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 1/12/2024.

Report to the FOMC on Economic Conditions and Monetary Policy

Book A

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

October 26, 2018

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

(This page is intentionally blank.)

Domestic Economic Developments and Outlook

The data on economic activity that we have received in the past several weeks indicate that the economy is expanding solidly. Real GDP appears on track to rise 3 percent for the year as a whole, bolstered by expansionary fiscal policy and financial conditions that remain generally supportive despite recent substantial declines in equity prices. Meanwhile, the labor market tightened further in September, and we continue to expect robust job gains in coming months, with the unemployment rate edging down to 3.6 percent by the end of this year. Overall, our assessment of the tightness of resource utilization in the current quarter is not materially different from that in the September Tealbook.[1]

Our medium-term forecast for GDP growth is somewhat lower than in the September Tealbook, primarily reflecting the recent declines in equity prices. We now expect the output gap to widen from 2½ percent currently to 3 percent in 2020 before dropping back—about ¼ percentage point narrower throughout the medium term than in the September Tealbook forecast. The path for the unemployment rate has correspondingly revised up slightly, bottoming out at 3.3 percent in 2020. Apart from equity prices, other influences on the contour of real GDP are mostly similar to our previous projection. In particular, while rising interest rates appear to be exerting a modest drag on economic activity to date—largely showing through in declining residential investment—we expect a more noticeable drag on economic activity over the next few years as monetary policy tightens further. In addition, we expect the boost from fiscal policy to wane and recent trade policy actions to restrain growth a little. All told, real GDP growth is projected to slow steadily from 3 percent this year to 1½ percent in 2021.

The 12-month change in core PCE prices is estimated to have been 1.9 percent in September, and we forecast it to remain around that level through the end of this year. Core PCE price inflation edges up to 2.0 percent over the medium term, as labor and product markets tighten further. Total PCE price inflation is projected to run slightly above core inflation through the end of this year and then to run a touch below it thereafter, as consumer energy prices are forecast to decline in the medium term.

[1] The BEA's report on third-quarter GDP was released after the close of the Tealbook forecast. As a result, the exhibits do not reflect these data.

Comparing the Staff Projection with Other Forecasts

The October Tealbook projection for real GDP growth lies close to both the Blue Chip consensus forecast and the Survey of Professional Forecasters (SPF) median forecast for 2018; all three forecasts step down in 2019 and are within a narrow range. The staff's unemployment rate forecast is in line with the others in 2018 and a touch below the Blue Chip consensus in 2019. The staff projection for measures of price inflation are close to the Blue Chip consensus and SPF median forecasts in both 2018 and 2019.

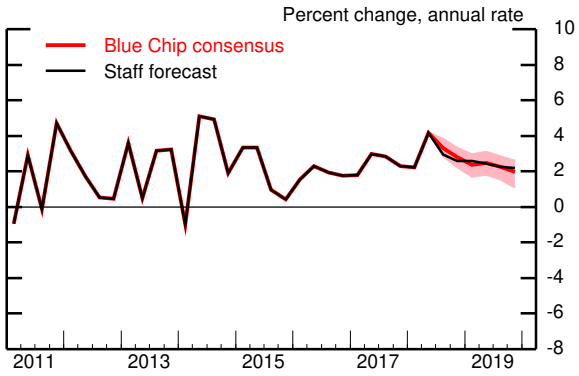
Comparison of Tealbook and Outside Forecasts

	2018	2019
GDP (Q4/Q4 percent change)		
October Tealbook	3.0	2.4
Blue Chip (10/10/18)	3.1	2.3
SPF median (08/10/18)	2.9	n.a.
Unemployment rate (Q4 level)		
October Tealbook	3.6	3.3
Blue Chip (10/10/18)	3.7	3.5
SPF median (08/10/18)	3.7	n.a.
CPI inflation (Q4/Q4 percent change)		
October Tealbook	2.3	2.3
Blue Chip (10/10/18)	2.5	2.3
SPF median (08/10/18)	2.4	2.3
PCE price inflation (Q4/Q4 percent change)		
October Tealbook	2.0	2.0
SPF median (08/10/18)	2.1	2.1
Core PCE price inflation (Q4/Q4 percent change)		
October Tealbook	1.9	2.0
SPF median (08/10/18)	2.0	2.1

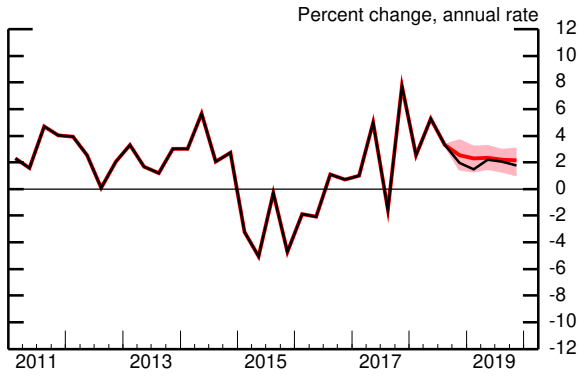
Note: SPF is the Survey of Professional Forecasters, CPI is the consumer price index, and PCE is personal consumption expenditures. Blue Chip does not provide results for overall and core PCE price inflation. The Blue Chip consensus forecast includes input from about 50 panelists, and the SPF about 40. Roughly 20 panelists contribute to both surveys.
n.a. Not available.
Source: Blue Chip Economic Indicators; Federal Reserve Bank of Philadelphia.

Tealbook Forecast Compared with Blue Chip

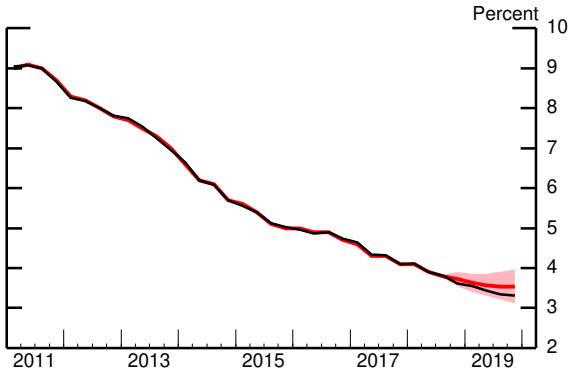
Real GDP



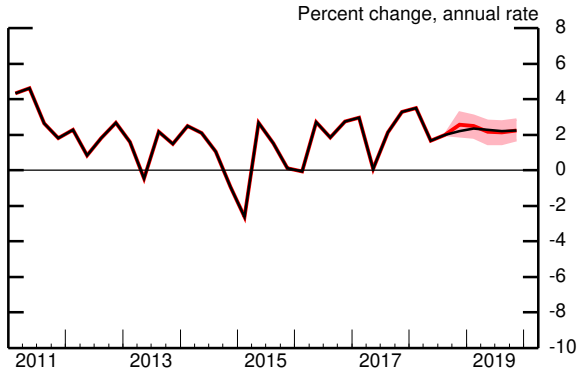
Industrial Production



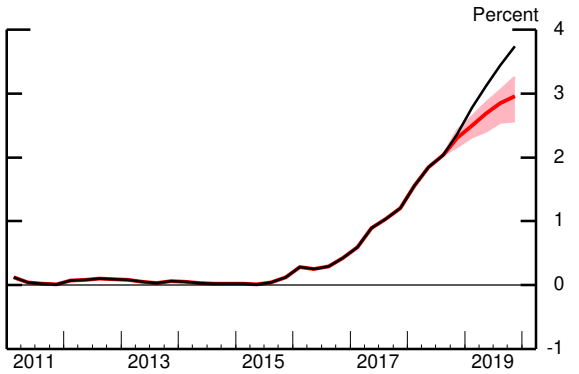
Unemployment Rate



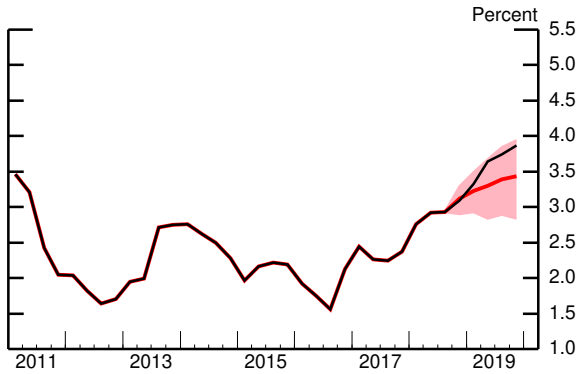
Consumer Price Index



Treasury Bill Rate



10-Year Treasury Yield



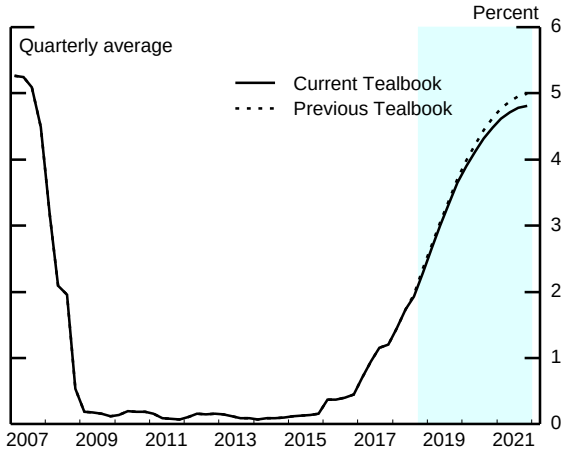
Note: The yield is for on-the-run Treasury securities. Over the forecast period, the staff's projected yield is assumed to be 15 basis points below the off-the-run yield.

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

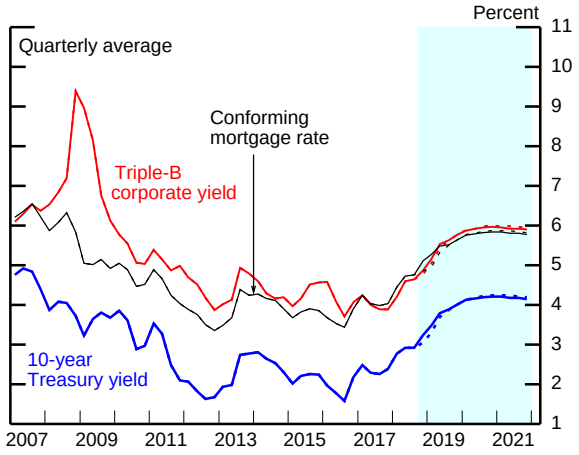
Domestic Econ Devel & Outlook

Key Background Factors underlying the Baseline Staff Projection

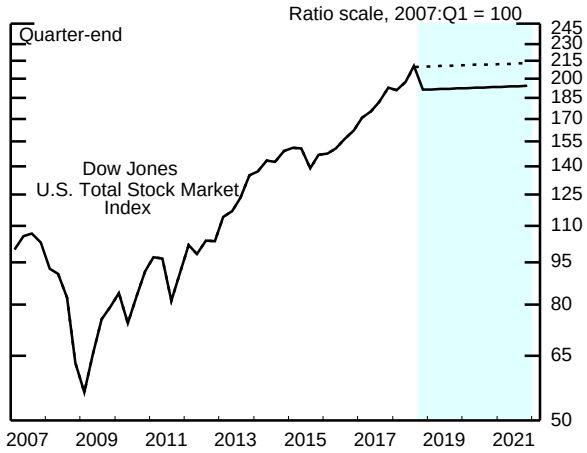
Federal Funds Rate



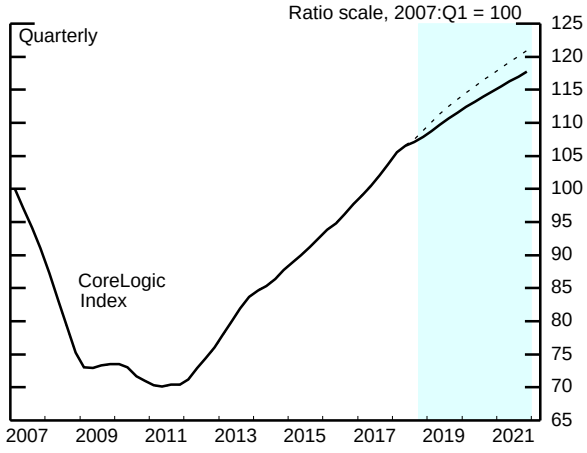
Long-Term Interest Rates



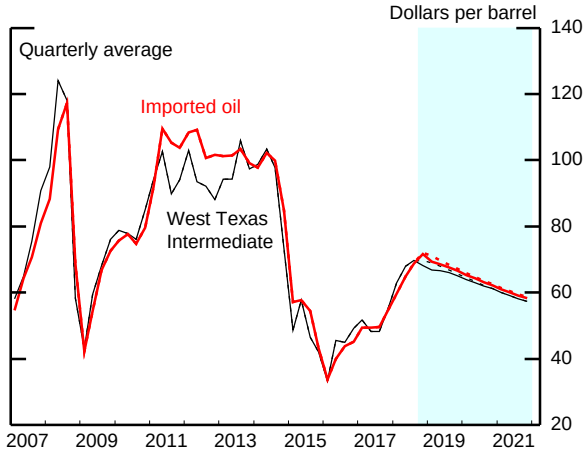
Equity Prices



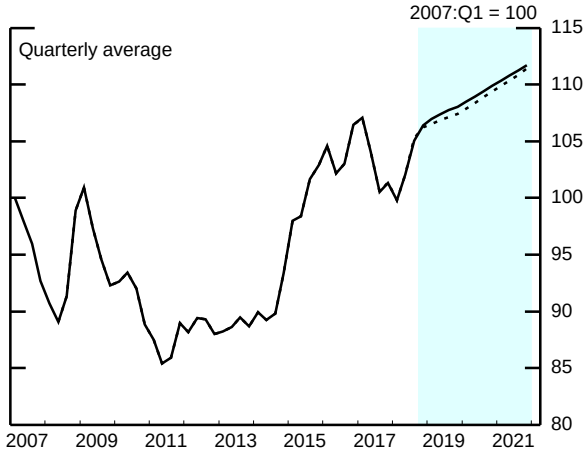
House Prices



Crude Oil Prices



Broad Real Dollar



Compared with the September Tealbook projection, inflation is a little lower in the medium term, as resource utilization is a bit less tight.

KEY BACKGROUND FACTORS

Monetary Policy

- The inertial version of the Taylor (1999) rule that we use in our projection calls for the federal funds rate to step up about ¼ percentage point over the rest of this year, to increase 1½ percentage points next year, and to rise, on average, ½ percentage point per year in 2020 and 2021, reaching nearly 5 percent in the fourth quarter of 2021. This trajectory is a little lower than the one in the September Tealbook because of the narrower projected output gap.

- The size of the SOMA portfolio continues a gradual and predictable decline in a manner consistent with the Committee's public declarations.

Other Interest Rates

- The 10-year Treasury yield is projected to rise from an average of about 3¼ percent in the current quarter to 4¼ percent by the end of 2021. This projected path is similar to the one in the September Tealbook.

  - The federal funds rate rises above the 10-year rate in the third quarter of 2020, similar to the September Tealbook.

- The path of the triple-B corporate bond yield is also similar to the one in the previous Tealbook, while the 30-year fixed mortgage rate has been revised up a bit over the next few quarters in response to recent market quotes. Both interest rates are projected to rise significantly over the medium term.

Equity Prices and Home Prices

- Equity prices declined substantially in recent weeks amid concerns about international trade policies, global growth, and potential interest rate increases. Equity prices are now projected to end the year about 9 percent below the September Tealbook forecast.[2] Beyond the current quarter, we

[2] As we were finalizing the staff projection, stock market prices were quite volatile. The quotes in this paragraph are based on the market close on Wednesday, October 24.

expect stock prices to edge up about ½ percent per year, similar to our previous forecast. Over the medium term, stock price appreciation is held down, because we judge equity valuations to be elevated even after considering the recent price declines.

- The latest housing market data have been softer than expected, and in response, we have marked down our house price projection. We now expect house price increases to slow from 6 percent in 2017 to 4 percent this year, a larger deceleration than in the September Tealbook. We also nudged down our forecast for house prices over the next three years and expect the rise in house prices to moderate further, to an average pace of 3 percent; the slowdown reflects both the ongoing rise in mortgage rates and our assessment that house prices are modestly elevated relative to rents.

Fiscal Policy

- We assume that the expansionary fiscal policies enacted over the past year will continue through the medium term.[3] Given these policy assumptions, we still estimate that discretionary fiscal policy actions across all levels of government will contribute a bit more than ½ percentage point to the rate of growth in aggregate demand in both 2019 and 2020, exclusive of any multiplier effects and financial offsets. This contribution eases to ¼ percentage point in 2021.

- We expect the federal budget deficit, which stood at 3½ percent of GDP in fiscal year 2017, to widen to 5¾ percent by fiscal 2021, primarily reflecting recent fiscal policy actions and the effects of higher interest rates on debt service costs. The box "Fiscal Policy and the State of the Economy" provides some historical perspective on the size of recent and projected deficits relative to the state of the business cycle.

    - 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 stabilize at around 105 percent of GDP,

[3] 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 lifting the discretionary spending caps for those years, which would be consistent with fiscal policymaker actions in the recent past.

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.

- In the near term, legislation to fund roughly one-fourth of federal discretionary spending for fiscal 2019 remains unresolved, and without further action, current funding would expire in the first week of December. The baseline projection continues to assume that funding legislation will be enacted and there will be no meaningful disruption of government operations.[4]

Foreign Economic Activity and the Dollar

- Real GDP in the foreign economies is expected to grow 2½ percent in the second half of this year, similar to its first-half pace. The projection for the second half is little changed relative to the September Tealbook, as weaker-than-expected third-quarter GDP growth in the emerging market economies was offset by stronger-than-expected growth in the advanced foreign economies. For the remainder of the forecast period, we continue to project GDP growth abroad to be close to its potential pace of around 2¾ percent.

- Since the September Tealbook, the broad nominal dollar has appreciated ¾ percent. Over the forecast period, we expect the broad real dollar to appreciate at an annual rate of about 1½ percent as market expectations for the federal funds rate move up toward the staff's assumed path. The downward revision to the staff's federal funds path implies a little less dollar appreciation than in the September Tealbook, leaving our projection for the broad real dollar at the end of the forecast horizon only a touch higher.

Oil Prices

- The spot price of Brent crude oil is down about $3 per barrel, on net, since the September Tealbook, closing most recently at $76 per barrel. Brent prices rose to $86 per barrel on October 3, their highest level in four years, reflecting concerns about the effects of impending U.S. sanctions on Iranian exports.

[4] A lapse in appropriations that resulted in a short-term partial shutdown of the federal government would have only minor implications for the outlook.

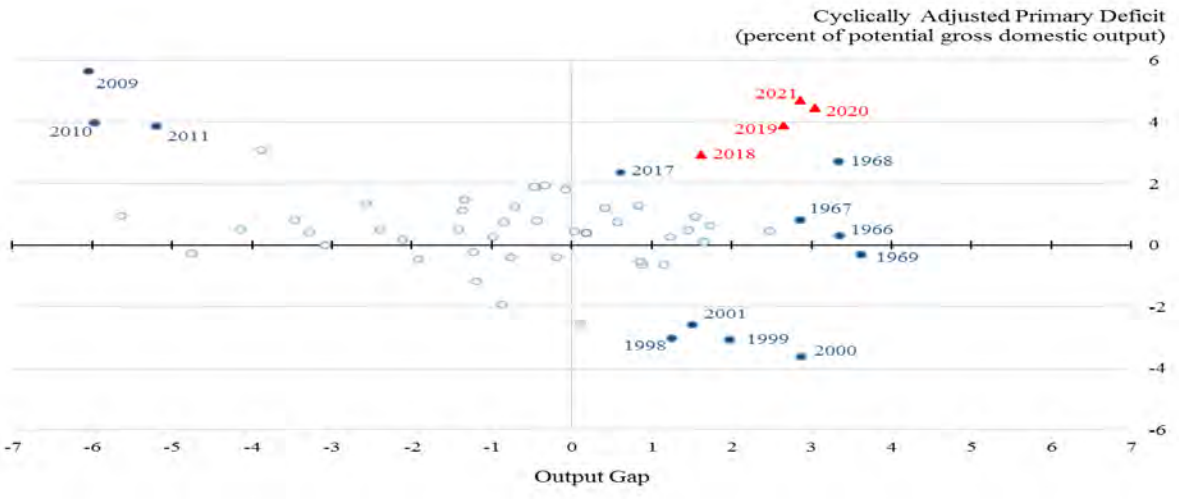
Fiscal Policy and the State of the Economy

The federal fiscal policy assumptions in the staff's baseline forecast yield primary budget deficits that average just under 3 percent of GDP between fiscal year (FY) 2018 and FY2021. Here we put these budget policies in historical perspective using two different measures—the cyclically adjusted primary (CAP) budget deficit and the staff's measure of fiscal impetus. During the FY2018 to FY2021 period, we expect that fiscal policy will result in relatively large deficits and will provide a modest boost to aggregate demand, both of which—especially the former—are atypical relative to the state of the business cycle.

The CAP deficit is often used to assess the sustainability of budget policies. The CAP deficit makes two adjustments to the total federal deficit. First, by focusing on the primary deficit, the CAP deficit excludes net interest payments associated with servicing existing government debt.[1] Second, the CAP deficit removes the transitory effects of the business cycle by estimating what the primary deficit would be if output were at its potential level.[2]

Figure 1 shows the historical relationship between the CAP deficit on the vertical axis and the output gap on the horizontal axis. The expected CAP deficits for FY2018 to FY2021 (red triangles) are outliers. Historically, when the output gap has been as large as staff projections for FY2018 to FY2021, the CAP deficit has been considerably smaller (as in FY1966 to FY1968) or the government has run a CAP *surplus* (as in FY1998 to FY2001). The last time the CAP deficit was roughly as large as staff projections for FY2018 to FY2021 was during the Great Recession, when the output gap was large and negative.

Figure 1: Cyclically Adjusted Primary Deficits and the Output Gap



Note: The figure displays data for FY1964 to FY2017 and staff estimates and projections for FY2018 to FY2021.
Source: Staff estimates.

[1] Persistently balancing the primary deficit implies a stable debt-to-GDP ratio if the pace of nominal GDP growth is equal to the average nominal rate of interest on the debt.

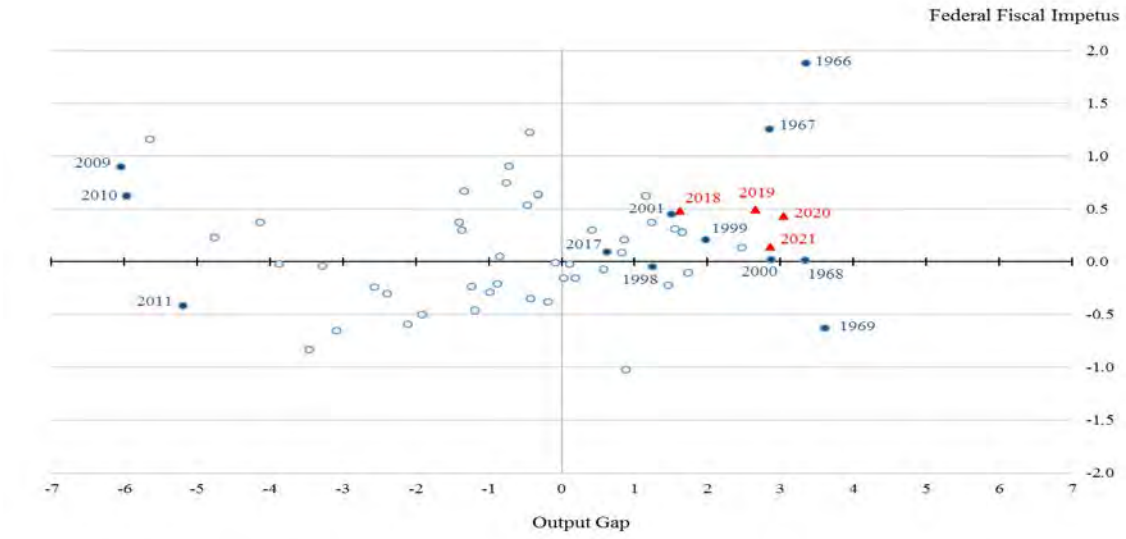
[2] The cyclically adjusted measure removes the deficit effects of automatic stabilizers (for example, lower taxes in response to reduced incomes or higher income-support payments triggered by a rise in unemployment) that operate when the economy is not at its potential level. This measure does not remove the effects of discretionary fiscal policy actions that are in response to the business cycle, such as a reduction in tax rates during a recession.

Further, the staff projects that the CAP deficit will *increase* while the output gap increases between FY2018 and FY2021. This pattern contrasts with the historical relationship, which, on average, implies that the CAP deficit *decreases* when the output gap increases.[3]

Growth in the CAP deficit beginning in FY2018 largely results from *discretionary* fiscal policy actions, specifically tax cuts from the Tax Cuts and Jobs Act (TCJA) and spending increases from the Bipartisan Budget Act (BBA 2018). The staff forecast assumes that elevated spending levels from the BBA 2018 remain in place beyond FY2019, growing with inflation each year (even though, under current law, appropriations are set to return to lower levels at the end of FY2019). Figure 2 illustrates how these policies affect aggregate demand. This figure shows fiscal impetus (FI), the first-round direct effect of discretionary fiscal policy actions on the growth of aggregate demand, on the vertical axis and the output gap on the horizontal axis. The FI projections imply that discretionary fiscal policy at the federal level will boost aggregate demand growth by roughly ½ percentage point per year through FY2020 and then taper off in FY2021 when the tax and spending policies are fully phased in.

Because FI is measured in terms of aggregate demand growth, it is associated with changes in, rather than the level of, the CAP deficit. The magnitude of FI depends in part on the type of fiscal policy that drives the CAP deficit changes. The increase in projected CAP deficits for FY2018 to FY2021 results largely from the TCJA tax cuts. By comparison, historical CAP deficits in years with a comparable output gap, such as FY1966 and FY1967, resulted mainly from defense spending increases and growth in government transfers, which provide a relatively larger boost to aggregate demand compared to tax decreases.[4]

Figure 2: Fiscal Impetus and the Output Gap



Note: The figure displays data for FY1964 to FY2017 and staff estimates and projections for FY2018 to FY2021.
Source: Staff estimates.

[3] Excluding FY2009 to FY2011 (which, if included, would make the relationship even more negative), a 1 percentage point increase in the output gap is associated with a 0.15 percentage point reduction in the CAP deficit.

[4] Although a 1 percentage point increase in defense purchases (as a percent of GDP) increases aggregate demand by 1 percentage point, we estimate that a similarly sized tax cut will boost demand by only two-thirds that amount.

More recently, prices retreated on reports of increasing production in Saudi Arabia, Russia, and the United States. Farther-dated futures prices are about unchanged, with the Brent futures price for delivery in December 2021 at $68 per barrel.

THE OUTLOOK FOR REAL GDP AND AGGREGATE SUPPLY

Our Tealbook projection has real GDP growth slowing from an annual rate of 3¼ percent in the first half of this year to a still-solid 2¾ percent pace in the second half. The BEA's advance estimate of GDP growth in the third quarter, which was released after the close of this forecast, was 3.5 percent, 0.6 percentage point above our Tealbook estimate. Consumer spending was stronger than we had anticipated while business fixed investment was weaker, leaving private domestic final purchases, or PDFP, close to our expectations. However, government purchases and inventory investment were above our expectations. Our preliminary assessment is that some of the third-quarter GDP surprise will be reversed in the fourth quarter, leaving GDP growth in the second half just a little stronger than our Tealbook projection.[5] (The accompanying exhibits present the Tealbook forecast and do not reflect the third-quarter GDP data.)

- We expect that Hurricanes Florence and Michael will leave essentially no imprint on GDP growth for the second half overall. Daily retail sales data from First Data suggest that Hurricane Florence had a very small negative effect (less than 5 basis points) on PCE growth in the third quarter; the effect from Hurricane Michael appears even smaller. The effects of the hurricanes on industrial production are also likely to be small: We estimate that total IP growth for the second half will be held down by about 0.1 percentage point because of the hurricanes, with some small manufacturing disruptions from Hurricane Florence and noticeable but short-lived disruptions to oil and natural gas production from Hurricane Michael.

- Recent data on consumer spending continue to point to stronger PCE growth in the second half of this year than in the first half. Spending continues to be supported by the recent tax cuts, wealth gains from earlier increases in equity prices and home values, solid gains in labor income, and favorable consumer

[5] We will provide further details on the implications of the BEA's report for our projection next week.

sentiment. The box "Household Wealth and the Personal Saving Rate" discusses how the composition of household wealth may be affecting aggregate consumption.

- The third-quarter data on business fixed investment were disappointing. Investment in equipment and intangibles slowed from its first-half pace, while investment in nonresidential structures—especially drilling structures—declined. Nonetheless, we expect investment growth to pick back up in the fourth quarter, as we see investment continuing to be supported by solid business output growth, ample access to financing, still-upbeat readings on business sentiment, buoyant profit expectations, and the effects of last year's tax cuts.

- With rising mortgage interest rates weighing on the affordability of housing, residential investment appears on track to continue to decline modestly in the second half of the year. Relative to the September Tealbook, we weakened our residential investment forecast for the rest of this year and most of next year, because recent indicators of housing demand have been weaker than expected and mortgage rates over the next few quarters have revised up. That said, we expect residential investment to flatten out next year, with the drag from mortgage interest rates roughly offset by demand for new construction driven by population growth, demographic changes, and a strong labor market.

- Net exports are projected to subtract about 1 percentage point from GDP growth for the second half of this year after adding ½ percentage point in the first half. The swing is partly attributable to soybean exports. In addition, appreciation of the dollar this year has removed some support to net exports. Compared with the September Tealbook, the contribution from net exports to real GDP growth in the second half is about ½ percentage point more negative.

- Manufacturing production, which rose at an annual rate of 2¾ percent in the third quarter, is expected to ease somewhat through the remainder of this year and early next year. This deceleration mainly reflects a step-down in motor vehicle production (and the upstream effects on other manufacturers).

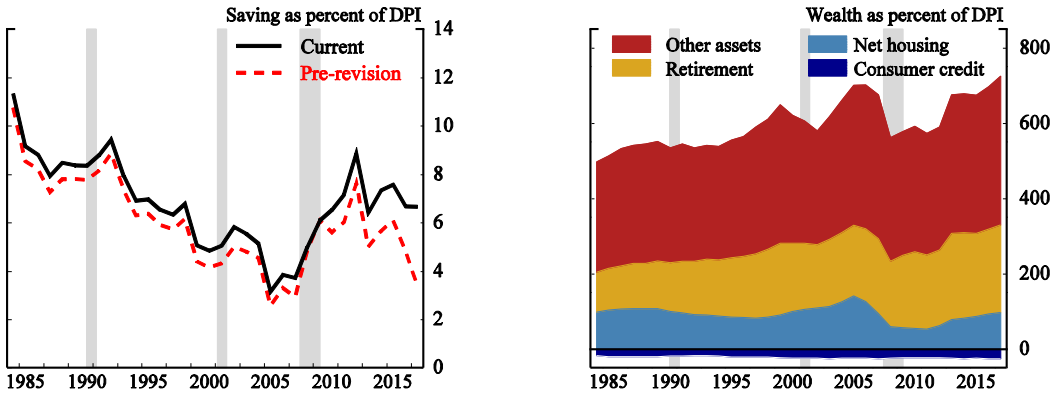
Household Wealth and the Personal Saving Rate

The NIPA personal saving rate (left panel of figure 1) is now reported to have remained elevated over the past few years rather than falling back toward pre-recession levels, as was estimated prior to the recent BEA comprehensive revision. The right panel of figure 1 shows why this persistently high saving rate may be a puzzle: Growth of household wealth relative to income should be pushing the saving rate down.[1] Here we explore whether trends in the composition and distribution of household wealth might currently be holding down aggregate consumption and raising the saving rate. We focus on differences in borrowing and spending behavior across age and wealth groups as well as the extent to which net saving (or more importantly, net dissaving) in particular balance sheet categories has led to movements in the overall saving rate.

The four net worth components we focus on are consumer credit, owner-occupied housing, retirement accounts, and the residual, labeled "other assets." Consumer credit includes nonhousing liabilities such as credit card, vehicle, and student loans. Owner-occupied housing wealth (or net housing) is the market value of housing less mortgage debt outstanding. Retirement accounts include traditional defined benefit pensions and account-type 401(k), 403(b), and IRA plans. The residual other assets are mostly closely held businesses and financial assets like stocks and bonds that are held outside of retirement accounts.

The evolving composition of wealth in the right panel of figure 1 is associated with a shifting distribution of wealth across types of households. The Board's Survey of Consumer Finances (SCF) finds that the share of wealth held by households with a head aged 55 or older increased from 53 percent in 1989 to 71 percent by 2016. In addition, the share of wealth held by the top wealth quartile increased from 80 percent to 85 percent for both the young and old.[2]

Figure 1: Saving and Wealth Relative to Income



Note: Grey shaded areas indicate recession periods as dated by the National Bureau of Economic Research (NBER).
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis; Financial Accounts of the United States.

[1] For additional staff perspective on the effect of wealth on saving and consumption, see Aditya Aladangady and Laura Feiveson (2018), "A Not-So-Great Recovery in Consumption: What is Holding Back Household Spending?" FEDS Notes (Washington: Board of Governors of the Federal Reserve System, March 8), https://www.federalreserve.gov/econres/notes/feds-notes/what-is-holding-back-household-spending-20180308.htm.

[2] The concept of wealth used here includes an estimate of defined benefit pensions. See Sebastian Devlin-Foltz, Alice Henriques, and John Sabelhaus (2016), "Is the U.S. Retirement System Contributing to Rising Wealth Inequality?" *Russell Sage Foundation Journal of the Social Sciences*, vol. 2 (November), pp. 59–85.

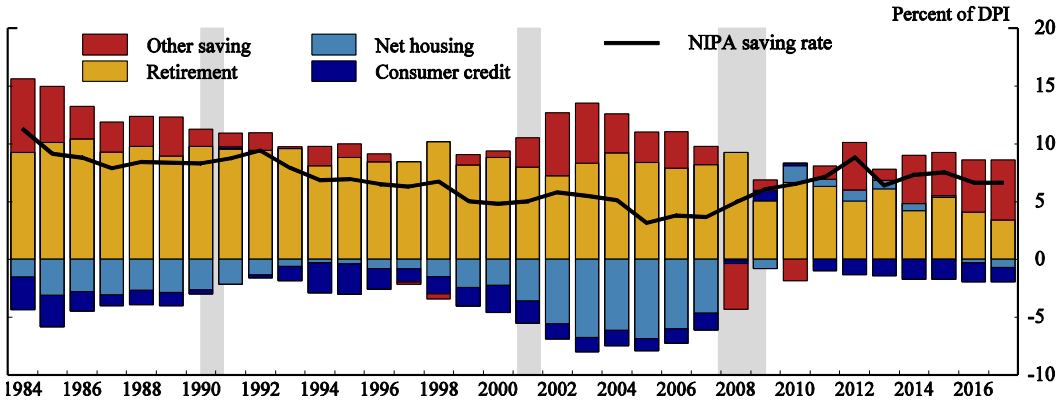
In order to shed light on movements in the saving rate over time, figure 2 presents annual changes in the different components of wealth from figure 1 after stripping out the relevant capital gains from each balance sheet category.

Figure 2 shows that net saving in retirement accounts has fallen in the past decade, from about 10 percent of disposable income in the 1980s and '90s to less than 5 percent in recent years. The downward trend in net retirement account saving is attributable to aging, as benefit payments and withdrawals are rising as a share of income, while new contributions relative to income are little changed.[3] However, in recent years, the decline in net retirement saving has been mostly offset by increased saving in business and financial assets outside of retirement accounts, which are held even more disproportionately at the top of the wealth distribution. If older and wealthier households are less likely to spend out of their wealth than the younger and less wealthy, this tendency may help explain why the saving rate has remained elevated despite overall rising wealth relative to income.

Figure 2 also highlights the important role of housing in accounting for movements in the saving rate over the past two decades. In the lead up to the financial crisis, NIPA saving dipped as households increased mortgage debt much more than they invested in new housing. More recently, net saving in owner-occupied housing has moved up and hovered near zero, as net mortgage borrowing and net residential investment have both remained low.

The pre-recession housing-related dissaving is generally associated with younger and less wealthy households. Those families borrowed extensively against housing to finance consumption or to invest in more housing, and those behaviors have fundamentally changed in the past decade. Younger and less wealthy households now carry more consumer debt and are less likely to have entered into owning homes and stocks, and one downstream effect is that they have not benefited from the rebound in asset prices.[4] Regardless of whether mortgage demand or supply has shifted, it is unlikely that we will return to the rates of housing dissaving observed in the pre-recession period.

Figure 2: Balance Sheet Decomposition of NIPA Personal Saving



Note: Grey shaded areas indicate recession periods as dated by the National Bureau of Economic Research (NBER).
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis; Financial Accounts of the United States.

[3] The continued rise in retirement assets relative to income shown in figure 1 is increasingly due to capital gains and not retirement account saving in the conventional NIPA sense.

[4] For a discussion of wealth distribution trends in recent years, see Lisa J. Dettling, Joanne W. Hsu, and Elizabeth Llanes (2018), "A Wealthless Recovery? Asset Ownership and the Uneven Recovery from the Great Recession," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, September 13), https://www.federalreserve.gov/econres/notes/feds-notes/asset-ownership-and-the-uneven-recovery-from-the-great-recession-20180913.htm.

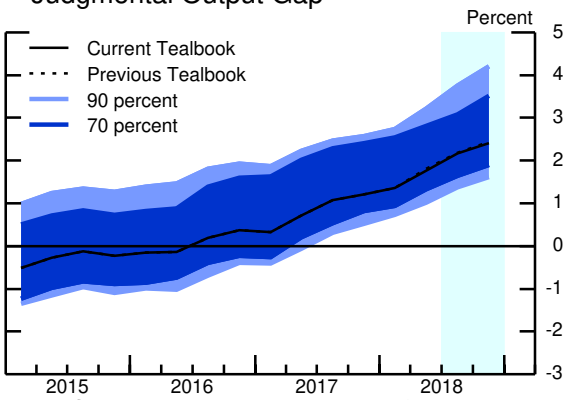
Cyclical Position of the U.S. Economy: Near-Term Perspective

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

Measure	2016	2017	2018	2018 Q2	2018 Q3	2018 Q4
Output gap[1]	**.4**	**1.2**	**2.4**	**1.8**	**2.2**	**2.4**
Previous Tealbook	.4	1.2	2.4	1.8	2.2	2.4
Real GDP	1.9	2.5	3.0	4.2	2.9	2.6
Previous Tealbook	1.9	2.5	3.1	4.7	3.0	2.5
Measurement error in GDP	-.3	.0	.1	.9	-.4	.0
Previous Tealbook	-.3	.0	.2	1.2	-.2	-.2
Potential output	1.6	1.6	1.7	1.7	1.7	1.7
Previous Tealbook	1.6	1.6	1.7	1.7	1.7	1.7

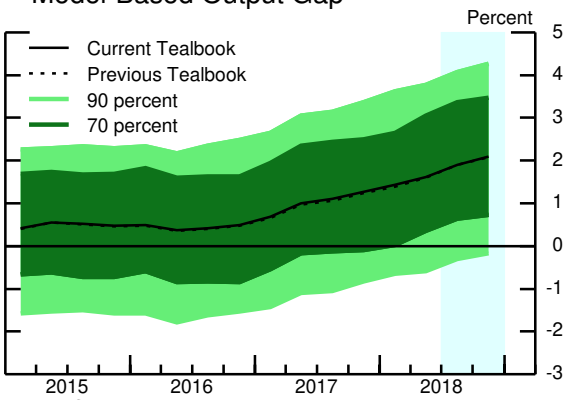
Note: The output gap is the percent difference between actual and potential output; a negative number indicates that the economy is operating below potential. The change in the output gap is equal to real GDP growth less the contribution of measurement error less the growth rate of potential output. 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



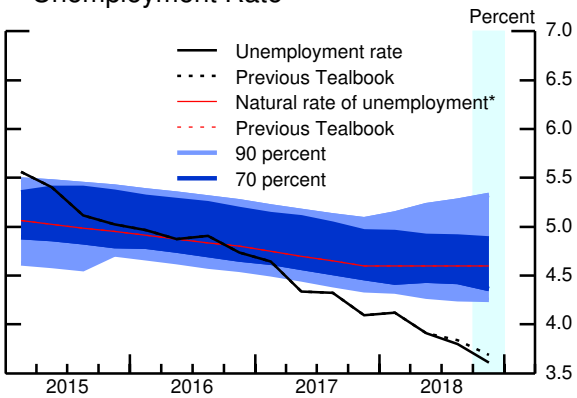
Note: Shaded regions show the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Model-Based Output Gap



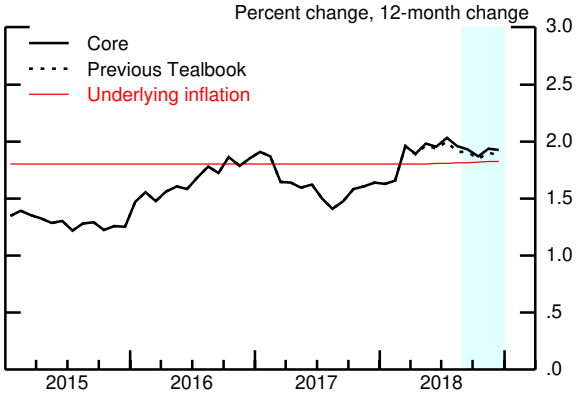
Note: Shaded regions denote model-computed uncertainty bands.
Source: Various macroeconomic data; staff assumptions.

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.

Indicators of factory activity from the national and regional manufacturing surveys remain consistent with further gains in production.

Over the medium term, we project that real GDP growth will slow roughly ½ percentage point per year, from 3 percent this year to 1½ percent in 2021. The gradual deceleration primarily reflects the ongoing tightening of monetary policy and waning fiscal impetus.

- Real GDP growth in this forecast is revised down relative to the September Tealbook, mainly reflecting the effects of the lower paths of equity prices and house prices. Partially offsetting these factors, net exports subtract less from real GDP relative to the September Tealbook projection.[6] In addition, with the output gap topping out about ¼ percentage point below our previous projection, we now judge that supply constraints will not materially restrain output growth.[7]

- In this forecast, we also incorporated the implications of the latest round of tariffs on Chinese imports, which were put in place after the September Tealbook closed and were not included in our previous projection.[8] We expect that the cumulative effect of tariffs imposed this year will be to lower the level of real GDP by about 0.2 percent over the medium term and raise core PCE price inflation by less than 0.1 percentage point in each of 2018 and 2019.

- We continue to assume that potential GDP growth will step up from 1.7 percent in 2018 to 1.9 percent in 2021, as structural productivity accelerates.

- With the federal government expected to run historically large and rising deficits over the medium term, the national saving rate is projected to trend

[6] The revised contribution of net exports to GDP primarily reflects our updated assessment of the responsiveness of net exports to U.S. GDP, foreign GDP, and exchange rates.

[7] That said, if our expectations for aggregate demand were to become more optimistic in subsequent forecasts, we would likely build back in some small drag from supply constraints.

[8] On September 24, the United States implemented an additional 10 percent tariff on about $180 billion of Chinese imports. In response, China imposed retaliatory tariffs on $60 billion of U.S. goods and also began to implement some nontariff trade barriers. We have not built into our forecast the additional 15 percentage points of tariffs on Chinese imports that the United States has announced would be imposed, in the absence of progress on trade negotiations, on January 1, 2019.

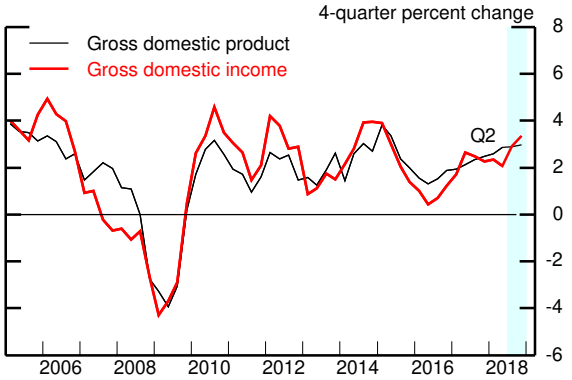
Summary of the Near-Term Outlook for GDP
(Percent change at annual rate except as noted)

Measure	2018:H1		2018:Q3		2018:Q4	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP	**3.4**	**3.2**	**3.0**	**2.9**	**2.5**	**2.6**
Private domestic final purchases	3.3	3.1	2.8	3.0	3.4	3.3
Personal consumption expenditures	2.3	2.1	2.9	3.2	2.7	2.7
Residential investment	-2.6	-2.4	-2.1	-5.2	-.2	-1.3
Nonres. private fixed investment	10.2	10.1	3.7	4.0	7.9	7.6
Government purchases	2.0	2.0	1.1	2.1	1.6	1.8
Contributions to change in real GDP						
Inventory investment[1]	-.3	-.5	1.2	1.8	-.3	-.4
Net exports[1]	.6	.6	-.8	-1.8	-.3	-.1

1. Percentage points.

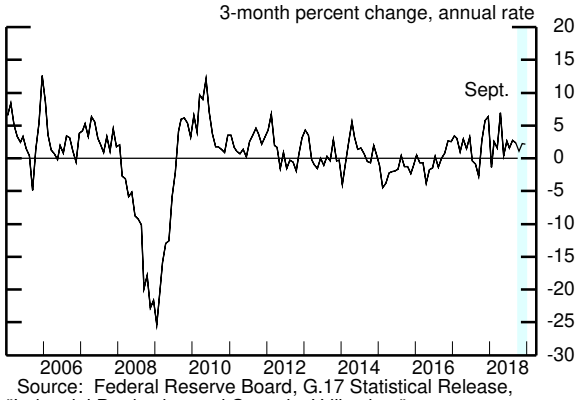
Recent Nonfinancial Developments (1)

Real GDP and GDI



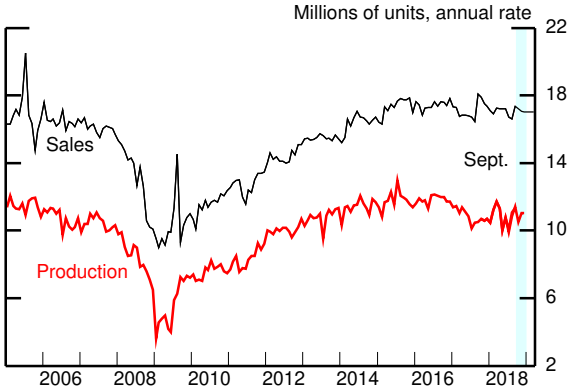
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Manufacturing IP ex. Motor Vehicles and Parts



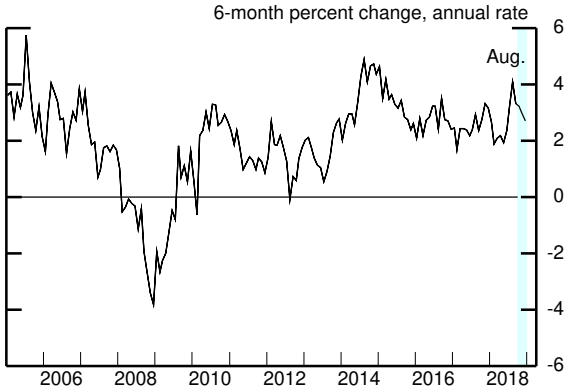
Source: Federal Reserve Board, G.17 Statistical Release, "Industrial Production and Capacity Utilization."

Sales and Production of Light Motor Vehicles



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

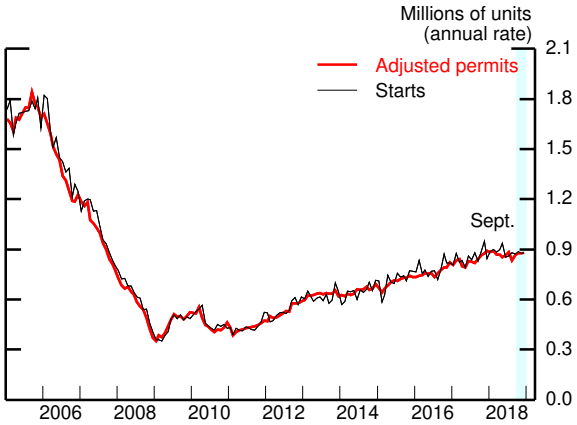
Real PCE Growth



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

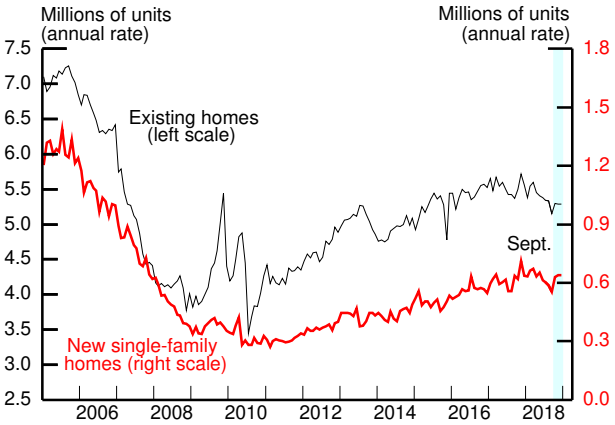
Recent Nonfinancial Developments (2)

Single-Family Housing Starts and Permits



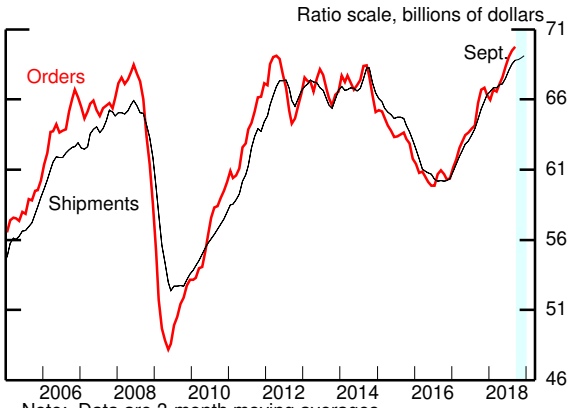
Note: Adjusted permits equal permit issuance plus starts outside of permit-issuing areas.
Source: U.S. Census Bureau.

Home Sales



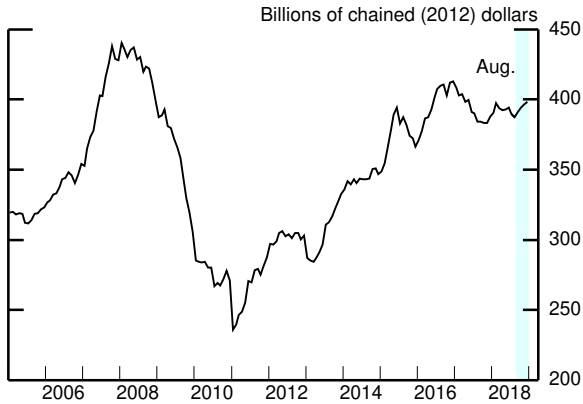
Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.

Nondefense Capital Goods ex. Aircraft



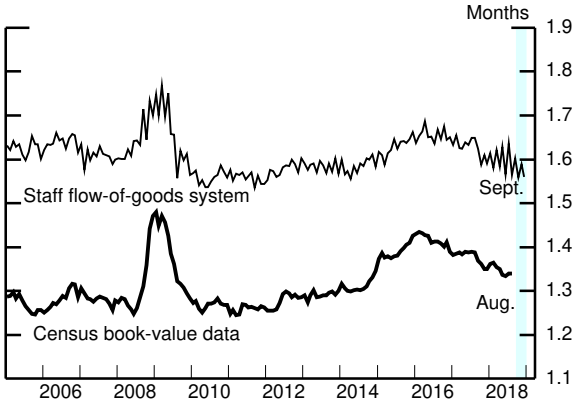
Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.

Nonresidential Construction Put in Place



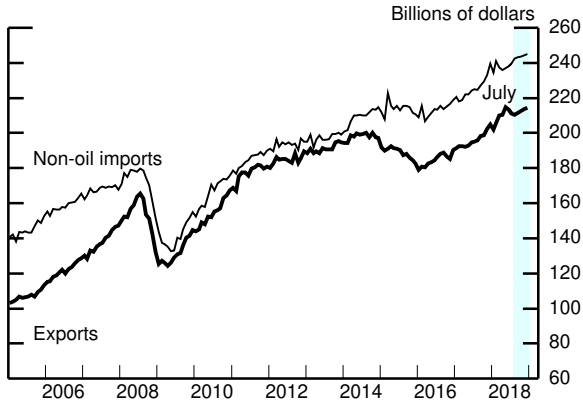
Note: Nominal CPIP deflated by BEA prices through 2018:Q2 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

Inventory Ratios



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

Exports and Non-oil Imports



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

Federal Reserve System Nowcasts of 2018:Q3 Real GDP Growth

(Percent change at annual rate from previous quarter)

Federal Reserve Entity	Type of model	Nowcast as of Oct. 24, 2018
Federal Reserve Bank		
Boston	• Mixed-frequency BVAR	3.1
New York	• Factor-augmented autoregressive model combination	2.2
	• Factor-augmented autoregressive model combination, financial factors only	1.9
	• Dynamic factor model	2.1
Cleveland	• Bayesian regressions with stochastic volatility	2.9
	• Tracking model	3.0
Atlanta	• Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow)	3.7
Chicago	• Dynamic factor models	4.4
	• Bayesian VARs	3.1
St. Louis	• Dynamic factor models	2.2
	• News index model	4.4
	• Let-the-data-decide regressions	2.8
Kansas City	• Accounting-based tracking estimate	2.3
Board of Governors	• Board staff's forecast (judgmental tracking model)[1]	3.0
	• Monthly dynamic factor models (DFM-45)	3.7
	• Mixed-frequency dynamic factor model (DFM-BM)	2.4
Memo: Median of Federal Reserve System nowcasts		3.0

[1] The October Tealbook forecast, finalized on October 25, 2018, is 2.9 percent.

downward. Nevertheless, private domestic investment as a share of the economy is roughly flat over the medium term. The widening gap between domestic investment and national saving is financed by increased inflows of foreign capital.

THE OUTLOOK FOR THE LABOR MARKET

Labor market conditions tightened further in September, about in line with our expectations.[9]

- According to the BLS, total nonfarm payrolls increased 134,000 in September—about 60,000 less than we had expected, with roughly half of the downward surprise likely due to disruptions from Hurricane Florence (which we had not incorporated into the September Tealbook forecast). However, estimates of job gains in July and August were revised up, and payroll growth for the three months ending in September averaged 200,000 per month on a hurricane-adjusted basis, a little higher than in our previous projection. Excluding the effects of hurricanes, we continue to expect payroll gains to average about 190,000 per month this quarter, well above the pace that we estimate is consistent with unchanged resource utilization.[10]

- Data that we analyze from the payroll processing firm ADP (see the exhibit "Labor Market Developments and Outlook (1)") point to an average increase in *private* payrolls over the three months ending in September of about 240,000. A state-space model, which combines the information from ADP and the BLS, estimates average monthly private job gains of 210,000 over the past three months.

- The unemployment rate edged down to 3.7 percent in September, slightly lower than we had expected. Because the decline in the unemployment rate was largely due to an increase in the job finding rate, which tends to have some persistent influence on the unemployment rate, we nudged down our

[9] The employment report for October will be released on November 2, the Friday before the FOMC meeting.

[10] We estimate that Hurricane Florence depressed job gains in September by 40,000, and that Hurricane Michael will depress job gains in October by 25,000. After accounting for the employment bounceback in the months after each storm, we expect that the hurricanes will have no net effect on job gains in October and that they will boost job gains by 40,000 in November.

forecast for the unemployment rate through the rest of the year. We now expect it to average 3.6 percent this quarter, 1 percentage point below our estimate of its natural rate.

- The labor force participation rate (LFPR) was 62.7 percent in September, the same as in August, whereas we had expected it to edge up 0.1 percentage point. However, we are reluctant to take much signal from surprises in the LFPR during the summer months and expect it to move back to 62.8 percent for the fourth quarter—the same level it has fluctuated around for the past few years and currently ¼ percentage point above our estimate of its trend. With offsetting misses to the unemployment rate and LFPR, the employment-to-population ratio in September came in at 60.4 percent, the same as in our September Tealbook forecast.

We continue to expect the labor market to tighten further over the medium term, consistent with above-trend output growth. Relative to the September Tealbook, job gains are a little slower, the unemployment rate is a touch higher, and the LFPR is a bit lower, with these revisions reflecting the slightly slower pace of GDP growth in this projection. As in previous projections, we continue to assume that, in an extremely tight labor market, a larger-than-usual amount of the tightening in labor utilization will manifest in a higher LFPR and a smaller-than-usual amount in a lower unemployment rate.

- Average monthly total payroll gains slow gradually in the projection, from about 195,000 in the second half of this year to about 80,000 in 2021.

- The unemployment rate is projected to decline from 3.6 percent in the fourth quarter to 3.3 percent by the middle of next year. The unemployment rate starts to turn up in 2021 and ends that year at 3.4 percent—still 1¼ percentage points below its natural rate.

- The LFPR is projected to remain at 62.8 percent through the end of 2020 and then gradually decline. With the trend participation rate expected to continue declining about 0.2 percentage point per year, we project that the LFPR gap will widen from ¼ percentage point at the end of 2018 to ½ percentage point in 2020 and narrow thereafter.

- We project that labor productivity will increase a little more than 1 percent per year, on average, over the forecast period, ¼ percentage point below our estimate of its structural pace.

THE OUTLOOK FOR INFLATION

Based on our translation of the September CPI and PPI data, we estimate that core PCE prices increased 1.9 percent over the 12 months ending in September, and that total PCE prices increased 2.0 percent. Both estimates are as we had expected in the September Tealbook and continue to indicate that inflation has firmed somewhat relative to a year ago. We continue to forecast both 12-month changes to remain near their current levels through the end of this year, about the same as in our September Tealbook forecast.

- Core import prices are expected to decline 1¾ percent in the second half of 2018, reversing their increase in the first half. The second-half decline reflects dollar appreciation and lower commodity prices. Beyond this year, import price inflation is expected to run at a ¾ percent pace, consistent with moderate foreign inflation and a gradually appreciating dollar.
  - These published import price indexes exclude tariffs. However, tariffs add to the prices that purchasers of imports actually pay—that is, effective import prices. We estimate that the tariffs implemented so far this year will boost effective import price inflation by 1½ percentage points in 2018 and ½ percentage point in 2019.

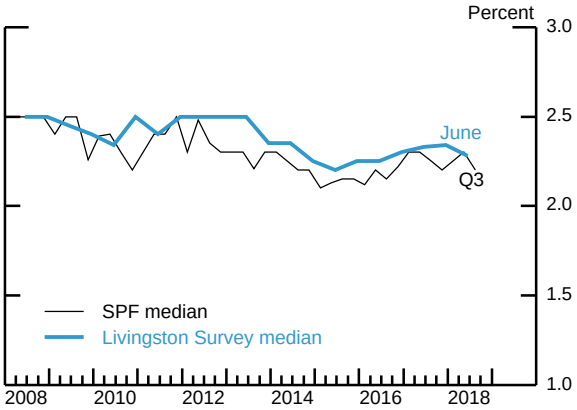
The latest readings on survey- and market-based measures of longer-term inflation expectations have been mixed since the September Tealbook but appear consistent, on balance, with expectations remaining relatively well anchored.

- In the final October report from the University of Michigan Surveys of Consumers, the median of inflation expectations over the next 5 to 10 years was 2.4 percent, near the bottom of the range seen in recent years.

- In contrast, the September reading on median three-year-ahead expected inflation from the Federal Reserve Bank of New York's Survey of Consumer Expectations was 3.0 percent, at the high end of recent readings.

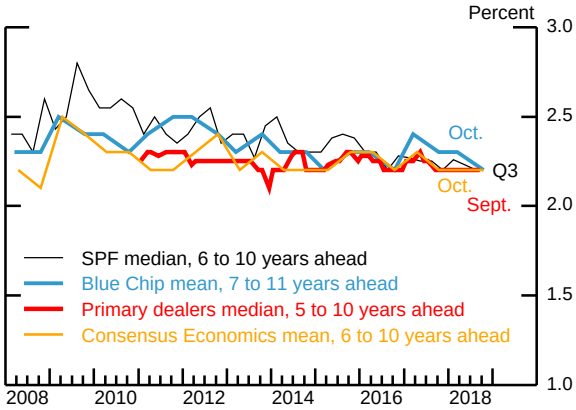
Survey Measures of Longer-Term Inflation Expectations

CPI Next 10 Years



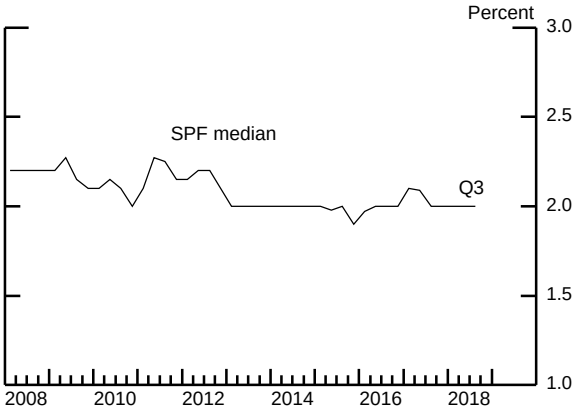
Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations



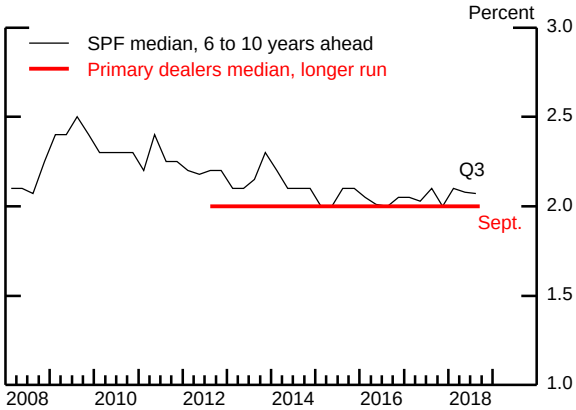
Source: Federal Reserve Bank of Philadelphia; Blue Chip Economic Indicators; Federal Reserve Bank of New York; Consensus Economics.

PCE Next 10 Years



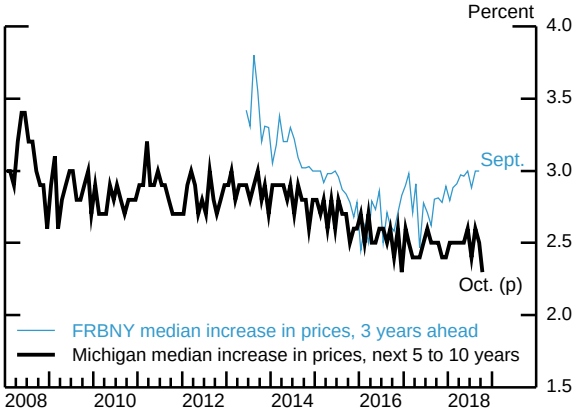
Source: Federal Reserve Bank of Philadelphia.

PCE Forward Expectations



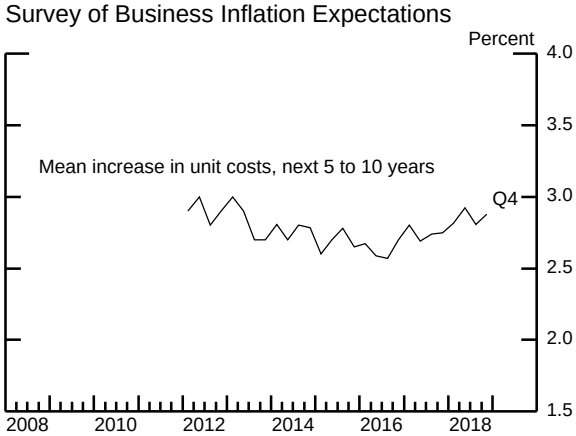
Note: Primary dealers data begin in August 2012.
Source: Federal Reserve Bank of Philadelphia; Federal Reserve Bank of New York.

Surveys of Consumers



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

Survey of Business Inflation Expectations



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

- Meanwhile, TIPS-based measures of inflation compensation have changed little since the September Tealbook.

We project that core inflation will edge up to 2.0 percent over the next year or so and remain at that level through 2021. The projected increase primarily reflects further tightening in resource utilization and our small assumed upward drift in trend inflation. Total inflation is projected to run slightly below core inflation after this year, reflecting the declining path for consumer energy prices in the medium term. Relative to the September Tealbook forecast, both total and core inflation are a little lower in the medium term, because resource utilization is a little less tight. Offsetting these revisions somewhat, the additional tariffs put in place since the September Tealbook push up inflation a little this year and next.

With labor demand remaining strong, we continue to expect that the pace of increases in hourly compensation will move up through the medium term, as firms try to retain workers and fill job vacancies in part by raising wages and benefits.

- Average hourly earnings rose 2.8 percent over the 12 months ending in September, a bit higher than we projected in the September Tealbook, with the upward surprise likely attributable to distortions from Hurricane Florence.[11] After adjusting measured wages for the estimated effects of all hurricanes this year and last, we continue to think the 12-month change in average hourly earnings from September to December will be flat at 2.9 percent. However, we project that the *measured* 12-month change to October and November will be distorted by hurricanes Florence and Michael.

- We estimate that the year-over-year change in compensation per hour (CPH) in the business sector will be 2¾ percent in the third quarter and step up to 3¼ percent in the fourth and first quarters, a slightly faster pace than in the September Tealbook. We continue to project that CPH will accelerate to a roughly 4 percent rate from 2019 through 2021.

[11] We think that hurricane-related declines in employment tend to boost measured wages because these employment distortions are likely to be concentrated in industries with a relatively large number of low-paid hourly workers, such as leisure and hospitality.

- We have not received any new information on the ECI since the September Tealbook.[12] Given the ECI's relatively muted cyclical sensitivity, we continue to expect it to accelerate somewhat from its recent 2½ to 2¾ percent pace to a 3 percent pace later in the medium term.

- The September reading of the Atlanta Fed's Wage Growth Tracker came in at 3.5 percent, near the upper end of the range seen over recent years.

THE LONG-TERM OUTLOOK

- We continue to assume that the natural rate of unemployment will be 4.6 percent and that potential output growth will be 1.7 percent per year in the longer run.

- We have maintained our assumption that the real equilibrium federal funds rate in the longer run will be ½ percent. The nominal yield on 10-year Treasury securities is assumed to be 3.4 percent; the term premium gradually rises toward 90 basis points, lifted in part by the elevated level of federal debt.

- 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. The SOMA portfolio is expected to be at a normal size by mid-2021.

- With these assumptions, real GDP growth slows to about 1¼ percent from 2022 to 2024, as the federal funds rate is above its neutral level and the boost to growth from fiscal policy fades. The unemployment rate moves up gradually from 3½ percent at the end of 2021 toward its assumed natural rate in subsequent years. PCE price inflation remains close to 2 percent throughout the projection.

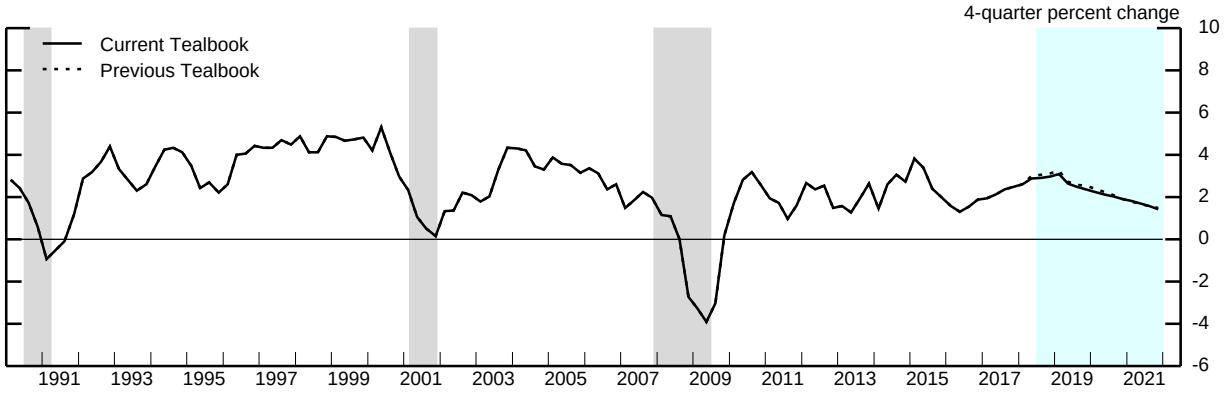
- With resource utilization cooling only slowly and inflation remaining close to the Committee's 2 percent objective, the nominal federal funds rate moves down only gradually from its elevated level at the end of the medium term toward its long-run value of 2½ percent.

[12] The ECI for September will be released on October 31.

Projections of Real GDP and Related Components
(Percent change at annual rate from final quarter of preceding period except as noted)

Measure	2017	2018		2018	2019	2020	2021
		H1	H2				
Real GDP	**2.5**	**3.2**	**2.8**	**3.0**	**2.4**	**1.9**	**1.4**
Previous Tealbook	2.5	3.4	2.8	3.1	2.5	1.9	1.5
Final sales	2.6	3.7	2.1	2.9	2.4	1.9	1.6
Previous Tealbook	2.6	3.8	2.3	3.0	2.5	1.9	1.6
Personal consumption expenditures	2.7	2.1	3.0	2.5	2.4	2.2	1.9
Previous Tealbook	2.7	2.3	2.8	2.6	2.8	2.5	2.1
Residential investment	3.8	-2.4	-3.3	-2.8	.5	.4	1.6
Previous Tealbook	3.8	-2.6	-1.2	-1.9	3.4	.4	1.3
Nonresidential structures	2.9	14.2	-.7	6.5	2.6	-.3	-2.1
Previous Tealbook	2.9	14.1	3.9	8.9	2.5	.0	-1.8
Equipment and intangibles	7.3	8.9	7.8	8.4	3.9	2.0	1.7
Previous Tealbook	7.3	9.1	6.4	7.7	4.2	2.2	1.7
Federal purchases	1.3	3.1	2.5	2.8	3.1	2.9	1.2
Previous Tealbook	1.3	3.2	2.5	2.8	3.1	2.8	1.3
State and local purchases	-.5	1.4	1.6	1.5	1.2	1.0	1.0
Previous Tealbook	-.5	1.3	.7	1.0	1.0	1.0	1.0
Exports	4.7	6.4	.3	3.3	2.5	2.9	3.2
Previous Tealbook	4.7	6.2	1.3	3.7	2.9	2.8	2.7
Imports	5.4	1.2	6.5	3.8	2.6	3.0	2.8
Previous Tealbook	5.4	1.2	4.7	3.0	4.8	4.2	3.5
	Contributions to change in real GDP (percentage points)						
Inventory change	-.1	-.5	.7	.1	.0	.0	-.2
Previous Tealbook	-.1	-.3	.4	.1	.0	.0	-.1
Net exports	-.2	.6	-.9	-.2	-.1	-.1	.0
Previous Tealbook	-.2	.6	-.5	.0	-.4	-.3	-.2

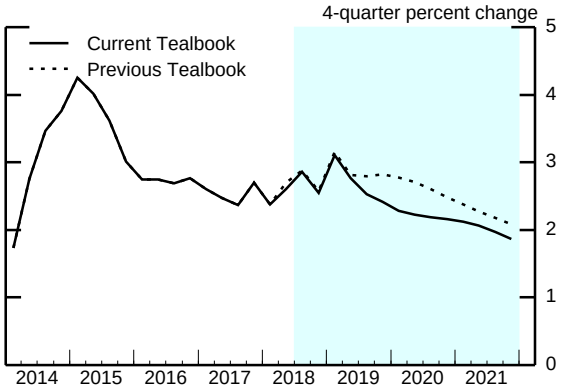
Real GDP



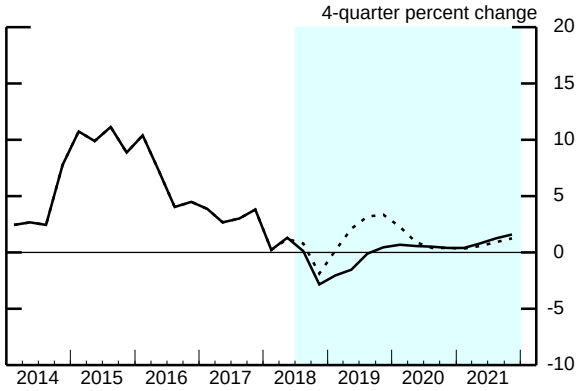
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Components of Final Demand

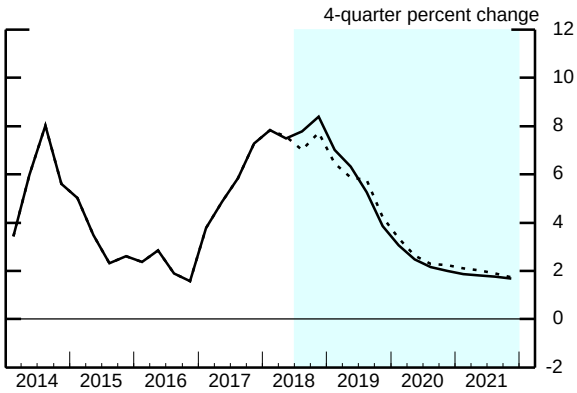
Personal Consumption Expenditures



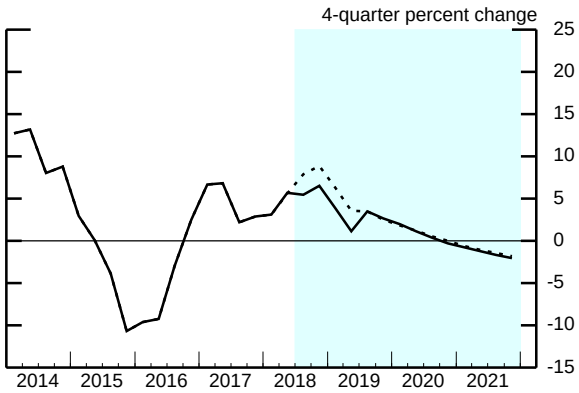
Residential Investment



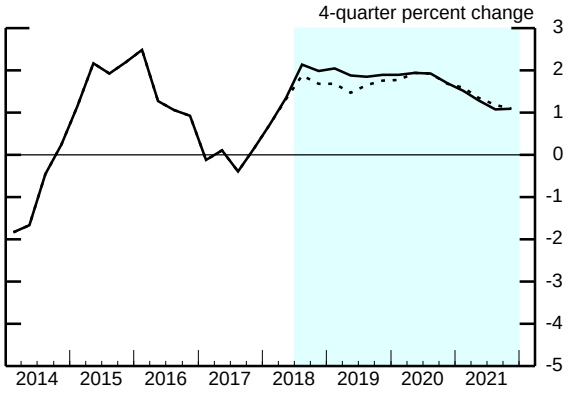
Equipment and Intangibles



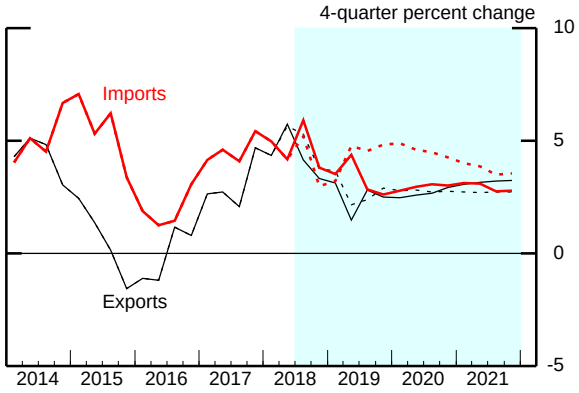
Nonresidential Structures



Government Consumption and Investment



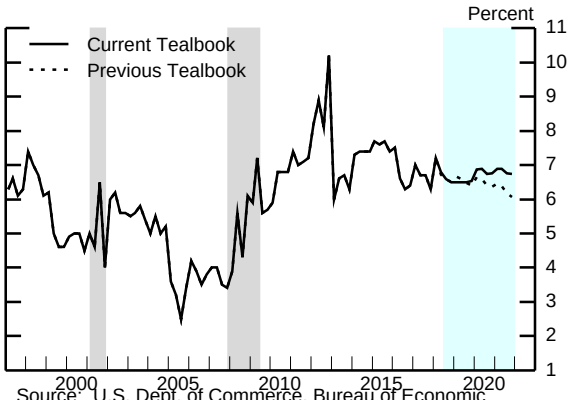
Exports and Imports



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

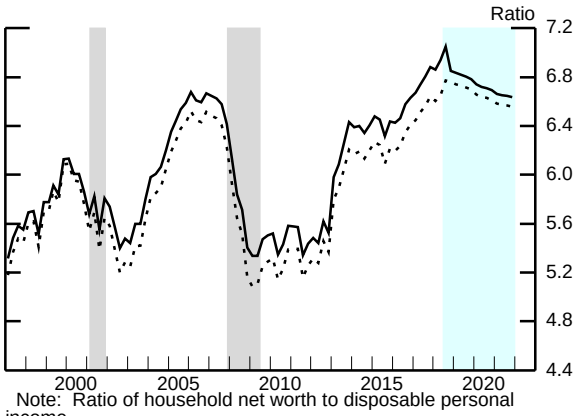
Aspects of the Medium-Term Projection

Personal Saving Rate



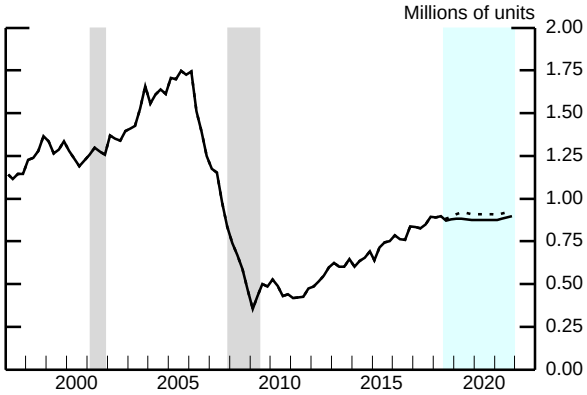
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Wealth-to-Income Ratio



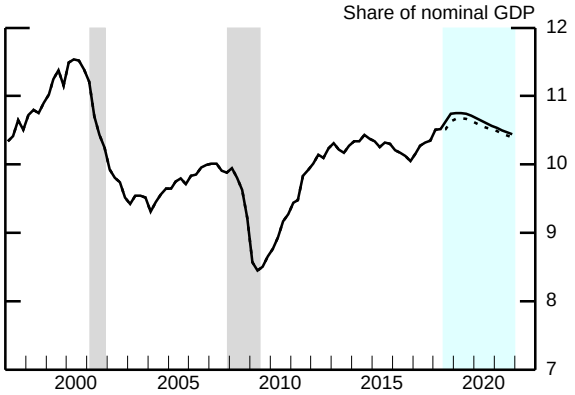
Note: Ratio of household net worth to disposable personal income.
Source: For net worth, Federal Reserve Board, Financial Accounts of the United States; for income, U.S. Dept. of Commerce, Bureau of Economic Analysis.

Single-Family Housing Starts



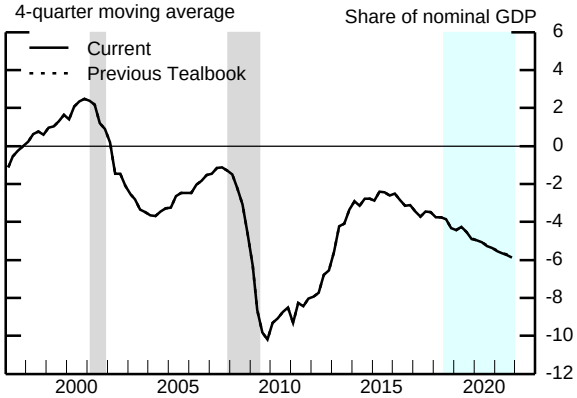
Source: U.S. Census Bureau.

Equipment and Intangibles Spending



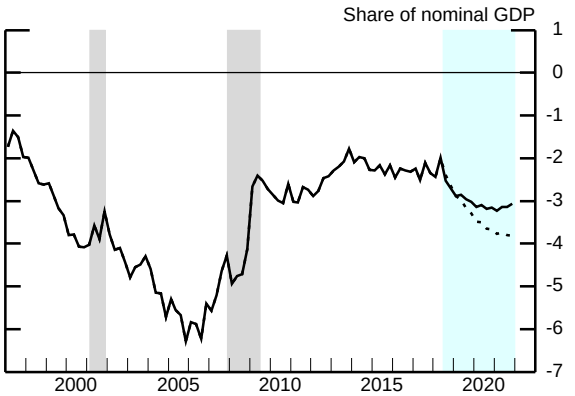
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Federal Surplus/Deficit



Source: ***Monthly Treasury Statement.***

Current Account Surplus/Deficit

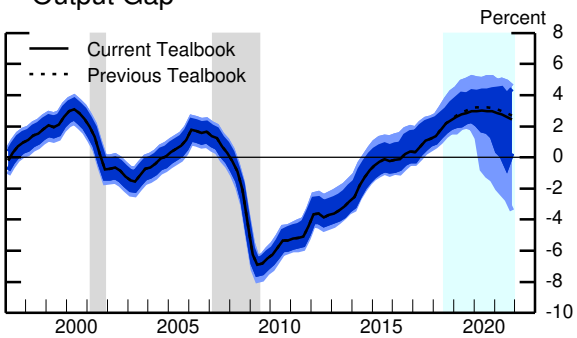


Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

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

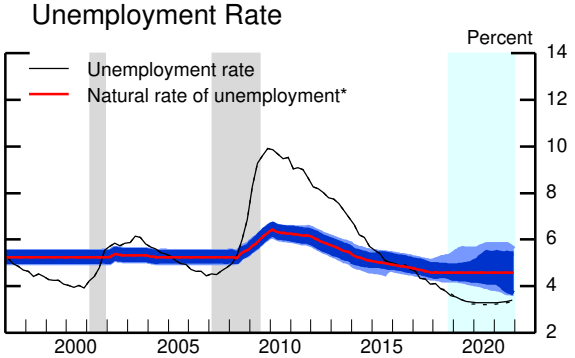
Cyclical Position of the U.S. Economy: Longer-Term Perspective

Output Gap



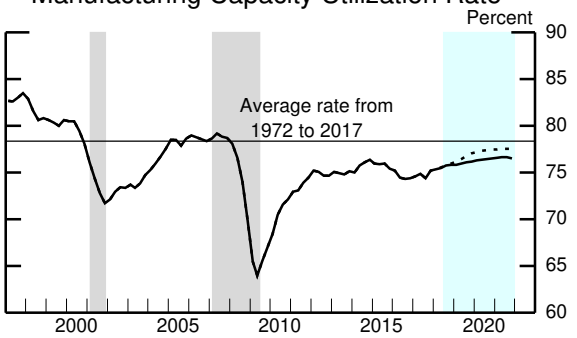
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the output gap.
Source: Various macroeconomic data; staff assumptions.

Unemployment Rate



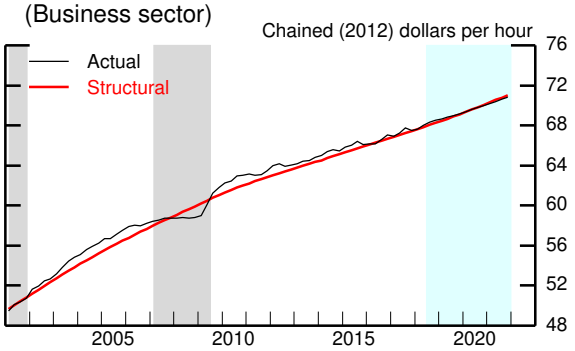
Note: Shaded regions show the 70 percent and 90 percent confidence intervals of the distribution of historical revisions to the staff's estimates of the natural rate.
*Staff estimate including the effect of extended and emergency unemployment insurance benefits.
Source: Various macroeconomic data; staff 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	1.6	1.7	1.8	1.9	1.9
Previous Tealbook	3.1	3.6	2.7	1.9	1.4	1.6	1.7	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	1.4	1.4
Previous Tealbook	1.7	2.9	2.7	1.8	1.2	1.2	1.2	1.3	1.4	1.4
Capital deepening	.7	1.4	1.0	.5	.8	.7	.7	.8	.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	.7	.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	-.3	-.2	-.2	-.2
Previous Tealbook	.4	-.1	-.2	-.5	-.5	-.3	-.3	-.2	-.2	-.2
Memo:										
Output gap[3]	-1.2	2.5	.3	-5.3	.4	1.2	2.4	3.0	2.9	2.4
Previous Tealbook	-1.2	2.5	.3	-5.3	.4	1.2	2.4	3.2	3.2	2.7

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	2017	2018		2018	2019	2020	2021
		H1	H2				
Nonfarm payroll employment[1]	183	218	196	207	168	121	82
Previous Tealbook	183	218	183	200	177	129	85
Private employment[1]	180	215	182	198	157	111	72
Previous Tealbook	180	215	179	197	166	119	75
Labor force participation rate[2]	62.7	62.8	62.8	62.8	62.8	62.8	62.5
Previous Tealbook	62.7	62.8	62.8	62.8	62.9	62.8	62.6
Civilian unemployment rate[2]	4.1	3.9	3.6	3.6	3.3	3.3	3.4
Previous Tealbook	4.1	3.9	3.7	3.7	3.3	3.2	3.4
Employment to population ratio[2]	60.1	60.4	60.5	60.5	60.7	60.7	60.4
Previous Tealbook	60.1	60.4	60.5	60.5	60.8	60.8	60.5

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

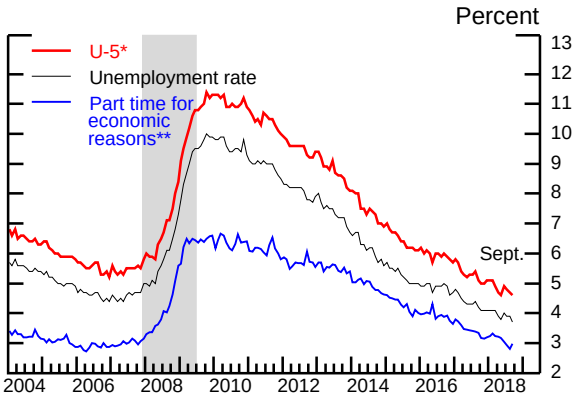
Measure	2017	2018		2018	2019	2020	2021
		H1	H2				
Percent change at annual rate from final quarter of preceding period							
PCE chain-weighted price index	1.8	2.2	1.7	2.0	2.0	1.9	1.9
Previous Tealbook	1.8	2.2	1.8	2.0	1.9	2.0	2.0
Food and beverages	.7	.7	.9	.8	2.5	2.6	2.3
Previous Tealbook	.7	.7	1.3	1.0	2.4	2.6	2.3
Energy	8.1	6.5	4.4	5.4	-.2	-1.1	-1.0
Previous Tealbook	8.1	6.5	6.4	6.5	-.5	-1.2	-.8
Excluding food and energy	1.6	2.1	1.7	1.9	2.0	2.0	2.0
Previous Tealbook	1.6	2.1	1.6	1.9	2.0	2.1	2.1
Prices of core goods imports[1]	1.1	1.6	-1.6	.0	.6	.8	.7
Previous Tealbook	1.1	1.6	-1.5	.0	.6	.8	.7
	Sept. 2018[2]	Oct. 2018[2]	Nov. 2018[2]	Dec. 2018[2]	Jan. 2019[2]	Feb. 2019[2]	Mar. 2019[2]
12-month percent change							
PCE chain-weighted price index	2.0	2.0	1.9	1.9	1.8	1.8	2.0
Previous Tealbook	2.0	2.0	2.0	2.0	...	...	...
Excluding food and energy	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Previous Tealbook	1.9	1.8	1.9	1.9	...	...	...

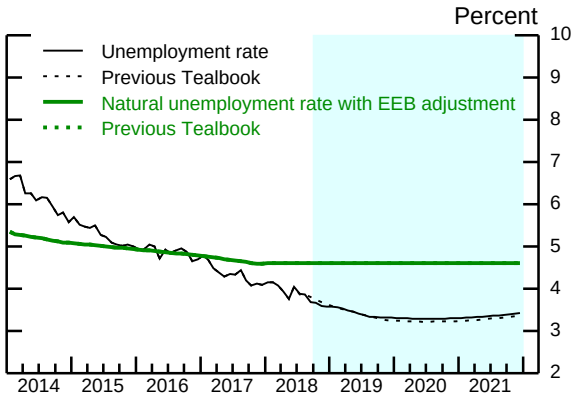
... Not applicable.
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Domestic Econ Devel & Outlook

Labor Market Developments and Outlook (1)

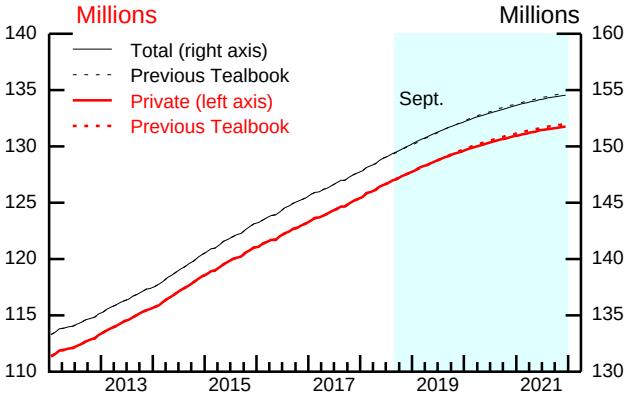
Measures of Labor Underutilization





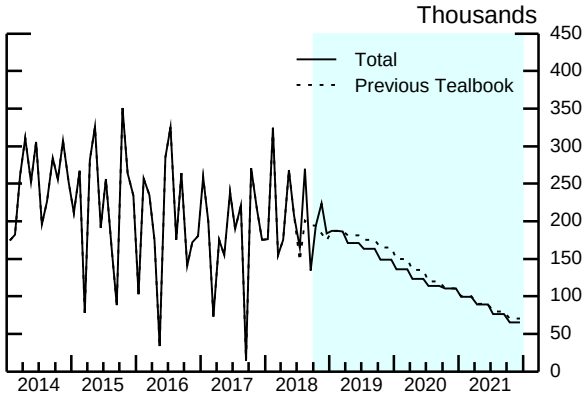
* U-5 measures total unemployed persons plus all marginally attached to the labor force as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
EEB Extended and emergency unemployment benefits.
Source: U.S. Department of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

Level of Payroll Employment



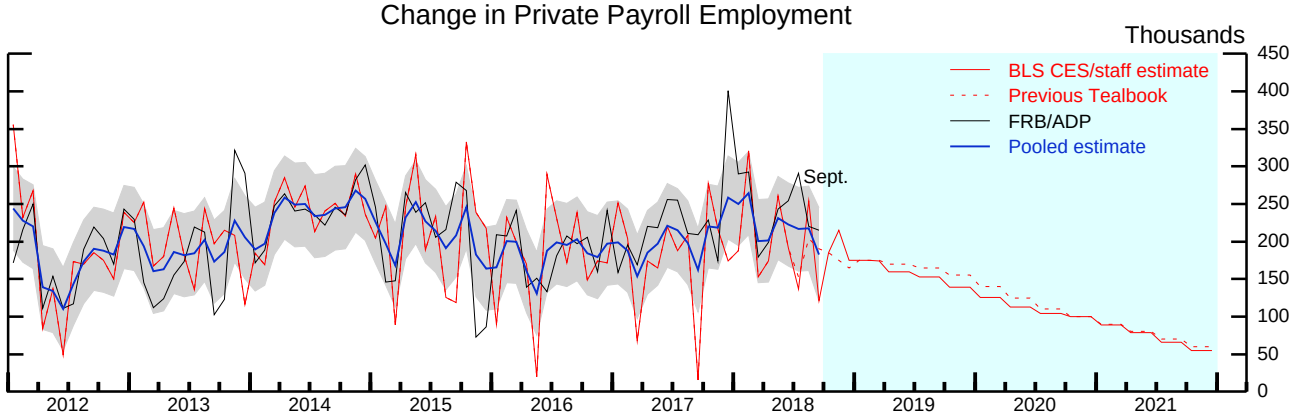
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Change in Total Payroll Employment



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

Change in Private Payroll Employment

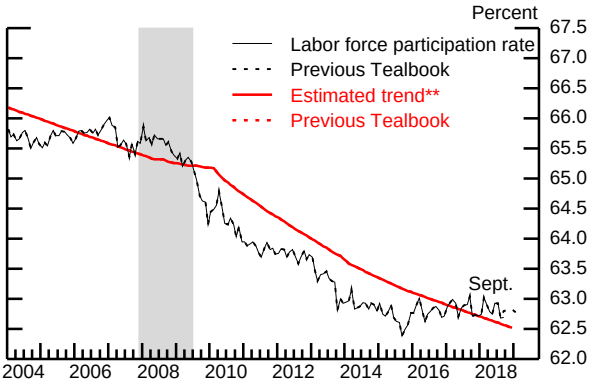


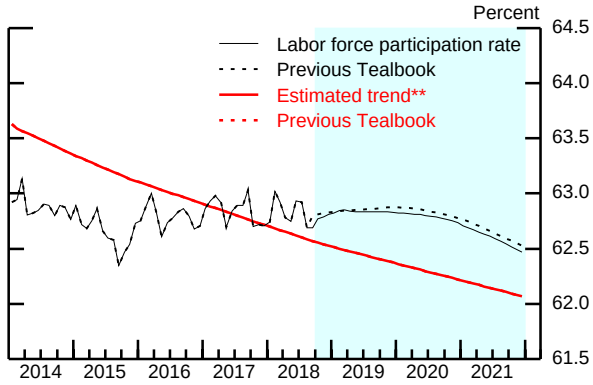
Note: Gray shaded area around blue line is 90 percent confidence interval around pooled estimate.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff calculations using microdata from ADP.

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)

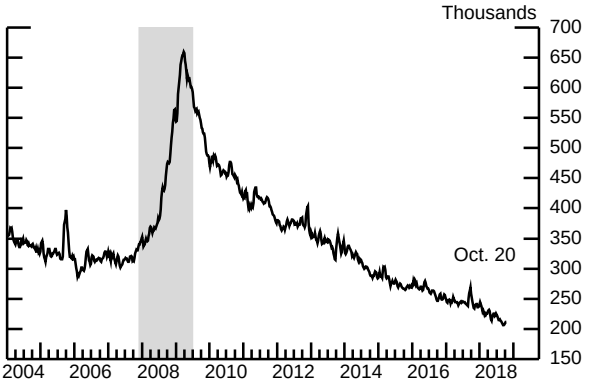
Labor Force Participation Rate*





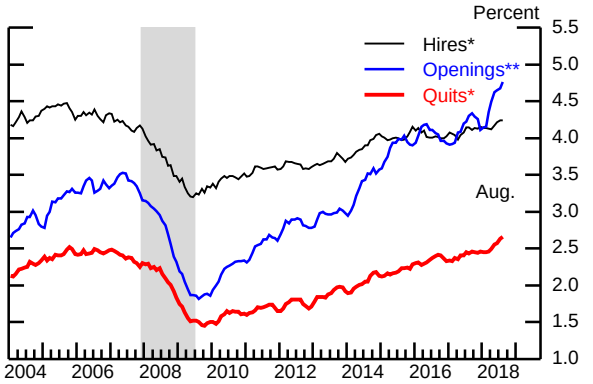
* Published data adjusted by staff to account for changes in population weights.
** Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Initial Unemployment Insurance Claims*



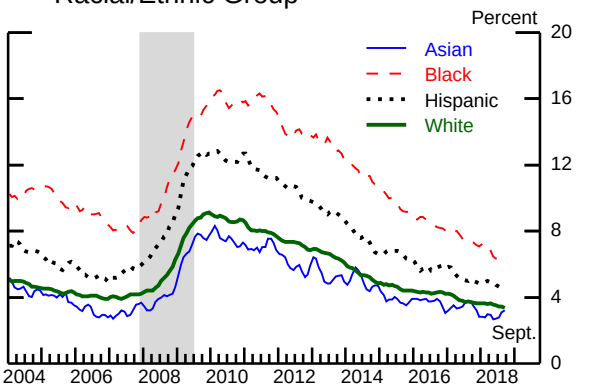
* 4-week moving average.
Source: U.S. Department of Labor, Employment and Training Administration.

Hires, Quits, and Job Openings



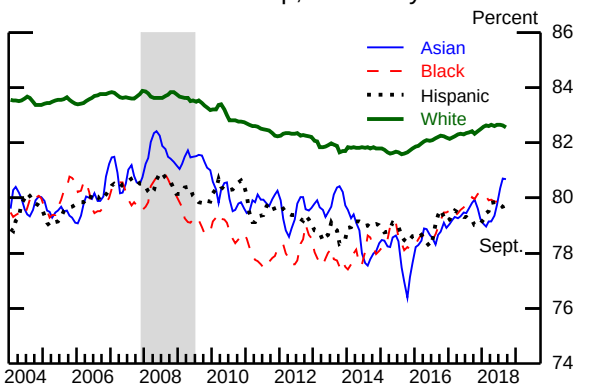
* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

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

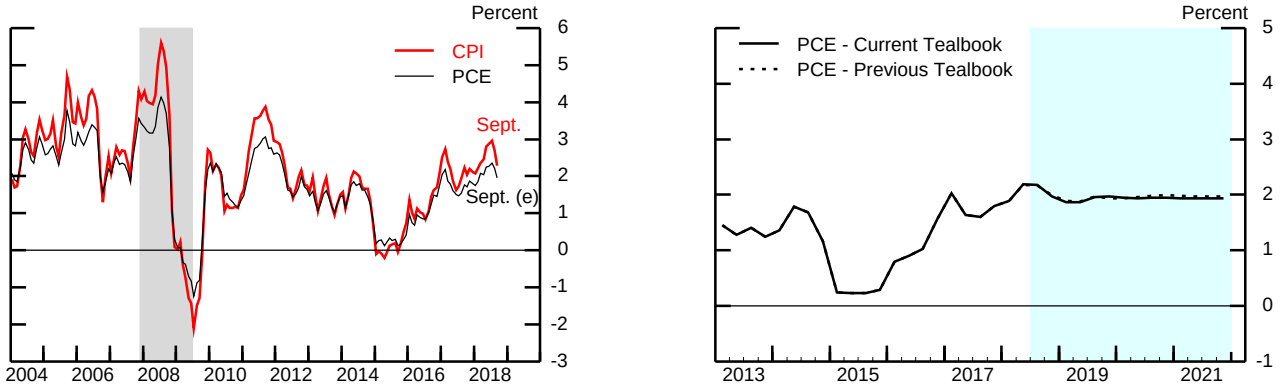


Note: These categories are not mutually exclusive, as the ethnicity Hispanic may include people of any race. The Current Population Survey defines Hispanic ethnicity as those who report their origin is Mexican, Puerto Rican, Cuban, Central American, or South American (and some others). 3-month moving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

Inflation Developments and Outlook (1)

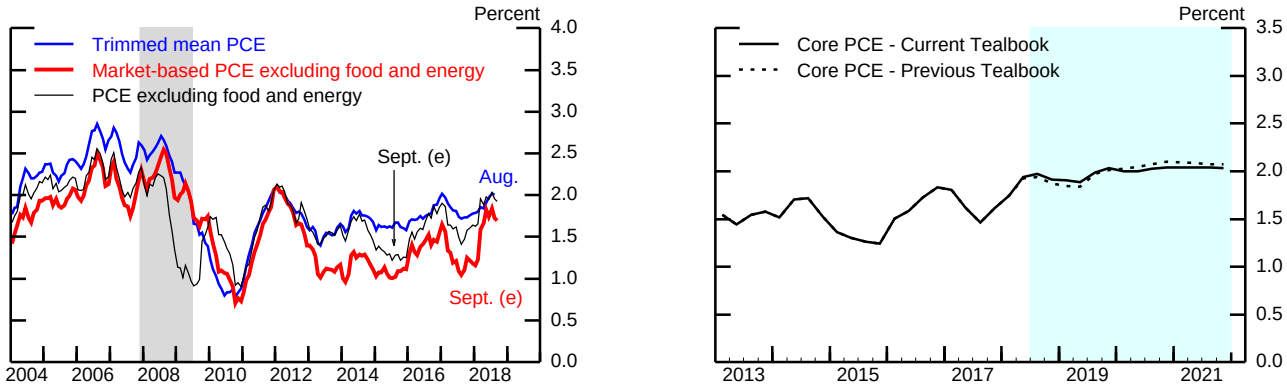
(Percent change from year-earlier period)

Headline Consumer Price Inflation



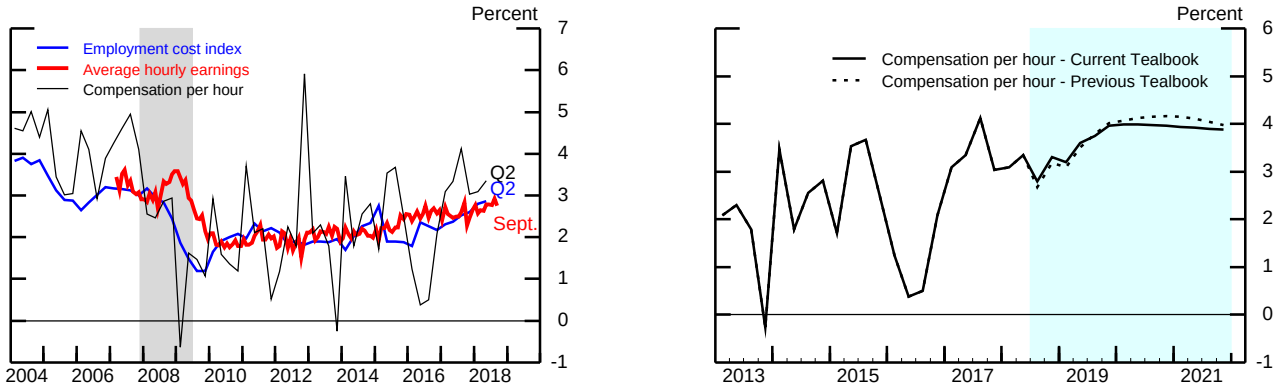
Note: PCE prices from July to September 2018 are staff estimates (e).
Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.

Measures of Underlying PCE Price Inflation



Note: Core PCE prices from July to September 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



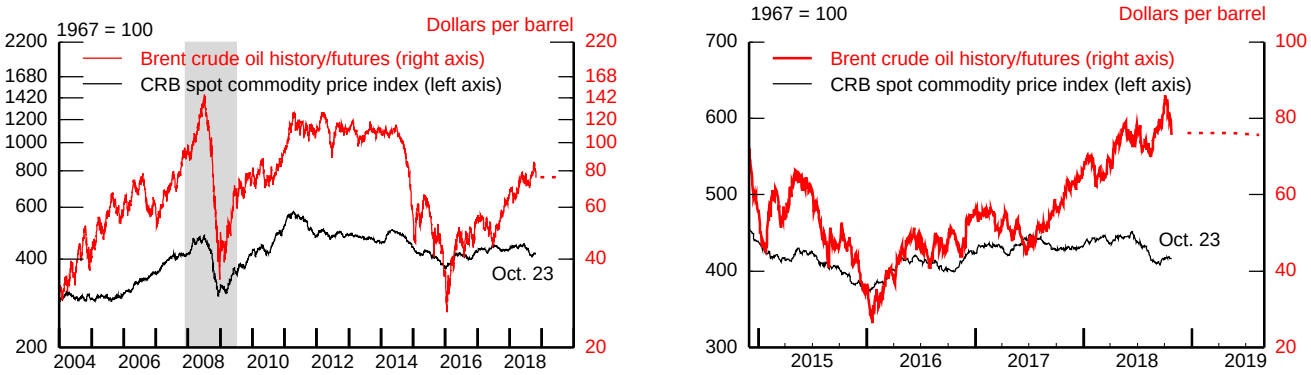
Note: Compensation per hour is for the business sector. Average hourly earnings are for the private nonfarm sector. The employment cost index is for the private sector.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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)

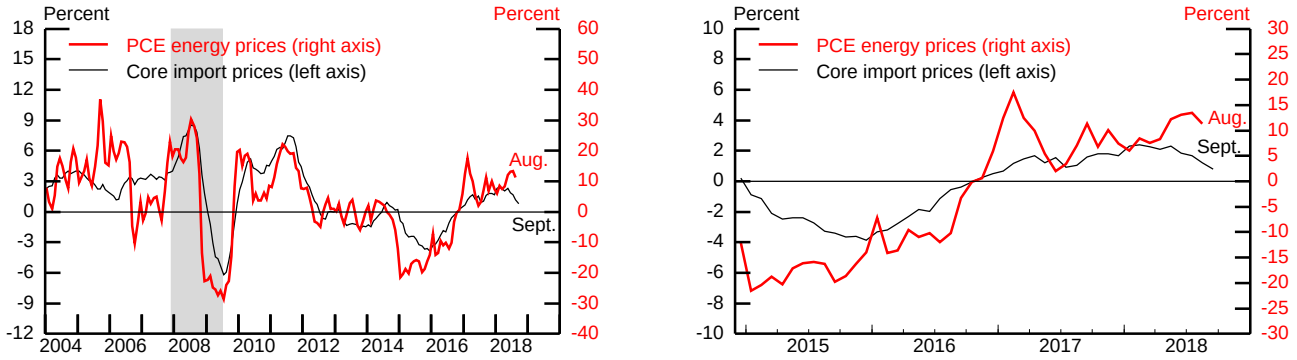
(Percent change from year-earlier period, except as noted)

Commodity and Oil Price Levels



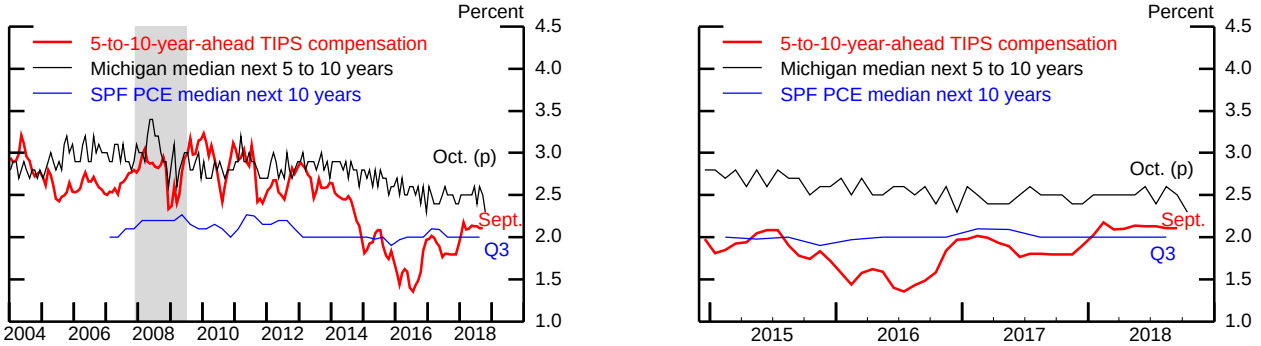
Note: Futures prices (dotted lines) are the latest observations on monthly futures contracts.
Source: For oil prices, U.S. Department of Energy, Energy Information Agency; for commodity prices, Commodity Research Bureau (CRB).

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

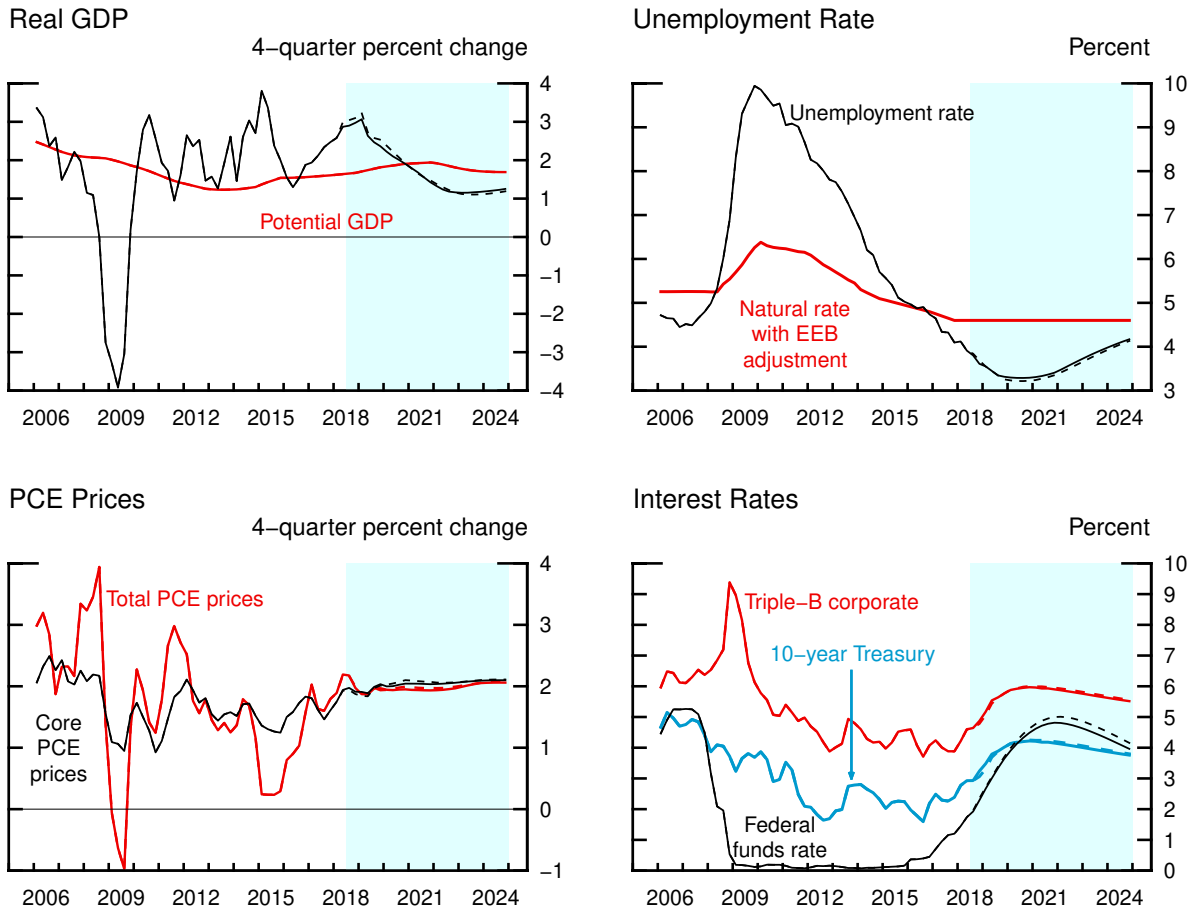
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.

The Long–Term Outlook

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

Measure	2018	2019	2020	2021	2022	2023	2024	Longer run
Real GDP	3.0	2.4	1.9	1.4	1.2	1.2	1.3	1.7
Previous Tealbook	3.1	2.5	1.9	1.5	1.2	1.1	1.2	1.7
Civilian unemployment rate[1]	3.6	3.3	3.3	3.4	3.7	4.0	4.2	4.6
Previous Tealbook	3.7	3.3	3.2	3.3	3.6	3.9	4.1	4.6
PCE prices, total	2.0	2.0	1.9	1.9	2.0	2.1	2.1	2.0
Previous Tealbook	2.0	1.9	2.0	2.0	2.0	2.1	2.1	2.0
Core PCE prices	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.0
Previous Tealbook	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.0
Federal funds rate[1]	2.29	3.65	4.49	4.81	4.67	4.34	3.96	2.50
Previous Tealbook	2.35	3.71	4.63	5.00	4.90	4.57	4.16	2.50
10-year Treasury yield[1]	3.2	4.0	4.2	4.2	4.0	3.9	3.8	3.4
Previous Tealbook	3.1	4.0	4.3	4.2	4.1	3.9	3.8	3.4

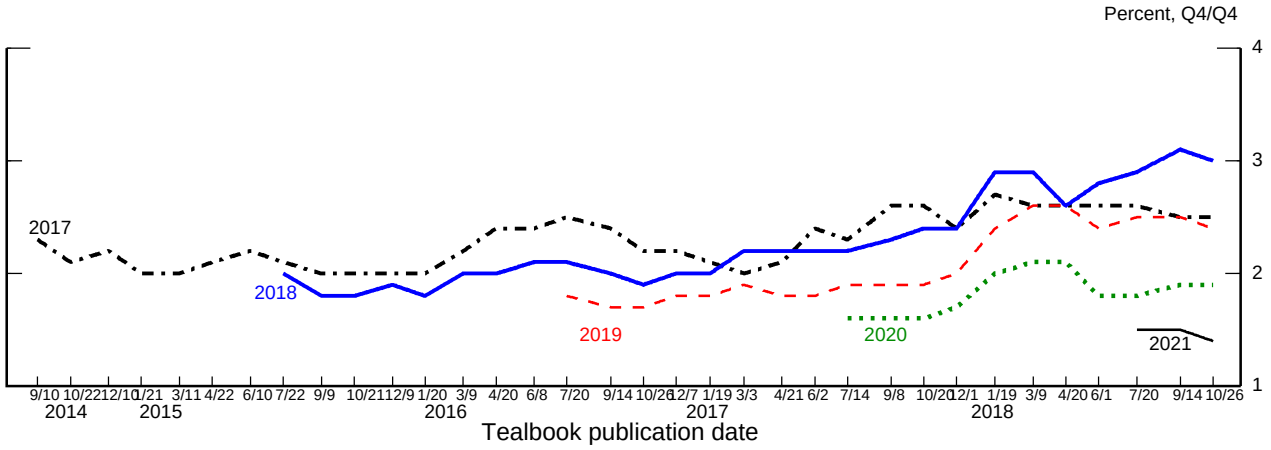
1. Percent, average for the final quarter of the period.



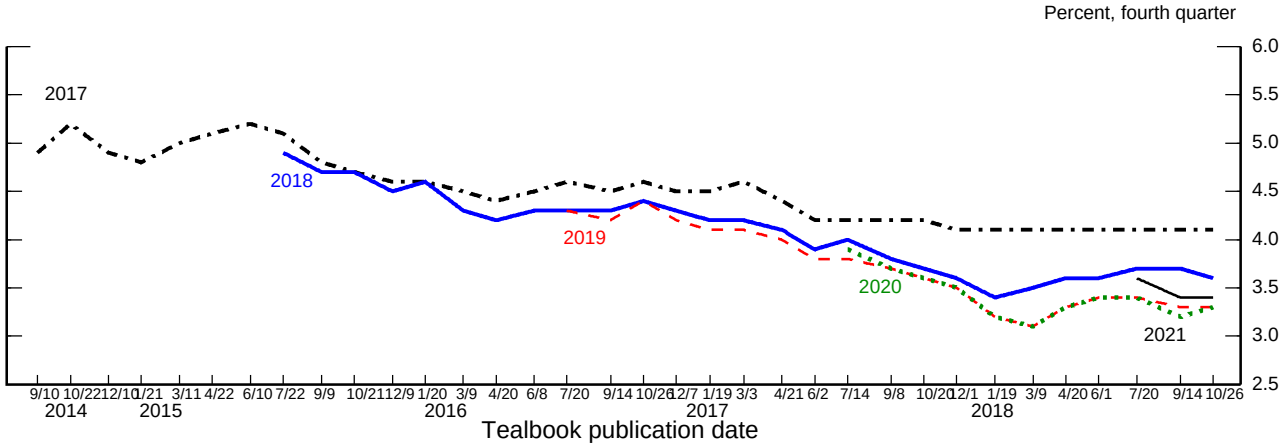
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

Evolution of the Staff Forecast

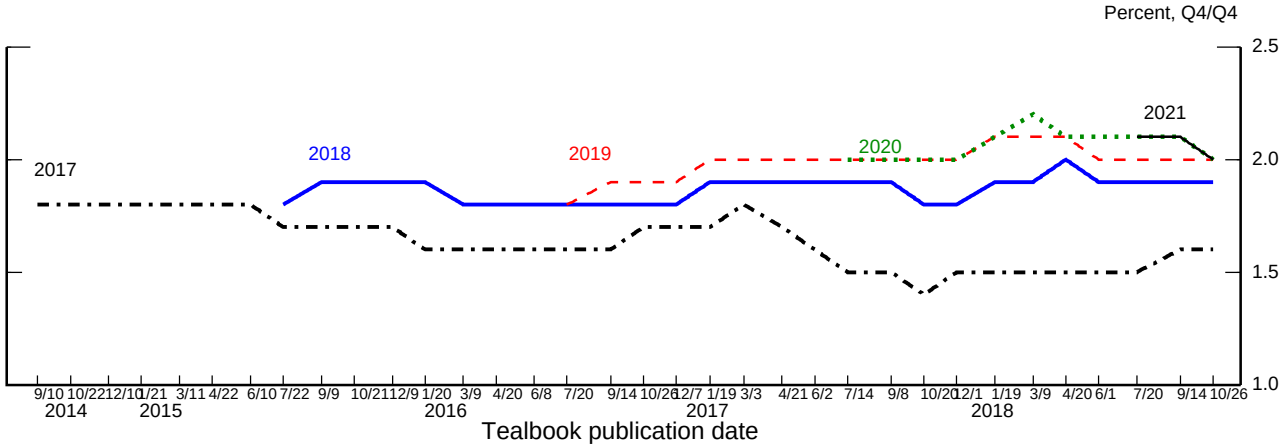
Change in Real GDP



Unemployment Rate



Change in PCE Prices excluding Food and Energy



(This page is intentionally blank.)

International Economic Developments and Outlook

Our foreign outlook continues to be positive despite a plethora of downside risks. Economic growth abroad remains solid, picking up to an estimated 2½ percent at an annual rate in the third quarter after dipping to 2 percent in the second. Indicators suggest a notable pickup in Latin America, notwithstanding continued stress in Argentina, with Mexico reversing its second-quarter contraction and Brazil rebounding from a nationwide truckers' strike. Conversely, growth slowed in China, and we estimate that it moderated in the advanced foreign economies (AFEs) from an unusually strong second quarter, largely reflecting a return to a more sustainable pace in Canada and Japan.

We see foreign growth remaining near 2½ percent over the forecast period, about in line with its potential. Overall, our forecast is little changed from the September Tealbook, as a small upward revision to the AFEs in the near term was mostly offset by a small downward revision to the emerging market economies (EMEs), including China.

Against the background of nearly closed output gaps, inflation has been picking up around the world. However, most of the rise in headline inflation is due to higher oil prices, which hit their highest level in four years before retracing some in recent weeks. In the AFEs, aggregate four-quarter inflation rose to 2 percent in the third quarter, but core inflation only edged up to 1.2 percent. Moreover, there is substantial variation across the AFEs, with core inflation running close to the 2 percent targeted by central banks in the United Kingdom and Canada and lingering at much lower rates in the euro area and Japan. Inflation also rose in the EMEs, reflecting higher energy prices, past currency depreciations, and a surge in food prices in China.

With inflation picking up and financial pressures increasing in EMEs, several EME central banks have tightened monetary policy in recent months. In Argentina, interest rates rose to over 70 percent after the central bank, under a revised program with the IMF, switched to a monetary targeting regime with a 0 percent money growth target. And central banks in Chile, India, Indonesia, the Philippines, Russia, and Turkey have all raised policy rates. We generally expect most EMEs to tighten monetary policy further over the forecast period, albeit at a measured pace, as U.S. monetary policy normalization continues and global financial conditions tighten. In the AFEs, monetary policy normalization promises to be very slow in the face of relatively subdued inflationary

pressures, uncertainties about the outlook, and headwinds that likely continue to weigh on r*'s. Our assumptions about monetary policy in the AFEs are little changed, and even at the end of the forecast period, we see policy rates at levels well below historical values.

The prominent risks we highlighted in September are still on our radar. First, financial distresses in EMEs—which have largely been confined to Argentina and Turkey thus far and have left only a small imprint on our baseline forecast—could become more widespread, perhaps triggered by problems in China or rising global interest rates. The consequences of such an outcome are described in our "EME Financial Turbulence" alternative scenario in the Risks and Uncertainty section of the Tealbook. Second, negotiations over the Italian budget and Brexit, which have not gone well of late, could fall apart and exert a greater drag in Europe than the still relatively modest effects currently built into our baseline. Third, tensions over trade policy could intensify and lead to greater disruptions to global trade than we are currently assuming. Fourth, higher-than-expected inflation in the United States and abroad, perhaps triggered by a rise in oil prices, could push up interest rates around the world. This risk is discussed in our "Inflation-Driven Global Tightening" alternative scenario. Finally, although the equity declines registered abroad of late—which in part reflect concerns about the risks just discussed—have not been large enough to weigh much on the foreign outlook, a more substantial global market correction obviously would have more adverse effects.

ADVANCED FOREIGN ECONOMIES

- ***Euro area.*** Available indicators, such as industrial production through August, suggest that economic activity slowed from an upwardly revised 1.8 percent in the second quarter to a still-solid 1½ percent in the third. In Italy, financial tensions increased after the government presented its budget proposal for 2019. The targeted deficit is significantly wider than previously agreed with the European Commission, reinforcing concerns about the sustainability of Italian public finances and straining the country's relations with the European Union. With rising financial tensions around Italy and PMIs declining noticeably in October, we project growth in the euro area to slow a bit further to 1¼ percent in the first half of 2019. Thereafter, we expect growth to edge up to 1½ percent by 2020 and hover around that pace through 2021.

  Headline inflation increased to 2.5 percent at an annual rate in the third quarter because of a sharp increase in retail energy prices, but core inflation edged down to 1.1 percent. As energy prices stabilize, headline inflation should fall just below

1½ percent before edging up as resource slack is eliminated. With our growth and inflation outlooks little changed, we continue to assume that the European Central Bank will cease net asset purchases in December, wait until late 2019 to begin raising its deposit rate, and then increase it to ¼ percent in 2021.

- ***United Kingdom.*** Incoming data are consistent with a rise in real GDP growth from 1.6 percent in the second quarter to 2½ percent in the third, ¾ percentage point higher than estimated in September, partially reflecting favorable weather conditions. We project that growth will fall back to 1½ percent (still slightly above our estimate of potential) in the current quarter and remain around this pace through the end of the forecast period. This outlook is conditional on our view that the United Kingdom and the European Union will eventually reach an agreement before the March 29, 2019, deadline. That said, with negotiations stalling on the Irish border issue, there is some risk that Brexit could occur without a deal in place, resulting in substantial disruptions to European supply chains and global financial markets.

  Inflation rose to 2.9 percent last quarter from 2 percent in the second, mostly reflecting higher retail energy prices. We have inflation gradually edging down to the Bank of England's (BOE) 2 percent target, as energy inflation eases and pass-through from past pound sterling depreciation fades. Given better-than-expected activity data, we moved the next rate hike to the second quarter of 2019, one quarter earlier than assumed in September. Even so, we still see the BOE normalizing policy only very gradually, raising the Bank Rate from the current 0.75 percent to 1¾ percent in 2021 and waiting until then to start reducing the size of its balance sheet.

- ***Canada.*** Recent indicators, such as monthly GDP for July and manufacturing PMI through September, point to 2¼ percent growth in the third quarter, about the average pace over the first half of the year and somewhat faster than forecast in September. The addition of now-legalized cannabis-related activity to the official data will provide a one-time kick to GDP, adding an estimated ½ percentage point to fourth-quarter growth, now projected at 2½ percent. With solid momentum in the economy, we expect growth to average just over 2 percent in 2019 before settling at its potential pace of 1¾ percent by mid-2020.

  After slowing to 1.1 percent in the second quarter, inflation bounced back to 2.6 percent in the third, as core inflation recovered from earlier one-off price declines in a few categories and airfares surged. Amid reports of rising input costs and solid wage growth, we expect inflation to remain somewhat above the 2 percent target in

2019 before edging down to its target level by the end of 2020. Citing reduced trade policy uncertainty after a deal was reached to replace NAFTA with the new U.S.-Mexico-Canada Agreement, or USMCA, the Bank of Canada (BOC) raised its policy rate 25 basis points to 1.75 percent on October 24. As resource utilization continues to increase, the BOC is expected to raise its policy rate to 3 percent by mid-2020.

- ***Japan.*** Real GDP growth is estimated to have moderated to ¾ percent in the third quarter from a blistering 3 percent pace in the second. This estimate is ¼ percentage point lower than in the September Tealbook, reflecting weaker-than-expected data on household consumption and net exports. Growth should remain near its potential rate of ¾ percent, abstracting from substantial fluctuations around the consumption tax hike planned for October 2019.

  Inflation swung from negative 2.3 percent in the second quarter to positive 2.7 percent in the third, in part reflecting pickups in food and retail energy prices. Core inflation also turned positive but only to a meager 0.4 percent. We continue to see core inflation edging up further, reflecting elevated resource utilization, and total inflation settling near 1 percent over the remainder of the forecast period. With inflation well below the Bank of Japan's (BOJ) 2 percent target, we expect the BOJ to maintain a highly accommodative stance, waiting until the end of 2020 to lift its target for the 10-year Japanese government bond yield to around ¼ percent.

EMERGING MARKET ECONOMIES

- ***China.*** Bucking the trend in most other EMEs, real GDP growth in China fell in the third quarter to just below 6 percent, down from 6½ percent in the second quarter and a touch weaker than our September Tealbook forecast. The slowdown was led by weaker investment, particularly in infrastructure, suggesting that earlier policy tightening continues to exert a drag on growth. Exports remained relatively strong, even in the face of escalating trade tensions with the United States. With tariffs now in effect on about half of Chinese exports to the United States, we expect export growth to slow somewhat going forward, although the effect of the tariffs will likely be mitigated by the nearly 8 percent depreciation of the renminbi against the dollar, which began in mid-June. In addition, we expect domestic demand to strengthen as the authorities shift to a more accommodative policy stance. Indeed, the People's Bank of China recently cut the reserve requirement ratio an additional 100 basis points, supporting credit growth. All told, we see growth picking back up to 6¼ percent this quarter before slowing gradually to 5¾ percent by the end of the

forecast period. Relative to the September Tealbook, this forecast is down a touch through the end of 2019, reflecting the latest round of U.S. tariffs on Chinese goods, which were announced on September 17.

Inflation stepped up from ¾ percent in the second quarter to around 4 percent in the third as an outbreak of African swine fever and adverse weather conditions caused pork and vegetable prices, respectively, to spike. As these temporary factors fade, we expect inflation to settle at 2½ percent.

- ***Other Emerging Asia.*** A recovery in the region's exports, which had slowed markedly in the second quarter, is expected to push growth up to 3½ percent in the third, despite a somewhat weak preliminary GDP release from Korea. We expect growth to edge up to 3¾ percent in 2019 and 2020. Although U.S.–China trade barriers implemented to date should have a negligible effect on growth in other emerging Asian economies, a further escalation of trade tensions remains a clear downside risk.

- ***Mexico.*** Recent data on retail sales and consumer confidence suggest that real GDP expanded at a 2 percent pace last quarter after a second-quarter contraction. Even so, construction activity has been weaker than expected, causing us to revise down our forecast for third-quarter growth ¼ percentage point. We see growth rising to nearly 3 percent by mid-2019, supported by robust U.S. demand and the dissipation of trade-related uncertainties after a deal was reached on the USMCA. Most Mexican producers are already close to meeting the stricter rules of origin and labor content requirements in the revised agreement, so we do not expect the new accord to result in a material shift in production from Mexico to the United States. A deal was already factored into our baseline and did not change our forecast.

  Headline inflation moved up to 5 percent on a 12-month basis in September on the back of energy price increases and base effects (transportation tariffs were cut in September 2017 after a series of earthquakes). In October, the Bank of Mexico (BOM) kept its policy rate at 7.75 percent, noting concerns about the slower-than-expected decline in inflation and potential second-round effects from higher energy prices. Assuming EME financial stresses abate, we see the BOM easing its monetary policy in mid-2019 as inflation moderates.

- ***Brazil.*** We estimate that real GDP growth jumped to 4 percent in the third quarter from a tepid ¾ percent in the second, largely reflecting a recovery from the May

truckers' strike. Recent data have been mixed but suggest that the economy's momentum is somewhat stronger than we anticipated in the September Tealbook, which led us to revise up the third-quarter forecast ½ percentage point. We expect growth to step back to 2¼ percent in the fourth quarter and then rise gradually to 2¾ percent in 2019, helped by a pickup in private investment once political uncertainty stemming from the presidential election fades. In the first round of the election, the right-wing candidate Jair Bolsonaro came in first with a large lead over the runner-up Fernando Haddad of the Workers' Party. The next president will be determined by a second-round runoff on October 28, and polls indicate a double-digit lead for Bolsonaro. Our baseline forecast assumes that the incoming government will push through an urgent social security reform in 2019 and thus avoid a heightening of fiscal and financial stresses. However, considerable uncertainty remains around the policy outlook.

Headline inflation accelerated to 6.6 percent in the third quarter, pressured by the lagged effects of the truckers' strike and the pass-through from currency depreciation. With the dissipation of these transitory effects, we expect inflation to fall to 4 percent in the fourth quarter before stabilizing at 4¼ percent—the central bank's target for 2019. Citing anchored inflation expectations and considerable resource slack, the Central Bank of Brazil did not change its policy rate in its September meeting.

- ***Argentina.*** On September 26, Argentine authorities agreed on a revised program with the IMF intended to restore market confidence and allay growing concern about government financing needs in 2019. The new program, which now awaits approval by the IMF Executive Board, envisions a larger and more front-loaded disbursement of IMF resources and features significantly tighter fiscal targets, strict limits on foreign exchange intervention, and a switch to a temporary monetary targeting regime in which the growth of the money supply is sharply reduced. As a result of both tighter fiscal and monetary policies and a sharp tightening of financial conditions in recent months, we now expect a much deeper recession, with four-quarter growth contracting nearly 8 percent this year. We expect a rebound in agricultural production from this year's drought to push overall GDP growth into positive territory next year, but outside of agriculture, the recession is expected to continue.

(This page is intentionally blank.)

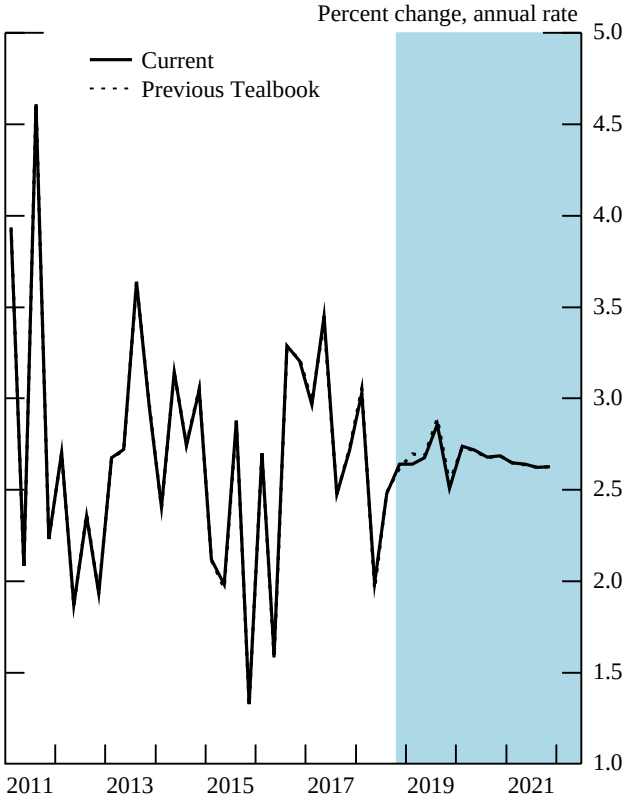
The Foreign GDP Outlook

Real GDP* — Percent change, annual rate

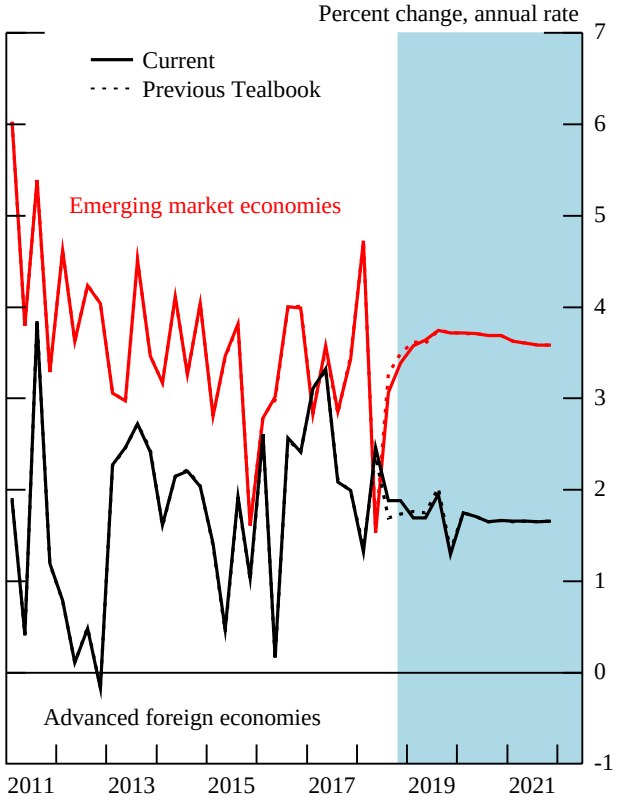
	2017	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019	2020	2021
1. Total Foreign	2.9	3.0	2.0	2.5	2.6	2.7	2.7	2.6
Previous Tealbook	2.9	3.1	2.0	2.5	2.6	2.7	2.7	2.6
2. Advanced Foreign Economies	2.6	1.3	2.5	1.9	1.9	1.7	1.7	1.7
Previous Tealbook	2.6	1.4	2.4	1.7	1.7	1.7	1.7	1.7
3. Canada	3.0	1.4	2.9	2.2	2.5	2.1	1.8	1.8
4. Euro Area	2.7	1.6	1.8	1.6	1.5	1.4	1.6	1.6
5. Japan	2.0	-.9	3.0	.7	.5	.1	.8	.8
6. United Kingdom	1.4	.4	1.6	2.5	1.6	1.6	1.7	1.6
7. Emerging Market Economies	3.2	4.7	1.5	3.1	3.4	3.7	3.7	3.6
Previous Tealbook	3.2	4.7	1.6	3.3	3.5	3.7	3.7	3.6
8. China	6.8	7.2	6.5	5.9	6.3	6.1	5.9	5.7
9. Emerging Asia ex. China	4.2	5.6	2.5	3.5	3.8	3.7	3.7	3.5
10. Mexico	1.6	4.0	-.6	2.1	2.6	2.8	2.9	2.9
11. Brazil	2.1	.6	.7	4.0	2.3	2.6	2.8	2.8

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

Total Foreign GDP



Foreign GDP



The Foreign Inflation Outlook

Consumer Prices* — Percent change, annual rate

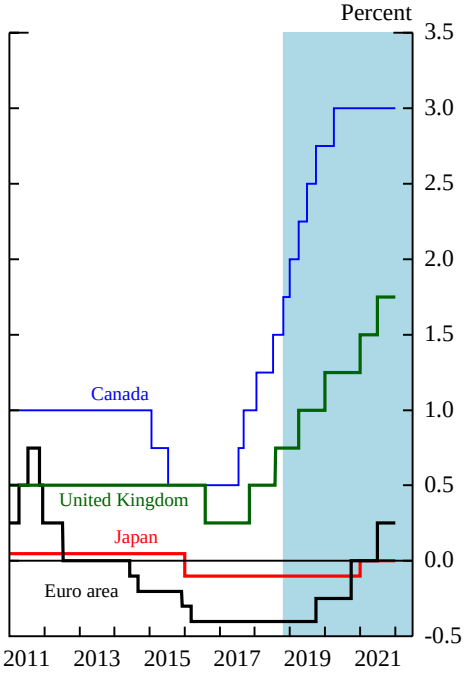
	2017	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019	2020	2021
1. Total Foreign	2.6	2.6	1.7	3.7	2.9	2.6	2.4	2.4
Previous Tealbook	2.6	2.7	1.7	3.5	2.7	2.7	2.4	2.4
2. Advanced Foreign Economies	1.5	2.6	1.0	2.5	2.1	1.9	1.7	1.7
Previous Tealbook	1.5	2.6	1.0	2.3	1.8	1.9	1.7	1.7
3. Canada	1.8	3.6	1.1	2.6	2.4	2.3	2.1	2.0
4. Euro Area	1.4	2.0	2.2	2.5	2.3	1.5	1.5	1.7
5. Japan	.6	2.5	-2.3	2.7	1.2	2.3	1.0	1.1
6. United Kingdom	3.0	2.4	2.0	2.9	2.4	2.3	2.2	2.1
7. Emerging Market Economies	3.4	2.7	2.2	4.6	3.5	3.1	2.9	2.9
Previous Tealbook	3.4	2.7	2.2	4.4	3.3	3.2	3.0	2.9
8. China	1.8	1.5	.7	4.1	2.9	2.5	2.5	2.5
9. Emerging Asia ex. China	2.3	2.2	1.4	1.5	2.4	2.8	2.8	2.8
10. Mexico	6.6	4.1	3.8	6.8	3.9	3.4	3.2	3.2
11. Brazil	2.8	3.1	4.3	6.6	4.0	4.3	4.3	4.3

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

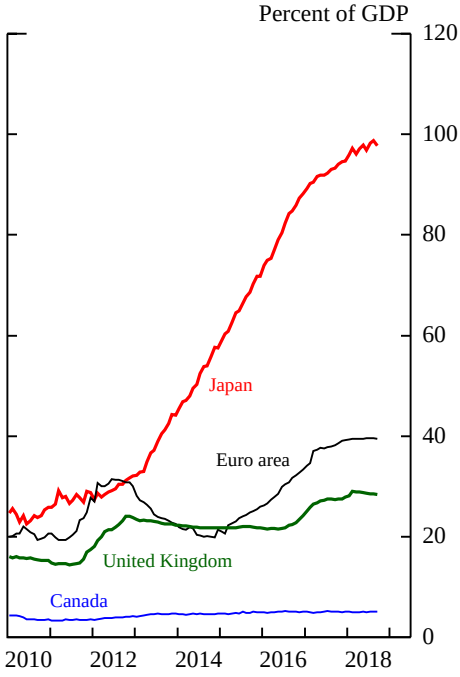
Int'l Econ Devel & Outlook

Foreign Monetary Policy

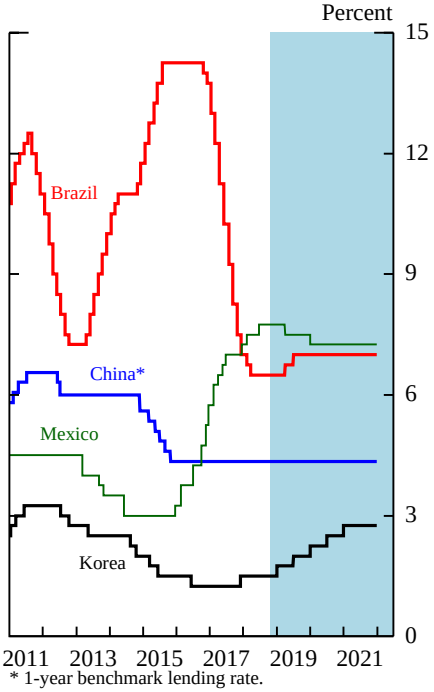
AFE Policy Rates



AFE Central Bank Balance Sheets



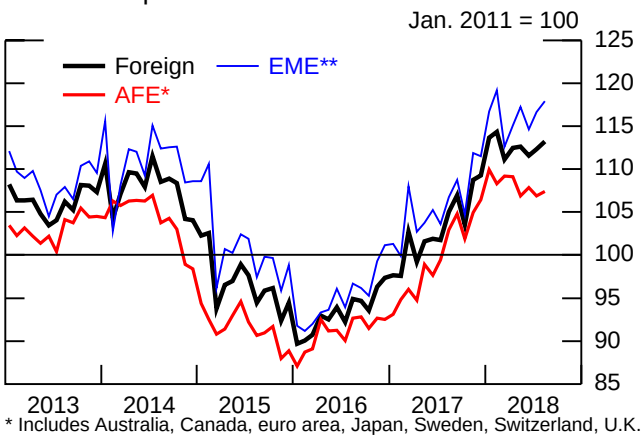
EME Policy Rates



* 1-year benchmark lending rate.

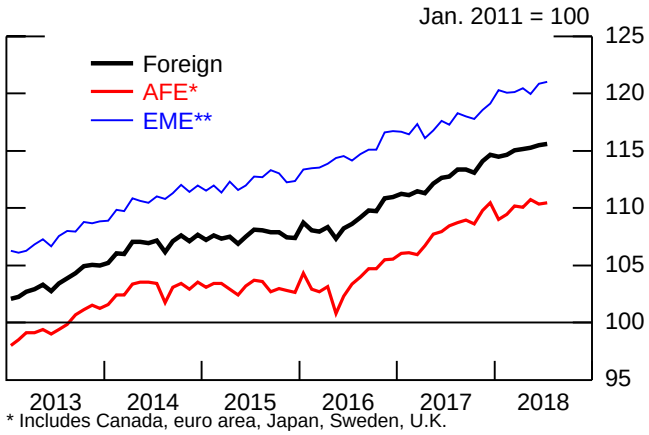
Recent Foreign Indicators

Nominal Exports



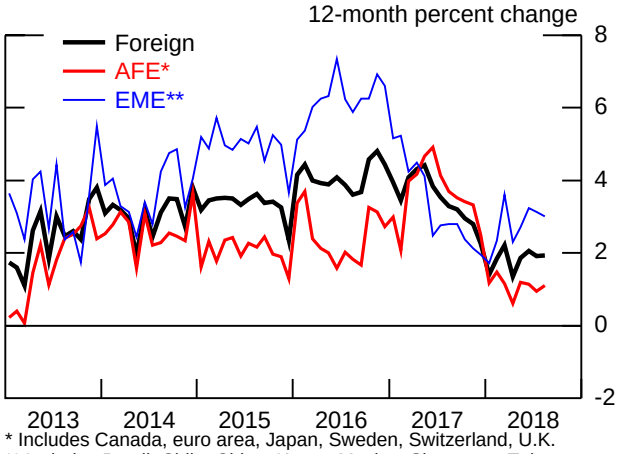
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Singapore, Taiwan, Thailand.

Industrial Production



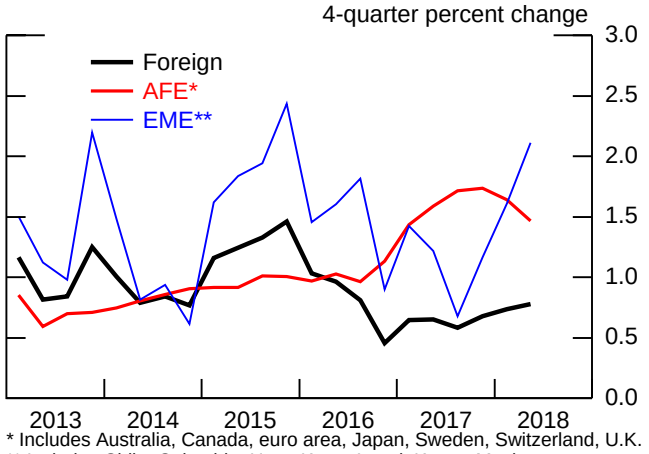
* Includes Canada, euro area, Japan, Sweden, U.K.
** Includes Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand.

Retail Sales



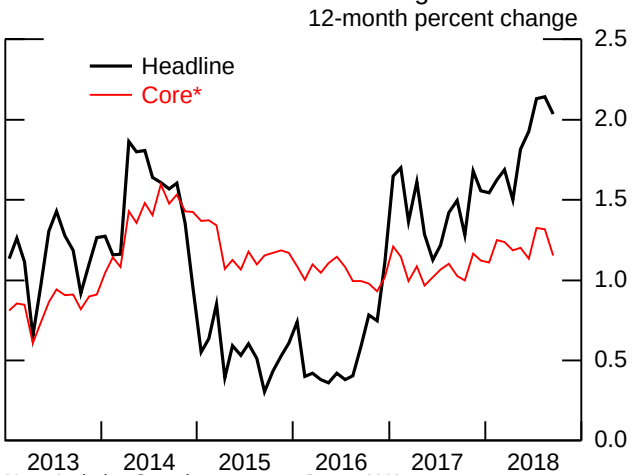
* Includes Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Brazil, Chile, China, Korea, Mexico, Singapore, Taiwan.

Employment



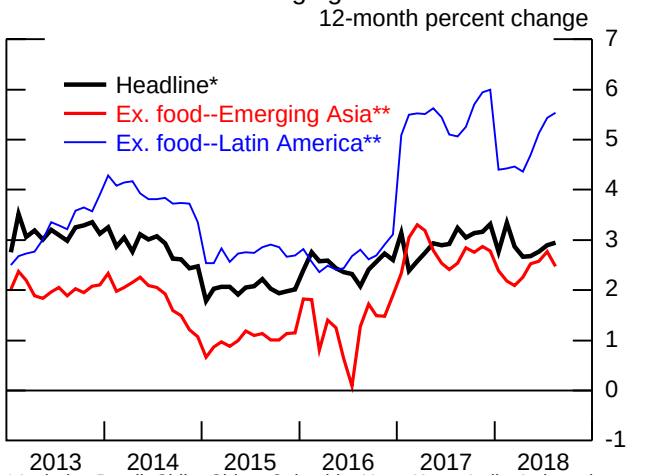
* Includes Australia, Canada, euro area, Japan, Sweden, Switzerland, U.K.
** Includes Chile, Colombia, Hong Kong, Israel, Korea, Mexico, Philippines, Russia, Singapore, Taiwan, Thailand, Turkey.

Consumer Prices: Advanced Foreign Economies



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

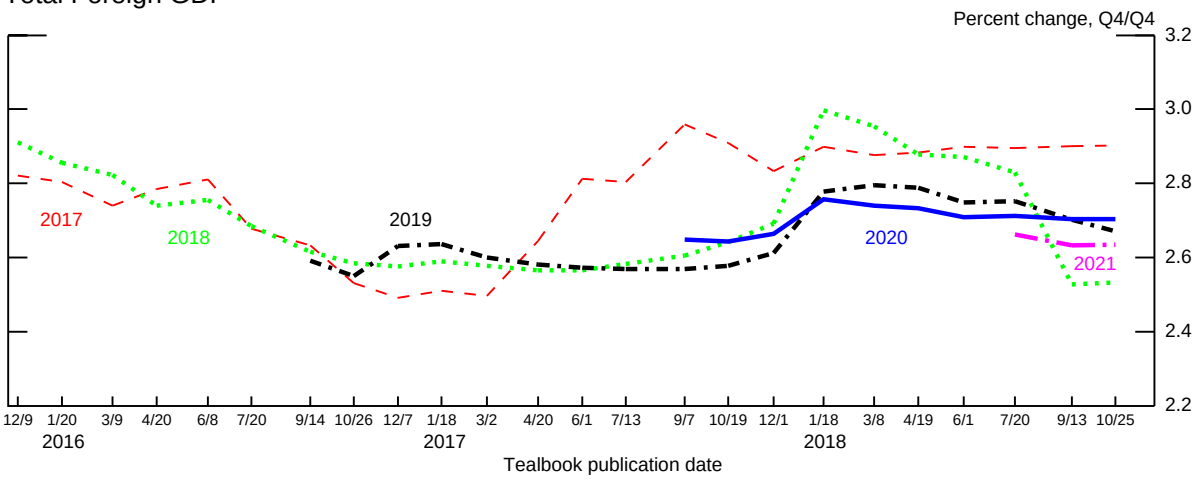
Consumer Prices: Emerging Market Economies



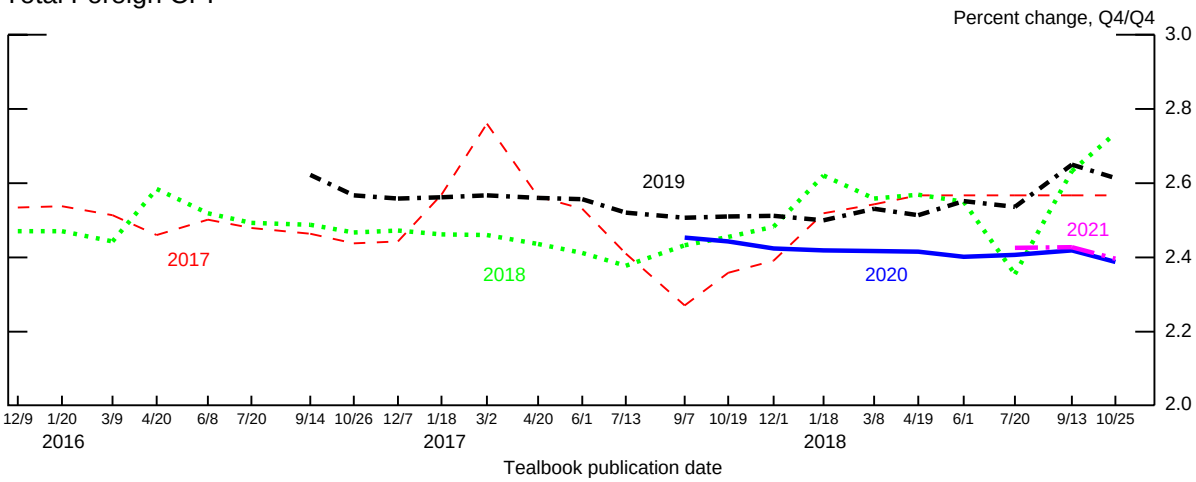
* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Latin America excludes Argentina and Venezuela.

Evolution of Staff's International Forecast

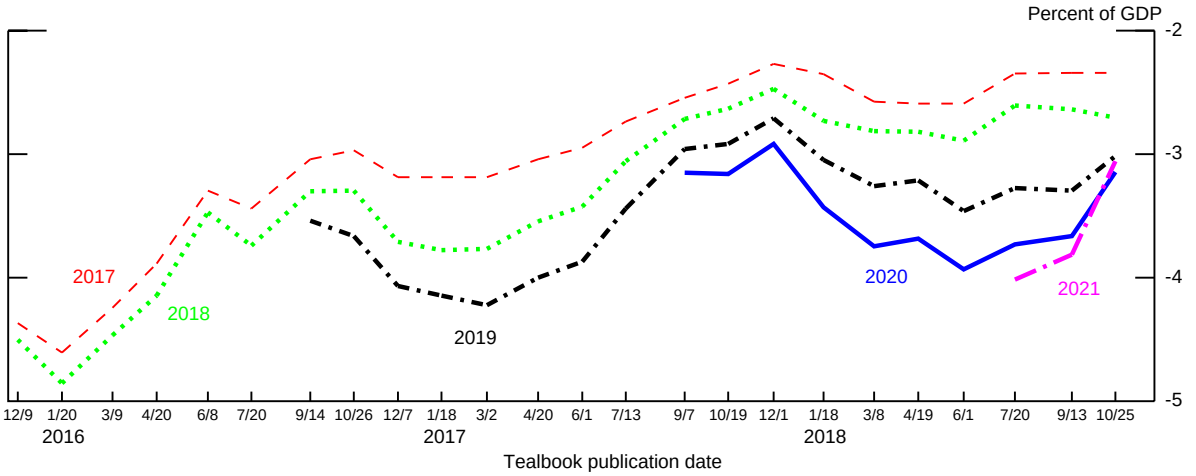
Total Foreign GDP



Total Foreign CPI



U.S. Current Account Balance



(This page is intentionally blank.)

Financial Market Developments

Concerns about ongoing international trade tensions, the global growth outlook, and rising interest rates weighed on equity market sentiment over the intermeeting period. Stock prices declined substantially on net, equity market volatilities rose notably, and the dollar appreciated. Treasury yields were little changed, as increases early in the period were offset by decreases owing to flight-to-safety flows associated with large equity market declines later in the period.

- Broad U.S. equity price indexes declined about 7 percent on net. The VIX increased significantly to levels that are notably elevated compared with its historical distribution.

- Despite the substantial declines in stock prices, credit spreads on investment- and speculative-grade corporate bonds widened by modest amounts.

- A straight read of market quotes implies that the probability of a 25 basis point rate hike occurring at the December FOMC meeting stands at 75 percent, little changed since the September meeting, while the probability of a rate increase at the November FOMC meeting is negligible.

- Nominal Treasury yields were little changed on net. TIPS yields rose, leaving TIPS-implied inflation compensation moderately lower, with some of the decline occurring after the softer-than-expected September CPI data release.

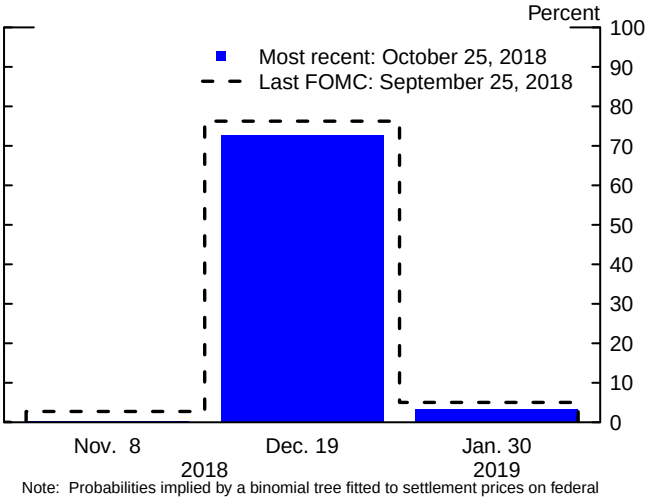
- The trade-weighted dollar index increased 2 percent against AFE currencies and 1¼ percent against EME currencies. Major foreign equity price indexes declined between 7 and 12 percent, on net, amid heightened tensions between the U.S. and China, Italian budget negotiations, and spillovers from U.S. markets.

Domestic Developments

During the intermeeting period, broad equity prices declined substantially, on net, amid unusual day-to-day volatility. At one point, prices had declined nearly 10 percent, on net, erasing all gains logged earlier in the year, before partly retracing near the end of the period. News related to ongoing international trade tensions, and investors' concerns

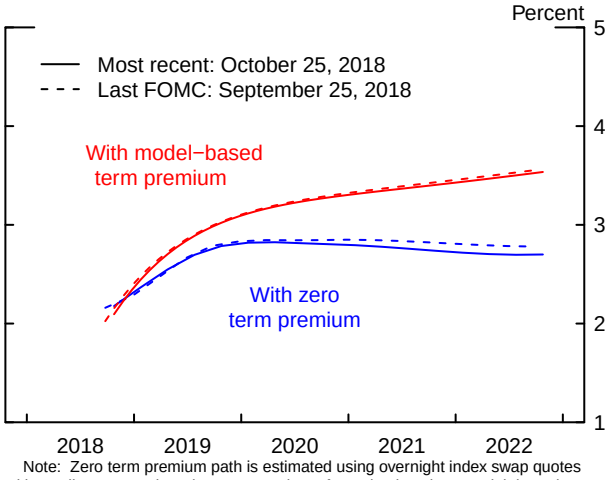
Policy Expectations and Treasury Yields

Market−Implied Probability of Rate Increase



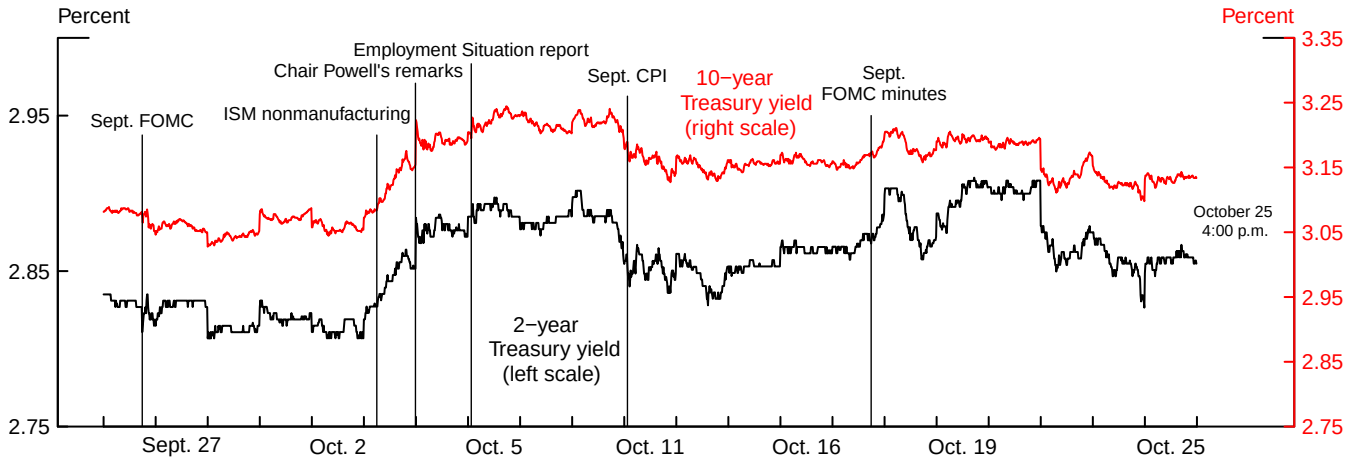
Note: Probabilities implied by a binomial tree fitted to settlement prices on federal funds futures contracts, assuming the policy action at each meeting is either no change or a 25 basis point increase in rates and no intermeeting moves. The effective federal funds rate until the next FOMC meeting is assumed to be equal to the observed rate.
Source: CME Group; Federal Reserve Board staff estimates.

Implied Federal Funds Rate



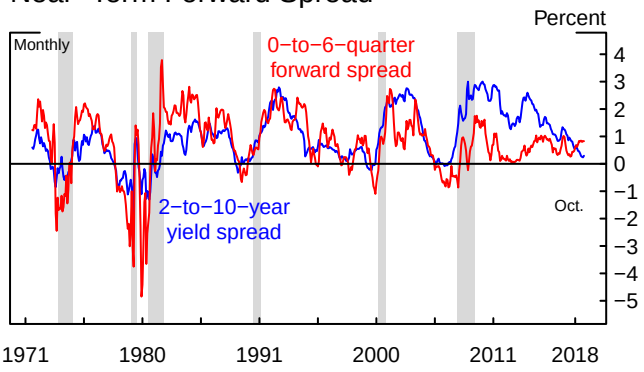
Note: Zero term premium path is estimated using overnight index swap quotes with a spline approach and a term premium of zero basis points. Model−based term premium path is estimated using a term structure model maintained by Board staff and corrects for term premium.
Source: Bloomberg; Federal Reserve Board staff estimates.

Selected Interest Rates



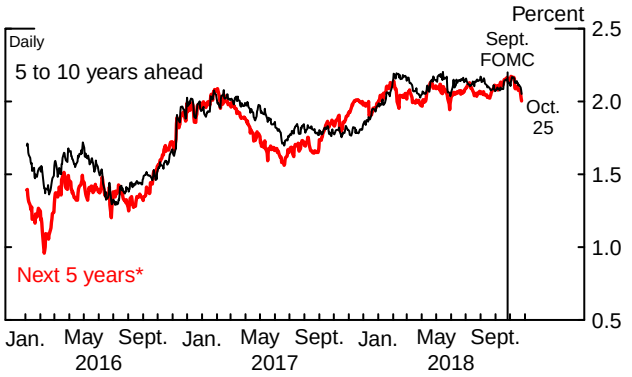
Note: Data are for 2018 and spaced at 5−minute intervals from 8:00 a.m. to 4:00 p.m.
Source: Bloomberg.

Long−Term Yield Spread and Near−Term Forward Spread



Note: The 0−to−6−quarter forward spread is the difference between the 3−month yield and the implied forward rate between 6 and 7 quarters ahead based on a smoothed Treasury yield curve. Data are monthly averages. Data for October 2018 based on values through October 25th.
Source: Federal Reserve Bank of New York; Federal Reserve Board staff estimates.

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; Federal Reserve Board staff estimates.

Financial Markets

over potential further increases in interest rates and the sustainability of strong corporate earnings growth, appeared to weigh on investor sentiment. Stock prices of the basic materials and industrial sectors underperformed the broader market, reportedly reflecting an increase in trade tensions with China. More broadly, investors seemed to reassess equity valuations that appeared elevated. Investors also reacted to some large firms raising concerns about the effect of rising costs on their future profitability in their latest earnings reports. One-month option-implied volatility on the S&P 500 index (VIX) increased significantly to levels that are notably elevated compared with its historical distribution, though it remained below those seen in early February.

Despite the significant declines in stock prices, spreads of yields on investment- and speculative-grade corporate bonds over yields on comparable-maturity Treasury securities widened only modestly. Overall, yields and spreads on both investment- and speculative-grade corporate bonds remained low compared with their respective distributions over the past several years. As we look ahead, however, yields and spreads on corporate bonds could potentially be boosted by a decrease in holdings by corporations, as recent tax law changes have provided incentives for corporations to reduce the size of their overseas financial portfolios and shift those holdings into more-liquid asset categories. The box "Recent Developments in Corporate Financial Investments" discusses these changes in corporations' investment strategies.

Market-implied measures of monetary policy expectations for the remainder of 2018 were little changed over the intermeeting period. Federal funds futures contracts currently imply a 75 percent probability that the FOMC will raise the target range for the federal funds rate by 25 basis points at its December meeting, while the probability of a rate increase at the November meeting remained close to zero.[1] Beyond 2018, federal funds rate expectations implied by OIS quotes—unadjusted for term premiums—decreased slightly over the intermeeting period and currently appear to embed about 50 basis points of additional tightening in 2019. A staff model that adjusts for term premiums implies an increase in the effective federal funds rate of roughly 75 basis points over the course of 2019.

[1] Of note, the calculation of the probability of a rate increase for the November meeting and for the December meeting does not take into account a potential technical adjustment to the IOER rate. Assuming no adjustment at the November FOMC meeting and a 5 basis point adjustment at the December meeting would imply a 90 percent probability of a rate hike at the December meeting.

Recent Developments in Corporate Financial Investments

Nonfinancial firms (hereafter, firms) have substantially increased their holdings of financial assets over recent years. Since the first quarter of 2011, the total financial assets of the 10 firms with the largest financial investment portfolios have nearly doubled, to $800 billion; these assets have grown from about one-third to almost one-half of total assets (table).[1] This growth suggests that the investment decisions of firms could have a substantial effect on the markets in which they invest. In this discussion, we explore recent changes in firms' financial investment strategies following the Tax Cuts and Jobs Act (TCJA).

When managing their financial assets, firms typically report that they prioritize capital preservation and liquidity over risk-adjusted return and thus prefer to hold portfolios of high-quality, short-duration securities. That said, firms with the largest portfolios appear to hold a relatively wide range of financial securities and products. For example, the top 10 firms have sizable positions in long-term corporate bonds (greater than one year) while holding relatively little in short-term investments, such as CP, CDs, and MMFs (figure 1). Moreover, these firms have historically held a large fraction of their financial assets in offshore accounts. For instance, just before the passage of the TCJA, three-fourths of the top 10 firms' financial assets were held offshore.[2]

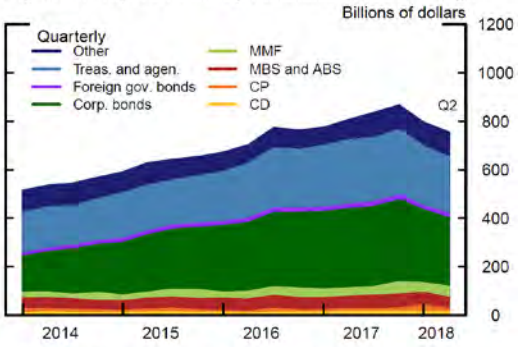
While firms are still evaluating the longer-term implications of the TCJA, recent data suggest three emerging trends in how they might be restructuring their financial asset holdings.

Table: Top 10 Corporate Holders of Financial Assets

	Q1:2011	Q2:2018
Total assets (dollars, billions)	1,543	1,943
Financial assets (dollars, billions)	434	809
Financial assets as % of total assets	28	42
Total assets as % of GDP	10	10
% of cash held offshore	59	79*
Financial assets of all nonfinancial corporations (dollars, billions)	2,896	4,054
% of financial assets held by top 10	15	20

Note: The sample of the top 10 nonfinancial firms is as of Q2:2018 and is measured by the amount of financial assets (cash, cash equivalents, and marketable securities).
*This value is based on the most recently reported data for each firm. All firms in the sample stopped reporting this information in late 2017 or early 2018.
Source: Bloomberg; SEC filings; Federal Reserve Board, Z.1 Statistical Release, "Financial Accounts of the United States."

Figure 1: Top 10 Firms by Financial Asset Holdings



Note: For historical comparison, the sample of the top 10 nonfinancial firms in this exhibit is as of Q1:2018 and is measured by the amount of financial assets (cash, cash equivalents, and marketable securities). Data are through Q2:2018.
Source: SEC filings.

[1] The management of firms' excess cash is part of their treasury functions, and these investors are typically referred to as "corporate cash managers."

[2] Estimates are based on SEC filings as of late 2017 and early 2018. Firms in our sample have since stopped reporting the size of their offshore holdings.

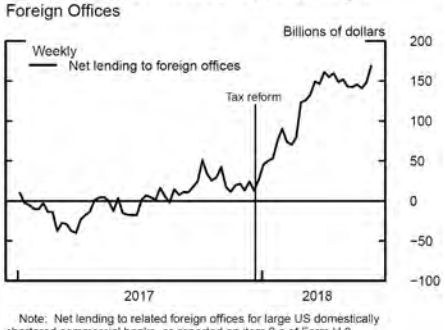
First, the TCJA reduced the incentive for firms to keep sizable holdings of financial assets offshore. Consistent with this development, we observe a substantial drawdown in the combined financial asset holdings of the largest 10 firms since the passage of tax reform (figure 1).[3]

Second, in light of the TCJA, firms are likely to treat their onshore and offshore financial asset holdings as close substitutes and as a result may demand higher liquidity in their offshore accounts. It is unclear how this will affect firms' offshore holdings of short-term money market instruments, given the offsetting effects of (1) a reduction in overall financial asset holdings and (2) a composition shift into more liquid investments. In any case, firms may reduce their illiquid financial investments, such as corporate bonds, abroad. Indeed, the reduction in the top 10 firms' financial asset holdings has been concentrated in U.S. Treasury securities and long-term corporate bonds, both of which fell 15 percent over the first two quarters of 2018.[4] The reduction in corporate bond holdings has coincided with an increase in trading of U.S. investment-grade corporate bonds between dealers and their foreign affiliates. Such trading increased by 5 percent and 20 percent year-on-year in the first and second quarters of 2018, respectively, consistent with dealers intermediating the rebalancing of firms' more illiquid offshore holdings.

Finally, foreign offices of domestic banks appear to have become more reliant on their home offices for funding, as large U.S. banks' net lending to their foreign offices has increased substantially (figure 2). This increase in lending may in part reflect banks' needs to replace offshore funding they previously received from firms, which may have been significant when all firms are considered.

Going forward, we intend to monitor changes in firms' financial asset management. Their sizable holdings of financial assets, unique investment objectives, and status as counterparties to large financial firms are likely to have ongoing implications for a range of financial markets.

Figure 2: Large Domestic Banks, Net Lending to Foreign Offices



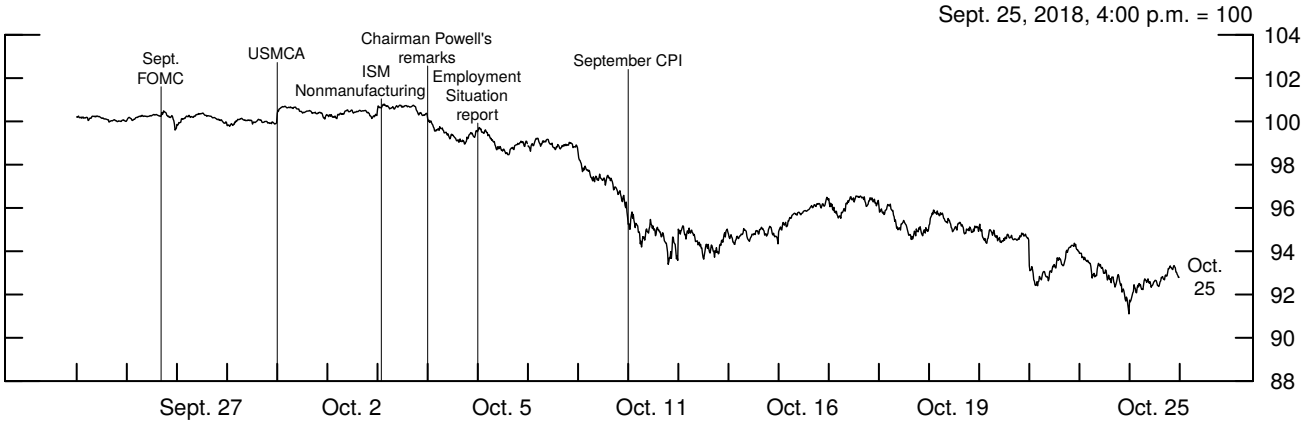
Note: Net lending to related foreign offices for large US domestically chartered commercial banks, as reported on Item 9.a of Form H.8.
Source: Federal Reserve Board, H.8 Statistical Release, "Selected Assets and Liabilities of Commercial Banks in the United States."

[3] The July Tealbook box "U.S. Corporations' Repatriation of Offshore Profits" discusses how U.S. nonfinancial firms with large holdings of cash abroad appeared to deploy those funds after the passage of the TCJA.

[4] Investments in short-term instruments also dropped 15 percent over the same period, but those investments represent a significantly smaller portion of their aggregate holdings.

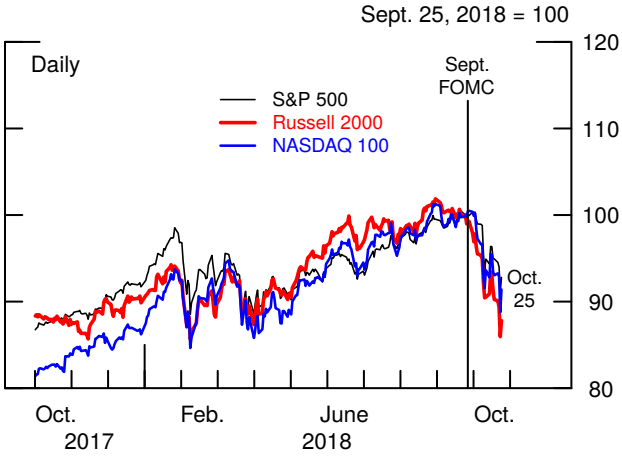
Corporate Asset Market Developments

Intraday S&P 500 Index



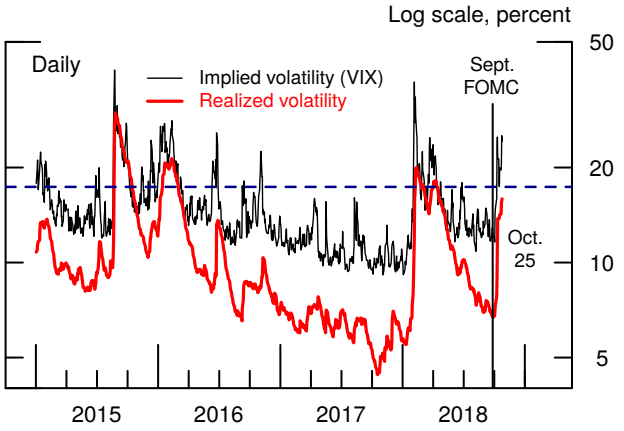
Note: Data are for 2018 and spaced at 5-minute intervals from 9:30 a.m. to 4:10 p.m.
Source: Bloomberg.

Selected Stock Indexes



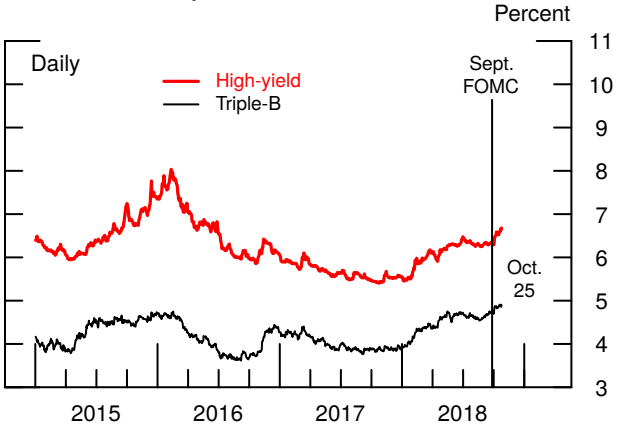
Source: Bloomberg.

Implied and Realized Volatilities on S&P 500



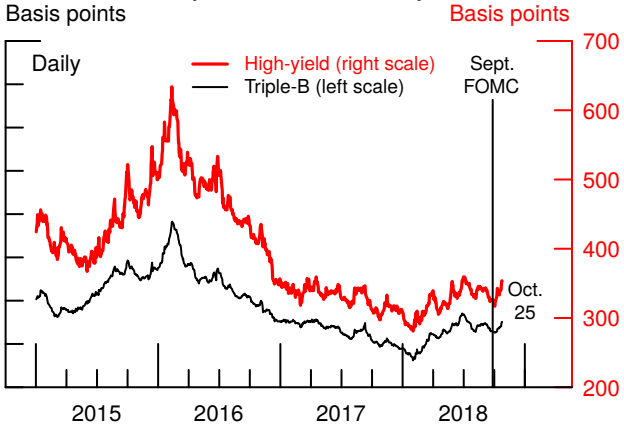
Note: Dashed line represents the historical median of VIX.
Source: Chicago Board Options Exchange; Bloomberg.

10-Year Corporate Bond Yields



Source: Staff estimates of smoothed yield curves based on Merrill Lynch bond data.

10-Year Corporate Bond Spreads



Note: Spreads over 10-year Treasury yield.
Source: Staff estimates of smoothed yield curves based on Merrill Lynch bond data and smoothed Treasury yield curve.

Financial Markets

The nominal Treasury yield curve was little changed, on net, since the September FOMC meeting amid some moderate volatility over the period, which market participants struggled to attribute to a clear catalyst. ISM nonmanufacturing data that came in above investor expectations and, to a lesser extent, FOMC participants' communications were cited as two potential factors contributing to a notable rise in yields early in the intermeeting period. However, market participants viewed neither factor as being able to explain much of the move in yields. Later in the period, yields declined in response to flight-to-safety flows associated with a drop in broad equity price indexes and a rise in market volatility. With yields little changed, on net, the spread between 10- and 2-year Treasury yields remained around the 25th percentile of its distribution since 1971, while the near-term forward spread stands near its 45th percentile.[2] Since the previous FOMC meeting, TIPS-implied inflation compensation over the next 5 years and 5-to-10-year inflation compensation have declined moderately, with some of the decline occurring after the September CPI came in below market expectations.

FOREIGN DEVELOPMENTS

Since the September FOMC meeting, global markets have been unsettled, with particularly notable declines in equity markets. Although there have been no clear drivers of the movements, foreign market participants have been focused on changes in U.S. equity prices and U.S. interest rates, ongoing trade tensions between the United States and China, and uncertainty regarding budget negotiations between the Italian government and the European Union.

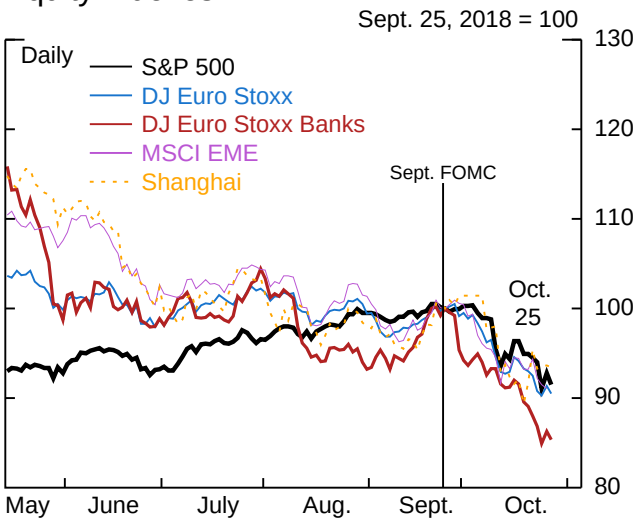
Major foreign equity indexes fell 7 to 12 percent over the intermeeting period. Option-implied measures of foreign equity volatility spiked as equity indexes fell in the United States and around the world, but such measures remained well below levels seen in February.

AFE 10-year government yields generally declined over the period, in contrast to U.S. yields. On net, yields fell 15 to 19 basis points in Germany and the United

[2] The near-term forward spread in this context is defined as the difference between the current implied forward rate on three-month Treasury bills six quarters from now and the current yield on a three-month Treasury bill. For analysis of the information content of these spreads, see Eric Engstrom and Steven Sharpe (2018), "(Don't Fear) the Yield Curve," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, June 28), https://www.federalreserve.gov/econres/notes/feds-notes/dont-fear-the-yield-curve-20180628.htm.

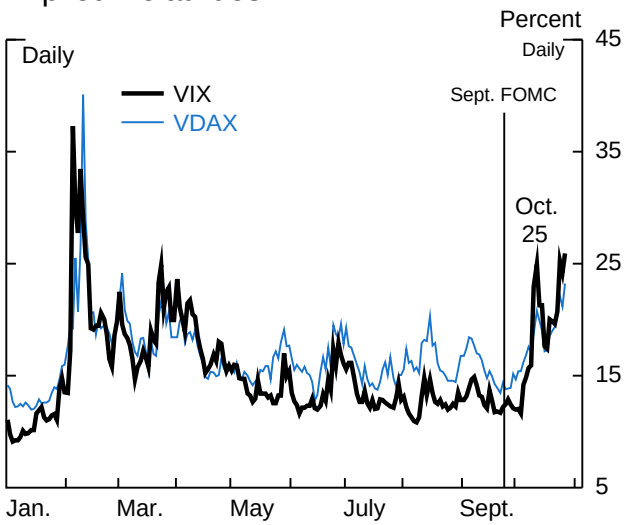
Foreign Developments

Equity Indexes



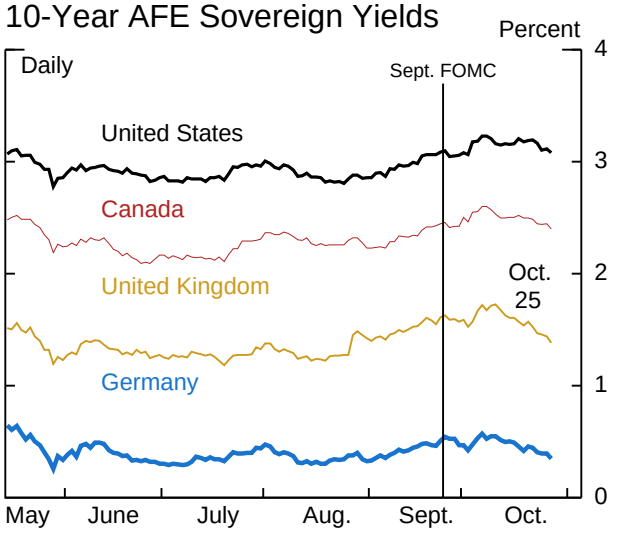
Note: Indexes denominated in local currency.
Source: Bloomberg.

Implied Volatilities



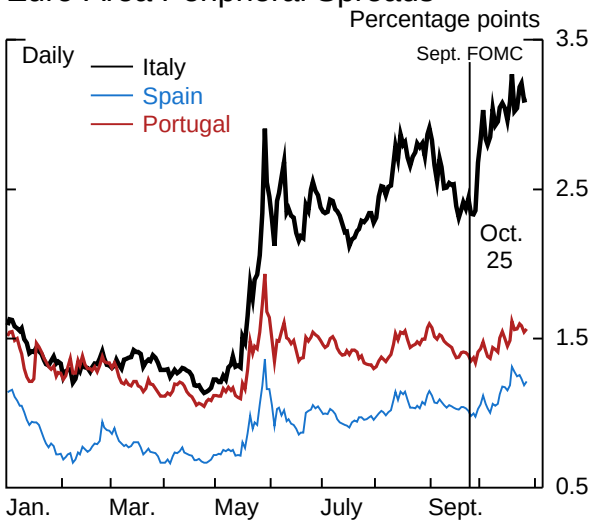
Source: Bloomberg; Haver.

10-Year AFE Sovereign Yields



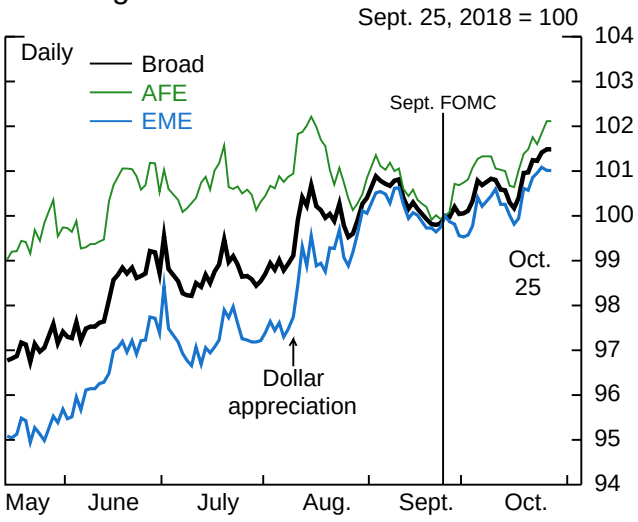
Source: Bloomberg.

Euro-Area Peripheral Spreads



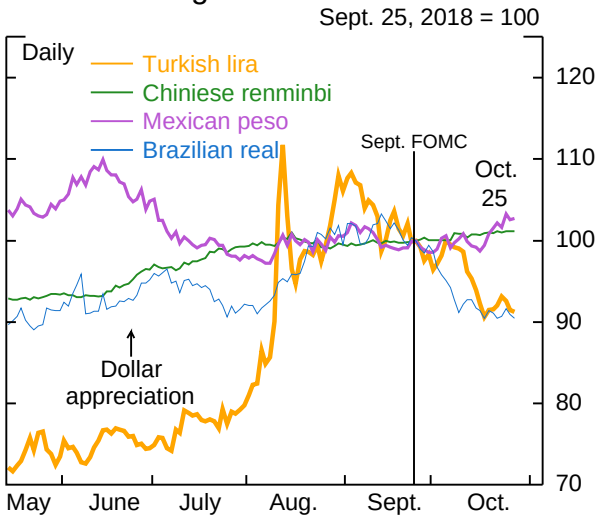
Source: Bloomberg.

Exchange Rates



Source: Bloomberg.

EME Exchange Rates



Source: Bloomberg.

Financial Markets

Kingdom, respectively, in part following weaker-than-expected inflation data and European political developments. Canadian 10-year yields were little changed, and short-term yields rose, bolstered by the announcement of the U.S.-Mexico-Canada trade agreement, or USMCA, and a policy rate hike by the Bank of Canada.

Ten-year Italian spreads widened about 76 basis points over the period as the Italian government proposed a budget with a wider deficit than market participants had expected. The proposed budget was rejected by the European Commission, raising the likelihood of a prolonged period of political confrontation. Other euro-area peripheral spreads widened 9 to 31 basis points, and there were significant outflows from funds focused on the euro-area periphery.

The dollar strengthened 2 percent against AFE currencies, including a 3½ percent appreciation against the euro, amid wider differentials between U.S. yields and AFE yields as well as concerns over Italian budget negotiations. The dollar appreciated 1¼ percent against EME currencies. While most EME currencies are down against the dollar, the EMEs that had experienced financial pressures earlier this year strengthened. The Brazilian *real* appreciated 9 percent as Jair Bolsonaro, perceived to be the relatively more market-friendly candidate, won the first round of the Brazilian presidential election with a larger-than-expected margin. Similarly, the Turkish lira retraced some earlier declines and rose 8½ percent over the period on declining tensions between Turkey and the United States. EME-dedicated funds experienced small outflows over the intermeeting period.

The three-month FX swap basis for the euro, the Swiss franc, and the Japanese yen increased discretely about 30 basis points at the end of September and remained elevated as the three-month contracts started to cross year-end (for more details, see the box "Recent Developments in Offshore Dollar Funding Markets").

SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS

Overnight rates in short-term funding markets rose in line with the increase in the target range announced at the September FOMC meeting. The distribution of federal funds trades shifted steadily to slightly higher rates over the intermeeting period, with the spread between the effective federal funds rate (EFFR) and the interest on excess reserves (IOER) rate narrowing from 2 basis points to 0 basis points. To date, there has been no marked change in the behavior of market participants as the EFFR rose to the IOER rate.

Recent Developments in Offshore Dollar Funding Markets

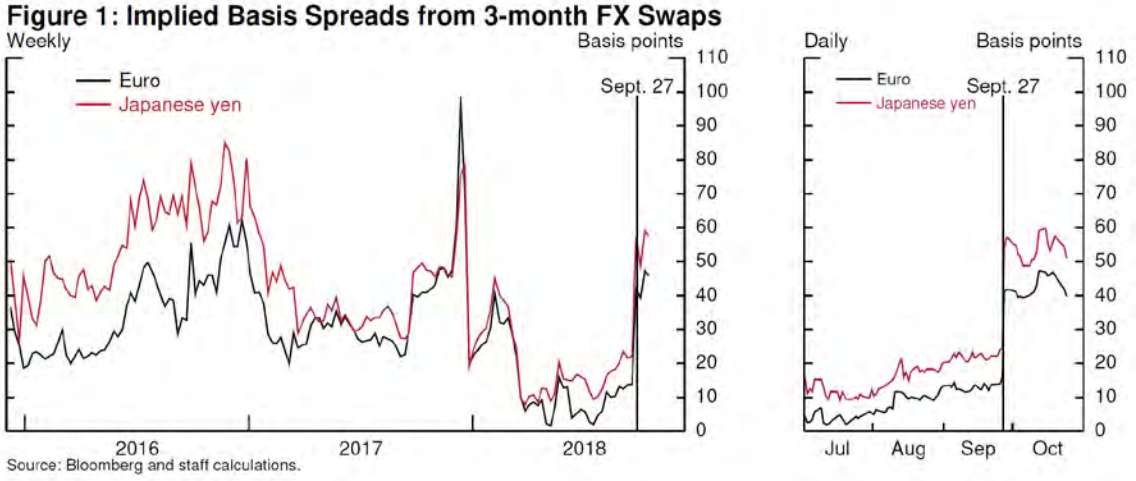
Market participants outside the United States can obtain dollar funding by exchanging foreign currency for dollars in the FX swap market or, if available to them, by borrowing dollars directly.[1] The difference in annualized costs between the two funding sources is the FX swap basis, typically quoted using LIBOR as a borrowing cost. In a frictionless world, the FX swap basis should be close to zero (as implied by "covered interest rate parity"), but dollar funding via the FX swap market has been more costly since the Global Financial Crisis (GFC).

For much of this year, however, the FX swap basis has been at its lowest level since the GFC, reflecting generally benign conditions in offshore dollar funding markets. One factor behind the low basis has been the flatter Treasury yield curve, which has likely reduced demand for dollar funding and hedging via FX swaps.[2]

On September 27, however, the first day that a new three-month FX swap contract would mature after the end of 2018, the three-month FX swap basis jumped 20 to 30 basis points in most major currencies (figure 1). There were no concurrent jumps in domestic dollar funding markets, such as the commercial paper market.

A discrete jump in the three-month FX basis also occurred in recent years when the contract first spanned the year-end. But the increase this year was larger, although it began from a lower level. This year's increase has raised concerns about an outsized spike at the end of 2018 in the cost of shorter-tenor dollar funding via FX swaps, perhaps even larger than the substantial spike that occurred last year (figure 2). It could also mean, however, that sensitized by last year's experience, more market participants are obtaining their dollar funding earlier.

Figure 1: Implied Basis Spreads from 3-month FX Swaps

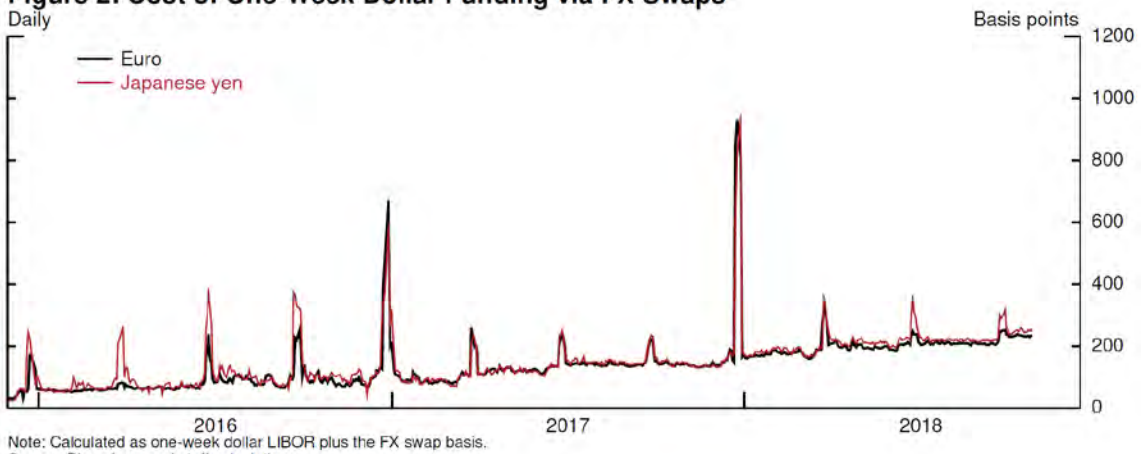


Source: Bloomberg and staff calculations.

[1] In an FX swap transaction, an investor buys dollars with foreign currency in a spot transaction while at the same time agreeing with the seller on a date and a forward exchange rate to reverse the transaction.

[2] Foreign investors often use dollar funding obtained via short-maturity FX swaps (and therefore hedged against FX risk for that maturity) to invest in longer-term dollar-denominated securities. A flatter Treasury yield curve reduces the return on that strategy.

Figure 2: Cost of One-Week Dollar Funding via FX Swaps



Note: Calculated as one-week dollar LIBOR plus the FX swap basis.
Source: Bloomberg and staff calculations.

An important factor explaining the spike in the basis at the end of 2017 was a temporary pullback from the FX swap market by several large banks, including U.S. institutions, that are important intermediaries and providers of dollar funding. The pullback reportedly reflected balance sheet constraints driven by concerns over capital requirements based on year-end reporting. Among these concerns is that of being placed in a higher global systemically important bank (G-SIB) surcharge bucket. [3]

FX swaps on the books of banks potentially affect all five risk categories used to calculate the G-SIB surcharge scores. Specifically, besides increasing the size of the balance sheet, FX swap transactions are conducted over the counter, are usually cross-jurisdictional, often involve other financial institutions as counterparties, and may have the dollar leg funded in the wholesale market. In addition, many FX swap contracts have very short maturities, which means they can quickly roll off the books of dealers. Thus, FX swap activity may be a prime target for a sudden year-end pullback by institutions acutely concerned about capital requirements.

The substantial spike in the FX basis currently priced by FX swap markets for the year-end reflects the high probability that some market participants will pay very high dollar funding costs for a short period at that time. We note, however, that previous year-end spikes have not resulted in widespread stresses in offshore dollar funding markets or been accompanied by unusual sales of U.S. assets, as most market participants likely anticipated such events. Of course, the cost of being prepared is the higher basis paid even now on contracts spanning the year-end, with the burden falling on counterparties swapping foreign currency liquidity for dollar liquidity.

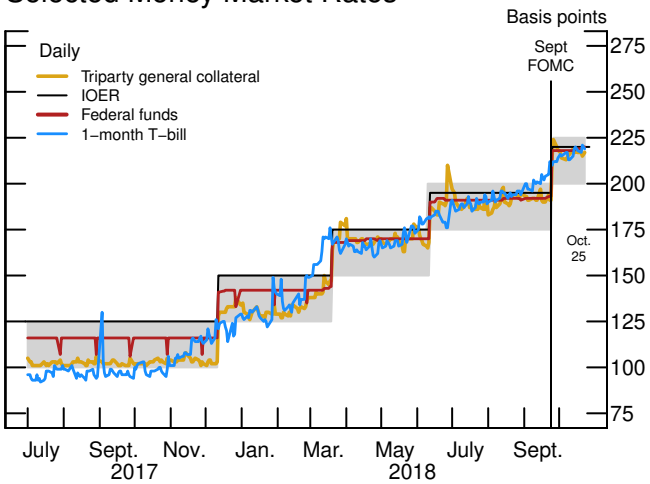
Finally, as with previous year-end spikes in the FX basis, we expect to see an associated rise in draws from our central bank dollar swap lines at the European Central Bank and the Bank of Japan. But these draws will likely again be far smaller than those seen in the GFC or the European Sovereign Debt Crisis.[4]

[3] G-SIB reporting is based on pure year-end readings for banks in continental Europe, while for U.S. and U.K. banks, for certain items, "year-end" reporting is based on a Q4 daily average or an average of the three month-ends in Q4.

[4] At the end of 2017, draws from our central bank swap lines peaked at $11.9 billion at the European Central Bank and $160 million at the Bank of Japan.

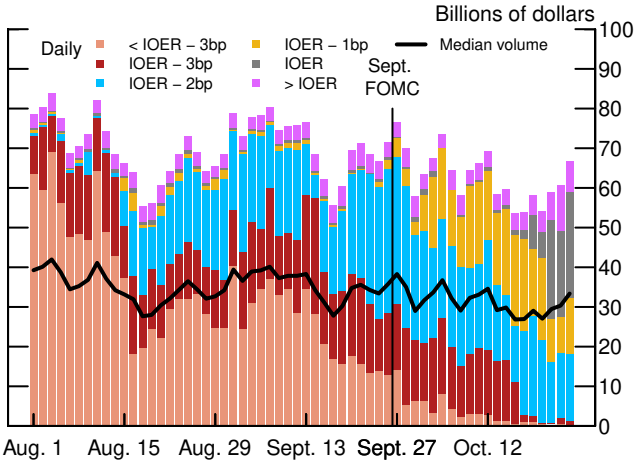
Short–Term Funding Markets

Selected Money Market Rates



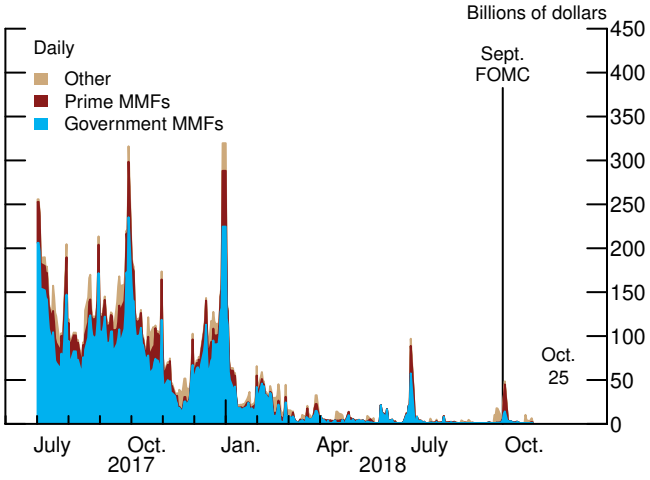
Note: Federal funds rate is a weighted median, and shaded area is the target range for the federal funds rate. IOER is interest on excess reserves.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

Distribution of Fed Funds Rate across Trades



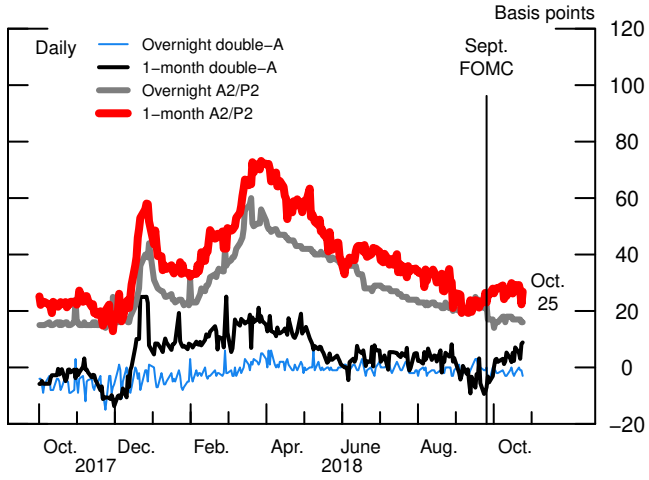
Note: IOER is interest on excess reserves.
Source: Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

ON RRP, Take–Up by Type



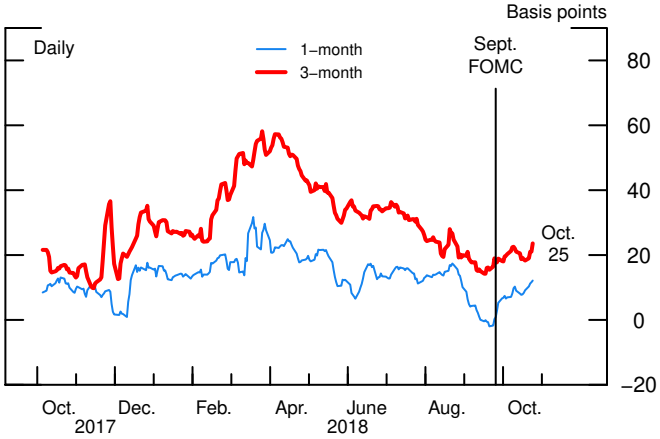
Note: ON RRP is overnight reverse repurchase agreement; MMF is money market fund.
Source: Federal Reserve Bank of New York.

Nonfinancial CP Spreads



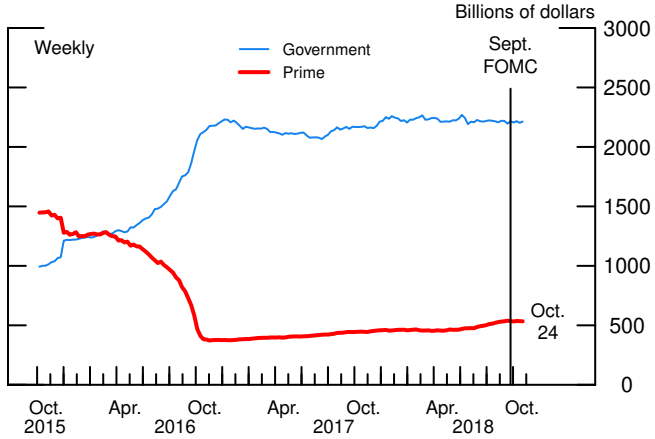
Note: Overnight commerical paper (CP) spreads are to federal funds rate. 1–month CP spreads are to the overnight index swap rate (OIS).
Source: Depository Trust & Clearing Corporation.

CD Spreads to OIS



Note: Certificate of deposit (CD) rates are a 5–day moving average.
Source: Depository Trust & Clearing Corporation.

Prime and Government MMF Assets under Manangement



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

Financial Markets

Federal funds volume declined to $63 billion per day from $70 billion in the previous intermeeting period. ON RRP take-up has remained low, averaging $4 billion per day excluding the September quarter-end.[3]

Since the previous FOMC meeting, overnight nonfinancial commercial paper (CP) rates are up about 25 basis points, while rates on longer-dated instruments, such as one-month to six-month negotiable certificates of deposit, are up about 15 basis points. The spreads of overnight CP rates over the EFFR were little changed; longer-dated unsecured short-term spreads over OIS increased somewhat but less than the three-month FX swap basis. Assets under management in money market funds (MMFs) were little changed over the intermeeting period, and net yields on taxable MMFs increased, on average, 16 basis points. Rates paid by banks on retail deposit products were also little changed, on average, over the intermeeting period and have increased only 1 to 14 basis points since last December.

[3] If test operations are ignored, October marks the first investment period since July 2010 that the Federal Reserve has purchased neither Treasury securities nor MBS. It completed September MBS purchases on October 11. The Desk, however, conducted small-value exercises. It rolled $26 million of Treasury bills, sold $47 million of Treasury bills, and purchased $139 million of MBS.

(This page is intentionally blank.)

Financing Conditions for Businesses and Households

While rising interest rates in recent months appeared to have reduced demand for credit by some borrowers, a continued easing of lending standards and terms for businesses and still generally accommodative supply conditions for households have served to support growth in borrowing and spending.

- Spreads on corporate bonds and loans have remained low relative to their average levels over the past several years, and banks reported further easing of standards and terms for C&I loans.

- Business financing flows have remained strong, especially for investment-grade corporate bonds and leveraged loans. However, banks reported weaker demand and lower loan volumes for both C&I and CRE loans.

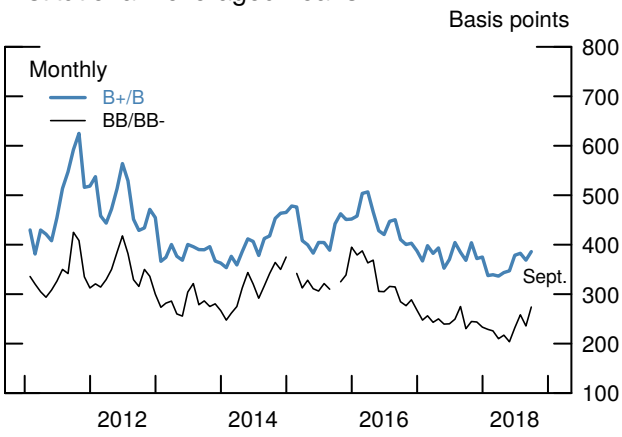
- Mortgage credit supply conditions for households remained accommodative, but mortgage originations for home purchase have remained flat. Refinancing activity continues to be subdued due, in part, to rising mortgage rates.

- Credit card loan growth showed signs of moderation amid rising interest rates and reported tightening of lending standards at the largest credit card banks. Other types of consumer credit, including student and auto loans, continued to grow at a solid pace.

- The October 2018 SLOOS asked a set of special questions on the effects of movements in the yield curve on banks' lending policies. A summary of banks' responses to those questions is discussed in the box "Bank Lending Policies and the Yield Curve" at the end of the section.

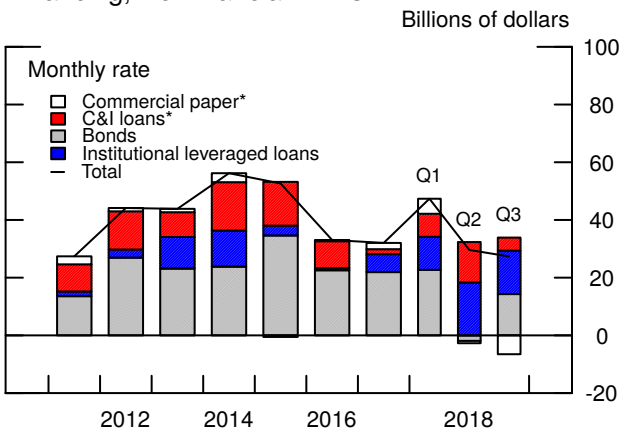
Business Finance

Average Spreads of New-Issue Institutional Leveraged Loans



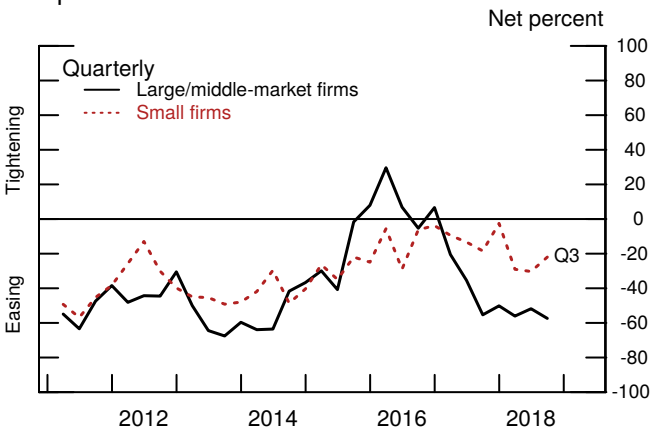
Note: Breaks in the series represent periods with no issuance. Spreads are calculated against 3-month LIBOR. The spreads do not include up-front fees.
Source: S&P LCD.

Selected Components of Net Debt Financing, Nonfinancial Firms



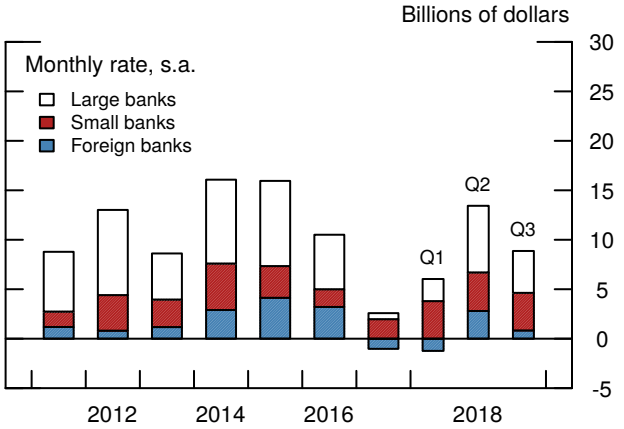
* Period-end basis.
Source: Mergent Fixed Income Securities Database; Thomson Reuters LPC; Federal Reserve Board; Depository Trust & Clearing Corporation.

C&I Loan Terms: Changes in Loan Spreads



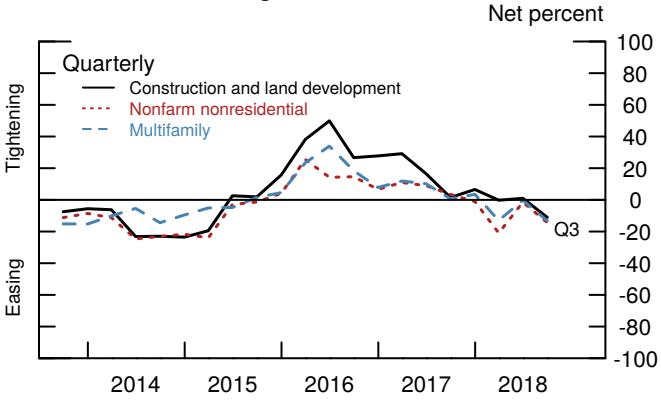
Note: Plotted are the net percentage of banks reporting increasing spreads on C&I loans. Banks' responses are weighted by the outstanding amount of C&I loans on their balance sheets at the end of the previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

C&I Loans



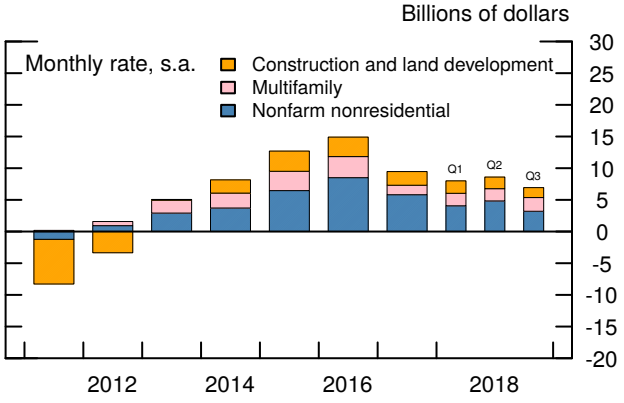
Note: Large banks are defined as the largest 25 banks by assets.
Source: Staff calculations, Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

CRE Loans: Changes in Standards



Note: Plotted are the net percentage of banks reporting tighter standards on CRE loans. Banks' responses are weighted by the outstanding amount of CRE loans on their balance sheets at the end of previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

CRE Loans



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

Financing Conditions

BUSINESS FINANCING CONDITIONS

Nonfinancial Corporations

Financing conditions for nonfinancial firms remained supportive of borrowing and spending over the intermeeting period. Spreads of yields on corporate bonds and institutional leveraged loans over those on three-month LIBOR remained low relative to their average level over the past several years but have drifted up in recent weeks. In the October 2018 SLOOS, banks, on net, reported easing standards and terms for C&I loans to large and middle-market firms over the past three months, and all banks that eased cited increased competition from both bank and nonbank lenders as an important reason. Other reasons provided by a significant fraction of banks that eased standards and terms on C&I loans included increased liquidity in the secondary market for these loans, a more favorable or less uncertain economic outlook, and an increased tolerance for risk.

Net debt financing of nonfinancial firms was robust in the third quarter, as weak speculative-grade bond issuance was largely offset by high leveraged loan issuance, reportedly reflecting investors' stronger demand for floating-rate products. Although the volume of leveraged loans held by nonbanks continued to grow steadily, C&I loan growth at banks slowed in the third quarter, especially at large and foreign banks, consistent with responses to the October 2018 SLOOS that demand for C&I loans had weakened over the third quarter on balance.

The pace of gross equity issuance through initial public offerings was solid in September and so far in October despite notable recent declines in stock prices. In contrast, the pace of seasoned equity offerings has slowed a bit in October, following strong issuance in September.

The credit quality of nonfinancial corporations remained solid, though modest signs of deterioration continued, as the volume of nonfinancial corporate bond downgrades somewhat outpaced that of upgrades in September. On net, the KMV expected year-ahead default rate for nonfinancial firms increased somewhat and stayed near the middle of its historical range.

The outlook for corporate earnings remained favorable on balance. During the current earnings reporting season, some large firms raised concerns about their future profitability due to increasing costs. Even so, projections by Wall Street analysts for year-ahead earnings for S&P 500 firms were, in aggregate, little changed over the

intermeeting period and continued to call for a healthy five percent growth in year-ahead earnings.

Small Businesses

Financing conditions for small businesses remained generally accommodative. Conditions have been stable in recent months, with the October 2018 SLOOS respondents reporting little change, on net, in bank lending standards to small firms over previous months. In the National Federation of Independent Business monthly member polls, the fraction of respondents with planned capital expenditures in the next six months has climbed in recent months, although it remains below its levels in the years leading up to the financial crisis. Lending volumes to small businesses have leveled out after rising over much of the past year.

Commercial Real Estate

Financing conditions in CRE markets remained accommodative. CMBS spreads remained near their post-crisis lows, and spreads on CRE loans at banks also remained low. The largest banks reported an easing of standards on all three major categories of CRE loans over the third quarter of 2018 on net. Banks also reported somewhat weaker demand for nonfarm nonresidential and construction and development loans. Consistent with these reports, growth of CRE loans on bank's balance sheets slowed a bit, driven primarily by a slowdown at large banks. Issuance of non-agency and agency CMBS was stable in recent months, similar to previous year levels.

MUNICIPAL GOVERNMENT FINANCING CONDITIONS

Credit conditions in municipal bond markets remained accommodative on balance. Yields on 20-year municipal bonds in the primary market increased slightly more than yields on Treasury securities, leaving spreads over comparable-maturity Treasury securities slightly higher. In the third quarter, the credit quality of state and local governments improved a bit as the number of upgrades was somewhat larger than that of downgrades. Gross issuance of municipal bonds in September and October was strong, much of which raised new capital.

HOUSEHOLD FINANCING CONDITIONS

Residential Real Estate

Although financing conditions in the residential mortgage market continued to be accommodative for most borrowers, the increase in mortgage rates since 2016 has appeared to have reduced demand, and financing conditions remained somewhat tight for borrowers with low credit scores. Refinance activity continued to be very muted, and the growth in purchase mortgage originations has slowed over the past year as mortgage rates remained near their highest level since 2011.

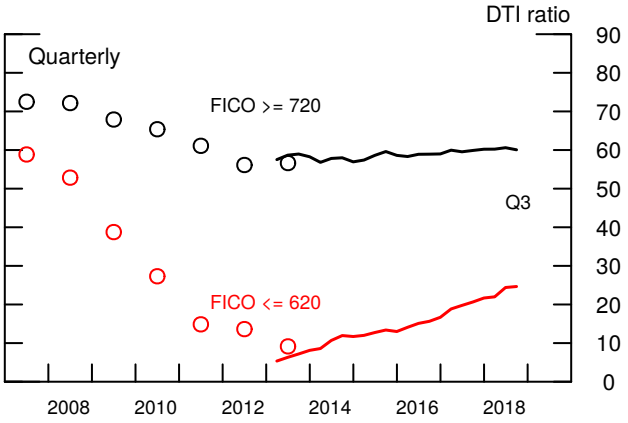
Consumer Credit

Financing conditions in consumer credit markets, on balance, remained supportive of growth in household spending, although interest rates for consumer loans continued to rise and appeared to have a greater bearing on consumer sentiment for large purchases. The share of respondents in the University of Michigan Surveys of Consumers that noted high interest rates as a reason for not making large purchases was larger in the most recent survey than in surveys conducted earlier in the year. Credit card loan growth showed signs of moderating amid rising interest rates and reported tightening of lending standards at the largest credit card banks. According to the October 2018 SLOOS, banks were less willing to make credit card loans as compared with the beginning of this year for borrowers across the credit spectrum, though the tightening was more pronounced for borrowers with lower credit scores.

Other types of consumer credit, including student and auto loans, continued to grow at a solid pace. Conditions in the consumer ABS market remained stable, with spreads hovering near historical lows and year-to-date issuance outpacing that in recent years.

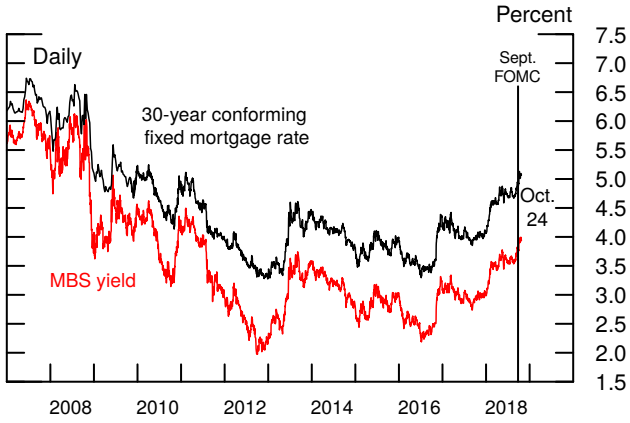
Household Finance

Maximum Allowed Debt-Service-to-Income Ratio for Residential Mortgages



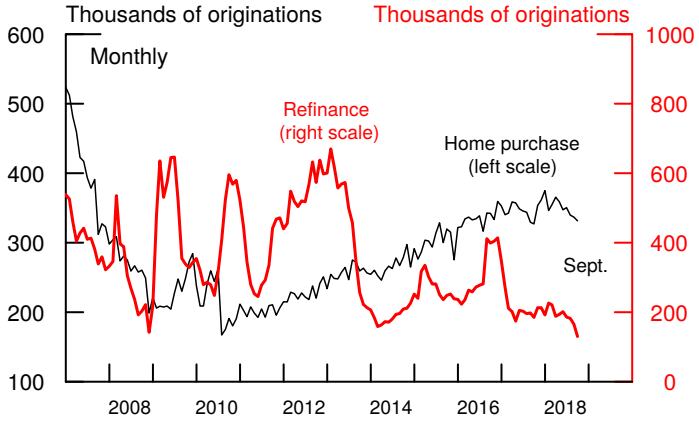
Note: DTI is debt service to income.
Source: For frontiers shown with circles, McDash and CoreLogic; for frontiers shown with solid lines, Optimal Blue.

Mortgage Rate and MBS Yield



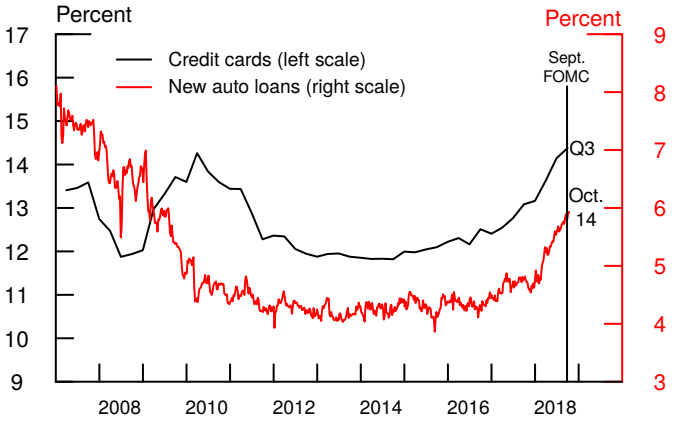
Note: The mortgage-backed securities (MBS) yield is the Fannie Mae 30-year current-coupon rate.
Source: For mortgage rate before 2010, Freddie Mac, after 2010, Loansifter; for MBS yield, Barclays.

Purchase and Refinance Activity



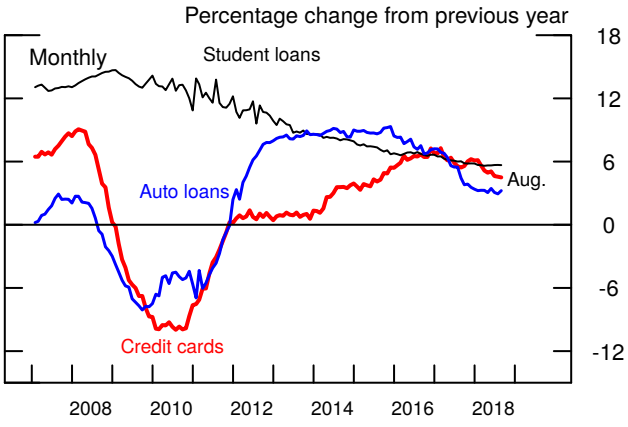
Note: The data are seasonally adjusted by Federal Reserve Board staff.
Source: For values before 2017, data reported under the Home Mortgage Disclosure Act of 1975; for values in and after 2017, staff estimates.

Consumer Interest Rates



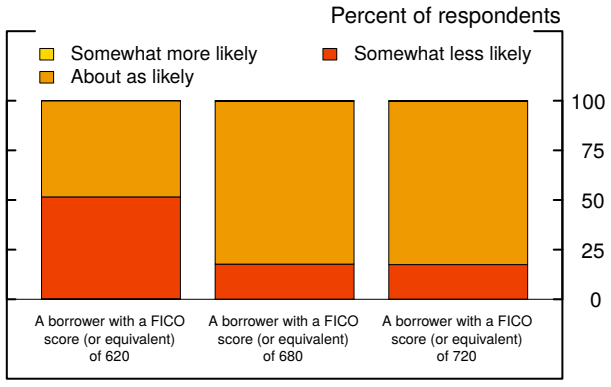
Note: Credit card data reflect rates at commercial banks on all credit card plans; data are reported quarterly and not seasonally adjusted. Auto loans data are reported weekly and seasonally adjusted.
Source: For credit cards, Federal Reserve Board; for auto loans, J.D. Power.

Consumer Credit



Source: Federal Reserve Board.

Likelihood of Approving Credit Card Applications, by FICO Score



Note: Compared with the beginning of the year. Individual bank responses have been weighted by the outstanding amount of the relevant loan category on the bank's balance sheet at the end of the previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Financing Conditions

Bank Lending Policies and the Yield Curve

The October 2018 SLOOS asked banks' loan officers a set of special questions on changes in lending policies in response to movements in the yield curve. Loan officers were first asked about changes in their lending policies in response to the flattening of the yield curve since the beginning of this year, independent of other factors that have influenced those policies. Loan officers were then asked to assess potential changes in their lending policies in response to a sustained hypothetical moderate inversion of the yield curve. [1]

Banks' loan officers generally reported that the recent flattening in the yield curve has not affected their standards or price terms across major loan categories (figure 1). In contrast, in response to a hypothetical moderate inversion of the yield curve, banks responded that they would tighten somewhat standards or price terms across every major loan category (figure 2). The vast majority of respondents interpreted this scenario as a signal of a future deterioration in economic conditions. Specifically, major shares of respondents indicated that they would anticipate such a scenario to be accompanied by a less favorable or more uncertain economic outlook, a likely deterioration in the quality of their bank's loan portfolio, and a reduction in their risk tolerance (figure 3).

About half of loan officers who indicated that their banks would tighten lending standards or price terms in response to a moderate yield curve inversion also said that less profitable lending relative to their banks' cost of funds and, relatedly, less aggressive competition from other banks and nonbanks under this scenario would be important reasons for tightening. Because bank lending may become less profitable when the yield curve inverts (due to banks obtaining funding at short-term interest rates but lending at longer-term interest rates), these responses suggest that a yield curve inversion could, by itself, act as a headwind to economic activity by causing some banks to pull back from lending, independent of changes in economic conditions.

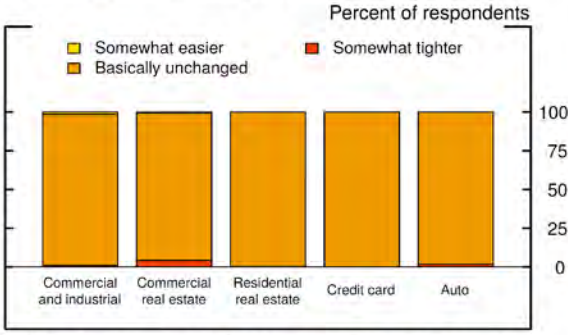
Relatedly, the September 2018 SCOOS provides one source of analogous information regarding the likely response of nonbanks to a hypothetical yield curve inversion; that survey focuses on securities dealers and the terms they offer to their institutional investor clients.[2] On balance, a modest net fraction of SCOOS respondents indicated that they would tighten their credit terms somewhat under this scenario. The most cited reasons for that outcome were that the scenario would be associated with higher dealer funding costs, a general worsening in the liquidity and functioning of securities markets, and a deterioration in the financial strength of counterparties associated with a general deterioration in macroeconomic conditions.[3]

[1] The hypothetical moderate inversion scenario assumes the 10-year Treasury yield falls moderately below the 3-month Treasury bill, and that this inversion prevails over the next year.

[2] Securities dealers extend financing to investors who, in turn, hold securities that are backed by loans to businesses and households. As such, the terms at which securities dealers engage with clients indirectly affect credit conditions for businesses and households.

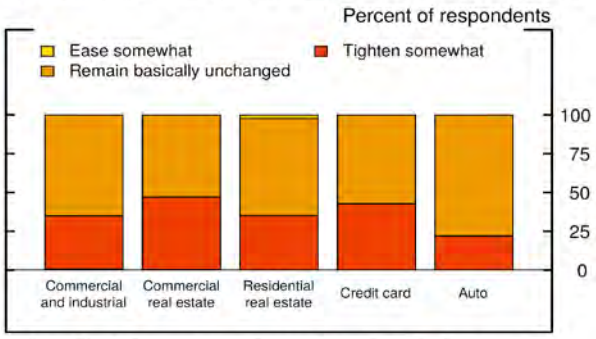
[3] For more details on responses to the SLOOS and SCOOS special questions on movements in the yield curve and changes in banks' and dealers' credit standards and terms, see the following memos: Robert Kurtzman (2018), "October 2018 Senior Loan Officer Opinion Survey on Bank Lending Practices," memorandum to the FOMC, Board of Governors of the Federal Reserve System, Division of Monetary Affairs, October 25; and Michael Gordy (2018), "September 2018 Senior Credit Officer Opinion Survey on

Figure 1. Changes in Credit Standards in Response to the Recent Flattening of the Yield Curve



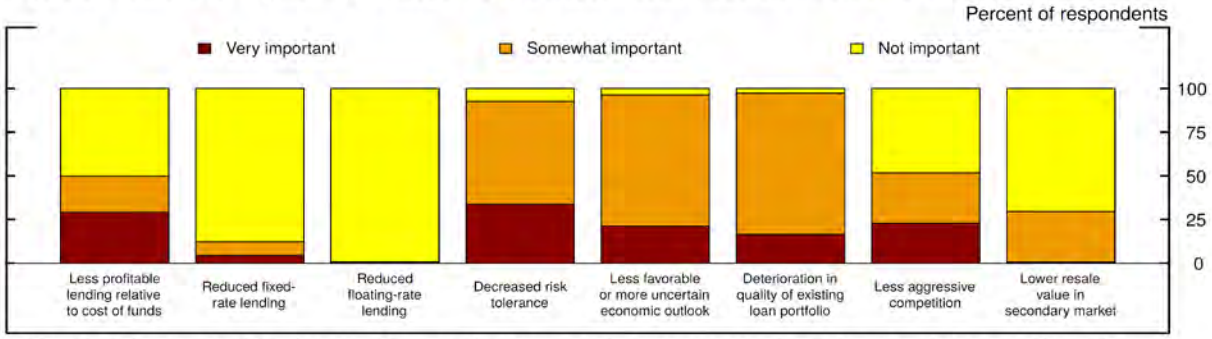
Note: Chart shows reported changes in credit standards in response to the flattening of the yield curve since the beginning of the year. Individual bank responses have been weighted by the outstanding amount of the relevant loan category on the bank's balance sheet at the end of the previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Figure 2. Changes in Credit Standards in Response to a Hypothetical, Moderate Inversion of the Yield Curve



Note: Chart shows reported changes in credit standards in response to a hypothetical, moderate inversion of the yield curve where the 3-month Treasury bill yield remains at its current level and the 10-year Treasury yield falls moderately below that level. Individual bank responses have been weighted by the outstanding amount of the relevant loan category on the bank's balance sheet at the end of the previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Figure 3. Reasons for Tightening in Response to a Hypothetical, Moderate Inversion of the Yield Curve



Note: Chart shows reasons that banks reported they would tighten credit standards in response to a hypothetical, moderate inversion of the yield curve where the 3-month Treasury bill yield remains at its current level and the 10-year Treasury yield falls moderately below that level. Individual bank responses have been weighted by the outstanding amount of the relevant loan category on the bank's balance sheet at the end of the previous quarter.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Financing Conditions

Dealer Financing Terms," memorandum to the FOMC, Board of Governors of the Federal Reserve System, Division of Research and Statistics, September 13.

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 in line with the average over the past 20 years, the benchmark used by the FOMC. In addition, we still judge the upside and downside risks around the projections for real GDP growth and the unemployment rate over that period as being balanced. On the upside, the underlying fundamentals for household spending and business investment remain strong—bolstered in part by the tax cuts enacted last year—and readings on household and business sentiment generally remain upbeat. In these circumstances, spending and investment could expand faster than in the staff projection. On the downside, foreign economic developments and trade policies 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 presented in the exhibit "Time-Varying Macroeconomic Risk."

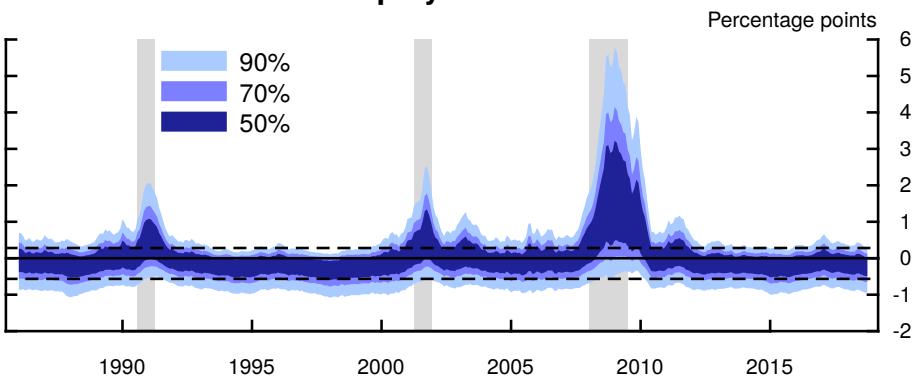
We remain concerned about recession risks during the period beyond the next year or so. In our baseline outlook, the economy is projected to move further beyond its potential over the next two years. If that forecast is correct, then we anticipate that a significant slowing in the pace of economic growth, 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 the period of subpar growth, the economy will be more susceptible to being pushed into a recession by negative shocks. Neither we nor anyone else have 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.

With regard to inflation, the staff still sees average uncertainty and balanced risks around the projection over the next year or so. 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 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

Risks & Uncertainty

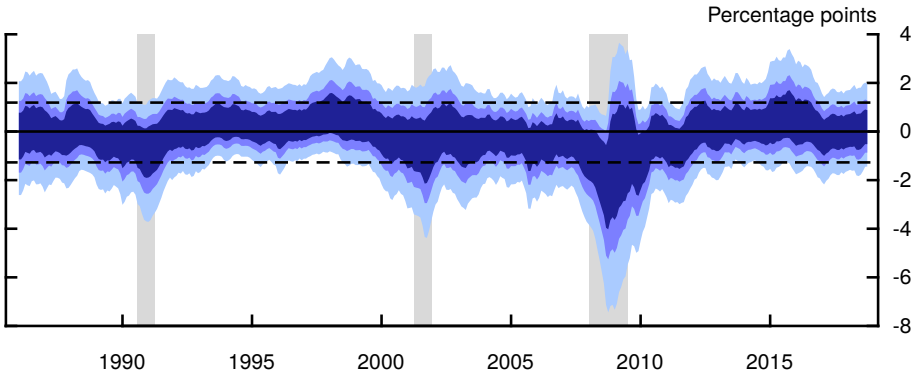
Time-Varying Macroeconomic Risk

Unemployment Rate



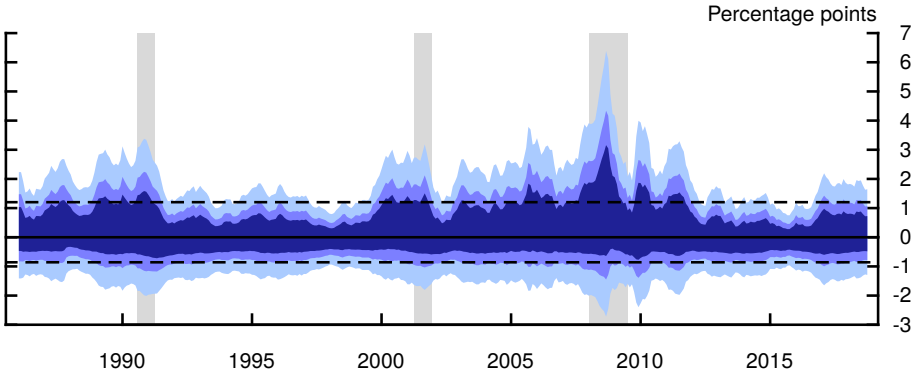
October 2018	
95th	0.3
85th	0.1
50th	-0.2
15th	-0.6
5th	-0.9

GDP Growth



October 2018	
95th	2.0
85th	1.3
50th	0.2
15th	-0.9
5th	-1.4

CPI Inflation

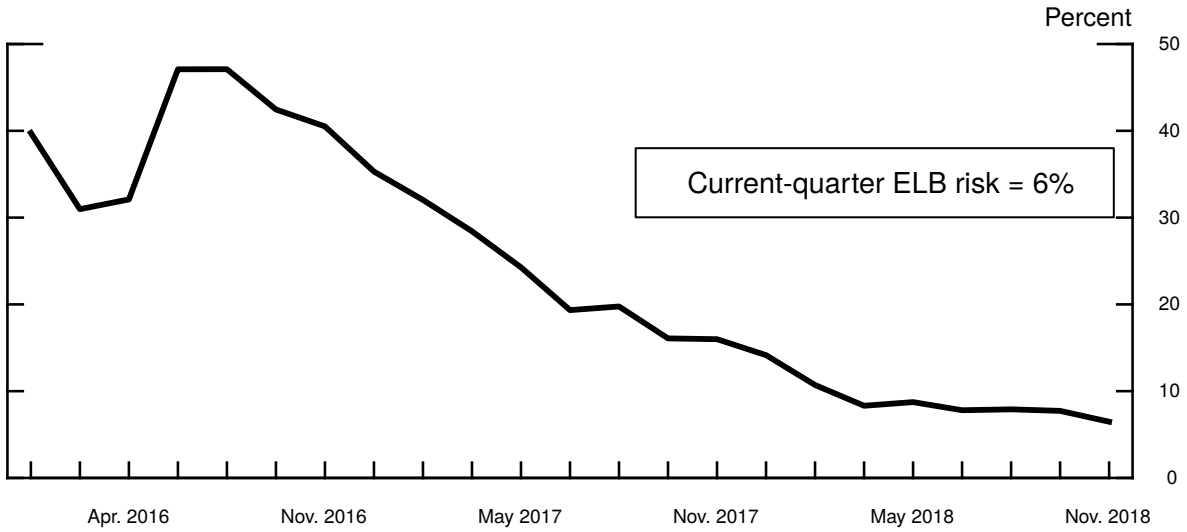


October 2018	
95th	1.6
85th	1.1
50th	0.1
15th	-0.8
5th	-1.3

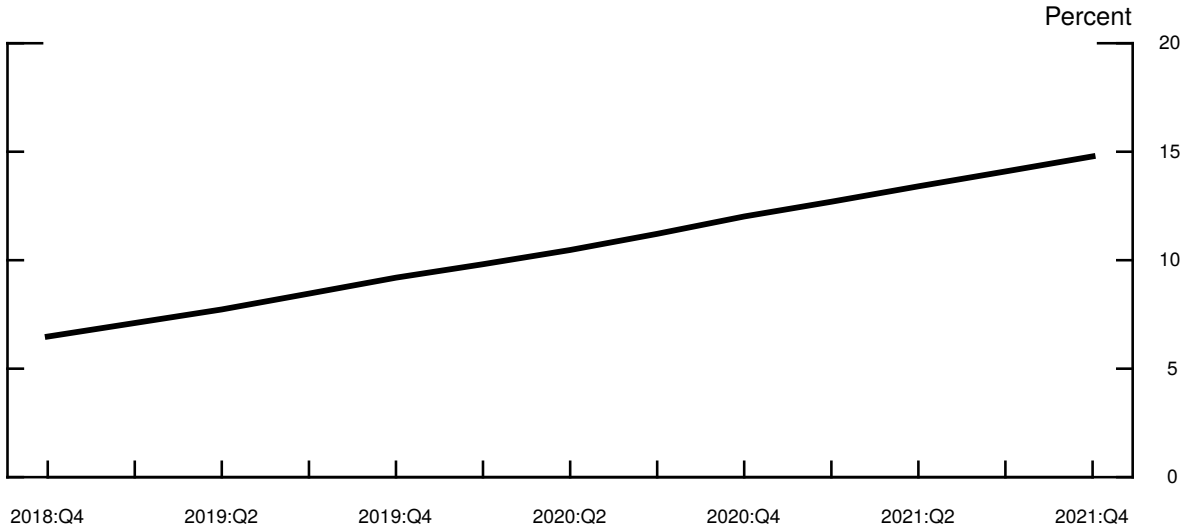
Note: The exhibit shows estimates of quantiles of the distribution of errors for four-quarter-ahead staff forecasts. The estimates are conditioned on indicators of real activity, inflation, financial market strain, and the volatility of high-frequency macroeconomic indicators. The tables show selected 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.

barriers could lead to higher inflation. These assessments are consistent with the statistical estimates of the time-varying risks for the inflation forecast over the next year. Of course, if the risks to the forecast for economic activity beyond a year or so are tilted to the downside, then the risks to the inflation projection would also tend to have a downward skew at that time.

Our view of the risks to the economic outlook is informed by the staff's quarterly quantitative surveillance (QS) assessment, which judges the overall financial vulnerabilities in the United States to be moderate. Vulnerabilities from leverage and maturity transformation in the U.S. financial system appear low. Banks look to be well capitalized and hold 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. In the household sector, debt has increased only moderately and primarily among prime-rated borrowers. However, in the nonfinancial corporate sector, borrowing by highly levered and lower-rated firms is elevated, suggesting that a weakening in economic activity could be amplified by strains within this sector. Asset valuation pressures also continue to be elevated despite the recent substantial declines in equity prices. In addition, term premiums on nominal Treasury securities, along with spreads on corporate bonds and on leveraged loans, have remained low. Although some indicators suggest that the pace of house price appreciation has slowed recently, house values increased substantially over the past year and still appear to be somewhat elevated relative to rents. Existing domestic financial vulnerabilities could amplify shocks from a marked jump in Treasury yields, which could be caused by an increase in concerns about the current high level and unsustainable trajectory of federal government debt. In addition, existing vulnerabilities could amplify shocks from abroad, 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 posits that increases in interest rates could restrain household and business spending by more than is assumed in the baseline. In the second scenario, higher realized inflation puts upward pressure on inflation expectations, which leads to persistently higher inflation and also slower output growth. The third scenario considers a downside risk from an increase in financial market concerns about federal government debt, which results in a larger and faster increase in term premiums on longer-term Treasury securities and higher borrowing rates. The fourth scenario posits that the natural rate of

unemployment is lower and structural productivity growth is faster than assumed in the baseline. The fifth scenario traces out the consequences of a sizable increase in financial market stress in China. Finally, the sixth scenario illustrates the effects of a large increase in oil prices that triggers a sharp rise in inflation in advanced economies and a tightening of global financial conditions.

The first four scenarios are simulated with the FRB/US model; the last two scenarios use the SIGMA model.[1] In all of the scenarios, the federal funds rate is governed by the same policy rule as in the baseline. Additionally, the size and composition of the SOMA portfolio are assumed to follow the baseline paths in all of the scenarios.

Greater Interest Rate Sensitivity [FRB/US]

The baseline forecast shows a large positive output gap for a number of years despite increases in the federal funds rate to about 2¼ percentage points above its long-run value. However, there is a risk that the projected tightening in monetary policy will weigh on economic activity more than is assumed in the baseline. In this scenario, we explore the possibility that household and business spending, along with equity prices, are more sensitive to interest rates than in the baseline.[2]

With household spending and business investment more responsive to the path of real interest rates and equity prices being lower by as much as 25 percent, real GDP growth is weaker than in the baseline until 2022. The unemployment rate is higher than in the baseline and moves above 4 percent in 2021; inflation remains close to baseline, reflecting the very flat Phillips curve in the FRB/US model. Resource utilization is much less tight than in the baseline, and inflation is little changed, which results in the federal funds rate being notably below the baseline path, peaking at 3¾ percent in early 2021.

Inflation Fears [FRB/US]

In recent years, private-sector expectations of future inflation have been formed in an environment mainly characterized by low and stable inflation, generally at or below the FOMC's

[1] FRB/US is a large-scale macroeconometric model of the U.S. economy, and SIGMA is a calibrated multicountry DSGE model.

[2] Specifically, the magnitude of the peak output response to a monetary policy shock of 1 percentage point on the federal funds rate is amplified from 0.2 percent in the baseline projection to 0.8 percent in this scenario, a value more consistent with some DSGE models.

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	2.8	2.4	1.9	1.4	1.2	1.2
Greater interest rate sensitivity	2.3	1.5	.9	1.2	1.4	1.7
Inflation fears	2.8	1.3	1.3	1.1	1.0	1.2
Federal debt concerns	2.8	1.9	1.5	1.4	1.3	1.4
Stronger supply side	2.8	2.9	2.6	2.1	1.7	1.5
EME financial turbulence	2.8	1.9	1.4	1.4	1.4	1.4
Inflation-driven global tightening	2.7	1.5	.7	1.2	1.4	1.5
Unemployment rate[1]						
Tealbook baseline and extension	3.6	3.3	3.3	3.4	3.7	4.2
Greater interest rate sensitivity	3.7	3.7	4.0	4.2	4.3	4.3
Inflation fears	3.6	3.7	4.0	4.2	4.5	5.1
Federal debt concerns	3.6	3.5	3.6	3.7	4.0	4.3
Stronger supply side	3.6	3.2	3.1	3.1	3.4	4.0
EME financial turbulence	3.6	3.5	3.7	3.9	4.1	4.5
Inflation-driven global tightening	3.6	3.6	4.1	4.4	4.6	4.7
Total PCE prices						
Tealbook baseline and extension	1.7	2.0	1.9	1.9	2.0	2.1
Greater interest rate sensitivity	1.7	2.0	1.9	1.9	1.9	2.0
Inflation fears	1.8	2.4	2.8	3.1	3.4	3.4
Federal debt concerns	1.7	2.0	1.9	1.9	1.9	2.0
Stronger supply side	1.7	1.9	1.9	1.8	1.9	2.0
EME financial turbulence	1.6	1.3	1.6	1.8	1.9	2.0
Inflation-driven global tightening	2.2	3.4	2.6	2.2	2.0	2.1
Core PCE prices						
Tealbook baseline and extension	1.7	2.0	2.0	2.0	2.1	2.1
Greater interest rate sensitivity	1.7	2.0	2.0	2.0	2.0	2.0
Inflation fears	1.8	2.5	2.9	3.2	3.5	3.5
Federal debt concerns	1.7	2.0	2.0	2.0	2.0	2.0
Stronger supply side	1.7	2.0	2.0	1.9	2.0	2.0
EME financial turbulence	1.6	1.6	1.7	1.9	2.0	2.0
Inflation-driven global tightening	1.8	3.1	2.8	2.3	2.1	2.1
Federal funds rate[1]						
Tealbook baseline and extension	2.3	3.6	4.5	4.8	4.7	4.0
Greater interest rate sensitivity	2.3	3.3	3.7	3.6	3.3	3.2
Inflation fears	2.3	3.5	4.3	4.7	4.7	4.2
Federal debt concerns	2.3	3.5	4.1	4.2	4.0	3.5
Stronger supply side	2.2	3.2	4.0	4.4	4.4	3.8
EME financial turbulence	2.3	3.2	3.8	4.2	4.1	3.6
Inflation-driven global tightening	2.3	4.3	4.7	4.1	3.5	3.2

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

2 percent objective. As a result, there is considerable uncertainty as to how these expectations might change if inflation were to run persistently and significantly above that objective. In particular, an extended period of inflation above 2 percent may cause longer-run inflation expectations to move upward and also raise the perceived riskiness of nominal assets, thus increasing term premiums.

In this scenario, we assume a steeper Phillips curve such that the tight economy leads to higher inflation than in the baseline, possibly as a result of nonlinearities in the relationship between resource utilization and inflation. Moreover, it is assumed that, in forming their inflation expectations, households and businesses put more weight on recent inflation experience than in the baseline. Finally, in this environment of heightened inflation risk, Treasury term premiums rise persistently to a level about 1 percentage point above their baseline values.

Under these assumptions, inflation runs substantially above the Tealbook forecast for several years. Yields on Treasury securities and corporate bonds rise in response to the assumed increase in inflation risk premiums, causing GDP growth to be about 1 percentage point slower than in the baseline in 2019. The unemployment rate increases slowly throughout the simulation, ending almost 1 percentage point above the baseline (though still only a little above its assumed natural rate by the end of the simulation period). The response of the federal funds rate in this scenario is initially dominated by the lower level of real GDP rather than by the higher path of inflation; as a result, the federal funds rate is slightly below baseline until early 2022. Thereafter, however, the influence of higher inflation dominates, and the federal funds rate is ¼ percentage point above baseline by 2024 as inflation is slowly brought back down toward the 2 percent objective.

Federal Debt Concerns [FRB/US]

In response to the enactment of expansionary fiscal policies over the past year and the resulting higher projected level of the federal debt-to-GDP ratio, the baseline projection has assumed that term premiums on Treasury securities will gradually rise further than they would otherwise. However, as noted in the QS assessment, an increase in concerns about the current high level and unsustainable trajectory of the U.S. federal government debt could lead to a larger and significantly more rapid increase in term premiums than assumed in the baseline. This scenario explores the implications of that outcome.[3] In particular, higher term premiums on

[3] In the scenario, the 10-year Treasury term premium is about 75 basis points above its baseline value by the end of 2019.

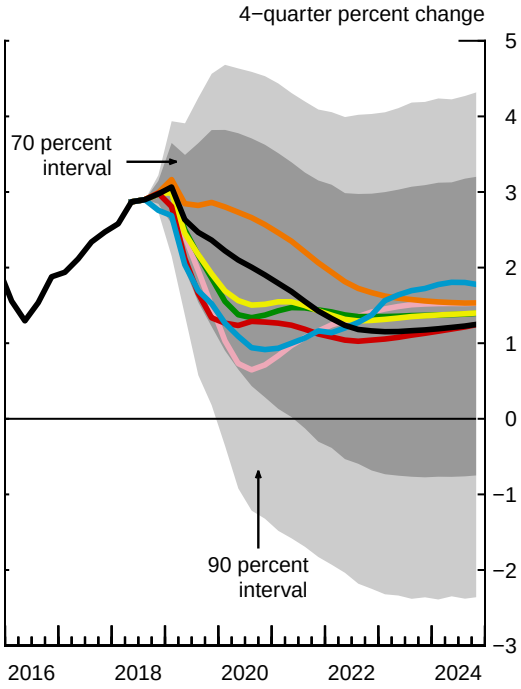
Risks & Uncertainty

Forecast Confidence Intervals and Alternative Scenarios

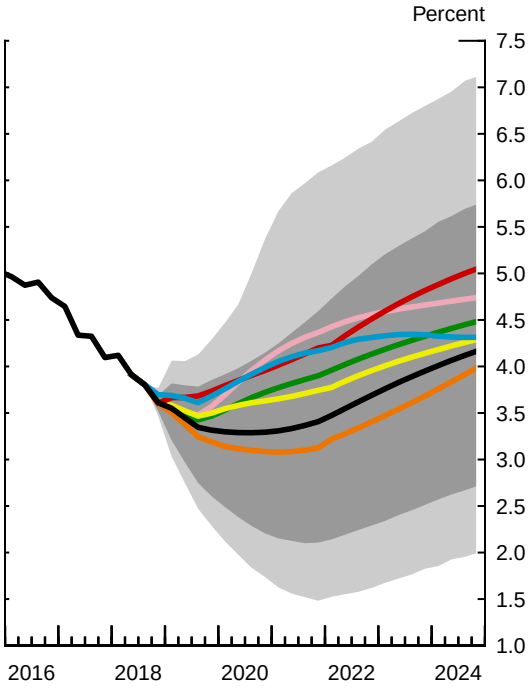
Confidence Intervals Based on FRB/US Stochastic Simulations

Tealbook baseline and extension
Greater interest rate sensitivity
Inflation fears
Federal debt concerns
Stronger supply side
EME financial turbulence
Inflation−driven global tightening

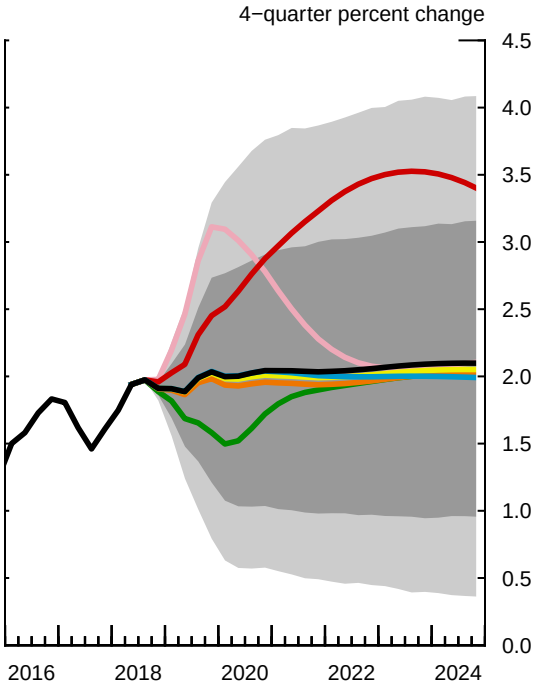
Real GDP



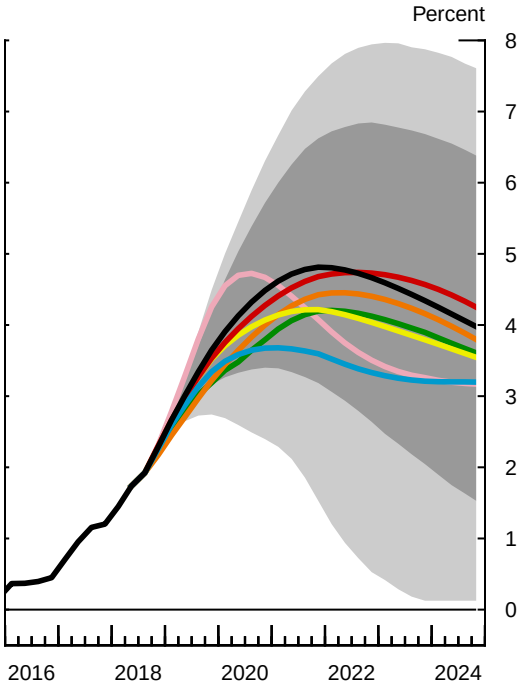
Unemployment Rate



PCE Prices excluding Food and Energy



Federal Funds Rate



Treasury securities show through to higher borrowing rates for both households and businesses, which restrains their spending and investment.

Given the higher borrowing costs, real GDP growth slows to ½ percentage point below the baseline in 2020, at which time the unemployment rate has risen about ¼ percentage point above the baseline. Inflation remains close to baseline levels, and consequently the federal funds rate is about ¼ percentage point lower, on average, over the medium term. The negative effects of a larger and faster increase in longer-term Treasury rates could be greater than illustrated in this scenario if, for example, they were to be amplified by financial sector vulnerabilities not reflected in this simulation.

Stronger Supply Side [FRB/US]

Although the unemployment rate is currently about 1 percentage point below our estimate of its natural rate, wage gains have remained modest. One way of reconciling modest wage gains with a very low unemployment rate is that the natural rate could be lower than in the baseline. In this scenario, we assume that the natural rate of unemployment has been lower in the past two years than assumed by the staff and that it continues to fall, possibly reflecting positive hysteresis. The natural rate is assumed to reach 4.1 percent at the end of 2019, ½ percentage point lower than in the baseline. In addition, we assume that structural productivity growth will be about ¼ percentage point faster than in the baseline. Finally, policymakers and the private sector are assumed to fully recognize these changes in supply-side conditions.

As a result, in this scenario, real GDP growth is, on average, ½ percentage point above the baseline, and the unemployment rate declines faster, reaching about 3 percent in 2021. Inflation rises more slowly than in the baseline, reflecting faster productivity growth, with core PCE inflation hovering around 2 percent in the medium term. With a narrower output gap persisting for several years and lower inflation, the federal funds rate is 4 percent at the end of 2020, ½ percentage point below the baseline.[4]

[4] In this scenario, resource utilization is less tight than in the baseline entering the projection period because the level of potential output is assumed to be higher over recent history.

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

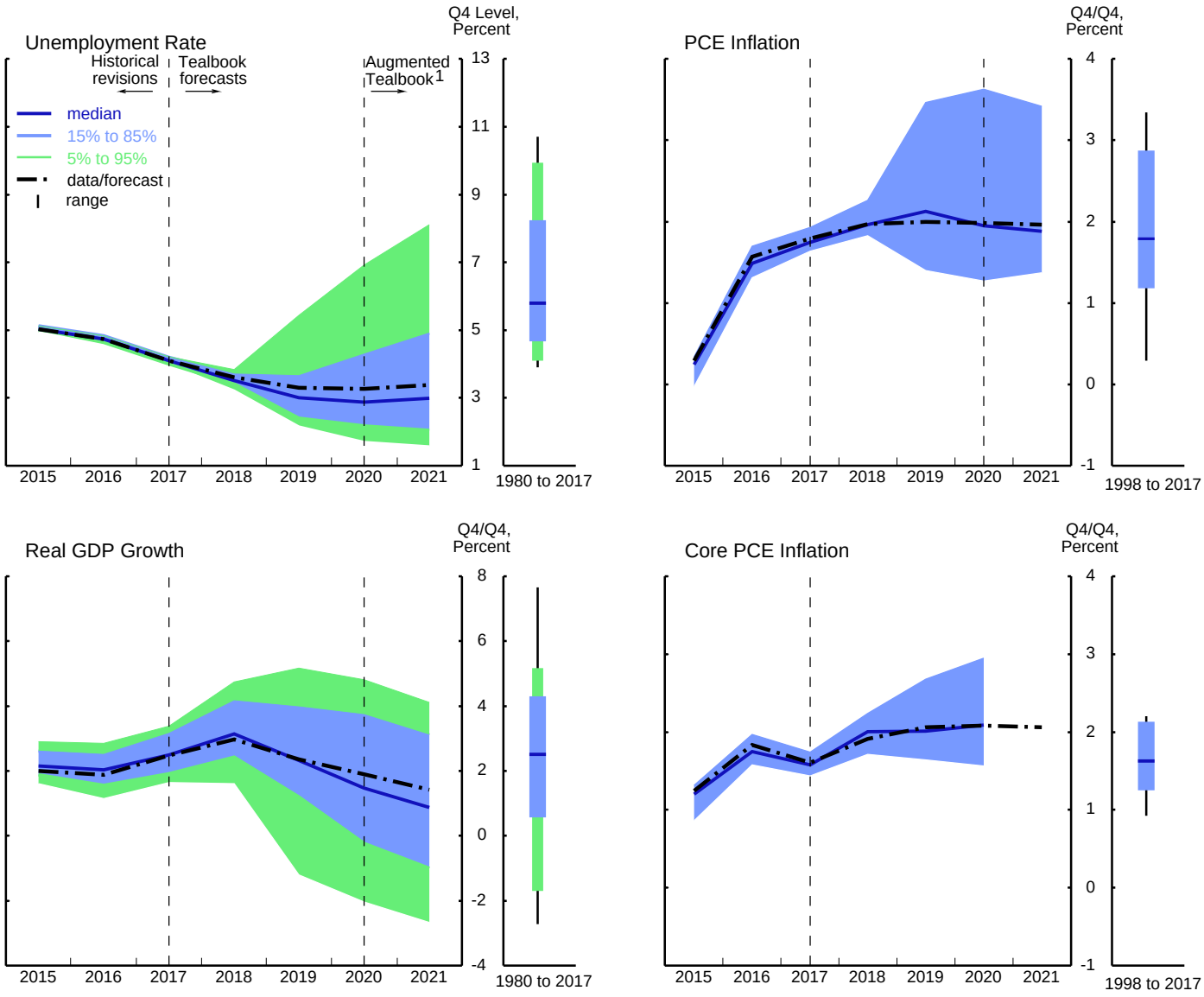
Measure	2018	2019	2020	2021	2022	2023	2024
Real GDP (percent change, Q4 to Q4)							
Projection	3.0	2.4	1.9	1.4	1.2	1.2	1.3
Confidence interval							
Tealbook forecast errors	2.4–4.2	1.2–4.0	-.2–3.7	-1.0–3.1	. . .	. . .	. . .
FRB/US stochastic simulations	2.8–3.1	1.2–3.8	.3–3.6	-.3–3.2	-.7–3.0	-.8–3.1	-.7–3.2
Civilian unemployment rate (percent, Q4)							
Projection	3.6	3.3	3.3	3.4	3.7	4.0	4.2
Confidence interval							
Tealbook forecast errors	3.4–3.7	2.4–3.7	2.2–4.3	2.1–4.9	. . .	. . .	. . .
FRB/US stochastic simulations	3.5–3.7	2.6–3.9	2.2–4.1	2.1–4.6	2.3–5.1	2.5–5.5	2.7–5.7
PCE prices, total (percent change, Q4 to Q4)							
Projection	2.0	2.0	1.9	1.9	2.0	2.1	2.1
Confidence interval							
Tealbook forecast errors	1.8–2.3	1.4–3.4	1.2–3.6	1.3–3.4	. . .	. . .	. . .
FRB/US stochastic simulations	1.9–2.0	1.0–2.8	.8–2.9	.8–3.0	.8–3.1	.8–3.2	.8–3.2
PCE prices excluding food and energy (percent change, Q4 to Q4)							
Projection	1.9	2.0	2.0	2.0	2.1	2.1	2.1
Confidence interval							
Tealbook forecast errors	1.7–2.2	1.6–2.6	1.5–2.9	. . .	. . .	. . .	. . .
FRB/US stochastic simulations	1.9–2.0	1.2–2.7	1.0–2.9	1.0–3.0	1.0–3.0	.9–3.1	1.0–3.2
Federal funds rate (percent, Q4)							
Projection	2.3	3.6	4.5	4.8	4.7	4.3	4.0
Confidence interval							
FRB/US stochastic simulations	2.3–2.3	3.2–4.2	3.4–5.7	3.2–6.6	2.6–6.8	2.0–6.7	1.5–6.4

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.

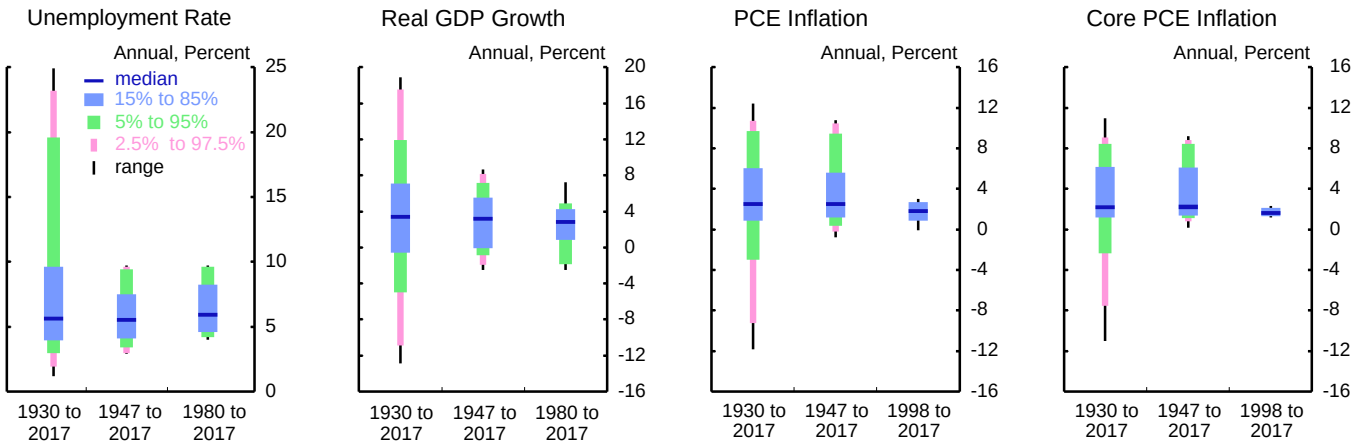
Prediction Intervals Derived from Historical Tealbook Forecast Errors

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 2- and 3-year-ahead forecast errors from Blue Chip, CBO, and CEA to extend the Tealbook prediction intervals through 2021.

EME Financial Turbulence [SIGMA]

A number of developments could trigger an increase in EME stresses over the forecast period, including a larger-than-expected increase in global interest rates, an escalation of global trade disputes, or a financial crisis in China. Although we expect that activity in China will decelerate only modestly over the forecast period, China's vulnerabilities have increased in recent years amid high private-sector debt levels and a still heavily leveraged shadow banking sector. Against this backdrop, adverse developments could put China's prospects in doubt and cause a deterioration of financial conditions, with knock-on effects to other EMEs. Such developments would likely cause flight-to-safety flows into dollar-denominated assets and put downward pressure on the renminbi and other EME currencies.

This scenario assumes that such a risk materializes. GDP in China and other EMEs falls by 4 percent and 2 percent relative to baseline, respectively, by 2020, as EME corporate borrowing spreads increase 150 basis points and confidence declines. The financial turbulence in EMEs and worries about future growth in global demand trigger a moderate rise in borrowing spreads in the United States and in the advanced foreign economies. Flight-to-safety flows cause the dollar to appreciate 10 percent and depress term premiums on U.S. government bonds. Despite weakening macroeconomic conditions, EME central banks are assumed to tighten monetary policy to mitigate upward pressure on inflation arising from the depreciation of their currencies.

The appreciation of the dollar, weaker foreign activity, and adverse financial spillovers cause U.S. GDP growth to moderate to just under 2 percent in 2019 and the unemployment rate to rise to 3¾ percent in 2020. Lower resource utilization and falling import prices reduce core PCE inflation to about 1½ percent in 2019. The federal funds rate follows a shallower path than in the baseline, rising to 3¾ percent by the end of 2020.

Inflation-Driven Global Tightening [SIGMA]

Oil prices rose to well over $80 per barrel early in the intermeeting period before subsiding more recently, and geopolitical tensions could push prices up substantially. Amid historically low unemployment rates in several major advanced economies, additional oil price increases could not only directly raise production costs but also boost inflation expectations and

set in motion a spiral of rising wages and prices.[5] Concerns about rising inflation could then prompt central banks to quickly increase policy rates and induce some tightening of global financial conditions.

Specifically, this scenario assumes that oil prices rise to $120 per barrel. In the context of very tight labor markets, and coming on the heels of previous large increases in oil prices, the cost increases pass through to prices to a much larger extent than in recent decades. Headline inflation in the advanced economies jumps to nearly 3½ percent in 2019 and core inflation 3 percent. Term premiums on government securities in the advanced economies rise 50 basis points above baseline, while private-sector borrowing spreads increase almost 40 basis points. Financial conditions in the EMEs are assumed to deteriorate a bit more than in the advanced economies.

Higher inflation and tighter financial conditions depress U.S. domestic demand, while lower foreign activity weighs on net exports. All told, U.S. GDP growth is, on average, a full percentage point below baseline in 2019 and 2020, and the unemployment rate reaches 4 percent in 2020. In response to the abrupt rise in inflation, the inertial Taylor rule prescribes that the federal funds rate rises 50 basis points above baseline in 2019. After peaking at around 4¾ percent in 2020, the federal funds rate declines below baseline as inflationary pressures wane and resource slack widens.

[5] It is also plausible that the increased market power of firms could lead to larger and more persistent pass-through of higher oil prices into inflation. For evidence of increased market power in the advanced economies, see Jan De Loecker and Jan Eeckhout (2018), "Global Market Power," NBER Working Paper Series 24768 (Cambridge, Mass.: National Bureau of Economic Research, June), https://www.nber.org/papers/w24768. For a discussion of the implications for monetary policy, see Andrew G. Haldane (2018), "Market Power and Monetary Policy," speech delivered at "Changing Market Structure and Implications for Monetary Policy," a symposium sponsored by the Federal Reserve Bank of Kansas City, held in Jackson Hole, Wyo., August 23–25, https://www.kansascityfed.org/~/media/files/publicat/sympos/2018/papersandhandouts/market-power-and-monetary-policy-speech-by-andy-haldane.pdf.

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	.10	.08	.03	.04
Previous Tealbook	.10	.07	.02	.03
Less than 1 percent				
Current Tealbook	.13	.17	.10	.23
Previous Tealbook	.12	.18	.12	.26

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	.00	.09	.19	.03
Previous Tealbook	.00	.11	.18	.03
Decrease by 1 percentage point				
Current Tealbook	.23	.01	.02	.09
Previous Tealbook	.26	.01	.03	.08

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	.02	.05	.02	.03
Previous Tealbook	.01	.02	.04	.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.

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 September Tealbook, inflation is projected to be a little higher in 2019, while the output gap is about ¼ percentage point narrower throughout the medium term. Overall, in response to these revisions, most of the strategies prescribe about the same path for the federal funds rate in the near term as in the previous Tealbook and a slightly lower path thereafter. A special exhibit illustrates how macroeconomic outcomes under flexible price-level targeting (FPLT) depend on the way the public forms expectations.

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 an 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]

Relative to the September Tealbook, the staff projects resource utilization to be a little less tight and inflation to be a little higher in the near term. Because the effects of these changes to the forecast mostly offset each other, the prescriptions of all of the policy rules are little changed from the previous Tealbook.

- 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-

[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.

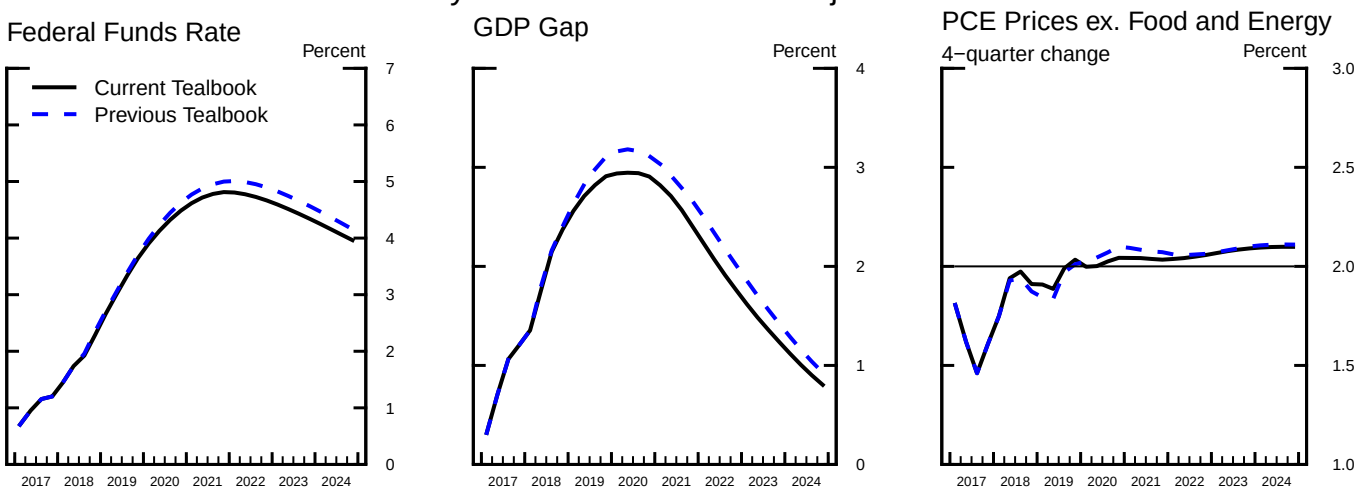
Policy Rules and the Staff Projection

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

(Percent)

	2018:Q4	2019:Q1
Taylor (1999) rule	**4.71**	**4.90**
Previous Tealbook	*4.69*	*4.87*
Taylor (1993) rule	**3.53**	**3.62**
Previous Tealbook	*3.49*	*3.56*
First−difference rule	**2.25**	**2.52**
Previous Tealbook projection	*2.31*	*2.66*
Flexible price−level targeting rule	**1.77**	**1.66**
Previous Tealbook projection	*1.75*	*1.62*
Addendum:		
Tealbook baseline	**2.29**	**2.66**

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**	3.29	*3.47*	*3.29*
Average projected real federal funds rate	1.85	*1.94*	*1.70*
SEP−consistent baseline			
FRB/US *r**	1.92		
Average projected real federal funds rate	1.00		

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 the output gap, 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 September 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**.

difference rule, which only responds incrementally to the change in economic conditions, essentially coincide with those of the Tealbook baseline.

- The FPLT rule, in an effort to eliminate the cumulative shortfall in the core PCE price index of about 2¼ percent since the end of 2011, prescribes setting the federal funds rate below the current target range.

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 September 2018 Summary of Economic Projections (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 3.29 percent, the current-quarter estimate of the Tealbook-consistent FRB/US *r** is 18 basis points lower than the value based on the September Tealbook projection, reflecting the staff's slightly lower output gap projection.

- At 1.92 percent, the SEP-consistent FRB/US *r** 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

[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 September 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.

averages almost 1 percentage point less than the corresponding path in the Tealbook.

SIMPLE POLICY RULE SIMULATIONS

The second exhibit reports 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 steps up about ¼ percentage point over the rest of this year, increases 1½ percentage points next year, and rises, on average, ½ percentage point per year in 2020 and 2021, reaching nearly 5 percent in the fourth quarter of 2021. This trajectory is a little lower than the one in the September 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 until early 2022. This higher path is associated with only a modestly higher trajectory for the real 10-year Treasury yield than in the baseline until mid-2020 and a slightly lower path thereafter, because the Taylor (1999) rule calls for somewhat lower values of the federal funds rate beyond the period shown. For the same reason, inflation is somewhat higher than in the baseline projection. 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.[5]

[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.

[5] The result that inflation runs above the baseline projection in this and the Taylor (1993) rule simulations, despite higher levels of the federal funds rate in the near term, depends on the assumption that

- The Taylor (1993) rule also calls for an immediate sharp increase in the federal funds rate. Because the Taylor (1993) rule responds less strongly to output exceeding its assumed potential level over the projection period, the prescriptions of this rule are lower than those of the Taylor (1999) rule over the period shown. The prescriptions from the Taylor (1993) rule are higher than the Tealbook baseline over the next two years, but, starting at the end of 2020, the path for the federal funds rate falls 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 beyond the medium term.

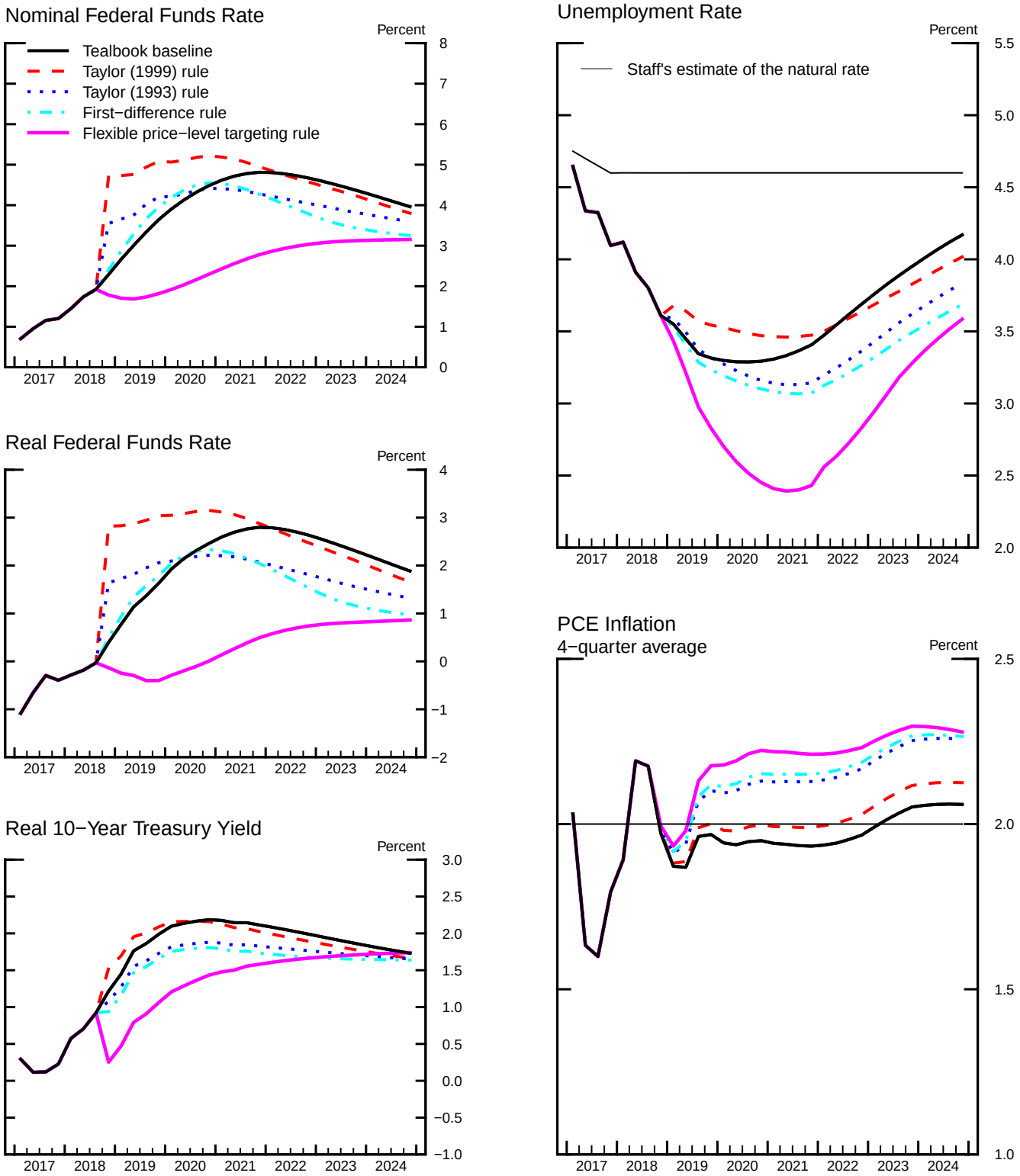
- The path for the federal funds rate prescribed by the first-difference rule lies somewhat above the path in the Tealbook baseline through 2020 but then runs below the baseline path for some years, during which the rule reacts to the projected decline in the output gap.[6] The associated lower path for the federal funds rate and the expectation of higher inflation in the future imply lower longer-term real interest rates, higher inflation, and lower unemployment than in the Tealbook baseline.

- The FPLT rule responds to, and seeks to eliminate, the shortfall that has cumulated since the end of 2011 between core PCE inflation and an annual rate of 2 percent. This rule's prescription generates a higher rate of inflation in coming years that eventually undoes the current 2¼ percentage point shortfall of the core PCE price index. The FPLT rule calls for keeping the federal funds rate somewhat below the current target range until the first quarter of 2020 and for keeping it below the federal funds rate path in the Tealbook baseline through mid-2027. 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

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 under 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.

[6] The first-difference rule responds to the expected change in the output gap rather than its level.

Simple Policy Rule Simulations



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

correctly anticipate the ensuing long period of a low federal funds rate, the path of the real 10-year Treasury rate drops 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 below 2½ percent in 2020.

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.[7] 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.[8]

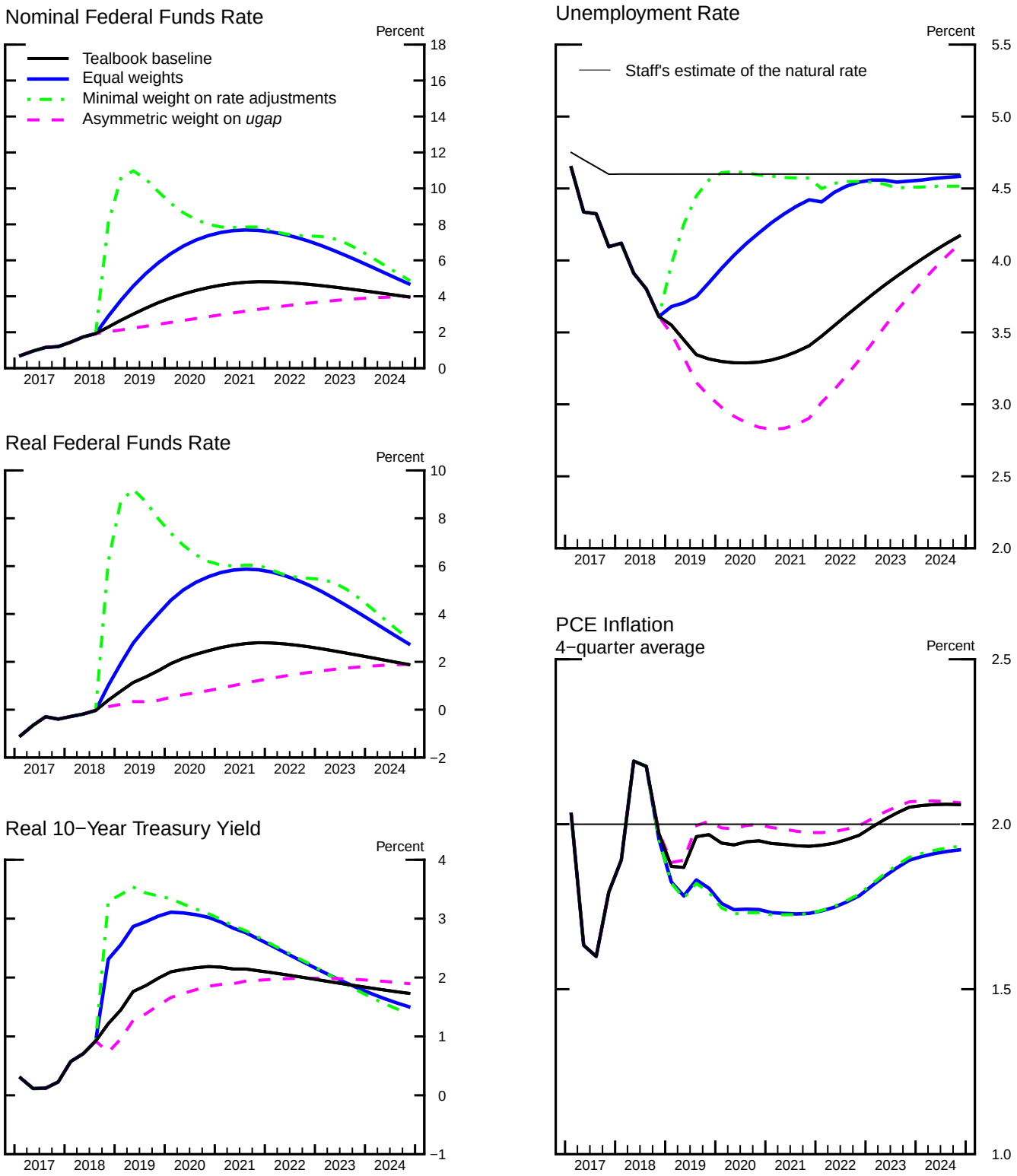
The first two of the three optimal control policies prescribe much higher paths for the federal funds rate than the path in the baseline projection, for two reasons. First, high levels of the real federal funds rate are necessary to push the unemployment rate up to its natural rate, because, consistent 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 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.[9] 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.

[7] 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. Previous Tealbooks also included a simulation labeled "Large weight on inflation gap," which has been dropped in this Tealbook.

[8] Under the optimal control policies, policymakers achieve the displayed economic outcomes by making promises that bind future policymakers to take actions that will 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.

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

Optimal Control Simulations under Commitment



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

- The 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 11 percent by mid-2019 and then averages around 7½ 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 rate is considerably below the path in the optimal control simulation with equal weights and below the Tealbook baseline path until 2024; it then exceeds the policy rate paths implied by the other two optimal control strategies and the Tealbook baseline starting in mid-2025. 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.

THE IMPLICATIONS OF EXPECTATIONS FOR FLEXIBLE PRICE-LEVEL TARGETING: A RECESSION SCENARIO

In the September Tealbook, we illustrated that the effectiveness of an FPLT rule in stabilizing the economy in a demand-driven recession varies depending on the initial price-level gap specified in the rule. The exhibit "The Implications of Expectations for Flexible Price-Level Targeting: A Recession Scenario" in this Tealbook clarifies that this effectiveness also depends on the ability of price and wage setters to anticipate changes in future policy.

In the FRB/US model and other models used for monetary policy analysis, current inflation is influenced by monetary policy through two distinct channels. The first channel operates through the current level of resource utilization, while the second channel operates through expectations of future inflation. To illustrate the importance of the second channel, we compare results from simulations of an FPLT rule under two different assumptions about expectations formation. In the first simulation, price and wage setters correctly anticipate the future course of monetary policy as well as the evolution of the economy, whereas in the second simulation, they form expectations using small-scale statistical models based on historical relationships.[10] By contrast, in both simulations financial market participants correctly anticipate future monetary policy and its economic implications. The FPLT rule sets the reference date for the target path of the price level to 2011:Q4, resulting in an initial price-level gap in 2018:Q4 of 2¼ percent.[11] The implications of these expectations formation assumptions are illustrated using the same recession scenario as in the Monetary Policy Strategies section of the September Tealbook.[12]

[10] Expectations formed in this way are often described as "VAR-based expectations" and are regularly used in the Risks and Uncertainty section of Tealbook A.

[11] The coefficient on the unemployment gap of the FPLT rule in these simulations is chosen to deliver the same marginal response to resource utilization as the inertial Taylor (1999) rule and is almost double the size of the coefficient used in the FPLT rule shown in the exhibit "Simple Policy Rule Simulations." The appendix in this Tealbook section contains the precise form of the rule.

[12] To construct the scenario, the current Tealbook baseline is subjected to a sequence of negative spending shocks starting in 2018:Q4 that raise the unemployment rate by close to the median increase of past recessions.

In the recession scenario baseline, the unemployment rate rises to almost 6 percent by mid-2020. PCE inflation drops quickly below 2 percent and remains below the Committee's objective for an extended period. The federal funds rate is set according to the inertial Taylor (1999) rule.

In the simulation "FPLT, model-consistent price and wage expectations," the policy rate path prescribed by the FPLT rule and its economic implications are correctly anticipated by wage and price setters.

- Given the large inherited price-level gap (shown in the bottom-right panel), the FPLT rule prescribes a much lower path for the federal funds rate than the inertial Taylor (1999) rule in the recession baseline.
- The path of PCE inflation is markedly higher than in the recession baseline, and the price-level gap narrows to negative 1¼ percent by the end of 2024. The increase in inflation is achieved mainly through higher expectations of future inflation, as price and wage setters anticipate that the path of the federal funds rate will remain low in the future until the price-level gap has been closed.
- With a more accommodative policy stance than in the recession baseline, real 10-year Treasury yields are lower and the peak unemployment rate is reduced to 5½ percent. The unemployment rate then falls below its natural rate for an extended period as the FPLT rule continues to prescribe accommodative policy in order to offset past shortfalls in inflation.

The simulation "FPLT, VAR-based price and wage expectations" is generated under the assumption that the expectations that underlie price- and wage-setting decisions are formed using small-scale statistical models based on historical relationships, while financial market participants, as before, correctly anticipate the future evolution of the economy and monetary policy.[13] Expectations of this nature can be thought of as arising from a situation in which price and wage setters do not understand policymakers' intention to pursue a target path for the price level.

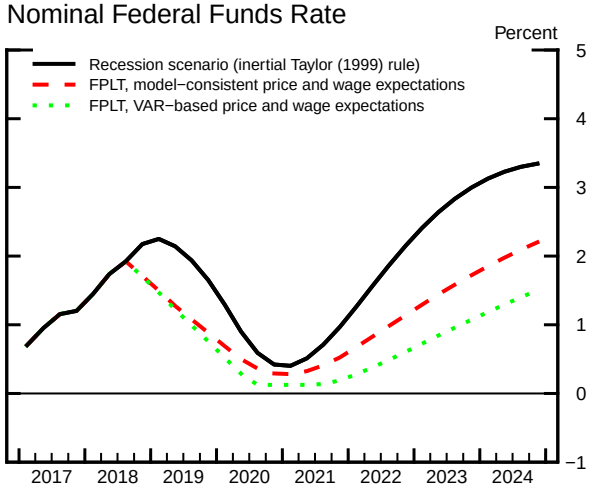
- Under these assumptions, price and wage setters fail to anticipate the full extent of policy accommodation prescribed by the FPLT rule in the future,

[13] These statistical models are held fixed throughout the simulation and, in particular, do not change in response to the adoption of the FPLT rule.

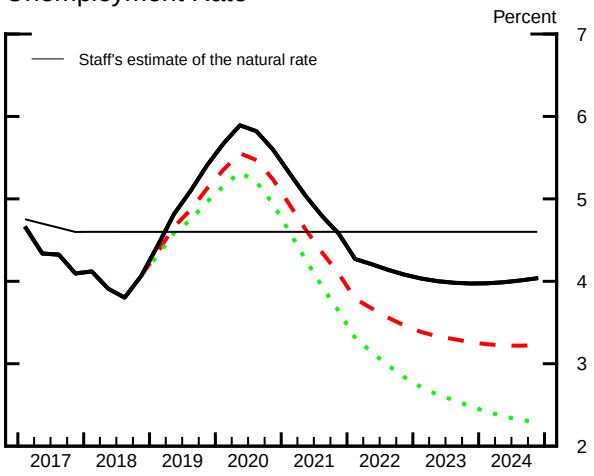
The Implications of Expectations for Flexible Price−Level Targeting

A Recession Scenario

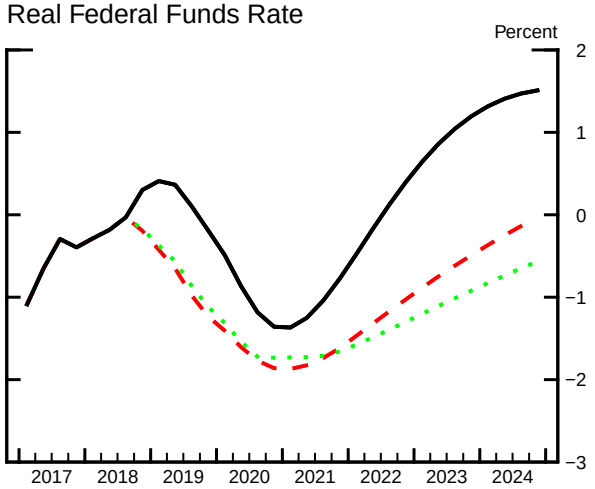
Nominal Federal Funds Rate



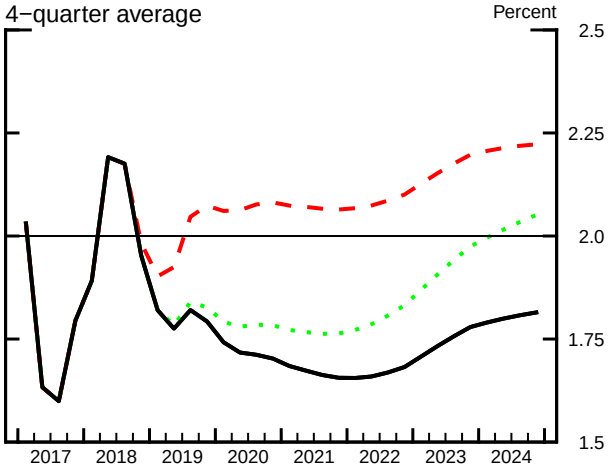
Unemployment Rate



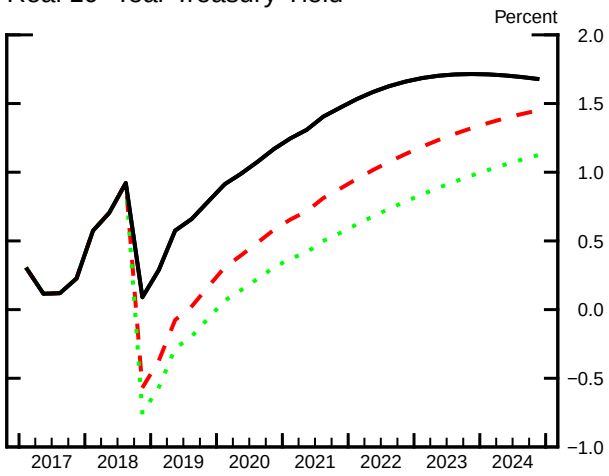
Real Federal Funds Rate



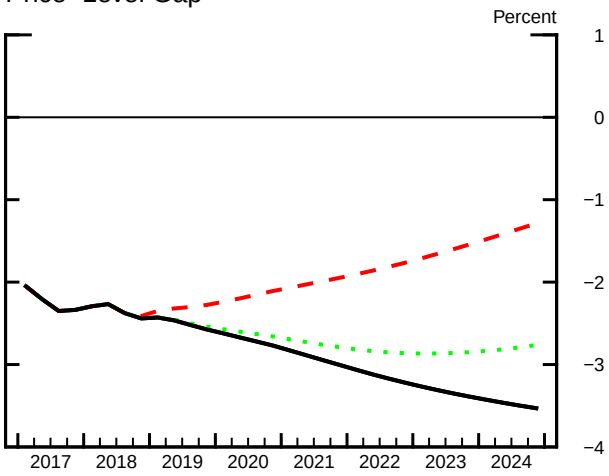
PCE Inflation
4−quarter average



Real 10−Year Treasury Yield



Price−Level Gap



Note: The FPLT rule used herein responds to the unemployment gap with a coefficient of −1.85. We constructed the recession scenario in the FRB/US model by subjecting the Tealbook baseline to a sequence of negative spending shocks starting in the fourth quarter of 2018, the first quarter in the simulation.

and thus inflation expectations are lower than in the previous simulation. As a result, PCE inflation stays below 2 percent until 2024, and the core PCE price-level gap does not narrow until 2023.

- Given the slower progress in closing the price-level gap, the FPLT rule under VAR-based price and wage expectations prescribes an even lower path for the nominal federal funds rate than in the previous simulation. With financial market participants correctly anticipating this lower path, real 10-year Treasury yields and the unemployment rate are considerably lower than in the previous simulation.
- The higher levels of resource utilization are insufficient to offset the effects of the lower inflation expectations of wage and price setters relative to the previous simulation, because the response of both current and expected inflation to current resource utilization is small. Even with an unemployment rate far below its natural rate through most of the simulation period, inflation does not rise enough to fulfill the promise of closing the price-level gap for more than a decade.

Overall, these simulations highlight that the effectiveness of flexible price-level targeting depends crucially on expectations formation. When price and wage setters do not understand the future effects of policy changes, announcing an FPLT strategy with a relatively large price gap at the onset of a recession requires a prolonged period of policy accommodation and very low levels of unemployment later on, with little gain in terms of higher inflation. The simulations provide an example of a commitment-based policy that is designed to achieve sizable stabilization benefits by steering expectations, yet may turn out to be undesirable if expectations fail to respond as intended, because the policy then induces substantial labor market overheating.

The final four exhibits tabulate the simulation results for key variables under the policy rules and optimal control simulations described previously.

Outcomes of Simple Policy Rule Simulations

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

Outcome and strategy	2018	2019	2020	2021	2022	2023	2024
Nominal federal funds rate[1]							
Taylor (1999)	4.7	5.1	5.2	4.9	4.6	4.2	3.8
Taylor (1993)	3.5	4.2	4.4	4.3	4.0	3.8	3.6
First-difference	2.4	4.0	4.6	4.3	3.8	3.4	3.2
Flexible price-level targeting	1.8	1.8	2.3	2.8	3.0	3.1	3.2
Extended Tealbook baseline	2.3	3.6	4.5	4.8	4.7	4.3	4.0
Real GDP							
Taylor (1999)	3.0	1.9	2.0	1.6	1.4	1.3	1.3
Taylor (1993)	3.0	2.4	2.2	1.7	1.3	1.2	1.3
First-difference	3.0	2.6	2.2	1.7	1.4	1.2	1.3
Flexible price-level targeting	3.0	3.5	2.7	1.7	1.0	.8	1.2
Extended Tealbook baseline	3.0	2.4	1.9	1.4	1.2	1.2	1.3
Unemployment rate[1]							
Taylor (1999)	3.6	3.5	3.5	3.5	3.6	3.8	4.0
Taylor (1993)	3.6	3.3	3.2	3.1	3.4	3.6	3.8
First-difference	3.6	3.2	3.1	3.1	3.3	3.5	3.7
Flexible price-level targeting	3.6	2.8	2.5	2.4	2.8	3.3	3.6
Extended Tealbook baseline	3.6	3.3	3.3	3.4	3.7	4.0	4.2
Total PCE prices							
Taylor (1999)	2.0	2.0	2.0	2.0	2.0	2.1	2.1
Taylor (1993)	2.0	2.1	2.1	2.1	2.2	2.3	2.3
First-difference	2.0	2.1	2.2	2.2	2.2	2.3	2.3
Flexible price-level targeting	2.0	2.2	2.2	2.2	2.2	2.3	2.3
Extended Tealbook baseline	2.0	2.0	1.9	1.9	2.0	2.1	2.1
Core PCE prices							
Taylor (1999)	1.9	2.1	2.1	2.1	2.1	2.2	2.2
Taylor (1993)	1.9	2.2	2.2	2.2	2.3	2.3	2.3
First-difference	1.9	2.2	2.2	2.3	2.3	2.3	2.3
Flexible price-level targeting	1.9	2.2	2.3	2.3	2.3	2.3	2.3
Extended Tealbook baseline	1.9	2.0	2.0	2.0	2.1	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	2018		2019				2020	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Nominal federal funds rate[1]								
Taylor (1999)	1.9	4.7	4.7	4.8	4.9	5.1	5.1	5.1
Taylor (1993)	1.9	3.5	3.7	3.8	4.0	4.2	4.2	4.3
First-difference	1.9	2.4	2.9	3.3	3.7	4.0	4.2	4.4
Flexible price-level targeting	1.9	1.8	1.7	1.7	1.7	1.8	1.9	2.0
Extended Tealbook baseline	1.9	2.3	2.7	3.0	3.3	3.6	3.9	4.1
Real GDP								
Taylor (1999)	2.9	3.0	2.9	2.3	2.1	1.9	2.0	2.0
Taylor (1993)	2.9	3.0	3.0	2.6	2.5	2.4	2.4	2.3
First-difference	2.9	3.0	3.1	2.7	2.6	2.6	2.5	2.4
Flexible price-level targeting	2.9	3.0	3.3	3.2	3.3	3.5	3.3	3.1
Extended Tealbook baseline	2.9	3.0	3.1	2.6	2.5	2.4	2.2	2.1
Unemployment rate[1]								
Taylor (1999)	3.8	3.6	3.7	3.6	3.6	3.5	3.5	3.5
Taylor (1993)	3.8	3.6	3.6	3.5	3.4	3.3	3.3	3.2
First-difference	3.8	3.6	3.5	3.4	3.3	3.2	3.2	3.2
Flexible price-level targeting	3.8	3.6	3.4	3.2	3.0	2.8	2.7	2.6
Extended Tealbook baseline	3.8	3.6	3.6	3.4	3.3	3.3	3.3	3.3
Total PCE prices								
Taylor (1999)	2.2	2.0	1.9	1.9	2.0	2.0	2.0	2.0
Taylor (1993)	2.2	2.0	1.9	1.9	2.1	2.1	2.1	2.1
First-difference	2.2	2.0	1.9	1.9	2.1	2.1	2.1	2.1
Flexible price-level targeting	2.2	2.0	1.9	2.0	2.1	2.2	2.2	2.2
Extended Tealbook baseline	2.2	2.0	1.9	1.9	2.0	2.0	1.9	1.9
Core PCE prices								
Taylor (1999)	2.0	1.9	1.9	1.9	2.0	2.1	2.0	2.0
Taylor (1993)	2.0	1.9	1.9	2.0	2.1	2.2	2.1	2.2
First-difference	2.0	1.9	2.0	2.0	2.1	2.2	2.2	2.2
Flexible price-level targeting	2.0	1.9	2.0	2.0	2.2	2.2	2.2	2.3
Extended Tealbook baseline	2.0	1.9	1.9	1.9	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	2019	2020	2021	2022	2023	2024
Nominal federal funds rate[1]							
Equal weights	2.9	5.9	7.4	7.7	7.1	6.0	4.7
Minimal weight on rate adjustments	8.1	9.8	8.0	7.9	7.4	6.6	4.9
Asymmetric weight on *ugap*	2.0	2.4	2.9	3.3	3.6	3.9	4.0
Extended Tealbook baseline	2.3	3.6	4.5	4.8	4.7	4.3	4.0
Real GDP							
Equal weights	3.0	1.2	1.1	1.2	1.4	1.7	1.5
Minimal weight on rate adjustments	3.0	-.1	1.4	1.7	1.7	1.8	1.5
Asymmetric weight on *ugap*	3.0	2.9	2.3	1.5	.9	.8	1.0
Extended Tealbook baseline	3.0	2.4	1.9	1.4	1.2	1.2	1.3
Unemployment rate[1]							
Equal weights	3.6	3.8	4.2	4.4	4.5	4.6	4.6
Minimal weight on rate adjustments	3.6	4.6	4.6	4.6	4.5	4.5	4.5
Asymmetric weight on *ugap*	3.6	3.1	2.8	2.9	3.3	3.8	4.1
Extended Tealbook baseline	3.6	3.3	3.3	3.4	3.7	4.0	4.2
Total PCE prices							
Equal weights	2.0	1.8	1.7	1.7	1.8	1.9	1.9
Minimal weight on rate adjustments	2.0	1.8	1.7	1.7	1.8	1.9	1.9
Asymmetric weight on *ugap*	2.0	2.0	2.0	2.0	2.0	2.1	2.1
Extended Tealbook baseline	2.0	2.0	1.9	1.9	2.0	2.1	2.1
Core PCE prices							
Equal weights	1.9	1.9	1.8	1.8	1.9	1.9	2.0
Minimal weight on rate adjustments	1.9	1.9	1.8	1.8	1.9	1.9	2.0
Asymmetric weight on *ugap*	1.9	2.1	2.1	2.1	2.1	2.1	2.1
Extended Tealbook baseline	1.9	2.0	2.0	2.0	2.1	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	2018		2019				2020	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Nominal federal funds rate[1]								
Equal weights	1.9	2.9	3.8	4.6	5.3	5.9	6.4	6.8
Minimal weight on rate adjustments	1.9	8.1	10.5	11.0	10.5	9.8	9.2	8.6
Asymmetric weight on *ugap*	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.7
Extended Tealbook baseline	1.9	2.3	2.7	3.0	3.3	3.6	3.9	4.1
Real GDP								
Equal weights	2.9	3.0	2.8	2.1	1.6	1.2	1.1	1.0
Minimal weight on rate adjustments	2.9	3.0	2.3	1.2	.4	-.1	.2	.6
Asymmetric weight on *ugap*	2.9	3.0	3.2	2.9	2.9	2.9	2.8	2.6
Extended Tealbook baseline	2.9	3.0	3.1	2.6	2.5	2.4	2.2	2.1
Unemployment rate[1]								
Equal weights	3.8	3.6	3.7	3.7	3.7	3.8	3.9	4.0
Minimal weight on rate adjustments	3.8	3.6	4.0	4.3	4.4	4.6	4.6	4.6
Asymmetric weight on *ugap*	3.8	3.6	3.5	3.3	3.2	3.1	3.0	2.9
Extended Tealbook baseline	3.8	3.6	3.6	3.4	3.3	3.3	3.3	3.3
Total PCE prices								
Equal weights	2.2	2.0	1.8	1.8	1.8	1.8	1.8	1.7
Minimal weight on rate adjustments	2.2	2.0	1.8	1.8	1.8	1.8	1.7	1.7
Asymmetric weight on *ugap*	2.2	2.0	1.9	1.9	2.0	2.0	2.0	2.0
Extended Tealbook baseline	2.2	2.0	1.9	1.9	2.0	2.0	1.9	1.9
Core PCE prices								
Equal weights	2.0	1.9	1.9	1.8	1.9	1.9	1.8	1.8
Minimal weight on rate adjustments	2.0	1.9	1.9	1.8	1.8	1.9	1.8	1.8
Asymmetric weight on *ugap*	2.0	1.9	1.9	1.9	2.0	2.1	2.0	2.1
Extended Tealbook baseline	2.0	1.9	1.9	1.9	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^*. 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.

THE IMPLICATIONS OF EXPECTATIONS FOR FLEXIBLE PRICE-LEVEL TARGETING: A RECESSION SCENARIO

The FPLT rule used in the special exhibit is of the form

$$R_t = 0.85R_{t-1} + 0.15(r^{LR} + \pi_t + (p_t - p_t^*) - 1.85(u_t - u_t^*)).$$

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. We set the coefficient on the unemployment gap to -1.85, which would imply a coefficient of 1 on the output gap under the Okun's law relationship assumed by the staff in constructing the Tealbook projection.

REFERENCES

Chung, Hess, Edward Herbst, and Michael T. Kiley (2014). "Effective Monetary Policy Strategies in New Keynesian Models: A Reexamination," *NBER Macroeconomics Annual*, vol. 29 (1), pp. 289–344.

Erceg, Christopher, Jon Faust, Michael Kiley, Jean-Philippe Laforte, David López-Salido, Stephen Meyer, Edward Nelson, David Reifschneider, and Robert Tetlow (2012). "An Overview of Simple Policy Rules and Their Use in Policymaking in Normal Times and Under Current Conditions," memorandum to the Federal Open Market Committee, Board of Governors of the Federal Reserve System, Divisions of International Finance, Monetary Affairs, and Research and Statistics, July 18.

Gust, Christopher, Benjamin K. Johannsen, David López-Salido, and Robert Tetlow (2016). "r*: Concepts, Measures, and Uses," memorandum to the Federal Open Market Committee, Board of Governors of the Federal Reserve System, Division of Monetary Affairs, October 13.

Orphanides, Athanasios (2003). "Historical Monetary Policy Analysis and the Taylor Rule," *Journal of Monetary Economics*, vol. 50 (July), pp. 983–1022.

Taylor, John B. (1993). "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, vol. 39 (December), pp. 195–214.

--------- (1999). "A Historical Analysis of Monetary Policy Rules," in John B. Taylor, ed., *Monetary Policy Rules.* Chicago: University of Chicago Press, pp. 319–41.

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

Interval	Nominal GDP		Real GDP		PCE price index		Core PCE price index		Unemployment rate[1]	
	09/14/18	10/25/18	09/14/18	10/25/18	09/14/18	10/25/18	09/14/18	10/25/18	09/14/18	10/25/18
Quarterly										
2018:Q1	4.3	4.3	2.2	2.2	2.5	2.5	2.2	2.2	4.1	4.1
Q2	8.1	7.6	4.7	4.2	1.9	2.0	2.1	2.1	3.9	3.9
Q3	4.7	4.3	3.0	2.9	1.5	1.5	1.5	1.5	3.8	3.8
Q4	4.4	4.6	2.5	2.6	2.1	1.9	1.8	1.8	3.7	3.6
2019:Q1	4.8	4.7	2.7	2.6	2.0	2.1	2.1	2.2	3.6	3.6
Q2	5.1	4.9	2.6	2.4	1.9	2.0	2.0	2.0	3.4	3.4
Q3	4.6	4.4	2.4	2.3	1.9	1.9	2.0	2.0	3.3	3.3
Q4	4.3	4.2	2.3	2.2	1.9	1.9	2.0	2.0	3.3	3.3
2020:Q1	4.2	4.1	2.1	2.0	2.0	2.0	2.1	2.0	3.2	3.3
Q2	4.4	4.3	2.0	1.9	2.0	1.9	2.1	2.0	3.2	3.3
Q3	4.0	4.1	1.8	1.9	2.0	1.9	2.1	2.1	3.2	3.3
Q4	3.8	3.8	1.7	1.8	2.0	1.9	2.1	2.1	3.2	3.3
Two-quarter[2]										
2018:Q2	6.2	5.9	3.4	3.2	2.2	2.2	2.1	2.1	-.2	-.2
Q4	4.5	4.5	2.8	2.8	1.8	1.7	1.6	1.7	-.2	-.3
2019:Q2	5.0	4.8	2.7	2.5	2.0	2.0	2.1	2.1	-.3	-.2
Q4	4.5	4.3	2.4	2.2	1.9	1.9	2.0	2.0	-.1	-.1
2020:Q2	4.3	4.2	2.1	2.0	2.0	1.9	2.1	2.0	-.1	.0
Q4	3.9	4.0	1.8	1.8	2.0	1.9	2.1	2.1	.0	.0
Four-quarter[3]										
2017:Q4	4.5	4.5	2.5	2.5	1.8	1.8	1.6	1.6	-.6	-.6
2018:Q4	5.3	5.2	3.1	3.0	2.0	2.0	1.9	1.9	-.4	-.5
2019:Q4	4.7	4.6	2.5	2.4	1.9	2.0	2.0	2.0	-.4	-.3
2020:Q4	4.1	4.1	1.9	1.9	2.0	1.9	2.1	2.0	-.1	.0
2021:Q4	3.6	3.5	1.5	1.4	2.0	1.9	2.1	2.0	.2	.1
Annual										
2017	4.2	4.2	2.2	2.2	1.8	1.8	1.6	1.6	4.4	4.4
2018	5.3	5.1	2.9	2.8	2.1	2.1	1.9	1.9	3.9	3.9
2019	4.9	4.8	2.8	2.6	1.9	1.9	1.9	2.0	3.4	3.4
2020	4.3	4.2	2.1	2.1	2.0	1.9	2.1	2.0	3.2	3.3
2021	3.7	3.7	1.6	1.6	2.0	1.9	2.1	2.0	3.3	3.4

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	2.9	2.6	2.6	2.4	2.3	2.2	2.0	1.9	1.9	1.8	3.0	2.4	1.9	1.4
Previous Tealbook	4.7	3.0	2.5	2.7	2.6	2.4	2.3	2.1	2.0	1.8	1.7	3.1	2.5	1.9	1.5
Final sales	5.4	1.1	3.0	2.8	2.5	2.1	2.1	2.0	1.9	1.7	1.9	2.9	2.4	1.9	1.6
Previous Tealbook	5.6	1.8	2.8	2.9	2.5	2.3	2.3	2.1	2.0	1.7	1.9	3.0	2.5	1.9	1.6
Priv. dom. final purch.	4.3	3.0	3.3	2.9	2.6	2.3	2.2	2.1	2.0	1.9	1.9	3.1	2.5	2.0	1.7
Previous Tealbook	4.6	2.8	3.4	3.3	3.2	2.9	2.6	2.4	2.3	2.2	2.1	3.2	3.0	2.3	1.9
Personal cons. expend.	3.8	3.2	2.7	2.7	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.5	2.4	2.2	1.9
Previous Tealbook	4.2	2.9	2.7	2.8	2.8	2.8	2.8	2.7	2.5	2.4	2.3	2.6	2.8	2.5	2.1
Durables	8.6	4.5	6.1	3.2	1.9	1.8	1.7	1.7	1.6	1.6	1.5	4.2	2.1	1.6	1.3
Nondurables	4.0	4.8	3.7	3.3	2.5	2.4	2.3	2.3	2.3	2.2	2.2	3.1	2.6	2.3	2.0
Services	3.0	2.6	1.8	2.5	2.5	2.3	2.3	2.2	2.3	2.2	2.2	2.1	2.4	2.2	1.9
Residential investment	-1.3	-5.2	-1.3	-.3	.7	.5	1.0	.6	.2	.3	.5	-2.8	.5	.4	1.6
Previous Tealbook	-1.8	-2.1	-.2	5.1	5.8	2.2	.4	.7	.4	.2	.3	-1.9	3.4	.4	1.3
Nonres. priv. fixed invest.	8.7	4.0	7.6	4.8	4.0	3.0	2.4	1.7	1.5	1.4	1.3	7.9	3.6	1.5	.8
Previous Tealbook	8.9	3.7	7.9	5.2	4.4	3.4	2.3	1.9	1.7	1.7	1.6	8.0	3.8	1.7	.9
Equipment & intangibles	7.1	7.4	8.3	5.3	4.3	3.2	2.6	2.1	2.0	1.9	1.9	8.4	3.9	2.0	1.7
Previous Tealbook	7.3	4.1	8.8	5.7	4.9	3.7	2.6	2.2	2.1	2.3	2.3	7.7	4.2	2.2	1.7
Nonres. structures	14.5	-6.5	5.4	3.1	3.1	2.4	1.9	.3	-.2	-.5	-.8	6.5	2.6	-.3	-2.1
Previous Tealbook	14.4	2.5	5.2	3.5	2.8	2.2	1.4	.8	.2	-.4	-.7	8.9	2.5	.0	-1.8
Net exports[2]	-841	-939	-945	-944	-952	-967	-973	-979	-990	-1007	-1004	-907	-959	-995	-1018
Previous Tealbook[2]	-844	-887	-907	-920	-952	-984	-1001	-1019	-1042	-1075	-1083	-885	-964	-1055	-1121
Exports	9.3	-2.6	3.4	2.7	2.4	2.6	2.1	2.6	2.9	3.0	3.2	3.3	2.5	2.9	3.2
Imports	-.6	9.9	3.1	1.9	2.7	3.6	2.2	2.5	3.3	4.1	1.9	3.8	2.6	3.0	2.8
Gov't. cons. & invest.	2.5	2.1	1.8	1.8	1.8	1.9	2.0	1.7	2.0	1.9	1.1	2.0	1.9	1.7	1.1
Previous Tealbook	2.4	1.1	1.6	1.5	1.6	1.8	2.0	1.6	2.3	1.8	1.1	1.7	1.8	1.7	1.1
Federal	3.7	2.3	2.6	2.7	2.8	3.3	3.5	3.0	3.8	3.4	1.2	2.8	3.1	2.9	1.2
Defense	6.0	3.0	3.4	3.0	3.0	3.9	4.1	3.3	4.4	3.3	1.0	3.8	3.5	3.0	1.0
Nondefense	.5	1.3	1.5	2.3	2.6	2.5	2.6	2.6	3.0	3.6	1.6	1.4	2.5	2.7	1.6
State & local	1.8	1.9	1.3	1.2	1.3	1.1	1.1	1.0	1.0	1.0	1.0	1.5	1.2	1.0	1.0
Change in priv. inventories[2]	-37	56	33	20	19	27	29	30	32	41	33	21	24	34	15
Previous Tealbook[2]	-23	37	21	14	19	29	29	31	31	39	29	16	23	32	16

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

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

Item	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real GDP	1.5	2.6	2.7	2.0	1.9	2.5	3.0	2.4	1.9	1.4
Previous Tealbook	1.5	2.6	2.7	2.0	1.9	2.5	3.1	2.5	1.9	1.5
Final sales	1.9	2.0	3.0	1.9	2.1	2.6	2.9	2.4	1.9	1.6
Previous Tealbook	1.9	2.0	3.0	1.9	2.1	2.6	3.0	2.5	1.9	1.6
Priv. dom. final purch.	2.6	2.6	4.3	2.7	2.7	3.3	3.1	2.5	2.0	1.7
Previous Tealbook	2.6	2.6	4.3	2.7	2.7	3.3	3.2	3.0	2.3	1.9
Personal cons. expend.	1.6	1.9	3.8	3.0	2.8	2.7	2.5	2.4	2.2	1.9
Previous Tealbook	1.6	1.9	3.8	3.0	2.8	2.7	2.6	2.8	2.5	2.1
Durables	6.3	5.0	9.2	6.0	6.8	7.7	4.2	2.1	1.6	1.3
Nondurables	.7	2.8	3.0	3.0	2.0	3.0	3.1	2.6	2.3	2.0
Services	1.2	1.1	3.2	2.6	2.4	1.8	2.1	2.4	2.2	1.9
Residential investment	15.4	7.1	7.8	8.9	4.5	3.8	-2.8	.5	.4	1.6
Previous Tealbook	15.4	7.1	7.8	8.9	4.5	3.8	-1.9	3.4	.4	1.3
Nonres. priv. fixed invest.	5.6	5.4	6.4	-.7	1.8	6.3	7.9	3.6	1.5	.8
Previous Tealbook	5.6	5.4	6.4	-.7	1.8	6.3	8.0	3.8	1.7	.9
Equipment & intangibles	6.1	5.1	5.6	2.6	1.6	7.3	8.4	3.9	2.0	1.7
Previous Tealbook	6.1	5.1	5.6	2.6	1.6	7.3	7.7	4.2	2.2	1.7
Nonres. structures	4.0	6.7	8.8	-10.7	2.5	2.9	6.5	2.6	-.3	-2.1
Previous Tealbook	4.0	6.7	8.8	-10.7	2.5	2.9	8.9	2.5	.0	-1.8
Net exports[1]	-569	-533	-578	-725	-786	-859	-907	-959	-995	-1018
Previous Tealbook[1]	-569	-533	-578	-725	-786	-859	-885	-964	-1055	-1121
Exports	2.1	6.0	3.0	-1.6	.8	4.7	3.3	2.5	2.9	3.2
Imports	.6	3.0	6.7	3.4	3.1	5.4	3.8	2.6	3.0	2.8
Gov't. cons. & invest.	-2.1	-2.4	.2	2.2	.9	.1	2.0	1.9	1.7	1.1
Previous Tealbook	-2.1	-2.4	.2	2.2	.9	.1	1.7	1.8	1.7	1.1
Federal	-2.6	-6.1	-1.2	1.2	.2	1.3	2.8	3.1	2.9	1.2
Defense	-4.7	-6.5	-3.6	-.2	-.7	1.3	3.8	3.5	3.0	1.0
Nondefense	1.2	-5.5	2.7	3.4	1.5	1.3	1.4	2.5	2.7	1.6
State & local	-1.7	.2	1.1	2.8	1.4	-.5	1.5	1.2	1.0	1.0
Change in priv. inventories[1]	71	109	87	129	23	23	21	24	34	15
Previous Tealbook[1]	71	109	87	129	23	23	16	23	32	16

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	2.9	2.6	2.6	2.4	2.3	2.2	2.0	1.9	1.9	1.8	3.0	2.4	1.9	1.4
Previous Tealbook	4.7	3.0	2.5	2.7	2.6	2.4	2.3	2.1	2.0	1.8	1.7	3.1	2.5	1.9	1.5
Final sales	5.3	1.1	3.0	2.8	2.5	2.1	2.1	2.0	1.9	1.7	1.9	2.9	2.4	1.9	1.6
Previous Tealbook	5.6	1.9	2.8	2.9	2.5	2.3	2.3	2.1	2.0	1.7	1.9	3.0	2.5	1.9	1.6
Priv. dom. final purch.	3.7	2.5	2.8	2.5	2.2	2.0	1.9	1.8	1.7	1.7	1.6	2.7	2.2	1.7	1.4
Previous Tealbook	4.0	2.4	2.9	2.8	2.7	2.5	2.2	2.1	2.0	1.9	1.8	2.7	2.6	1.9	1.6
Personal cons. expend.	2.6	2.2	1.8	1.8	1.7	1.6	1.5	1.5	1.5	1.5	1.4	1.7	1.6	1.5	1.3
Previous Tealbook	2.9	2.0	1.8	1.9	1.9	1.9	1.9	1.8	1.7	1.6	1.6	1.8	1.9	1.7	1.4
Durables	.6	.3	.4	.2	.1	.1	.1	.1	.1	.1	.1	.3	.2	.1	.1
Nondurables	.6	.7	.5	.5	.4	.3	.3	.3	.3	.3	.3	.4	.4	.3	.3
Services	1.4	1.2	.9	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.1	1.0	.9
Residential investment	-.1	-.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	-.1	.0	.0	.1
Previous Tealbook	-.1	-.1	.0	.2	.2	.1	.0	.0	.0	.0	.0	-.1	.1	.0	.0
Nonres. priv. fixed invest.	1.2	.5	1.0	.7	.6	.4	.3	.2	.2	.2	.2	1.1	.5	.2	.1
Previous Tealbook	1.2	.5	1.1	.7	.6	.5	.3	.3	.2	.2	.2	1.1	.5	.2	.1
Equipment & intangibles	.7	.8	.9	.6	.5	.3	.3	.2	.2	.2	.2	.9	.4	.2	.2
Previous Tealbook	.8	.4	.9	.6	.5	.4	.3	.2	.2	.2	.2	.8	.4	.2	.2
Nonres. structures	.4	-.2	.2	.1	.1	.1	.1	.0	.0	.0	.0	.2	.1	.0	-.1
Previous Tealbook	.4	.1	.2	.1	.1	.1	.0	.0	.0	.0	.0	.3	.1	.0	-.1
Net exports	1.2	-1.8	-.1	.0	-.1	-.2	-.1	-.1	-.2	-.3	.1	-.2	-.1	-.1	.0
Previous Tealbook	1.2	-.8	-.3	-.2	-.5	-.5	-.3	-.3	-.4	-.5	-.1	.0	-.4	-.3	-.2
Exports	1.1	-.3	.4	.3	.3	.3	.3	.3	.3	.4	.4	.4	.3	.4	.4
Imports	.1	-1.5	-.5	-.3	-.4	-.5	-.3	-.4	-.5	-.6	-.3	-.6	-.4	-.4	-.4
Gov't. cons. & invest.	.4	.4	.3	.3	.3	.3	.3	.3	.4	.3	.2	.3	.3	.3	.2
Previous Tealbook	.4	.2	.3	.3	.3	.3	.3	.3	.4	.3	.2	.3	.3	.3	.2
Federal	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.1	.2	.2	.2	.1
Defense	.2	.1	.1	.1	.1	.1	.2	.1	.2	.1	.0	.1	.1	.1	.0
Nondefense	.0	.0	.0	.1	.1	.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	1.8	-.4	-.3	.0	.2	.0	.0	.0	.2	-.1	.1	.0	.0	-.2
Previous Tealbook	-.9	1.2	-.3	-.1	.1	.2	.0	.0	.0	.1	-.2	.1	.0	.0	-.1

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

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

Item	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	1.9	2.0	2.1	2.4	2.1	2.0	2.1	2.3	2.1	2.0	2.2	2.1	2.1	2.1
Previous Tealbook	3.0	1.6	1.8	2.0	2.4	2.1	2.0	2.1	2.4	2.1	2.0	2.1	2.1	2.2	2.1
PCE chain-wt. price index	2.0	1.5	1.9	2.1	2.0	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	1.9	1.9
Previous Tealbook	1.9	1.5	2.1	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0
Energy	.7	3.5	5.3	-.4	.4	-.2	-.8	-1.0	-1.1	-1.2	-1.1	5.4	-.2	-1.1	-1.0
Previous Tealbook	.6	5.0	7.9	1.0	-.8	-.9	-1.2	-1.2	-1.2	-1.3	-1.2	6.5	-.5	-1.2	-.8
Food	1.2	.4	1.3	2.1	2.2	2.6	3.0	2.8	2.6	2.5	2.4	.8	2.5	2.6	2.3
Previous Tealbook	1.2	.6	1.9	2.0	2.2	2.6	3.0	2.8	2.6	2.5	2.4	1.0	2.4	2.6	2.3
Ex. food & energy	2.1	1.5	1.8	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.1	1.9	2.0	2.0	2.0
Previous Tealbook	2.1	1.5	1.8	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	1.9	2.0	2.1	2.1
Ex. food & energy, market based	2.2	1.2	1.6	2.1	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.7	1.9	1.9	1.9
Previous Tealbook	2.2	1.2	1.7	1.9	1.8	1.8	1.8	2.0	2.0	1.9	1.9	1.8	1.8	2.0	1.9
CPI	1.7	2.0	2.2	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Previous Tealbook	1.7	2.2	2.6	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.5	2.2	2.3	2.3
Ex. food & energy	1.8	2.0	2.0	2.6	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.2	2.5	2.5	2.5
Previous Tealbook	1.8	2.1	2.1	2.2	2.4	2.4	2.4	2.6	2.6	2.5	2.5	2.2	2.3	2.6	2.6
ECI, hourly compensation[2]	2.4	2.3	2.3	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.9	2.9
Previous Tealbook[2]	2.4	2.3	2.3	2.8	2.8	2.8	2.9	3.0	3.0	3.0	3.0	2.8	2.8	3.0	3.0
Business sector															
Output per hour	3.4	1.4	1.1	.7	1.2	1.0	1.1	1.1	1.2	1.3	1.2	1.6	1.0	1.2	1.1
Previous Tealbook	4.2	1.5	.8	1.3	1.2	1.1	1.0	1.1	1.2	1.2	1.2	1.8	1.1	1.2	1.1
Compensation per hour	2.3	3.4	3.2	3.9	3.9	4.0	4.1	4.0	4.0	4.0	4.0	3.3	4.0	4.0	3.9
Previous Tealbook	2.3	2.9	3.2	3.9	4.0	4.1	4.1	4.1	4.2	4.2	4.1	3.2	4.0	4.2	4.0
Unit labor costs	-1.1	2.0	2.1	3.1	2.7	3.0	2.9	2.8	2.7	2.7	2.7	1.7	2.9	2.7	2.7
Previous Tealbook	-1.8	1.4	2.3	2.6	2.8	2.9	3.1	3.0	3.0	2.9	2.9	1.4	2.8	3.0	2.8
Core goods imports chain-wt. price index[3]	.6	-2.2	-1.1	.1	.6	1.0	.9	.9	.8	.8	.7	.0	.6	.8	.7
Previous Tealbook[3]	.5	-2.2	-.9	.2	.6	.8	.8	.9	.7	.7	.7	.0	.6	.8	.7

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

Changes in Prices and Costs

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

Item	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
GDP chain-wt. price index	2.1	1.8	1.6	.9	1.5	2.0	2.2	2.1	2.1	2.1
Previous Tealbook	2.1	1.8	1.6	.9	1.5	2.0	2.1	2.1	2.2	2.1
PCE chain-wt. price index	1.8	1.2	1.2	.3	1.6	1.8	2.0	2.0	1.9	1.9
Previous Tealbook	1.8	1.2	1.2	.3	1.6	1.8	2.0	1.9	2.0	2.0
Energy	2.1	-2.9	-6.9	-16.4	2.1	8.1	5.4	-.2	-1.1	-1.0
Previous Tealbook	2.1	-2.9	-6.9	-16.4	2.1	8.1	6.5	-.5	-1.2	-.8
Food	1.3	.7	2.8	.3	-1.8	.7	.8	2.5	2.6	2.3
Previous Tealbook	1.3	.7	2.8	.3	-1.8	.7	1.0	2.4	2.6	2.3
Ex. food & energy	1.8	1.6	1.5	1.2	1.8	1.6	1.9	2.0	2.0	2.0
Previous Tealbook	1.8	1.6	1.5	1.2	1.8	1.6	1.9	2.0	2.1	2.1
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	1.8	1.8	2.0	1.9
CPI	1.9	1.2	1.2	.4	1.8	2.1	2.3	2.3	2.3	2.3
Previous Tealbook	1.9	1.2	1.2	.4	1.8	2.1	2.5	2.2	2.3	2.3
Ex. food & energy	1.9	1.7	1.7	2.0	2.2	1.7	2.2	2.5	2.5	2.5
Previous Tealbook	1.9	1.7	1.7	2.0	2.2	1.7	2.2	2.3	2.6	2.6
ECI, hourly compensation[1]	1.8	2.0	2.3	1.9	2.2	2.6	2.8	2.8	2.9	2.9
Previous Tealbook[1]	1.8	2.0	2.3	1.9	2.2	2.6	2.8	2.8	3.0	3.0
Business sector										
Output per hour	.2	1.8	.1	.7	1.1	.8	1.6	1.0	1.2	1.1
Previous Tealbook	.2	1.8	.1	.7	1.1	.8	1.8	1.1	1.2	1.1
Compensation per hour	5.9	-.3	2.8	2.5	2.1	3.0	3.3	4.0	4.0	3.9
Previous Tealbook	5.9	-.3	2.8	2.5	2.1	3.0	3.2	4.0	4.2	4.0
Unit labor costs	5.7	-2.0	2.7	1.8	1.0	2.3	1.7	2.9	2.7	2.7
Previous Tealbook	5.7	-2.0	2.7	1.8	1.0	2.3	1.4	2.8	3.0	2.8
Core goods imports chain-wt. price index[2]	-.4	-2.2	-.4	-4.4	-.7	1.1	.0	.6	.8	.7
Previous Tealbook[2]	-.4	-2.2	-.4	-4.4	-.7	1.1	.0	.6	.8	.7

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

Other Macroeconomic Indicators

Item	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2018[1]	2019[1]	2020[1]	2021[1]
Employment and production															
Nonfarm payroll employment[2]	217	190	201	187	171	163	149	136	123	114	110	206	167	121	82
Unemployment rate[3]	3.9	3.8	3.6	3.6	3.4	3.3	3.3	3.3	3.3	3.3	3.3	3.6	3.3	3.3	3.4
Previous Tealbook[3]	3.9	3.8	3.7	3.6	3.4	3.3	3.3	3.2	3.2	3.2	3.2	3.7	3.3	3.2	3.4
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	60.5	60.6	60.7	60.7	60.7	60.7	60.7	60.7	60.7	60.5	60.7	60.7	60.4
Employment-to-Population Trend[3]	59.8	59.7	59.7	59.6	59.6	59.6	59.5	59.5	59.4	59.4	59.4	59.7	59.5	59.4	59.2
Output gap[4]	1.8	2.2	2.4	2.6	2.7	2.9	3.0	3.0	3.0	3.0	2.9	2.4	3.0	2.9	2.4
Previous Tealbook[4]	1.8	2.2	2.4	2.7	2.9	3.0	3.2	3.2	3.2	3.2	3.2	2.4	3.2	3.2	2.7
Industrial production[5]	5.3	3.3	2.0	1.5	2.2	2.0	1.8	1.7	1.1	1.1	.9	3.3	1.9	1.2	.5
Previous Tealbook[5]	5.1	3.0	1.9	2.4	2.7	2.5	2.3	2.0	1.4	1.3	1.0	3.1	2.5	1.4	.7
Manufacturing industr. prod.[5]	2.3	2.8	1.9	.8	1.8	1.9	1.3	1.1	1.1	1.2	.8	2.2	1.5	1.1	.4
Previous Tealbook[5]	2.3	2.8	2.5	2.0	2.7	3.0	2.4	1.7	1.5	1.4	1.0	2.4	2.5	1.4	.7
Capacity utilization rate - mfg.[3]	75.5	75.8	75.9	75.8	76.0	76.1	76.2	76.3	76.4	76.5	76.5	75.9	76.2	76.5	76.5
Previous Tealbook[3]	75.5	75.8	76.0	76.1	76.4	76.8	77.0	77.2	77.3	77.4	77.5	76.0	77.0	77.5	77.5
Housing starts[6]	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.3
Light motor vehicle sales[6]	17.2	16.9	17.1	17.0	17.0	17.0	17.0	16.9	16.8	16.8	16.7	17.1	17.0	16.8	16.6
Income and saving															
Nominal GDP[5]	7.6	4.3	4.6	4.7	4.9	4.4	4.2	4.1	4.3	4.1	3.8	5.2	4.6	4.1	3.5
Real disposable pers. income[5]	2.5	2.3	2.3	2.7	2.4	2.3	2.4	3.7	2.3	1.6	2.1	2.9	2.4	2.4	1.9
Previous Tealbook[5]	2.4	2.3	2.6	3.4	2.5	2.3	2.4	3.7	2.3	1.6	2.2	2.9	2.7	2.4	1.8
Personal saving rate[3]	6.8	6.6	6.5	6.5	6.5	6.5	6.5	6.9	6.9	6.7	6.8	6.5	6.5	6.8	6.7
Previous Tealbook[3]	6.7	6.6	6.5	6.7	6.6	6.5	6.4	6.6	6.6	6.4	6.4	6.5	6.4	6.4	6.1
Corporate profits[7]	12.5	8.9	3.8	1.3	2.4	-.6	-1.9	-1.6	1.7	1.1	-.1	7.5	.3	.3	.1
Profit share of GNP[3]	10.8	11.0	11.0	10.9	10.9	10.7	10.6	10.4	10.4	10.3	10.2	11.0	10.6	10.2	9.9
Gross national saving rate[3]	18.7	19.0	19.0	18.7	18.7	18.7	18.7	18.5	18.6	18.5	18.5	19.0	18.7	18.5	18.3
Net national saving rate[3]	3.5	4.1	4.0	3.5	3.5	3.4	3.3	3.1	3.0	2.9	2.8	4.0	3.3	2.8	2.5

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

Other Macroeconomic Indicators

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

Item	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Employment and production										
Nonfarm payroll employment[1]	179	192	250	226	195	182	206	167	121	82
Unemployment rate[2]	7.8	7.0	5.7	5.0	4.7	4.1	3.6	3.3	3.3	3.4
Previous Tealbook[2]	7.8	7.0	5.7	5.0	4.7	4.1	3.7	3.3	3.2	3.4
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	60.1	60.5	60.7	60.7	60.4
Employment-to-Population Trend[2]	60.3	60.2	60.1	60.0	59.9	59.8	59.7	59.5	59.4	59.2
Output gap[3]	-3.7	-2.8	-.8	-.2	.4	1.2	2.4	3.0	2.9	2.4
Previous Tealbook[3]	-3.7	-2.8	-.8	-.2	.4	1.2	2.4	3.2	3.2	2.7
Industrial production	2.2	2.3	3.4	-3.3	-.5	3.0	3.3	1.9	1.2	.5
Previous Tealbook	2.2	2.3	3.4	-3.3	-.5	3.0	3.1	2.5	1.4	.7
Manufacturing industr. prod.	1.4	1.1	1.4	-1.6	-.1	1.9	2.2	1.5	1.1	.4
Previous Tealbook	1.4	1.1	1.4	-1.6	-.1	1.9	2.4	2.5	1.4	.7
Capacity utilization rate - mfg.[2]	74.7	75.1	76.3	75.4	74.4	75.2	75.9	76.2	76.5	76.5
Previous Tealbook[2]	74.7	75.1	76.3	75.4	74.4	75.2	76.0	77.0	77.5	77.5
Housing starts[4]	.8	.9	1.0	1.1	1.2	1.2	1.3	1.2	1.2	1.3
Light motor vehicle sales[4]	14.4	15.5	16.5	17.4	17.5	17.1	17.1	17.0	16.8	16.6
Income and saving										
Nominal GDP	3.6	4.4	4.4	2.9	3.4	4.5	5.2	4.6	4.1	3.5
Real disposable pers. income	4.9	-2.5	5.2	3.1	1.6	2.8	2.9	2.4	2.4	1.9
Previous Tealbook	4.9	-2.5	5.2	3.1	1.6	2.8	2.9	2.7	2.4	1.8
Personal saving rate[2]	10.2	6.3	7.4	7.4	6.4	6.3	6.5	6.5	6.8	6.7
Previous Tealbook[2]	10.2	6.3	7.4	7.4	6.4	6.3	6.5	6.4	6.4	6.1
Corporate profits[5]	.7	3.9	5.9	-10.7	7.6	3.3	7.5	.3	.3	.1
Profit share of GNP[2]	11.9	11.8	12.0	10.4	10.8	10.7	11.0	10.6	10.2	9.9
Gross national saving rate[2]	18.8	19.2	20.2	19.4	18.3	18.3	19.0	18.7	18.5	18.3
Net national saving rate[2]	3.7	4.0	5.1	4.3	3.0	3.1	4.0	3.3	2.8	2.5

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

Staff Projections of Government-Sector Accounts and Related Items

Item	2016	2017	2018	2019	2020	2021	2018 Q2	2018 Q3	2018 Q4	2019 Q1
Unified federal budget[1]				Nominal dollars, billions						
Receipts	3,268	3,316	3,329	3,443	3,586	3,716	1,044	788	782	715
Outlays	3,853	3,982	4,108	4,407	4,752	5,037	1,051	960	1,117	1,119
Surplus/deficit	-585	-665	-779	-964	-1,166	-1,320	-7	-172	-335	-404
				Percent of GDP						
Surplus/deficit	-3.2	-3.5	-3.9	-4.5	-5.3	-5.7	-.1	-3.4	-6.5	-7.8
Previous Tealbook	*-3.2*	*-3.5*	*-3.8*	*-4.4*	*-5.0*	*-5.5*	*-.1*	*-3.3*	*-6.5*	*-7.6*
Primary surplus/deficit	-1.9	-2.1	-2.2	-2.7	-3.0	-3.3	1.8	-2.2	-4.4	-5.9
Net interest	1.3	1.4	1.6	1.8	2.3	2.4	2.0	1.2	2.1	1.9
Cyclically adjusted surplus/deficit	-3.1	-3.7	-4.5	-5.7	-6.6	-7.1	-.9	-4.3	-7.5	-8.9
Federal debt held by public	76.4	76.1	77.9	78.0	80.3	83.3	77.4	77.9	78.6	78.5
Government in the NIPA[2]				Real percent change, annual rate						
Purchases	.9	.1	2.0	1.9	1.7	1.1	2.5	2.1	1.8	1.8
Consumption	.9	-.1	1.5	1.3	1.2	.8	1.9	1.3	1.1	1.1
Investment	.7	1.4	4.1	4.3	3.4	2.1	5.3	5.3	4.5	4.3
State and local construction	1.8	-2.9	4.3	2.5	1.0	1.0	6.3	5.0	3.0	3.0
Real disposable personal income	1.6	2.8	2.9	2.4	2.4	1.9	2.4	2.3	2.3	2.7
Contribution from transfers[3]	.3	.2	.5	.8	.6	.6	.4	.3	.4	1.7
Contribution from taxes[3]	-.1	-.6	-.2	-.7	-.6	-.7	-.2	-.8	-.7	-.3
Government employment				Average net change in monthly payrolls, thousands						
Federal	3	-1	0	2	1	1	1	-0	2	3
State and local	14	3	8	9	9	9	7	19	7	9
Fiscal indicators[2]				Percentage point contribution to change in real GDP, annual rate						
Fiscal effect (FE)[4]	.4	.1	.5	.7	.6	.4	.6	.6	.6	.8
Discretionary policy actions (FI)	.3	.2	.7	.6	.5	.2	.8	.7	.7	.7
Previous Tealbook	*.3*	*.2*	*.6*	*.6*	*.5*	*.2*	*.8*	*.5*	*.6*	*.6*
Federal purchases	.0	.1	.2	.2	.2	.1	.2	.1	.2	.2
State and local purchases	.1	-.1	.2	.1	.1	.1	.2	.2	.1	.1
Taxes and transfers	.1	.1	.4	.3	.2	.0	.4	.4	.4	.4
Cyclical	-.1	-.1	-.2	-.2	-.1	.0	-.2	-.2	-.2	-.2
Other	.2	.1	.0	.3	.2	.2	.0	.1	.1	.3

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

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

Measure and country	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4
	Projected											
***Real GDP*[1]**												
Total foreign	3.0	2.0	2.5	2.6	2.6	2.7	2.9	2.5	2.7	2.7	2.7	2.7
Previous Tealbook	*3.1*	*2.0*	*2.5*	*2.6*	*2.7*	*2.7*	*2.9*	*2.5*	*2.7*	*2.7*	*2.7*	*2.7*
Advanced foreign economies	1.3	2.5	1.9	1.9	1.7	1.7	2.0	1.3	1.7	1.7	1.7	1.7
Canada	1.4	2.9	2.2	2.5	2.2	2.1	2.1	2.1	2.0	1.8	1.8	1.8
Japan	-.9	3.0	.7	.5	.5	.7	3.1	-3.8	.9	.8	.8	.8
United Kingdom	.4	1.6	2.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7
Euro area	1.6	1.8	1.6	1.5	1.3	1.4	1.3	1.6	1.6	1.7	1.6	1.6
Germany	1.5	1.8	1.8	1.7	1.5	1.5	1.5	1.6	1.5	1.5	1.4	1.4
Emerging market economies	4.7	1.5	3.1	3.4	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7
Asia	6.2	4.1	4.4	4.8	4.7	4.6	4.7	4.6	4.6	4.6	4.5	4.5
Korea	4.1	2.4	2.3	3.3	3.1	3.1	3.1	3.1	3.0	3.0	3.0	3.0
China	7.2	6.5	5.9	6.3	6.2	6.1	6.1	6.0	6.0	6.0	5.9	5.9
Latin America	3.3	-1.0	1.8	2.1	2.6	2.8	2.9	2.9	2.9	2.9	2.9	2.9
Mexico	4.0	-.6	2.1	2.6	2.7	2.7	2.9	2.9	2.9	2.9	2.9	2.9
Brazil	.6	.7	4.0	2.3	2.5	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	2.9	2.6	2.5	2.5	2.9	2.4	2.4	2.4	2.4
Previous Tealbook	*2.7*	*1.7*	*3.5*	*2.7*	*2.6*	*2.6*	*2.5*	*2.9*	*2.4*	*2.4*	*2.4*	*2.4*
Advanced foreign economies	2.6	1.0	2.5	2.1	1.8	1.6	1.7	2.6	1.6	1.7	1.7	1.7
Canada	3.6	1.1	2.6	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.0
Japan	2.5	-2.3	2.7	1.2	1.2	.9	1.0	6.3	1.0	1.0	1.0	1.0
United Kingdom	2.4	2.0	2.9	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1
Euro area	2.0	2.2	2.5	2.3	1.6	1.4	1.4	1.5	1.5	1.5	1.5	1.6
Germany	1.2	2.5	2.5	2.8	2.5	2.1	2.2	2.3	2.3	2.3	2.2	2.2
Emerging market economies	2.7	2.2	4.6	3.5	3.2	3.2	3.1	3.1	3.0	2.9	2.9	2.9
Asia	1.8	1.0	3.1	2.7	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Korea	1.6	1.8	2.4	2.6	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1
China	1.5	.7	4.1	2.9	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Latin America	4.8	4.9	8.0	5.4	4.8	4.4	4.2	4.1	3.7	3.6	3.5	3.5
Mexico	4.1	3.8	6.8	3.9	3.7	3.5	3.3	3.3	3.2	3.2	3.2	3.2
Brazil	3.1	4.3	6.6	4.0	4.3	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	2.8	2.1	2.7	2.9	2.5	2.7	2.7	2.6
Previous Tealbook	*2.2*	*3.0*	*2.8*	*2.1*	*2.7*	*2.9*	*2.5*	*2.7*	*2.7*	*2.6*
Advanced foreign economies	.3	2.5	2.0	1.2	1.9	2.6	1.9	1.7	1.7	1.7
Canada	.7	3.6	2.5	.3	2.0	3.0	2.3	2.1	1.8	1.8
Japan	.3	2.8	-.3	1.2	1.5	2.0	.8	.1	.8	.8
United Kingdom	1.6	2.6	3.1	2.2	1.7	1.4	1.5	1.6	1.7	1.6
Euro area	-1.1	.7	1.6	2.0	2.1	2.7	1.6	1.4	1.6	1.6
Germany	.2	1.6	2.3	1.3	1.9	2.8	1.7	1.5	1.4	1.4
Emerging market economies	4.1	3.5	3.6	2.9	3.4	3.2	3.2	3.7	3.7	3.6
Asia	5.8	5.4	5.0	4.5	4.9	5.2	4.9	4.6	4.6	4.4
Korea	2.1	3.5	2.8	3.2	2.6	2.8	3.0	3.1	3.0	2.8
China	8.0	7.6	7.1	6.8	6.8	6.8	6.5	6.1	5.9	5.7
Latin America	2.9	1.7	2.5	1.6	2.1	1.5	1.5	2.8	2.9	2.9
Mexico	3.0	1.2	3.4	2.8	3.3	1.6	2.0	2.8	2.9	2.9
Brazil	2.2	2.6	-.1	-5.5	-2.1	2.1	1.9	2.6	2.8	2.8
Consumer prices[2]										
Total foreign	2.3	2.4	2.0	1.4	1.9	2.6	2.7	2.6	2.4	2.4
Previous Tealbook	*2.3*	*2.4*	*2.0*	*1.4*	*1.9*	*2.6*	*2.6*	*2.7*	*2.4*	*2.4*
Advanced foreign economies	1.3	1.0	1.2	.4	.9	1.5	2.1	1.9	1.7	1.7
Canada	1.0	1.0	2.0	1.3	1.4	1.8	2.4	2.3	2.1	2.0
Japan	-.2	1.4	2.6	.1	.3	.6	1.0	2.3	1.0	1.1
United Kingdom	2.6	2.1	.9	.1	1.2	3.0	2.4	2.3	2.2	2.1
Euro area	2.3	.8	.1	.2	.7	1.4	2.3	1.5	1.5	1.7
Germany	1.9	1.4	.4	.2	1.0	1.6	2.2	2.3	2.2	2.0
Emerging market economies	3.1	3.4	2.7	2.1	2.7	3.4	3.2	3.1	2.9	2.9
Asia	2.6	3.1	1.8	1.5	2.0	2.0	2.1	2.6	2.6	2.6
Korea	1.7	1.1	1.0	.9	1.5	1.5	2.1	2.1	2.1	2.1
China	2.1	2.9	1.5	1.5	2.1	1.8	2.3	2.5	2.5	2.5
Latin America	4.4	4.2	4.9	3.4	4.3	6.7	5.8	4.4	3.6	3.5
Mexico	4.1	3.6	4.2	2.3	3.3	6.6	4.6	3.4	3.2	3.2
Brazil	5.6	5.8	6.5	10.4	7.1	2.8	4.5	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.

U.S. Current Account

Quarterly Data

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4
					Billions of dollars, s.a.a.r.							
U.S. current account balance	**-486.8**	**-405.8**	**-519.8**	**-564.7**	**-608.6**	**-608.9**	**-638.3**	**-658.3**	**-691.5**	**-689.9**	**-715.2**	**-714.9**
Previous Tealbook	*-489.9*	*-409.4*	*-494.6*	*-551.8*	*-610.1*	*-638.2*	*-685.8*	*-720.9*	*-769.9*	*-780.6*	*-822.1*	*-834.6*
Current account as percent of GDP	-2.4	-2.0	-2.5	-2.7	-2.9	-2.9	-3.0	-3.0	-3.1	-3.1	-3.2	-3.1
Previous Tealbook	*-2.4*	*-2.0*	*-2.4*	*-2.6*	*-2.9*	*-3.0*	*-3.2*	*-3.3*	*-3.5*	*-3.5*	*-3.6*	*-3.7*
Net goods & services	-616.0	-535.2	-627.7	-633.6	-635.1	-620.6	-626.0	-630.2	-639.0	-631.6	-639.6	-633.8
Investment income, net	258.2	256.9	224.9	181.8	148.4	122.6	104.7	85.0	69.4	52.6	41.5	31.9
Direct, net	310.4	309.9	309.4	295.7	284.4	281.0	287.0	291.2	298.2	304.7	316.7	328.7
Portfolio, net	-52.2	-53.0	-84.5	-113.9	-135.9	-158.4	-182.3	-206.2	-228.8	-252.1	-275.2	-296.9
Other income and transfers, net	-129.1	-127.5	-117.0	-113.0	-121.9	-110.9	-117.0	-113.0	-121.9	-110.9	-117.0	-113.0

Annual Data

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
						Billions of dollars				
U.S. current account balance	**-426.2**	**-349.5**	**-365.1**	**-409.7**	**-434.3**	**-449.1**	**-494.3**	**-628.5**	**-702.9**	**-729.1**
Previous Tealbook	*-426.2*	*-349.5*	*-365.1*	*-409.7*	*-434.3*	*-449.1*	*-486.4*	*-663.8*	*-801.8*	*-880.7*
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*	*-3.1*	*-3.6*	*-3.8*
Net goods & services	-536.8	-461.9	-489.5	-500.4	-503.5	-552.3	-603.1	-628.0	-636.0	-632.1
Investment income, net	216.1	215.4	229.0	214.7	205.7	235.1	230.5	115.2	48.8	18.7
Direct, net	285.5	283.3	284.2	284.6	272.6	298.4	306.4	285.9	312.1	360.1
Portfolio, net	-69.4	-67.9	-55.3	-70.0	-66.9	-63.3	-75.9	-170.7	-263.2	-341.4
Other income and transfers, net	-105.5	-103.1	-104.6	-123.9	-136.6	-132.0	-121.7	-115.7	-115.7	-115.7

Abbreviations

ABS	asset-backed securities
AFE	advanced foreign economy
BBA	Bipartisan Budget Act of 2018
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BOC	Bank of Canada
BOE	Bank of England
BOJ	Bank of Japan
BOM	Bank of Mexico
CAP	cyclically adjusted primary
CD	certificate of deposit
C&I	commercial and industrial
CMBS	commercial mortgage-backed securities
CP	commercial paper
CPH	compensation per hour
CPI	consumer price index
CRE	commercial real estate
DSGE	dynamic stochastic general equilibrium
ECI	employment cost index
EFFR	effective federal funds rate
EME	emerging market economy
FI	fiscal impetus
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
FY	fiscal year
GDP	gross domestic product
GFC	Global Financial Crisis
G-SIB	globally systemically important bank
IMF	International Monetary Fund
IOER	interest on excess reserves
IP	industrial production
IRA	individual retirement account
ISM	Institute for Supply Management
LFPR	labor force participation rate
LIBOR	London interbank offered rate
MBS	mortgage-backed securities
Michigan survey	University of Michigan Surveys of Consumers
MMF	money market fund
NAFTA	North American Free Trade Agreement
NBER	National Bureau of Economic Research
NIPA	national income and product accounts
OIS	overnight index swap
ON RRP	overnight reverse repurchase agreement
PCE	personal consumption expenditures
PDFP	private domestic final purchases
PMI	purchasing managers index
PPI	producer price index
QS	quantitative surveillance
SCF	Survey of Consumer Finances
SCOOS	Senior Credit Officer Opinion Survey on Dealer Financing Terms

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
TCJA	Tax Cuts and Jobs Act
TIPS	Treasury Inflation-Protected Securities
USMCA	U.S.-Mexico-Canada Agreement
VAR	vector autoregression
VIX	one-month-ahead option-implied volatility on the S&P 500 index

(This page is intentionally blank.)