative to the December Tealbook, reflecting a markdown of potential growth following a series of downside growth surprises.

- ***Mexico.*** We estimate that growth in Mexico stepped down to 1½ percent in the fourth quarter amid a rise in policy uncertainty. The incoming administration's decision to cancel a major airport project and slow privatization in the oil sector raised concerns about its support for market-friendly policies. As a result, domestic financial conditions tightened significantly between early October and mid-December: Long-term interest rates rose sharply, and the peso depreciated by close

to 8 percent. Concerns about peso depreciation, together with persistently above-target inflation and inflation expectations, prompted the Bank of Mexico to raise its policy rate further to 8.25 percent in December. More recently, concerns about the administration's policies were allayed somewhat by its fiscally responsible budget for this year, which caused the peso to appreciate and long-term interest rates to decline. Although we marked down the near-term outlook in the December Tealbook, since then we have not adjusted the longer-term outlook for the Mexican economy, as we await further information on the administration's policies. We see growth rising gradually to a little under 3 percent by the end of 2020, but downside risks remain.

- ***Brazil.*** Data suggest the Brazilian economy remained stuck in low gear last quarter. That said, business confidence has risen sharply in recent months, supported by reduced political uncertainty after the recent presidential election. And, with double-digit unemployment indicating considerable economic slack and policy interest rates remaining low, we see growth rising above potential to 2½ percent this year. Our baseline assumes that the new government headed by Jair Bolsonaro will push through some form of social security reform in 2019, thereby avoiding the destabilizing possibility of breaching the fiscal expenditure cap in 2020. Indeed, the government appears to have decided to fast-track the reform by amending the proposal currently in the congress instead of sending a brand new proposal. That said, considerable uncertainty remains around prospects for reform.

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The Foreign GDP Outlook

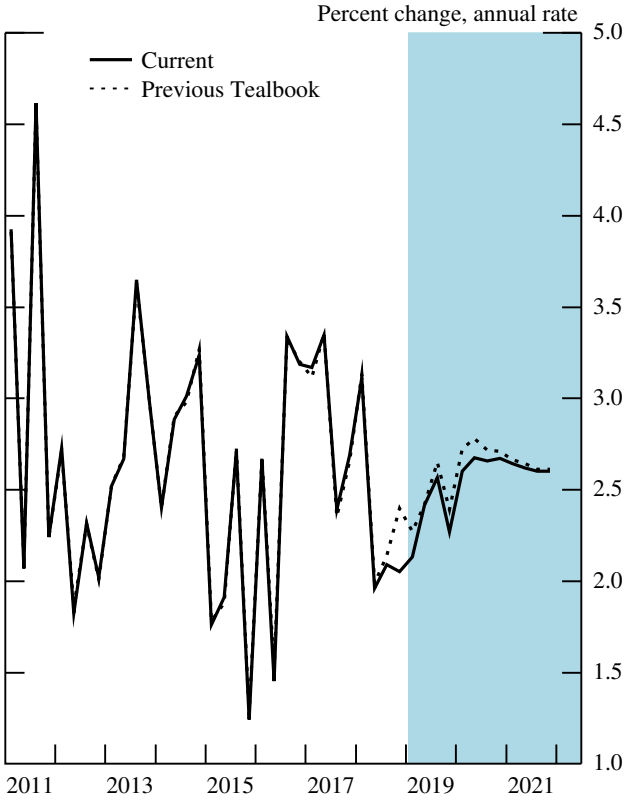
Real GDP* Percent change, annual rate

	2018			2019			2020	2021
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	2.5	2.1	2.1	2.1	2.4	2.4	2.7	2.6
Previous Tealbook	2.6	2.1	2.4	2.3	2.4	2.5	2.7	2.6
2. Advanced Foreign Economies	1.9	1.0	1.5	1.4	1.6	1.4	1.7	1.7
Previous Tealbook	1.9	1.1	2.0	1.6	1.5	1.6	1.8	1.7
3. Canada	2.3	2.0	1.8	1.0	2.0	1.7	1.9	1.7
4. Euro Area	1.6	.6	.8	1.8	1.2	1.2	1.5	1.7
5. Japan	.7	-2.5	2.3	1.0	.8	-.5	.9	.8
6. United Kingdom	1.0	2.5	1.1	1.1	1.5	1.9	1.9	1.7
7. Emerging Market Economies	3.2	3.2	2.6	2.9	3.2	3.4	3.6	3.5
Previous Tealbook	3.2	3.1	2.8	3.0	3.3	3.5	3.7	3.6
8. China	6.8	5.9	5.8	5.9	6.2	6.3	5.9	5.7
9. Emerging Asia ex. China	4.1	2.4	3.3	3.3	3.3	3.4	3.4	3.3
10. Mexico	1.9	3.4	1.5	1.5	2.0	2.4	2.8	2.9
11. Brazil	.7	3.1	.8	2.2	2.5	2.7	2.8	2.8

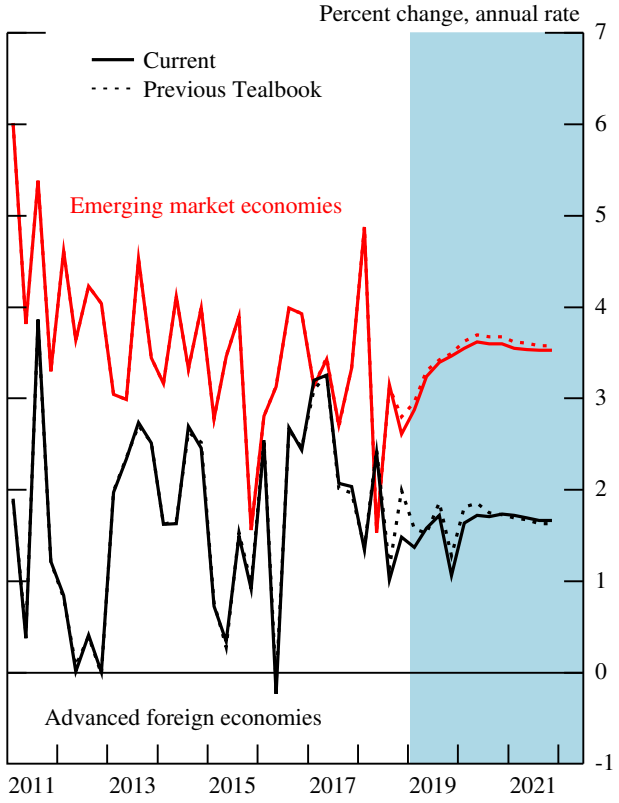
* GDP aggregates weighted by shares of U.S. merchandise exports.

Int'l Econ Devel & Outlook

Total Foreign GDP



Foreign GDP



The Foreign Inflation Outlook

Consumer Prices* Percent change, annual rate

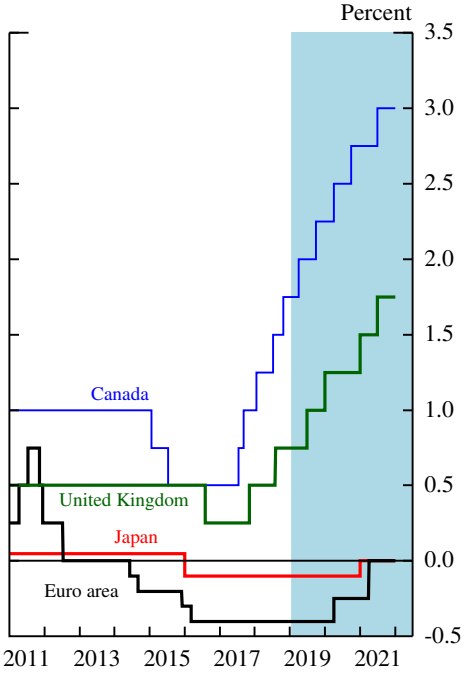
	2018			2019			2020	2021
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	2.2	3.7	2.2	2.0	2.3	2.5	2.3	2.3
Previous Tealbook	2.2	3.7	2.8	2.0	2.3	2.5	2.4	2.4
2. Advanced Foreign Economies	1.8	2.5	.9	1.0	1.3	1.9	1.5	1.6
Previous Tealbook	1.8	2.5	1.6	.7	1.3	2.0	1.6	1.7
3. Canada	2.3	2.6	1.0	2.0	2.0	2.0	2.0	2.0
4. Euro Area	2.1	2.6	.9	.7	1.0	1.2	1.3	1.4
5. Japan	.1	2.7	.4	-.3	.6	3.6	.9	1.1
6. United Kingdom	2.2	2.9	1.9	1.4	2.0	2.3	2.3	2.2
7. Emerging Market Economies	2.4	4.6	3.2	2.7	3.0	2.9	2.9	2.9
Previous Tealbook	2.4	4.6	3.7	3.0	3.0	2.9	2.9	2.9
8. China	1.1	4.1	2.4	1.6	2.1	2.1	2.5	2.5
9. Emerging Asia ex. China	1.8	1.6	1.3	1.3	2.6	2.7	2.8	2.8
10. Mexico	3.9	6.8	4.6	4.3	3.5	3.3	3.2	3.2
11. Brazil	3.7	6.6	2.6	3.1	4.3	4.3	4.3	4.3

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

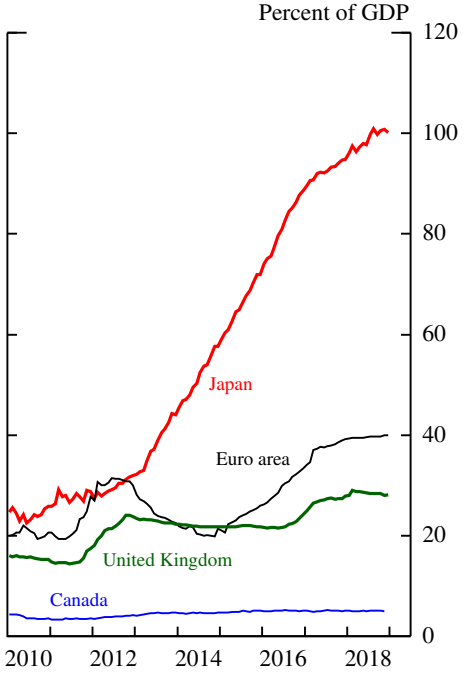
Int'l Econ Devel & Outlook

Foreign Monetary Policy

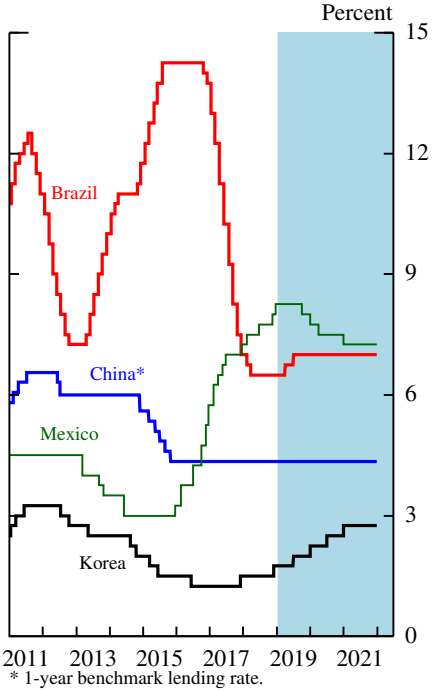
AFE Policy Rates



AFE Central Bank Balance Sheets



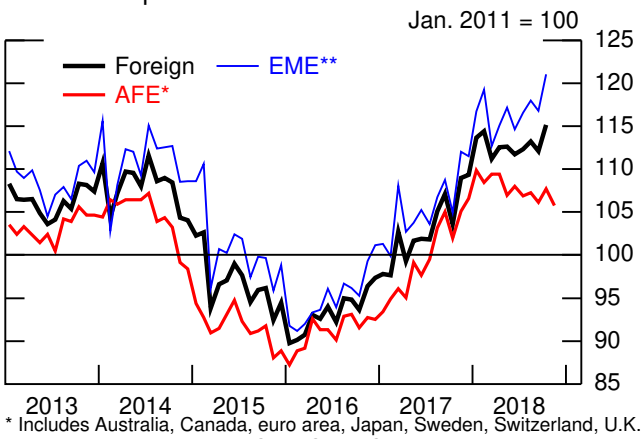
EME Policy Rates



* 1-year benchmark lending rate.

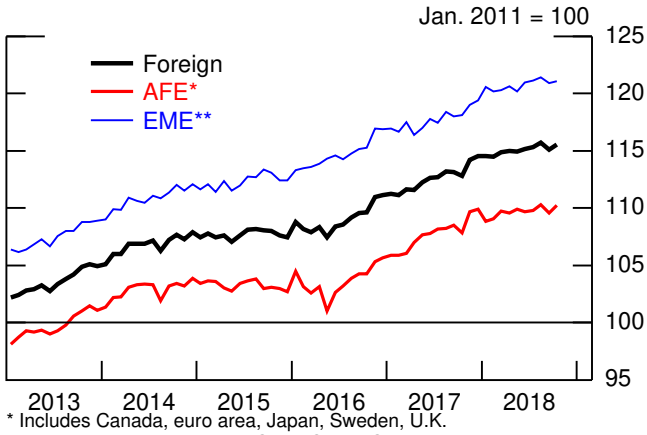
Recent Foreign Indicators

Nominal Exports



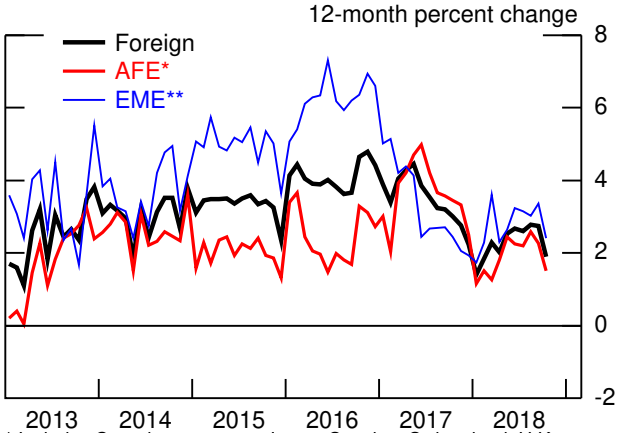
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Singapore, Taiwan, Thailand.

Industrial Production



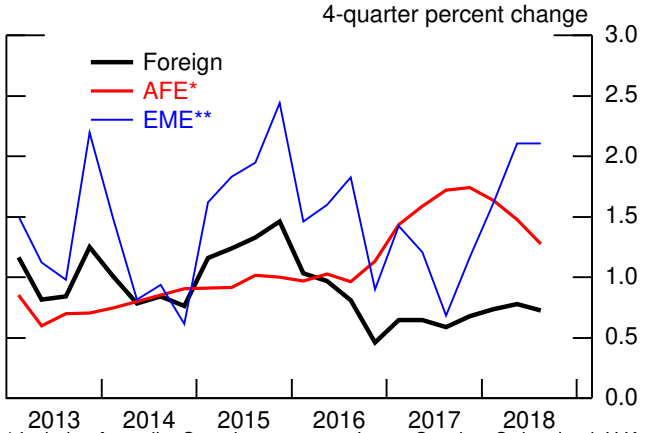
* Includes Canada, euro area, Japan, Sweden, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand.

Retail Sales



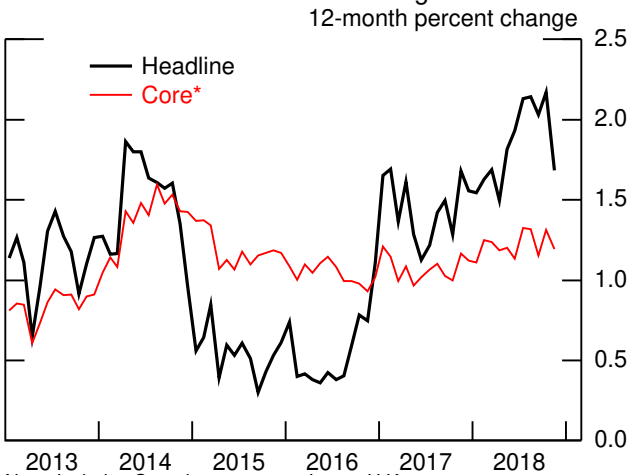
* Includes Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, Chile, China, Korea, Mexico, Singapore, Taiwan.

Employment



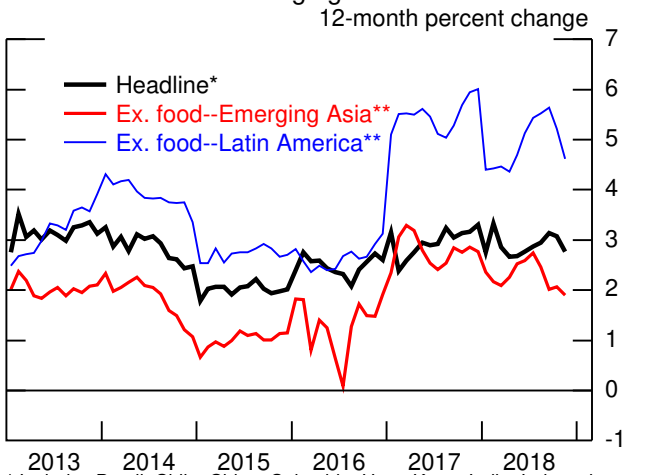
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Chile, Colombia, Hong Kong, Israel, Korea, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand, Turkey.

Consumer Prices: Advanced Foreign Economies



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

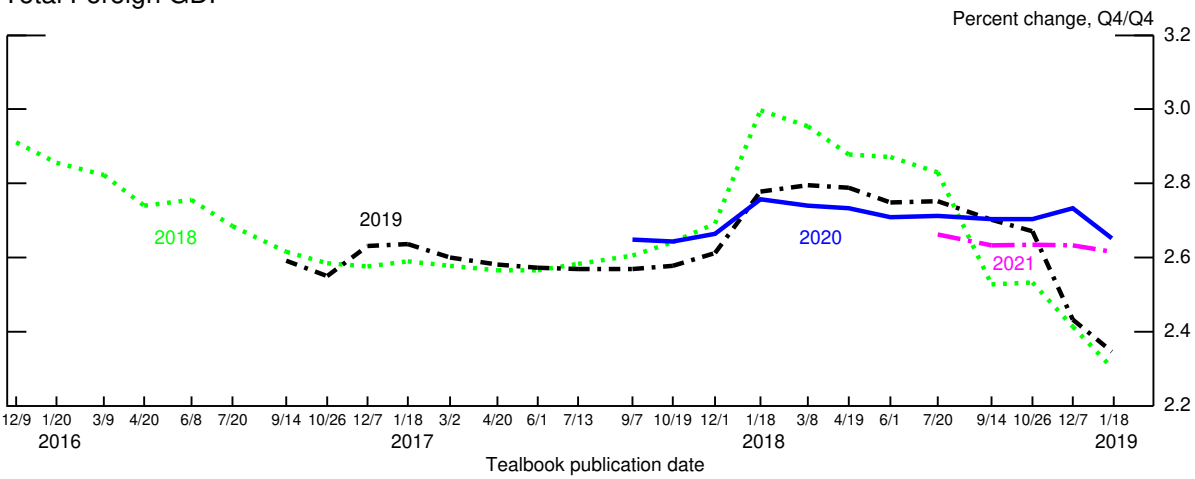
Consumer Prices: Emerging Market Economies



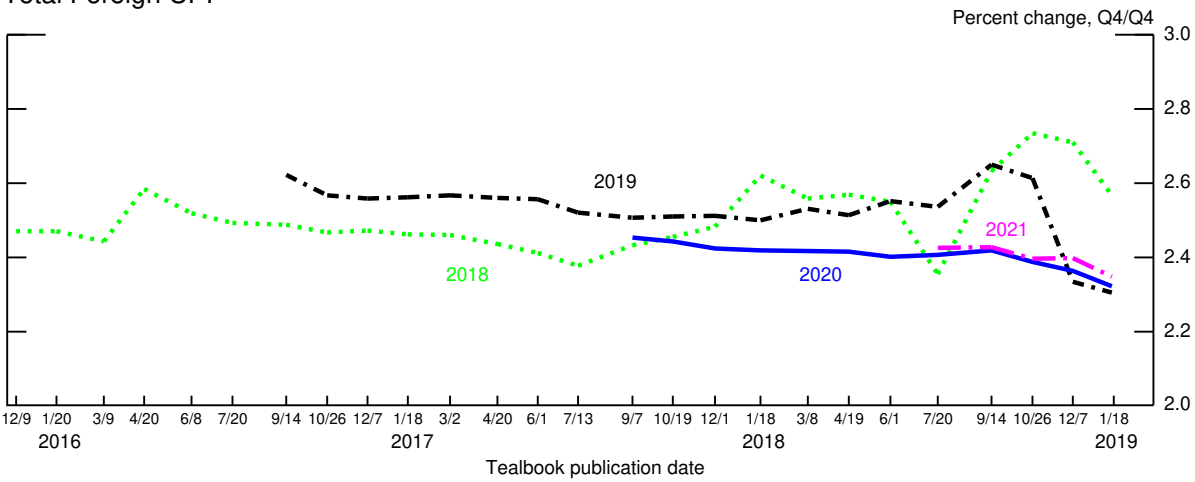
* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Latin America excludes Argentina and Venezuela.

Evolution of Staff's International Forecast

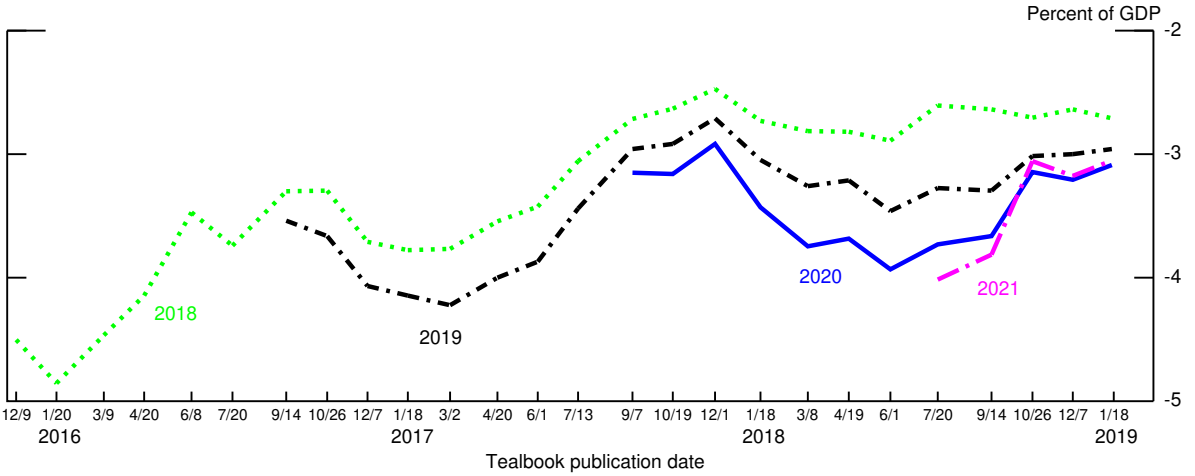
Total Foreign GDP



Total Foreign CPI



U.S. Current Account Balance



Int'l Econ Devel & Outlook

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Financial Market Developments

Investors' risk sentiment deteriorated over the early part of the intermeeting period, spurring increased volatility and declines in the prices for risky assets. Later in the period, however, sentiment turned, and risky asset prices rallied. On net, equity prices ended the period notably higher, supported in part by communications of FOMC participants later in the period that were interpreted as signaling greater flexibility in the conduct of monetary policy in response to adverse macroeconomic or financial market developments. That said, market-based measures of monetary policy expectations over the next few years ended the period only modestly lower.

- The S&P 500 equity index was down as much as 8 percent at one point during the intermeeting period but ended the period 3.5 percent higher. On net, the VIX fell notably, corporate bond spreads were little changed, nominal Treasury yields declined modestly, and TIPS-based measures of inflation compensation were little changed.

- A straight read of OIS rates suggests that investors expect that the federal funds rate will remain unchanged in 2019 and decline about 15 basis points in 2020. However, adjusting for estimated term premiums suggests an expectation for two 25 basis point rate hikes in 2019 and further gradual increases thereafter.

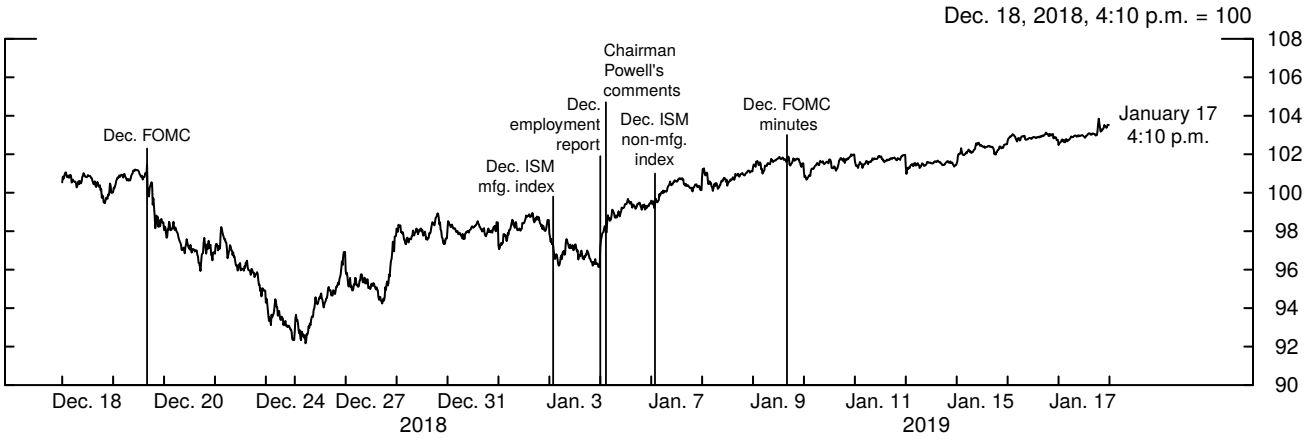
- Foreign equity markets generally tracked the swings in U.S. markets, although price movements abroad were more modest. Overall, foreign equity prices registered a small increase over the period. The staff's broad dollar index declined 1.6 percent amid falling U.S. yields and greater investor optimism about prospects for some EMEs.

- As expected, the U.K. Parliament rejected the government's Brexit deal. U.K. financial markets were somewhat volatile after the vote, but the broader market reaction, including in U.S. asset prices, was muted.

- The probabilities of a recession in 2019 as implied by a few statistical models that condition on Treasury term spreads and risk premiums estimated from corporate credit spreads have increased notably over recent months and now range from about 20 to 40 percent.

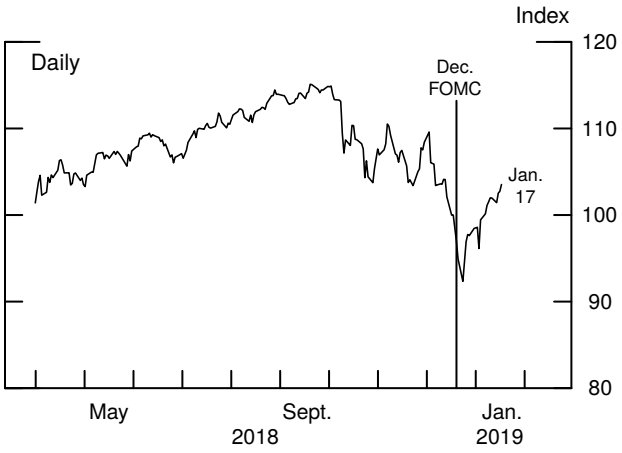
Corporate Asset Market Developments

Intraday S&P 500 Index



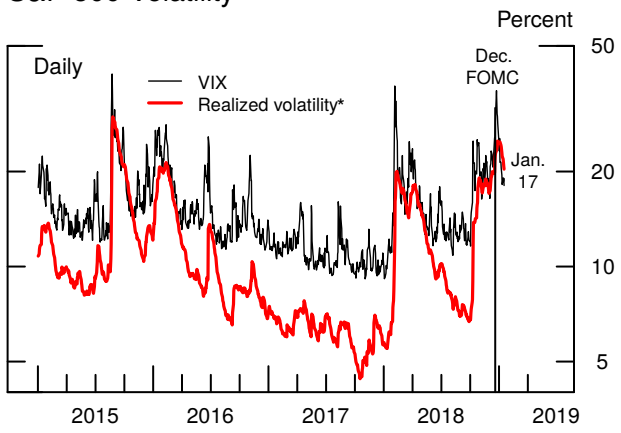
Note: Data are for 2018 and 2019; data are spaced at 5-minute intervals from 9:30 a.m. to 4:10 p.m.
Source: Bloomberg.

S&P 500 Index



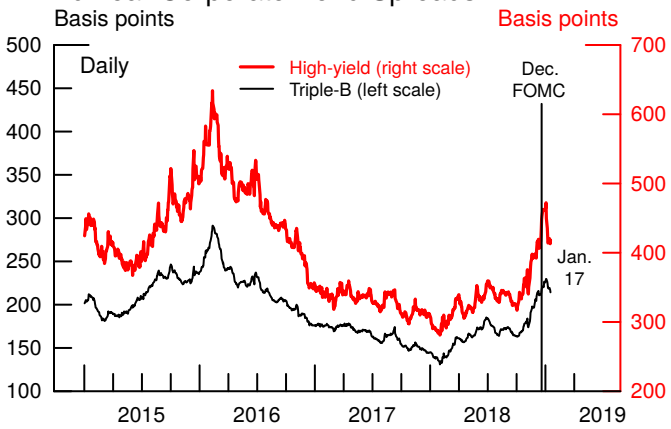
Source: Bloomberg.

S&P 500 Volatility



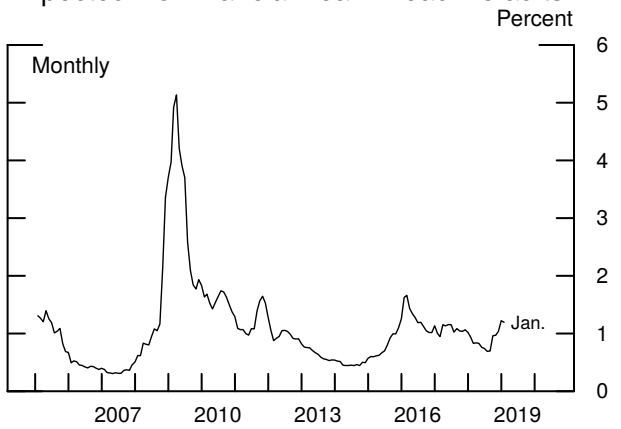
* 5-minute returns used in exponentially weighted moving average with 75 percent of weight distributed over the most recent 20 days.
Source: Bloomberg.

10-Year Corporate Bond Spreads



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

Expected Nonfinancial Year-Ahead Defaults



Note: Firm-level estimates of default weighted by firm liabilities as a percent of total liabilities, excluding defaulted firms. The January value is the monthly average to date.
Source: Moody's KMV; Board staff calculations.

Financial Markets

DOMESTIC DEVELOPMENTS

Early in the period, investors' risk sentiment generally deteriorated, prompting a substantial decline in broad equity indexes, a sharp rise in financial market volatility measures, and a notable widening in corporate spreads over Treasury securities. The first leg down in risky asset prices followed the communications after the December FOMC meeting, which were reportedly perceived as not fully appreciating the implications of the pullback from risky assets and somewhat weaker-than-expected global data over recent months for the U.S. economic outlook. Notable declines in risk sentiment were also prompted by weaker-than-expected data, international trade frictions, the partial federal government shutdown, and concerns about the outlook for corporate earnings related in part to the outlook for global growth and trade.

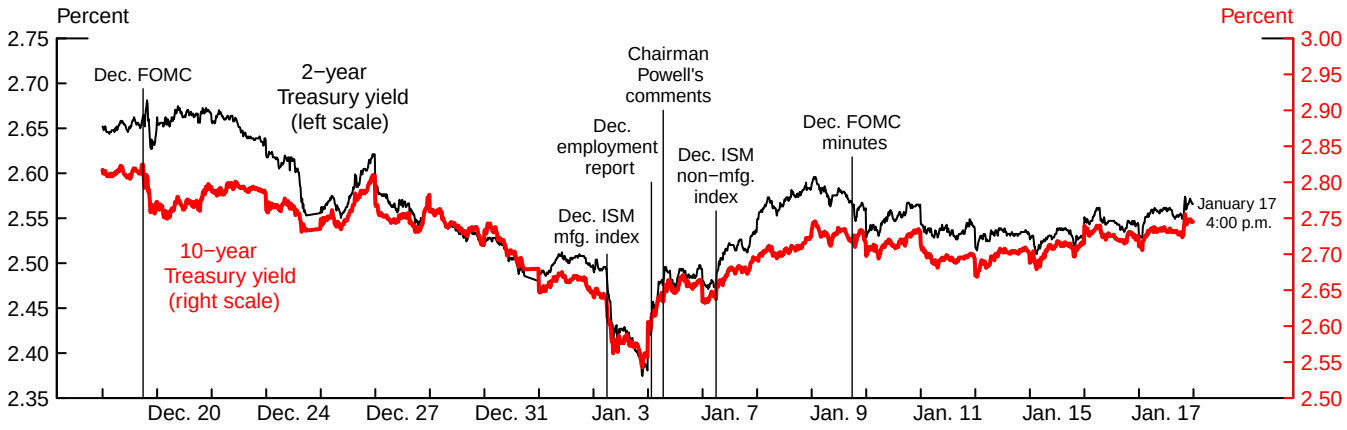
Later in the period, however, equity prices rallied, option-implied volatility declined, and corporate spreads narrowed following positive signals regarding trade negotiations, some robust economic data releases, and communications from FOMC participants that were perceived as suggesting that the FOMC could be "patient" in assessing the implications of recent economic and financial developments for the economic outlook and the future path of policy. On net, the S&P 500 index rose 3.5 percent over the intermeeting period, option-implied volatility declined notably, and corporate spreads were little changed.

Nominal interest rates also varied substantially amid the shifts in investors' appetite for holding risky assets. At one point during the intermeeting period, the yield on a 10-year nominal Treasury security was 26 basis points lower; a staff term structure model implied that around half of this decline in Treasury yields reflected a lower term premium, consistent with a general flight to safety. Treasury yields rose subsequently, and 2-, 5-, and 10-year yields ended the period 8 basis points, 9 basis points, and 7 basis points lower, respectively. The 5-year and 5-to-10-year-forward TIPS-implied inflation compensation measures were little changed on net.

With 10- and 2-year Treasury yields falling by similar amounts, the spread between them changed little and remained at about the 20th percentile of its distribution since 1971. The near-term forward spread narrowed 11 basis points, on net, leaving it

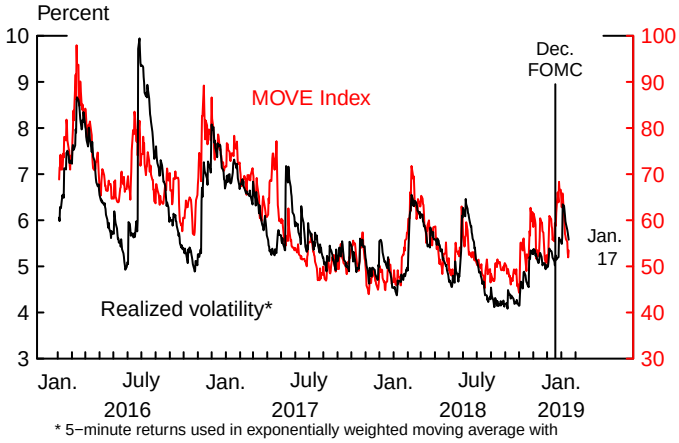
Policy Expectations and Treasury Yields

Selected Interest Rates



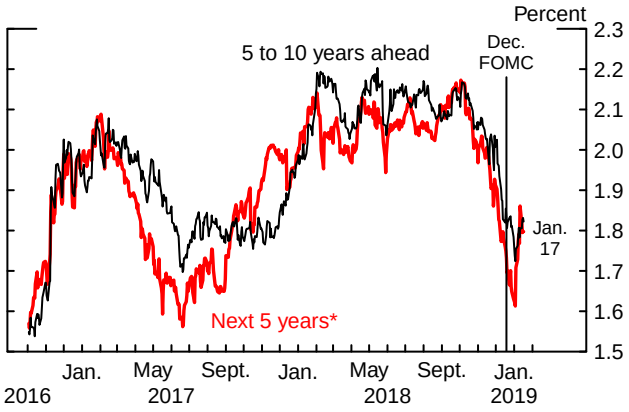
Note: 5−minute intervals, 8:00 a.m. to 4:00 p.m. Data shown are for 2018 and 2019.
Source: Bloomberg.

Volatility of Treasury Yields



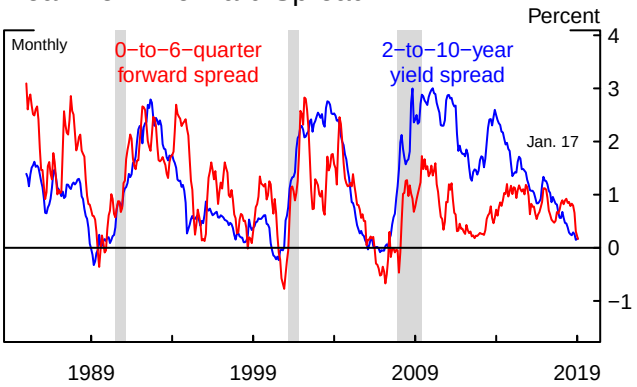
* 5−minute returns used in exponentially weighted moving average with 75 percent of weight distributed over the most recent 20 days.
Source: Bloomberg; Board staff calculations.

TIPS−Based Inflation Compensation



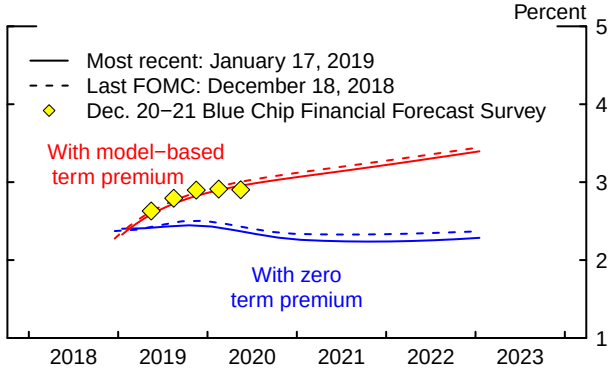
Note: Estimates based on smoothed nominal and inflation-indexed Treasury yield curves.
* Adjusted for lagged indexation of Treasury Inflation-Protected Securities (carry effect).
Source: Federal Reserve Bank of New York; Board staff calculations.

Long−Term Yield Spread and Near−Term Forward Spread



Note: The 0−to−6−quarter forward spread is the difference between the 3−month yield and the implied forward rate between 6 and 7 quarters ahead based on a smoothed Treasury yield curve. Data through December 2018 are monthly averages. Data for January 2019 based on values for January 17. 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.

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 taken December 20 and 21.
Source: Bloomberg; Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Financial Forecasts; Board staff calculations.

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around its 15th percentile since 1971.[1] As discussed in the box "Recession Probabilities from Fixed-Income Markets," the probabilities of a recession in 2019 as implied by a few statistical models that condition on Treasury term spreads and risk premiums estimated from corporate credit spreads have increased notably in recent months and now range from about 20 to 40 percent.

Investors continue to expect no change to the target range for the federal funds rate at the January FOMC meeting. Measures of federal funds rate expectations over the next few years fell substantially over the early part of the intermeeting period but subsequently recovered and ended the period only moderately lower. A straight read of forward rates implied by OIS quotes suggests that investors expect the federal funds rate to remain unchanged during 2019 and to decline about 15 basis points in 2020. However, a staff model that adjusts for term premiums implies that investors expect two rate hikes in 2019 and further gradual increases thereafter.

Changes since the September 2018 FOMC Meeting

Although the net changes in U.S. risky asset prices over the intermeeting period were, overall, positive, since the September 2018 FOMC meeting investors' appetite for holding risky U.S. assets has deteriorated markedly, on net, and has appeared unusually sensitive to changing perceptions about monetary policy and the growth outlook. Over this longer period, the S&P 500 has fallen about 10 percent, and spreads on investment- and speculative-grade corporate bonds have widened 49 basis points and 93 basis points, respectively. The widening in corporate spreads since the September FOMC meeting appears to reflect increases in both expected credit losses and risk premiums.[2]

Over the same period, 2-, 5-, and 10-year nominal Treasury yields have fallen 27 basis points, 39 basis points, and 35 basis points, respectively. However, TIPS yields have only edged down slightly, on net, implying that inflation compensation has fallen substantially; 5-year and 5-to-10-year inflation compensation are 37 basis points and

[1] The near-term forward spread is defined as the difference between the six-quarter-ahead forward rate on Treasury bills and the three-month Treasury bill yield. This 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.

[2] The number of credit rating downgrades and the KMV expected year-ahead default rate have risen substantially in recent months, which suggests that investors expect an increase in credit losses over the next few years. In addition, staff estimates of the risk premium component of high-yield bond spreads and of the excess bond premium (a measure of the risk premium for exposure to U.S. corporate credit risk in excess of the compensation due to expected default) have also both increased substantially.

Recession Probabilities from Fixed-Income Markets

Amid the recent turmoil in financial markets and the noticeable flattening of the yield curve, market participants expressed increased concerns about the risk of recession in the U.S. economy in the near term. This discussion provides an update of the likelihood that the U.S. economy will enter a recession within the next four quarters based on simple statistical models. The analysis uses three recession predictors from fixed-income markets: two components of the slope of the yield curve and one measure of investor risk sentiment.

The slope of the yield curve is measured with either the long-term spread, which is the difference between the 10-year and the 2-year Treasury yields, or the near-term spread, which is the difference between the six-quarter-ahead forward Treasury yield and the three-month bill rate. The long-term spread is a measure of the yield curve most well known as having a statistical relationship with recession incidence. The near-term spread is closer to a measure of market expectations for the near-term direction of monetary policy. When negative, the near-term spread indicates that market participants expect monetary policy to ease in the year ahead, presumably to respond to an imminent economic slowdown.

Investor risk sentiment is gauged by the excess bond premium (EBP)—the component of corporate bond spreads in excess of an estimate of the compensation for expected losses from defaults. The EBP is a useful leading indicator of the business cycle, as periods of elevated credit-market sentiment (that is, when EBP is low) are often associated with a subsequent decline in economic activity.

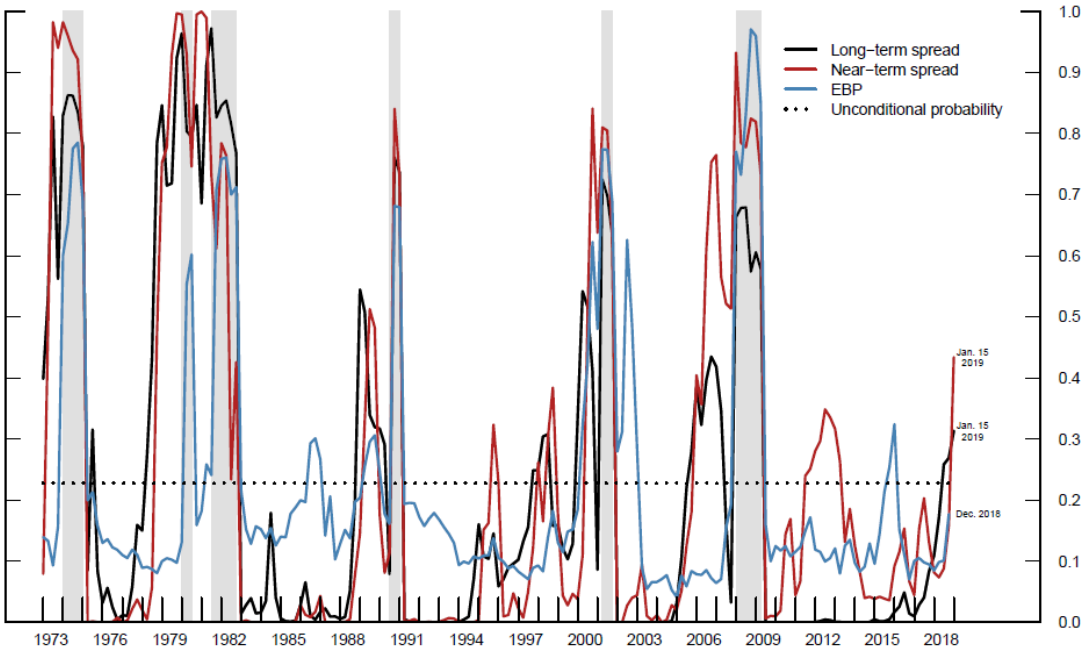
The statistical analysis estimates the probability of transitioning into a recession or remaining in one at some point in the next four quarters as a function of either the near-term spread, the long-term spread, or the EBP. The three models are estimated using data from 1973 to 2018.

As shown in figure 1, the probabilities implied by the far- and near-term spreads (the black and red lines, respectively) are at the highest levels estimated in the current expansion, reaching 32 percent and 43 percent, respectively, and are above the unconditional probability of recession of 23 percent (the dotted line). In contrast, the estimate derived from the corporate bond market (the blue line) has increased only modestly and points to a probability of recession of around 20 percent, as of December 2018.

Figure 2 plots the estimated probabilities from two alternative models that combine information embedded in both the Treasury and the corporate bond markets. The model with long-term spreads and EBP estimated a 40 percent probability that the U.S. economy will enter a recession over the next four quarters, and the model with near-term spreads and EBP estimated a 35 percent probability.

All models presented here have significant statistical power for predicting a recession over the next four quarters, and their estimated probabilities have risen markedly in recent months. However, it should be noted that recession prediction models that include nonfinancial variables tend to point to notably lower risk of recession.

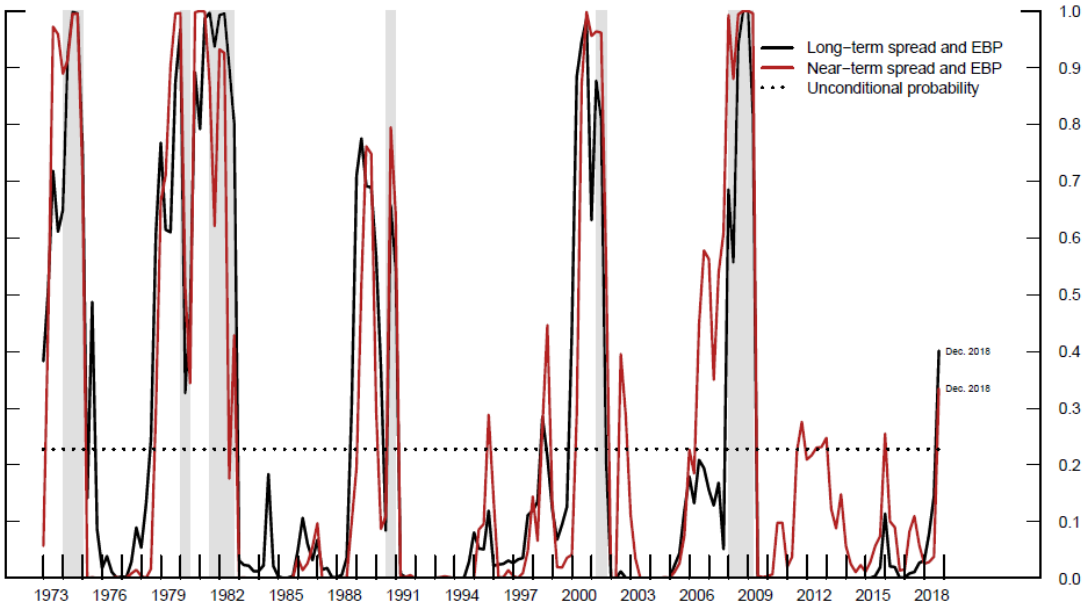
Figure 1: Conditional Probability of Recession Over the Next 4 Quarters



Note: These lines depict the conditional probability of transitioning into or remaining in a recession at some point over the next 4 quarters as estimated by three probit models, using as independent variables the long−term spread, the near−term spread, and EBP. The long−term spread is the difference between the 10−year and 2−year Treasury yield. The near−term spread is the difference between 5−quarter−ahead and 1−quarter−ahead forward Treasury rates. EBP is the excess bond premium of Gilchrist and Zakrajsek (2012). The dotted black line denotes the unconditional probability of being in a recession at some point in the next 4 quarters. The conditional probabilities are estimated using average quarterly values from 1973:Q1 to 2018:Q4. For estimating the models using the term spreads as independent variables, the observations occurring at the effective lower bound are excluded from the sample. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.

Source: Federal Reserve staff estimates.

Figure 2: Conditional Probability of Recession Over the Next 4 Quarters

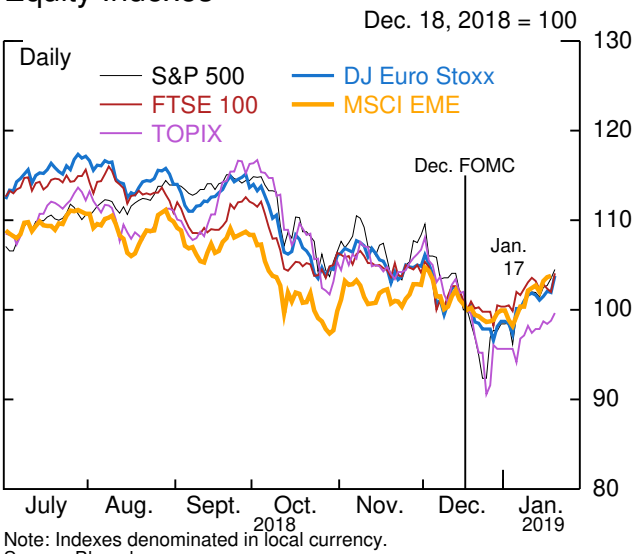


Note: This chart depicts the conditional probability of transitioning into or remaining in a recession at some point over the next 4 quarters as estimated by probit models using two sets of independent variables: the long−term spread and EBP, and the near−term spread and EBP. The long−term spread is the difference between the 10−year and 2−year Treasury yield. The near−term spread is the difference between 5−quarter−ahead and 1−quarter−ahead forward Treasury rates. EBP is the excess bond premium of Gilchrist and Zakrajsek (2012). The dotted black line denotes the unconditional probability of being in a recession at some point in the next 4 quarters. The conditional probability is estimated using average quarterly values from 1973:Q1 to 2018:Q3 and December 2018 data. The shaded bars indicate periods of business recession as defined by the National Bureau of Economic Research.

Source: Federal Reserve staff estimates.

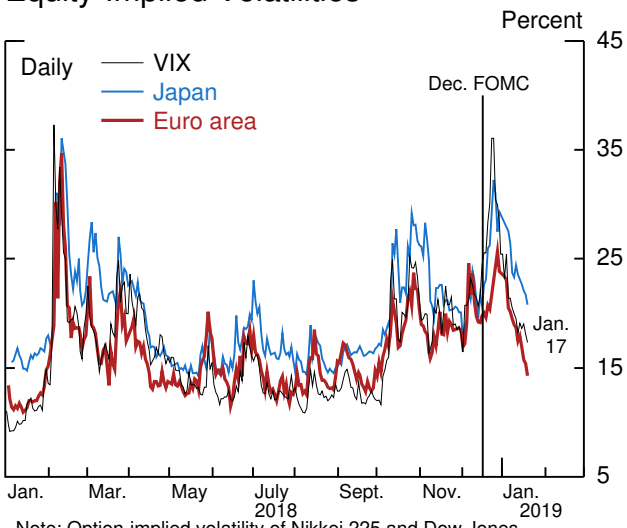
Foreign Developments

Equity Indexes



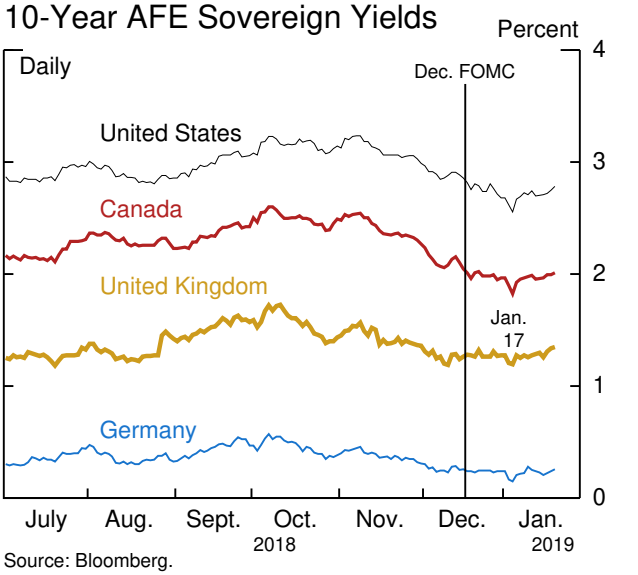
Note: Indexes denominated in local currency.
Source: Bloomberg.

Equity-Implied Volatilities



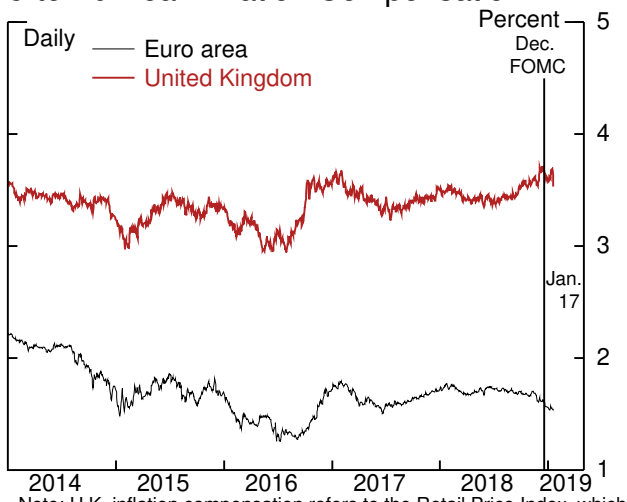
Note: Option-implied volatility of Nikkei 225 and Dow Jones Euro STOXX 50 are shown for Japan and euro area, respectively.
Source: Bloomberg.

10-Year AFE Sovereign Yields



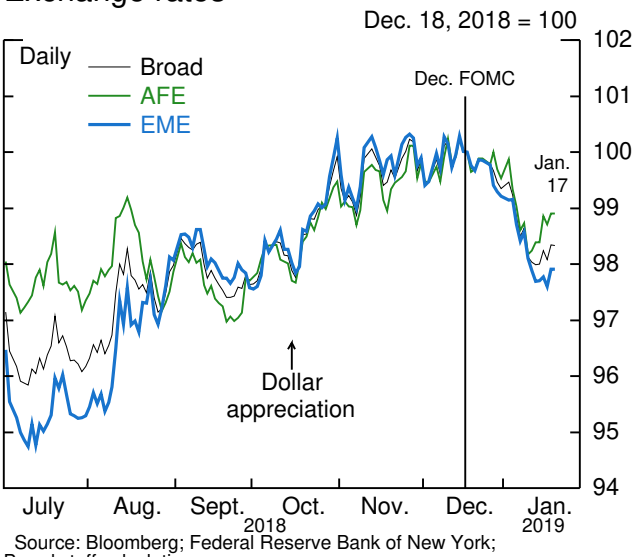
Source: Bloomberg.

5-to-10-Year Inflation Compensation



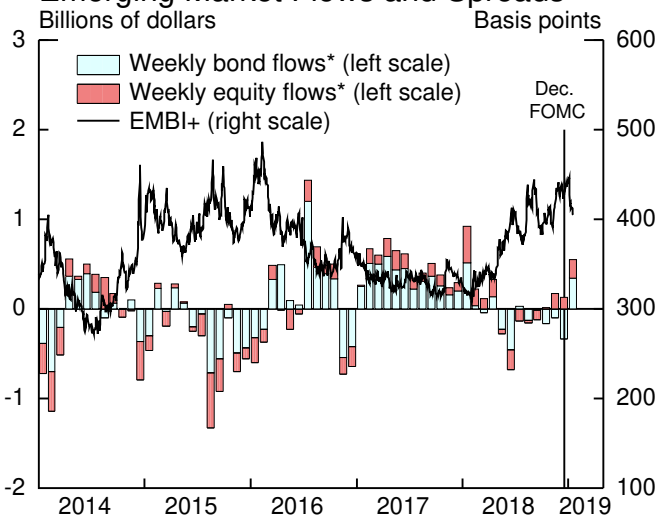
Note: U.K. inflation compensation refers to the Retail Price Index, which partly accounts for the higher level of the series relative to the euro area.
Source: Bloomberg.

Exchange rates



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

Emerging Market Flows and Spreads



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

33 basis points lower, respectively. As discussed in the box "The Decline in Longer-Horizon Inflation Compensation," most of the decline in inflation compensation since the September FOMC meeting likely reflects falls in risk premiums, rather than a decline in expected inflation.

FOREIGN DEVELOPMENTS

Downbeat economic data from China and Europe, volatility in U.S. financial markets, and trade policy concerns weighed on risk sentiment in foreign financial markets early in the period. Subsequently, communications by FOMC participants and increasing optimism about trade relations between the United States and China led to a recovery in risky asset prices and AFE bond yields.

Foreign equity markets broadly followed the movements in the S&P 500 index, although volatility in most foreign markets was relatively muted. On balance, European equity indexes moved up moderately, while Chinese equities declined a bit. Early in the period, below-expectations manufacturing PMI data from China and trade frictions weighed on Chinese equity prices. The resumption of U.S. trade negotiations with China in the second week of January boosted investor sentiment, and most of the decline in Chinese equity prices retraced. Broad-based appreciation of the Japanese yen amid safe-haven flows contributed to the underperformance of Japanese equities, which ended the period 1.2 percent lower.

Flight-to-safety flows pushed down longer-term sovereign yields in AFEs early in the period, but yields partially recovered in subsequent weeks and generally ended the period only slightly lower on net. In the United Kingdom, longer-term yields increased significantly after the government's Brexit deal was rejected by Parliament, as market participants reportedly saw an increased likelihood that Prime Minister May would seek a compromise with those favoring a softer Brexit. Overall, expectations for monetary policy in AFEs over the next few years were little changed. In the euro area, measures of inflation compensation declined moderately.

The staff's trade-weighted broad dollar index moved down 1.6 percent. Narrowing U.S.-AFE interest rate differentials were instrumental in driving dollar weakness. However, the 2.9 percent dollar depreciation against the Japanese yen appeared to be also driven by safe-haven flows. On January 2, in an environment of very low market liquidity during early Asian trading hours, the yen appreciated sharply in a

The Decline in Longer-Horizon Inflation Compensation

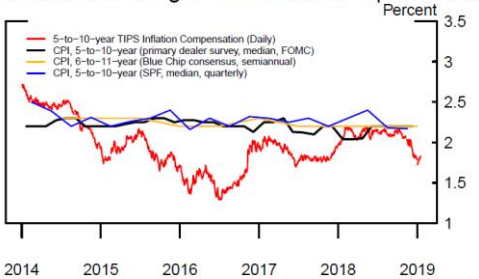
Yields on longer-term nominal Treasury securities have declined appreciably since the September 2018 FOMC, with most of the decline in nominal yields attributable to a decline in inflation compensation as yields on Treasury Inflation-Protected Securities (TIPS) have been relatively little changed over this period. In particular, 5-to-10-year-forward inflation compensation fell from an annual rate of around 2.1 percent in late September to 1.8 percent in mid-January (the red line in figure 1).

Although the decline in inflation compensation could indicate that market participants' inflation expectations have moved lower, it also may reflect reductions in the inflation risk premium and in "other" risk premiums. Other risk premiums tend to fall with the relative illiquidity of TIPS as well as with increased investor demand for nominal relative to inflation-indexed securities—for example, when investors pile into nominal Treasury securities during times of market stress. According to the staff's term structure models, 5-to-10-year inflation expectations have remained little changed since September 2018. Instead, a reduction in the inflation risk premium and in other risk premiums accounts for most of the decline in longer-horizon inflation compensation over this period.

Information about longer-run inflation expectations can be also obtained from survey forecasts. As shown in figure 1, measures of inflation expectations 5 to 10 years ahead based on the Desk's Survey of Primary Dealers, the Blue Chip Financial Forecasts survey, and the Survey of Professional Forecasters were little changed, on net, over the past few months. Similarly, the probability distribution of longer-run inflation from the Desk's surveys has also remained relatively stable (not shown). In particular, survey respondents have not materially changed the odds that they attach to either low or high inflation outcomes.

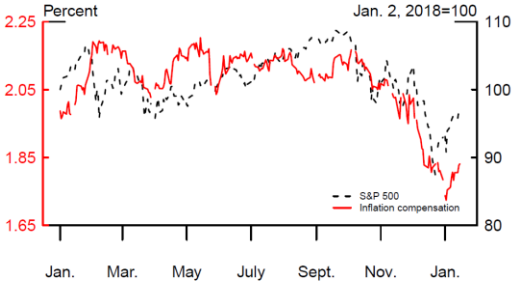
Some additional support for the decline in risk premiums can be found in the strong co-movement of inflation compensation with equity prices since last September, as both declined sharply throughout the last quarter of 2018 (figure 2). The recent episode of deteriorating risk sentiment that pushed equity prices down likely weighed on inflation compensation through two channels. First, increased perceptions of downside risks to the growth outlook coupled with a lack of upward inflationary pressures may have led investors to become more concerned about scenarios in which both growth and inflation are low, leading to a decline in the inflation risk premium. Second, safe-haven flows into

Figure 1: Inflation Compensation and Survey Measures of Longer-Term Inflation Expectations



Note: Blue Chip figures are from Blue Chip Financial Forecasts.
Source: Blue Chip; Federal Reserve Bank of New York.

Figure 2: 5-to-10-Year Inflation Compensation and the S&P 500 Index



Source: Barclays and Bloomberg.

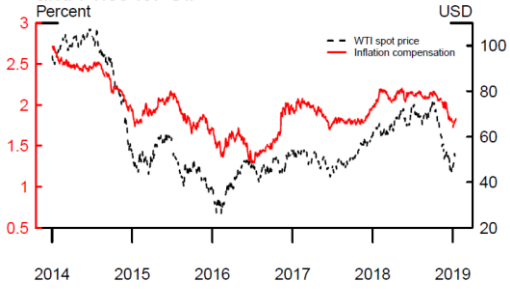
Financial Markets

nominal Treasury securities likely pushed down nominal Treasury yields and inflation compensation through a decline in other risk premiums.[1]

The current episode differs a bit from the declines in inflation compensation in the second half of 2014, when declines in inflation expectations seemed to play somewhat more of a role. In both the current and the 2014 episode, market participants associated the decline in inflation compensation with a plunge in oil prices (figure 3). Although it remains unclear what specific mechanism links long-horizon inflation compensation with oil prices, market participants noted that in both episodes the oil price declines could be partly signaling weaker global demand and weaker risk sentiment, and these factors might also be showing through to lower inflation risk and other risk premiums.[2] However, the most recent episode has not witnessed a global drop in inflation compensation, while disinflationary pressures from abroad likely weighed on domestic inflation expectations in the 2014 episode as the fall in U.S. inflation compensation mirrored the declines in euro-area and U.K. inflation compensation (figure 4). Consistent with these observations, the staff's term structure model attributed about half of the decline in longer-horizon inflation compensation during the second-half of 2014 to lower inflation expectations and inflation risk premium, while during the most recent episode the model estimates suggest that inflation expectations remained little changed.

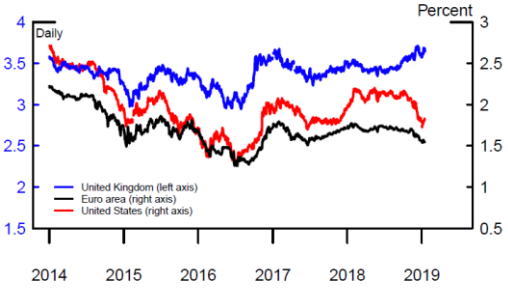
On balance, the staff's term structure model, the evidence from surveys of investors, professional forecasters, and economists, and the shifts in investor risk sentiment over the past months suggest that lower inflation risk premiums and other risk premiums—rather than declines in inflation expectations—account for a bulk of the decline in longer-horizon inflation compensation since last September. However, deducing sources of changes in inflation compensation is sensitive to modeling assumptions, and one cannot rule out that inflation expectations among market participants have edged down some over the past few months.

Figure 3: 5-to-10-Year Inflation Compensation and Price for Oil



Source: Barclays and Bloomberg.

Figure 4: 5-to-10-Year Inflation Compensation



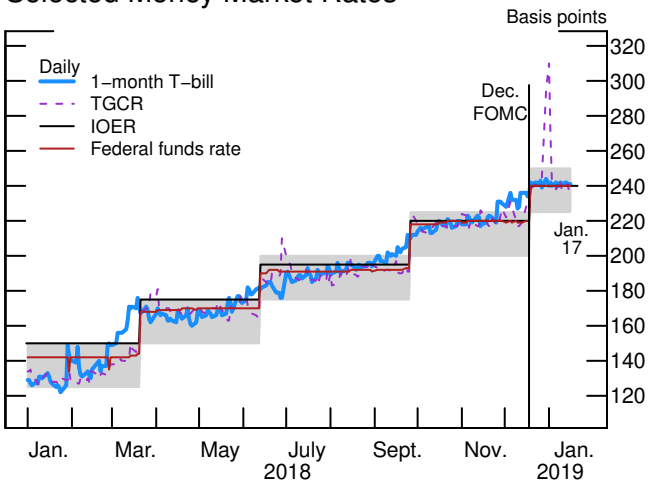
Source: Federal Reserve Bank of New York; Federal Reserve Board staff estimates; Barclays.

[1] For a discussion of the inflation risk premium and other risk premiums, see, for example, Andrew Chen, Eric Engstrom, and Olesya Grishchenko (2016), "Has the Inflation Risk Premium Fallen? Is it Now Negative?" FEDS Notes (Washington: Board of Governors of the Reserve System, April 4), https://www.federalreserve.gov/econresdata/notes/feds-notes/2016/has-the-inflation-risk-premium-fallen-is-it-now-negative-20160404.html; and Stefania D'Amico, Don Kim, and Min Wei (2018), "Tips from TIPS: The Informational Content of Treasury Inflation-Protected Security Prices," *Journal of Financial and Quantitative Analysis*, vol. 53 (February), pp. 395–436.

[2] In both the 2014 and the current episode, market participants attributed a substantial part of oil price declines to supply factors.

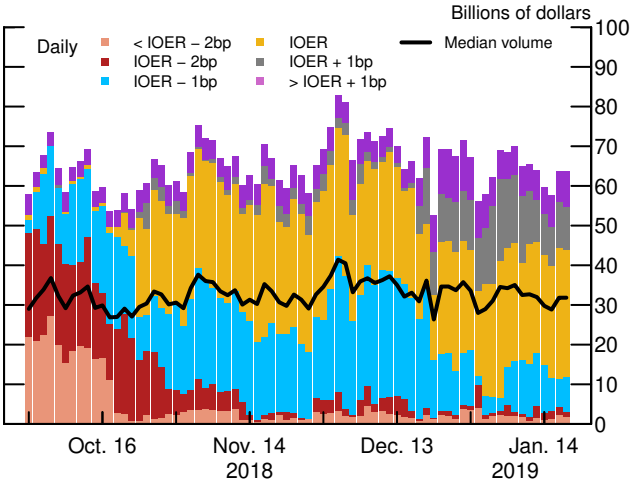
Short–Term Funding Markets

Selected Money Market Rates



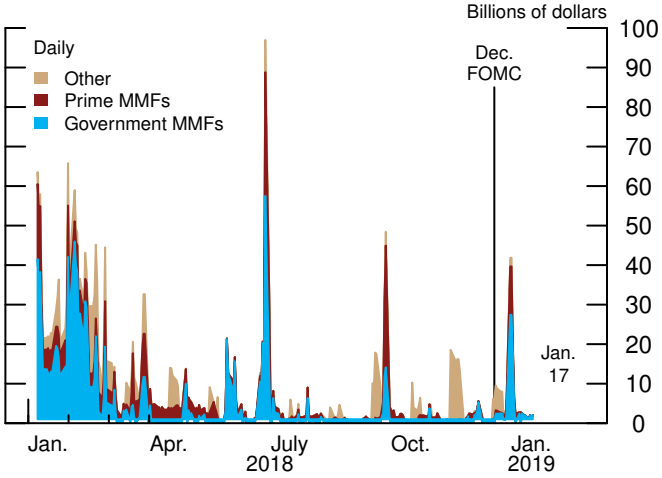
Note: Federal funds rate is a weighted median. Shaded area is the target range for the federal funds rate. IOER is interest on excess reserves. TGCR is triparty general collateral rate.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

Distribution of Fed Funds Rate across Trades



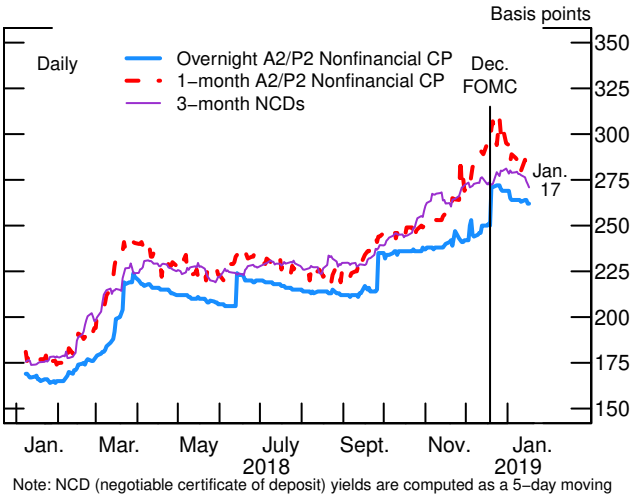
Note: IOER is interest on excess reserves.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

ON RRP Take–Up by Type



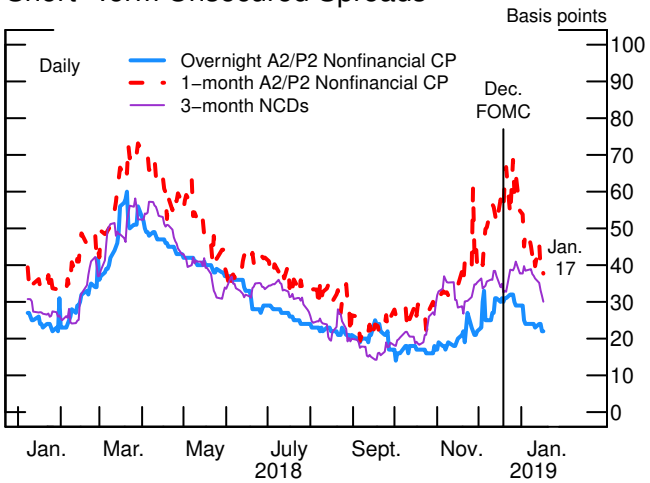
Note: ON RRP is overnight reverse repurchase agreement; MMFs are money market funds.
Source: Federal Reserve Bank of New York.

Short–Term Unsecured Rates



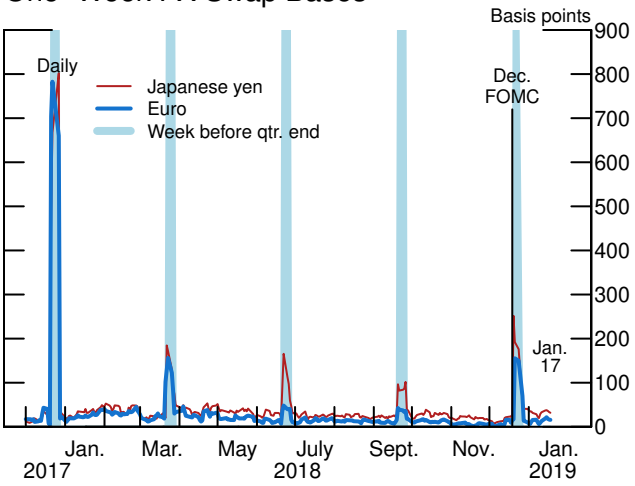
Note: NCD (negotiable certificate of deposit) yields are computed as a 5–day moving average. CP is commercial paper.
Source: Depository Trust & Clearing Corporation.

Short–Term Unsecured Spreads



Note: Overnight spreads are to the effective federal funds rate while 1–month and 3–month spreads are to overnight index swap rates. NCD (negotiable certificate of deposit) spreads are computed as a 5–day moving average. CP is commerical paper.
Source: Depository Trust & Clearing Corporation.

One–Week FX Swap Bases



Source: Bloomberg; Board staff calculations.

Financial Markets

flash event, but much of the move quickly retraced. The dollar also depreciated significantly over the intermeeting period against some major EME currencies, including the Brazilian *real* and Mexican peso, following progress on pension reform in Brazil and a prudent fiscal announcement in Mexico, respectively. Optimism regarding trade negotiations between the United States and China reportedly contributed to a significant dollar depreciation against the Chinese renminbi.

Financial conditions in EMEs improved over the period. Inflows to dedicated emerging market funds resumed after two quarters of outflows. And although EME sovereign spreads increased moderately early in the period, they subsequently retraced and ended up slightly lower on net.

SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Following the December FOMC meeting, the effective federal funds rate rose in line with the 20 basis point increase in the interest rate on excess reserves and printed consistently at 2.40 percent, 10 basis points below the top of the target range. Other overnight funding rates also increased following the increase in the target range for the federal funds rate. ON RRP take-up continued to average about $5 billion per day, excluding year-end.

Year-end pressures in repo markets were reportedly exacerbated by a high volume of settlements of Treasury securities against a backdrop of large dealer inventories and reduced intermediation by global systemically important banks. General collateral rates across different platforms saw very large daily increases but have since returned to normal levels relative to other money market rates. Year-end pressures in other domestic funding markets were limited. In overseas dollar funding markets, increases in one-week FX swap bases and draws at central bank dollar swap facilities were smaller than those recorded at the end of 2017. Spreads on commercial paper and negotiable certificates of deposit with tenors exceeding 30 days remained elevated relative to their levels over recent years, reportedly due in part to recent heavy net Treasury issuance.

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Financing Conditions for Businesses and Households

Information received over the intermeeting period indicates that financing conditions for businesses and households have tightened a bit further but remain generally supportive of spending.

- Gross issuance of corporate bonds slowed considerably in December across the credit rating spectrum, while spreads on nonfinancial corporate bonds were volatile but little changed on net. Issuance of institutional leveraged loans also declined as spreads widened.
- In the January 2019 SLOOS, banks reported that, on net, commercial and industrial (C&I) lending standards eased somewhat in the fourth quarter; however, SLOOS respondents expect C&I lending standards to tighten somewhat and loan demand to weaken over 2019.
- Mortgage rates edged down, and mortgage credit supply conditions for households remained generally supportive of borrowing.
- Consumer interest rates rose further, and banks continued to tighten credit card lending standards, though consumer credit continued to grow moderately.
- The federal government shutdown appears to have had limited effects to date on the ability of most households and businesses to borrow.
- Recent changes in financing conditions indexes support the overall assessment that financing conditions for businesses and households are still generally supportive of economic activity.

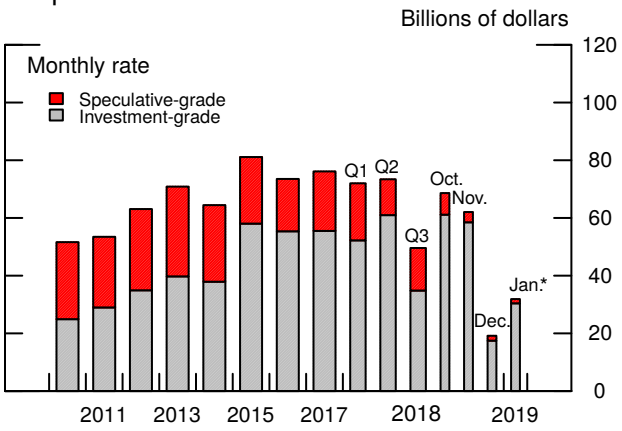
BUSINESS FINANCING CONDITIONS

Nonfinancial Corporations

Financing conditions for nonfinancial firms tightened somewhat, on balance, over the intermeeting period and, according to some capital market indicators, are slightly less supportive of spending. Gross issuance of corporate bonds slowed considerably in December across the credit rating spectrum. The slowing in investment-grade corporate bond issuance was particularly notable, although more recent data suggest some recovery

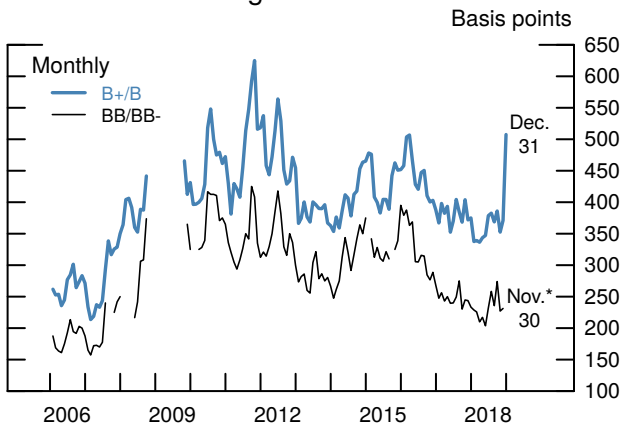
Business Finance

Gross Issuance of Nonfinancial Corporate Bonds



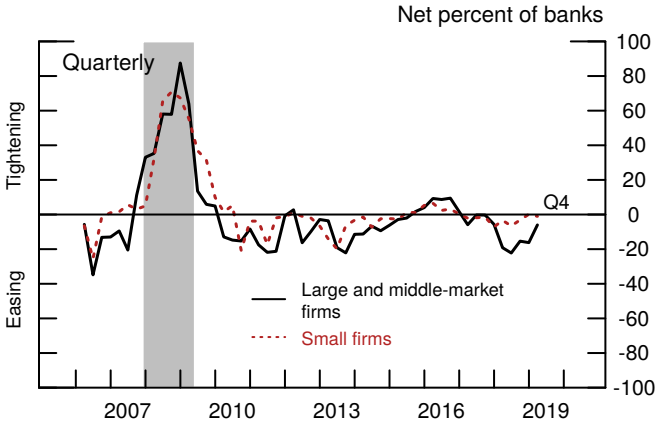
Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
*January data reflect preliminary data on issuance through January 16.
Source: Mergent Fixed Income Securities Database.

Average Spreads of New-Issue Institutional Leveraged Loans



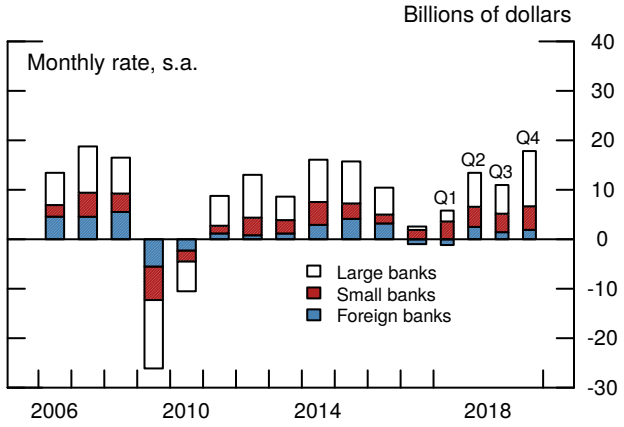
Note: Breaks in the series represent periods with no issuance. Spreads are calculated against 3-month LIBOR. The spreads do not include up-front fees.
* The BB/BB- series ends in November because of a lack of loan issuance in December.
Source: S&P LCD.

Standards for C&I Loans



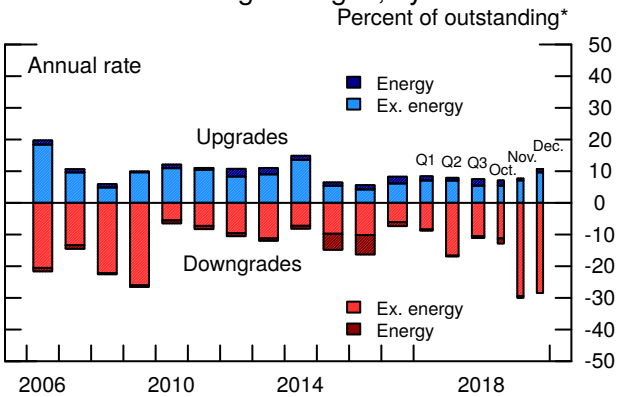
Note: C&I is commercial and industrial. Banks' responses are weighted by the outstanding amount of C&I loans on their balance sheets at the end of the previous quarter. The shaded bar indicates a period of business recession as defined by the National Bureau of Economic Research.
Source: Federal Reserve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

Commercial and Industrial Loans



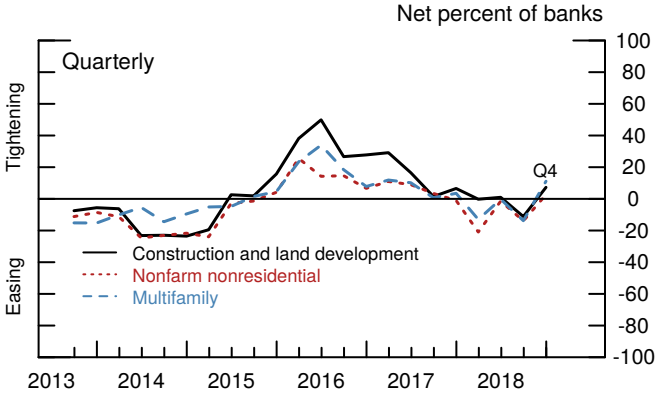
Note: Large banks are defined as the largest 25 banks by assets.
Source: Board Staff calculations, Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

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.

Standards for CRE Loans



Note: CRE is commercial real estate. Banks' responses are weighted by the outstanding amount of CRE loans 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).

Financing Conditions

in January. Gross issuance of speculative-grade bonds has been slowing for several months. Spreads on nonfinancial corporate bonds were volatile but little changed, on net. Institutional leveraged loan issuance slowed in December to its lowest level since July 2016, as loan spreads widened substantially.

In the January 2019 SLOOS, a modest net share of banks reported having eased lending standards and some terms for C&I loans in the fourth quarter, though many fewer banks reporting having eased standards and terms than had done so in earlier surveys in 2018. Growth of C&I loans on banks' balance sheets picked up in the fourth quarter, reflecting stronger originations as well as reduced paydowns and loan sales. In a set of special questions inquiring about banks' outlooks for 2019, SLOOS respondents forecast that lending standards would tighten for large and middle-market firms and that demand for C&I loans would weaken, reflecting in part banks' outlook for a general worsening in loan credit quality.

The credit quality of nonfinancial corporations continued to show signs of deterioration, as the volume of nonfinancial corporate bond downgrades significantly outpaced that of upgrades in December. Still, actual corporate bond defaults remained low overall, and the six-month trailing bond default rate was about unchanged in December. Over the intermeeting period, private-sector analysts significantly revised down their projections for corporate earnings overall for the fourth quarter and for 2019 as a whole, with the largest revisions for 2019 in the energy and technology sectors.

The pace of gross equity issuance through both initial and seasoned offerings was sluggish in December. Reports suggest that several firms have had to push back initial equity offering plans because of the partial closure of the Securities and Exchange Commission (SEC) during the federal government shutdown.[1] Still, market participants continue to expect 2019 to be a solid year for initial offerings, with several high-profile offerings in train.

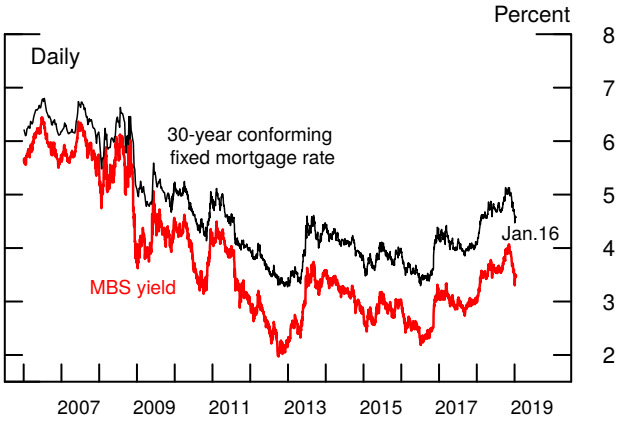
Small Business

Overall, small business credit market conditions were little changed since the December FOMC meeting and remain accommodative. Lending volumes to small

[1] The SEC has stopped reviewing and providing feedback on registration statements for initial public offerings (IPOs), making it unlikely a firm will complete an IPO until the government shutdown ends.

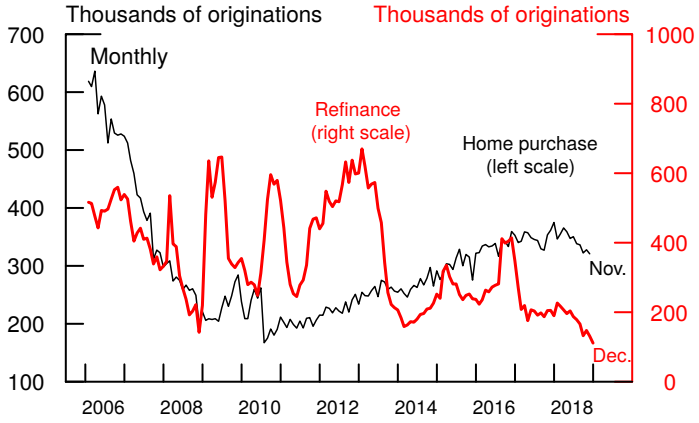
Household Finance

Mortgage Rate and MBS Yield



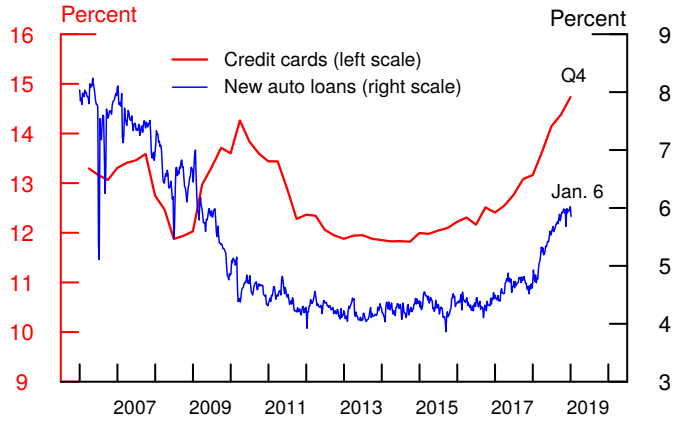
Note: The mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate.
Source: For mortgage rate through 2010, Freddie Mac; after 2010, Loansifter; for MBS yield, Barclays.

Purchase and Refinance Activity



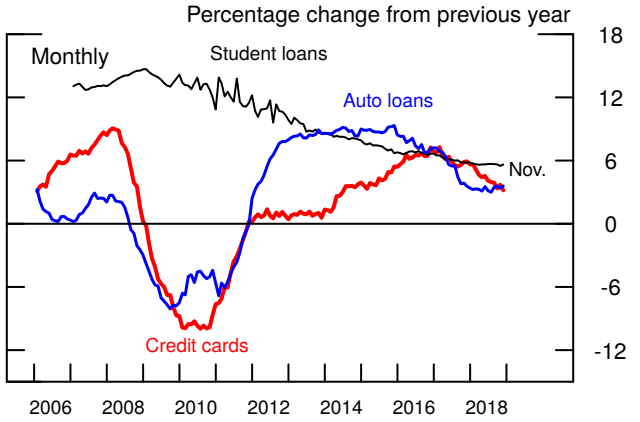
Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values through 2017, data reported under the Home Mortgage Disclosure Act of 1975; for values in 2018, staff estimates.

Consumer Interest Rates



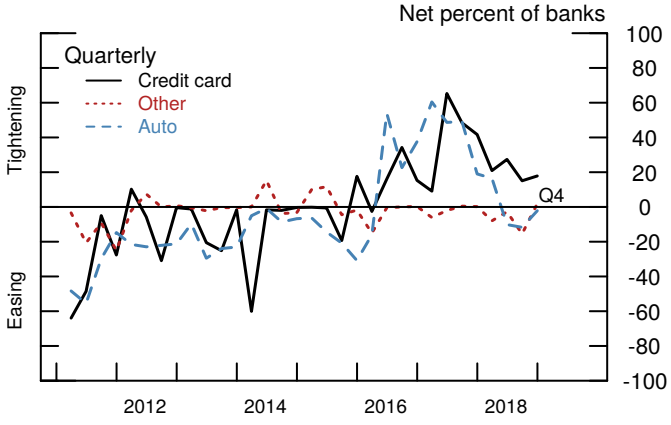
Note: Credit card data reflect rates at commercial banks on all credit card plans; data are reported quarterly and not seasonally adjusted. Auto loans data are reported weekly and seasonally adjusted.
Source: For credit cards, Federal Reserve Board; for auto loans, J.D. Power.

Consumer Credit



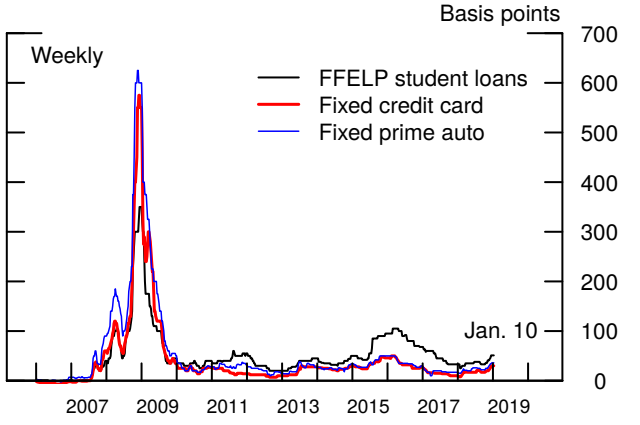
Source: Federal Reserve Board.

Standards for Consumer Loans



Note: Banks' responses are weighted by the oustanding 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).

Selected ABS Spreads (3-Year Triple-A)



Note: Spreads are to swap rate for credit card and auto asset-backed securities (ABS) and to 3-month LIBOR for student loans. Student loans are from the Federal Family Education Loan Program.
Source: J.P. Morgan.

Financing Conditions

businesses rebounded a bit in recent months, and indicators of recent loan performance remained strong. Demand for credit by small businesses was about unchanged, although there are some signs of softening going forward. For example, in the National Federation of Independent Business survey, the share of respondents with planned capital expenditures in the next six months and the share reporting that the next three months is a good time to expand each fell 5 percentage points in December. While anecdotal concerns have been raised about the halting of Small Business Administration loan applications during the federal government shutdown, these loans represent a very small portion of total small business financing.

Commercial Real Estate

Financing conditions for commercial real estate (CRE) remained generally supportive of transactions, refinancing, and construction activity. Although CMBS spreads have been volatile, they were little changed, on net, over the intermeeting period, and issuance of both agency and non-agency CMBS has remained strong in recent weeks. CRE loans on banks' books expanded at a pace comparable to the rest of the year. According to the January SLOOS, lending standards and demand were about unchanged in the fourth quarter for nonfarm nonresidential loans, the largest CRE loan category. Banks, however, reported weaker demand and somewhat tighter standards for multifamily loans and construction loans. For 2019, banks reported expecting demand to weaken and standards to tighten for all types of CRE loans.

MUNICIPAL GOVERNMENT FINANCING CONDITIONS

Credit conditions in municipal bond markets were little changed. Gross issuance of municipal bonds slowed in December but remained at a solid level, and yields on 20-year municipal bonds moved about in line with yields on Treasury securities. In December, the credit quality of state and local governments improved a bit as the number of rating upgrades slightly exceeded that of downgrades.

HOUSEHOLD FINANCING CONDITIONS

Residential Real Estate

Financing conditions in the residential mortgage market remained supportive of homebuying for most borrowers. Rates on 30-year conforming mortgages decreased 15 basis points since the December FOMC meeting, in line with yields on agency securities. Mortgage rates are now a little over 4½ percent after having been above 5 percent in

October and November. Lagged data on home-purchase originations continued to slide through November, and refinancing originations remained muted through December.

Conforming loan limits for loans eligible to be purchased by the GSEs increased in January, although this change may lead to only a small expansion of credit, as jumbo loans were already widely available and jumbo-conforming mortgage interest rate spreads were already low. It appears that the federal government shutdown has had only small effects to date on aggregate mortgage activity, as the GSEs, Department of Veterans Affairs, the IRS's income verification program, and most FHA mortgage programs remain in operation.[2] However, the effects on the ability of some households to borrow may increase as the shutdown continues.

Consumer Credit

Financing conditions in consumer credit markets tightened a bit through late last year against a backdrop of rising interest rates but, on balance, were generally supportive of growth in household spending. Banks reported in the SLOOS that they tightened credit card lending standards during the fourth quarter and anticipate further tightening over 2019. In the consumer asset-backed securities market, spreads widened somewhat amid broad market volatility. Nevertheless, consumer credit continued to grow moderately through November 2018, and delinquencies on such credit remained at low levels. In addition, the mail volume of credit card offers, a measure of credit availability, increased appreciably in the fourth quarter.

FINANCING CONDITIONS INDEXES

A staff index that provides a measure of financing conditions for nonfinancial corporations indicates that financing conditions are still accommodative relative to historical standards but have tightened, on net, since early September, consistent with the widening in corporate spreads and the decline in equity prices over this period. The staff's SLOOS Bank Lending Standards Index, which measures the net share of banks reporting tighter lending standards averaged across all core loan categories to businesses and households, indicated that a slightly greater share of banks eased lending standards

[2] FHA Title 1 (home improvement), HECM (equity extraction), and multifamily loans will not be endorsed during the shutdown. The FHA will continue to endorse forward mortgages (home-purchase and refinance loans). Mortgages guaranteed or made directly by the USDA Rural Housing Service are also unavailable to borrowers.

than tightened lending standards over the fourth quarter compared with the historical average. However, a smaller share of banks reported easing standards than did so earlier in 2018. As shown in the appendix to this Tealbook section, other publicly available financial conditions indexes (FCIs), which aggregate a large set of financial variables into a summary series, have tightened, on net, since September, though they remain slightly accommodative or close to a neutral level relative to historical standards.

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Appendix

Technical Note on Financial Conditions Indexes

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

Overview of Selected FCIs

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

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

The first index in the table, the staff FCI for nonfinancial corporations, measures financing conditions for nonfinancial corporations.[1] This index is constructed as the difference in equity returns between two portfolios of firms with credit ratings above and just below investment grade. To the extent that speculative-grade firms are more sensitive to changes in financing conditions than investment-grade firms but have similar exposure to other shocks, movements in this index provide a clean 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 SLOOS. Banks' responses for a given loan category are weighted by banks' holdings of those loans on their balance sheets.[2]

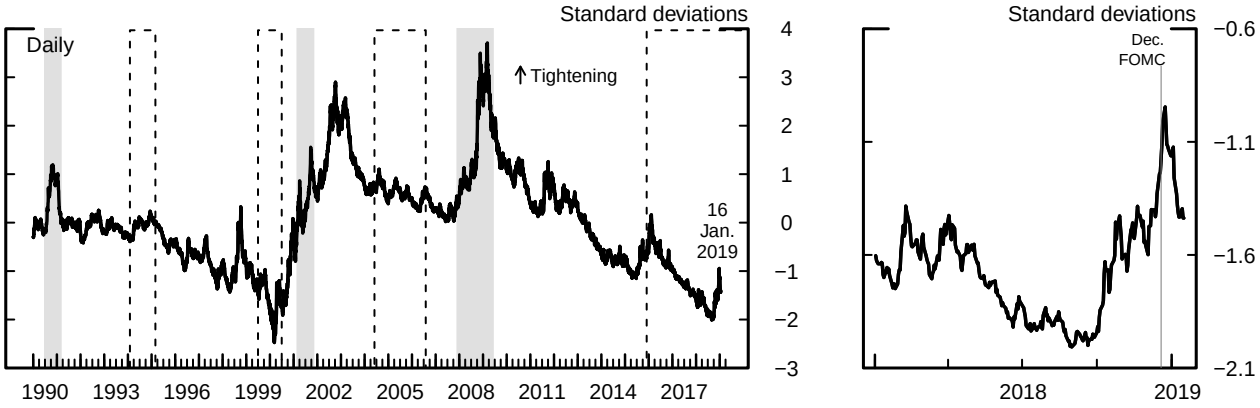
The other FCIs are constructed by aggregating a large set of financial variables into a summary series using various statistical methods. While these indexes provide a useful summary of broad financial market developments, the movements in these indexes may reflect both changes in financing conditions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

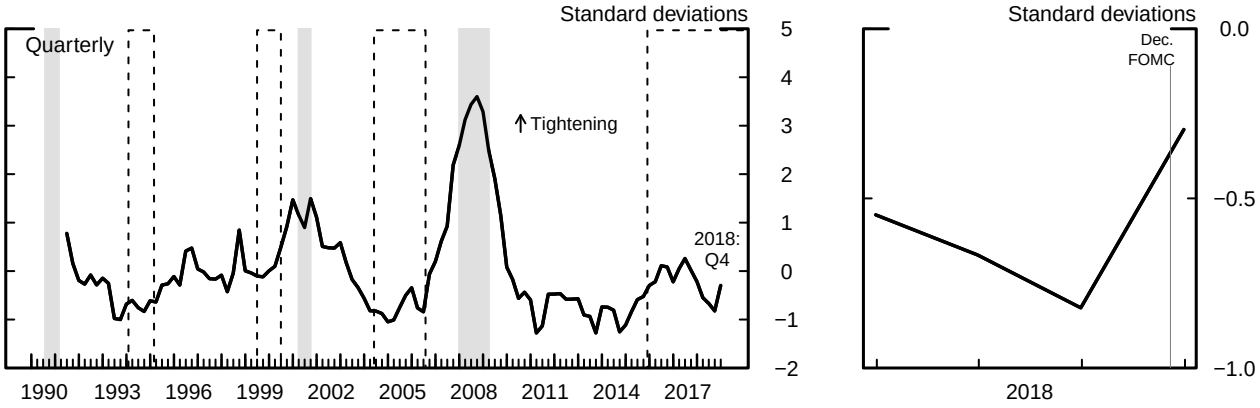
Selected Financial Conditions Indexes

Staff FCI for Nonfinancial Corporations



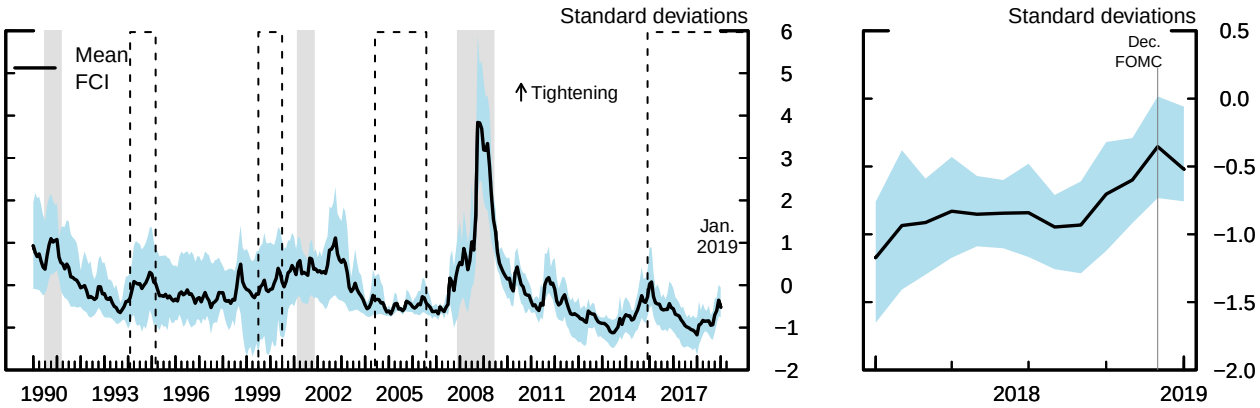
Note: The index is the deviation from the long−run relation between the systematic components of the cumulative log returns of 2 portfolios of firms with credit ratings above and just below investment grade. The systematic components are derived from the 5−factor Fama−French asset pricing model, augmented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

SLOOS Bank Lending Standards Index



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

Mean and Range of External FCIs

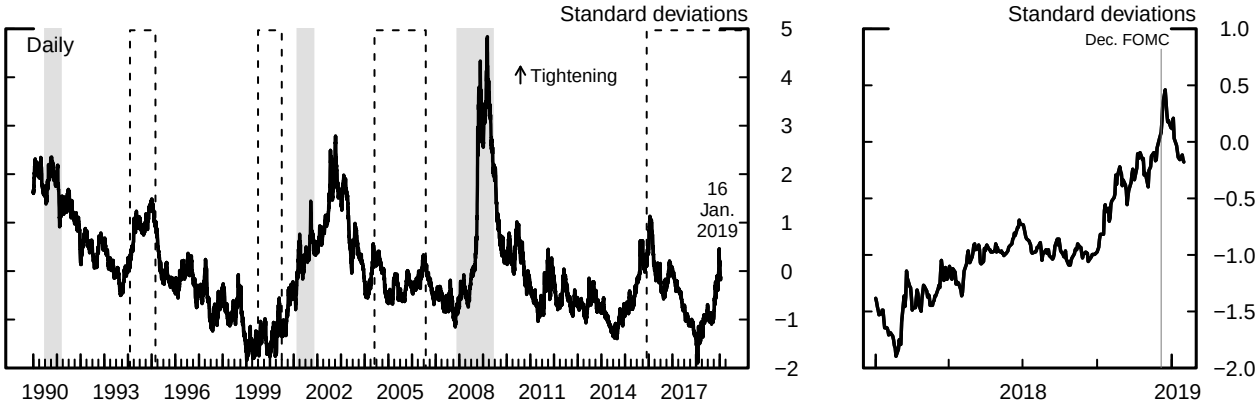


Note: Mean FCI represents the mean of FCIs developed by Goldman Sachs and the Federal Reserve Banks of Chicago, St. Louis, and Kansas City. The blue shaded region represents the range of these 4 standardized FCIs.
Source: Bloomberg; Federal Reserve Banks of Chicago, St. Louis, and Kansas City.

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

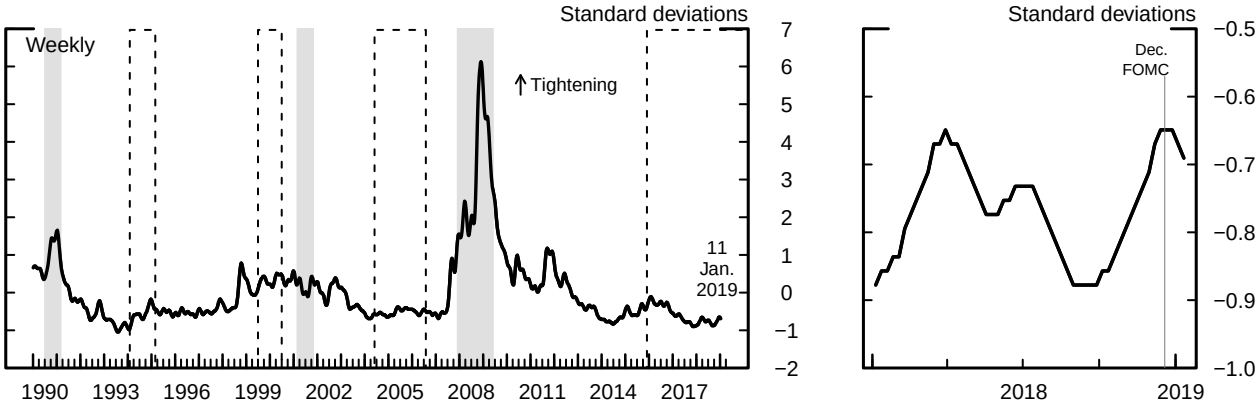
Selected Financial Conditions Indexes

Goldman Sachs FCI



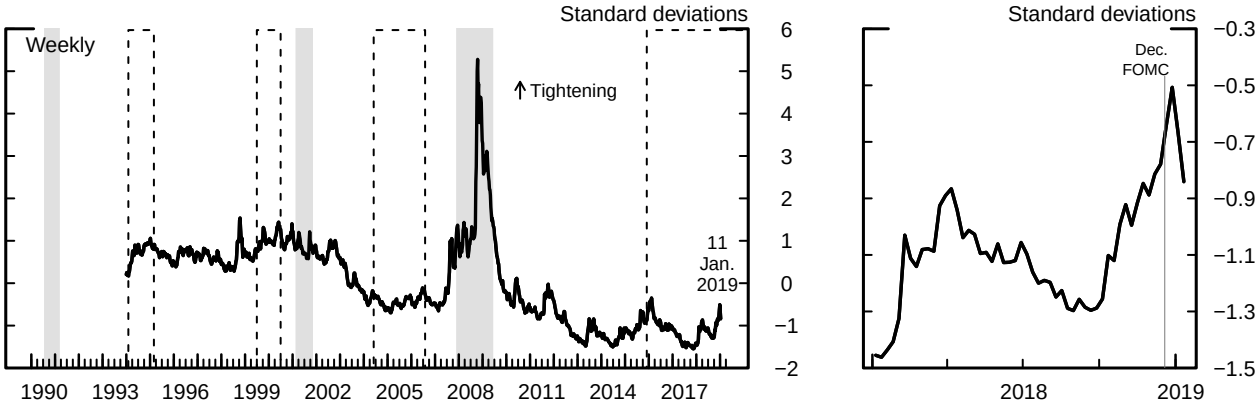
Note: The index is a weighted average of 5 financial variables: the federal funds rate, the 10−year Treasury yield, the triple−B yield spreads to Treasury, the S&P price−to−earnings ratio, the broad value of the U.S. dollar. Weights are pinned down by the contribution of each financial variable on real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

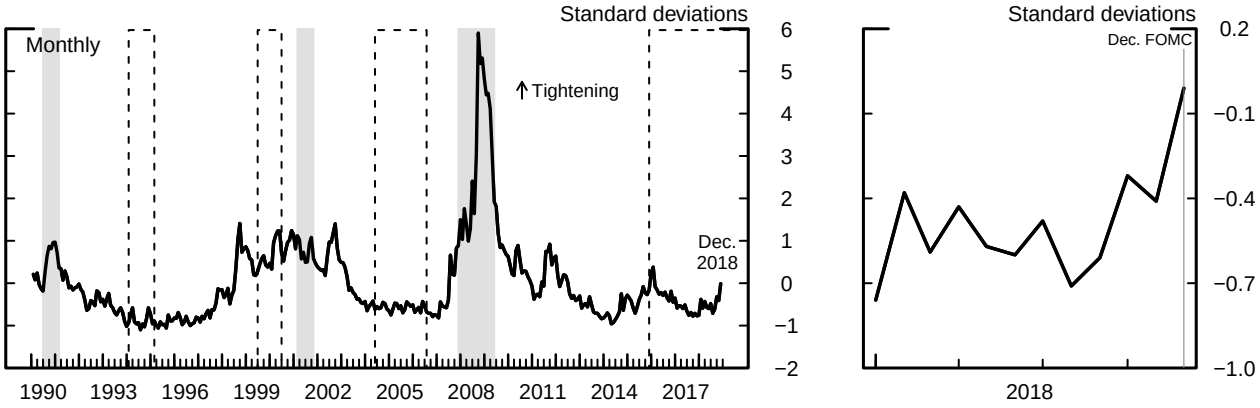


Note: The index is the principal component of 18 variables including short− and long−term Treasury yields, corporate yields, money market and corporate bond spreads, bond and stock market volatility indicators, breakeven inflation rate, and the S&P 500 index.
Source: Federal Reserve Bank of St. Louis.

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

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

We continue to view the uncertainty around the staff forecast of economic activity over the next year or so as being broadly in line with the average over the past 20 years, the benchmark used by the FOMC and a period that includes substantial volatility in real activity. However, we do think that uncertainty has increased in recent months, reflecting the developments that have led to heightened financial market turbulence. That said, we still judge the upside and downside risks around the projections for real GDP growth and the unemployment rate over the next year or so as being balanced. On the upside, the recent data on economic activity have been more positive than we had expected. In addition, underlying fundamentals for household spending and business investment remain strong—bolstered in part by the tax cuts enacted a year ago—and readings on household and business sentiment generally remain favorable. In these circumstances, consumption and investment could expand faster than in the staff projection. On the downside, the materialization of risks associated with developments abroad, particularly in China and Europe, could generate adverse spillovers to the U.S. economy. Trade policies also could move in directions that have significant negative effects on U.S. economic growth. These overall assessments are consistent with the four-quarter-ahead estimates of forecast risks around GDP growth and the unemployment rate, conditional on current macroeconomic and financial indicators, presented in the exhibit "Time-Varying Macroeconomic Risk."

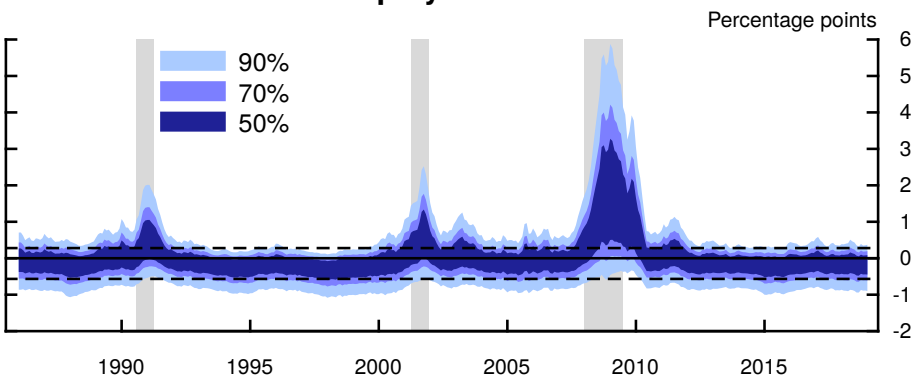
We remain concerned about recession risks during the period beyond the next year or so, and the ongoing financial market volatility has added to those concerns. In our baseline outlook, the economy is projected to move further beyond its potential through this year. If that forecast is correct, then we anticipate that a significant slowing in the pace of economic growth along with a gradual increase in the unemployment rate will be necessary to return the economy to a sustainable position in the longer run. During that period of subpar growth, the economy could be more susceptible to being pushed into a recession by negative shocks.[1] Neither we nor

[1] For example, the probability of a recession, based on stochastic simulations in the FRB/US model around the baseline projection, rises from 8 percent in 2019 to 23 percent in 2021.

Risks & Uncertainty

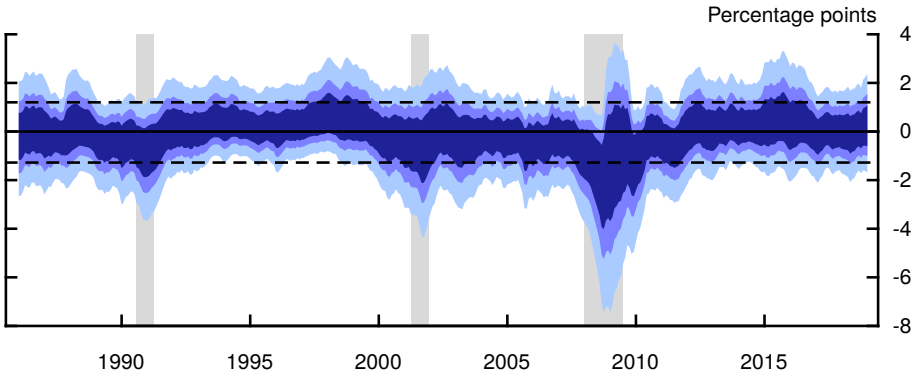
Time-Varying Macroeconomic Risk

Unemployment Rate



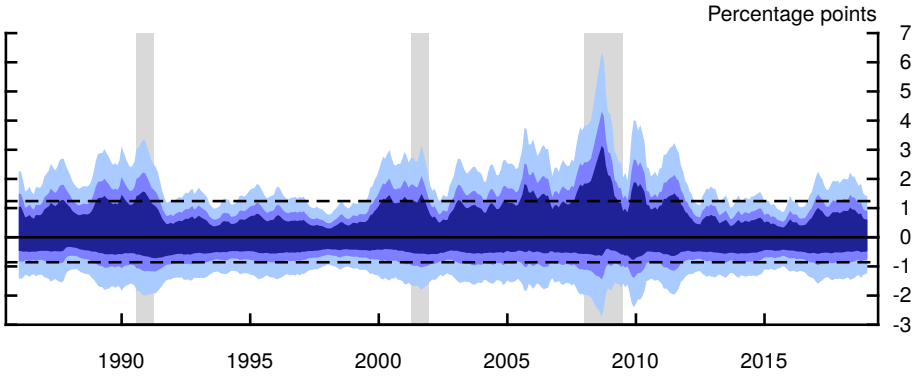
January 2019	
95th	0.4
85th	0.2
50th	-0.2
15th	-0.6
5th	-0.9

GDP Growth



January 2019	
95th	2.4
85th	1.5
50th	0.2
15th	-1.0
5th	-1.7

CPI Inflation

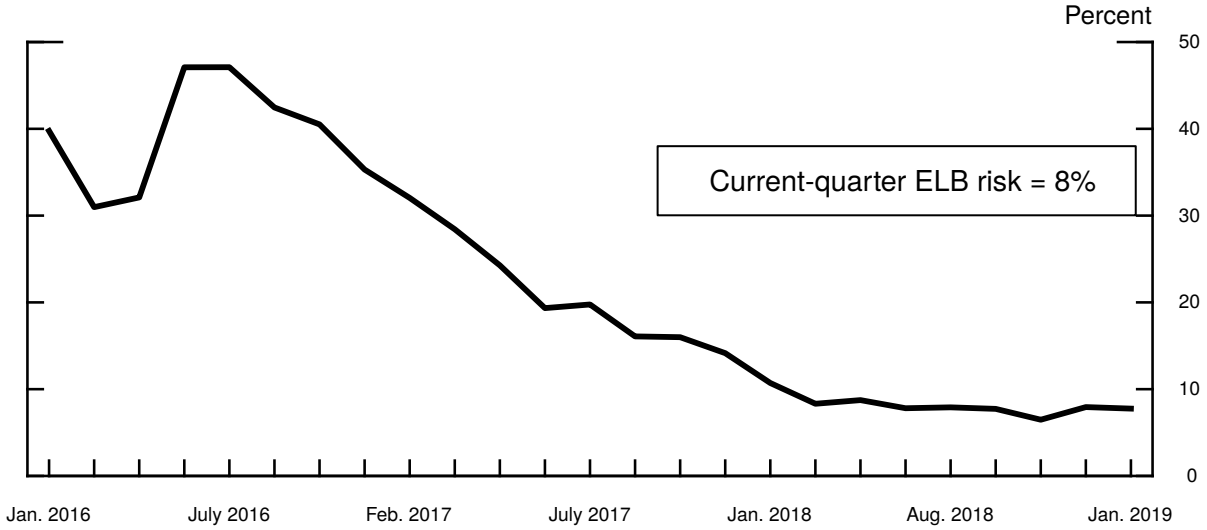


January 2019	
95th	1.4
85th	0.9
50th	0.1
15th	-0.8
5th	-1.2

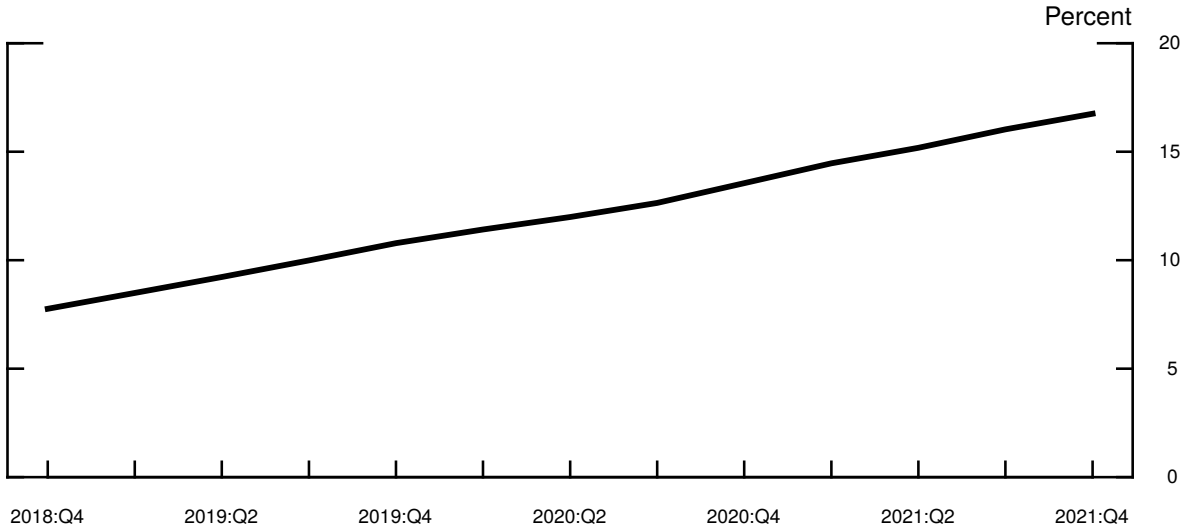
Note: The exhibit shows estimates of quantiles of the distribution of errors for four-quarter-ahead staff forecasts. The estimates are conditioned on indicators of real activity, inflation, financial market strain, and the volatility of high-frequency macroeconomic indicators. The tables show selected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

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.

anyone else has clear insight as to the precise timing of when a recession could occur, but the period of adjustment back to sustainability will be a time of heightened downside risk.[2]

With regard to inflation, the staff still sees average uncertainty and balanced risks around the projection over the next year or so. These assessments are consistent with the statistical estimates of the time-varying risks for the inflation forecast over the next year. To the downside, longer-run inflation expectations relevant for wage and price setting could currently be lower than assumed in the baseline or may not edge up in the coming years. Also, the foreign exchange value of the dollar could appreciate more than expected and put downward pressure on inflation. To the upside, with economic activity projected to move further above its potential, inflation could increase more than in the staff forecast, 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. Of course, if the risks to the forecast for economic activity beyond a year or so are tilted to the downside, then the risks to the inflation projection would also tend to have a small downward skew at that time. All of these inflation risks would be of relatively modest size as long as inflation expectations remain 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, and more persistently, from 2 percent.

Our view of the risks to the economic outlook is informed by both the staff's quantitative surveillance (QS) assessment in October, which judged the overall financial vulnerabilities in the United States to be moderate, and by recent financial developments. Net movements in financial market prices over the past few months have decreased valuation pressures in equity, corporate bond, and leveraged loan markets, apparently reflecting a marked reduction in investors' risk appetites. The reduction in appetite for corporate debt was accompanied by a marked slowing in the issuance of high-yield bonds and leveraged loans, although risky corporations do not seem to

[2] This assessment is consistent with recent research, using quantile regressions, on the distribution of fluctuations in the unemployment rate and in real GDP growth. For a discussion of 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 a discussion of 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. Their results 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 credit growth is high and the unemployment rate is low.

face an urgent need to refinance their debt. Moreover, key financial institutions do not appear to be experiencing undue stress from the recent volatility in financial markets. Vulnerabilities stemming from leverage and maturity transformation in the U.S. financial system appear low. Banks appear to be well capitalized and are holding substantial amounts of high-quality liquid assets, while liquidity risk associated with money market funds remains much reduced owing to the SEC reforms implemented a couple of years ago. Vulnerabilities associated with private nonfinancial-sector leverage remain moderate. Measures such as debt-to-asset ratios among the riskiest businesses are still elevated, but concerns about leverage in the business sector are balanced somewhat by the apparent resilience of the household sector, where borrowing has grown moderately and only among prime-rated borrowers. Existing vulnerabilities, particularly in the nonfinancial corporate sector, could amplify both domestic and foreign shocks, including from developments associated with international trade policies, emerging market economies (EMEs), or Brexit.

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 illustrates a recession caused by a substantial further correction in financial market valuations and a considerable loss in confidence by businesses and households. The second scenario describes how the effects of such a recession could be amplified if the downturn intensifies leverage constraints on financial institutions, thus significantly curtailing the supply of credit. In contrast to the first two scenarios, the third scenario illustrates the upside risk that the strong momentum in economic activity seen last year continues, such that growth this year is faster than in the baseline. The fourth scenario examines the possibility that there is greater supply-side capacity in the economy—in particular, faster structural productivity growth and a higher trend in labor force participation than assumed in the baseline. Alternatively, the fifth scenario simulates the consequences of supply constraints binding more substantially than in the baseline when labor markets are very tight for an extended period, causing higher inflation than in the baseline. In the sixth scenario, we consider the possibility that an economic slowdown in China triggers financial turbulence in the EMEs, with modest spillovers to the advanced economies. Finally, the seventh scenario envisions that an economic slowdown in China could have more severe repercussions on global financial markets.

Alternative Scenarios

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

Measure and scenario	2018 H2	2019	2020	2021	2022	2023-24
Real GDP						
Tealbook baseline and extension	3.1	2.2	1.9	1.4	1.1	1.3
Recession with resilient institutions	3.1	.7	1.1	1.6	1.2	1.3
Recession with vulnerable institutions	3.1	-.8	1.6	1.8	1.1	1.2
Stronger aggregate demand	3.1	3.0	2.1	1.4	1.1	1.1
Stronger aggregate supply	3.1	2.3	2.3	1.7	1.3	1.3
Supply constraints	3.1	2.2	1.8	1.3	1.1	1.2
China slowdown	3.1	1.8	1.5	1.5	1.4	1.4
China slowdown with global financial spillovers	3.1	1.3	.3	1.0	1.4	1.7
Unemployment rate[1]						
Tealbook baseline and extension	3.8	3.5	3.5	3.6	3.9	4.3
Recession with resilient institutions	3.8	4.2	5.5	4.5	4.2	4.4
Recession with vulnerable institutions	3.8	4.9	6.5	5.0	4.7	4.9
Stronger aggregate demand	3.8	3.1	3.0	3.2	3.5	4.0
Stronger aggregate supply	3.8	3.5	3.4	3.5	3.8	4.2
Supply constraints	3.8	3.6	3.7	3.8	4.0	4.4
China slowdown	3.8	3.6	3.8	4.0	4.2	4.5
China slowdown with global financial spillovers	3.8	3.8	4.4	4.8	5.0	5.0
Total PCE prices						
Tealbook baseline and extension	1.5	1.8	1.9	2.0	2.0	2.1
Recession with resilient institutions	1.5	1.7	1.8	2.0	2.0	2.1
Recession with vulnerable institutions	1.5	1.6	1.8	1.9	1.8	1.9
Stronger aggregate demand	1.5	1.9	2.0	2.1	2.1	2.1
Stronger aggregate supply	1.5	1.6	1.5	1.7	1.8	1.9
Supply constraints	1.5	2.3	2.4	2.4	2.2	2.1
China slowdown	1.5	1.3	1.5	1.9	2.0	2.0
China slowdown with global financial spillovers	1.5	1.0	1.0	1.6	1.9	2.1
Core PCE prices						
Tealbook baseline and extension	1.5	2.0	2.0	2.0	2.0	2.1
Recession with resilient institutions	1.5	2.0	1.9	2.0	2.0	2.1
Recession with vulnerable institutions	1.5	1.9	1.8	1.9	1.9	1.9
Stronger aggregate demand	1.5	2.1	2.1	2.1	2.1	2.1
Stronger aggregate supply	1.5	1.8	1.6	1.7	1.8	1.9
Supply constraints	1.5	2.5	2.5	2.4	2.2	2.1
China slowdown	1.5	1.8	1.6	1.9	1.9	2.0
China slowdown with global financial spillovers	1.5	1.5	1.2	1.6	1.8	2.0
Federal funds rate[1]						
Tealbook baseline and extension	2.2	3.4	4.2	4.5	4.4	3.7
Recession with resilient institutions	2.2	3.3	2.1	2.2	2.7	3.1
Recession with vulnerable institutions	2.2	2.8	.5	.7	1.4	1.8
Stronger aggregate demand	2.2	3.8	4.9	5.3	5.2	4.4
Stronger aggregate supply	2.2	3.3	3.9	4.1	4.1	3.6
Supply constraints	2.2	3.5	4.4	4.7	4.6	3.9
China slowdown	2.2	3.2	3.5	3.8	3.7	3.3
China slowdown with global financial spillovers	2.2	3.1	2.9	2.8	2.7	2.8

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

We simulate each of these scenarios using one of five models maintained by the staff that embed different macroeconomic structures and dynamics.[3] In all of the scenarios, the federal funds rate is governed by the same policy rule as in the baseline.[4] Additionally, the size and composition of the SOMA portfolio are assumed to follow the baseline paths in all of the scenarios.

Financial-Based Recession with Resilient Financial Institutions [Gertler-Karadi Model]

Volatility in financial markets has been elevated in recent months, and further substantial declines in asset values remain a salient risk. In this scenario, we assume such a decline occurs, accompanied by a loss in confidence by businesses and households, such that the level of investment is 20 percent lower than in the baseline at the end of 2020. However, we further assume that the substantial decline in confidence and asset prices does not impair the efficiency of financial intermediation, consistent with recent staff QS reports depicting only moderate financial vulnerabilities and well-capitalized commercial banks. Accordingly, the spread between the rate at which firms borrow and the deposit rate remains close to baseline.

Real GDP growth is only 0.7 percent this year and remains below baseline in 2020. The unemployment rate starts rising this year and peaks at around 5½ percent in 2020 before moving back toward its natural rate. Inflation moves down only slightly relative to the baseline because the Phillips curve is flat. Reacting largely to the weaker pace of real economic activity, the federal funds rate falls to 2 percent by the second quarter of 2021, about 2.5 percentage points below baseline.

[3] The five models used are the following: (1) a version of the model from Mark L. Gertler and Peter Karadi (2011), "A Model of Unconventional Monetary Policy," *Journal of Monetary Economics*, vol. 58 (January), pp. 17–34; (2) an estimated New Keynesian DSGE model with search and matching frictions in the labor market and endogenous labor supply developed by Isabel Cairó, Hess Chung, Francesco Ferrante, Cristina Fuentes-Albero, Damjan Pfajfar, and Camilo Morales-Jiménez from the Macroeconomic & Quantitative Studies Section at the Board; (3) a calibrated New Keynesian DSGE model with search and matching frictions in the labor market similar to that described in Mark L. Gertler, Luca Sala, and Antonella Trigari (2008), "An Estimated Monetary DSGE Model with Unemployment and Staggered Nominal Wage Bargaining," *Journal of Money, Credit and Banking*, vol. 40 (November), pp. 1713–64; (4) EDO, which is an estimated medium-scale New Keynesian DSGE model of the U.S. economy; and (5) SIGMA, which is a calibrated multicountry DSGE model.

[4] In the scenarios "Financial-Based Recession with Resilient Financial Institutions," "Financial-Based Recession with Vulnerable Financial Institutions," "Stronger Aggregate Supply," and "Supply Constraints," the output gap that appears in the inertial version of the Taylor (1999) policy rule is inferred from the unemployment rate gap (specifically, the output gap is equal to the negative of twice the difference between the unemployment rate and its long-run natural rate of 4.6 percent).

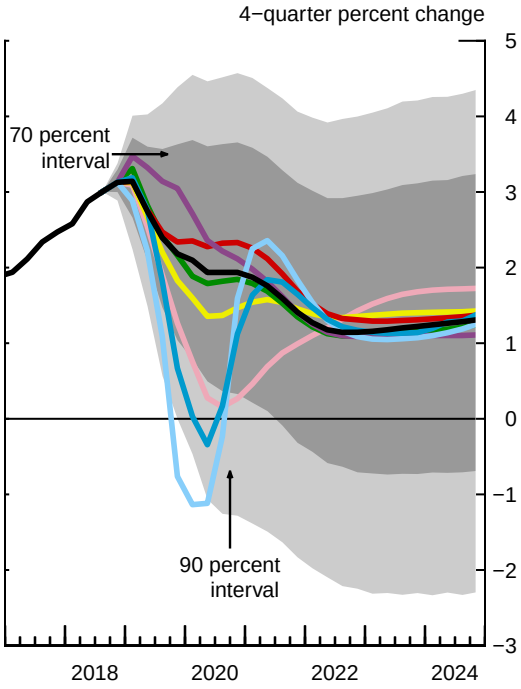
Risks & Uncertainty

Forecast Confidence Intervals and Alternative Scenarios

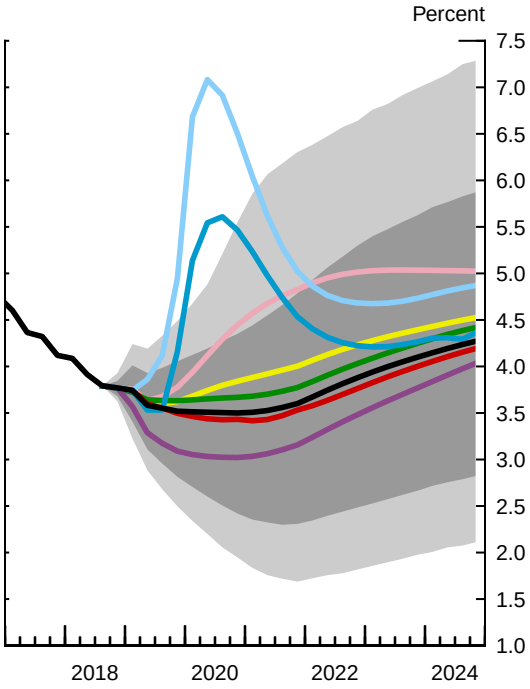
Confidence Intervals Based on FRB/US Stochastic Simulations

Tealbook baseline and extension
Recession with resilient institutions
Recession with vulnerable institutions
Stronger aggregate demand
Stronger aggregate supply
Supply constraints
China slowdown
China slowdown with global financial spillovers

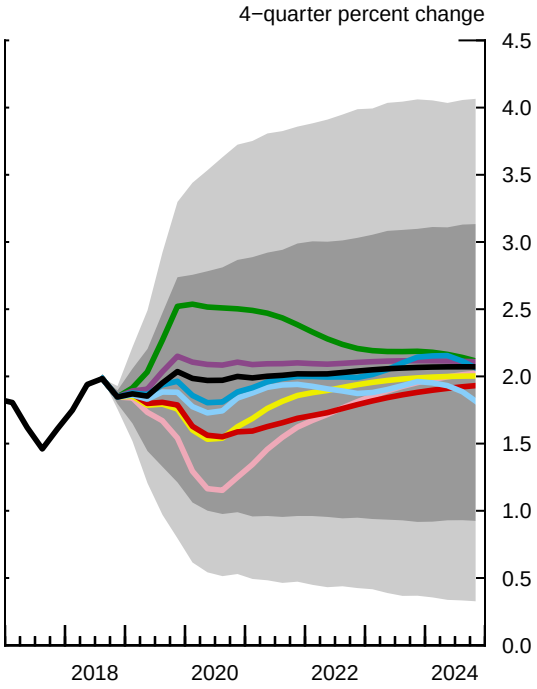
Real GDP



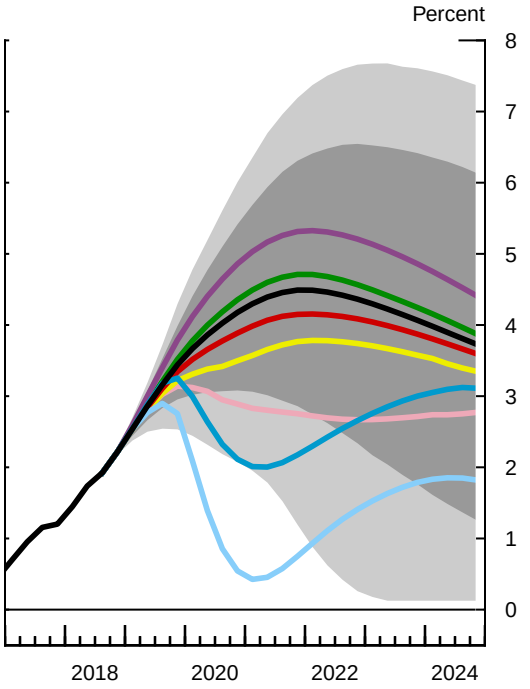
Unemployment Rate



PCE Prices excluding Food and Energy



Federal Funds Rate



Financial-Based Recession with Vulnerable Financial Institutions [Gertler-Karadi Model]

While the previous scenario assumed that the financial system would continue to function well over the course of the downturn, the adverse developments assumed in that scenario may lead to a deterioration in the efficiency of financial intermediation. We illustrate this risk by replaying the previous scenario, assuming that the downturn intensifies financial constraints, making financial institutions more vulnerable to a recession and widening the spread between the rate at which firms borrow and the deposit rate. Specifically, we assume that the correction in asset valuations heightens concerns regarding the underlying condition of financial intermediaries, restricting the flow of credit to firms and further suppressing investment.

Under these circumstances, this year financial intermediaries' net worth falls about 25 percent, and corporate bond spreads increase 300 basis points, on average, relative to baseline. Starting in the second half of this year, output declines for three quarters before beginning to recover, and investment falls 26 percent below baseline at the end of 2020. The unemployment rate rises 1.4 percentage points above the baseline at the end of this year and peaks at 7.1 percent in 2020 before returning to its natural rate. As in the previous scenario, inflation moves down only a little relative to the baseline because the Phillips curve is flat, and it remains about 0.1 percentage point below the 2 percent objective, on average, over the simulation period. Monetary policy provides substantial accommodation: Even under the inertial version of the Taylor (1999) rule assumed here, starting in the third quarter of 2019, the federal funds rate decreases 2.5 percentage points in response to the rapid increase in economic slack, and it comes within ½ percentage point of its effective lower bound at the end of 2020.

Stronger Aggregate Demand [EDO]

Although the baseline projection assumes that economic growth will slow notably this year from its strong pace in 2018, real private domestic final purchases in the second half of last year were unexpectedly robust, and incoming labor market data have also been stronger than expected. In contrast to the previous recession scenarios, this scenario assumes that the upbeat readings on real activity are a signal that the strong economic momentum from last year will continue this year.

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

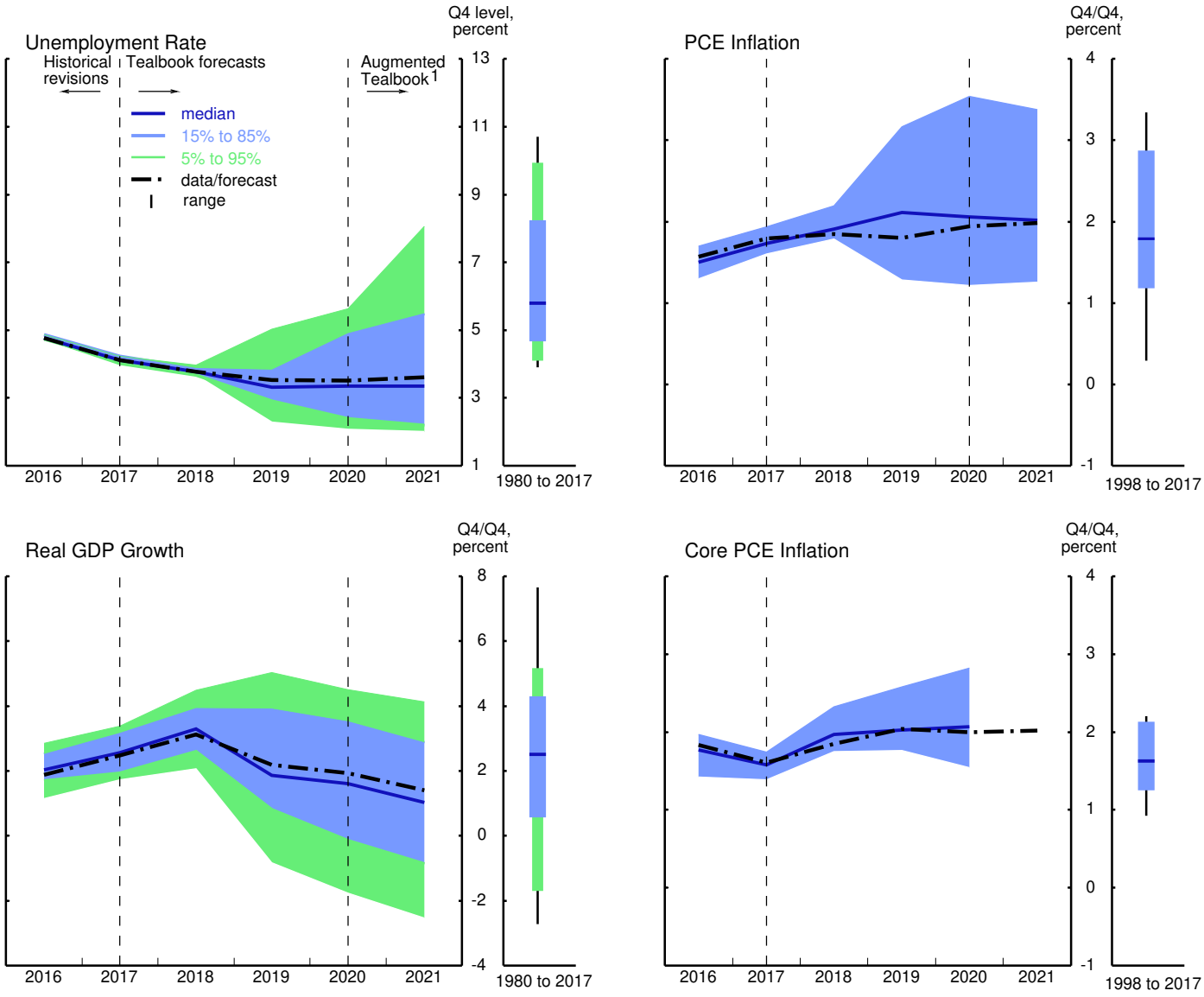
Measure	2018	2019	2020	2021	2022	2023	2024
Real GDP							
(percent change, Q4 to Q4)							
Projection	3.1	2.2	1.9	1.4	1.1	1.2	1.3
Confidence interval							
Tealbook forecast errors	2.6–3.9	.8–3.9	-.1–3.5	-.9–2.9	. . .	. . .	. . .
FRB/US stochastic simulations	3.0–3.3	1.0–3.6	.3–3.7	-.3–3.1	-.7–3.0	-.7–3.1	-.7–3.2
Civilian unemployment rate							
(percent, Q4)							
Projection	3.8	3.5	3.5	3.6	3.9	4.1	4.3
Confidence interval							
Tealbook forecast errors	3.7–3.9	2.9–3.8	2.4–4.9	2.2–5.5	. . .	. . .	. . .
FRB/US stochastic simulations	3.7–3.8	2.8–4.1	2.4–4.4	2.3–4.8	2.5–5.3	2.7–5.6	2.8–5.9
PCE prices, total							
(percent change, Q4 to Q4)							
Projection	1.8	1.8	1.9	2.0	2.0	2.1	2.1
Confidence interval							
Tealbook forecast errors	1.8–2.2	1.3–3.2	1.2–3.5	1.3–3.4	. . .	. . .	. . .
FRB/US stochastic simulations	1.8–1.9	.9–2.6	.8–2.9	.8–3.1	.8–3.1	.8–3.2	.8–3.2
PCE prices excluding food and energy							
(percent change, Q4 to Q4)							
Projection	1.8	2.0	2.0	2.0	2.0	2.1	2.1
Confidence interval							
Tealbook forecast errors	1.7–2.3	1.8–2.6	1.5–2.8	. . .	. . .	. . .	. . .
FRB/US stochastic simulations	1.8–1.9	1.2–2.7	1.0–2.9	1.0–3.0	.9–3.0	.9–3.1	.9–3.1
Federal funds rate							
(percent, Q4)							
Projection	2.2	3.4	4.2	4.5	4.4	4.1	3.7
Confidence interval							
FRB/US stochastic simulations	2.2–2.2	3.0–4.0	3.1–5.4	2.9–6.3	2.3–6.5	1.8–6.4	1.2–6.1

Note: Shocks underlying FRB/US stochastic simulations are randomly drawn from the 1969–2017 set of model equation residuals. Intervals derived from Tealbook forecast errors are based on projections made from 1980 to 2017 for real GDP and unemployment and from 1998 to 2017 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.

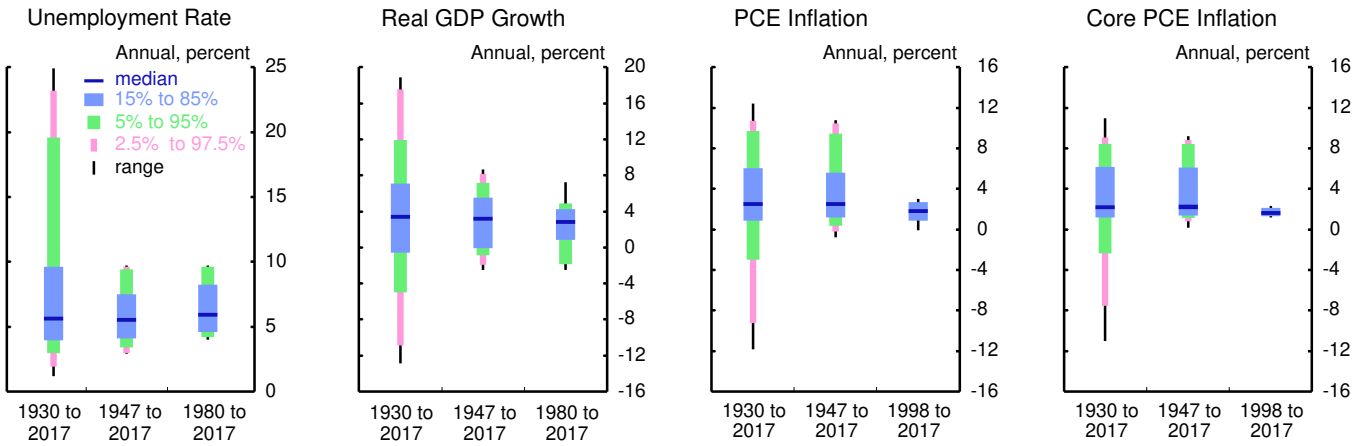
Prediction Intervals Derived from Historical Tealbook Forecast Errors

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.

Real GDP rises at an annual rate of 3 percent in 2019, compared with 2.2 percent in the baseline. The unemployment rate falls more rapidly, bottoming out at 3 percent in 2020 and remaining lower than in the baseline for some time thereafter. With resource utilization running tighter, inflation is a touch higher than the staff projection during the simulation period. The federal funds rate reaches 5.3 percent at the beginning of 2022 and ends 2024 at 4.4 percent.

Stronger Aggregate Supply [MQS-LM Model]

The staff projects that the labor force participation rate (LFPR) will remain essentially constant over much of the medium term against the backdrop of a declining structural trend. However, our assessment of the trend is subject to a great deal of uncertainty, and, indeed, the LFPR has shown surprising strength over the past year. Moreover, business-sector productivity growth picked up last year and could continue at that faster pace in coming years. In this scenario, we assume that the underlying trend in the LFPR is higher and that total factor productivity (TFP) growth is faster than in the baseline. Specifically, starting in 2017, we assume a highly persistent exogenous increase in the willingness of households to supply labor relative to baseline, which ultimately leaves the LFPR ½ percentage point above the baseline in 2021. Similarly, we assume that structural TFP growth since 2017 has been increasing ¼ percentage point faster than estimated by the staff and will continue to be ¼ percentage point faster than baseline over the simulation period.

With the faster growth in potential output in this scenario, real GDP growth is 0.1 percentage point and 0.4 percentage point above the baseline in 2019 and 2020, respectively. The unemployment rate declines gradually and is about 0.1 percentage point below baseline in 2024, as most of the additional job searchers find employment rapidly and, over the longer term, more intensive recruiting also gradually decreases the stock of unemployed workers. Inflation is almost ½ percentage point below baseline in 2020, as the increase in TFP growth lowers firms' costs. Mainly reflecting persistently lower inflation, the federal funds rate is around ¼ percentage point below baseline over the simulation period.

Supply Constraints [Gertler-Sala-Trigari Model]

In the baseline, although the unemployment rate is persistently below the natural rate of unemployment, inflation remains subdued, consistent with the modest response of prices to resource utilization seen for some time. However, some measures of wage growth have picked up in recent months, and wages could accelerate further if employers face an increasingly tight

labor market. In particular, when the unemployment rate is unusually low, filling a job vacancy becomes increasingly difficult, which could imply a reduced pace of hiring and a substantially steeper rise in wages, as the value to firms of filling a vacant job increases. In this scenario, tighter supply constraints in the labor market push up wages, and those higher wages pass through into prices, raising inflation above baseline. We illustrate this risk using simulations from a nonlinear New Keynesian model with costly search and matching frictions in the labor market.[5]

With greater supply constraints, the unemployment rate continues to decline until the end of 2019 but remains about ¼ percentage point above the baseline over the forecast horizon. However, GDP growth is close to the baseline throughout the projection as, in this model, more intense utilization of capital partially compensates for the reduction in labor input. Wage growth is, on average, nearly ½ percentage point higher than in the baseline for the next two years, and real wages remain above baseline through 2023. Because of higher recruiting costs and real wage growth well in excess of productivity growth, inflation is around 2½ percent over the medium term. Nonetheless, because policymakers interpret the higher unemployment rate as indicative of less tight labor utilization, the federal funds rate is only 20 basis points above the baseline over the simulation period, as the effect of higher inflation is largely offset by the effect of the smaller perceived resource utilization gap.

China Slowdown [SIGMA]

The disappointing tone of incoming Chinese data has renewed concerns about the outlook for China. In our baseline, we expect policy easing to allow output to expand at around a 6 percent pace over most of the forecast period. However, the recent moderation in activity may prove more protracted and heighten China's vulnerability to adverse developments—such as an escalation of trade tensions or a property price bust. In this scenario, we assume that the risk of a slowdown in China materializes, causing distress in EMEs by reducing demand for their exports and thus tightening financial conditions. While this scenario assumes that financial spillovers are largely contained to EMEs, the next scenario considers the possibility of global contagion.

Specifically, GDP growth in China falls to 3 percent, leading to both weaker exports and higher borrowing spreads (by 150 basis points) in other EMEs that push their GDP growth down

[5] For a more detailed description of the model, see the box "Alternative View: Supply Constraints Will Prevent the Unemployment Rate from Falling Much Further" in the Domestic Economic Developments and Outlook section of the July 2018 Tealbook.

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	.08	.05	.03	.05
Previous Tealbook	.08	.05	.04	.05
Less than 1 percent				
Current Tealbook	.17	.22	.09	.19
Previous Tealbook	.16	.22	.09	.20

Probability of Unemployment Events

(4 quarters ahead)

Probability that the unemployment rate will . . .	Staff	FRB/US	EDO	BVAR
Increase by 1 percentage point				
Current Tealbook	.02	.17	.20	.03
Previous Tealbook	.02	.18	.22	.03
Decrease by 1 percentage point				
Current Tealbook	.12	.00	.03	.07
Previous Tealbook	.12	.00	.01	.10

Probability of Near-Term Recession

Probability that real GDP declines in the next two quarters	Staff	FRB/US	EDO	BVAR	Factor Model
Current Tealbook	.01	.03	.05	.02	.03
Previous Tealbook	.01	.02	.06	.02	.00

Note: "Staff" represents stochastic simulations in FRB/US around the staff baseline; baselines for FRB/US, BVAR, EDO, and the factor model are generated by those models themselves, up to the current-quarter estimate. Data for the current quarter are taken from the staff estimate for the second Tealbook in each quarter; if the second Tealbook for the current quarter has not yet been published, the preceding quarter is taken as the latest historical observation.

to 1 percent by the end of 2019. Flight-to-safety flows lead to an appreciation of the dollar of about 10 percent against EME currencies and 5 percent against advanced foreign economy (AFE) currencies.

Weaker foreign activity and the stronger dollar reduce U.S. net exports, causing U.S. GDP growth to moderate to about 1.5 percent in 2020, about 0.5 percentage point lower than in the baseline. The unemployment rate reaches 4 percent in 2021. Core PCE inflation falls to 1.6 percent in 2020, about 0.4 percentage point lower than in the baseline. The federal funds rate follows a somewhat shallower path than in the baseline.

China Slowdown with Global Financial Spillovers [SIGMA]

Against the backdrop of the significant market volatility seen in recent months, an abrupt slowdown of GDP growth in China would very likely trigger more severe reverberations on global financial markets than envisioned in the previous scenario. Here, we assume that the slowdown in China precipitates a sharp rise in borrowing costs around the globe, with corporate spreads rising 250 basis points in EMEs and 150 basis points in both the United States and AFEs. Flight-to-safety flows depress term premiums on U.S. government bonds and lead to an appreciation of the broad real dollar of 12 percent.

As this scenario entails lower foreign demand, tighter financial conditions, and a stronger dollar compared with the previous one, the effects on the U.S. economy are larger. U.S. GDP growth falls to just 0.3 percent in 2020, about 1.5 percentage points lower than in the baseline, and the unemployment rate rises to 5 percent by 2022. Lower resource utilization and falling import prices reduce U.S. core inflation to 1.2 percent in 2020. In response to tepid output growth and below-target inflation, the federal funds rate runs below 3 percent in 2020 (about 0.5 percentage point below the previous scenario) and remains there in subsequent years.

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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. Compared with the December Tealbook, the current projection for the output gap is essentially unchanged in the near term but is somewhat narrower over the next several years. The inflation projection is little changed from the December Tealbook. In response to these revisions, the strategies considered herein prescribe paths for the federal funds rate that are about 10 to 60 basis points lower at the end of 2021 than in the December Tealbook. In a special exhibit, we examine optimal control simulations when the underlying baseline projection is consistent with the median responses to the December 2018 Summary of Economic Projections (SEP) rather than the staff forecast.

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 Taylor (1999) rule (also known as the "balanced approach" rule), the Taylor (1993) rule, a first-difference rule, and a flexible price-level targeting (FPLT) rule. These near-term prescriptions take as given the Tealbook baseline projections for the output gap and core inflation, shown in the middle panels.[1] The top and middle panels also provide the staff's baseline path for the federal funds rate, which is constructed using an inertial version of the Taylor (1999) rule.[2]

The staff's near-term projections for both resource utilization and inflation are essentially unchanged from their December Tealbook values. Consequently, the prescriptions of most of the policy rules are about unchanged from those in the previous Tealbook.

[1] 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 output gap.

[2] 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.

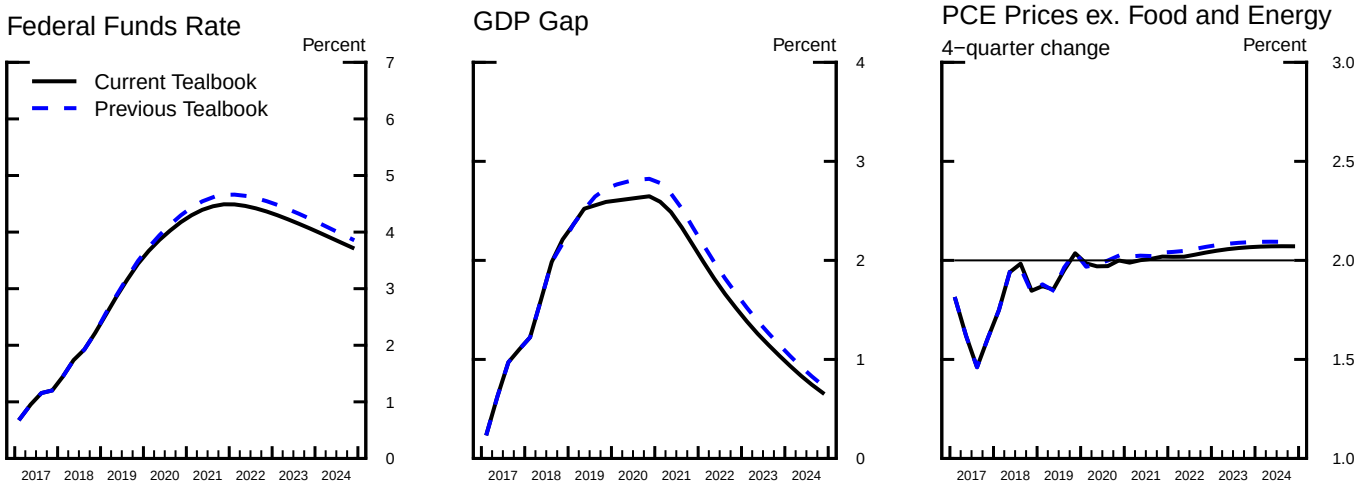
Policy Rules and the Staff Projection

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

(Percent)

	2019:Q1	2019:Q2
Taylor (1999) rule	**4.64**	**4.78**
Previous Tealbook	*4.66*	*4.76*
Taylor (1993) rule	**3.46**	**3.52**
Previous Tealbook	*3.47*	*3.50*
First−difference rule	**2.41**	**2.52**
Previous Tealbook projection	*2.50*	*2.68*
Flexible price−level targeting rule	**2.00**	**1.84**
Previous Tealbook projection	*2.03*	*1.87*
Addendum:		
Tealbook baseline	**2.54**	**2.86**

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**	3.03	*3.21*	*3.13*
Average projected real federal funds rate	1.83	*1.91*	*1.72*
SEP−consistent baseline			
FRB/US *r**	1.68		
Average projected real federal funds rate	.97		

1. For rules that have a lagged policy rate as a right−hand−side variable, the lines denoted "Previous Tealbook projection" report prescriptions based on the previous Tealbook's staff outlook for inflation and resource slack, but 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 December 2018 median SEP responses. The "Average projected real federal funds rate" is calculated under the Tealbook and SEP−consistent baseline projections over the same 12−quarter period as FRB/US *r**.

- The prescriptions of the Taylor (1999) and Taylor (1993) rules, which do not feature interest rate smoothing terms, remain well above the corresponding policy rates in the Tealbook baseline.

- The near-term prescriptions of the first-difference rule, which responds to the change in the expected output gap, are slightly lower than in the December Tealbook, reflecting lower projected output growth for later this year.

- The FPLT rule, in an effort to eliminate the cumulative shortfall in the core PCE price index of about 2.4 percent since the end of 2011, prescribes setting the federal funds rate substantially below the current target range but about in line with the prescriptions from this rule reported in the December Tealbook.

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 generated under two baselines: the Tealbook baseline and a projection consistent with the medians in the December 2018 SEP.[3] 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 period starting in the current quarter, would bring the output gap to zero in the final quarter of that period. This concept of *r** is a summary of the projected underlying strength of the real economy and does not take into account considerations such as achieving the inflation objective or avoiding sharp changes in the federal funds rate.

- At just over 3 percent, the current value of the Tealbook-consistent FRB/US *r** is 18 basis points lower than its estimate for the same quarter based on the December Tealbook projection, shown in the center column; the difference reflects the staff's slightly lower output gap projection.

[3] To construct a baseline projection consistent with median SEP responses for the FRB/US model, the staff interpolated annual SEP information to a quarterly frequency and assumed that, beyond 2021 (the final year reported in the December 2018 SEP), the economy transitions to the longer-run values in a smooth and monotonic way. The staff also posited economic relationships to project variables not covered in the SEP. For example, the staff assumed an Okun's law relationship to recover an output gap from the deviation of the median SEP unemployment rate from the median SEP estimate of its longer-run value.

- At almost 1.7 percent, the corresponding SEP-consistent FRB/US *r** based on the December SEP is 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 considerably smaller amount over the medium term than does the current Tealbook forecast. This smaller anticipated output gap occurs despite the fact that the median path for the real federal funds rate implied by the SEP projections averages 1 percentage point less than the corresponding path in the Tealbook.

SIMPLE POLICY RULE SIMULATIONS

The second exhibit reports the Tealbook baseline and results from dynamic simulations of the FRB/US model under the Taylor (1999) rule, the Taylor (1993) rule, the first-difference rule, and the FPLT rule. These simulations reflect the endogenous responses of the output gap and inflation to the different federal funds rate paths implied by the policy rules.[4] The simulations for each rule are carried out under the assumptions that policymakers commit to following that rule in the future and that financial market participants, price setters, and wage setters correctly anticipate that monetary policy will follow through on this commitment and are aware of the implications for interest rates and the economy.

- Under the Tealbook baseline, the federal funds rate increases about 1¼ percentage points this year, ¾ percentage point in 2020, and ¼ percentage point in 2021, reaching 4.5 percent in the fourth quarter of 2021. This trajectory is a little lower than the one in the December Tealbook because of the narrower projected output gap.

- The Taylor (1999) rule calls for an immediate and substantial increase in the federal funds rate, and the prescribed values remain above the corresponding Tealbook baseline values through 2021. This higher path is associated with only a modestly higher trajectory for the real 10-year Treasury yield than in the baseline throughout 2020 and a slightly lower path thereafter, because the Taylor (1999) rule calls for somewhat lower values of the federal funds rate

[4] Because of the endogenous responses of the output gap and inflation to the different federal funds rate paths, the near-term prescriptions from the dynamic simulations can differ from those shown in the top panel of the first exhibit.

for most of the decade. Inflation is somewhat higher than in the baseline projection.[5] The path for the unemployment rate lies above the Tealbook baseline path over the next few years, but it subsequently lies below and takes a bit longer to return to its natural rate.

- The Taylor (1993) rule also calls for an immediate sizable increase in the federal funds rate. Because the Taylor (1993) rule responds less strongly to the positive output gaps that occur in the projection period, this rule prescribes lower rates than does the Taylor (1999) rule over the period shown. The prescriptions from the Taylor (1993) rule are higher than the Tealbook baseline through late 2020 but subsequently fall below the baseline path for a sustained period. As a result, inflation is higher, and the real 10-year Treasury yield is lower, than their corresponding values in the Tealbook projection. The more accommodative conditions also engender a lower unemployment rate than in the Tealbook projection.

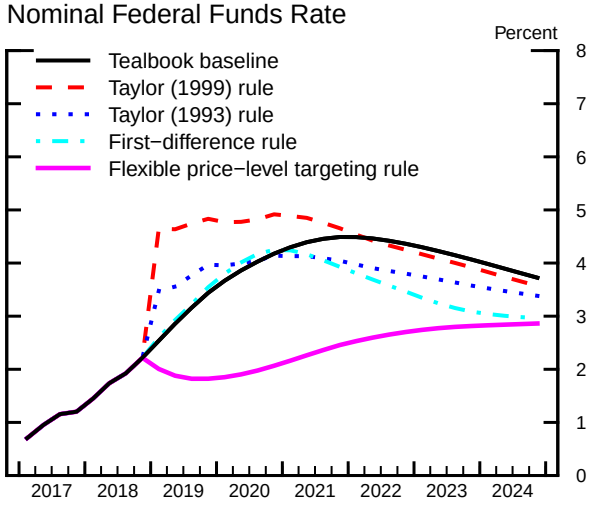
- The path for the federal funds rate prescribed by the first-difference rule lies a touch above the path in the Tealbook baseline through late 2020 but then runs below the baseline path for some years, reflecting the fact that this rule reacts to the expected future change in the output gap rather than its level. The associated lower path for the federal funds rate, together with the expectation of higher inflation in the future, implies lower longer-term real interest rates and thus lower unemployment than in the Tealbook baseline.

- The FPLT rule responds to, and seeks to eliminate, the shortfall that has cumulated between the level of core PCE prices and 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 2.4 percent shortfall of the core PCE price index requires inflation to run above 2 percent in coming years. To achieve this

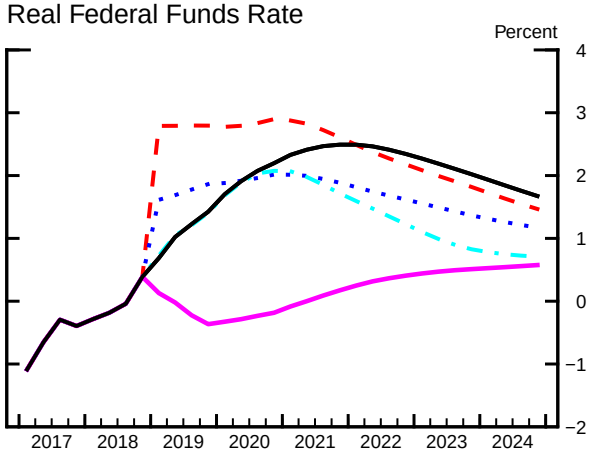
[5] The result that inflation runs above the baseline projection in this simulation, despite higher levels of the federal funds rate in the near term, depends on the assumption that price and wage setters perfectly anticipate the more accommodative path of the federal funds rate beyond the next several years and factor these future monetary policy conditions into today's price and wage setting decisions. The box "Learning and Misperceptions of Policy Strategies" in the Monetary Policy Strategies section of the June 2018 Tealbook A presented results for a scenario in which price and wage setters lack such a perfect understanding. In that scenario, the switch from an inertial to a non-inertial policy rule led to a significant decline in inflation and a rise in the unemployment rate at the start of the simulation in response to an unexpected jump in the federal funds rate.

Simple Policy Rule Simulations

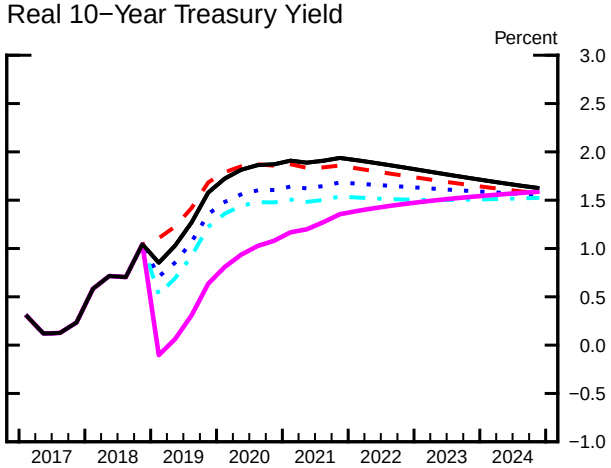
Nominal Federal Funds Rate



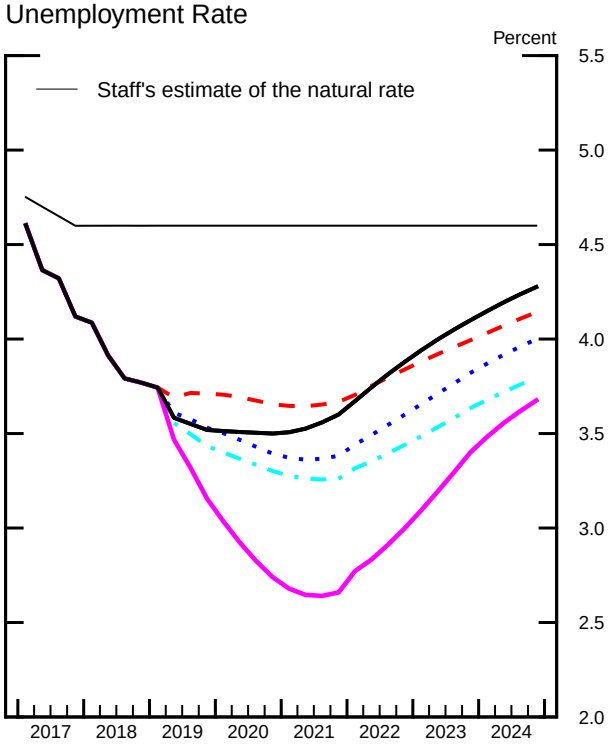
Real Federal Funds Rate



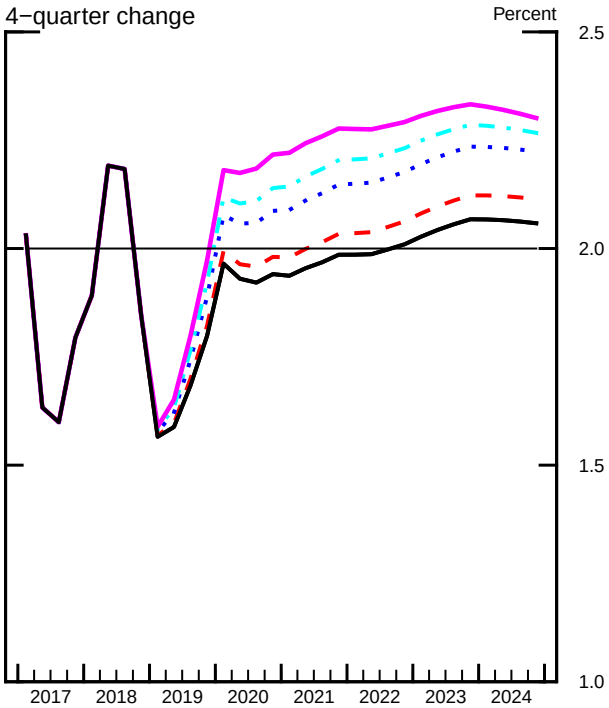
Real 10−Year Treasury Yield



Unemployment Rate



PCE Inflation
4−quarter change



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

outcome, the FPLT rule calls for keeping the federal funds rate somewhat below the current target range until early 2021 and below the federal funds rate path in the Tealbook baseline through 2027 (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 drops and remains below the Tealbook baseline for the next six years. The unemployment rate is substantially lower than in the Tealbook baseline and all other simulations shown, dropping to 2.6 percent in 2021.

- Compared with the corresponding results shown in the December Tealbook, the prescribed paths for the federal funds rate are lower at the end of 2021 by 12 to 24 basis points.

OPTIMAL CONTROL SIMULATIONS UNDER COMMITMENT

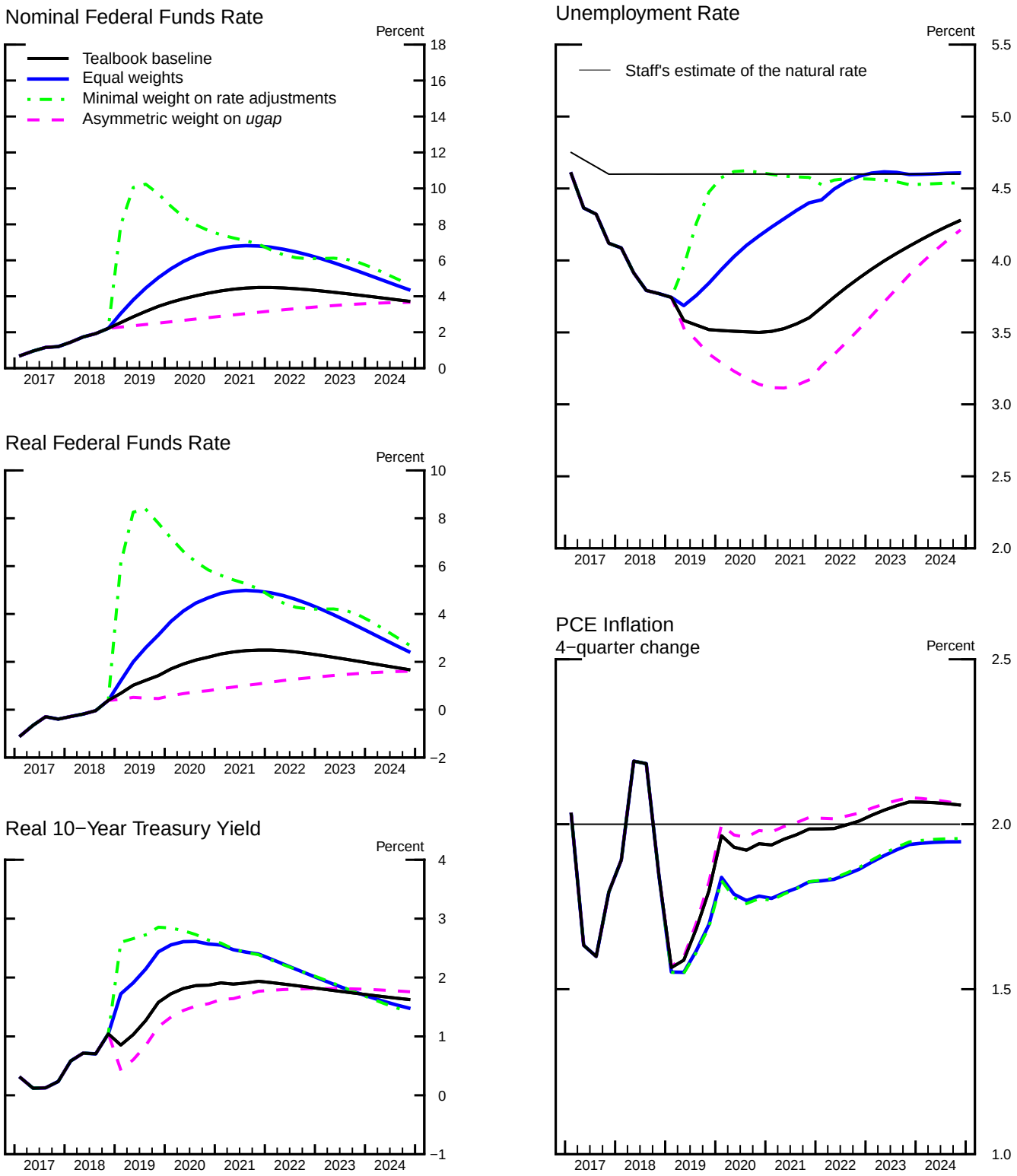
The third exhibit displays optimal control simulations under various assumptions about policymakers' preferences, as captured by three specifications of the loss function.[6] The concept of optimal control employed here corresponds to a commitment policy under which the plans that policymakers make today constrain future policy choices; such a constraint may improve economic outcomes.[7]

The first two of the three optimal control policies prescribe much higher paths for the federal funds rate than the path in the baseline projection, for two reasons. First, high levels of the real federal funds rate are necessary to push the unemployment rate up to its natural rate, because, consistent with recent historical experience, the unemployment rate does not respond strongly to changes in real interest rates in the FRB/US model. Second, because monetary policy actions are assumed to be understood and fully credible, the front-loading of policy tightening is not disruptive. In practice, however, if the FOMC

[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.

[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.

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.

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.[8] By contrast, the third optimal control policy allows the unemployment rate to decline to levels not experienced since the 1950s. Such a development might likewise entail outcomes different from those predicted by the simulations.

- 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. This strategy is designed to temper the projected sizable undershooting, over the next several years, 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, as already indicated, the response in the FRB/US model of inflation to the current level of resource utilization is small.

- The second simulation, "Minimal weight on rate adjustments," uses a loss function that assigns only a very small cost to changes in the federal funds rate but that is otherwise identical to the loss function with equal weights. This simulated policy seeks to return the unemployment rate to its natural rate even faster than under the equal-weights specification. The federal funds rate soars to 10 percent by mid-2019 and then averages around 7 percent from 2020 through 2024.

- The third simulation, "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 the loss function is identical to the specification with equal weights when the unemployment rate is above the natural rate. Under this strategy, the path for the federal funds

[8] See note 5 for a related discussion in the context of simple policy rules.

rate is considerably below the path in the optimal control simulation with equal weights and below the Tealbook baseline path until the end of 2024; it then exceeds the policy rate paths implied by the other two optimal control strategies and the Tealbook baseline starting in mid-2025 (not shown). With the asymmetric loss function, 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 undershooting the natural rate of unemployment. The tighter labor market keeps inflation closer to 2 percent than in the case of equal weights. Beyond the period shown, the unemployment rate runs a little above its natural rate for several years as policymakers act to contain the inflationary pressures stemming from the prolonged period of elevated resource utilization.

- Compared with the corresponding results shown in the December Tealbook, the optimal control simulations prescribe paths for the federal funds rate that are 13 basis points ("Asymmetric weight on *ugap*") to 58 basis points ("Minimal weight on rate adjustments") lower at the end of 2021.

OPTIMAL CONTROL USING A PROJECTION CONSISTENT WITH THE SEP

The optimal control simulations presented so far show how different assumptions regarding policymakers' preferences give rise to different policy prescriptions and macroeconomic outcomes under the Tealbook baseline. In particular, the path for the policy rate in the Tealbook baseline and associated macroeconomic outcomes fall between those obtained from optimal control simulations under the equal-weights and the asymmetric-weight-on-*ugap* loss functions. Here, we show that, under the SEP-consistent baseline, the assumption that policymakers' preferences are described by the asymmetric loss function results in policy rates and macroeconomic outcomes that resemble those under the SEP baseline.[9]

- The SEP-consistent baseline and the Tealbook baseline differ in several ways.

[9] As before, the simulations are carried out using the FRB/US model, implying that the marginal effects of changes in the federal funds rate are the same under the SEP-consistent baseline as they are under the Tealbook baseline. It is also the case that policymakers commit to following the optimal policy and that these promises are taken as credible by wage and price setters and by financial market participants.

- As shown in the upper-right panel, the unemployment gap in the SEP-consistent baseline is less negative from mid-2020 on than in the Tealbook baseline. In the longer run, the natural rate of unemployment in the SEP-consistent projection, at 4.4 percent, is somewhat lower than the staff's estimate of the natural rate of unemployment, at 4.6 percent.[10]

- At the same time, the path for the federal funds rate, shown in the upper-left panel, is lower in the SEP-consistent baseline than in the Tealbook baseline. This lower policy path does not result in markedly higher inflation and thus does not necessarily represent an easier stance of policy; instead, it might reflect a lower neutral rate of interest over the medium term.[11]

- The path for inflation, shown in the bottom-right panel, is a touch higher in the SEP-consistent baseline than in the Tealbook baseline over the next few years.

- The policy path and macroeconomic outcomes under the SEP-consistent baseline resemble the results of an optimal control strategy under the asymmetric loss function based on that SEP-consistent baseline (the lines labeled "Asymmetric weight on *ugap* (SEP-consistent)."[12]

  - Through 2021, the deviation of the optimal control path from the path in the SEP-consistent baseline averages about 40 basis points for the federal funds rate, 5 basis points for the unemployment gap, and 3 basis points for inflation.

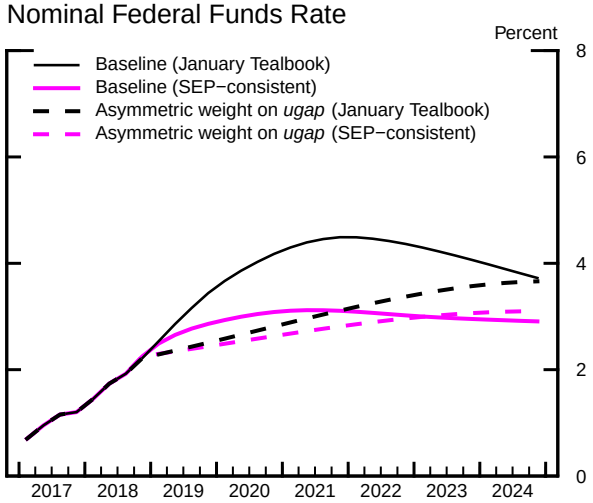
[10] Because of the differences in the estimates of the natural rate of unemployment in the SEP-consistent baseline and the Tealbook baseline, the unemployment gap in the Tealbook baseline differs from the one implicit in the SEP baseline both going forward as well as in the recent past.

[11] This result is reminiscent of the discussion of the medium-term notion of the equilibrium real federal funds rate under the SEP-consistent baseline presented earlier.

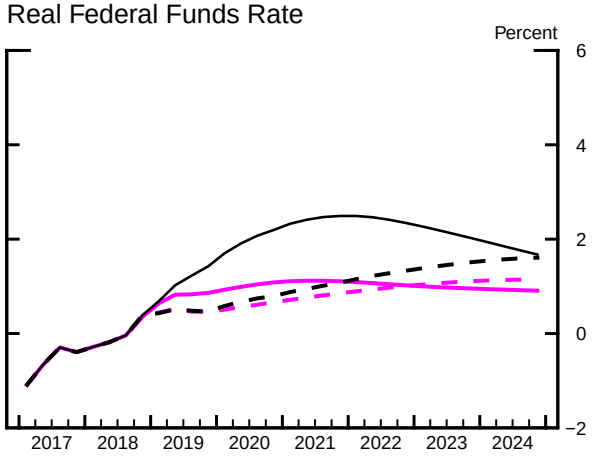
[12] This similarity is not found under the SEP-consistent baseline for the other loss functions considered in this section. As an example, in a simulation with an equal-weights loss function (not shown), the path for the federal funds rate is significantly higher than the median SEP path (including its extension in the SEP-consistent baseline) because the strategy seeks to temper the projected sizable undershooting by the unemployment rate of its natural rate over the next several years.

Optimal Control Using a Projection Consistent with the SEP

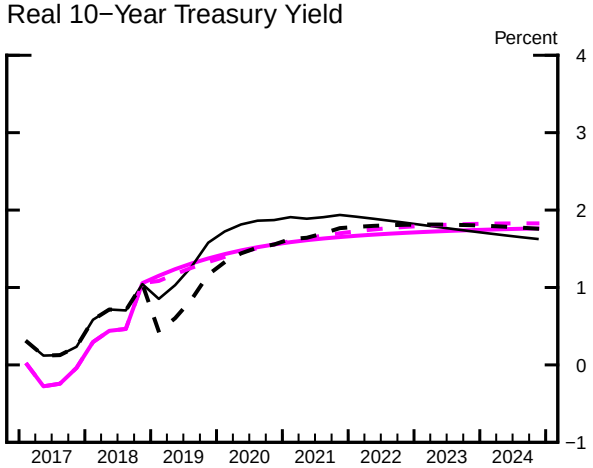
Nominal Federal Funds Rate



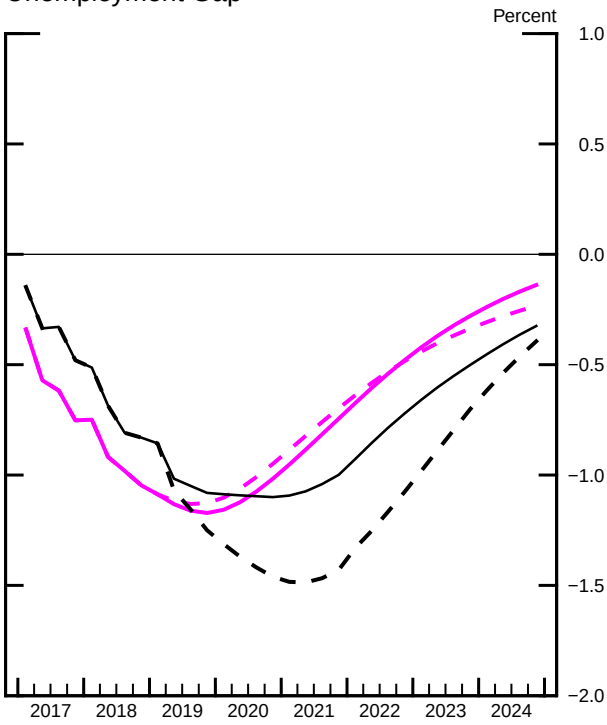
Real Federal Funds Rate



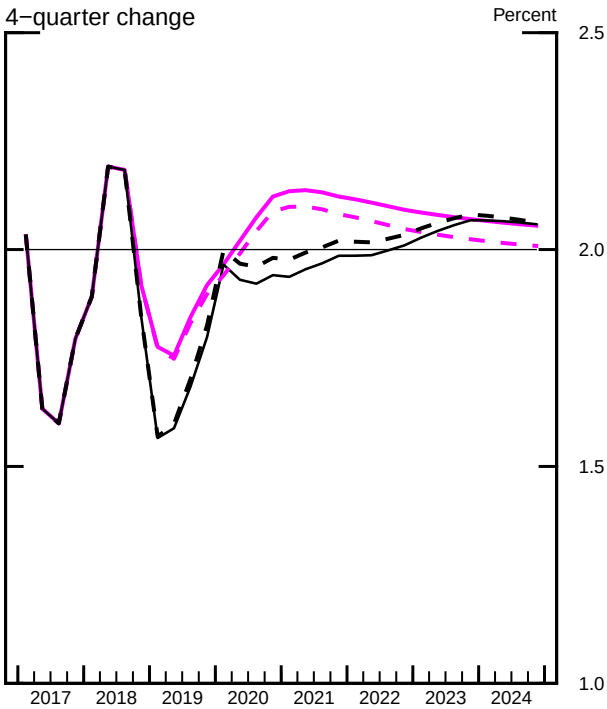
Real 10−Year Treasury Yield



Unemployment Gap



PCE Inflation
4−quarter change



Note: The SEP−consistent projection is constructed to match the median responses to the December 2018 Summary of Economic Projections. All simulations are performed in the FRB/US model.

- By contrast, under the Tealbook baseline, these differences are substantially larger overall, averaging about 110 basis points, 25 basis points, and negative 3 basis points, respectively.

- Overall, these results suggest that a policymaker with an asymmetric loss function would view the combination of the Tealbook inflation, unemployment rate, and interest rate projections as suboptimal and would be willing to let the unemployment rate drift substantially lower in order to achieve somewhat higher inflation and a smoother funds rate path. By contrast, when presented with the inflation, unemployment rate, and interest rate projections based on the SEP medians, such a policymaker would find the constellation of these paths nearly optimal.

- The analysis is subject to several caveats, of which we highlight two.

  - The median SEP projections used in the construction of the SEP-consistent baseline need not correspond to the projections of any particular respondent or of the Committee.

  - In constructing the SEP-consistent baseline as well as in performing the simulations, the staff makes assumptions about the underlying economic relationships that need not coincide with the perceived economic tradeoffs of SEP respondents.

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."

Outcomes of Simple Policy Rule Simulations

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

Outcome and strategy	2018 H2	2019	2020	2021	2022	2023	2024
Nominal federal funds rate[1]							
Taylor (1999)	2.2	4.8	4.9	4.7	4.2	3.9	3.6
Taylor (1993)	2.2	4.0	4.1	4.0	3.8	3.6	3.4
First-difference	2.2	3.5	4.2	3.9	3.5	3.1	3.0
Flexible price-level targeting	2.2	1.8	2.1	2.5	2.7	2.8	2.9
Extended Tealbook baseline	2.2	3.4	4.2	4.5	4.4	4.1	3.7
Real GDP							
Taylor (1999)	3.1	1.8	2.0	1.6	1.3	1.3	1.4
Taylor (1993)	3.1	2.2	2.2	1.6	1.3	1.2	1.3
First-difference	3.1	2.4	2.2	1.7	1.4	1.3	1.4
Flexible price-level targeting	3.1	3.0	2.8	1.8	1.1	.9	1.2
Extended Tealbook baseline	3.1	2.2	1.9	1.4	1.1	1.2	1.3
Unemployment rate[1]							
Taylor (1999)	3.8	3.7	3.7	3.7	3.8	4.0	4.1
Taylor (1993)	3.8	3.5	3.4	3.4	3.6	3.8	4.0
First-difference	3.8	3.4	3.3	3.3	3.4	3.6	3.8
Flexible price-level targeting	3.8	3.2	2.7	2.7	3.0	3.4	3.7
Extended Tealbook baseline	3.8	3.5	3.5	3.6	3.9	4.1	4.3
Total PCE prices							
Taylor (1999)	1.5	1.8	2.0	2.0	2.1	2.1	2.1
Taylor (1993)	1.5	1.9	2.1	2.1	2.2	2.2	2.2
First-difference	1.5	1.9	2.1	2.2	2.2	2.3	2.3
Flexible price-level targeting	1.5	2.0	2.2	2.3	2.3	2.3	2.3
Extended Tealbook baseline	1.5	1.8	1.9	2.0	2.0	2.1	2.1
Core PCE prices							
Taylor (1999)	1.5	2.1	2.0	2.1	2.1	2.1	2.1
Taylor (1993)	1.5	2.1	2.1	2.2	2.2	2.2	2.2
First-difference	1.5	2.2	2.2	2.2	2.3	2.3	2.3
Flexible price-level targeting	1.5	2.2	2.3	2.3	2.3	2.3	2.3
Extended Tealbook baseline	1.5	2.0	2.0	2.0	2.0	2.1	2.1

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]								
Taylor (1999)	4.6	4.6	4.7	4.8	4.8	4.8	4.8	4.9
Taylor (1993)	3.5	3.6	3.8	4.0	4.0	4.0	4.0	4.1
First-difference	2.6	2.9	3.2	3.5	3.8	4.0	4.2	4.2
Flexible price-level targeting	2.0	1.9	1.8	1.8	1.9	1.9	2.0	2.1
Extended Tealbook baseline	2.5	2.9	3.2	3.4	3.7	3.9	4.0	4.2
Real GDP								
Taylor (1999)	3.1	2.6	2.2	1.8	1.7	1.7	1.8	2.0
Taylor (1993)	3.1	2.7	2.4	2.2	2.2	2.1	2.1	2.2
First-difference	3.1	2.8	2.5	2.4	2.4	2.2	2.2	2.2
Flexible price-level targeting	3.1	3.0	2.9	3.0	3.2	3.0	2.9	2.8
Extended Tealbook baseline	3.1	2.7	2.4	2.2	2.1	1.9	1.9	1.9
Unemployment rate[1]								
Taylor (1999)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Taylor (1993)	3.7	3.6	3.6	3.5	3.5	3.5	3.4	3.4
First-difference	3.7	3.6	3.5	3.4	3.4	3.4	3.3	3.3
Flexible price-level targeting	3.7	3.5	3.3	3.2	3.0	2.9	2.8	2.7
Extended Tealbook baseline	3.7	3.6	3.6	3.5	3.5	3.5	3.5	3.5
Total PCE prices								
Taylor (1999)	1.6	1.6	1.7	1.8	2.0	2.0	2.0	2.0
Taylor (1993)	1.6	1.6	1.7	1.9	2.1	2.1	2.1	2.1
First-difference	1.6	1.6	1.8	1.9	2.1	2.1	2.1	2.1
Flexible price-level targeting	1.6	1.7	1.8	2.0	2.2	2.2	2.2	2.2
Extended Tealbook baseline	1.6	1.6	1.7	1.8	2.0	1.9	1.9	1.9
Core PCE prices								
Taylor (1999)	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0
Taylor (1993)	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.1
First-difference	1.9	1.9	2.0	2.2	2.1	2.1	2.2	2.2
Flexible price-level targeting	1.9	1.9	2.1	2.2	2.2	2.2	2.2	2.3
Extended Tealbook baseline	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0

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	2018 H2	2019	2020	2021	2022	2023	2024
Nominal federal funds rate[1]							
Equal weights	2.2	5.0	6.5	6.8	6.3	5.4	4.4
Minimal weight on rate adjustments	2.2	9.7	7.7	6.9	6.1	5.9	4.7
Asymmetric weight on *ugap*	2.2	2.5	2.8	3.1	3.4	3.6	3.7
Extended Tealbook baseline	2.2	3.4	4.2	4.5	4.4	4.1	3.7
Real GDP							
Equal weights	3.1	1.5	1.2	1.1	1.3	1.7	1.6
Minimal weight on rate adjustments	3.1	.4	1.3	1.6	1.7	1.8	1.5
Asymmetric weight on *ugap*	3.1	2.6	2.3	1.5	1.0	.9	1.1
Extended Tealbook baseline	3.1	2.2	1.9	1.4	1.1	1.2	1.3
Unemployment rate[1]							
Equal weights	3.8	3.8	4.2	4.4	4.6	4.6	4.6
Minimal weight on rate adjustments	3.8	4.5	4.6	4.6	4.6	4.5	4.5
Asymmetric weight on *ugap*	3.8	3.3	3.1	3.2	3.5	3.9	4.2
Extended Tealbook baseline	3.8	3.5	3.5	3.6	3.9	4.1	4.3
Total PCE prices							
Equal weights	1.5	1.7	1.8	1.8	1.9	1.9	1.9
Minimal weight on rate adjustments	1.5	1.7	1.8	1.8	1.9	1.9	2.0
Asymmetric weight on *ugap*	1.5	1.8	2.0	2.0	2.0	2.1	2.1
Extended Tealbook baseline	1.5	1.8	1.9	2.0	2.0	2.1	2.1
Core PCE prices							
Equal weights	1.5	1.9	1.8	1.9	1.9	1.9	2.0
Minimal weight on rate adjustments	1.5	1.9	1.8	1.9	1.9	1.9	2.0
Asymmetric weight on *ugap*	1.5	2.1	2.0	2.1	2.1	2.1	2.1
Extended Tealbook baseline	1.5	2.0	2.0	2.0	2.0	2.1	2.1

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	3.0	3.8	4.5	5.0	5.5	5.9	6.3	6.5
Minimal weight on rate adjustments	8.0	10.1	10.2	9.7	9.0	8.4	8.0	7.7
Asymmetric weight on *ugap*	2.3	2.4	2.4	2.5	2.6	2.7	2.7	2.8
Extended Tealbook baseline	2.5	2.9	3.2	3.4	3.7	3.9	4.0	4.2
Real GDP								
Equal weights	3.1	2.5	1.9	1.5	1.2	1.0	1.1	1.2
Minimal weight on rate adjustments	3.1	2.1	1.2	.4	-.0	.3	.7	1.3
Asymmetric weight on *ugap*	3.1	2.9	2.6	2.6	2.6	2.4	2.4	2.3
Extended Tealbook baseline	3.1	2.7	2.4	2.2	2.1	1.9	1.9	1.9
Unemployment rate[1]								
Equal weights	3.7	3.7	3.8	3.8	3.9	4.0	4.1	4.2
Minimal weight on rate adjustments	3.7	4.0	4.3	4.5	4.6	4.6	4.6	4.6
Asymmetric weight on *ugap*	3.7	3.5	3.4	3.3	3.3	3.2	3.2	3.1
Extended Tealbook baseline	3.7	3.6	3.6	3.5	3.5	3.5	3.5	3.5
Total PCE prices								
Equal weights	1.6	1.6	1.6	1.7	1.8	1.8	1.8	1.8
Minimal weight on rate adjustments	1.6	1.5	1.6	1.7	1.8	1.8	1.8	1.8
Asymmetric weight on *ugap*	1.6	1.6	1.7	1.8	2.0	2.0	2.0	2.0
Extended Tealbook baseline	1.6	1.6	1.7	1.8	2.0	1.9	1.9	1.9
Core PCE prices								
Equal weights	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8
Minimal weight on rate adjustments	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.8
Asymmetric weight on *ugap*	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0
Extended Tealbook baseline	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0

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 Monetary Policy Strategies section. It also reports the expression for the inertial version of the Taylor (1999) rule; the staff uses that inertial version, augmented with a small temporary intercept adjustment, in the construction of the Tealbook baseline projection. 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 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 (1999) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t$
Taylor (1993) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.5ygap_t$
Inertial Taylor (1999) rule	$R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t)$
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 two rules in the table were studied by Taylor (1993, 1999), whereas the inertial version of the Taylor (1999) rule and rules that depend on a price gap like the FPLT rule have been featured prominently in analysis by Board staff.[1] An FPLT rule similar to the one above is also analyzed by Chung and others (2014).

Where applicable, the intercepts of the simple rules, denoted r^{LR}, are constant and chosen so that they are consistent with a 2 percent longer-run inflation objective and an equilibrium real federal funds rate in the longer run of 0.5 percent. The prescriptions of the first-difference rule do not depend on the level of the output gap or the longer-run real interest rate; see Orphanides (2003).

NEAR-TERM PRESCRIPTIONS OF SELECTED POLICY RULES

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

[1] For applications, see, for example, Erceg and others (2012).

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.[2] 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.

[2] 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 three 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 three specifications of the loss function. The table "Loss Functions" shows the weights used in the three 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
Minimal weight on rate adjustments	1	1	1	0.01
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, "Minimal weight on rate adjustments," places almost no weight on changes in the federal funds rate.[3] The third 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 three 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

[3] The inclusion of a minimal but strictly positive weight on changes in the federal funds rate helps ensure a well-behaved numerical solution.

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)

	Nominal GDP		Real GDP		PCE price index		Core PCE price index		Unemployment rate[1]	
Interval	12/07/18	01/17/19	12/07/18	01/17/19	12/07/18	01/17/19	12/07/18	01/17/19	12/07/18	01/17/19
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	5.0	4.9	3.5	3.4	1.5	1.6	1.5	1.6	3.8	3.8
Q4	3.9	4.4	2.3	2.8	1.4	1.4	1.6	1.5	3.7	3.8
2019:Q1	4.6	3.9	2.6	2.3	1.7	1.3	2.3	2.3	3.6	3.7
Q2	4.7	4.7	2.4	2.6	1.9	2.1	2.0	2.0	3.5	3.6
Q3	4.4	4.1	2.3	1.9	1.9	2.0	2.0	2.0	3.5	3.6
Q4	4.1	3.9	2.1	1.9	1.8	1.8	1.9	1.9	3.4	3.5
2020:Q1	4.1	4.1	2.1	1.9	2.0	2.0	2.1	2.1	3.4	3.5
Q2	4.2	4.2	2.0	1.9	2.0	1.9	2.0	2.0	3.4	3.5
Q3	4.1	4.0	2.0	1.9	2.0	1.9	2.0	2.0	3.4	3.5
Q4	3.9	3.9	1.9	1.9	1.9	1.9	2.0	2.0	3.4	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	4.4	4.7	2.9	3.1	1.4	1.5	1.5	1.5	-.2	-.1
2019:Q2	4.7	4.3	2.5	2.4	1.8	1.7	2.2	2.2	-.2	-.2
Q4	4.2	4.0	2.2	1.9	1.9	1.9	1.9	1.9	-.1	-.1
2020:Q2	4.2	4.1	2.0	1.9	2.0	2.0	2.0	2.0	.0	.0
Q4	4.0	4.0	1.9	1.9	1.9	1.9	2.0	2.0	.0	.0
Four-quarter[3]										
2017:Q4	4.5	4.5	2.5	2.5	1.8	1.8	1.6	1.6	-.6	-.7
2018:Q4	5.2	5.3	3.0	3.1	1.8	1.8	1.8	1.8	-.4	-.3
2019:Q4	4.4	4.1	2.4	2.2	1.8	1.8	2.0	2.0	-.3	-.3
2020:Q4	4.1	4.1	2.0	1.9	2.0	1.9	2.0	2.0	.0	.0
2021:Q4	3.6	3.5	1.4	1.4	2.0	2.0	2.0	2.0	.1	.1
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	4.7	4.5	2.6	2.6	1.7	1.7	1.9	1.9	3.5	3.6
2020	4.2	4.1	2.1	2.0	1.9	1.9	2.0	2.0	3.4	3.5
2021	3.8	3.8	1.7	1.7	2.0	2.0	2.0	2.0	3.4	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	2.8	2.3	2.6	1.9	1.9	1.9	1.9	1.9	1.9	3.1	2.2	1.9	1.4
Previous Tealbook	4.2	3.5	2.3	2.6	2.4	2.3	2.1	2.1	2.0	2.0	1.9	3.0	2.4	2.0	1.4
Final sales	5.4	1.0	3.5	2.2	2.5	2.1	2.2	2.0	2.0	1.7	1.8	3.0	2.3	1.9	1.5
Previous Tealbook	5.4	1.2	2.8	2.6	2.4	2.2	2.2	2.2	2.0	1.8	1.9	2.8	2.3	2.0	1.6
Priv. dom. final purch.	4.3	3.0	4.0	2.3	2.5	2.3	2.2	2.0	2.0	2.0	1.9	3.3	2.3	1.9	1.6
Previous Tealbook	4.3	3.2	2.9	2.6	2.7	2.5	2.4	2.2	2.1	2.1	2.0	3.1	2.6	2.1	1.7
Personal cons. expend.	3.8	3.5	3.8	2.4	2.5	2.3	2.2	2.2	2.2	2.2	2.1	2.9	2.4	2.2	1.9
Previous Tealbook	3.8	3.7	3.0	2.5	2.5	2.5	2.5	2.5	2.4	2.3	2.2	2.8	2.5	2.3	1.9
Durables	8.6	3.7	7.9	5.1	2.0	1.8	1.7	1.7	1.6	1.6	1.5	4.4	2.7	1.6	1.3
Nondurables	4.0	4.6	4.8	5.1	3.0	2.4	2.3	2.3	2.3	2.3	2.2	3.4	3.2	2.3	2.0
Services	3.0	3.2	2.9	1.3	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.5	2.1	2.2	1.9
Residential investment	-1.3	-3.6	-4.4	-3.4	1.4	2.9	2.2	.1	-.8	-.5	-1.1	-3.2	.7	-.6	-.4
Previous Tealbook	-1.3	-2.9	-5.4	-2.6	1.0	1.0	.8	.4	.3	.2	.1	-3.3	.0	.2	.2
Nonres. priv. fixed invest.	8.7	2.5	7.1	3.2	3.1	2.3	1.8	1.4	1.6	1.6	1.5	7.4	2.6	1.5	.8
Previous Tealbook	8.7	2.1	5.1	4.8	4.0	3.1	2.5	1.5	1.4	1.7	1.6	6.8	3.6	1.5	.9
Equipment & intangibles	7.1	4.4	9.4	2.8	3.7	2.9	1.8	2.1	2.2	2.3	2.3	7.9	2.8	2.2	1.6
Previous Tealbook	7.1	3.8	7.1	5.0	4.7	3.5	2.5	2.1	2.1	2.3	2.4	7.2	3.9	2.2	1.6
Nonres. structures	14.5	-3.4	-.2	4.6	1.0	.4	1.8	-.9	-.1	-.8	-1.2	5.9	1.9	-.8	-2.0
Previous Tealbook	14.5	-3.4	-1.2	3.8	1.7	1.7	2.3	-.3	-1.3	-.5	-.7	5.6	2.4	-.7	-1.7
Net exports[2]	-841	-950	-961	-955	-972	-984	-988	-991	-996	-1014	-1015	-913	-975	-1004	-1023
Previous Tealbook[2]	-841	-946	-946	-946	-963	-983	-997	-998	-1010	-1032	-1034	-909	-972	-1018	-1046
Exports	9.3	-4.9	1.9	2.4	2.3	2.5	2.0	2.6	2.9	3.1	3.2	2.3	2.3	3.0	3.1
Imports	-.6	9.3	2.7	1.1	3.7	3.2	1.8	2.2	2.7	4.3	2.4	3.5	2.5	2.9	2.6
Gov't. cons. & invest.	2.5	2.6	1.7	.4	3.7	2.0	2.0	1.8	2.0	1.9	1.1	2.1	2.0	1.7	.9
Previous Tealbook	2.5	2.5	1.5	1.9	1.9	1.9	2.0	1.7	2.1	1.9	1.1	2.0	1.9	1.7	1.0
Federal	3.7	3.5	3.2	-1.0	7.8	3.3	3.5	3.0	3.8	3.5	1.2	3.2	3.4	2.9	.9
Defense	6.0	4.9	5.7	3.2	3.1	3.9	4.1	3.3	4.4	3.3	1.0	4.9	3.6	3.0	.9
Nondefense	.5	1.6	-.4	-7.0	15.2	2.5	2.6	2.6	3.0	3.7	1.6	.9	3.1	2.7	1.0
State & local	1.8	2.0	.9	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.0	1.4	1.2	1.0	1.0
Change in priv. inventories[2]	-37	90	46	52	55	44	32	29	26	37	44	32	46	34	36
Previous Tealbook[2]	-37	89	52	53	56	64	60	51	51	59	58	34	58	55	47

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	3.1	2.2	1.9	1.4
Previous Tealbook	1.5	2.6	2.7	2.0	1.9	2.5	3.0	2.4	2.0	1.4
Final sales	1.9	2.0	3.0	1.9	2.1	2.6	3.0	2.3	1.9	1.5
Previous Tealbook	1.9	2.0	3.0	1.9	2.1	2.6	2.8	2.3	2.0	1.6
Priv. dom. final purch.	2.6	2.6	4.3	2.7	2.7	3.3	3.3	2.3	1.9	1.6
Previous Tealbook	2.6	2.6	4.3	2.7	2.7	3.3	3.1	2.6	2.1	1.7
Personal cons. expend.	1.6	1.9	3.8	3.0	2.8	2.7	2.9	2.4	2.2	1.9
Previous Tealbook	1.6	1.9	3.8	3.0	2.8	2.7	2.8	2.5	2.3	1.9
Durables	6.3	5.0	9.2	6.0	6.8	7.7	4.4	2.7	1.6	1.3
Nondurables	.7	2.8	3.0	3.0	2.0	3.0	3.4	3.2	2.3	2.0
Services	1.2	1.1	3.2	2.6	2.4	1.8	2.5	2.1	2.2	1.9
Residential investment	15.4	7.1	7.8	8.9	4.5	3.8	-3.2	.7	-.6	-.4
Previous Tealbook	15.4	7.1	7.8	8.9	4.5	3.8	-3.3	.0	.2	.2
Nonres. priv. fixed invest.	5.6	5.4	6.4	-.7	1.8	6.3	7.4	2.6	1.5	.8
Previous Tealbook	5.6	5.4	6.4	-.7	1.8	6.3	6.8	3.6	1.5	.9
Equipment & intangibles	6.1	5.1	5.6	2.6	1.6	7.3	7.9	2.8	2.2	1.6
Previous Tealbook	6.1	5.1	5.6	2.6	1.6	7.3	7.2	3.9	2.2	1.6
Nonres. structures	4.0	6.7	8.8	-10.7	2.5	2.9	5.9	1.9	-.8	-2.0
Previous Tealbook	4.0	6.7	8.8	-10.7	2.5	2.9	5.6	2.4	-.7	-1.7
Net exports[1]	-569	-533	-578	-725	-786	-859	-913	-975	-1004	-1023
Previous Tealbook[1]	-569	-533	-578	-725	-786	-859	-909	-972	-1018	-1046
Exports	2.1	6.0	3.0	-1.6	.8	4.7	2.3	2.3	3.0	3.1
Imports	.6	3.0	6.7	3.4	3.1	5.4	3.5	2.5	2.9	2.6
Gov't. cons. & invest.	-2.1	-2.4	.2	2.2	.9	.1	2.1	2.0	1.7	.9
Previous Tealbook	-2.1	-2.4	.2	2.2	.9	.1	2.0	1.9	1.7	1.0
Federal	-2.6	-6.1	-1.2	1.2	.2	1.3	3.2	3.4	2.9	.9
Defense	-4.7	-6.5	-3.6	-.2	-.7	1.3	4.9	3.6	3.0	.9
Nondefense	1.2	-5.5	2.7	3.4	1.5	1.3	.9	3.1	2.7	1.0
State & local	-1.7	.2	1.1	2.8	1.4	-.5	1.4	1.2	1.0	1.0
Change in priv. inventories[1]	71	109	87	129	23	23	32	46	34	36
Previous Tealbook[1]	71	109	87	129	23	23	34	58	55	47

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	2.8	2.3	2.6	1.9	1.9	1.9	1.9	1.9	1.9	3.1	2.2	1.9	1.4
Previous Tealbook	4.2	3.5	2.3	2.6	2.4	2.3	2.1	2.1	2.0	2.0	1.9	3.0	2.4	2.0	1.4
Final sales	5.3	1.0	3.5	2.2	2.5	2.1	2.2	2.0	2.0	1.7	1.8	2.9	2.2	1.9	1.5
Previous Tealbook	5.3	1.2	2.8	2.6	2.3	2.2	2.2	2.2	2.0	1.8	1.9	2.8	2.3	2.0	1.6
Priv. dom. final purch.	3.7	2.6	3.4	2.0	2.2	2.0	1.9	1.7	1.7	1.7	1.6	2.8	2.0	1.7	1.4
Previous Tealbook	3.7	2.7	2.5	2.2	2.3	2.2	2.1	1.9	1.8	1.8	1.7	2.7	2.2	1.8	1.4
Personal cons. expend.	2.6	2.4	2.6	1.7	1.7	1.5	1.5	1.5	1.5	1.5	1.4	2.0	1.6	1.5	1.3
Previous Tealbook	2.6	2.5	2.0	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.5	1.9	1.7	1.6	1.3
Durables	.6	.3	.5	.4	.1	.1	.1	.1	.1	.1	.1	.3	.2	.1	.1
Nondurables	.6	.6	.7	.7	.4	.3	.3	.3	.3	.3	.3	.5	.4	.3	.3
Services	1.4	1.5	1.4	.6	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.2	1.0	1.1	.9
Residential investment	-.1	-.1	-.2	-.1	.1	.1	.1	.0	.0	.0	.0	-.1	.0	.0	.0
Previous Tealbook	-.1	-.1	-.2	-.1	.0	.0	.0	.0	.0	.0	.0	-.1	.0	.0	.0
Nonres. priv. fixed invest.	1.2	.4	1.0	.4	.4	.3	.2	.2	.2	.2	.2	1.0	.4	.2	.1
Previous Tealbook	1.2	.3	.7	.6	.5	.4	.3	.2	.2	.2	.2	.9	.5	.2	.1
Equipment & intangibles	.7	.5	1.0	.3	.4	.3	.2	.2	.2	.2	.2	.8	.3	.2	.2
Previous Tealbook	.7	.4	.7	.5	.5	.4	.3	.2	.2	.2	.2	.7	.4	.2	.2
Nonres. structures	.4	-.1	.0	.1	.0	.0	.1	.0	.0	.0	.0	.2	.1	.0	-.1
Previous Tealbook	.4	-.1	.0	.1	.1	.1	.1	.0	.0	.0	.0	.2	.1	.0	-.1
Net exports	1.2	-2.0	-.2	.1	-.3	-.2	.0	.0	.0	-.3	.0	-.3	-.1	-.1	.0
Previous Tealbook	1.2	-1.9	.1	.0	-.3	-.3	-.2	.0	-.2	-.3	.0	-.2	-.2	-.1	.0
Exports	1.1	-.6	.2	.3	.3	.3	.2	.3	.4	.4	.4	.3	.3	.4	.4
Imports	.1	-1.4	-.4	-.2	-.6	-.5	-.3	-.3	-.4	-.6	-.4	-.5	-.4	-.4	-.4
Gov't. cons. & invest.	.4	.4	.3	.1	.6	.3	.3	.3	.4	.3	.2	.4	.3	.3	.2
Previous Tealbook	.4	.4	.3	.3	.3	.3	.3	.3	.4	.3	.2	.3	.3	.3	.2
Federal	.2	.2	.2	-.1	.5	.2	.2	.2	.2	.2	.1	.2	.2	.2	.1
Defense	.2	.2	.2	.1	.1	.1	.2	.1	.2	.1	.0	.2	.1	.1	.0
Nondefense	.0	.0	.0	-.2	.4	.1	.1	.1	.1	.1	.0	.0	.1	.1	.0
State & local	.2	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.2	.1	.1	.1
Change in priv. inventories	-1.2	2.3	-.7	.1	.1	-.2	-.2	-.1	-.1	.2	.1	.2	-.1	.1	-.1
Previous Tealbook	-1.2	2.3	-.6	.0	.1	.1	-.1	-.2	.0	.1	.0	.2	.0	.0	-.2

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	1.8	1.6	2.0	2.1	1.9	2.1	2.2	2.1	2.0	2.2	1.9	2.1	2.1
Previous Tealbook	3.0	1.7	1.8	2.0	2.2	2.1	1.9	2.0	2.2	2.1	2.0	2.1	2.0	2.1	2.1
PCE chain-wt. price index	2.0	1.6	1.4	1.3	2.1	2.0	1.8	2.0	1.9	1.9	1.9	1.8	1.8	1.9	2.0
Previous Tealbook	2.0	1.5	1.4	1.7	1.9	1.9	1.8	2.0	2.0	2.0	1.9	1.8	1.8	2.0	2.0
Energy	.7	3.3	.4	-18.4	2.4	.7	.4	-.1	.0	-.1	-.1	4.2	-4.1	-.1	.5
Previous Tealbook	.7	3.4	-.4	-12.9	-.8	.0	.2	-.4	-.4	-.1	.0	4.0	-3.5	-.2	.5
Food	1.2	.4	.3	2.1	2.2	2.4	2.4	2.3	2.3	2.3	2.3	.5	2.3	2.3	2.3
Previous Tealbook	1.2	.4	.2	2.1	2.3	2.4	2.4	2.3	2.3	2.3	2.3	.5	2.3	2.3	2.3
Ex. food & energy	2.1	1.6	1.5	2.3	2.0	2.0	1.9	2.1	2.0	2.0	2.0	1.8	2.0	2.0	2.0
Previous Tealbook	2.1	1.5	1.6	2.3	2.0	2.0	1.9	2.1	2.0	2.0	2.0	1.8	2.0	2.0	2.0
Ex. food & energy, market based	2.2	1.2	1.3	2.3	2.0	1.8	1.7	1.9	1.8	1.8	1.8	1.7	1.9	1.9	1.9
Previous Tealbook	2.2	1.2	1.2	2.3	1.8	1.8	1.7	1.9	1.9	1.9	1.8	1.6	1.9	1.9	1.9
CPI	1.7	2.0	1.8	1.0	2.5	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.0	2.3	2.3
Previous Tealbook	1.7	2.0	1.8	1.6	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.0	2.3	2.4
Ex. food & energy	1.8	2.0	2.0	2.7	2.5	2.4	2.3	2.5	2.4	2.4	2.4	2.2	2.5	2.4	2.5
Previous Tealbook	1.8	2.0	2.1	2.8	2.4	2.4	2.3	2.5	2.5	2.5	2.5	2.2	2.5	2.5	2.5
ECI, hourly compensation[2]	2.4	3.0	2.6	2.8	2.8	2.8	2.9	2.8	2.8	2.8	2.8	3.0	2.9	2.8	2.8
Previous Tealbook[2]	2.4	3.0	2.6	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	3.0	2.9	2.9	2.9
Business sector															
Output per hour	3.6	1.8	1.8	.3	1.2	.8	.9	1.1	1.2	1.2	1.2	1.9	.8	1.2	1.2
Previous Tealbook	3.6	2.0	.9	.7	.6	1.1	1.1	1.1	1.2	1.3	1.3	1.8	.9	1.2	1.2
Compensation per hour	.5	2.8	3.4	3.7	3.9	3.9	3.9	3.8	3.8	3.8	3.8	2.7	3.8	3.8	3.7
Previous Tealbook	.5	2.8	2.9	3.7	3.9	3.9	3.9	3.9	3.9	3.9	3.9	2.6	3.9	3.9	3.8
Unit labor costs	-2.9	1.0	1.6	3.3	2.7	3.1	2.9	2.7	2.6	2.5	2.5	.8	3.0	2.6	2.5
Previous Tealbook	-2.9	.8	1.9	2.9	3.3	2.8	2.8	2.7	2.6	2.6	2.6	.8	3.0	2.6	2.6
Core goods imports chain-wt. price index[3]	.6	-1.2	-.1	.4	1.5	.9	.9	1.1	.9	.8	.9	.5	.9	.9	.8
Previous Tealbook[3]	.6	-1.2	1.0	.3	.8	.9	1.0	1.1	1.1	1.0	1.0	.7	.8	1.0	.9

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

Changes in Prices and Costs

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

Item	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	2.2	1.9	2.1	2.1
Previous Tealbook	2.1	1.8	1.6	.9	1.5	2.0	2.1	2.0	2.1	2.1
PCE chain-wt. price index	1.8	1.2	1.2	.3	1.6	1.8	1.8	1.8	1.9	2.0
Previous Tealbook	1.8	1.2	1.2	.3	1.6	1.8	1.8	1.8	2.0	2.0
Energy	2.1	-2.9	-6.9	-16.4	2.1	8.1	4.2	-4.1	-.1	.5
Previous Tealbook	2.1	-2.9	-6.9	-16.4	2.1	8.1	4.0	-3.5	-.2	.5
Food	1.3	.7	2.8	.3	-1.8	.7	.5	2.3	2.3	2.3
Previous Tealbook	1.3	.7	2.8	.3	-1.8	.7	.5	2.3	2.3	2.3
Ex. food & energy	1.8	1.6	1.5	1.2	1.8	1.6	1.8	2.0	2.0	2.0
Previous Tealbook	1.8	1.6	1.5	1.2	1.8	1.6	1.8	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	1.9	1.9	1.9
Previous Tealbook	1.5	1.1	1.2	1.1	1.5	1.2	1.6	1.9	1.9	1.9
CPI	1.9	1.2	1.2	.4	1.8	2.1	2.2	2.0	2.3	2.3
Previous Tealbook	1.9	1.2	1.2	.4	1.8	2.1	2.2	2.0	2.3	2.4
Ex. food & energy	1.9	1.7	1.7	2.0	2.2	1.7	2.2	2.5	2.4	2.5
Previous Tealbook	1.9	1.7	1.7	2.0	2.2	1.7	2.2	2.5	2.5	2.5
ECI, hourly compensation[1]	1.8	2.0	2.3	1.9	2.2	2.6	3.0	2.9	2.8	2.8
Previous Tealbook[1]	1.8	2.0	2.3	1.9	2.2	2.6	3.0	2.9	2.9	2.9
Business sector										
Output per hour	.2	1.8	.1	.7	1.1	.8	1.9	.8	1.2	1.2
Previous Tealbook	.2	1.8	.1	.7	1.1	.8	1.8	.9	1.2	1.2
Compensation per hour	5.9	-.3	2.8	2.5	2.1	3.0	2.7	3.8	3.8	3.7
Previous Tealbook	5.9	-.3	2.8	2.5	2.1	3.0	2.6	3.9	3.9	3.8
Unit labor costs	5.7	-2.0	2.7	1.8	1.0	2.3	.8	3.0	2.6	2.5
Previous Tealbook	5.7	-2.0	2.7	1.8	1.0	2.3	.8	3.0	2.6	2.6
Core goods imports chain-wt. price index[2]	-.4	-2.2	-.4	-4.4	-.7	1.1	.5	.9	.9	.8
Previous Tealbook[2]	-.4	-2.2	-.4	-4.4	-.7	1.1	.7	.8	1.0	.9

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]	217	190	254	202	181	160	140	130	123	117	110	220	171	120	70
Unemployment rate[3]	3.9	3.8	3.8	3.7	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.8	3.5	3.5	3.6
Previous Tealbook[3]	3.9	3.8	3.7	3.6	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.7	3.4	3.4	3.5
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	60.7	60.7	60.6	60.6	60.7	60.6	60.4
Employment-to-Population Trend[3]	59.8	59.8	59.8	59.7	59.7	59.6	59.6	59.6	59.5	59.5	59.5	59.8	59.6	59.5	59.3
Output gap[4]	1.6	2.0	2.2	2.4	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.2	2.6	2.7	2.2
Previous Tealbook[4]	1.6	2.0	2.2	2.4	2.5	2.7	2.8	2.8	2.8	2.9	2.9	2.2	2.8	2.9	2.4
Industrial production[5]	5.2	4.7	3.8	1.0	2.1	1.0	1.0	1.6	1.6	1.4	1.5	4.1	1.3	1.5	.8
Previous Tealbook[5]	5.3	4.7	3.8	2.2	1.9	1.4	1.4	1.5	1.1	1.0	.9	4.1	1.7	1.1	.4
Manufacturing industr. prod.[5]	2.3	3.7	2.3	1.7	1.1	1.0	1.0	.7	1.0	1.2	1.1	2.5	1.2	1.0	.5
Previous Tealbook[5]	2.3	3.5	3.8	1.6	1.3	1.3	1.3	1.0	1.0	1.0	.7	2.9	1.4	.9	.2
Capacity utilization rate - mfg.[3]	75.5	75.9	76.1	76.2	76.2	76.3	76.2	76.3	76.3	76.4	76.5	76.1	76.2	76.5	76.6
Previous Tealbook[3]	75.5	75.9	76.3	76.5	76.6	76.6	76.7	76.8	76.9	77.0	77.0	76.3	76.7	77.0	76.8
Housing starts[6]	1.3	1.2	1.2	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2
Light motor vehicle sales[6]	17.2	16.9	17.5	17.2	17.0	16.9	16.9	16.9	16.8	16.7	16.7	17.2	17.0	16.8	16.7
Income and saving															
Nominal GDP[5]	7.6	4.9	4.4	3.9	4.7	4.1	3.9	4.1	4.2	4.0	3.9	5.3	4.1	4.1	3.5
Real disposable pers. income[5]	1.8	2.4	3.3	4.1	2.3	2.1	2.0	3.1	2.0	1.3	2.0	3.0	2.6	2.1	1.6
Previous Tealbook[5]	1.8	2.4	2.8	3.4	2.8	2.2	2.3	3.4	2.1	1.4	2.1	2.8	2.7	2.2	1.8
Personal saving rate[3]	6.7	6.3	6.2	6.5	6.5	6.5	6.4	6.6	6.6	6.4	6.4	6.2	6.4	6.4	6.1
Previous Tealbook[3]	6.7	6.3	6.2	6.4	6.4	6.4	6.3	6.5	6.5	6.3	6.3	6.2	6.3	6.3	6.1
Corporate profits[7]	12.5	14.7	-2.6	-3.1	1.1	.7	-2.9	-.6	2.0	2.0	1.9	7.2	-1.1	1.3	1.1
Profit share of GNP[3]	10.8	11.1	10.9	10.8	10.7	10.6	10.4	10.3	10.3	10.2	10.2	10.9	10.4	10.2	10.0
Gross national saving rate[3]	18.5	18.7	18.4	18.5	18.3	18.3	18.2	18.1	18.1	18.0	18.0	18.4	18.2	18.0	17.8
Net national saving rate[3]	3.3	3.5	3.4	3.4	3.1	3.0	2.9	2.7	2.6	2.5	2.5	3.4	2.9	2.5	2.1

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]	179	192	250	226	195	182	220	171	120	70
Unemployment rate[2]	7.8	7.0	5.7	5.0	4.8	4.1	3.8	3.5	3.5	3.6
Previous Tealbook[2]	7.8	7.0	5.7	5.0	4.7	4.1	3.7	3.4	3.4	3.5
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	60.6	60.4
Employment-to-Population Trend[2]	60.3	60.2	60.1	60.0	59.9	59.9	59.8	59.6	59.5	59.3
Output gap[3]	-3.7	-2.8	-.8	-.2	.3	1.1	2.2	2.6	2.7	2.2
Previous Tealbook[3]	-3.7	-2.8	-.8	-.2	.3	1.1	2.2	2.8	2.9	2.4
Industrial production	2.2	2.3	3.4	-3.3	-.5	3.0	4.1	1.3	1.5	.8
Previous Tealbook	2.2	2.3	3.4	-3.3	-.5	3.0	4.1	1.7	1.1	.4
Manufacturing industr. prod.	1.4	1.1	1.4	-1.6	-.1	1.9	2.5	1.2	1.0	.5
Previous Tealbook	1.4	1.1	1.4	-1.6	-.1	1.9	2.9	1.4	.9	.2
Capacity utilization rate - mfg.[2]	74.7	75.1	76.3	75.4	74.4	75.2	76.1	76.2	76.5	76.6
Previous Tealbook[2]	74.7	75.1	76.3	75.4	74.4	75.2	76.3	76.7	77.0	76.8
Housing starts[4]	.8	.9	1.0	1.1	1.2	1.2	1.3	1.2	1.2	1.2
Light motor vehicle sales[4]	14.4	15.5	16.5	17.4	17.5	17.1	17.2	17.0	16.8	16.7
Income and saving										
Nominal GDP	3.6	4.4	4.4	2.9	3.4	4.5	5.3	4.1	4.1	3.5
Real disposable pers. income	4.9	-2.5	5.2	3.1	1.6	2.8	3.0	2.6	2.1	1.6
Previous Tealbook	4.9	-2.5	5.2	3.1	1.6	2.8	2.8	2.7	2.2	1.8
Personal saving rate[2]	10.2	6.3	7.4	7.4	6.4	6.3	6.2	6.4	6.4	6.1
Previous Tealbook[2]	10.2	6.3	7.4	7.4	6.4	6.3	6.2	6.3	6.3	6.1
Corporate profits[5]	.7	3.9	5.9	-10.7	7.6	3.3	7.2	-1.1	1.3	1.1
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	18.4	18.2	18.0	17.8
Net national saving rate[2]	3.7	4.0	5.1	4.3	3.0	3.1	3.4	2.9	2.5	2.1

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 Q3	2018 Q4	2019 Q1	2019 Q2
Unified federal budget[1]				Nominal dollars, billions						
Receipts	3,268	3,316	3,329	3,435	3,586	3,712	788	774	713	1,109
Outlays	3,853	3,982	4,108	4,415	4,729	4,999	960	1,146	1,088	1,120
Surplus/deficit	-585	-665	-779	-980	-1,143	-1,287	-172	-372	-374	-11
				Percent of GDP						
Surplus/deficit	-3.2	-3.5	-3.8	-4.6	-5.2	-5.6	-3.4	-7.3	-7.2	-.2
Previous Tealbook	*-3.2*	*-3.5*	*-3.8*	*-4.7*	*-5.3*	*-5.7*	*-3.4*	*-7.2*	*-7.3*	*-.3*
Primary surplus/deficit	-1.9	-2.1	-2.2	-2.8	-3.0	-3.3	-2.2	-4.7	-5.8	2.2
Net interest	1.3	1.4	1.6	1.8	2.2	2.3	1.2	2.6	1.4	2.4
Cyclically adjusted surplus/deficit	-3.1	-3.7	-4.5	-5.7	-6.4	-6.8	-4.2	-8.2	-8.2	-1.3
Federal debt held by public	76.4	76.1	77.8	78.8	80.9	83.7	77.8	78.9	78.6	78.8
Government in the NIPA[2]				Real percent change, annual rate						
Purchases	.9	.1	2.1	2.0	1.7	.9	2.6	1.7	.4	3.7
Consumption	.9	-.1	1.6	1.4	1.2	.6	2.3	.8	-.5	3.4
Investment	.7	1.4	4.1	4.3	3.4	2.0	4.0	5.9	4.2	4.5
State and local construction	1.8	-2.9	4.2	2.5	1.0	1.0	4.6	3.0	3.0	3.0
Real disposable personal income	1.6	2.8	2.9	2.6	2.1	1.6	2.3	3.3	4.1	2.3
Contribution from transfers[3]	.3	.2	.5	.8	.5	.6	.5	.5	2.0	.5
Contribution from taxes[3]	-.1	-.6	-.1	-.7	-.5	-.6	-.7	-.6	-.6	-.6
Government employment				Average net change in monthly payrolls, thousands						
Federal	3	-1	1	2	1	1	1	2	3	2
State and local	14	3	5	9	9	9	15	1	9	9
Fiscal indicators[2]				Percentage point contribution to change in real GDP, annual rate						
Fiscal effect (FE)[4]	.4	.1	.5	.8	.6	.4	.7	.6	.7	1.2
Discretionary policy actions (FI)	.3	.2	.7	.6	.5	.2	.8	.6	.4	.9
Previous Tealbook	*.3*	*.2*	*.7*	*.6*	*.5*	*.2*	*.8*	*.6*	*.7*	*.6*
Federal purchases	.0	.1	.2	.2	.2	.1	.2	.2	-.1	.5
State and local purchases	.1	-.1	.2	.1	.1	.1	.2	.1	.1	.1
Taxes and transfers	.1	.1	.3	.3	.2	.0	.3	.3	.4	.3
Cyclical	-.1	-.1	-.2	-.2	-.1	.0	-.2	-.2	-.1	-.2
Other	.2	.1	.0	.3	.2	.2	.1	.2	.4	.4

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)

					Projected							
	2018				2019				2020			
Measure and country	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
***Real GDP*[1]**												
Total foreign	3.1	2.0	2.1	2.1	2.1	2.4	2.6	2.3	2.6	2.7	2.7	2.7
Previous Tealbook	*3.1*	*2.0*	*2.1*	*2.4*	*2.3*	*2.4*	*2.7*	*2.4*	*2.7*	*2.8*	*2.7*	*2.7*
Advanced foreign economies	1.3	2.4	1.0	1.5	1.4	1.6	1.7	1.1	1.6	1.7	1.7	1.7
Canada	1.7	2.9	2.0	1.8	1.0	2.0	1.7	1.7	1.9	1.9	1.8	1.8
Japan	-1.3	2.8	-2.5	2.3	1.0	.8	3.2	-4.0	.7	1.0	1.0	.9
United Kingdom	.3	1.7	2.5	1.1	1.1	1.5	1.9	1.9	1.9	1.9	1.9	1.9
Euro area	1.5	1.7	.6	.8	1.8	1.2	1.2	1.3	1.4	1.5	1.6	1.7
Germany	1.5	1.8	-.8	.7	2.0	1.5	1.4	1.4	1.4	1.4	1.4	1.4
Emerging market economies	4.9	1.5	3.2	2.6	2.9	3.2	3.4	3.5	3.6	3.6	3.6	3.6
Asia	6.3	4.0	3.7	4.3	4.3	4.5	4.6	4.5	4.4	4.4	4.4	4.4
Korea	4.1	2.4	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5
China	7.2	6.5	5.9	5.8	5.9	6.2	6.4	6.3	6.0	6.0	5.9	5.9
Latin America	3.5	-1.0	2.7	1.0	1.5	2.1	2.4	2.5	2.8	2.9	2.9	2.9
Mexico	4.3	-.4	3.4	1.5	1.5	2.0	2.3	2.5	2.7	2.9	2.9	2.9
Brazil	.6	.7	3.1	.8	2.3	2.5	2.8	2.8	2.8	2.8	2.8	2.8
***Consumer prices*[2]**												
Total foreign	2.6	1.7	3.7	2.2	2.0	2.3	2.3	2.7	2.3	2.3	2.3	2.3
Previous Tealbook	*2.6*	*1.7*	*3.7*	*2.8*	*2.0*	*2.3*	*2.3*	*2.7*	*2.3*	*2.4*	*2.4*	*2.4*
Advanced foreign economies	2.6	1.0	2.5	.9	1.0	1.3	1.5	2.4	1.5	1.5	1.5	1.6
Canada	3.6	1.1	2.6	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Japan	2.5	-2.3	2.7	.4	-.3	.6	.9	6.3	.9	.9	1.0	1.0
United Kingdom	2.3	2.0	2.9	1.9	1.4	2.0	2.2	2.3	2.3	2.3	2.2	2.2
Euro area	2.1	2.1	2.6	.9	.7	1.0	1.2	1.2	1.2	1.3	1.3	1.4
Germany	1.3	2.5	2.4	1.6	1.5	1.6	1.9	2.1	2.2	2.2	2.1	2.1
Emerging market economies	2.6	2.2	4.6	3.2	2.7	3.0	2.9	2.9	2.9	2.9	2.9	2.9
Asia	1.8	1.0	3.2	2.0	1.5	2.3	2.3	2.3	2.5	2.6	2.6	2.6
Korea	1.6	2.2	1.9	1.5	-.1	1.9	1.9	1.9	2.0	2.1	2.1	2.1
China	1.5	.7	4.1	2.4	1.6	2.1	2.1	2.1	2.4	2.5	2.5	2.5
Latin America	4.8	4.9	8.1	6.1	5.3	4.5	4.3	4.2	3.7	3.6	3.5	3.5
Mexico	4.1	3.8	6.8	4.6	4.3	3.5	3.3	3.3	3.2	3.2	3.2	3.2
Brazil	3.1	4.3	6.6	2.6	3.1	4.3	4.3	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	2.9	1.9	2.7	2.9	2.3	2.3	2.7	2.6
Previous Tealbook	*2.2*	*3.0*	*2.9*	*1.9*	*2.7*	*2.9*	*2.4*	*2.4*	*2.7*	*2.6*
Advanced foreign economies	.3	2.4	2.1	.9	1.8	2.6	1.6	1.4	1.7	1.7
Canada	.7	3.4	2.8	-.4	1.8	2.9	2.1	1.6	1.9	1.7
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	1.6	1.9	1.7
Euro area	-1.1	.7	1.6	2.0	2.1	2.7	1.2	1.4	1.5	1.7
Germany	.2	1.6	2.3	1.3	1.9	2.8	.8	1.6	1.4	1.5
Emerging market economies	4.1	3.5	3.6	2.9	3.5	3.2	3.0	3.2	3.6	3.5
Asia	5.8	5.4	5.0	4.5	4.9	5.2	4.6	4.5	4.4	4.2
Korea	2.1	3.5	2.8	3.2	2.6	2.8	2.8	2.5	2.5	2.3
China	8.0	7.6	7.1	6.8	6.8	6.8	6.3	6.2	5.9	5.7
Latin America	2.9	1.7	2.5	1.6	2.2	1.5	1.5	2.1	2.9	2.9
Mexico	3.0	1.2	3.4	2.8	3.3	1.5	2.2	2.1	2.8	2.9
Brazil	2.2	2.6	-.1	-5.5	-1.9	2.2	1.3	2.6	2.8	2.8
Consumer prices[2]										
Total foreign	2.3	2.4	2.0	1.4	1.9	2.6	2.6	2.3	2.3	2.3
Previous Tealbook	*2.3*	*2.4*	*2.0*	*1.4*	*1.9*	*2.6*	*2.7*	*2.3*	*2.4*	*2.4*
Advanced foreign economies	1.3	1.0	1.2	.4	.9	1.5	1.8	1.5	1.5	1.6
Canada	1.0	1.0	2.0	1.3	1.4	1.8	2.1	2.0	2.0	2.0
Japan	-.2	1.4	2.6	.1	.3	.6	.8	1.8	.9	1.1
United Kingdom	2.6	2.1	.9	.1	1.2	3.0	2.3	2.0	2.3	2.2
Euro area	2.3	.8	.1	.2	.7	1.4	1.9	1.0	1.3	1.4
Germany	1.9	1.4	.4	.2	1.0	1.6	1.9	1.8	2.1	2.0
Emerging market economies	3.1	3.4	2.7	2.1	2.7	3.4	3.2	2.9	2.9	2.9
Asia	2.6	3.1	1.8	1.5	2.0	2.0	2.0	2.1	2.6	2.6
Korea	1.7	1.1	1.0	.9	1.4	1.4	1.8	1.4	2.0	2.1
China	2.1	2.9	1.5	1.5	2.1	1.8	2.2	2.0	2.5	2.5
Latin America	4.3	4.2	4.9	3.4	4.3	6.7	5.9	4.6	3.6	3.5
Mexico	4.1	3.6	4.2	2.3	3.3	6.6	4.8	3.6	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				2019				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	**-486.8**	**-404.9**	**-499.3**	**-565.8**	**-599.4**	**-619.6**	**-630.1**	**-643.6**	**-672.5**	**-668.2**	**-695.5**	**-699.2**
Previous Tealbook	*-486.8*	*-405.8*	*-495.1*	*-550.5*	*-585.0*	*-593.0*	*-628.5*	*-654.5*	*-683.3*	*-687.4*	*-719.9*	*-727.6*
Current account as percent of GDP	-2.4	-2.0	-2.4	-2.7	-2.8	-2.9	-2.9	-3.0	-3.1	-3.0	-3.1	-3.1
Previous Tealbook	*-2.4*	*-2.0*	*-2.4*	*-2.6*	*-2.8*	*-2.8*	*-2.9*	*-3.0*	*-3.1*	*-3.1*	*-3.2*	*-3.2*
Net goods & services	-616.0	-538.4	-634.6	-634.4	-619.1	-628.4	-632.9	-634.3	-640.5	-631.9	-643.3	-642.9
Investment income, net	258.2	263.2	251.6	179.7	139.8	117.9	117.9	101.8	88.1	72.7	62.9	54.8
Direct, net	310.4	316.4	310.6	278.6	252.6	248.1	266.5	271.3	277.1	282.7	293.9	305.5
Portfolio, net	-52.2	-53.1	-59.0	-98.9	-112.8	-130.2	-148.7	-169.5	-189.1	-210.0	-230.9	-250.6
Other income and transfers, net	-129.1	-129.7	-116.2	-111.1	-120.0	-109.0	-115.1	-111.1	-120.0	-109.0	-115.1	-111.1

Annual Data

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	Billions of dollars									
U.S. current account balance	**-426.8**	**-348.8**	**-365.2**	**-407.8**	**-432.9**	**-449.1**	**-489.2**	**-623.2**	**-683.8**	**-716.4**
Previous Tealbook	*-426.2*	*-349.5*	*-365.1*	*-409.7*	*-434.3*	*-449.1*	*-484.6*	*-615.3*	*-704.6*	*-747.0*
Current account as percent of GDP	-2.6	-2.1	-2.1	-2.2	-2.3	-2.3	-2.4	-2.9	-3.1	-3.1
Previous Tealbook	*-2.6*	*-2.1*	*-2.1*	*-2.2*	*-2.3*	*-2.3*	*-2.4*	*-2.9*	*-3.2*	*-3.2*
Net goods & services	-537.4	-461.1	-489.6	-498.5	-502.0	-552.3	-605.8	-628.7	-639.6	-641.6
Investment income, net	216.1	215.4	229.0	214.7	205.7	235.1	238.2	119.3	69.7	39.0
Direct, net	285.5	283.3	284.2	284.6	272.6	298.4	304.0	259.6	289.8	331.1
Portfolio, net	-69.4	-67.9	-55.3	-70.0	-66.9	-63.3	-65.8	-140.3	-220.2	-292.1
Other income and transfers, net	-105.5	-103.1	-104.6	-123.9	-136.6	-132.0	-121.5	-113.8	-113.8	-113.8

Abbreviations

AFE	advanced foreign economy
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BOC	Bank of Canada
C&I	commercial and industrial
CMBS	commercial mortgage-backed securities
CPI	consumer price index
CRE	commercial real estate
DFM	dynamic factor model
DSGE	dynamic stochastic general equilibrium
EBP	excess bond premium
ECB	European Central Bank
ECI	employment cost index
EME	emerging market economy
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
FX	foreign exchange
GDP	gross domestic product
GNP	gross national product
GSE	government-sponsored enterprise
HECM	Home Equity Conversion Mortgage

IPO	initial public offering
IRS	Internal Revenue Service
LFPR	labor force participation rate
NIPA	national income and product accounts
OIS	overnight index swap
ON RRP	overnight reverse repurchase agreement
PCE	personal consumption expenditures
PMI	purchasing managers index
QS	quantitative surveillance
SBA	Small Business Administration
SEC	Securities and Exchange Commission
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
TFP	total factor productivity
TIPS	Treasury Inflation-Protected Securities
USDA	United States Department of Agriculture
VA	Department of Veterans Affairs
VAR	vector autoregression
VIX	one-month-ahead option-implied volatility on the S&P 500 index