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.

Report to the FOMC
on Economic Conditions
and Monetary Policy

Book A

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

January 23, 2017

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

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Domestic Economic Developments and Outlook

Our assessment of the broad macroeconomic situation has not changed materially since the time of our previous projection, and incoming data suggest that the economy is continuing to expand at a moderate rate. Over the second half of 2016, real GDP now appears to have increased about 2¾ percent at an annual rate, a little faster than in our December forecast. However, the additional strength reflects factors that we think will prove transitory and reverse early this year. Consequently, the level of GDP in the second quarter of this year is roughly unrevised from our earlier projection. Moreover, the labor market continued to improve gradually through year-end, much as we had anticipated. Overall, we view the economy as currently operating a little above its sustainable level, with real GDP about ½ percent above potential output and the unemployment rate—at 4.7 percent—¼ percentage point below its natural rate.

Over the medium term, we continue to project that real GDP will increase about 2 percent per year in 2017 and 2018—about the same as its pace in 2016—before slowing slightly to 1¾ percent in 2019 as monetary policy continues to tighten. With GDP increasing faster than potential, the output gap widens to 1¾ percent at the end of 2019, which is a tick wider than in the December projection. Correspondingly, the unemployment rate is projected to fall to 4.1 percent in 2019—just a touch lower than in the December projection and nearly 1 percentage point below our estimate of its natural rate.

Our inflation projection is also little revised relative to December. We continue to project that total PCE price inflation will move up gradually to 1.9 percent in 2019; core PCE inflation also drifts higher and now rounds up to 2.0 percent in 2019. Relative to 2016, a variety of small factors push up core inflation over the medium term, including the fading effects of earlier declines in energy prices and non-energy import prices and tightening resource utilization.

KEY BACKGROUND FACTORS

Fiscal Policy

- Considerable uncertainty continues to prevail about the size, timing, and composition of any potential fiscal policy changes that may be enacted in

Comparing the Staff Projection with Other Forecasts

The staff's projection for real GDP growth in 2017 and 2018 is a touch below the projections from the Survey of Professional Forecasters (SPF) and the Blue Chip consensus forecast. The staff's forecast for the unemployment rate is a bit below Blue Chip in 2018 and the rather outdated SPF survey in 2017. The staff's inflation projection is roughly in line with the outside forecasters for the CPI but below the SPF forecasts for PCE price inflation in 2017 and 2018.
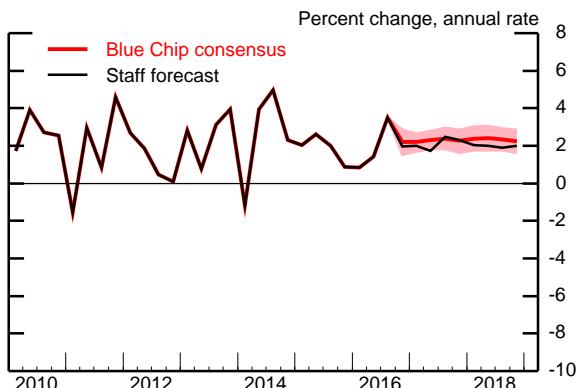
**Comparison of Tealbook and Outside Forecasts**

	2016	**2017**	**2018**
GDP (Q4/Q4 percent change)			
January Tealbook	1.9	2.1	2.0
Blue Chip (1/10/17)	2.0	2.3	2.3
SPF median (11/14/16)	1.8	2.2	n.a.
Unemployment rate (Q4 level)			
January Tealbook	4.7	4.5	4.2
Blue Chip (1/10/17)	4.7	4.5	4.4
SPF median (11/14/16)	4.8	4.7	n.a.
CPI inflation (Q4/Q4 percent change)			
January Tealbook	1.8	2.4	2.2
Blue Chip (1/10/17)	1.7	2.4	2.3
SPF median (11/14/16)	1.5	2.2	2.2
PCE price inflation (Q4/Q4 percent change)			
January Tealbook	1.5	1.7	1.8
SPF median (11/14/16)	1.4	1.9	2.0
Core PCE price inflation (Q4/Q4 percent change)			
January Tealbook	1.7	1.7	1.9
SPF median (11/14/16)	1.8	1.9	1.9
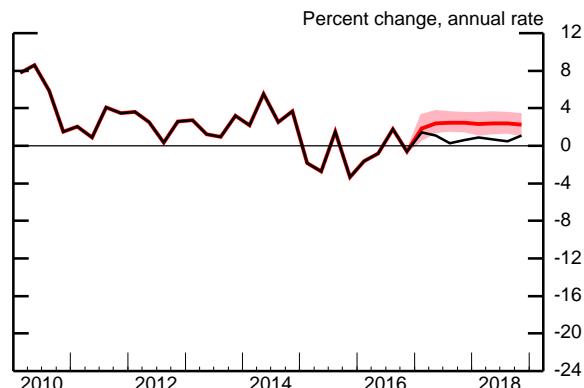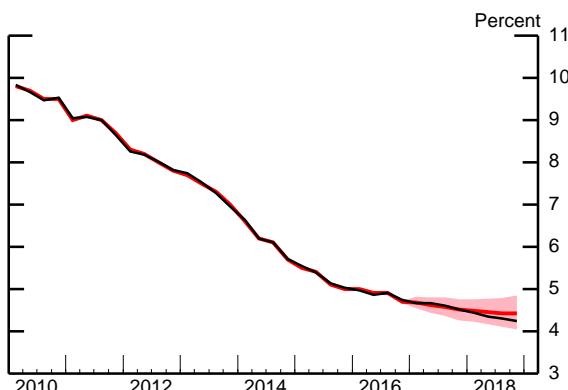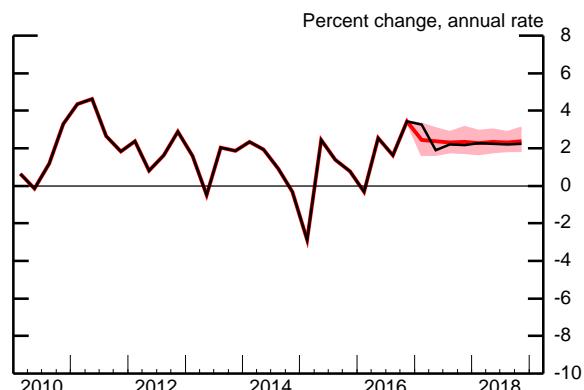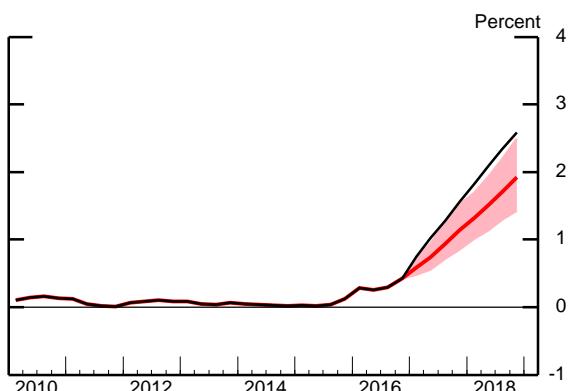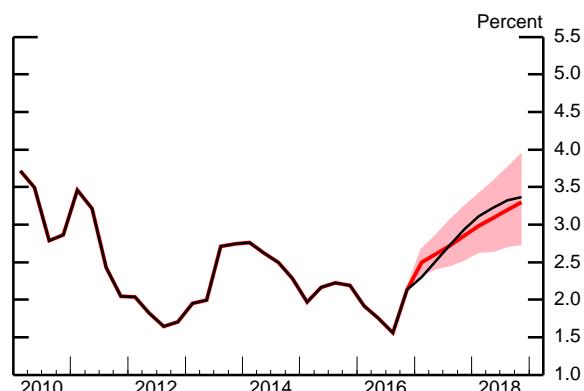
Note: SPF is the Survey of Professional Forecasters, CPI is the consumer price index, and PCE is personal consumption expenditures. Blue Chip does not provide results for PCE price inflation. The Blue Chip consensus forecast includes input from about 50 panelists, and the SPF about 40. Roughly 20 panelists contribute to both surveys.
n.a. Not available.
Source: Blue Chip Economic Indicators; Federal Reserve Bank of Philadelphia.

Tealbook Forecast Compared with Blue Chip
## (Blue Chip survey released January 10, 2017)

Real GDP

Percent change, annual rate

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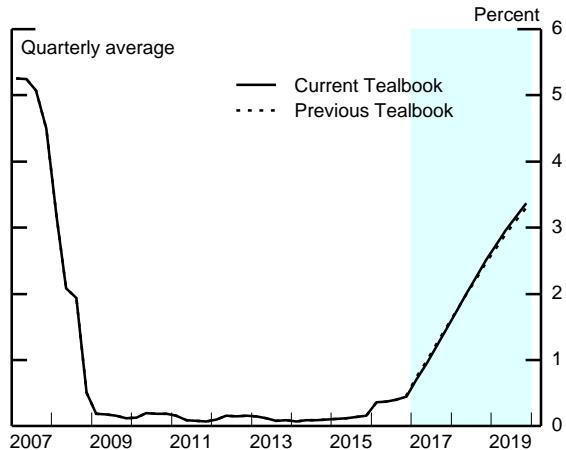
Note: The shaded area represents the area between the Blue Chip top 10 and bottom 10 averages.

Industrial Production

Percent change, annual rate

Unemployment Rate

Percent

Consumer Price Index

Percent change, annual rate

Treasury Bill Rate

Percent

10-Year Treasury Yield

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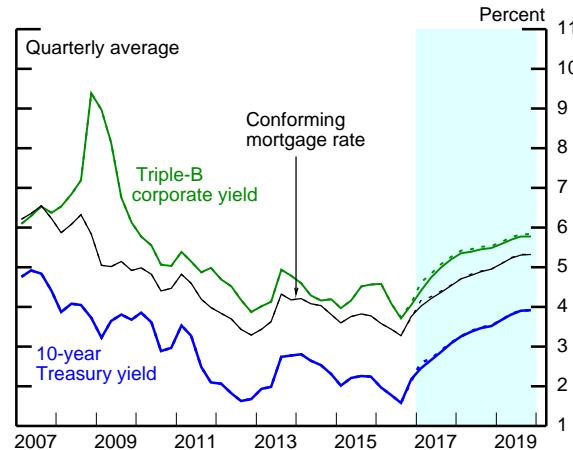
Note: The yield is for on-the-run Treasury securities. Over the forecast period, the staff's projected yield is assumed to be 15 basis points below the off-the-run yield.

Key Background Factors underlying the Baseline Staff Projection
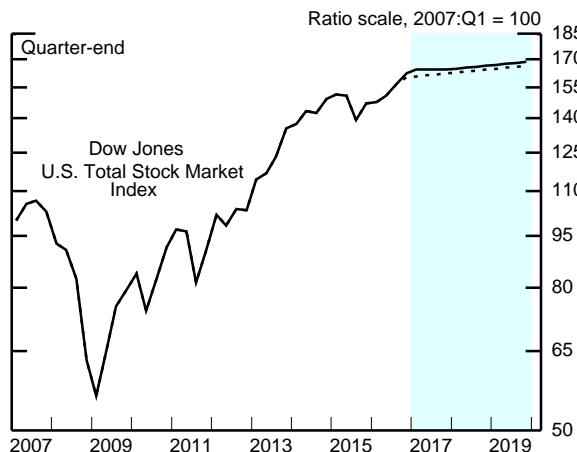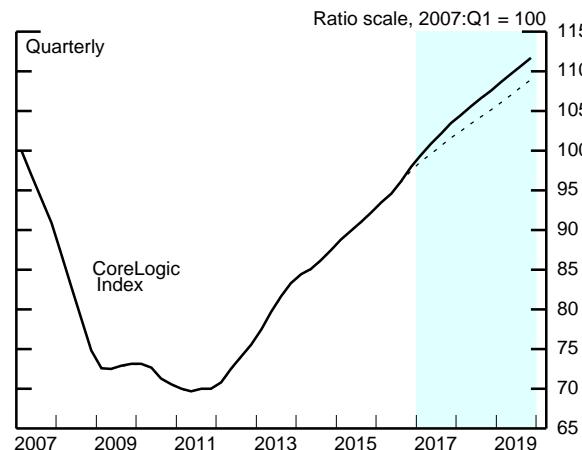
Federal Funds Rate

Quarterly average

Percent

—— Current Tealbook
· · · · Previous Tealbook

Long-Term Interest Rates

Quarterly average

Percent

Triple-B
corporate yield

Conforming
mortgage rate

10-year
Treasury yield

Equity Prices

Quarter-end

Ratio scale, 2007:Q1 = 100

Dow Jones
U.S. Total Stock Market
Index

House Prices

Quarterly

Ratio scale, 2007:Q1 = 100

CoreLogic
Index

Crude Oil Prices

Quarterly average

Dollars per barrel

Imported oil

West Texas
Intermediate

Broad Real Dollar

Quarterly average

2007:Q1 = 100
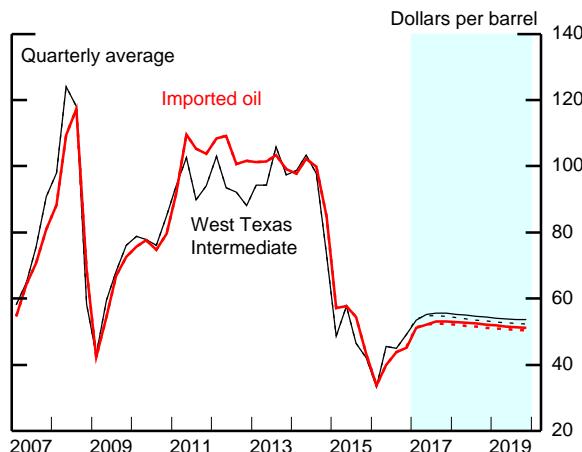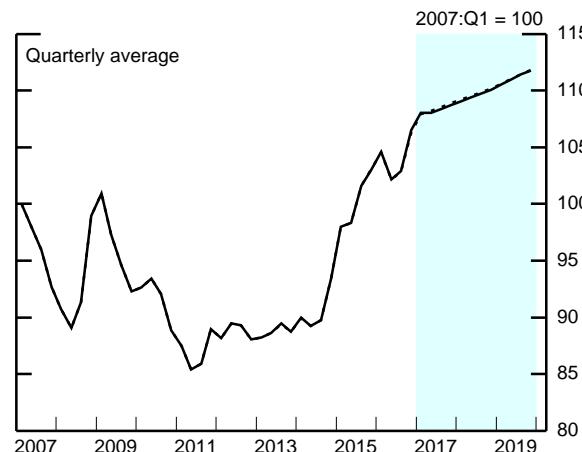
coming months and years. As a result, we have retained our placeholder assumption that the new Administration will implement adjustments to fiscal policy that increase the annual "primary" budget deficit (that is, the deficit excluding interest costs) by 1 percent of GDP; for now, we also continue to assume that this fiscal expansion takes the form of a cut in personal income taxes that begins in the third quarter of 2017. This fiscal expansion is projected to boost the growth rate of real GDP about ¼ percentage point per year in 2017, 2018, and 2019 (exclusive of multiplier effects and any offsets from higher interest rates and the dollar).[1]

- We continue to project that all discretionary policy actions across federal, state, and local governments will increase real GDP growth ½ percentage point in 2017 and roughly ¼ percentage point in both 2018 and 2019.

Monetary Policy

- The intercept-adjusted inertial Taylor (1999) rule, which we use to mechanically set the federal funds rate in our projection, calls for the federal funds rate to increase about 1 percentage point per year, on average, over the projection period and to average 3.4 percent in the fourth quarter of 2019.[2] The path for the federal funds rate is essentially unchanged from our December projection.

- We continue to assume that the SOMA portfolio will remain at its current level through the third quarter of 2017 and then begin to contract, as the proceeds from maturing assets are no longer reinvested.

Other Interest Rates

- The 10-year Treasury yield is projected to rise significantly over the medium term, from an average of 2.5 percent in the current quarter to 3.9 percent by

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[1] We estimate that delaying the introduction of the fiscal policy change until the beginning of 2018 would lower the level of real GDP at the end of 2019 by about 0.1 percent (inclusive of multiplier effects and offsets from higher interest rates and the dollar) and raise the unemployment rate by roughly half a tenth. In the Risks and Uncertainty section, we present scenarios exploring some alternative possibilities regarding the size and composition of the fiscal expansion.

[2] We have maintained the upward adjustment introduced in the December Tealbook that boosted the intercept in the longer run by ¼ percentage point to take account of the greater fiscal stimulus.

Domestic Econ Devel & Outlook

the end of the projection period, the same endpoint as in the December
Tealbook.

- The paths for triple-B corporate bond yields and 30-year fixed mortgage rates
  are also little revised.

Equity Prices and Home Prices

- Equity prices have risen about 2¾ percent since the December Tealbook. The
  increase was a little larger than we had anticipated, and we view it as reducing
  the scope for further stock price appreciation over the medium term. As a
  result, we now project that equity prices will rise about 1 percent per year on
  average over the projection period, compared with the 1¼ percent rate of
  appreciation in the December Tealbook.

- According to the latest data, house prices have been rising faster in recent
  months than we had expected and faster than the average growth rate over the
  previous year. We think that the brisk pace of house price growth partly
  reflects a stronger effect of housing supply constraints than we previously
  anticipated. Because we expect these constraints to abate only gradually, we
  have raised our projection for house price growth through 2019. We now
  project that home values will rise at an annual average rate of 4½ percent over
  the medium term. By the end of 2019, the projected level of house prices is
  2½ percent higher than in the December Tealbook.

Foreign Economic Activity and the Dollar

- Foreign real GDP rose at an estimated annual rate of 2¼ percent in the fourth
  quarter—up slightly from its average growth rate over the prior couple of
  quarters. Consistent with continued solid readings on activity, we expect
  foreign growth of 2½ percent in the current quarter. Growth should remain at
  about that pace through the rest of the forecast period, supported by
  accommodative policies in the advanced foreign economies and a moderate
  recovery in Latin America. This forecast is little changed relative to the
  December Tealbook.

- The broad nominal dollar has appreciated about ½ percent since the time of
  the December Tealbook, primarily reflecting a further sizable appreciation
  relative to the Mexican peso. We expect the broad real dollar to appreciate at

roughly a 1¼ percent annual rate through the forecast period, as market expectations for the federal funds rate move up toward the staff forecast. Relative to the December Tealbook, our dollar projection is little changed.

Oil and Commodity Prices

- Oil markets have been relatively quiet since the agreements late last year between OPEC and some non-OPEC countries to cut production. The spot price of Brent crude oil is now trading at $55 per barrel, and the December 2019 futures price is currently just over $56.50 per barrel—both little changed since the December Tealbook. Following these futures quotes, we continue to project that oil prices will remain roughly flat over the medium term.

- Prices for industrial metals, after increasing sharply in late 2016, have edged higher since the time of the December Tealbook on concerns about labor-related supply disruptions and some greater Chinese demand. Food and agricultural prices also edged up a bit because of concerns about both the supply of sugar from Brazil and dry conditions in the Great Plains, which may affect the supply of wheat.

THE OUTLOOK FOR REAL GDP

We estimate that real GDP rose at an annual rate of 2¾ percent in the second half of 2016 after rising only 1 percent in the first half. The step-up in growth from the first to the second half of last year, which is a little larger than we projected in December, reflected the stabilization of inventory investment as well as bigger gains in government spending and private domestic final purchases. The upward revision to output growth in the second half of last year is roughly mirrored by weaker growth in the first half of this year, leaving the average pace essentially unchanged. We now project real GDP to grow at a little less than a 2 percent rate in the first half of this year.

- By our estimate, consumer spending rose at an annual rate of 2¾ percent in the fourth quarter. We expect growth in the first half of this year to be only slightly less brisk, supported by continued gains in employment and household income, earlier increases in household wealth, and upbeat

Authorized for Public Release

Federal Reserve System Nowcasts of 2016:Q4 Real GDP Growth
(Percent change at annual rate from previous quarter)

Federal Reserve entity	Type of model	Nowcast as of Jan. 17, 2017
Federal Reserve Bank		
Boston	• Mixed-frequency BVAR	3.3
New York	• Factor-augmented autoregressive model combination	2.6
	• Factor-augmented autoregressive model combination, financial factors only	2.0
	• Dynamic factor model	2.1
Cleveland	• Bayesian regressions with stochastic volatility	2.1
	• Tracking model	1.6
Atlanta	• Tracking model combined with Bayesian vector autoregressions (VARs), dynamic factor models, and factor-augmented autoregressions (known as GDPNow)	2.8
Chicago	• Dynamic factor models	2.8
	• Bayesian VARs	1.7
St. Louis	• Dynamic factor models	2.8
	• News index model	3.0
	• Let-the-data-decide regressions	2.4
Kansas City	• Accounting-based tracking estimate	1.6
Board of Governors	• Board staff's forecast (judgmental tracking model)[1]	2.0
	• Monthly dynamic factor models (DFM-45)	3.2
	• Mixed-frequency dynamic factor model (DFM-BM)	3.9
Memo: Median of Federal Reserve System nowcasts		2.5

1. The January Tealbook forecast, finalized on January 18, is 2.0 percent.

consumer sentiment.[3] We were somewhat surprised by the strength of consumption growth in the fourth quarter (which we have revised up almost ¾ percentage point since the December Tealbook). But the surprise reflected stronger-than-expected increases in the consumption of energy services and purchases of motor vehicles, which we expect to largely unwind this quarter. This downward revision to growth of consumer spending accounts for much of the small downward revision to near-term GDP growth.

- Incoming indicators suggest that investment in equipment and intangibles (E&I) rose moderately in the fourth quarter following net declines earlier in the year. Given recent increases in orders of nondefense capital goods and a widespread improvement in business sentiment, we project E&I investment will grow at about a 4 percent pace in the first half of this year.[4] We also project nonresidential structures investment will grow at a 4½ percent pace over the first half of this year as investment in drilling and mining structures starts to rebound somewhat following two years of steep declines.

- After falling back in the middle of 2016, residential investment now appears to be increasing at a moderate pace. In the fourth quarter, starts and permits for single-family housing remained above their average pace in the first half of 2016; sales of new and existing homes also remained solid through November.[5] However, with mortgage rates having risen notably since early

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[3] While we view the level of consumer sentiment as supportive of consumption growth, we have taken little signal from the sharp improvement in sentiment in December. The December jump, which was sustained in the preliminary January Michigan survey release, appears to be related to the election. A recent research paper examines presidential elections since 2000 and finds that such election-related movements in sentiment have had little effect on consumer spending (see Atif Mian, Amir Sufi, and Nasim Khoshkhou (2015), "Government Economic Policy, Sentiments, and Consumption," NBER Working Paper Series 21316 (Cambridge, Mass.: National Bureau of Economic Research, July), www.nber.org/papers/w21316?sy=316). However, in the Risks and Uncertainty section we explore the implications of a more pronounced upshift in aggregate demand.

[4] In addition to solid improvements in the activity indexes from the ISM and the Philadelphia Fed, from which we usually take signal for investment spending, we have also seen outsized gains in business sentiment in other surveys, such as the one from the National Federation of Independent Business and the Conference Board's CEO confidence survey. We will continue to monitor these surveys to see whether the recent gains persist.

[5] We received data on housing starts for December too late for inclusion in the staff baseline forecast.

Summary of the Near-Term Outlook
(Percent change at annual rate except as noted)
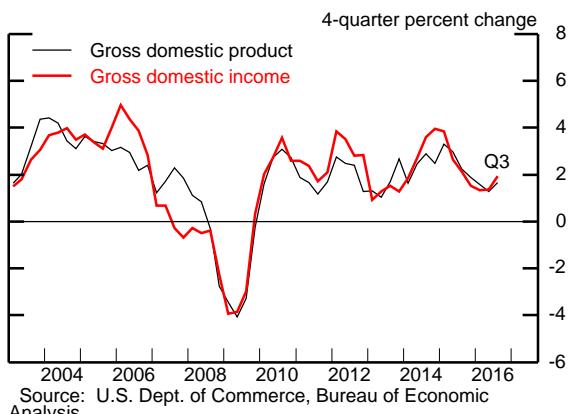
Measure	2016:Q3		2016:Q4		2017:H1	
	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook	Previous Tealbook	Current Tealbook
Real GDP	**3.3**	**3.5**	**1.6**	**2.0**	**2.1**	**1.9**
Private domestic final purchases	2.1	2.4	2.5	2.9	2.7	2.5
Personal consumption expenditures	2.8	3.0	2.1	2.8	2.6	2.4
Residential investment	-4.1	-4.1	11.5	10.7	2.7	-.4
Nonres. private fixed investment	.3	1.4	1.9	1.4	3.3	4.3
Government purchases	.8	.8	2.3	2.4	1.7	1.7
Contributions to change in real GDP						
Inventory investment[1]	.5	.5	-.3	.2	.2	.0
Net exports[1]	.8	.9	-.6	-1.1	-.7	-.6
Unemployment rate	**4.9**	**4.9**	**4.8**	**4.7**	**4.7**	**4.7**
PCE chain price index	**1.4**	**1.5**	**2.3**	**2.1**	**1.8**	**1.8**
Ex. food and energy	1.7	1.7	1.4	1.2	1.7	1.7
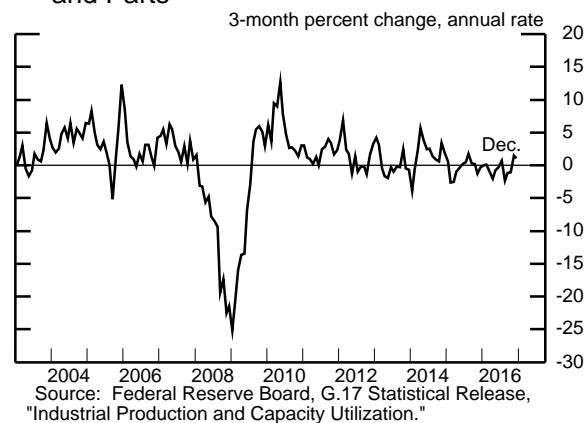
1. Percentage points.

Recent Nonfinancial Developments (1)

Real GDP and GDI

Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.
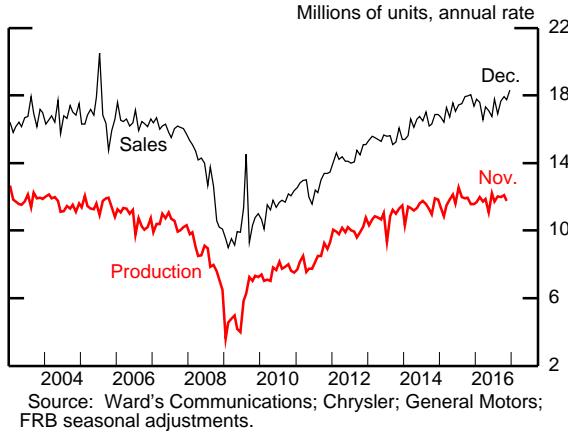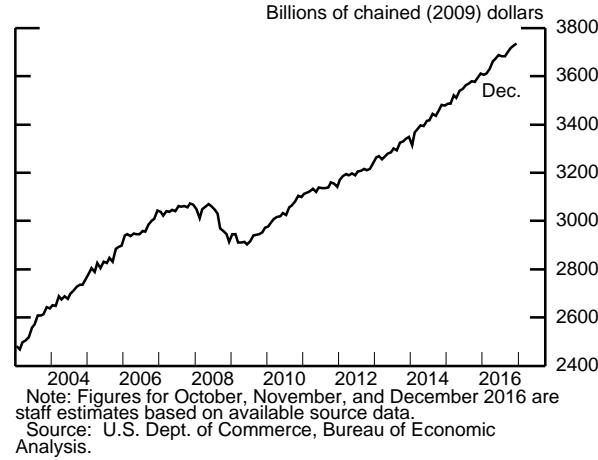
Manufacturing IP ex. Motor Vehicles and Parts

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

Sales and Production of Light Motor Vehicles

Source: Ward's Communications; Chrysler; General Motors; FRB seasonal adjustments.
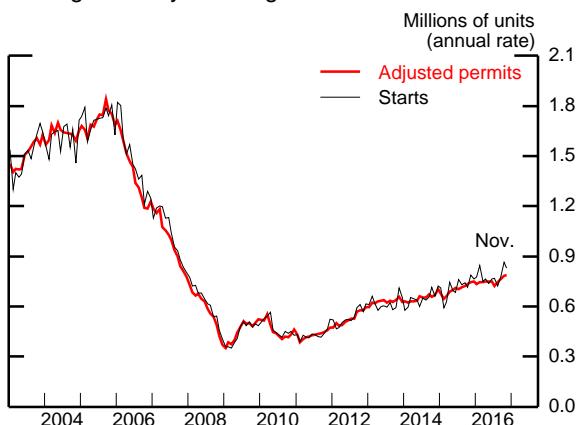
Real PCE Goods ex. Motor Vehicles

Note: Figures for October, November, and December 2016 are staff estimates based on available source data.
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis.

Recent Nonfinancial Developments (2)
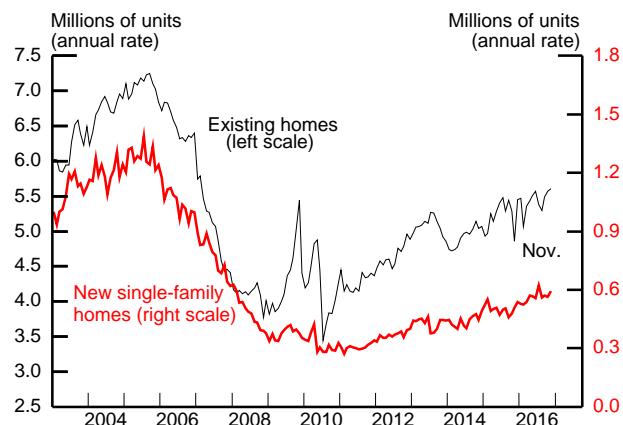
Single-Family Housing Starts and Permits

Millions of units
(annual rate)

— Adjusted permits
— Starts

Nov.

2004 2006 2008 2010 2012 2014 2016

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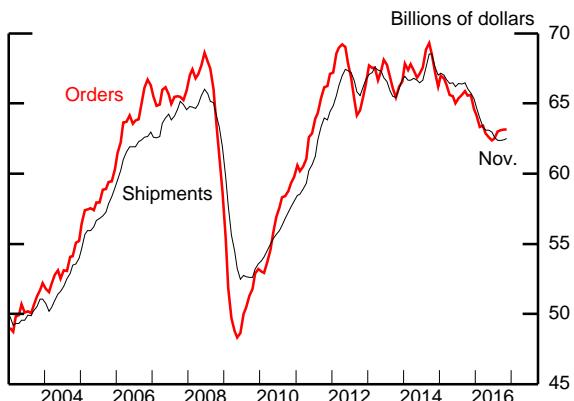
Home Sales

Millions of units
(annual rate)

Millions of units
(annual rate)

Existing homes
(left scale)

Nov.

New single-family
homes (right scale)

2004 2006 2008 2010 2012 2014 2016

Source: For existing, National Association of Realtors; for new, U.S. Census Bureau.
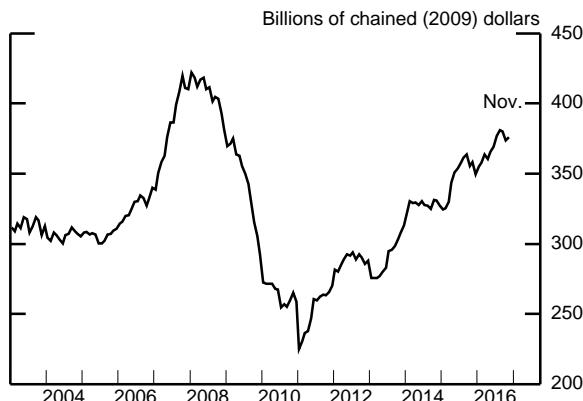
Nondefense Capital Goods ex. Aircraft

Billions of dollars

Orders

Shipments

Nov.

2004 2006 2008 2010 2012 2014 2016

Note: Data are 3-month moving averages.
Source: U.S. Census Bureau.
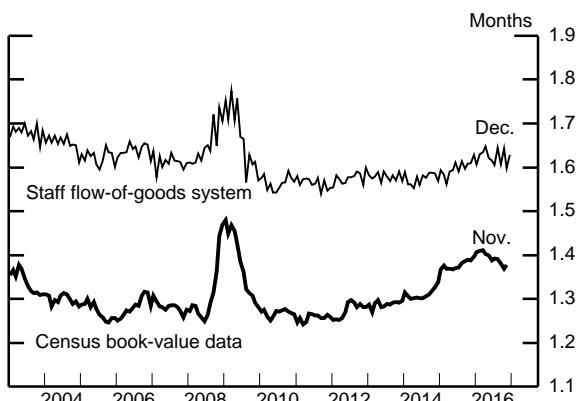
Nonresidential Construction Put in Place

Billions of chained (2009) dollars

Nov.

2004 2006 2008 2010 2012 2014 2016

Note: Nominal CPIP deflated by BEA prices through 2016:Q3 and by the staff's estimated deflator thereafter.
Source: U.S. Census Bureau.

Inventory Ratios

Months

Dec.

Staff flow-of-goods system

Nov.

Census book-value data

2004 2006 2008 2010 2012 2014 2016
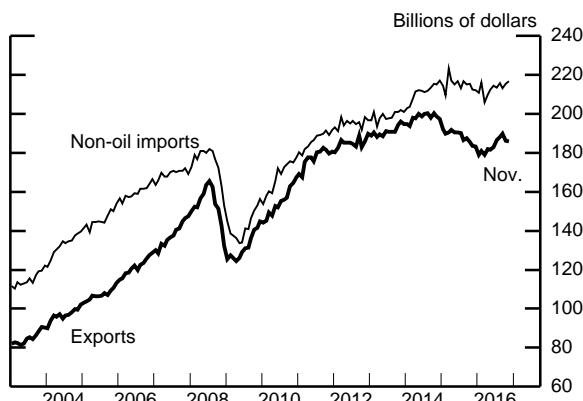
Note: Flow-of-goods system inventories include manufacturing and mining industries and are relative to consumption. Census data cover manufacturing and trade, and inventories are relative to sales.
Source: U.S. Census Bureau; staff calculations.

Exports and Non-oil Imports

Billions of dollars

Non-oil imports

Nov.

Exports

2004 2006 2008 2010 2012 2014 2016

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

November, we expect residential investment to essentially flatten out over the first half of this year.[6]

- Inventory investment added about ¼ percentage point to GDP growth in the second half of last year after subtracting ¾ percentage point from growth in the first half. The staff's flow-of-goods system shows inventory-to-sales ratios near comfortable levels in most sectors outside of energy (inventories of energy products remain very high), and thus we expect inventory investment to have little effect on GDP growth in the first half of this year.

- After adding nearly 1 percentage point to U.S. GDP growth in the third quarter, net exports are currently estimated to have subtracted about 1 percentage point in the fourth quarter—a bit more than expected in the December Tealbook, as recent export data have been weak. Net exports are projected to subtract just over ½ percentage point from real GDP growth in the first half of 2017 as imports continue to respond to firming U.S. demand and as a strong dollar boosts imports and restrains exports.

- The level of manufacturing production has changed little, on net, in recent months (indeed, since late 2014), restrained by weak export demand and slow domestic capital investment. To reflect the recent strengthening in the new orders indexes in the national and regional manufacturing surveys, we have marked up slightly manufacturing production in the first half of this year, but growth is projected to be modest, given ongoing headwinds from weak foreign demand.

Over the medium term, real GDP is projected to increase 2 percent in 2017 and 2018 before easing to 1¾ percent in 2019, as monetary policy continues to tighten.

- As in the past couple of Tealbooks, we expect potential output growth to creep up gradually from 1½ percent this year to 1¾ percent at the end of the medium term, owing to a small acceleration in structural labor productivity.

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[6] Consistent with our models and the experience of the "taper tantrum" in 2013, we expect higher rates to reduce sales and construction with a lag of a few months. Such a delay may partly reflect a temporary offsetting boost to demand from prospective homebuyers who jump into the market before rates increase further. Indeed, in the Michigan survey there has been an increase in the number of respondents reporting that it is a good time to buy a home in advance of rate increases.

- With GDP growth expected to outpace our estimate of potential growth over the medium term, aggregate output moves further above our estimate of its sustainable level. At the end of 2019, we forecast real GDP to be 1¾ percent above its potential level.

THE OUTLOOK FOR THE LABOR MARKET

The incoming data suggest that the labor market continued to tighten gradually through the end of last year.

- Total nonfarm payroll employment is reported to have increased an average of 165,000 per month from October through December, about as expected and well above the range of 80,000 to 110,000 per month that we judge is consistent with an unchanged unemployment rate and labor force participation declining in parallel with its trend path.

- After dropping to 4.6 percent in November, the unemployment rate ticked up to 4.7 percent in December. For the quarter as a whole, the unemployment rate averaged 4.7 percent—down 0.3 percentage point from the same period a year earlier. Looking ahead, we expect the unemployment rate to remain at this level through the middle of this year, unrevised from the December Tealbook.

- The labor force participation rate (LFPR) edged back up to 62.7 percent in December, the same level as its average in the fourth quarter. Over the past year the LFPR has moved up a bit, which, when judged relative to its declining trend, represents a tightening in the labor market. We expect the participation rate to remain at 62.7 percent through the first half of 2017.

- Combining the unemployment rate and the LFPR, we see the employment-to-population ratio as currently a little above its structural trend.

- Other indicators of labor market conditions have also continued to improve. The share of employed individuals working part time for economic reasons declined over 2016, as did the share of the long-term unemployed in overall unemployment. In December, both were at their lowest levels since the recession, albeit still somewhat above their averages prior to the recession. Layoffs, whether measured by either initial claims or JOLTS data, have

remained low, and households' assessments of job availability have continued to rise. Further, the labor market conditions index, or LMCI, increased slightly over the past three months, driven by improvements both in employment and hiring indicators and in consumer and business assessments of the jobs situation.

- Labor productivity in the business sector is now estimated to have increased at an annual rate of about 2½ percent in the second half of 2016 after having declined at a ½ percent pace in the first half of the year. The resulting 1 percent increase for 2016 as a whole exceeds the average pace seen over the preceding five-year period by about ½ percentage point.

The medium-term outlook for the labor market is for continued improvement through 2019 but at a gradually slowing pace—a projection that is essentially unrevised from the December Tealbook.

- As real GDP growth slows toward its potential rate, average monthly payroll gains are expected to slow from about 180,000 in 2016 and 2017 to about 160,000 in 2018 and 120,000 in 2019.

- We project that labor productivity will increase at an average annual rate of a bit less than 1 percent over the projection period, similar to its estimated pace in 2016 and close to our estimate of its structural rate.

- After falling 1 percentage point cumulatively over the past two years, the unemployment rate is projected to continue to decline, but at a slowing pace— the unemployment rate falls a total of only ½ percentage point over the next three years. Similarly, over the next three years both the labor force participation rate and the employment-to-population ratio continue to improve relative to their declining trends, but at a slowing pace.

- By the end of 2019, the unemployment rate is projected to reach 4.1 percent, nearly 1 percentage point below our estimate of its natural rate. The level at the end of 2019 is just a few basis points lower than our projection in the December Tealbook. Both the labor force participation rate and the employment-to-population ratio also end the medium-term projection somewhat above our estimates of their trends.

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THE OUTLOOK FOR INFLATION
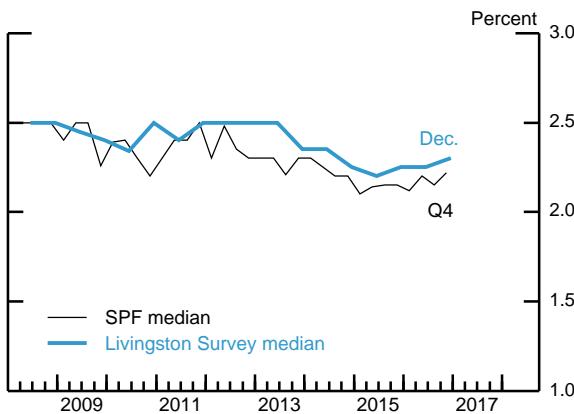
On a 12-month-change basis, total PCE price inflation has continued to rise toward the FOMC's 2 percent objective in recent months, mainly reflecting movements in energy prices, while core PCE price inflation has stayed around 1.7 percent.

- Movements in the price of oil have pushed up the 12-month change in total PCE prices from 0.2 percent in the middle of 2015 to an estimated 1.6 percent at the end of 2016 (based on PPI and CPI data through December). We expect this 12-month measure to move up to 2 percent in February and March, mainly reflecting the effect of earlier declines in gasoline prices dropping out of the calculation; it then eases to 1.8 percent in the second quarter.

- Based on the most recent data, we estimate that core PCE prices rose 1.7 percent in the 12 months through December, a touch below our projection in the December Tealbook. We expect core inflation to remain close to this level over the near term.[7]

- Core import prices are now estimated to have declined just slightly for 2016 as a whole, and in the first quarter of 2017 the ongoing drag from the dollar is expected to push core import prices down at a ¼ percent pace. Thereafter, we expect import price inflation to turn positive and move up to a ¾ percent rate by 2018, consistent with moderate foreign inflation, a gradually appreciating dollar, and slowly declining commodity prices. This path for core import prices is estimated to have held down core PCE price inflation by 0.2 percentage point in 2016 and is expected to reduce core inflation by 0.1 percentage point per year over the remainder of the medium term.

- With regard to longer-term inflation expectations, the incoming data have been mixed. Median expectations over the next 5 to 10 years from the University of Michigan Surveys of Consumers dropped to a historic low of 2.3 percent in December before rebounding to 2.5 percent in the January preliminary report. The TIPS-based measure of 5-to-10-year-forward inflation compensation, at about 2 percent, is little changed since the

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[7] Continuing the general pattern in previous years, monthly core PCE inflation in the first half of 2016 exceeded its pace in the second half of the year, and we have built some residual seasonality into the projection.

Domestic Econ Devel & Outlook
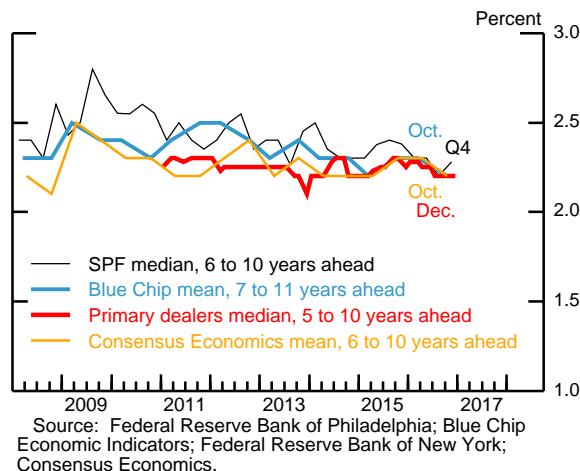
Survey Measures of Longer-Term Inflation Expectations

CPI Next 10 Years

Percent

Dec.

Q4

SPF median
Livingston Survey median

2009   2011   2013   2015   2017
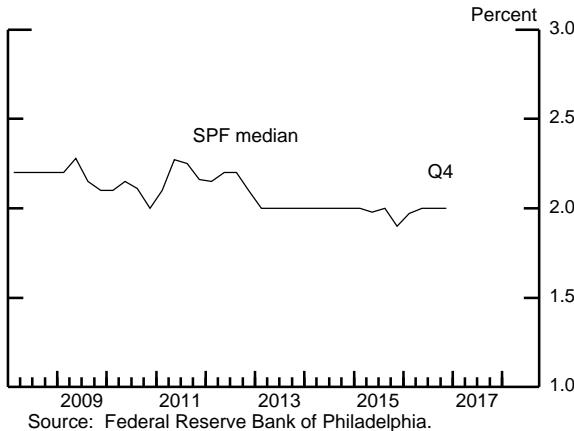
Note: SPF is Survey of Professional Forecasters.
Source: Federal Reserve Bank of Philadelphia.

CPI Forward Expectations

Percent

Oct.
Q4
Oct.
Dec.

SPF median, 6 to 10 years ahead
Blue Chip mean, 7 to 11 years ahead
Primary dealers median, 5 to 10 years ahead
Consensus Economics mean, 6 to 10 years ahead

2009   2011   2013   2015   2017

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

PCE Next 10 Years

Percent

SPF median

Q4

2009   2011   2013   2015   2017

Source: Federal Reserve Bank of Philadelphia.

PCE Forward Expectations

Percent

SPF median, 6 to 10 years ahead
Primary dealers median, longer run

Q4

Dec.

2009   2011   2013   2015   2017

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

Surveys of Consumers

Percent

Dec.
Jan.

FRBNY median increase in prices, 3 years ahead
Michigan median increase in prices, next 5 to 10 years

2009   2011   2013   2015   2017

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

Survey of Business Inflation Expectations

Percent

Mean increase in unit costs, next 5 to 10 years

Q1

2009   2011   2013   2015   2017

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

December Tealbook after rising notably in the prior couple of months. Meanwhile the 3-year-ahead measure of inflation expectations in the Federal Reserve Bank of New York's Survey of Consumer Expectations ticked up to 2.8 percent in December.

Total PCE inflation is anticipated to move up to 1.9 percent by 2019, unchanged from the December Tealbook. Core PCE price inflation reaches 2.0 percent in 2019. A tightening of resource utilization and the waning pass-through from earlier declines in core import and energy prices each contribute a small amount to the ¼ percentage point acceleration in core inflation between 2016 and 2019. Further, as in previous Tealbooks, we assume a small pickup (5 basis points in each of 2018 and 2019) in the prevailing level of inflation expectations relevant for wage and price setting. In this Tealbook, we nudged up the core PCE inflation projection a few basis points in 2018 and 2019 to better balance the inflation risks in light of the low unemployment rate, persistently rising house prices, and continued strong rent increases. This adjustment caused the core inflation projection—when rounded to one decimal place—to edge up 0.1 percentage point in 2018 and 2019.

The data on labor compensation received since the previous Tealbook have been mixed; taken together, however, they strike us as broadly consistent with a labor market that is operating close to its sustainable level against a backdrop of sluggish trend growth in productivity.

- Average hourly earnings for all employees rose 0.4 percent in December following a decline in November. We expect another relatively strong reading in January, partly driven by increases in minimum wages in a number of states.[8] Over the past 12 months, this measure of wages has increased 2.9 percent after rising at a relatively steady pace of 2 percent earlier in the recovery period.

- Compensation per hour in the business sector (as measured in the Productivity and Costs release) is now estimated to have risen 2.9 percent over the four

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[8] The average state minimum wage is estimated to have risen from roughly $8.25 to $8.50 per hour in January. Because a small percentage of workers will be affected by this change, the increase is expected to add about 0.1 percentage point to the change in average hourly earnings in January.

quarters through 2016:Q3. Based on the available monthly indicators, we expect the four-quarter change for 2016 as a whole to be 2.5 percent.

- The latest reading from the Federal Reserve Bank of Atlanta's Wage Growth Tracker was 3.9 percent in November 2016.[9] This movement continues an upward trend seen over the past year and brings the increases in this measure of wage growth close to pre-recession levels.

We continue to project that hourly labor compensation growth in the business sector (as reflected in the productivity and cost measure) will pick up gradually and reach 3½ percent by 2019 as the labor market tightens further.
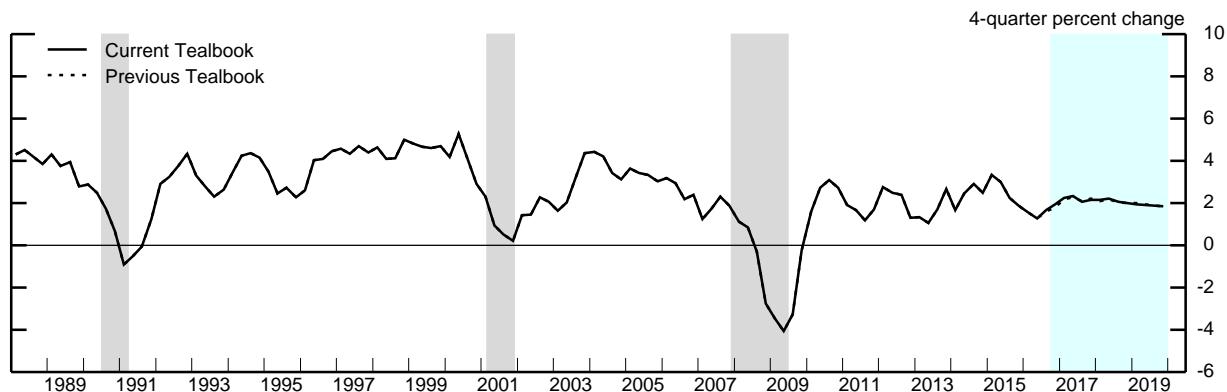
THE LONG-TERM OUTLOOK

- In the longer run, we continue to assume a natural rate of unemployment of 5 percent and a growth rate of potential GDP of 1.7 percent.

- 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 projected to have returned to a normal size by the beginning of 2021.

- With output above its potential and inflation at the Committee's 2 percent objective, the nominal federal funds rate is about 1 percentage point above its long-run value of 3 percent in 2021 and then moves back toward its long-run value thereafter.

- Real GDP slows to 1.5 percent in 2020 and 1.3 percent in 2021 as the federal funds rate is above its neutral level. The unemployment rate is 4.2 percent in 2020 and rises gradually toward its assumed natural rate in subsequent years.

- PCE price inflation moves up from 1.9 percent in 2019 and slightly overshoots the Committee's long-run objective in 2020 and 2021 before gradually converging to 2 percent.

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[9] The data are 3-month moving averages of the median 12-month change in hourly wages of individuals, based on self-reported usual earnings in the Current Population Survey (CPS). The index covers only individuals who earn less than $150,000 per year and who were employed in both the current month of the CPS and one year earlier.

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

Measure	2016	2017 H1	2017 H2	2017	2018	2019
Real GDP	**1.9**	**1.9**	**2.4**	**2.1**	**2.0**	**1.8**
Previous Tealbook	1.8	2.1	2.3	2.2	2.0	1.8
Final sales	2.2	1.9	2.5	2.2	1.9	2.0
Previous Tealbook	2.1	1.8	2.4	2.1	2.0	1.9
Personal consumption expenditures	2.9	2.4	3.4	2.9	2.7	2.5
Previous Tealbook	2.7	2.6	3.4	3.0	2.7	2.5
Residential investment	1.4	-.4	2.0	.8	3.9	5.2
Previous Tealbook	1.5	2.7	.8	1.7	5.6	3.7
Nonresidential structures	.9	4.5	2.6	3.6	.2	-.4
Previous Tealbook	.8	2.2	1.2	1.7	-.3	-.7
Equipment and intangibles	-.2	4.2	3.9	4.1	3.0	2.2
Previous Tealbook	-.3	3.6	3.8	3.7	3.0	2.2
Federal purchases	.7	2.1	1.1	1.6	-.5	-.4
Previous Tealbook	.7	2.1	1.1	1.6	-.5	-.4
State and local purchases	.8	1.5	1.3	1.4	1.2	1.2
Previous Tealbook	.7	1.4	1.3	1.4	1.2	1.2
Exports	1.7	.3	1.1	.7	2.1	2.8
Previous Tealbook	2.4	.0	1.0	.5	1.9	2.7
Imports	1.4	4.2	4.4	4.3	5.0	3.8
Previous Tealbook	1.3	5.0	4.4	4.7	4.7	4.1
Contributions to change in real GDP (percentage points)						
Inventory change	-.2	.0	-.1	-.1	.0	-.1
Previous Tealbook	-.3	.2	-.1	.1	.0	-.1
Net exports	.0	-.6	-.5	-.5	-.5	-.3
Previous Tealbook	.1	-.7	-.5	-.6	-.5	-.3
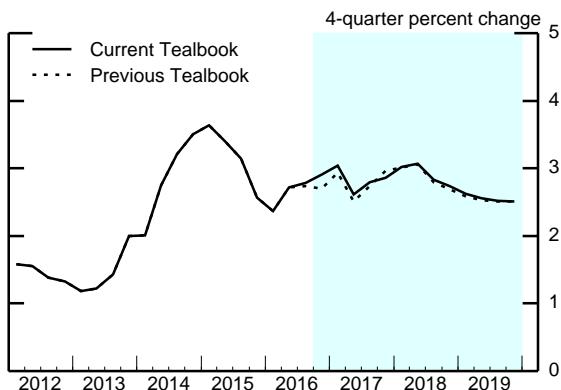
Real GDP

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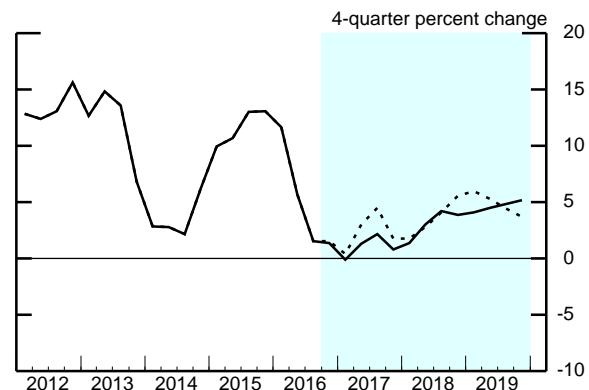
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Components of Final Demand
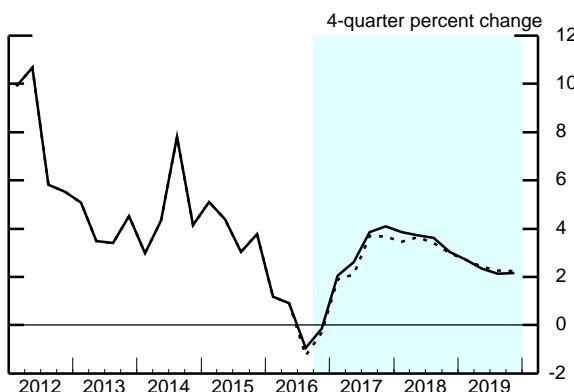
Personal Consumption Expenditures
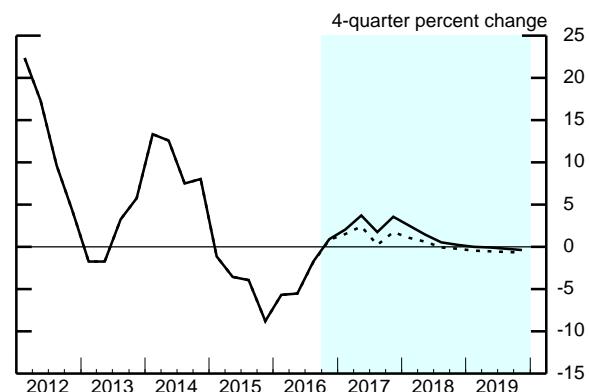
4-quarter percent change

Current Tealbook
Previous Tealbook

Residential Investment

4-quarter percent change

Equipment and Intangibles

4-quarter percent change

Nonresidential Structures

4-quarter percent change
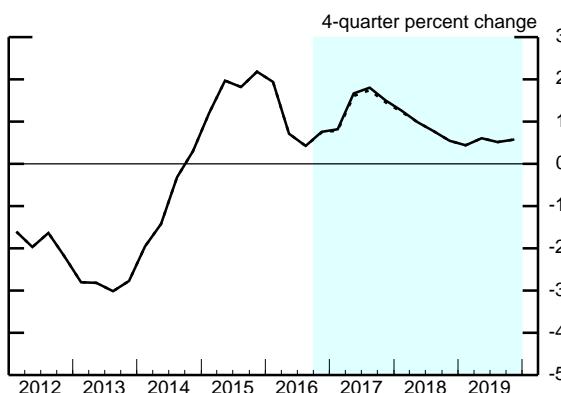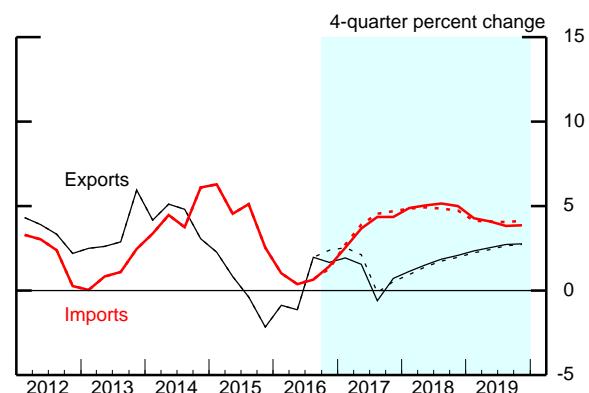
Government Consumption and Investment

4-quarter percent change

Exports and Imports

4-quarter percent change
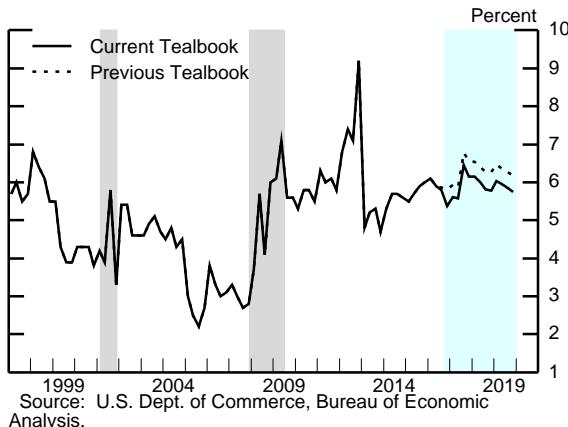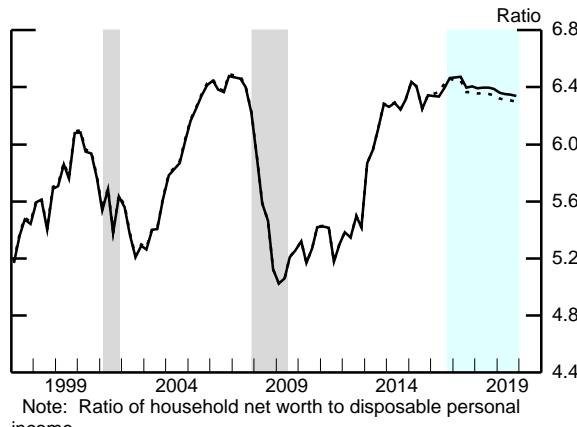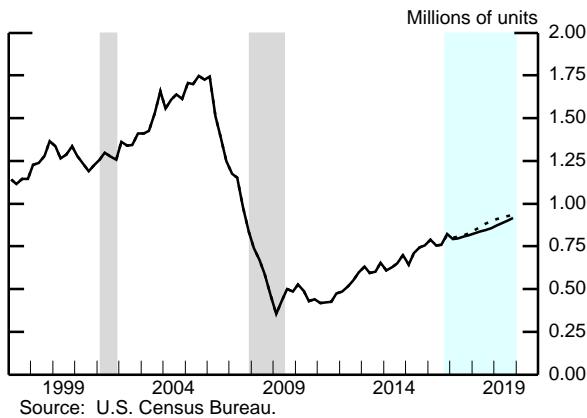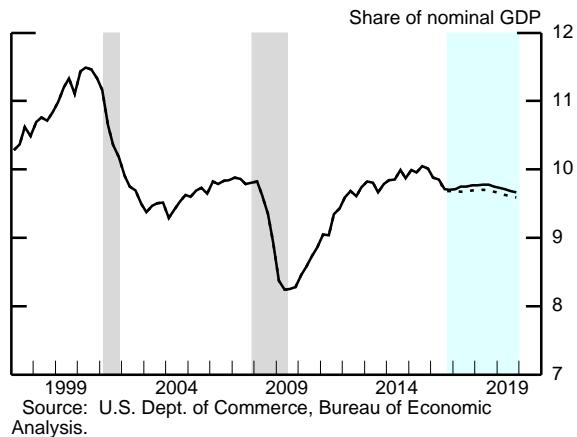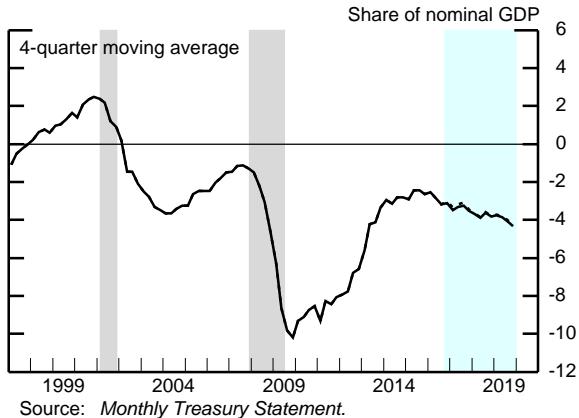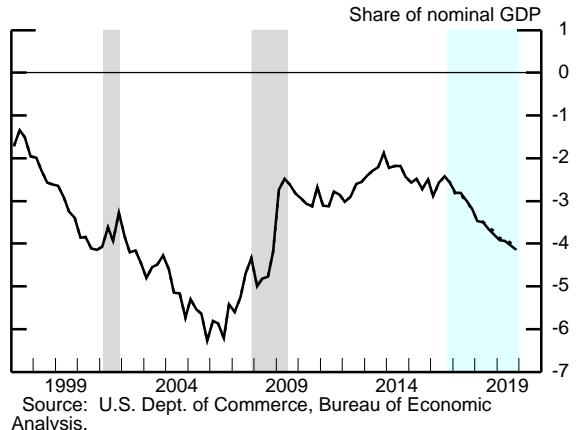
Exports

Imports

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

Aspects of the Medium-Term Projection

Personal Saving Rate

Percent

- Current Tealbook
- ‥ Previous Tealbook

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

Wealth-to-Income Ratio

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

Millions of units

Source: U.S. Census Bureau.

Equipment and Intangibles Spending

Share of nominal GDP

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

Federal Surplus/Deficit

Share of nominal GDP

4-quarter moving average

Source: *Monthly Treasury Statement.*

Current Account Surplus/Deficit

Share of nominal GDP

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.

Decomposition of Potential GDP
(Percent change, Q4 to Q4, except as noted)
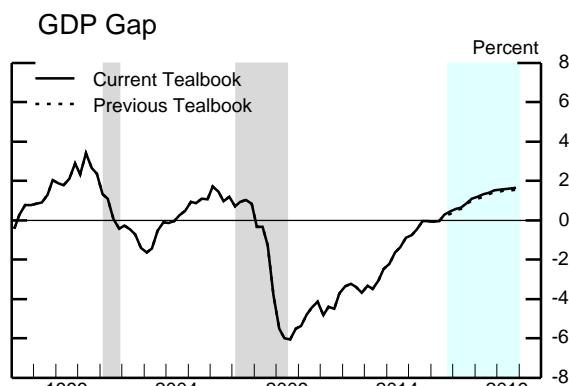
Measure	1974-95	1996-2000	2001-07	2008-10	2011-15	2016	2017	2018	2019
Potential real GDP	3.1	3.4	2.6	1.6	1.1	1.4	1.5	1.6	1.7
Previous Tealbook	3.1	3.4	2.6	1.6	1.1	1.4	1.5	1.6	1.7
Selected contributions[1]									
Structural labor productivity[2]	1.6	2.9	2.8	1.4	.8	.9	1.1	1.1	1.2
Previous Tealbook	1.6	2.9	2.8	1.4	.8	.9	1.1	1.1	1.2
Capital deepening	.7	1.5	1.0	.3	.5	.4	.4	.4	.4
Multifactor productivity	.7	1.0	1.5	.9	.0	.2	.5	.5	.7
Structural hours	1.6	1.2	.8	.1	.6	.6	.4	.3	.3
Previous Tealbook	1.6	1.2	.8	.1	.6	.6	.4	.3	.3
Labor force participation	.4	-.1	-.2	-.5	-.6	-.5	-.5	-.5	-.5
Previous Tealbook	.4	-.1	-.2	-.5	-.6	-.5	-.5	-.5	-.5
Memo:									
GDP gap[3]	-1.9	2.4	.8	-4.2	.0	.4	1.1	1.5	1.7
Previous Tealbook	-1.9	2.4	.8	-4.2	.0	.3	1.0	1.4	1.6

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 GDP in the final quarter of the period indicated. A negative number indicates that the economy is operating below potential.
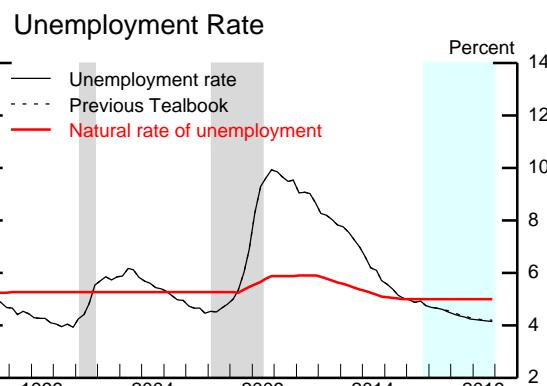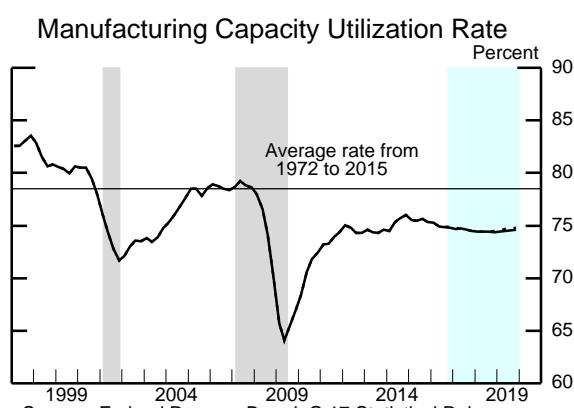
GDP Gap

Note: The GDP gap is the percent difference between actual and potential GDP; a negative number indicates that the economy is operating below potential.
 Source: U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

Unemployment Rate

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

Manufacturing Capacity Utilization Rate

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

Structural and Actual Labor Productivity
(Business sector)
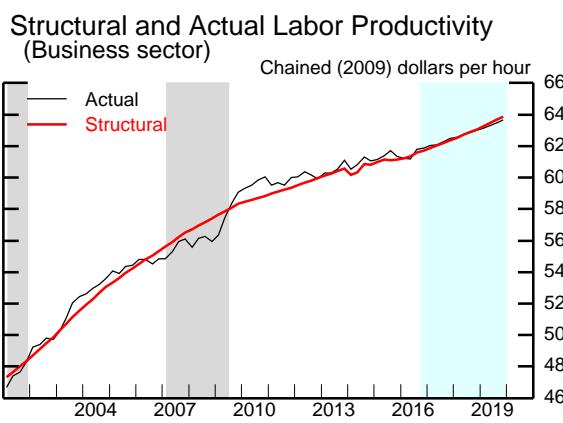
Source: U.S. Department of Labor, Bureau of Labor Statistics; U.S. Department of Commerce, Bureau of Economic Analysis; staff assumptions.

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

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The Outlook for the Labor Market

Measure	2016	2017		2017	2018	2019
		H1	H2			
Output per hour, business[1]	.9	.7	1.3	1.0	.9	1.0
Previous Tealbook	.7	.8	1.1	1.0	.9	1.1
Nonfarm payroll employment[2]	180	183	185	184	162	125
Previous Tealbook	180	180	182	181	157	121
Private employment[2]	165	172	173	173	150	113
Previous Tealbook	161	168	170	169	145	109
Labor force participation rate[3]	62.7	62.7	62.6	62.6	62.3	62.0
Previous Tealbook	62.7	62.7	62.6	62.6	62.3	62.0
Civilian unemployment rate[3]	4.7	4.7	4.5	4.5	4.2	4.1
Previous Tealbook	4.8	4.7	4.5	4.5	4.3	4.2

1. Percent change from final quarter of preceding period at annual rate.
2. Thousands, average monthly changes.
3. Percent, average for the final quarter in the period.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.

Inflation Projections

Measure	2016	2017		2017	2018	2019
		H1	H2			
Percent change at annual rate from final quarter of preceding period						
PCE chain-weighted price index	1.5	1.8	1.6	1.7	1.8	1.9
Previous Tealbook	1.5	1.8	1.6	1.7	1.8	1.9
Food and beverages	-1.7	1.6	2.2	1.9	2.2	2.2
Previous Tealbook	-1.5	1.3	2.0	1.7	2.2	2.2
Energy	2.1	4.3	-.3	2.0	.1	.6
Previous Tealbook	1.7	3.5	.8	2.1	.4	.8
Excluding food and energy	1.7	1.7	1.6	1.7	1.9	2.0
Previous Tealbook	1.7	1.7	1.6	1.7	1.8	1.9
Prices of core goods imports[1]	-.1	.4	1.2	.8	.7	.7
Previous Tealbook	.1	.1	.9	.5	.7	.7

	Dec. 2016[2]	Jan. 2017[2]	Feb. 2017[2]	Mar. 2017[2]	Apr. 2017[2]	May 2017[2]
12-month percent change						
PCE chain-weighted price index	1.6	1.8	2.0	2.0	1.8	1.8
Previous Tealbook	1.7	1.7	1.9	2.0		
Excluding food and energy	1.7	1.6	1.6	1.6	1.6	1.6
Previous Tealbook	1.8	1.7	1.6	1.7		
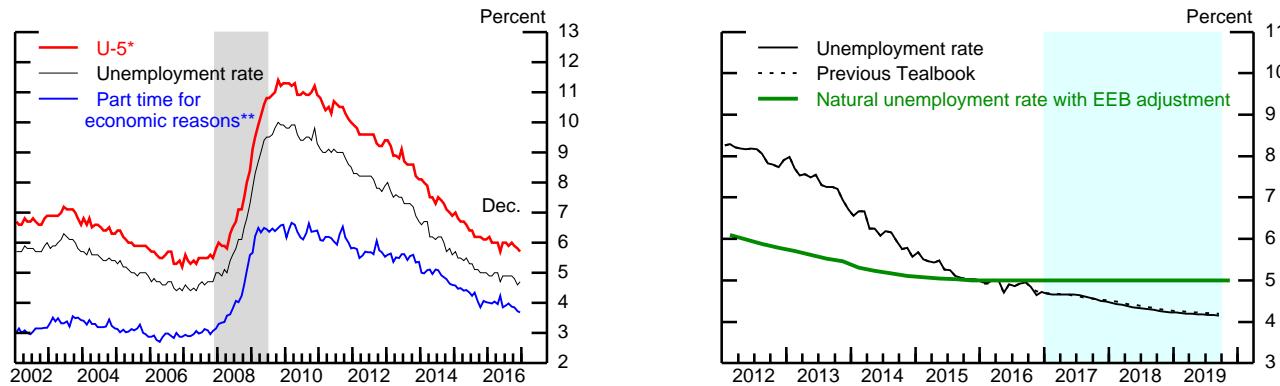
1. Core goods imports exclude computers, semiconductors, oil, and natural gas.
2. Staff forecast.
Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Labor Market Developments and Outlook (1)

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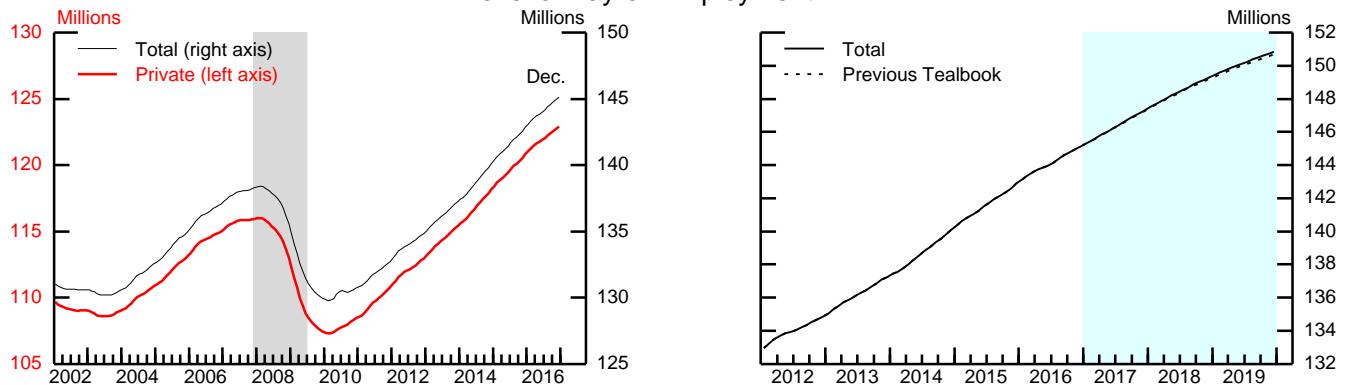
* U-5 measures total unemployed persons plus all marginally attached to the labor force, as a percent of the labor force plus persons marginally attached to the labor force.
** Percent of Current Population Survey employment.
EEB Extended and emergency unemployment benefits.
Source: U.S. Department of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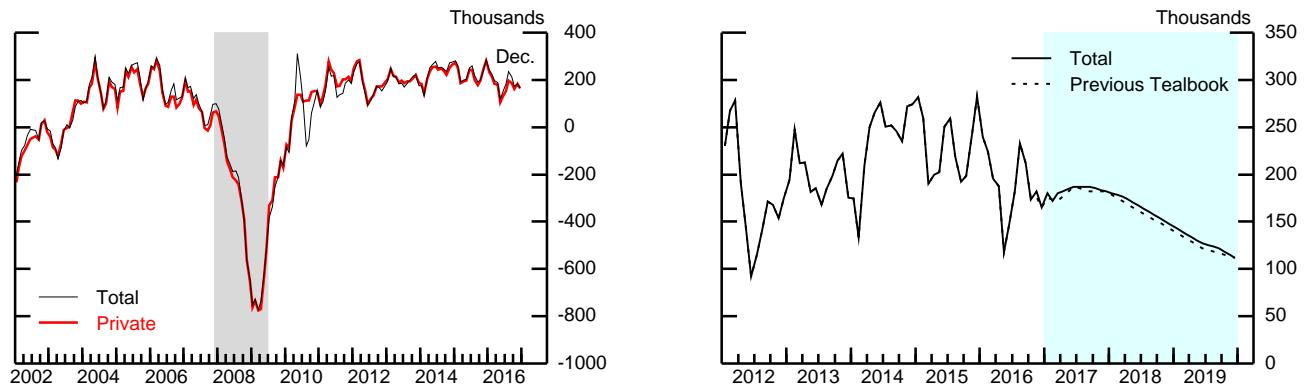
Level of Payroll Employment*

* 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Change in Payroll Employment*
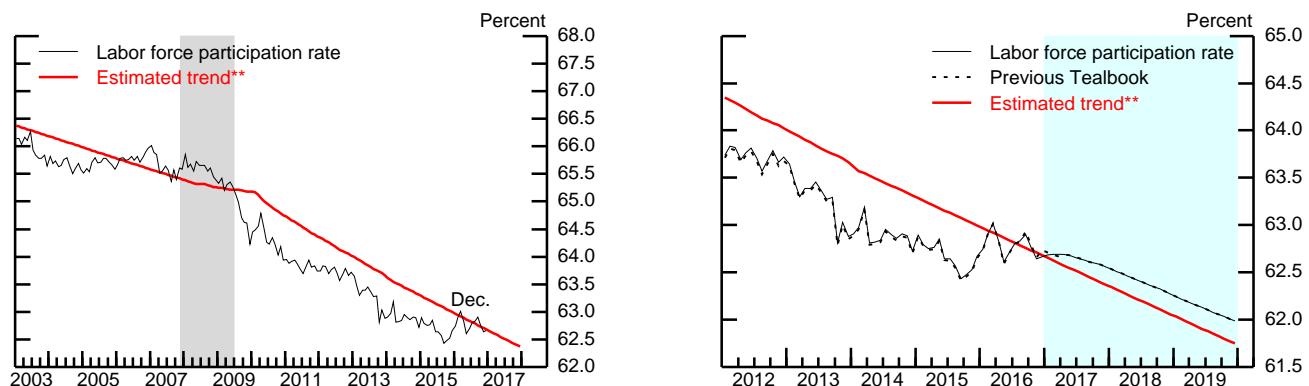
* 3-month moving averages.
Source: U.S. Department of Labor, Bureau of Labor Statistics.

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

Labor Market Developments and Outlook (2)

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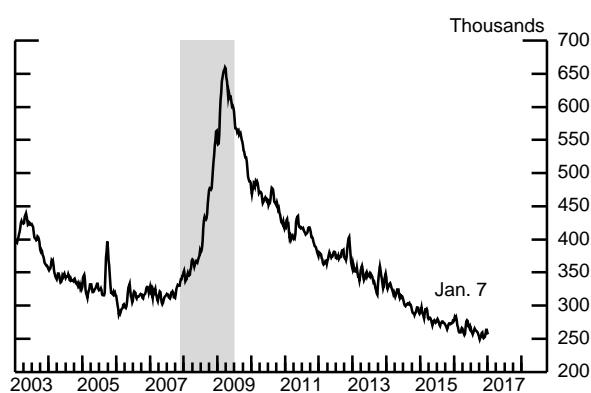
* Published data adjusted by staff to account for changes in population weights.
** Includes staff estimate of the effect of extended and emergency unemployment benefits.
Source: U.S. Department of Labor, Bureau of Labor Statistics; staff assumptions.
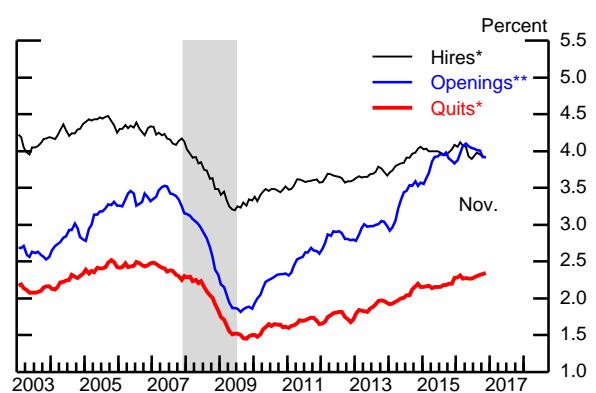
Initial Unemployment Insurance Claims*

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

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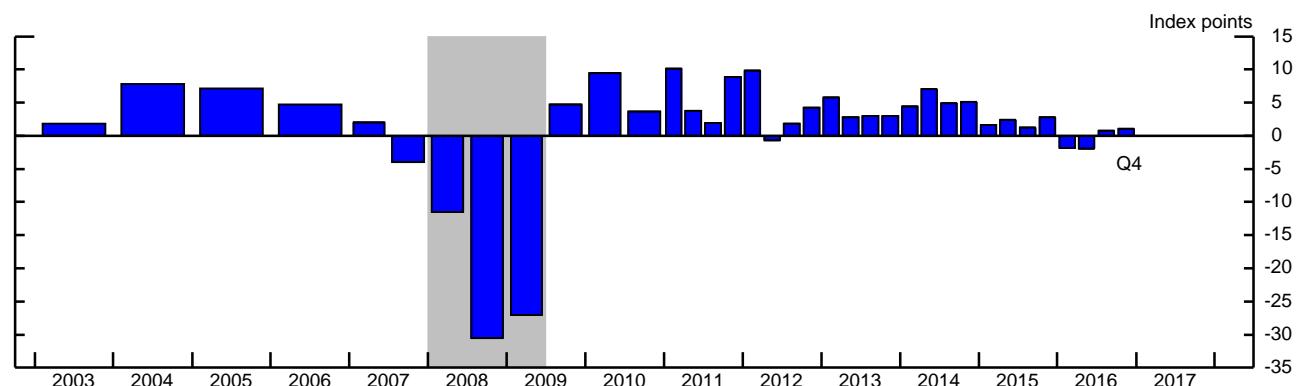
* Percent of private nonfarm payroll employment, 3-month moving average.
** Percent of private nonfarm payroll employment plus unfilled jobs, 3-month moving average.
Source: Job Openings and Labor Turnover Survey.

Average Monthly Change in Labor Market Conditions Index
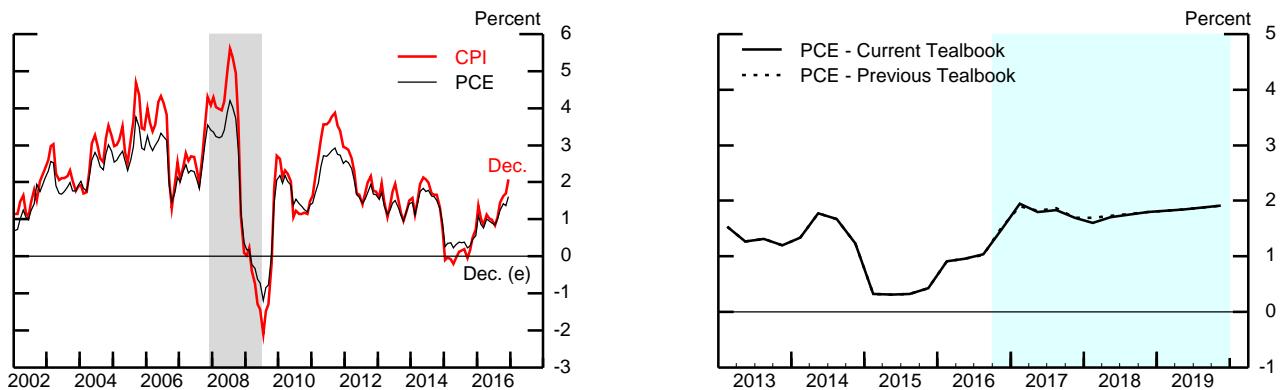
Source: Labor market conditions index estimated by staff.

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

Inflation Developments and Outlook (1)
(Percent change from year-earlier period)
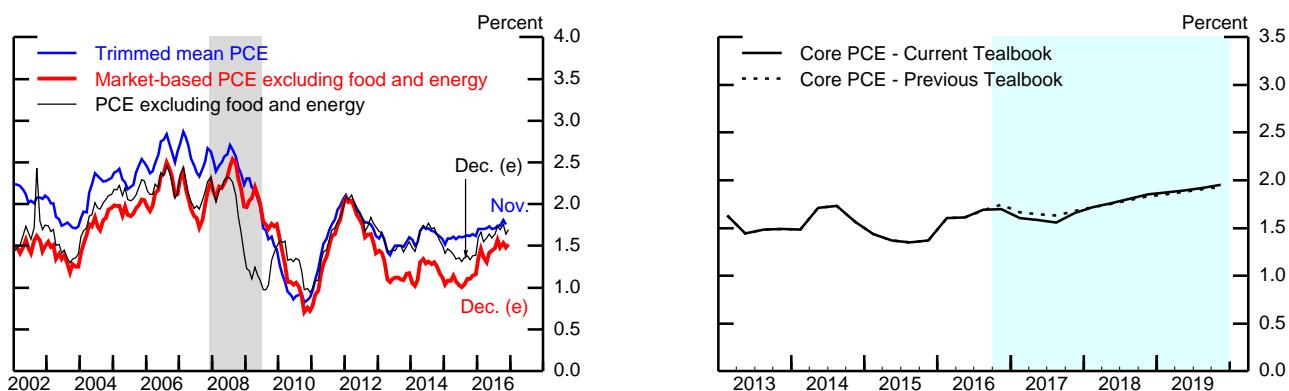
Headline Consumer Price Inflation

Note: PCE prices from October to December 2016 are staff estimates (e).
Source: For CPI, U.S. Department of Labor, Bureau of Labor Statistics; for PCE, U.S. Department of Commerce, Bureau of Economic Analysis.
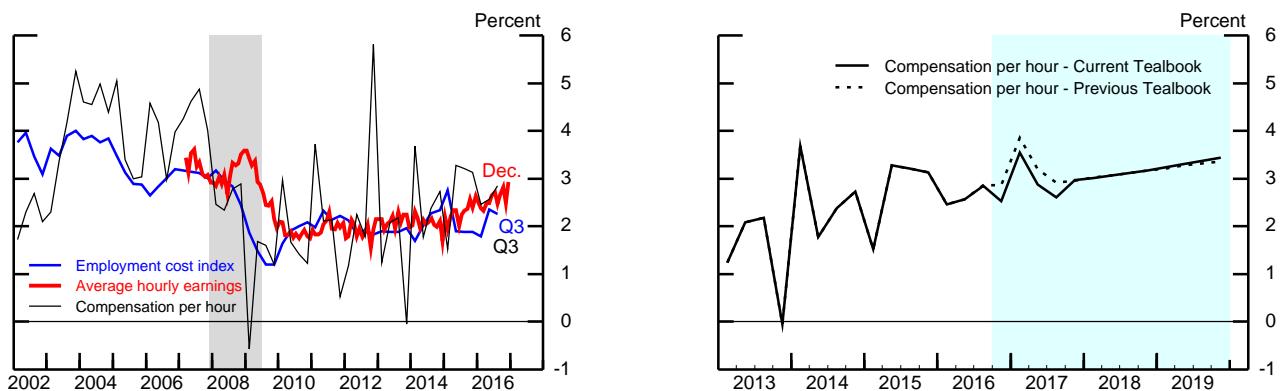
Measures of Underlying PCE Price Inflation

Note: Core PCE prices from October to December 2016 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.
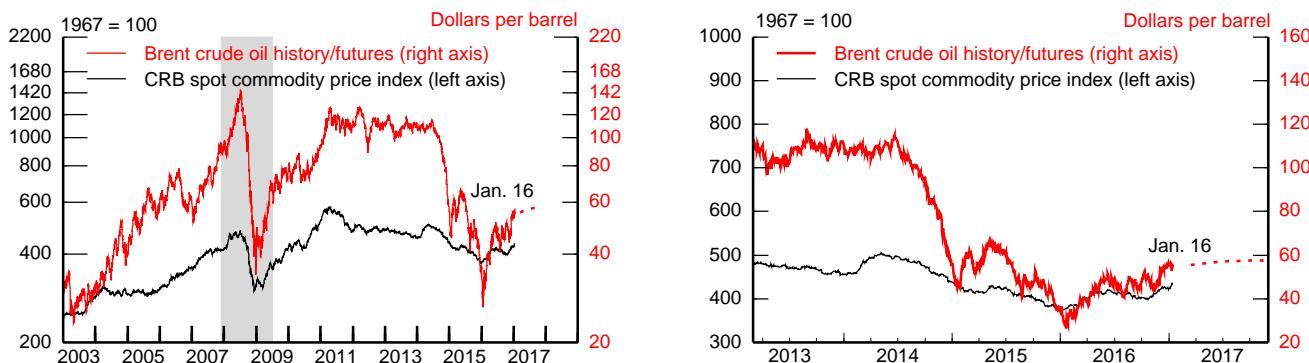
Note: The gray shaded bars indicate a period of business recession as defined by the National Bureau of Economic Research.
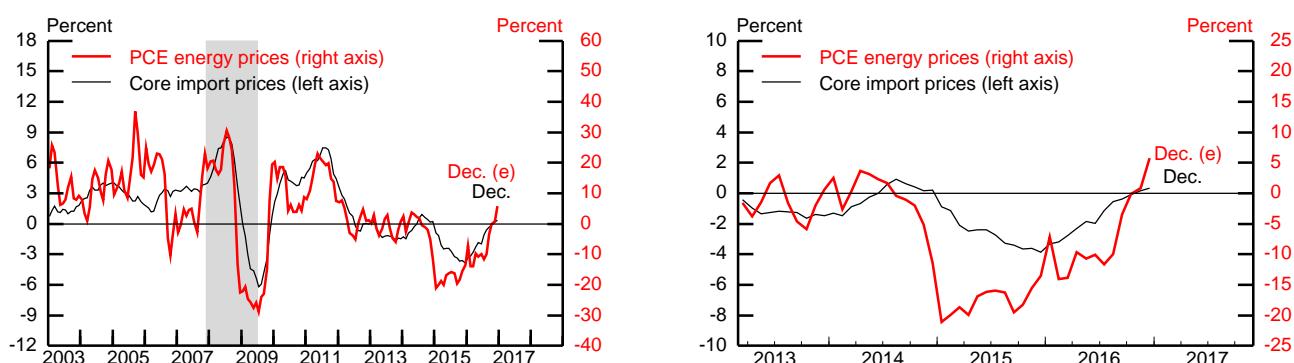
Inflation Developments and Outlook (2)
(Percent change from year-earlier period, except as noted)
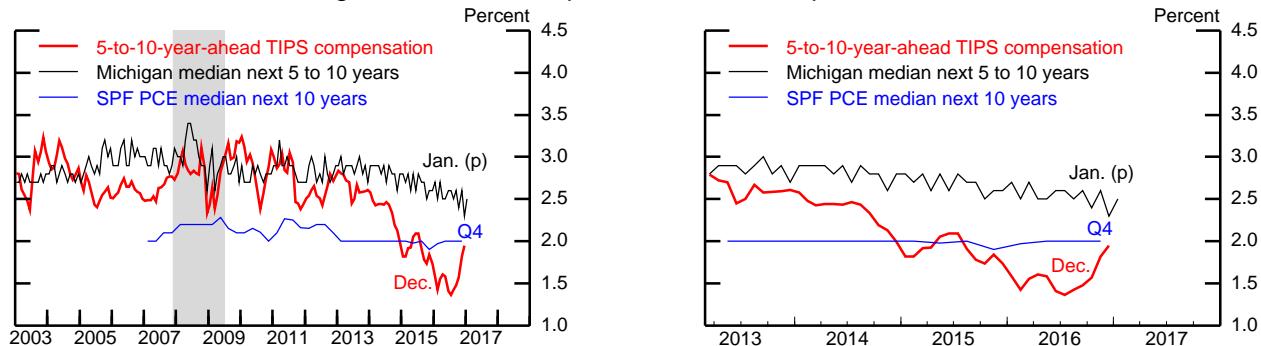
Commodity and Oil Price Levels

1967 = 100   Dollars per barrel
- Brent crude oil history/futures (right axis)
- CRB spot commodity price index (left axis)

Jan. 16

1967 = 100   Dollars per barrel
- Brent crude oil history/futures (right axis)
- CRB spot commodity price index (left axis)

Jan. 16

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

Percent   Percent
- PCE energy prices (right axis)
- Core import prices (left axis)

Dec. (e)
Dec.

Percent   Percent
- PCE energy prices (right axis)
- Core import prices (left axis)

Dec. (e)
Dec.

(e) Estimate.
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

Percent
- 5-to-10-year-ahead TIPS compensation
- Michigan median next 5 to 10 years
- SPF PCE median next 10 years

Jan. (p)
Q4
Dec.

Percent
- 5-to-10-year-ahead TIPS compensation
- Michigan median next 5 to 10 years
- SPF PCE median next 10 years

Jan. (p)
Q4
Dec.

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.

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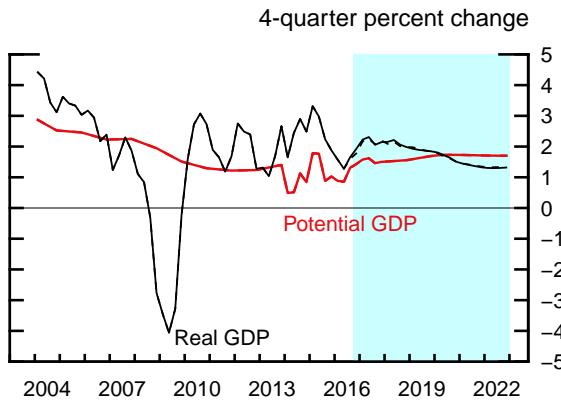
The Long-Term Outlook

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

Domestic Econ Devel & Outlook
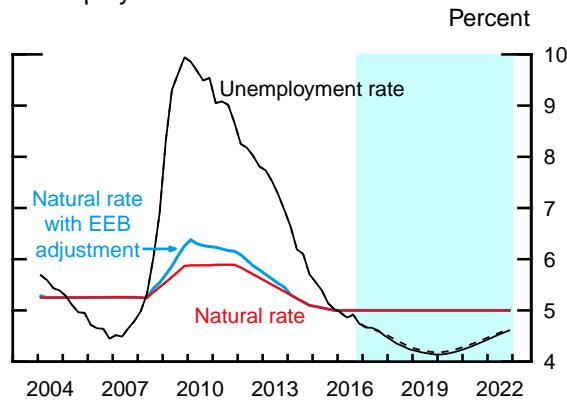
Measure	2016	2017	2018	2019	2020	2021	Longer run
Real GDP	1.9	2.1	2.0	1.8	1.5	1.3	1.7
Previous Tealbook	1.8	2.2	2.0	1.8	1.5	1.3	1.7
Civilian unemployment rate[1]	4.7	4.5	4.2	4.1	4.2	4.4	5.0
Previous Tealbook	4.8	4.5	4.3	4.2	4.3	4.4	5.0
PCE prices, total	1.5	1.7	1.8	1.9	2.1	2.1	2.0
Previous Tealbook	1.5	1.7	1.8	1.9	2.1	2.1	2.0
Core PCE prices	1.7	1.7	1.9	2.0	2.0	2.1	2.0
Previous Tealbook	1.7	1.7	1.8	1.9	2.0	2.1	2.0
Federal funds rate[1]	.45	1.46	2.51	3.37	3.87	4.01	3.00
Previous Tealbook	.47	1.49	2.47	3.30	3.77	3.91	3.00
10-year Treasury yield[1]	2.2	3.1	3.5	3.9	3.9	3.9	3.5
Previous Tealbook	2.1	3.1	3.5	3.9	3.9	3.9	3.5

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

Real GDP — 4-quarter percent change

Unemployment Rate — Percent

PCE Prices — 4-quarter percent change

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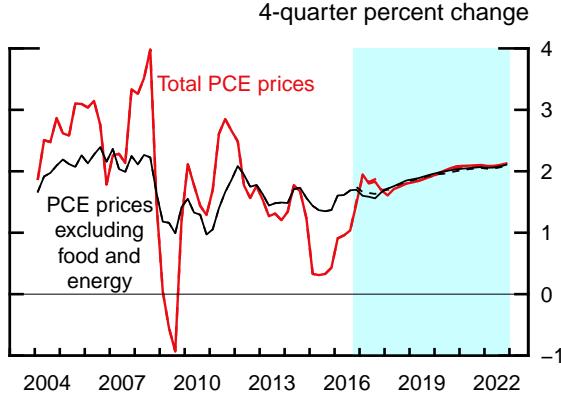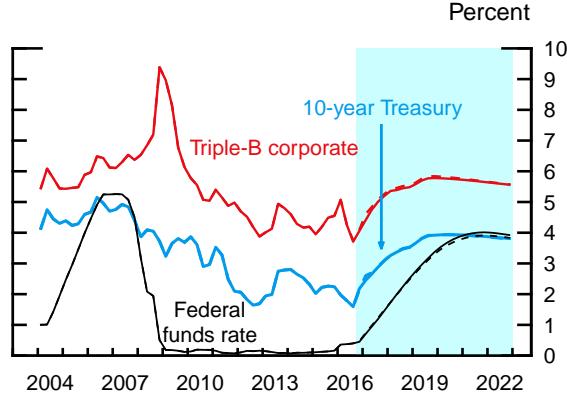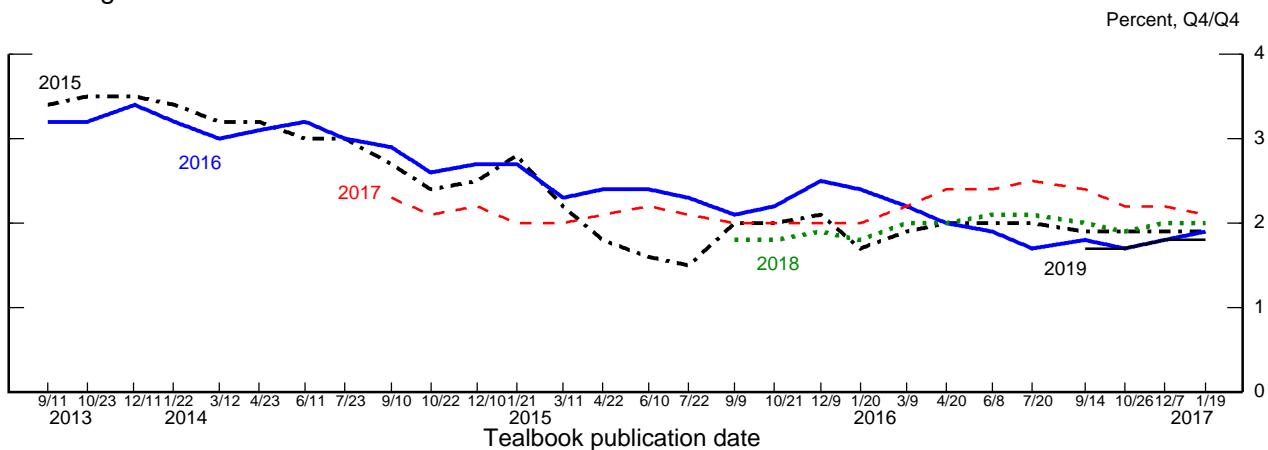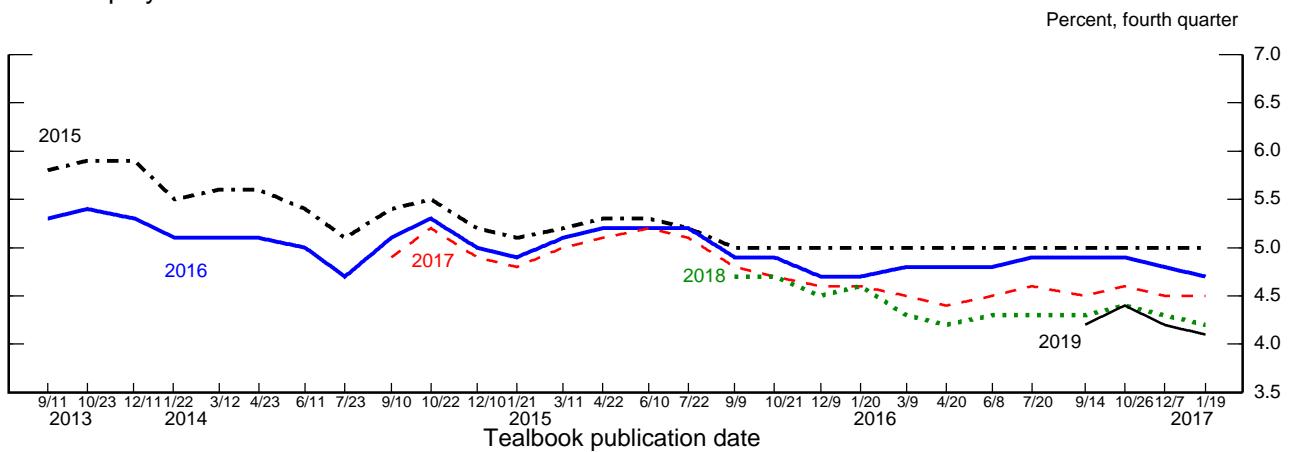
Note: In each panel, shading represents the projection period, and dashed lines are the previous Tealbook.

Evolution of the Staff Forecast

Change in Real GDP

Percent, Q4/Q4

Tealbook publication date

Unemployment Rate

Percent, fourth quarter
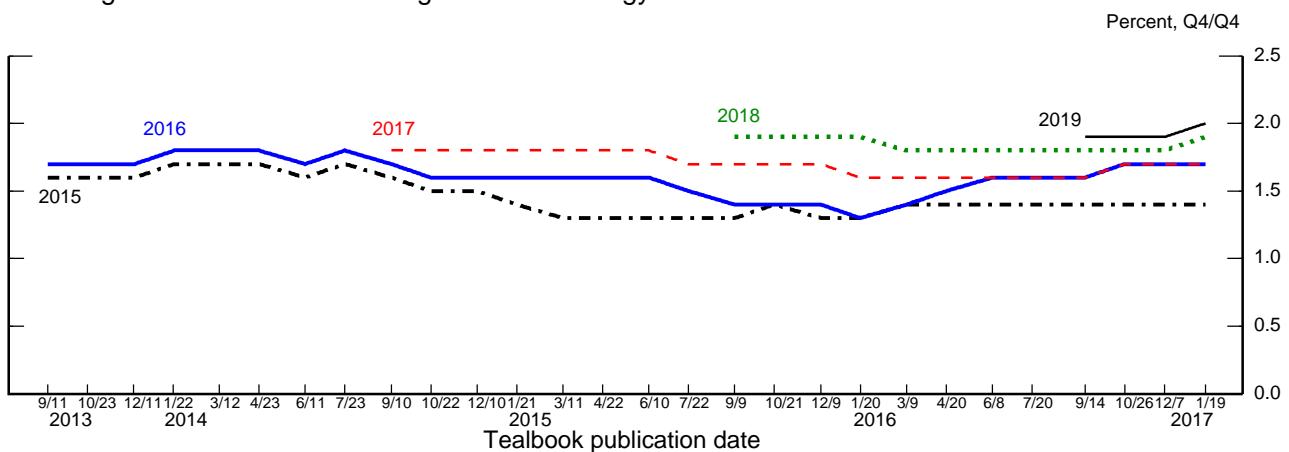
Tealbook publication date

Change in PCE Prices excluding Food and Energy

Percent, Q4/Q4

Tealbook publication date

Domestic Econ Devel & Outlook

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International Economic Developments and Outlook

After rebounding strongly in the third quarter from the second-quarter pothole, total foreign growth moderated to an estimated 2¼ percent pace in the fourth quarter. In line with the recent upbeat indicators on economic activity, we project that foreign growth will edge up to 2½ percent—its estimated potential rate—over the next couple of quarters and hold at about that pace through 2019, supported by accommodative monetary policies in the advanced foreign economies (AFEs) and a moderate recovery in Latin America. This forecast is little changed relative to the December Tealbook.

Over the past year, markets were recurrently roiled by concerns emanating from abroad, but the global economy appears to have weathered the shocks in 2016 fairly well and seems to be better positioned going forward. Some of the global risks that preoccupied markets and policymakers have subsided to some extent, including those associated with further declines in commodity prices, the fallout from Brexit, and the financial stresses in the European banking system. However, other concerns remain. One such concern is possible turmoil in the emerging market economies (EMEs) in the face of rising U.S. interest rates, further dollar appreciation, and uncertainty regarding trade policies. (See the "Stronger Dollar and EME Turbulence" alternative scenario in the Risks and Uncertainty section.) Additionally, the possibility of a hard landing in China remains an important risk, as the credit-easing undertaken by authorities to bolster economic growth has heightened the vulnerabilities of the corporate and financial sectors to future shocks.

Overall, the abatement of some downside risks, along with signs of strengthening industrial production and trade abroad, have led us to contemplate upside risk to our foreign outlook. Accommodative monetary policy abroad, progress on balance sheet repair, and reduced fiscal pressures could spur faster foreign growth than we are currently projecting, as discussed in our "Stronger Foreign Growth and Weaker Dollar" alternative scenario in the Risks and Uncertainty section.

Inflation in the AFEs has increased in recent months but remains significantly below central banks' targets. Overall, we estimate that AFE inflation picked up in the fourth quarter to an annual rate of almost 1½ percent, up from ¾ percent in the third quarter, largely reflecting an increase in retail energy prices caused by a lagged pass-through of higher oil prices. Going forward, and in line with still-subdued core inflation

readings, we expect inflation in most of the AFEs to increase only gradually, and in the euro area and Japan to remain well below 2 percent even in 2019. Given the restrained outlook for inflation, we continue to expect monetary policy in the AFEs to remain accommodative through 2019. In line with this view, the European Central Bank (ECB) at its December meeting, which occurred just after the close of last month's Tealbook, announced the extension of its asset purchase program until at least December 2017.

Inflation also rose in most EMEs in the fourth quarter, bringing aggregate EME inflation to an estimated 3 percent, up from 2¼ percent in the third quarter. An increase in retail energy prices helped raise inflation from very low levels in emerging Asia, while the sharp depreciation of the peso continued to put upward pressure on inflation in Mexico. In contrast, in South America, growing resource slack as well as some stabilization of currencies in the region helped push inflation down faster than predicted. Going forward, EME inflation is expected to average about 3 percent over the forecast period, with declines in Latin America roughly offsetting moderate increases in Asia.

ADVANCED FOREIGN ECONOMIES

- *Euro Area.* Recent indicators—such as November industrial production and PMIs as well as confidence readings through December—suggest that GDP growth moved up to nearly 2 percent in the fourth quarter from 1.4 percent in the third. Thereafter, we project that GDP growth will slow to a still-above-potential pace of 1¾ percent in the first quarter before edging up to almost 2 percent by 2019, supported by accommodative monetary policy. This forecast is a touch stronger than in the December Tealbook as a result of a weaker euro and higher equity prices. This projection takes into account that, with anti-EU sentiment prevalent across the euro area and with national elections in France, Germany, and possibly Italy in 2017, elevated political uncertainty is likely to trigger bouts of volatility and financial stress.

  On December 8, the ECB announced the extension of its asset purchase program— originally scheduled to last at least through March 2017—until at least December 2017; starting in April, however, it will lower its monthly pace of purchases from €80 billion to €60 billion. Relative to our expectations at the time of the December Tealbook, the ECB extended the program for a longer period albeit at a slower pace of purchases. With core inflation below 1 percent at the end of 2016 and headline inflation projected to linger near 1½ percent through 2019, we anticipate that

the ECB will start tapering its purchases at the beginning of 2018 and cease them entirely by the middle of that year. We also assume that the ECB will continue to reinvest the proceeds of its program during the forecast period while keeping policy rates at their current levels until late 2019. These assumptions are in line with the official statement and press conference that followed the ECB's January 19 meeting.

- *United Kingdom.* Strong PMIs and confidence indicators through December suggest that economic activity was stronger than expected in the fourth quarter, with real GDP growing slightly below the 2.3 percent pace recorded in the third quarter. We project growth to slow to 1½ percent in 2017 and remain subdued through the rest of the forecast period as still-elevated uncertainty related to Brexit weighs on household and business spending. Formal Brexit talks are expected to start this March, and we assume the U.K. authorities will not reach a deal with the EU until the end of the allotted two-year period in March 2019. We expect less economic integration post-Brexit and, thus, a weaker pace of U.K. potential growth. The projected outlook is a touch higher than in the December Tealbook because of further depreciation of sterling, which should support exports, and our sense that Brexit uncertainty has been exerting less drag on growth than we had previously estimated.

  Inflation is expected to rise from 2 percent in the fourth quarter to 3½ percent in the first quarter and to remain above the Bank of England's (BOE) 2 percent target through early 2018 as past exchange rate depreciation passes through to consumer prices. We expect the BOE to complete its sovereign bond purchase program early this year and to increase its policy rate 25 basis points in late 2017 but to continue purchasing corporate bonds through the first quarter of 2018.

- *Canada.* After a strong rebound in activity in the third quarter, led by a recovery in oil production, we estimate that Canadian GDP growth moderated to 2 percent in the fourth quarter, little changed from our December forecast. Monthly GDP for October contracted unexpectedly, but more-recent indicators—such as manufacturing production and PMIs through December—were more buoyant. Going forward, we project GDP growth to remain at around 2 percent in 2017, supported by accommodative monetary and fiscal policies, before edging down in 2018. Relative to the December Tealbook, this projection is a touch weaker in 2017, primarily reflecting a stronger Canadian dollar.

- *Japan.* Following a major revision of the national accounts data, third-quarter real GDP growth was revised down to 1.3 percent from 2.2 percent. However, growth in the first half of 2016 was marked up almost 1 percentage point to 2.3 percent. Recent data—including consumer confidence, PMIs, and industrial production—suggest that GDP rose 1.1 percent in the fourth quarter, about ¼ percentage point higher than previously projected. We expect GDP growth to decline to just under 1 percent through the end of 2018 before stalling in 2019 as a result of a planned consumption tax hike. Japanese inflation was barely positive in the fourth quarter and is projected to rise to only 1¼ percent by 2019. We anticipate the Bank of Japan will continue its aggressive asset purchases and keep the 10-year yield near zero during the forecast period but not introduce further easing measures.

EMERGING MARKET ECONOMIES

- *China.* We have revised up our estimate of real GDP growth in the fourth quarter to 6¾ percent, ½ percentage point above our December Tealbook estimate, and in line with recent data for industrial production, manufacturing PMIs, and foreign trade. We expect some of this additional momentum in the industrial sector to carry over into the first half of 2017. Nonetheless, we see growth edging down to 6¼ percent in 2017 and slowing further to 5¾ percent by 2019 as policy stimulus fades, with authorities taking further steps to rein in credit growth. Although downside risks are significant—including the possibility of a sharp adjustment in the property market, a run on the financial system, and a destabilizing currency depreciation—in our baseline we continue to expect authorities to be able to manage these risks.

  Consumer price inflation in China increased to an estimated 2½ percent in the fourth quarter from 1.3 percent in the third as previous declines in food prices faded. We expect inflation to hover around 2½ percent over the forecast period. Meanwhile, producer price inflation rose sharply in recent months after years of deflation, but the increases in producer prices are concentrated in the mining and raw materials sectors, which have generated little pass-through to consumer prices in the past.

- *Other Emerging Asia.* Real GDP growth is estimated to have declined from 3¾ percent in the third quarter to 3¼ percent in the fourth quarter, largely driven by a sharp slowdown in India following outsized third-quarter growth. The slowdown in India is due importantly to the negative effects of the demonetization effort. For the other economies in the region, fourth-quarter growth was revised up, as incoming

indicators—such as PMIs, industrial production, and exports—point to an upturn in their export-oriented manufacturing sectors, including the high-tech sector. We expect growth in the region to pick up to 3¾ percent in the first half of 2017, a touch higher than our December forecast, and to remain roughly at that pace through the end of 2019.

Inflation in emerging Asia excluding China is estimated to have increased to 2¾ percent in the fourth quarter, up from 1 percent in the third quarter, on the back of higher retail energy prices. We project inflation to pick up to 3½ percent by the end of the forecast period, driven by higher commodity prices and currency depreciation.

- *Mexico.* Incoming data support our view that real GDP growth decreased to 2 percent in the fourth quarter—down ½ percentage point from the December Tealbook—from 4 percent in the third. Manufacturing PMIs and exports have been disappointing recently, consistent with the ongoing weakness in U.S. manufacturing, while deteriorating consumer confidence suggests that household demand is softening. We see GDP growth dropping further to 1½ percent this quarter as heightened uncertainty over U.S. trade policy weighs on private investment and January's 15 percent hike on fuel prices crimps household demand. Thereafter, we expect growth to move gradually up to 2¾ percent by 2019, supported by the peso's 30 percent real depreciation since mid-2014 and a boost from reforms to the energy sector. The first-quarter projection is revised down ½ percentage point relative to the December Tealbook.

  We expect Mexican headline inflation to step up further to 6½ percent in the first quarter from about 4 percent in the fourth, largely driven by sharp hikes in gasoline prices. These hikes are part of the government's deregulation plan, which would allow gasoline and diesel prices to reflect market conditions by the end of this year. With the peso depreciation and gasoline price increases putting upward pressure on inflation, we expect the Bank of Mexico to tighten monetary policy further, on top of the 275 basis point increase in the policy rate since late 2015 (including a 50 basis point rate hike in December). We see inflation settling at 3¼ percent, a little above the 3 percent midpoint of the target range, by 2018.

- *Brazil.* Recent data—including weak industrial production, falling manufacturing PMI, low confidence readings, and rising unemployment—suggest that the Brazilian economy remained mired in recession in the fourth quarter, but the pace of

contraction was slower than in the third quarter. In the current quarter we expect the economy to bottom out, with GDP rising a tepid 1½ percent for 2017 as a whole and 2¼ percent in 2019. Growth will be supported by accommodative monetary policy and fiscal reforms. Despite periodic bouts of political tension in the aftermath of the Petrobras scandal and the impeachment of the previous president, the government has succeeded in making progress on fiscal reform, including a cap on government spending growth equal to the inflation rate.

A faster-than-expected decline in inflation in December to a 12-month rate of 6.3 percent, just below the upper bound of the central bank's target range, has offered some respite. Against the backdrop of weak economic activity, a strengthening currency, and declining inflation, we expect more monetary easing than previously anticipated. Indeed, the Brazilian Central Bank reduced its policy rate 75 basis points at its January meeting, a larger-than-expected cut.

- *Turkey.* Throughout 2016, financial pressures on Turkey had been growing in the wake of a failed coup attempt, general geopolitical and security concerns, and rating downgrades by Moody's and S&P. As a result, real GDP shrank at a double-digit annual rate in the third quarter, the largest quarterly decline since the Global Financial Crisis. Since the beginning of the year, market concerns about Turkey have intensified, including an 8½ percent depreciation of the Turkish lira against the dollar. The pressures on Turkish assets appear to be exacerbated by recent terrorist attacks and concerns about the government's response to inflation risks. These developments are occurring amid an environment of significant external financing needs, slowing economic growth, and escalation of political and geopolitical uncertainty. With 12-month inflation rising to 8.6 percent in December, significantly above the 7 percent upper bound of the central bank's target range, the central bank is widely expected to raise its policy rate at its next meeting on January 24. However, some observers fear that political pressures could limit the central bank's ability to take the steps necessary to contain inflation.

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Int'l Econ Devel & Outlook

The Foreign GDP Outlook

Real GDP*

Percent change, annual rate

	2016			2017			2018	2019
	H1	Q3	Q4	Q1	Q2	H2		
1. Total Foreign	**1.9**	**2.9**	**2.3**	**2.4**	**2.5**	**2.5**	**2.6**	**2.6**
Previous Tealbook	*1.8*	*2.9*	*2.2*	*2.4*	*2.5*	*2.5*	*2.6*	*2.6*
2. Advanced Foreign Economies	**1.4**	**2.2**	**1.9**	**1.9**	**1.8**	**1.8**	**1.7**	**1.7**
Previous Tealbook	*1.3*	*2.4*	*1.8*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*
3.　　Canada	0.7	3.5	2.0	2.2	2.1	1.9	1.8	1.9
4.　　Euro Area	1.6	1.4	1.9	1.7	1.7	1.8	1.8	1.9
5.　　Japan	2.3	1.3	1.1	1.2	1.2	0.9	0.9	0.1
6.　　United Kingdom	2.0	2.3	1.9	1.6	1.6	1.6	1.6	1.7
7. Emerging Market Economies	**2.4**	**3.6**	**2.8**	**2.9**	**3.2**	**3.3**	**3.4**	**3.5**
Previous Tealbook	*2.4*	*3.5*	*2.7*	*3.0*	*3.1*	*3.3*	*3.4*	*3.5*
8.　　China	6.8	6.8	6.7	6.4	6.2	6.0	5.8	5.7
9.　　Emerging Asia ex. China	3.3	3.7	3.3	3.5	3.8	3.7	3.6	3.5
10.　　Mexico	1.1	4.0	2.0	1.6	2.0	2.1	2.5	2.8
11.　　Brazil	-1.8	-3.3	-1.0	0.8	1.6	2.0	2.1	2.2

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

Total Foreign GDP

Percent change, annual rate

Foreign GDP

Percent change, annual rate

The Foreign Inflation Outlook

Consumer Prices* Percent change, annual rate

	2016 H1	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 H2	2018	2019
1. Total Foreign	**1.7**	**1.6**	**2.4**	**2.8**	**2.6**	**2.5**	**2.5**	**2.6**
Previous Tealbook	*1.8*	*1.7*	*2.2*	*2.4*	*2.4*	*2.5*	*2.5*	*2.6*
2. Advanced Foreign Economies	**0.4**	**0.7**	**1.4**	**1.7**	**1.6**	**1.5**	**1.6**	**1.9**
Previous Tealbook	*0.5*	*0.7*	*1.4*	*1.6*	*1.6*	*1.5*	*1.6*	*1.8*
3. Canada	1.6	0.9	1.5	2.1	2.1	1.8	1.9	2.0
4. Euro Area	-0.0	1.1	1.9	1.6	1.3	1.4	1.5	1.6
5. Japan	-0.5	-0.9	0.2	0.6	0.9	1.0	1.2	2.5
6. United Kingdom	0.5	1.9	2.0	3.6	3.0	2.4	2.0	1.9
7. Emerging Market Economies	**2.7**	**2.2**	**3.1**	**3.6**	**3.3**	**3.2**	**3.1**	**3.1**
Previous Tealbook	*2.8*	*2.3*	*2.7*	*3.0*	*3.1*	*3.1*	*3.1*	*3.1*
8. China	2.4	1.3	2.6	2.2	2.5	2.5	2.5	2.5
9. Emerging Asia ex. China	1.7	1.1	2.8	2.4	2.8	3.0	3.2	3.4
10. Mexico	2.6	3.6	4.1	6.5	4.2	3.5	3.2	3.2
11. Brazil	9.6	6.5	2.6	4.4	5.4	5.2	4.9	4.5

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

Int'l Econ Devel & Outlook

Foreign Monetary Policy

AFE Policy Rates

Percent

AFE Central Bank Balance Sheets

Percent of GDP

EME Policy Rates

Percent

* 1-year benchmark lending rate.

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Recent Foreign Indicators

Int'l Econ Devel & Outlook

Nominal Exports

Jan. 2011 = 100

- Foreign
- AFE*
- EME**

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

Industrial Production

Jan. 2011 = 100

- Foreign
- AFE*
- EME**

* 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

12-month percent change

- Foreign
- AFE*
- EME**

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

Employment

4-quarter percent change

- Foreign
- AFE*
- EME**

* 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

12-month percent change

- Headline
- Core*

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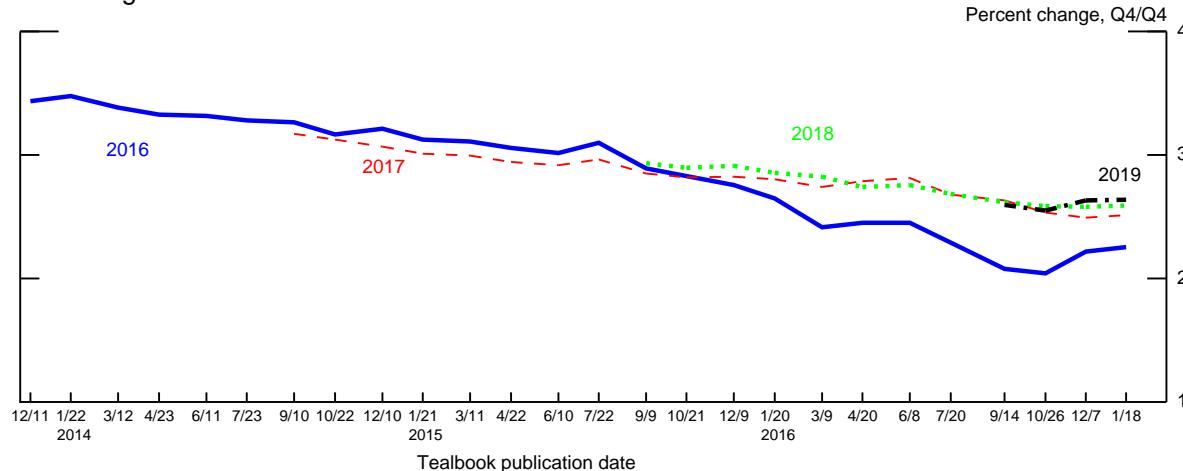
Consumer Prices: Emerging Market Economies

12-month percent change

- Headline*
- Ex. food--Emerging Asia**
- Ex. food--Latin America**

* Includes Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Singapore, Taiwan, Thailand.
** Excludes all food; staff calculation. Excludes Argentina and Venezuela.
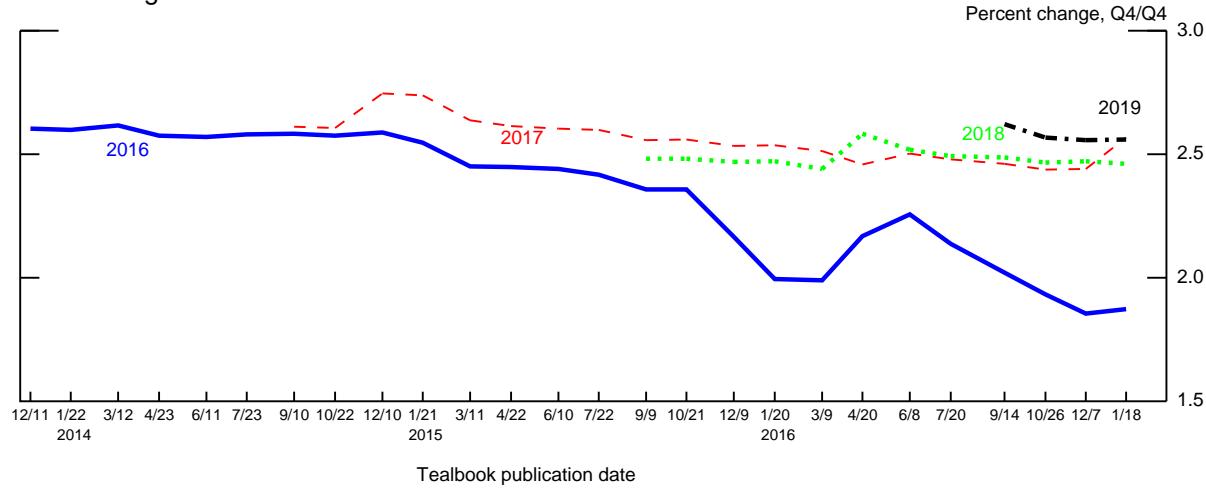
Evolution of Staff's International Forecast

Total Foreign GDP

Percent change, Q4/Q4

2016
2017
2018
2019

12/11 1/22 3/12 4/23 6/11 7/23 9/10 10/22 12/10 1/21 3/11 4/22 6/10 7/22 9/9 10/21 12/9 1/20 3/9 4/20 6/8 7/20 9/14 10/26 12/7 1/18
2014   2015   2016

Tealbook publication date

Total Foreign CPI

Percent change, Q4/Q4

2016
2017
2018
2019

12/11 1/22 3/12 4/23 6/11 7/23 9/10 10/22 12/10 1/21 3/11 4/22 6/10 7/22 9/9 10/21 12/9 1/20 3/9 4/20 6/8 7/20 9/14 10/26 12/7 1/18
2014   2015   2016

Tealbook publication date

U.S. Current Account Balance

Percent of GDP

2016
2017
2018
2019

12/11 1/22 3/12 4/23 6/11 7/23 9/10 10/22 12/10 1/21 3/11 4/22 6/10 7/22 9/9 10/21 12/9 1/20 3/9 4/20 6/8 7/20 9/14 10/26 12/7 1/18
2014   2015   2016

Tealbook publication date

Int'l Econ Devel & Outlook

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Int'l Econ Devel & Outlook

Financial Market Developments

Financial asset prices were generally little changed, on balance, over the intermeeting period. Nominal Treasury yields moved up notably across the curve in the days following the December FOMC meeting, but yields mostly trended down during the remainder of the period. Although market commentaries offered a variety of explanations for the decline, it is difficult to identify a clear catalyst. Meanwhile, broad domestic equity price indexes were about flat amid low volatility. Conversely, the dollar exhibited considerable volatility and ended the period somewhat higher.
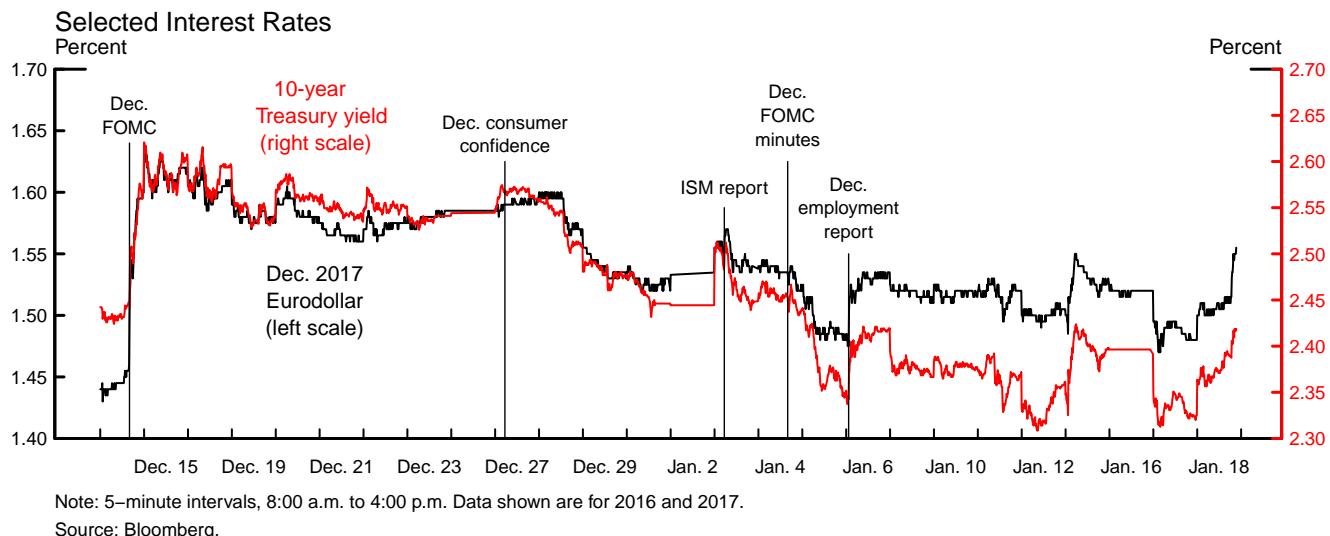
- Based on a straight read of market quotes, the probability of an increase in the target range for the federal funds rate at or before the March meeting was little changed at about 25 percent, while the cumulative probability of an increase at or before the June meeting ticked up to about 70 percent.

- Yields on 2- and 5-year nominal Treasury securities were little changed, while 10-year yields decreased 9 basis points on net.

- TIPS-based inflation compensation was essentially unchanged, on balance, at the 5-year horizon and increased 5 basis points at the 5-to-10-year horizon.

- Broad U.S. equity price indexes were little changed on net. Measures of option-implied stock price volatility remained near the lower ends of their ranges over the past several years, as did corporate bond spreads.

- The broad dollar index was up somewhat, on balance, largely reflecting a sizable appreciation of the dollar against the Mexican peso.

- Year-end dynamics in money markets largely followed the pattern of recent quarter-ends, although the upward pressure on repo rates at some past quarter-ends was absent at this year-end.

POLICY EXPECTATIONS AND ASSET MARKET DEVELOPMENTS
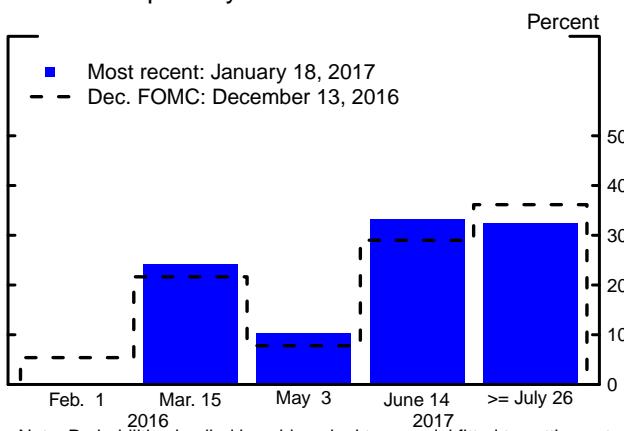
Domestic Developments

Although the Committee's decision to raise the target range for the federal funds rate at the December FOMC meeting was widely anticipated, some of the accompanying

Financial Markets

Policy Expectations and Treasury Yields

Selected Interest Rates

Percent

Percent

- Dec. FOMC
- 10-year Treasury yield (right scale)
- Dec. consumer confidence
- Dec. FOMC minutes
- ISM report
- Dec. employment report
- Dec. 2017 Eurodollar (left scale)

Left scale: 1.40, 1.45, 1.50, 1.55, 1.60, 1.65, 1.70

Right scale: 2.30, 2.35, 2.40, 2.45, 2.50, 2.55, 2.60, 2.65, 2.70

Dec. 15, Dec. 19, Dec. 21, Dec. 23, Dec. 27, Dec. 29, Jan. 2, Jan. 4, Jan. 6, Jan. 10, Jan. 12, Jan. 16, Jan. 18

Note: 5–minute intervals, 8:00 a.m. to 4:00 p.m. Data shown are for 2016 and 2017.
Source: Bloomberg.

Probability Distribution of the Timing of Next Rate Increase Implied by Federal Funds Futures

Percent

- Most recent: January 18, 2017
- Dec. FOMC: December 13, 2016

Feb. 1 2016, Mar. 15, May 3, June 14 2017, >= July 26

Note: Probabilities implied by a binominal tree model fitted to settlement prices on federal funds futures contracts taken at 2 p.m. CST under the assumption that the effective federal funds rate before the next FOMC meeting is equal to its 30–day moving average.
Source: CME Group; Federal Reserve Board staff estimates.

Implied Federal Funds Rate

Percent

- Most recent: January 18, 2017
- Dec. FOMC: December 13, 2016
- With model–based term premium
- With zero term premium

2017, 2018, 2019, 2020, 2021

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.

Treasury Yield Curve

Percent

- Most recent: January 18, 2017
- Dec. FOMC: December 13, 2016

Maturity in years: 2, 5, 10, 20, 30

Note: Smoothed yield curve estimated from off-the-run Treasury coupon securities. Yields shown are those on notional par Treasury securities with semiannual coupons.
Source: Federal Reserve Bank of New York; Federal Reserve Board staff estimates.

Inflation Compensation

Percent

- Daily
- 5 to 10 years ahead
- Dec. FOMC
- Jan. 18
- Next 5 years*

2014, 2015, 2016, 2017

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

communications were interpreted as less accommodative than expected. In particular, market commentaries focused on the upward revision to the median projection for the path of the federal funds rate this year in the Summary of Economic Projections. Investors also took note of references in the December minutes to an elevated level of uncertainty surrounding future fiscal policies and their potential effect on the economic outlook. Meanwhile, market participants appeared to interpret economic data releases over the period as a touch above expectations on balance.

Indicators of near-term expectations for the path of the federal funds rate generally appear little changed over the intermeeting period. Based on a straight read of quotes on federal funds futures, the risk-neutral probability of an increase in the target range for the federal funds rate at or before the March meeting was little changed at about 25 percent, while the cumulative probability of an increase at or before the June meeting edged up to about 70 percent. Both a straight read of the expected federal funds rate path from OIS quotes and the estimated path from a staff model that adjusts for term premiums were little changed, on net, suggesting no material change to expected policy rates over the medium term.

Treasury yields moved up immediately following the December FOMC meeting but generally decreased during the remainder of the intermeeting period, leaving 2- and 5-year yields little changed, on net, while the 10-year yield moved down 9 basis points. While market commentary offered various explanations for the decline, a clear catalyst is difficult to identify. Despite the decrease, the 10-year Treasury yield remains about 50 basis points higher than on the day before the elections. TIPS-based inflation compensation at the 5-to-10-year horizon moved up moderately, on net, since the December FOMC meeting and is now about 40 basis points higher than pre-election levels. One-year-ahead option-implied volatilities on swap rates showed that the uncertainty about the future level of long-term rates also remained elevated relative to pre-election levels.

Corporate capital markets were relatively tranquil over the period. Broad U.S. equity price indexes were little changed, on net, since the December FOMC meeting and fluctuated in a relatively narrow range. However, equity prices remain notably higher than pre-election levels, due in part to expectations for more expansionary fiscal policy in the medium term (see the box "Expected Dividend Growth since the Election"). Measures of option-implied stock price volatility at the 1- and 12-month horizons, as well

Financial Markets
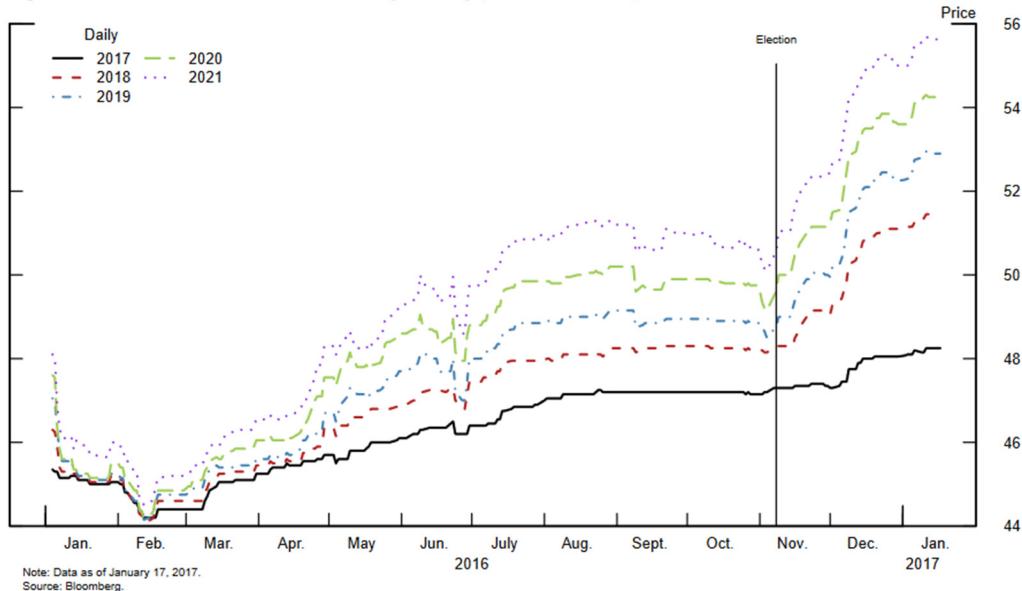
Expected Dividend Growth since the Election

Since the U.S. presidential election, broad measures of equity prices have increased significantly. In this discussion, we use prices of equity derivatives—specifically, dividend futures contracts based on dividends paid by firms in the S&P 500 stock price index—to interpret this move. They suggest that the recent increase in equity valuations appears to have been largely driven by a change in market participants' expectations regarding the growth rate of dividends over the next two years and, to a lesser extent, by an increase in the expected growth rate of dividends further out.

The holder of a long position in a dividend futures contract receives at maturity the difference between the dividends paid out by the companies in the S&P 500 over the year before expiration and the futures quote at the initiation of the long position.[1] Figure 1 plots the time series of the market quotes for contracts expiring during the period from 2017 through 2021. Market quotes fluctuated in a narrow range in the second half of 2016 and then increased markedly after the U.S. election; quotes for longer-dated contracts rose the most.[2]

Given the nature of these futures contracts, we can extract information from their prices about investors' views of future equity dividends.[3] In particular, using contracts with

Figure 1: S&P 500 Dividend Futures Prices by Maturity (Annual Contracts)

Note: Data as of January 17, 2017.
Source: Bloomberg.

[1] Dividend futures contracts are expressed in S&P 500 index points. For example, on December 15, 2016, the 2017 dividend futures contract was trading at 48 while the S&P 500 index closed at 2,262, which implies an expected dividend yield of 2.1 percent at the end of 2017.

[2] Market quotes for contracts maturing in 2016 were also available during 2016, but as dividends are announced much earlier than they are paid out to equity holders, they do not incur much uncertainty and are excluded from this analysis.
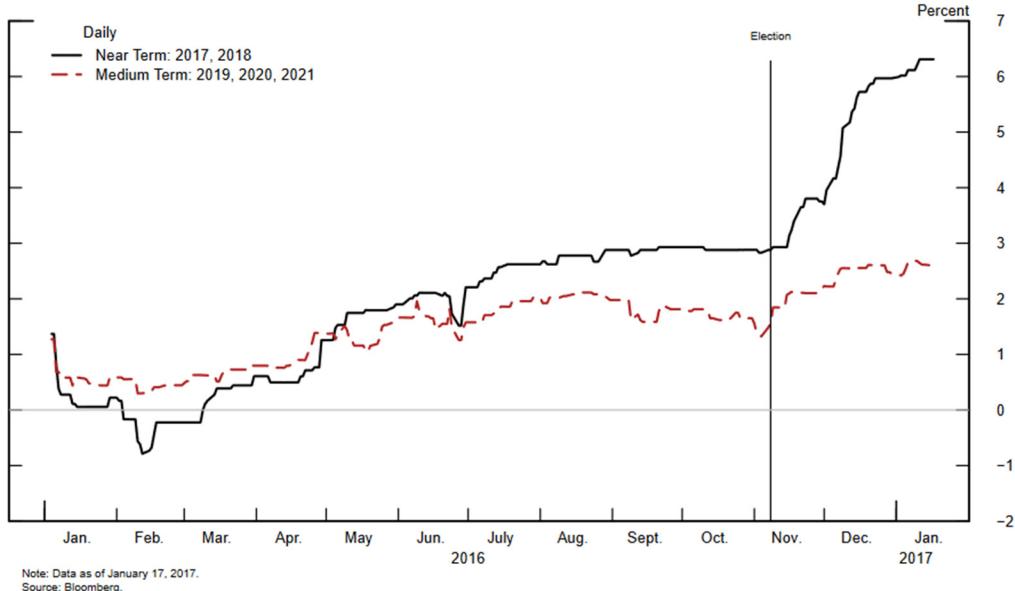
[3] The analysis assumes that dividend futures quotes do not reflect margin requirements, short-sale constraints, or any other form of limits to arbitrage.

different maturities, we can construct two measures of expected dividend growth: a "near term" expected average dividend growth measure for the years 2017 and 2018 and a "medium term" forward expected average dividend growth measure for the years 2019, 2020, and 2021.
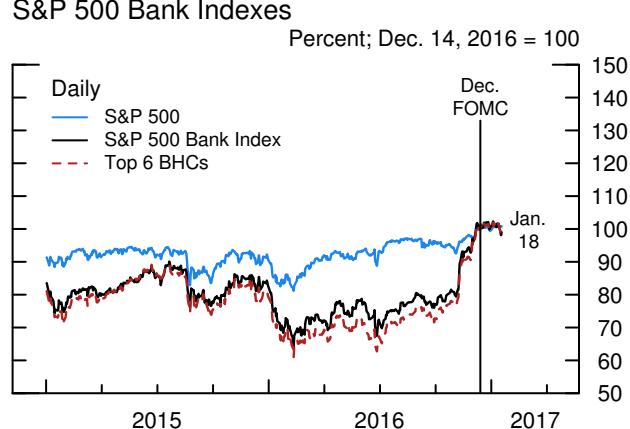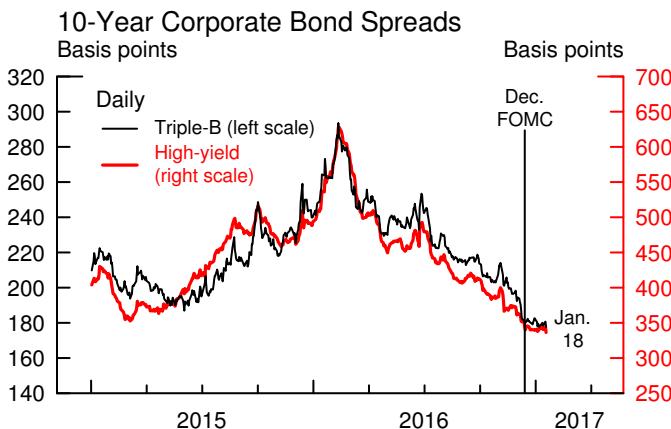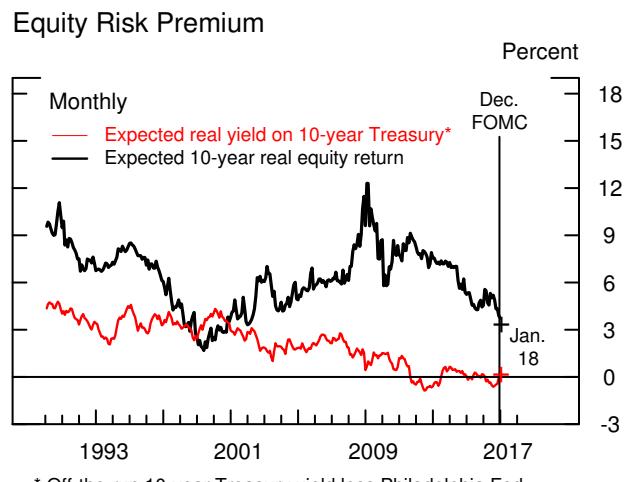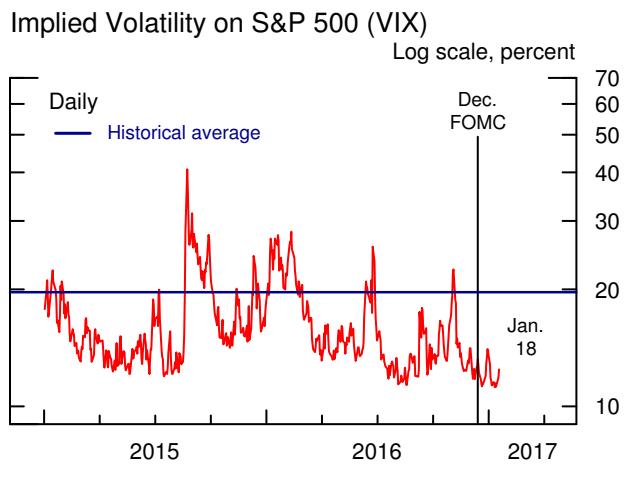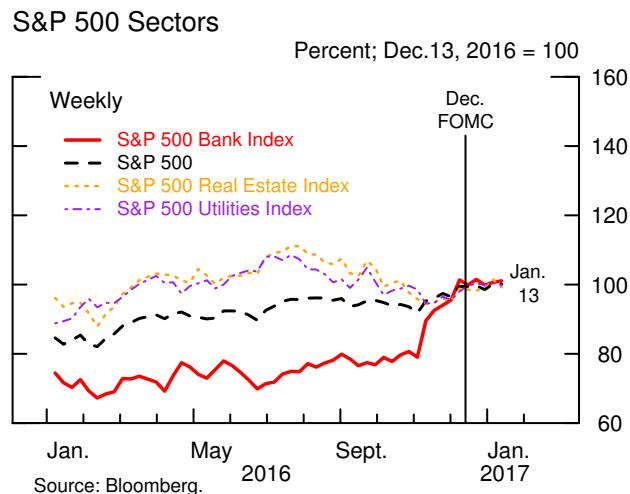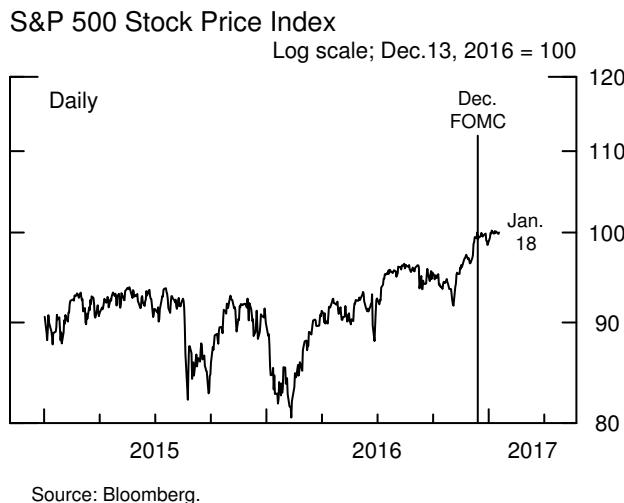
As shown in figure 2, the near-term measure of expected dividend growth rose gradually but significantly between mid-February and early November of last year. In contrast, the medium-term measure increased appreciably less, on balance, over the same period. Since the U.S. election, implied near-term dividend growth has jumped more than 3 percentage points, while medium-term growth has stepped up more moderately.

The increase in the medium-term measure could potentially reflect both a decline in the premium required by investors to hold equity risk and a revision in their forecasts for medium-term dividend growth. The fact that the near-term measure increased substantially more than the medium-term measure suggests that the run-up in the S&P 500 since the election mostly reflects investors' expectations of appreciably higher dividend growth over the next two years, perhaps reflecting a potential decrease in corporate taxes that would increase the level of after-tax profits and therefore dividends paid out. To put this revision in investors' expectations into historical perspective, the increase in the expected dividend growth rate would correspond to a movement in the two-year dividend growth rate for the S&P 500 from the 20th percentile to the 67th percentile of its historical distribution since 1985. Of course, a great deal of uncertainty remains about the eventual effect of potential changes in fiscal policy on corporate earnings and dividends.

Figure 2: Forward Expected Dividend Growth Rates

Note: Data as of January 17, 2017.
Source: Bloomberg.

Financial Markets

Corporate Asset Markets

S&P 500 Stock Price Index

Log scale; Dec.13, 2016 = 100

Source: Bloomberg.

S&P 500 Sectors

Percent; Dec.13, 2016 = 100

Source: Bloomberg.

Implied Volatility on S&P 500 (VIX)

Log scale, percent

Note: Historical average is taken from 1990 onward.
Source: Chicago Board Options Exchange.

Equity Risk Premium

Percent

* Off-the-run 10-year Treasury yield less Philadelphia Fed
10-year expected inflation.
+ Denotes latest observation using daily interest rates and stock
prices as well as staff forecast of corporate profits.
Source: Staff projections.

10-Year Corporate Bond Spreads

Basis points　　　　　　　　Basis points

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.

S&P 500 Bank Indexes

Percent; Dec. 14, 2016 = 100

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

Financial Markets

as 10-year investment- and speculative-grade corporate bond spreads, edged down over the intermeeting period to near the lower ends of their ranges over the past several years.

Bank equity prices slightly underperformed the broader market late in the intermeeting period, despite better-than-expected earnings releases from several large banks, as investors apparently reassessed the large rise in bank equity prices seen after the election. CDS spreads for the six largest BHCs declined a bit over the intermeeting period. In December, banks as a group reported net unrealized losses on securities holdings for the first time since 2014. Despite the large increase in yields for many fixed-income assets since the election, banks' net unrealized losses were rather small as a share of their total holdings.
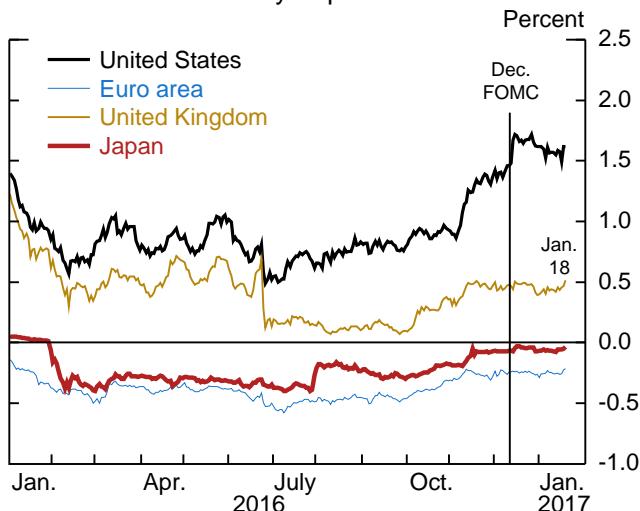
Foreign Developments

Although the dollar moved up immediately following the December FOMC meeting, it subsequently depreciated against the backdrop of solid foreign economic data and a reassessment of the post-election gains by investors, which seemed to be driven in part by uncertainty about the incoming Administration's fiscal and trade policies. On balance, the broad dollar index rose somewhat, with notable movements against some currencies. The dollar appreciated by 8¼ percent against the Mexican peso despite a rate hike and intervention activity by the Bank of Mexico; it rose 8¾ percent against the Turkish lira in the face of political and economic woes. Amid ongoing concerns about a "hard" Brexit, the dollar appreciated against the British pound by about 3¼ percent on net. Later in the period, the dollar rose sharply against the Canadian dollar and ended the period 1 percent higher. In contrast, the Chinese renminbi (RMB) appreciated against the dollar by about ¾ percent. Some market commentary suggested that Chinese authorities were engineering "two way" volatility in the RMB exchange rate to stem speculative capital outflows, as RMB fixing rates were set at unexpectedly strong levels and liquidity conditions in the offshore RMB market tightened noticeably during the first week of January.

On balance, asset price movements in foreign financial markets were consistent with a slight improvement in risk sentiment. Global equity prices were supported by better-than-expected economic data and, in Europe, by the passage of major risk events. Deutsche Bank reached a settlement with the U.S. Department of Justice on MBS-related charges, and the Italian government approved a funding package and other measures to support struggling domestic banks. Despite the improvement in the economic outlook in
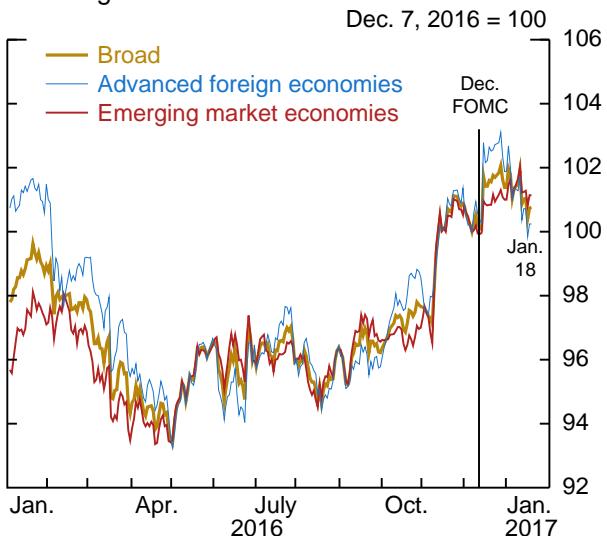
Foreign Developments

24-Month-Ahead Policy Expectations

Percent

- United States
- Euro area
- United Kingdom
- Japan

Dec. FOMC
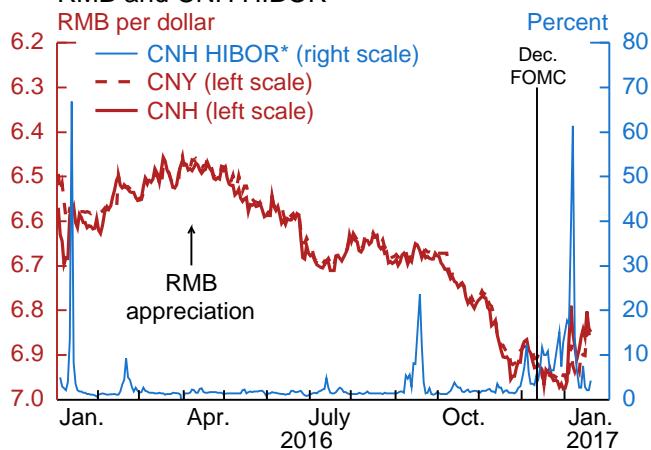
Jan. 18

Note: Based on overnight index swaps.
Source: Bloomberg; staff calculations.

RMB and CNH HIBOR

RMB per dollar

Percent

- CNH HIBOR* (right scale)
- CNY (left scale)
- CNH (left scale)

Dec. FOMC

RMB appreciation
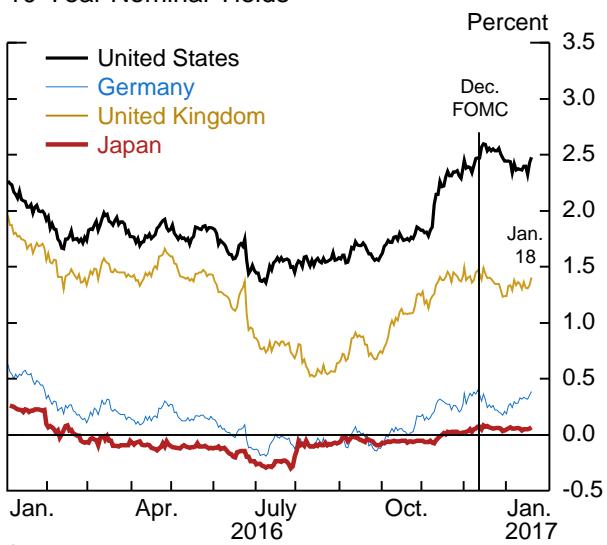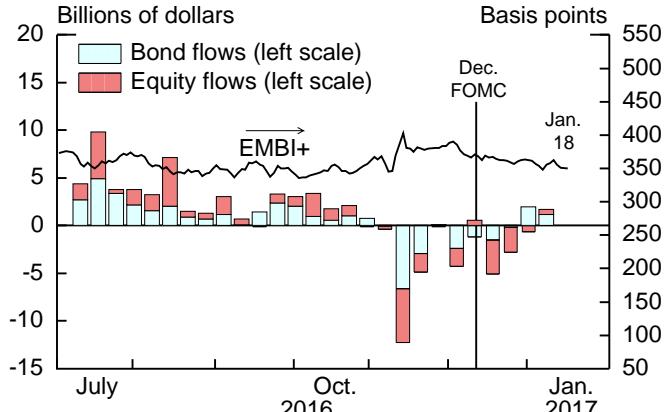
Note: CNH is offshore RMB. CNY is onshore RMB.
Last data point is Jan. 18.
  * Offshore RMB (CNH) overnight Hong Kong interbank offered rate (HIBOR).
  Source: Bloomberg.

Emerging Market Flows and Spreads

Billions of dollars

Basis points

- Bond flows (left scale)
- Equity flows (left scale)

Dec. FOMC

Jan. 18

EMBI+

Note: Emerging market bond spreads over zero-coupon Treasury securities. Excludes intra-China flows. EMBI+ is the J.P. Morgan Emerging Markets Bond Index Plus.
  Source: Bloomberg; Emerging Portfolio Fund Research.

Exchange Rates

Dec. 7, 2016 = 100

- Broad
- Advanced foreign economies
- Emerging market economies

Dec. FOMC

Jan. 18

Source: Bloomberg.

10-Year Nominal Yields

Percent

- United States
- Germany
- United Kingdom
- Japan

Dec. FOMC

Jan. 18

Source: Bloomberg.

Equity Market Indexes

Dec. 7, 2016 = 100

- S&P 500
- Euro Stoxx
- UK FTSE 100
- EME*

Dec. FOMC

Jan. 18

* Emerging market economies. MSCI local-currency index.
Source: Bloomberg; Datastream.

Financial Markets

the euro zone, longer-term yields in AFEs ended the period little changed, on net, in part because of spillovers from the lower U.S. Treasury yields. In the emerging markets, sovereign spreads narrowed modestly, and flows to EME funds turned positive in recent weeks.

SHORT-TERM FUNDING MARKETS AND FEDERAL RESERVE OPERATIONS
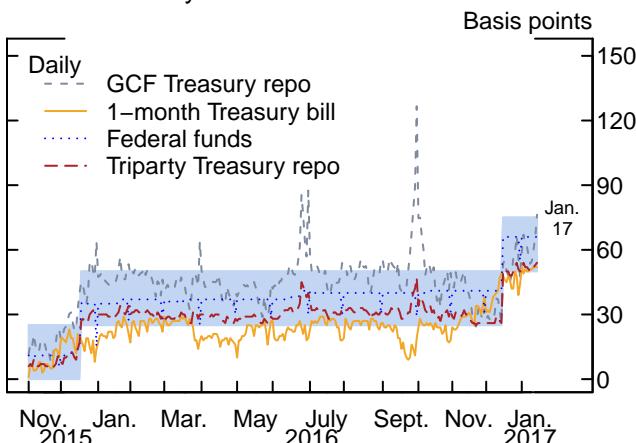
Similar to developments in December 2015, money market rates responded quickly to the change in the target range for the federal funds rate, and there were some temporary pressures on money market rates evident at year-end. The effective federal funds rate printed at 66 basis points every day, except for year-end, when the rate dropped to 55 basis points. The overnight repo rate for Treasury collateral increased to about 50 basis points in the days following the FOMC meeting and remained around that level in the days leading up to year-end. In contrast to recent quarter-ends, Treasury repo rates fell to just below the ON RRP rate at year-end. Market participants partially attributed this decline to the larger amount of cash available in the repo market from government MMFs, consistent with the large shift in assets from prime to government MMFs associated with money market funds reform. In the days leading into year-end, ON RRP take-up rose steadily, with ON RRPs outstanding reaching $468 billion at year-end. Subsequently, take-up retraced to levels seen earlier in December.

Abroad, year-end dynamics in most foreign money markets were generally orderly. However, very short-term FX swap bases at year-end widened notably, leading to modest increases in the take-up of dollar auctions at the Bank of Japan and the European Central Bank. Shortly thereafter, FX swap bases returned to levels closer to recent norms.

Conditions in other domestic short-term funding markets were generally stable over the intermeeting period. Reflecting the federal funds rate hike and associated rise in money market rates, net yields on money market fund investments moved up. Assets under management for MMFs changed little in recent weeks, with government funds experiencing modest net outflows and prime funds staying about flat. Flows into and out of large time deposits at banks were modest after having experienced large outflows in the lead-up to the deadline for implementation of money market funds reform.

Financial Markets

Monetary Policy Implementation and Short Term Funding Markets

Selected Money Market Rates

Basis points

Daily
- GCF Treasury repo
- 1–month Treasury bill
- Federal funds
- Triparty Treasury repo

Jan. 17
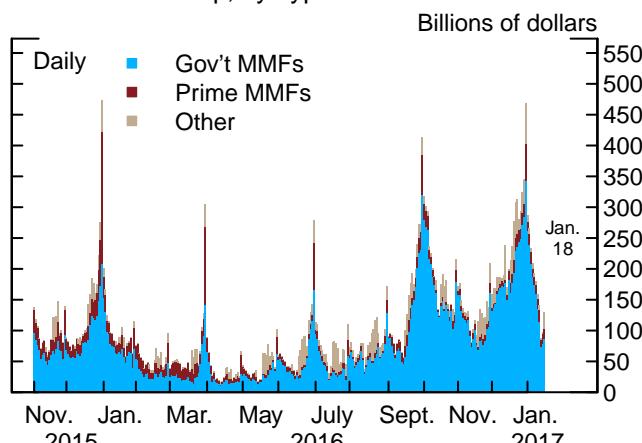
Note: Shaded area is the target range for the federal funds rate.
Federal funds rate is a weighted median. Triparty repurchase agreement (repo) rate is a weighted median. GCF is General Collateral Finance.
Source: Federal Reserve Bank of New York; Federal Reserve Board, Form FR 2420, Report of Selected Money Market Rates.

ON RRP Take–Up, by Type

Billions of dollars

Daily
- Gov't MMFs
- Prime MMFs
- Other

Jan. 18
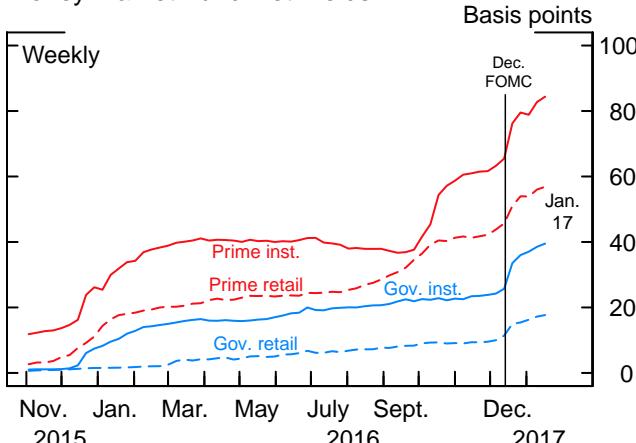
Note: ON RRP is overnight reverse repurchase agreement; MMFs are money market funds.
Source: Federal Reserve Bank of New York.
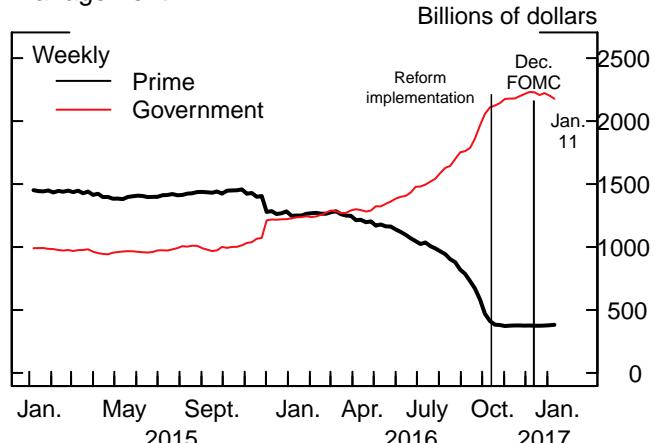
Money Market Fund Net Yields

Basis points

Weekly

Dec. FOMC

Prime inst.
Prime retail
Gov. inst.
Gov. retail

Jan. 17
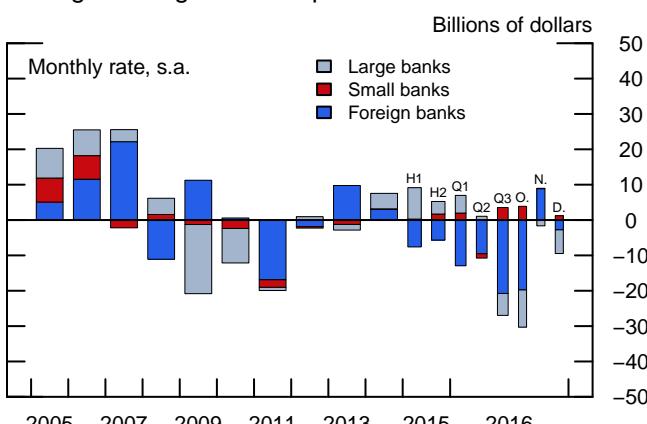
Note: Net yields are the annualized average yield, net of expense ratio, earned over the past 7 days without reinvesting dividends.
Source: iMoneyNet.

Prime and Government MMF Assets under Management

Billions of dollars

Weekly
- Prime
- Government

Reform implementation

Dec. FOMC

Jan. 11

Source: Calculations by the Federal Reserve Board based on data from the Investment Company Institute.

Change in Large Time Deposits

Billions of dollars

Monthly rate, s.a.
- Large banks
- Small banks
- Foreign banks

H1 H2 Q1 Q2 Q3 O. N. D.

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

Financial Markets

Authorized for Public Release

Financing Conditions for Businesses and Households

Financing conditions for nonfinancial businesses and households have remained generally accommodative in recent months and continue to be supportive of economic activity.

- Bank credit and nonbank credit remained largely available for small and large businesses and for most households. However, mortgage standards continued to be tight for households with low credit scores or harder-to-document income, and credit card standards remained tight for subprime borrowers.

- The January Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS) indicates that standards reportedly tightened for consumer loans and commercial real estate (CRE) loans but eased for commercial and industrial (C&I) loans and residential real estate loans.[1]

- Overall credit flows remained solid in recent months. The available data suggest that the net rise in interest rates since the summer has not had a substantial effect on the flow of credit, although CRE and household lending by banks slowed a bit in the fourth quarter.

BUSINESS FINANCING CONDITIONS

Financing conditions for nonfinancial firms have stayed accommodative in recent months, and credit remains widely available both from banks and from nonbank lenders.
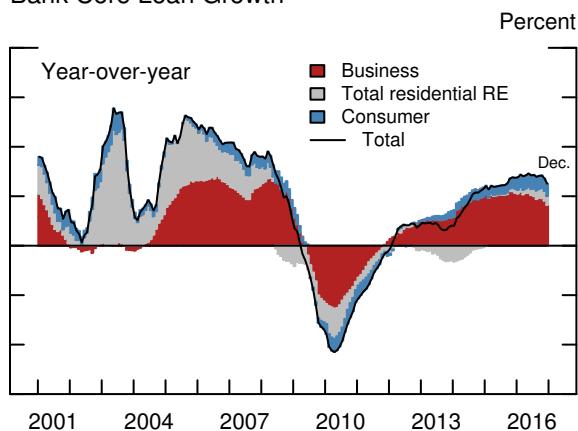
Commercial and Industrial Lending

After a slowdown in the third quarter, C&I loan growth at banks picked up in the fourth quarter, although it expanded at a pace that was lower than that of earlier in the year. In the January SLOOS, a modest net share of domestic banks reported easing C&I lending standards to large and medium-sized firms over the fourth quarter, while lending

---

[1] For each loan category, SLOOS results are calculated by weighting each bank's response by the size of its loan portfolio in that category. For detailed information on the results of the January survey, see Maya Shaton (forthcoming), "Senior Loan Officer Opinion Survey on Bank Lending Practices," memorandum to the FOMC, Board of Governors of the Federal Reserve System, Monetary Affairs.

Financing Conditions

Business Finance
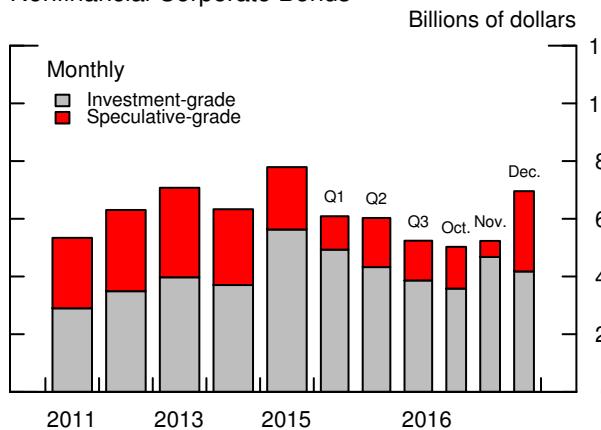
Bank Core Loan Growth

Percent

Note: RE is real estate. Business loans include C&I (commercial and industrial) and CRE (commercial real estate).
Source: Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Financial Ratios for Nonfinancial Corporations

Ratio   Ratio

Note: Data are annual through 1999 and quarterly thereafter.
Source: Compustat.

Gross Issuance of Nonfinancial Corporate Bonds

Billions of dollars

Note: Bonds are categorized by Moody's, Standard & Poor's, and Fitch.
Source: Mergent Fixed Income Securities Database.
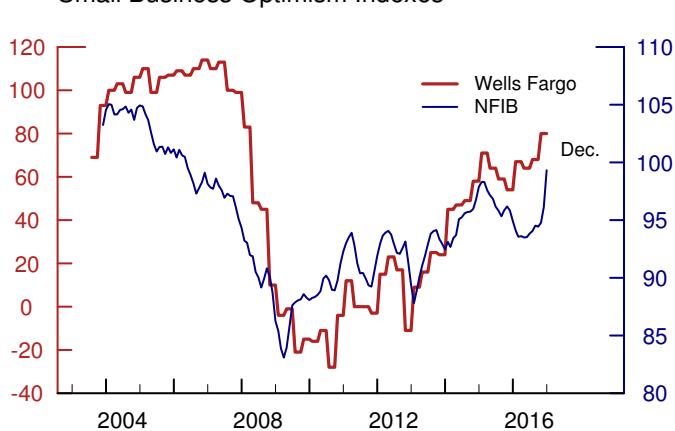
Changes in Standards for Commercial Real Estate Loans at Banks

Net percent

Note: Net percent is the fraction of loans accounted for by banks that reported having tightened standards minus the fraction of loans accounted for by banks that reported having eased standards.
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Commercial Real Estate Loans at Banks

Billions of dollars

Note: Data are seasonally adjusted.
Source: Federal Reserve Board, Form FR 2644, Weekly Report of Selected Assets and Liabilities of Domestically Chartered Commercial Banks and U.S. Branches and Agencies of Foreign Banks.

Small Business Optimism Indexes

Note: Wells Fargo data are monthly and not seasonally adjusted. NFIB (National Federation of Indepent Business) data are monthly and seasonally adjusted; a 3-month moving average is reported.
Source: Wells Fargo Small Business Survey; Small Business Economic Trends Data.

Financing Conditions

standards for small firms remained about unchanged. On net, surveyed banks also reported expecting their standards for C&I loans to ease somewhat in 2017.

Nonfinancial Corporate Debt and Equity Issuance

Nonfinancial corporations continued to find it relatively easy to raise funds in bond and equity markets. While aggregate corporate leverage remained very elevated, cash holdings are high, and debt service payments are low, due in part to interest rates that are still low by historical standards.

After a slowdown in November, gross issuance of corporate bonds rebounded in December to about its robust average pace over the past few years. Although early estimates suggest that issuance has weakened somewhat in January, relatively low yields indicate that bond financing conditions have remained accommodative overall. Institutional leveraged loan issuance was very strong in December. Gross equity issuance by nonfinancial firms was also solid in November and December, primarily reflecting a robust pace of seasoned offerings.

Commercial Real Estate Finance

Financing conditions in CRE markets remained largely accommodative, although results from the SLOOS indicate that banks tightened their lending standards somewhat over the course of 2016, especially for construction and land development loans, and are expected to tighten them a bit further in 2017. CRE loans at banks continued to grow in the fourth quarter, although at a somewhat slower pace than earlier in the year.
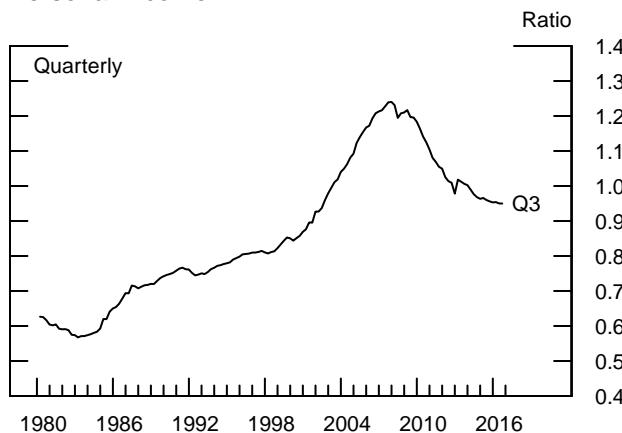
The commercial mortgage-backed securities (CMBS) market has also remained broadly supportive of CRE financing, and CMBS issuance was solid in the fourth quarter, in part because issuers tried to complete deals before the implementation of new risk retention rules in late December. The delinquency rate on CMBS moved up further in November, but this increase in delinquencies did not affect financing conditions, as it reflected delinquencies on loans originated before the financial crisis.

Small Business Finance

Credit supply to well-established small businesses remained generally accommodative. Although indicators of small business loan performance deteriorated slightly in recent months, they remained generally strong, and any credit quality concerns did not appear to hurt the ability of small businesses to obtain credit. Credit demand,

Financing Conditions

Household Finance
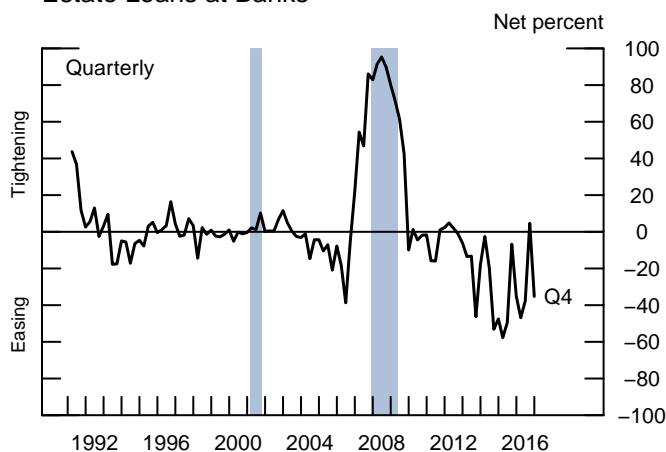
Household Debt relative to Disposable Personal Income

Ratio

Note: Includes only home mortgage debt and consumer credit.

Source: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

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

DTI ratio

Source: For frontiers shown with circles, McDash and CoreLogic; for frontiers shown with solid lines, Optimal Blue.
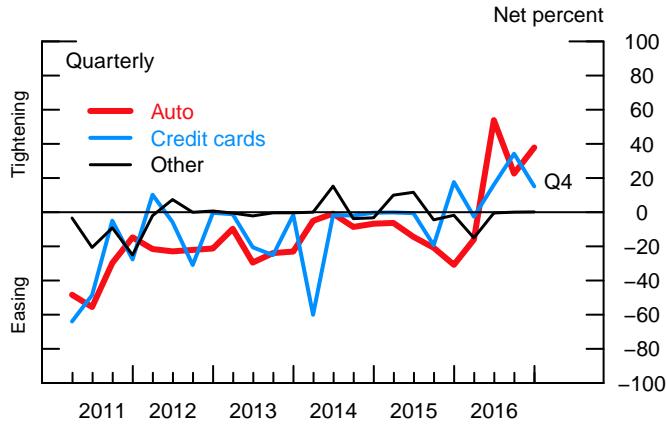
Changes in Standards for Residential Real Estate Loans at Banks

Net percent

Note: Series constructed by taking an average of net percentages across all residential real estate categories asked about in each quarter.
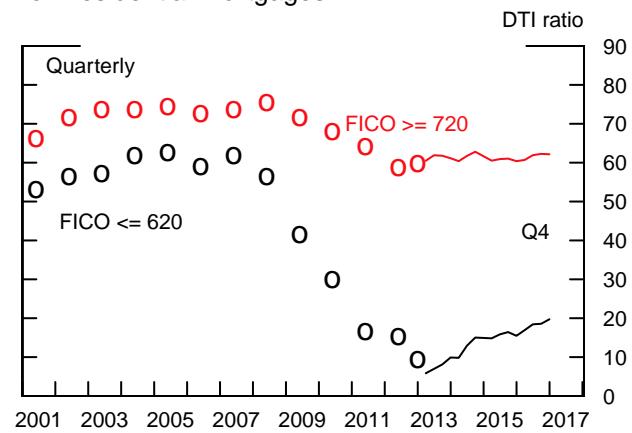
Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.
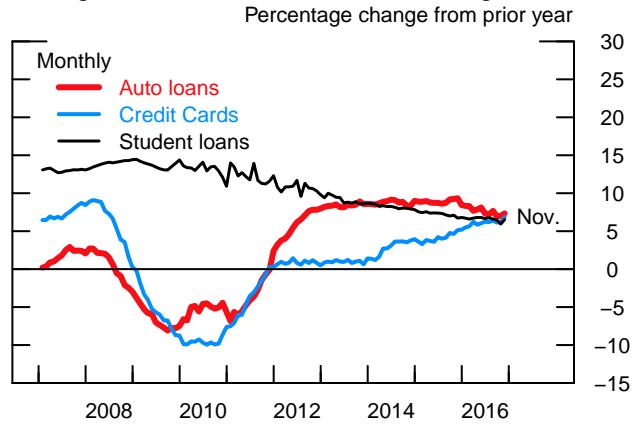
Mortgage Rate and MBS Yield

Rate

Note: For MBS (mortgage–backed security) yield, Fannie Mae 30–year current coupon rate. FRM is fixed–rate mortgage.

Source: For mortgage rate, Loansifter. For MBS yield, Barclays.

Changes in Standards for Consumer Loans at Banks

Net percent

Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices.

Change in Consumer Credit Outstanding

Percentage change from prior year

Note: Data are not seasonally adjusted.

Source: Federal Reserve Board.

Financing Conditions

however, continued to be weak despite some signs of strengthening in November. More recently, after the presidential election, indexes of small business optimism moved up significantly.

MUNICIPAL GOVERNMENT FINANCING CONDITIONS

Credit appeared generally available for state and local governments as well. Although gross issuance of municipal bonds decreased somewhat in December, early indications suggest that issuance is on pace to post a typical volume for January. In addition, ratios of yields on 20-year general obligation bonds to those on comparable-maturity Treasury securities have changed little, on net, in recent months, suggesting that financing conditions have not tightened for state and local governments.

HOUSEHOLD FINANCING CONDITIONS

Credit remained largely available to households with good credit scores, but mortgage lending was still very tight for households with low credit scores or harder-to-document income; credit card lending was still tight for households with low credit scores. Bank lending to households was solid in the fourth quarter, although somewhat slower than earlier in the year.

Household balance sheets remained supportive of credit provision. Total household debt, the sum of residential mortgages and consumer credit, increased at a moderate pace in the third quarter, leaving the ratio of household debt to disposable personal income little changed at around its 2002 level.

Residential Mortgages

Financing conditions for residential mortgages remained accommodative for most households. Our measure of the maximum debt-to-income ratio allowed for residential mortgages suggests that mortgage credit was broadly available to households with high and average credit scores.[2] However, mortgage credit conditions continued to be very tight for lower-score households, and improvements in recent years have been very slight. In early January, the Department of Housing and Urban Development announced that the Federal Housing Administration is planning to reduce the insurance premium on new

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[2] Our measure is a weighted average of the estimated maximum ratio of debt service to income that mortgage lenders will allow across a given set of borrower characteristics, including credit score. As such, it is a measure of mortgage credit supply.

Financing Conditions

loans 25 basis points, which would represent a small easing of credit for lower-score households. The January SLOOS indicated that banks eased lending standards across several categories of residential real estate loans in the fourth quarter.

In recent months, the interest rate on 30-year fixed mortgages has moved in line with that on comparable-maturity Treasury securities, rising notably after the election but retracing part of its increase since mid-December. Although the mortgage rate is higher than it was last summer, it is in the middle of the range seen over the past five years and remains low by historical standards. Available indicators suggest that purchase originations changed little in recent months despite higher mortgage rates, while refinance originations fell sharply. Bank lending for residential mortgages was solid in the fourth quarter, though its rate of growth was a touch lower than in the previous quarter. Issuance of mortgage-backed securities was also robust.

Consumer Credit

Consumer credit continued to be broadly available to households, although credit card lending standards remained tight for subprime borrowers. The average credit score of auto loans originated in recent quarters has trended up gradually across various types of lenders. A significant net fraction of January SLOOS respondents reported tightening standards on auto lending.[3] Moreover, a slightly smaller net fraction reported tightening credit card standards. On net, banks also reported expecting standards to tighten further on auto and credit card loans in 2017. Total consumer loan balances from both bank and nonbank sources increased at a robust rate through November, with credit card loans, student loans, and auto loans all increasing at a similar pace.

Delinquencies on credit card loans and on auto loans remained low through the third quarter. Delinquencies on student loans continued to move down gradually from elevated levels (see the box "Recent Dynamics of Student Loan Delinquencies" for a broader discussion).

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[3] Banks account for only about 40 percent of outstanding auto loans and for a smaller share of auto credit extended to nonprime borrowers.

Recent Dynamics of Student Loan Delinquencies

Unemployment rates for young individuals have been decreasing from an elevated level for several years, suggesting that economic conditions for the young have been improving (figure 1). As a result, borrowers currently repaying their student loans should be better positioned to pay back those debts than cohorts of several years ago. However, staff estimates derived from the FRBNY Consumer Credit Panel/Equifax (CCP) indicate that the delinquency rate of total student debt outstanding has remained stubbornly high in recent years (figure 2). These estimates raise the question of why we have not seen a decline in student loan delinquencies given the considerable improvements in the labor market as well as the debt repayment relief offered by the Department of Education's (DOE) income-driven repayment (IDR) plans for federal student loans.[1]

New staff analysis points to the shifting composition of student debt in the CCP data as having masked a decline in student loan delinquency rates since 2012. One distinctive characteristic of student loans is that, unlike other types of consumer debt, the repayment period is postponed until after a borrower has left school (rather than right after the loan is originated).[2] Thus, in the CCP data, student loans cannot be recorded as delinquent while borrowers remain in school. Holding all other factors constant, a material rise in the fraction of borrowers transitioning from school to the repayment period for their student debt could, mechanically, boost the estimated overall delinquency rate. And, as discussed later, a significant rise in the share of outstanding student debt requiring repayment does appear to have occurred in recent years.

A limitation of the CCP is that it does not contain school enrollment information, so it is impossible to know with certainty which student borrowers are already in the repayment period of their student loan obligations. To measure the delinquency rate among this category of borrowers, we construct an indicator of being in the repayment period based on the recency of their student debt. More specifically, we treat all borrowers in the CCP who opened their most recent student loan more than 365 days ago as being in the repayment period.[3] Figure 3 shows that this approximation results in a similar rate of balances in the CCP categorized as being in the repayment period as in the DOE data for federal loans.[4] Moreover, figure 3 shows that the percentage of balances in the repayment period has increased significantly in recent years, likely reflecting the outsized

---

[1] IDR plans are student loan repayment plans that help borrowers manage their debt by tying their monthly payments to their incomes. According to the DOE's data, enrollment in these plans for direct loan borrowers more than doubled in the last two years, from 2.5 million to 5.3 million.

[2] More precisely, student loan borrowers in general do not have to start repaying their student loans immediately after exiting school (or after their enrollment status drops to less than part time). The "waiting" period after exiting school and before repayment begins is known as the grace period and typically lasts six months.
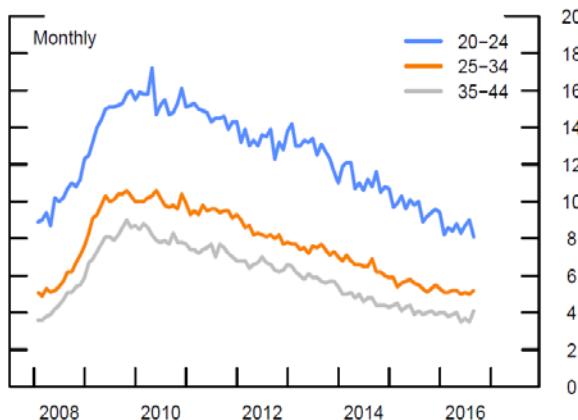
[3] Additionally, if borrowers are delinquent on at least one student loan in a given quarter, all of their balances are treated as being in the repayment phase.

[4] For comparability reasons, given the impossibility of knowing which loans are in deferment or forbearance statuses in the CCP (which, ideally, should not be included in the calculation of the delinquency rate for balances in the repayment period), the calculated rate of federal loan balances in repayment includes loans in deferment (for reasons different than being in school or in a grace period), forbearance, default, and other statuses.

Financing Conditions

cohort enrolled in higher education in the latter 2000s leaving school and entering the repayment period for their student debt. Specifically, we estimate that the fraction of total student loan balances in the repayment period climbed from about 55 percent at the end of 2010 to 80 percent in 2016:Q2.
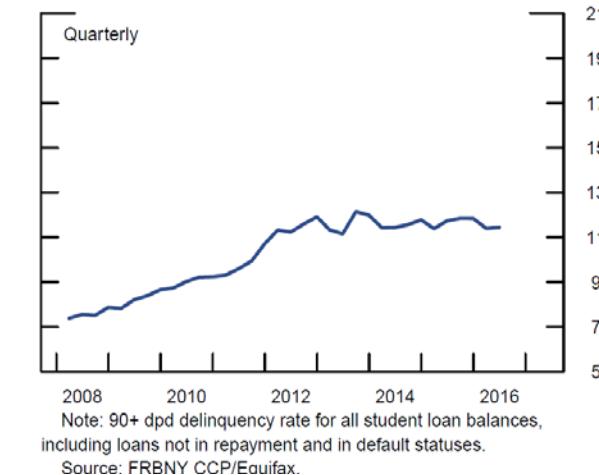
Thus, as shown in figure 4, focusing only on student debt in the repayment period in the CCP, the delinquency rate has been decreasing gradually, but steadily, for almost four years—a pattern more consistent with the improvements seen in the labor market. In particular, the delinquency rate for student loans in the repayment period—the solid blue line—decreased from 18.6 percent in 2012:Q2 to 14.6 percent in 2016:Q2. (The dashed line represents the delinquency rate when all loans are considered, including those in school deferment or in a grace period, already shown in figure 2.) This decrease suggests that much-improved job prospects, increased take-up in IDR plans, and perhaps other factors have contributed to better student loan performance in recent years.

Figure 1: Unemployment Rate for Young Individuals
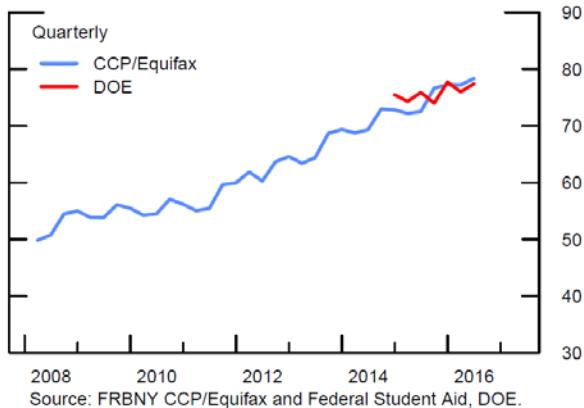
Note: Series are seasonally adjusted by BLS.
Source: Current Population Survey, BLS Data Series.

Figure 2: Percentage of Balances in Delinquency
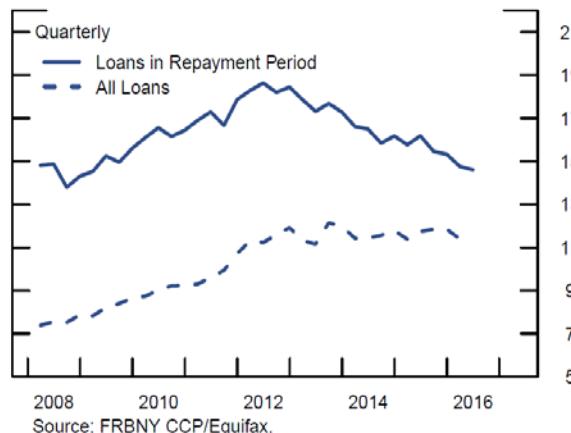
Note: 90+ dpd delinquency rate for all student loan balances, including loans not in repayment and in default statuses.
Source: FRBNY CCP/Equifax.

Figure 3: Percentage of Balances in the Repayment Period

Source: FRBNY CCP/Equifax and Federal Student Aid, DOE.

Figure 4: Percentage of Balances in Delinquency

Source: FRBNY CCP/Equifax.

Risks and Uncertainty

ASSESSMENT OF RISKS

The evidence regarding the magnitude of the uncertainty around our projections for real GDP growth and the unemployment rate is mixed. On balance, we now see that uncertainty as being somewhat higher than before the recent U.S. elections but nonetheless reasonably well in line with the average over the past 20 years (the benchmark used by the FOMC). On the one hand, the Baker, Bloom, and Davis index of economic policy uncertainty—although fluctuating widely from day to day and week to week—has, on average, been higher since the election than in the months prior. The options-implied expected volatility associated with longer-term Treasury securities has also moved up since the election, albeit only modestly. On the other hand, options-based indexes of expected stock market volatility (for example, the VIX) remain at subdued levels, as do corporate bond spreads.

We have maintained our assumption that the risks to our medium-term GDP projection are tilted to the downside, primarily because monetary policy is likely better positioned to offset large positive shocks than substantial adverse ones. While a rising federal funds rate implies increasing room for conventional monetary policy actions, in the staff's baseline outlook, there is not much room for accommodation in the event of a moderately large adverse shock over the next couple of years. Although we continue to view the risks as tilted to the downside, we view those risks as less pronounced than in the recent past, importantly because risks to the foreign outlook have subsided somewhat. We view the risks around our unemployment rate projection as aligned with those for GDP and, therefore, as skewed to the upside.

With regard to inflation, we do not view the current level of uncertainty as unusually high. We see important risks to inflation on both the upside and the downside, and we view those risks as roughly balanced. To the downside, some survey-based measures of longer-term inflation expectations are near historically low levels. In addition, as shown in one of the alternative scenarios, the projected divergence between domestic and foreign monetary policies could generate greater appreciation of the dollar than we have anticipated in the baseline forecast. To the upside, with the economy projected to be operating above its long-run potential, inflation may increase more than

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Alternative Scenarios

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

Measure and scenario	2017 H1	2017 H2	2018	2019	2020-21
Real GDP					
Extended Tealbook baseline	1.9	2.4	2.0	1.8	1.4
Larger fiscal expansion	1.9	2.8	2.4	2.1	1.5
No fiscal expansion	1.9	1.9	1.9	1.8	1.4
Stronger aggregate demand	3.3	2.7	1.8	1.6	1.3
Lower inflation expectations	1.9	2.4	2.0	1.9	1.5
Weaker productivity and faster wage growth	1.7	1.9	1.3	1.2	1.3
Stronger dollar and EME turbulence	1.5	1.5	1.4	1.9	1.6
Stronger foreign growth and weaker dollar	2.1	2.9	2.5	2.0	1.2
Unemployment rate[1]					
Extended Tealbook baseline	4.7	4.5	4.2	4.1	4.4
Larger fiscal expansion	4.7	4.4	3.9	3.7	3.7
No fiscal expansion	4.7	4.6	4.4	4.4	4.7
Stronger aggregate demand	4.3	4.1	4.0	4.0	4.4
Lower inflation expectations	4.7	4.5	4.3	4.1	4.3
Weaker productivity and faster wage growth	4.7	4.5	4.4	4.5	4.8
Stronger dollar and EME turbulence	4.7	4.7	4.7	4.7	4.8
Stronger foreign growth and weaker dollar	4.6	4.4	3.9	3.7	4.0
Total PCE prices					
Extended Tealbook baseline	1.8	1.6	1.8	1.9	2.1
Larger fiscal expansion	1.8	1.7	2.1	2.2	2.5
No fiscal expansion	1.8	1.5	1.7	1.8	2.0
Stronger aggregate demand	1.9	1.6	1.8	1.9	2.1
Lower inflation expectations	1.6	1.3	1.5	1.7	1.9
Weaker productivity and faster wage growth	2.2	2.2	2.6	2.8	2.9
Stronger dollar and EME turbulence	1.2	.7	1.3	1.8	2.0
Stronger foreign growth and weaker dollar	2.2	2.1	2.3	2.2	2.2
Core PCE prices					
Extended Tealbook baseline	1.7	1.6	1.9	2.0	2.1
Larger fiscal expansion	1.7	1.8	2.1	2.3	2.4
No fiscal expansion	1.7	1.6	1.8	1.8	1.9
Stronger aggregate demand	1.8	1.7	1.9	2.0	2.1
Lower inflation expectations	1.5	1.3	1.6	1.7	1.9
Weaker productivity and faster wage growth	2.1	2.2	2.6	2.8	2.8
Stronger dollar and EME turbulence	1.3	1.0	1.4	1.8	1.9
Stronger foreign growth and weaker dollar	1.9	2.0	2.3	2.2	2.2
Federal funds rate[1]					
Extended Tealbook baseline	.9	1.5	2.5	3.4	4.0
Larger fiscal expansion	.9	1.5	2.9	4.1	5.4
No fiscal expansion	.9	1.4	2.3	3.0	3.3
Stronger aggregate demand	1.1	1.8	3.0	3.7	4.2
Lower inflation expectations	.9	1.4	2.2	3.1	3.8
Weaker productivity and faster wage growth	1.0	1.7	3.1	4.0	4.5
Stronger dollar and EME turbulence	1.0	1.2	1.7	2.5	3.4
Stronger foreign growth and weaker dollar	1.0	1.8	3.2	4.2	4.6

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

the staff expects, consistent with the predictions of models that emphasize nonlinear effects of economic slack on inflation.

Our view of the risks to the economic outlook is informed by the staff's quarterly quantitative surveillance assessment, which judges the vulnerabilities in the U.S. financial system as moderate. The rise in prices in real estate and equity markets, as well as the narrowing of corporate bond spreads, signals an uptick in valuation pressures to a notable level. But the stability implications of these building pressures are mitigated by a number of factors. One is that capital and liquidity buffers at U.S. banks are strong and, according to the somewhat limited available data, leverage is moderate at nonbank financial institutions. Moreover, the reduction in assets under management at prime money funds that occurred through October in anticipation of money market fund reform has not reversed and points to a modest reduction in the risks associated with maturity transformation in the money market fund sector. Finally, the volume of credit being extended to the private nonfinancial sector as a whole remains moderate despite increased indications of high leverage in the corporate sector, as borrowing by households remains far below levels experienced late in the previous decade.

ALTERNATIVE SCENARIOS
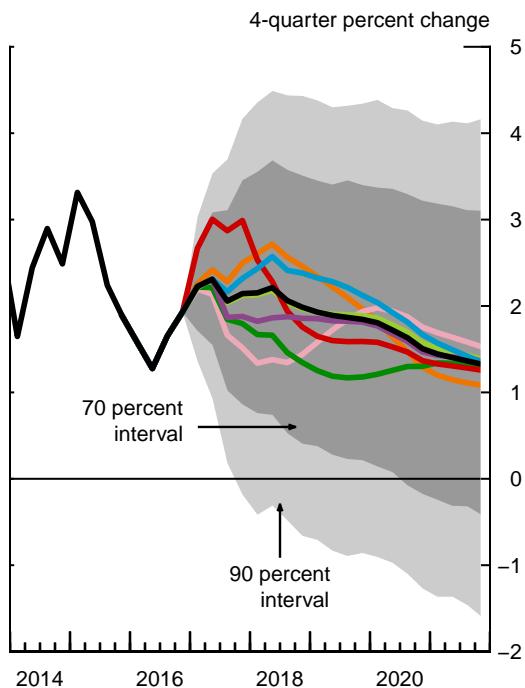
To illustrate some of the risks to the outlook, we construct alternatives to the baseline projection using simulations of staff models. The first scenario considers the effects of a future fiscal expansion that is larger and that has a different composition than in the staff baseline, while the second scenario assumes that the tax cut included in the staff baseline does not materialize. The third scenario illustrates the effects of greater momentum in private demand. In the fourth scenario, we examine possible consequences of lower long-term inflation expectations. We then consider the implications of subdued labor productivity growth paired with larger increases in wages in the fifth scenario. In the sixth scenario, we consider the possibility that U.S. monetary policy normalization leads to a much stronger appreciation of the dollar. The seventh and last scenario analyzes the consequences of stronger foreign growth and a weaker dollar.

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Risks & Uncertainty

Forecast Confidence Intervals and Alternative Scenarios
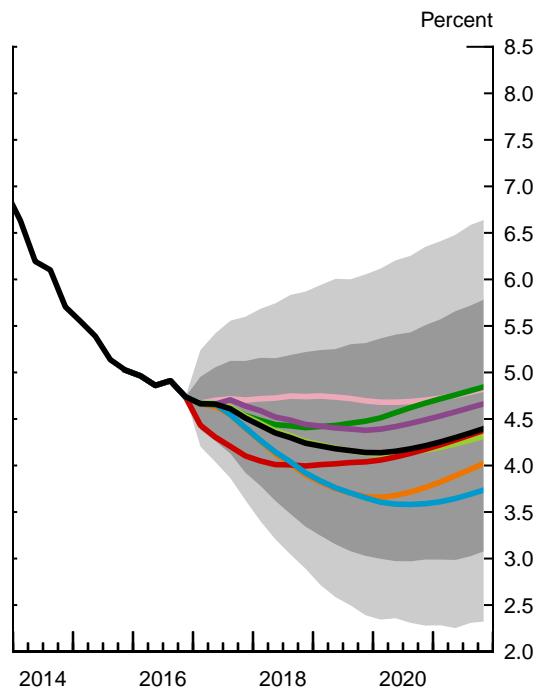
Confidence Intervals Based on FRB/US Stochastic Simulations

- ■ Extended Tealbook baseline
- ■ Larger fiscal expansion
- ■ No fiscal expansion
- ■ Stronger aggregate demand
- ■ Lower inflation expectations
- ■ Weaker productivity and faster wage growth
- ■ Stronger dollar and EME turbulence
- ■ Stronger foreign growth and weaker dollar

Real GDP

4-quarter percent change

70 percent interval

90 percent interval

Unemployment Rate

Percent

PCE Prices excluding Food and Energy

4-quarter percent change

Federal Funds Rate

Percent

Risks & Uncertainty
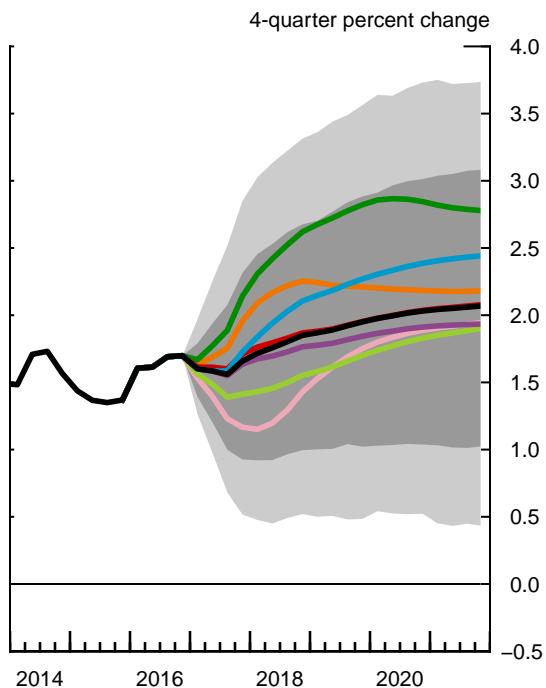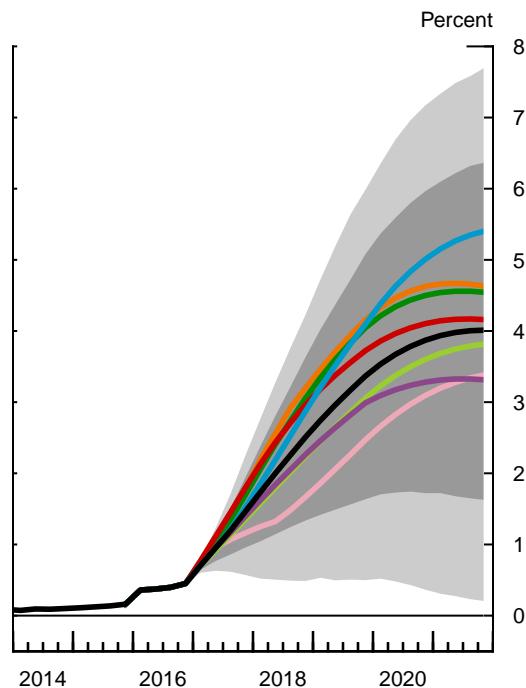
We simulate these scenarios in a variety of staff models, which are indicated in the scenario headings.[1] For the two fiscal policy scenarios, we assume different adjustments to the intercept in the inertial policy rule used in the baseline, as we will describe in further detail. In the other five scenarios, the federal funds rate is governed by the same rule as in the baseline. In all cases, we assume that the size and composition of the SOMA portfolio follow the baseline paths.

Larger Fiscal Expansion (simulated in FRB/US)

In the baseline projection, the staff is assuming a cut in personal income taxes equal to 1 percent of GDP debuting in 2017:Q3. In this scenario, we study the effect of a fiscal expansion that is larger and has a different composition: In addition to the tax cut considered in the baseline, we assume an increase in government purchases equal to 1 percent of GDP, phased in from 2017:Q3 onward.[2] We assume that half of the additional government spending is directed to public infrastructure.[3] In the long run, the intercept of the policy rule governing the federal funds rate converges to a level that is 25 basis points higher than in the baseline, and the 10-year Treasury rate is revised up 38 basis points.[4]

Real GDP growth is ¼ percentage point higher than in the baseline, on average, in 2018 and 2019, reflecting the effect on aggregate demand of the additional government spending. The unemployment rate follows a lower path, bottoming out at 3¾ percent in 2020. The tighter resource utilization puts upward pressure on inflation, which reaches 2½ percent by the end of 2021.[5] As a result, the federal funds rate follows a steeper path, reaching 5½ percent in 2021, about 1½ percentage points higher than in the baseline.

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[1] The models used are FRB/US, which is a large-scale macroeconometric model of the U.S. economy; EDO, which is an estimated medium-scale New Keynesian DSGE model; and SIGMA, which is a multicountry open-economy model.

[2] In particular, we assume that the additional government spending is phased in over a four-year period. Spending returns gradually to the baseline path thereafter.

[3] In an effort to capture supply-side effects of additional government spending, we assume that government investment in physical capital has an annual rate of return of 7 percent, consistent with the estimate in Congressional Budget Office (2016), *The Macroeconomic and Budgetary Effects of Federal Investment* (Washington: CBO, June), https://www.cbo.gov/publication/51628. This rate of return, together with the size and gradual implementation of government spending on infrastructure assumed in this scenario, implies only a small increment to potential output.

[4] These intercept adjustments are consistent with the adjustments that were made in the December Tealbook to the intercept in the policy rule and the longer-run value of the term premium.

[5] In this scenario and the next one, the responses of inflation are likely larger than the revisions that the staff would implement using its judgmental apparatus, in part because inflation in FRB/US

**Selected Tealbook Projections and 70 Percent Confidence Intervals Derived
from Historical Tealbook Forecast Errors and FRB/US Simulations**
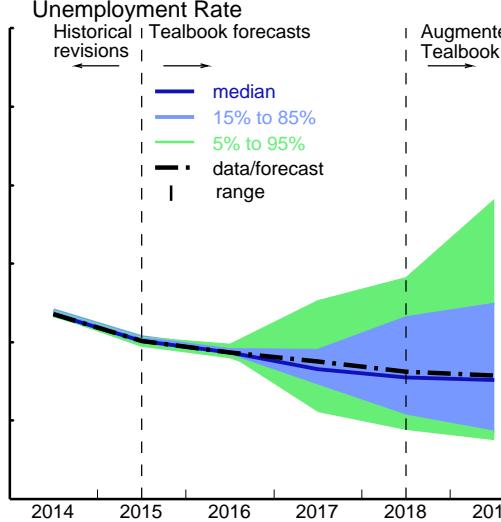
Measure	2016	2017	2018	2019	2020	2021
Real GDP						
(percent change, Q4 to Q4)						
Projection	1.9	2.1	2.0	1.8	1.5	1.3
Confidence interval						
Tealbook forecast errors	1.3–2.8	.6–3.8	-.4–3.6	-.8–3.3	. . .	. . .
FRB/US stochastic simulations	1.8–2.1	.9–3.5	.4–3.5	.2–3.4	-.2–3.2	-.4–3.1
Civilian unemployment rate						
(percent, Q4)						
Projection	4.7	4.5	4.2	4.1	4.2	4.4
Confidence interval						
Tealbook forecast errors	4.6–4.8	3.9–4.8	3.1–5.6	2.7–6.0	. . .	. . .
FRB/US stochastic simulations	4.7–4.7	3.9–5.1	3.3–5.2	3.0–5.3	3.0–5.5	3.1–5.8
PCE prices, total						
(percent change, Q4 to Q4)						
Projection	1.5	1.7	1.8	1.9	2.1	2.1
Confidence interval						
Tealbook forecast errors	1.4–1.8	1.1–3.1	1.0–3.4	1.1–3.3	. . .	. . .
FRB/US stochastic simulations	1.4–1.5	.9–2.4	.9–2.7	.9–2.9	1.0–3.2	1.0–3.2
PCE prices excluding						
food and energy						
(percent change, Q4 to Q4)						
Projection	1.7	1.7	1.9	2.0	2.0	2.1
Confidence interval						
Tealbook forecast errors	1.5–2.1	1.4–2.3	1.3–2.6	. . .	. . .	. . .
FRB/US stochastic simulations	1.6–1.7	.9–2.3	1.0–2.7	1.0–2.9	1.0–3.0	1.0–3.1
Federal funds rate						
(percent, Q4)						
Projection	.4	1.5	2.5	3.4	3.9	4.0
Confidence interval						
FRB/US stochastic simulations	.4–.4	1.0–1.9	1.3–3.6	1.6–5.1	1.7–6.0	1.6–6.4

Note: Shocks underlying FRB/US stochastic simulations are randomly drawn from the 1969–2015 set of model equation residuals. Intervals derived from Tealbook forecast errors are based on projections made from 1980 to 2015 for real GDP and unemployment and from 1998 to 2015 for PCE prices. The intervals for real GDP, unemployment, and total PCE prices are extended into 2019 using information from the Blue Chip survey and forecasts from the CBO and CEA.

. . . Not applicable.
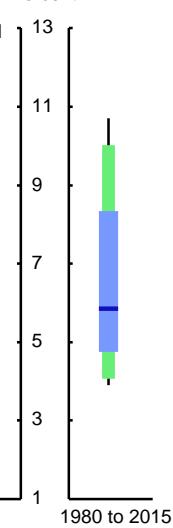
Prediction Intervals Derived from Historical Tealbook Forecast Errors

Risks & Uncertainty

Forecast Error Percentiles
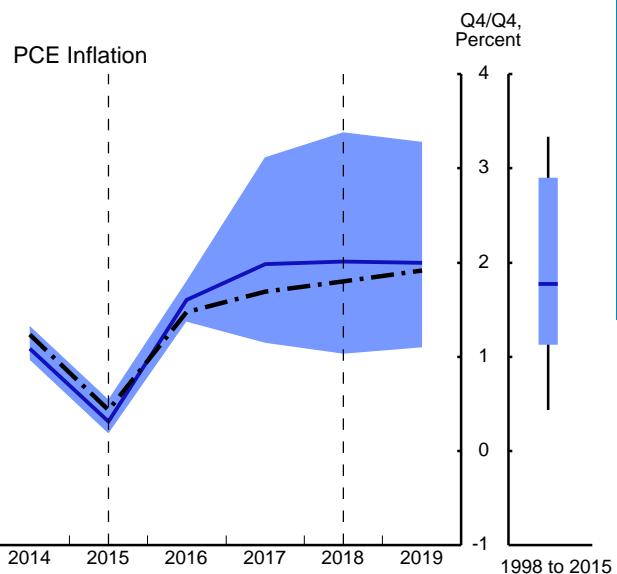
Historical Distributions

Q4 Level, Percent

Unemployment Rate

Historical revisions | Tealbook forecasts | Augmented Tealbook[1]

- median
- 15% to 85%
- 5% to 95%
- data/forecast
- range

1980 to 2015

PCE Inflation

Q4/Q4, Percent

1998 to 2015
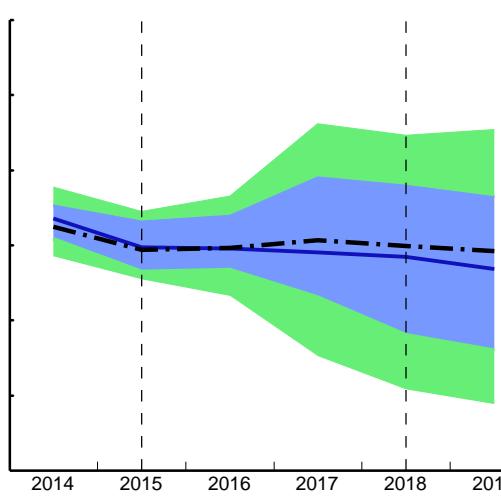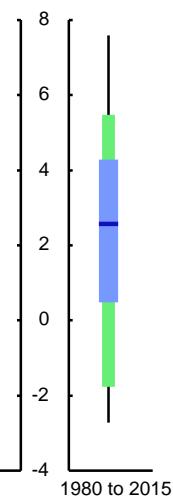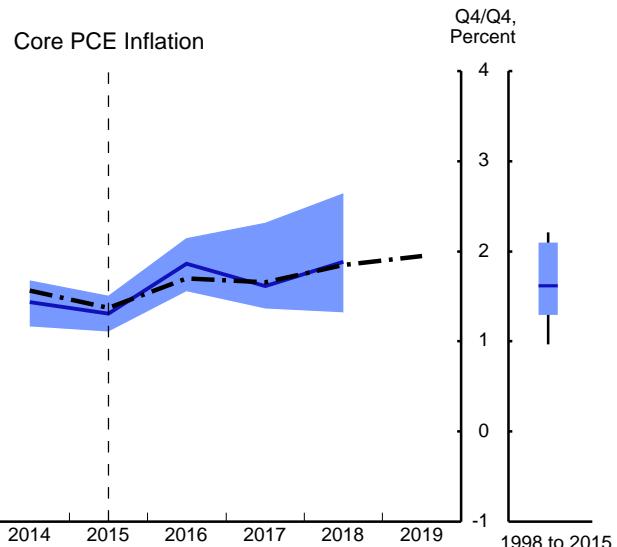
Real GDP Growth

Q4/Q4, Percent

1980 to 2015

Core PCE Inflation

Q4/Q4, Percent

1998 to 2015
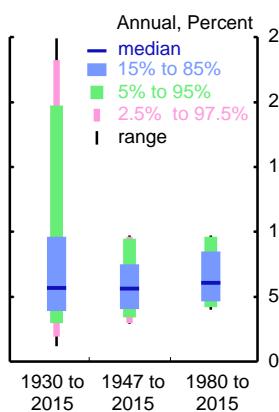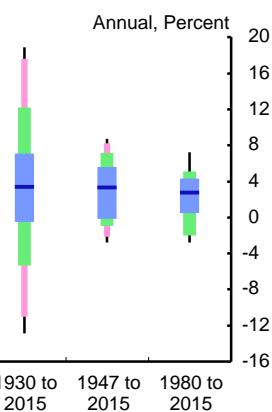
Historical Distributions

Unemployment Rate

Annual, Percent

- median
- 15% to 85%
- 5% to 95%
- 2.5% to 97.5%
- range

1930 to 2015 | 1947 to 2015 | 1980 to 2015

Real GDP Growth

Annual, Percent

1930 to 2015 | 1947 to 2015 | 1980 to 2015

PCE Inflation

Annual, Percent

1930 to 2015 | 1947 to 2015 | 1998 to 2015

Core PCE Inflation

Annual, Percent

1930 to 2015 | 1947 to 2015 | 1998 to 2015
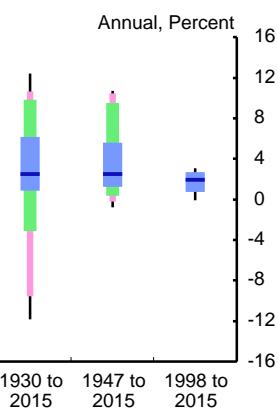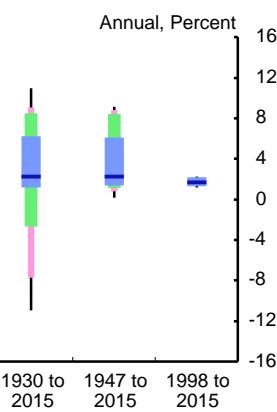
Note:. See the technical note in the appendix for more information on this exhibit.

1. Augmented Tealbook prediction intervals use 1- and 2-year-ahead forecast errors from Blue Chip, CBO, and CEA to extend the Tealbook prediction intervals through 2019.

Risks & Uncertainty

No Fiscal Expansion (simulated in FRB/US)

Enactment of fiscal expansion is not assured. This scenario posits that the fiscal expansion assumed in the baseline does not materialize. As a consequence, we also unwind the adjustments to the rule for setting the federal funds rate and to the long-term interest rate term premium made in the baseline projection in the December Tealbook.

Without the fiscal expansion, real GDP growth is slightly weaker than in the baseline and unemployment is higher, by about ¼ percentage point starting at the end of this year. In addition, inflation follows a lower trajectory.[6] These developments—as well as the adjustment to the policy rule—leave the federal funds rate about ½ percentage point below the baseline at the end of 2020.

Stronger Aggregate Demand (simulated in EDO)

Several indicators of consumer and business confidence have increased significantly in the past month or two. Furthermore, motor vehicle sales in December were strong, and there are increasing signs of wage acceleration, which could support household income and further boost confidence. Motivated by these upbeat developments, this scenario assumes a considerable improvement in animal spirits, which spurs faster consumer and business spending.[7]

In this scenario, real GDP rises 3 percent in 2017, compared with 2¼ percent in the baseline projection. The unemployment rate falls faster than in the baseline, bottoming out at around 4 percent by the end of 2018; it then edges up over the remainder of the forecast period and returns to the baseline level by late 2021. Inflation is little changed, while the federal funds rate rises more steeply and is as much as ½ percentage point higher than the baseline in late 2018.[8]

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generally moves more with demand than it does in the staff judgmental projection. More important, to better capture the long-lasting changes to fiscal policy, we assume model-consistent expectations as opposed to VAR expectations that are more typical for alternative simulations in FRB/US. It turns out that the inflation response in these scenarios is larger with model-consistent expectations than with VAR expectations.

[6] For the unemployment rate, this No Fiscal Expansion scenario comes very close to unwinding the effect of the fiscal policy that was built into the baseline in the December round. For inflation, as noted previously, the inflation effect is larger than in the staff judgmental apparatus.

[7] We generate this scenario by applying a positive shock of one standard deviation to the model's main driver of aggregate demand.

[8] In some respects, this scenario is similar to the Larger Fiscal Expansion scenario in that both feature an increase in aggregate demand. However, their macroeconomic consequences are notably

Lower Inflation Expectations (simulated in FRB/US)

The University of Michigan Surveys of Consumers measure of longer-run inflation expectations of households has been trending down for some time. As we have noted in the past, it is not altogether clear that these survey-based readings are relevant for actual wage and price setting, and other measures have not moved in this direction.[9] However, in this scenario, we assume that the downtrend is relevant, and we illustrate the risks from inflation expectations that are ½ percentage point lower than in the baseline in the first quarter of 2017. Thereafter, longer-run expectations are affected by the economy's experience of inflation but return to the FOMC's objective in the long run.

Under these circumstances, headline inflation is only 1½ percent in 2017, ¼ percentage point below the baseline, and rises to only 1¾ percent in 2019. Inflation remains persistently below target in part because the baseline policy rule does not respond very aggressively to inflation deviations. The federal funds rate runs about ¼ percentage point lower than the baseline for several years. Real GDP growth and the unemployment rate are roughly at the baseline, in part because real interest rates on longer-dated bonds are little changed.

Weaker Productivity and Faster Wage Growth (simulated in FRB/US)

In the baseline, despite an unemployment rate that is persistently below the natural rate of unemployment, inflation remains subdued, consistent with the modest response of prices to economic activity seen in recent years. However, we do not claim to know the relationship between resource slack and inflation with great precision. It is possible, for example, that wages may prove more sensitive to a tight labor market than we have assumed, and the resulting higher wages may pass through into higher prices. In this scenario, wage inflation responds more to economic slack than assumed in the baseline, resulting in larger gains in labor compensation. Additionally, we assume that labor productivity growth is slower than in the baseline.

Higher wages and lower productivity imply higher costs of production, and in the FRB/US model, these higher costs pass through to price inflation. Accordingly, PCE

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different, in part because they are simulated in different models. Furthermore, the shocks in the Stronger Aggregate Demand scenario are calibrated to a typical aggregate demand shock, while the shocks in the Larger Fiscal Expansion scenario are calibrated to a very specific and long-lasting fiscal expansion.

[9] For example, the Federal Reserve Bank of Atlanta's measure of longer-run expectations of unit costs reported by businesses in the Sixth District is near the middle of its range since its introduction in 2012.

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prices accelerate more than in the baseline and rise 2¾ percent in 2019. The weaker path of labor productivity lowers aggregate demand because of reduced permanent income and raises the unemployment rate above the baseline. At the end of 2020, the unemployment rate is ½ percentage point higher than in the staff projection. The federal funds rate rises ½ percentage point above the baseline, largely because of higher inflation.

Stronger Dollar and EME Turbulence (simulated in SIGMA)

The staff baseline projects that the dollar will appreciate about 5 percent over the forecast period as the federal funds rate rises somewhat faster than markets currently appear to expect. The normalization of U.S. monetary policy, however, could well cause a more pronounced and persistent appreciation of the dollar, especially if higher U.S. interest rates generate financial turbulence in vulnerable EMEs. In this scenario, we assume that the broad real dollar appreciates an additional 10 percent by the end of the year and that EME corporate borrowing spreads rise substantially in the face of persistent capital outflows from EMEs. Despite weakening macroeconomic conditions in EMEs, we assume EME central banks tighten monetary policy to mitigate upward pressure on inflation arising from the depreciation of their currencies. All told, foreign GDP growth runs, on average, about ¾ percentage point below the baseline in 2017 and 2018.

The stronger dollar and weaker foreign growth depress U.S. real net exports. Consequently, U.S. real GDP growth moderates to about 1½ percent in 2017, nearly ¾ percentage point less than in the baseline. Lower import prices and weaker economic activity keep core PCE inflation below 1½ percent through 2018. The federal funds rate follows a shallower path than in the baseline, rising to only 2½ percent by the end of 2019, nearly 1 percentage point lower than in the baseline.

Stronger Foreign Growth and Weaker Dollar (simulated in SIGMA)

In our baseline forecast, we see the headwinds facing the foreign economies as diminishing only gradually as foreign output expands at a modest pace and underlying inflation slowly edges closer to central bank targets. However, some foreign industrial production and trade indicators have come in somewhat stronger than expected in recent months, and the expansion abroad may prove faster, especially if highly accommodative monetary policies in the AFEs boost aggregate demand more than assumed in the baseline. In this scenario, we assume that foreign GDP growth rises to about 3½ percent in 2017 and 2018 and thus averages about 1 percentage point per year higher than under

our baseline projection. Increased optimism about the durability of the foreign recovery—and the perception of diminished tail risks—causes the broad real dollar to fall 8 percent relative to the baseline by the end of 2018.

U.S. real GDP expands 2½ percent in 2017 and 2018, nearly ½ percentage point more than in the baseline, as the weaker dollar and stronger foreign growth boost U.S. real net exports. The unemployment rate falls to 3¾ percent by the end of 2019. Higher import prices and heightened resource pressures cause core PCE inflation to move persistently above 2 percent in 2018 and 2019. The federal funds rate rises more quickly, increasing to 4¼ percent by the end of 2019 compared with 3½ percent in the baseline.

Risks & Uncertainty

Assessment of Key Macroeconomic Risks (1)

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	.06	.06	.03	.05
Previous Tealbook	.06	.08	.06	.06
Less than 1 percent				
Current Tealbook	.18	.18	.08	.19
Previous Tealbook	.18	.14	.04	.18

Probability of Unemployment Events

(4 quarters ahead)

Probability that the unemployment rate will . . .	Staff	FRB/US	EDO	BVAR
Increase by 1 percentage point				
Current Tealbook	.03	.03	.15	.02
Previous Tealbook	.03	.03	.18	.02
Decrease by 1 percentage point				
Current Tealbook	.08	.08	.11	.12
Previous Tealbook	.07	.08	.10	.12
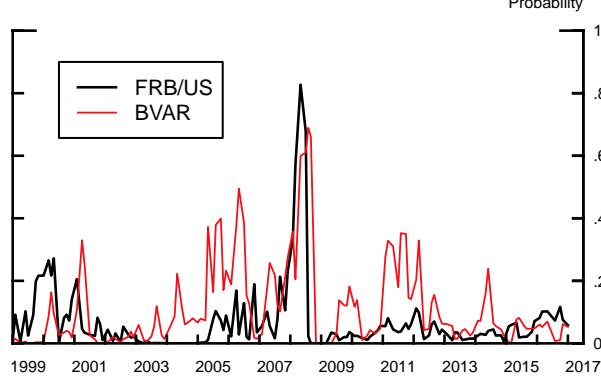
Probability of Near-Term Recession

Probability that real GDP declines in the next two quarters	Staff	FRB/US	EDO	BVAR	Factor Model
Current Tealbook	.03	.01	.04	.04	.02
Previous Tealbook	.02	.02	.06	.06	.00
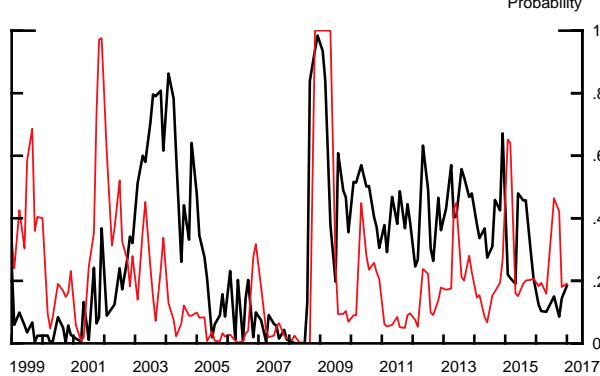
Note: "Staff" represents stochastic simulations in FRB/US around the staff baseline; baselines for FRB/US, BVAR, EDO, and the factor model are generated by those models themselves, up to the current-quarter estimate. Data for the current quarter are taken from the staff estimate for the second Tealbook 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.

Assessment of Key Macroeconomic Risks (2)
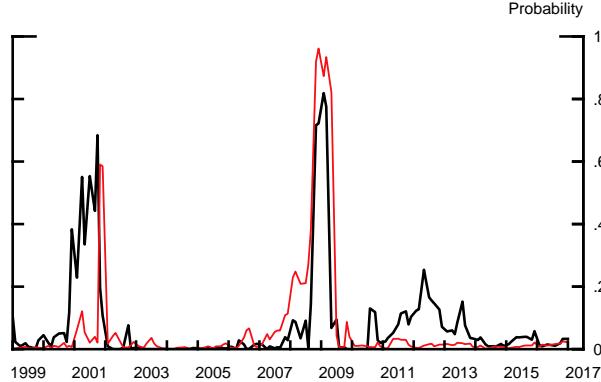
Probability that Total PCE Inflation Is above 3 Percent
(4 quarters ahead)
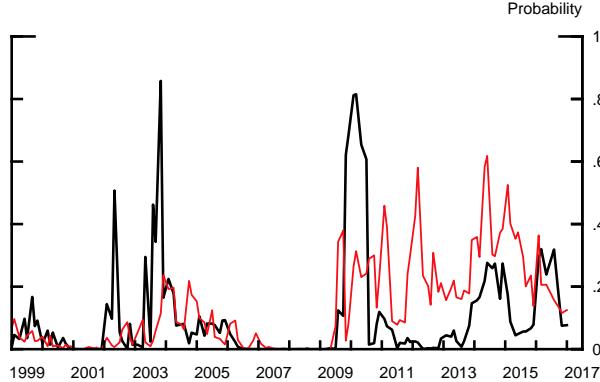
Probability that Total PCE Inflation Is below 1 Percent
(4 quarters ahead)
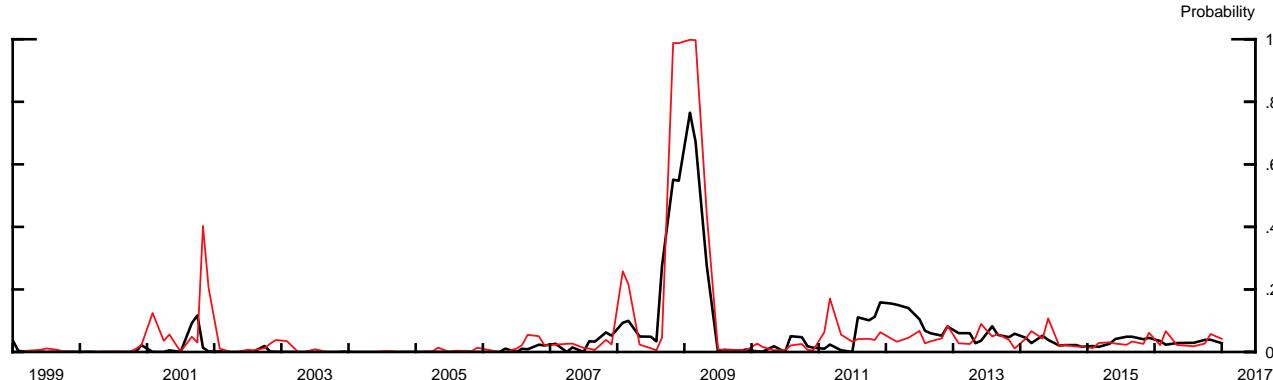
Probability that the Unemployment Rate Increases 1 ppt
(4 quarters ahead)

Probability that the Unemployment Rate Decreases 1 ppt
(4 quarters ahead)

Probability that Real GDP Declines in Each of the Next Two Quarters

Note: See notes on facing page. Recession and inflation probabilities for FRB/US and the BVAR are real-time estimates. See Robert J. Tetlow and Brian Ironside (2007), "Real–Time Model Uncertainty in the United States: The Fed, 1996–2003," *Journal of Money, Credit and Banking*, vol. 39 (October), pp. 1533–61.

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Risks & Uncertainty

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Appendix

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

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

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

The prediction intervals around the current and one-year-ahead forecasts are derived from historical staff forecast errors, comparing staff forecasts with the latest published data. For the unemployment rate and real GDP growth, errors were calculated for 1980 through 2014, yielding percentiles of the sizes of the forecast errors. For PCE and core PCE inflation, errors for 1998 through 2014 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.

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[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.

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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 discussion, we consider a selection of strategies for setting the federal funds rate and compare the associated policy paths and macroeconomic outcomes with those in the Tealbook baseline forecast. The prescriptions of simple rules and optimal control exercises are generally little changed from the December 2016 Tealbook, reflecting largely unchanged economic projections. As in December, most simple rules and optimal control exercises call for a more rapid increase in the federal funds rate than assumed in the staff forecast. We also present a box in which we review the evolution of Tealbook-consistent FRB/US r^* over the past decade and examine its relationship with other notions of the stance of monetary policy.

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 policy rules: the Taylor (1993) rule, the Taylor (1999) rule, an inertial version of the Taylor (1999) rule, and a first-difference rule.[1] These prescriptions take as given the staff's baseline projections for the output gap and inflation in the near term, shown in the middle panels. The top and middle panels also include the staff's baseline assumption for the path of the federal funds rate.

- The near-term prescriptions of each of the policy rules are slightly below those in the December Tealbook, reflecting a small downward revision to the staff's projection of core PCE inflation in 2017.

- The Taylor (1993) and Taylor (1999) rules, which feature no interest rate smoothing term, prescribe substantially higher federal funds rates in the near term than the inertial Taylor (1999) rule, the first-difference rule, or the Tealbook baseline.

A MEDIUM-TERM EQUILIBRIUM REAL FEDERAL FUNDS RATE

The bottom panel of the exhibit reports the estimate of a medium-term notion of the equilibrium real federal funds rate that is generated using the FRB/US model, given the staff's baseline projection. This Tealbook-consistent FRB/US r^* corresponds to the

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[1] We provide details on each of these four simple rules in the appendix to this section.

<div style="writing-mode: vertical">Monetary Policy Strategies</div>

Policy Rules and the Staff Projection
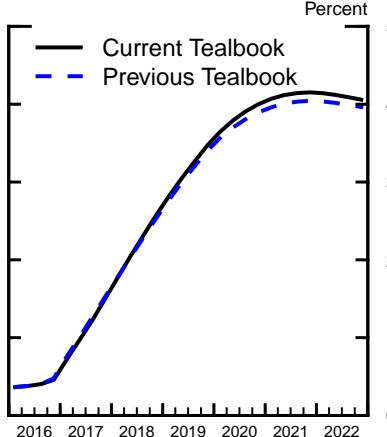
Near–Term Prescriptions of Selected Simple Policy Rules[1]

(Percent)
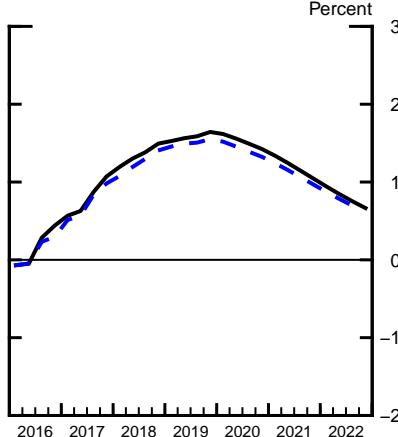
	2017:Q1	2017:Q2
Taylor (1993) rule	**2.69**	**2.70**
Previous Tealbook	*2.76*	*2.77*
Taylor (1999) rule	**2.97**	**3.00**
Previous Tealbook	*3.01*	*3.04*
Inertial Taylor (1999) rule	**0.83**	**1.16**
Previous Tealbook projection	*0.84*	*1.17*
First–difference rule	**0.59**	**0.76**
Previous Tealbook projection	*0.63*	*0.77*
Addendum:		
Tealbook baseline	**0.70**	**0.95**

Key Elements of the Staff Projection
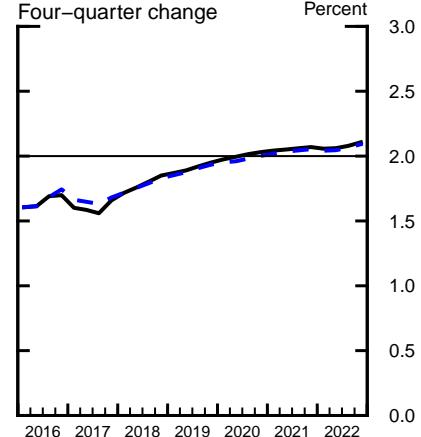
Federal Funds Rate

Percent

- Current Tealbook
- Previous Tealbook

GDP Gap

Percent

PCE Prices Excluding Food and Energy

Four–quarter change

Percent

A Medium–Term Equilibrium Real Federal Funds Rate[2]

(Percent)

	Current Tealbook	*Current–Quarter Estimate Based on Previous Tealbook*	*Previous Tealbook*
Tealbook–consistent FRB/US r^*	1.54	*1.43*	*1.16*
Average projected real federal funds rate	0.34	*0.32*	*0.10*

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 "Tealbook–consistent 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. The "average projected real federal funds rate" is calculated under the Tealbook baseline projection over the same 12–quarter period as the Tealbook–consistent FRB/US r^*. When the current–Tealbook and previous–Tealbook reference periods differ, the column "Current–Quarter Estimate Based on Previous Tealbook" reports values for the current reference period had the previous–Tealbook projection materialized.

Monetary Policy Strategies

level of the real federal funds rate that, if maintained over a 12-quarter period, would bring the output gap to zero in the final quarter of that period.

- The current-quarter estimate of Tealbook-consistent FRB/US r^* is 0.1 percentage point higher than it would have been if the staff projection of the output gap over the next 12 quarters had not changed since the December Tealbook, reflecting the small upward revision to the projected output gap. Moreover, the current-quarter estimate is 0.4 percentage point higher than the estimate reported in the December Tealbook; this increase primarily reflects the rolling over of the reference period, which, given a rising path of the output gap in coming years, now requires the closing of a larger output gap than in December.

- At 1.5 percent, Tealbook-consistent FRB/US r^* is more than 1 percentage point above the average level of the real federal funds rate in the staff forecast for the same 12-quarter period and ½ percentage point above the staff's estimate of the real federal funds rate in the long run.

- The real federal funds rate in the baseline staff forecast is, on average, below Tealbook-consistent FRB/US r^* because the policy reaction function assumed by the staff encompasses several policy considerations in addition to closing the output gap, most importantly returning inflation to the Committee's 2 percent objective.

- The increase in Tealbook-consistent FRB/US r^* in this projection is the most recent in a series that reflects the gradual improvement in the real economy since 2011. In the box "Mind the (Output) Gap: A History of Tealbook-Consistent FRB/US r^*," we examine the real-time history of Tealbook-consistent FRB/US r^* in relation to the average level of the real federal funds rate.

SIMPLE POLICY RULES SIMULATIONS

The second exhibit reports dynamic simulations of the FRB/US model under the Taylor (1993) rule, the Taylor (1999) rule, the inertial version of the Taylor (1999) rule,

Mind the (Output) Gap:
A History of Tealbook-Consistent FRB/US r*

The Tealbook-consistent FRB/US *r** (henceforth, FRB/US *r**) is the level of the real federal funds rate that, if maintained over a 12-quarter period, closes the output gap at the end of that period, according to the FRB/US model and given the staff projection. As such, FRB/US *r** summarizes, in a single number, a stance of policy that focuses on eliminating resource slack over the medium term in the model. Over time, FRB/US *r** has provided information about the current and projected strength of the economy. FRB/US *r** can be at a level that is unattainable by the actual real federal funds rate because the effective lower bound (ELB) on nominal interest rates is not imposed in the computation of FRB/US *r**. Moreover, when the ELB is binding, the gap between the FRB/US *r** and the real federal funds rate in the staff projection can be interpreted as an indicator of the extent to which conventional monetary policy is constrained in its ability to return the economy to its potential level.[1]

However, FRB/US *r** is not necessarily a measure of the *appropriate* stance of monetary policy. For example, it differs from the real interest rate paths derived from optimal control simulations in several ways: FRB/US *r** does not take into account any gap between projected and targeted inflation, it compels closing the output gap over a fixed time frame regardless of the initial magnitude and sign of the gap, and it requires that the real interest rate remains fixed over this time frame.[2]

In figure 1, we show the real-time evolution of FRB/US *r** since 2006, along with the corresponding real-time 12-quarter average of the real federal funds rate in the contemporaneous baseline staff forecast (henceforth, the average real rate). The color-shaded areas in the figure indicate the Great Recession and the periods over which the Federal Reserve conducted its asset purchase programs. In figure 2, we report the real-time projected 12-quarter averages of the output gap and of headline inflation (the latter measured in deviations from 2 percent).

In the years before the Great Recession, the staff saw the economy as likely to operate close to its potential level over the medium term under its baseline monetary

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[1] The FRB/US *r** measure is largely a function of two factors: the staff projection for the output gap 12 quarters ahead and the staff assumption for the average real value of the federal funds rate over the next 12 quarters. In this sense, FRB/US *r** is simply a summary measure of the underlying strength of aggregate demand over the medium term in the staff projection, assuming that the staff assessment of the interest sensitivity of aggregate demand is similar to that embedded in the FRB/US model. For a discussion of how FRB/US *r** relates to other equilibrium interest rate concepts, see Christopher J. Gust, Benjamin K. Johannsen, David J. Lopez-Salido, and Robert J. Tetlow (2015), "*r**: Concepts, Measures, and Uses," memorandum to the Federal Open Market Committee, October 13.

[2] That said, the outcomes associated with a policy that implemented FRB/US *r** could be close to those derived from an optimal control simulation, at least in some circumstances. For example, if demand shocks were the only source of variation in the output gap, optimal control simulations would seek to prevent the output gap from opening up and would simultaneously keep inflation near the Committee's long-run objective at all times. This nexus ceases to exist when supply shocks are also inducing fluctuations in the output gap.

policy assumptions; accordingly, the average real rate in the staff projection was near FRB/US *r**. This proximity between the average real rate and FRB/US *r** continued into the early phase of the recession. Although the economic outlook deteriorated appreciably in the first half of 2008, the assumed conventional monetary policy easing in the staff projection was seen as sufficient to eliminate economic slack in the medium term.

The worsening of the Global Financial Crisis in late 2008 and early 2009 led to a marked deterioration of the economic outlook and sharp declines in FRB/US *r**. As the nominal federal funds rate reached the ELB late in 2008, a wide and persistent disparity opened up between FRB/US *r** and the average real rate. Subsequently, the staff viewed the combination of large-scale asset purchase programs, reinvestment of maturing principal, and forward guidance regarding the path of the nominal federal funds rate as bolstering the economic outlook and preventing an even larger disparity between FRB/US *r** and the average real rate.[3]

By the end of 2013, domestic and global headwinds had abated somewhat. Closing the output gap over the medium term once again became a plausible scenario, even without additional asset purchases, allowing FRB/US *r** to catch up with the average real rate in the staff projection. As a consequence of the Committee's decision to maintain an accommodative stance of monetary policy (to support further improvements in economic conditions and a return of inflation to 2 percent), the staff projection for the output gap began to turn positive over the medium term, and FRB/US *r** has exceeded the average real rate noticeably since mid-2015.

The period since 2013 illustrates why FRB/US *r** is not necessarily a measure of the appropriate stance of monetary policy. Although higher real policy rates could prevent the projected overshooting of output relative to potential output shown in figure 2, such a decision would further delay the return of inflation to the Committee's 2 percent objective. With realized inflation having trended below 2 percent since the onset of the Great Recession, some policymakers may see a strong commitment to achieving the inflation objective in the coming years as important for ensuring the credibility of that objective. Moreover, the FRB/US *r** concept does not account for the limits of conventional monetary policy in responding to downside risks in a low interest rate environment, so risk-management considerations might be playing a role in the average real rate remaining below FRB/US *r**.

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[3] In figure 1, as the anticipated effects of the asset purchase programs were incorporated into the staff projection, the average projected output gap became smaller and the disparity between FRB/US *r** and the average real rate narrowed. The timing of the incorporation of new progams within the staff projection varied. The large-scale asset purchase programs announced in March 2009 and September 2012 were not incorporated into the staff forecast until the subsequent Tealbook rounds. By contrast, the staff forecasts in November 2010 and September 2011 already anticipated much of the effects of the second large-scale asset purchase program and the maturity extension program, respectively.
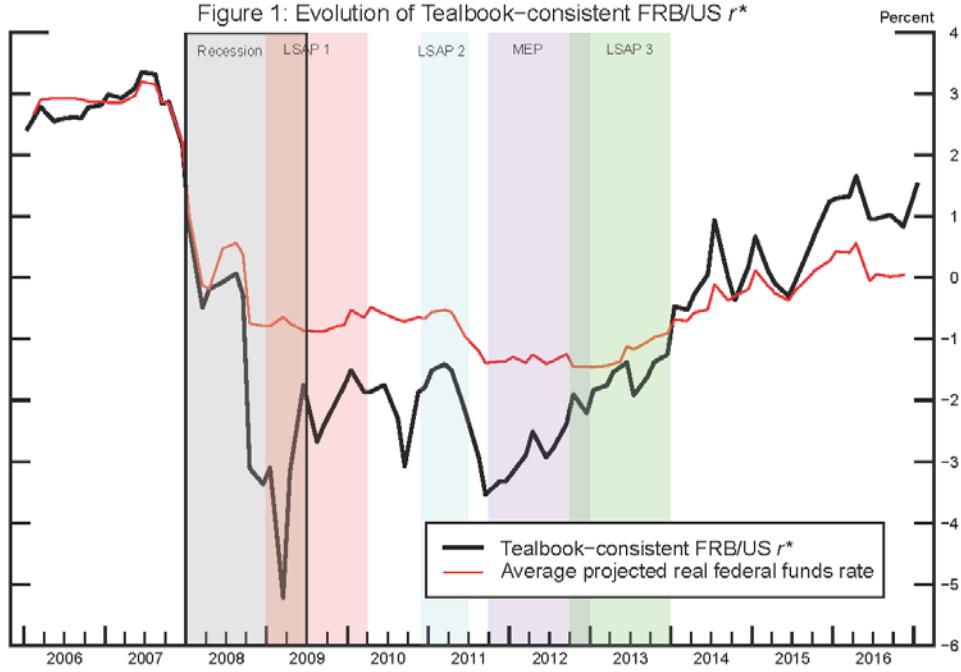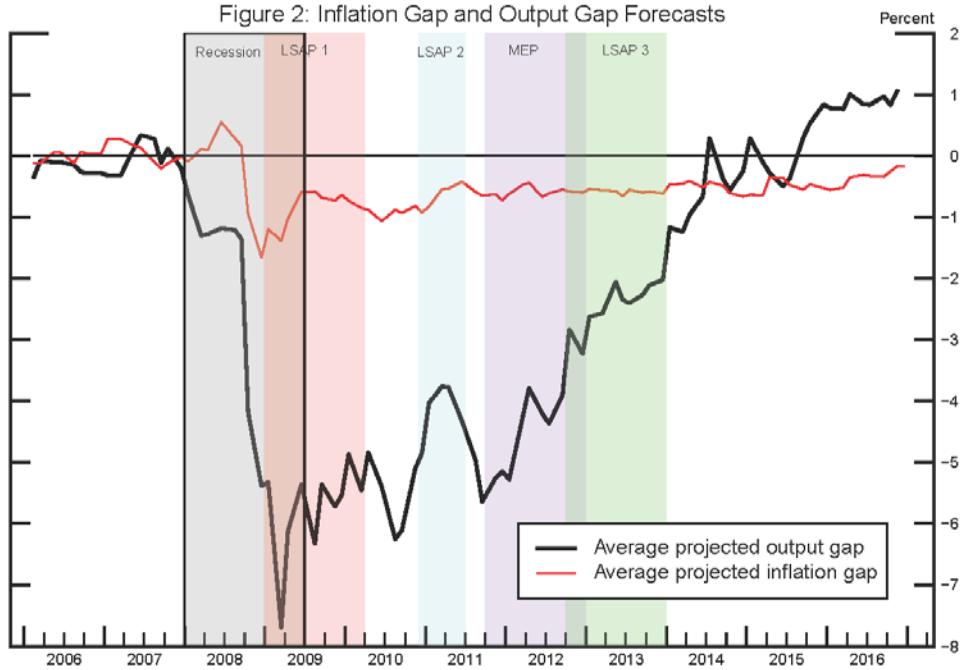
Figure 1: Evolution of Tealbook−consistent FRB/US r*

Legend:
— Tealbook−consistent FRB/US r*
— Average projected real federal funds rate

Figure 2: Inflation Gap and Output Gap Forecasts

Legend:
— Average projected output gap
— Average projected inflation gap

Note: The color−shaded areas in both figures indicate the recession and periods over which the Federal Reserve conducted its large−scale asset purchase programs (LSAPs) and its maturity extension program (MEP). The decision to reinvest the maturing principal in August 2010 is not highlighted in the figures.
Source: Federal Reserve Board staff calculations based on data from various Tealbooks.

and the first-difference rule.[2] These simulations reflect the endogenous responses of the output gap and inflation when the federal funds rate follows the paths implied by the different policy rules.[3] Given only small changes to the staff projection since the December Tealbook, the policy paths prescribed by each rule and the associated macroeconomic outcomes are also little changed.
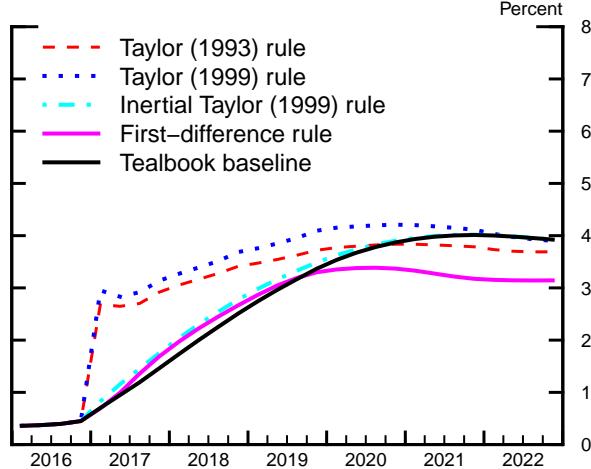
- The policy path in the staff forecast is constructed using a version of the inertial Taylor (1999) rule with a temporary downward adjustment to the intercept. In the Tealbook baseline, the nominal federal funds rate increases, on average, about 80 basis points per year through the first quarter of 2020, when it reaches 3.5 percent. The pace of tightening subsequently slows, and the federal funds rate peaks at 4 percent in 2021 before eventually returning to its longer-run level of 3 percent.

- The inertial Taylor (1999) rule with a constant intercept prescribes a slightly higher path for the federal funds rate over the next few years than the version with a judgmental intercept adjustment used to construct the Tealbook baseline. The difference in policy rates arising from this alternative intercept assumption is small and dissipates too rapidly to have marked effects on the real longer-term interest rates that influence economic activity in the FRB/US model. Thus, macroeconomic outcomes under the inertial Taylor (1999) rule are similar to those in the Tealbook baseline.

- The Taylor (1993) and Taylor (1999) rules call for an immediate sharp tightening in policy and produce paths for the real federal funds rate that lie significantly above the Tealbook baseline path over the next few years, largely because these two policy rules do not incorporate any interest rate smoothing. Despite these initially higher policy paths, the macroeconomic outcomes under these two rules are not far from those under the Tealbook baseline because of the assumptions that the public immediately understands the

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[2] Unless otherwise noted, the policy rules and optimal control simulations assume 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 that policy strategy. Such policy strategies are described as commitment strategies.
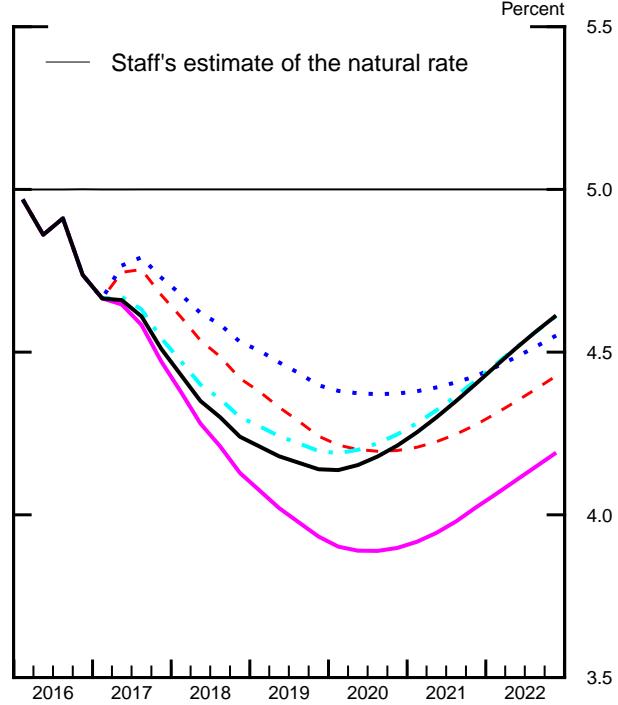
[3] Because of these endogenous responses, the near-term prescriptions from the dynamic simulations can differ from those shown in the top panel of the first exhibit.

Simple Policy Rule Simulations
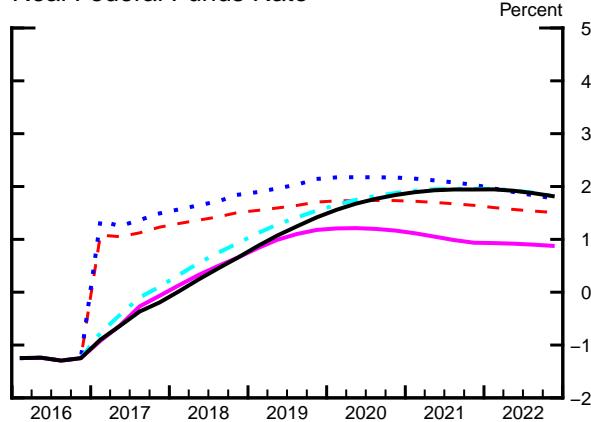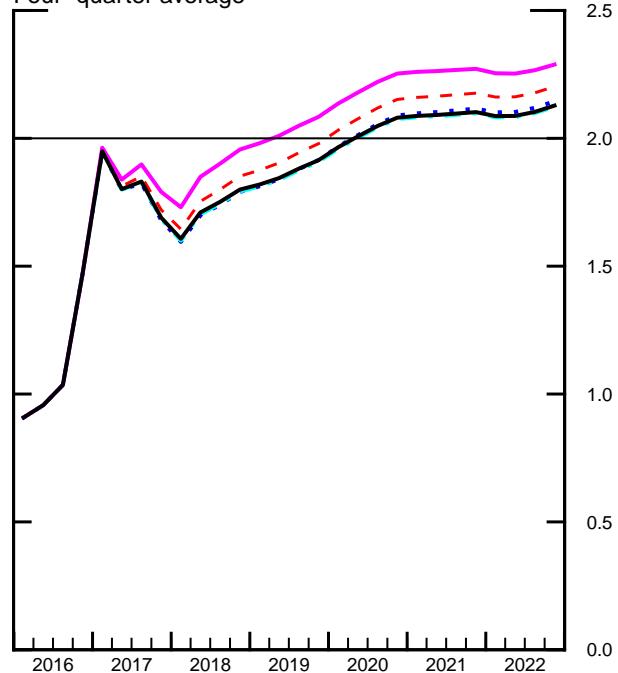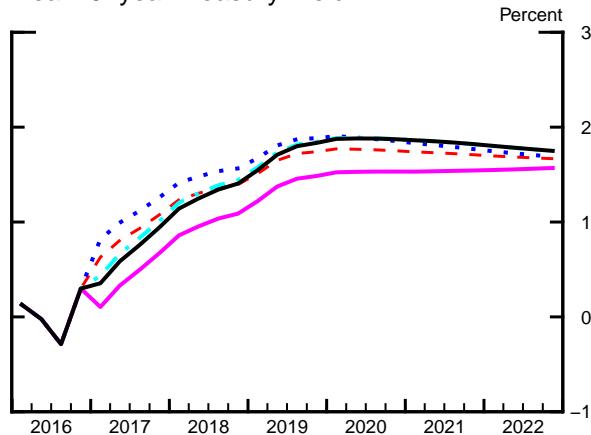
Monetary Policy Strategies

Nominal Federal Funds Rate

Percent

- – – – Taylor (1993) rule
- ····· Taylor (1999) rule
- –·–·– Inertial Taylor (1999) rule
- ——— First–difference rule
- ——— Tealbook baseline

Real Federal Funds Rate

Percent

Real 10–year Treasury Yield

Percent

Unemployment Rate

Percent

- ——— Staff's estimate of the natural rate

PCE Inflation
Four–quarter average

Percent

Note: The policy rule simulations in this exhibit are based on rules that respond to core 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.

macroeconomic effects of following the rules and believes the policymakers' commitment to stabilize the economy in the future. The Taylor (1999) rule calls for slightly higher policy rates than the Taylor (1993) rule over the period shown because it responds more strongly to the projected rise in output above its potential level over the next several years. As a consequence, the Taylor (1999) rule generates a higher trajectory for the unemployment rate and a slightly lower trajectory for inflation than does the Taylor (1993) rule.

- The first-difference rule prescribes a slightly higher path for the federal funds rate through the end of 2019 than the Tealbook baseline. Thereafter, the federal funds rate slowly drifts down to near its longer-run level of 3 percent. By contrast, the federal funds rate in the Tealbook baseline continues to rise for a while after 2019. This divergence occurs because the first-difference rule, which responds to the expected change in the output gap rather than to its level, reacts to the slower pace of economic growth projected late in the decade and beyond. The lower path of the federal funds rate after 2020, in conjunction with expectations of higher price and wage inflation in the future, implies lower longer-term real rates over the entire projection period as well as higher levels of resource utilization and inflation. Thus, the first-difference rule generates outcomes for the unemployment rate that are markedly below the unemployment rate paths generated under the other policy rules and further below the staff's estimate of the natural rate.

OPTIMAL CONTROL SIMULATIONS UNDER COMMITMENT
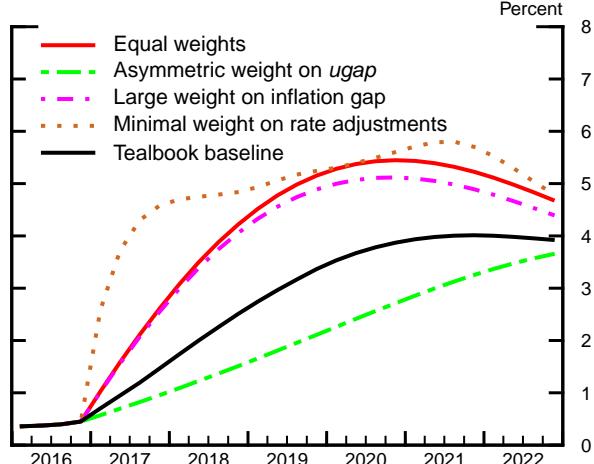
The third exhibit displays optimal control simulations under various assumptions about policymakers' preferences, as captured by four specifications of the loss function.[4] The concept of optimal control employed here corresponds to a commitment policy under which the plans that policymakers make today are assumed to constrain future policy choices in a way that improves overall economic outcomes, given the baseline outlook.[5] As was the case for the simple rules, the federal funds rate paths prescribed by optimal

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[4] 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 provides technical details on the optimal control simulations.
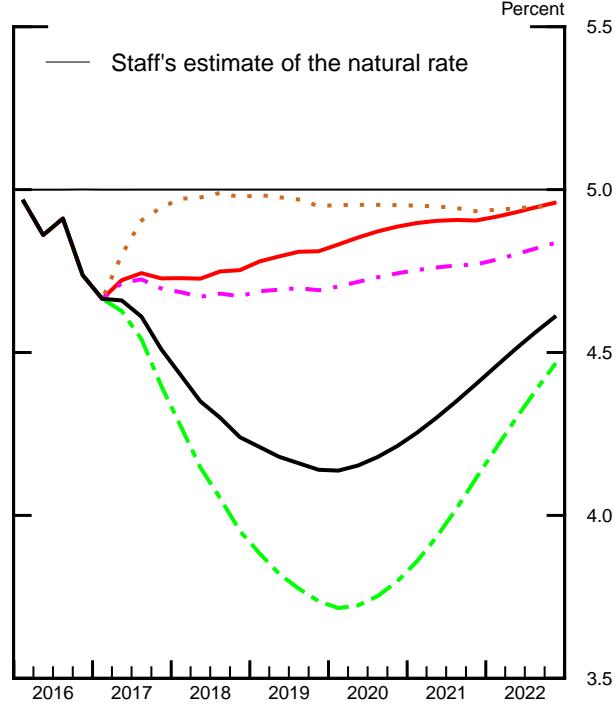
[5] Under the optimal control policies shown in the exhibit, policymakers improve current economic outcomes by making promises that bind future policymakers' actions; however, the simulations are not conditioned on policy commitments that might have been made in the past.
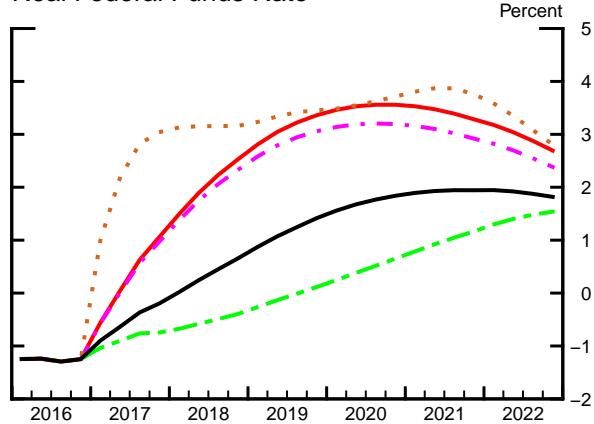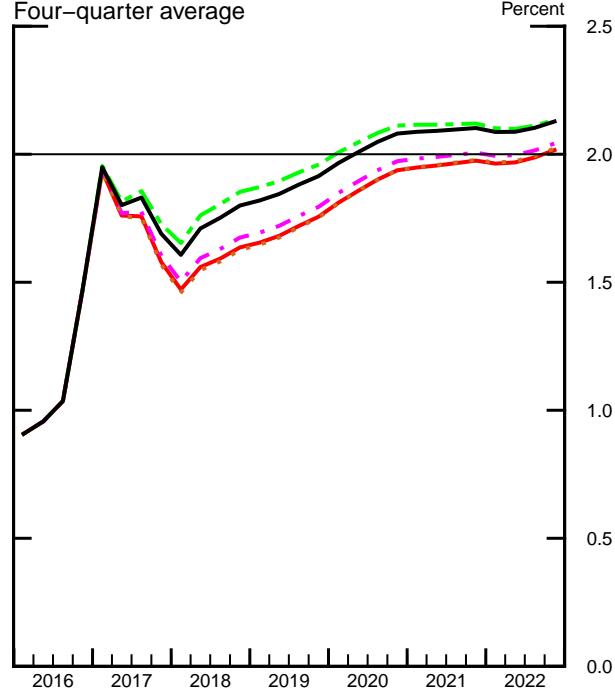
Authorized for Public Release

Optimal Control Simulations under Commitment

Monetary Policy Strategies

Nominal Federal Funds Rate

Percent

- Equal weights
- Asymmetric weight on *ugap*
- Large weight on inflation gap
- Minimal weight on rate adjustments
- Tealbook baseline

Real Federal Funds Rate

Percent

Real 10–year Treasury Yield

Percent

Unemployment Rate

Percent

- Staff's estimate of the natural rate

PCE Inflation
Four–quarter average

Percent
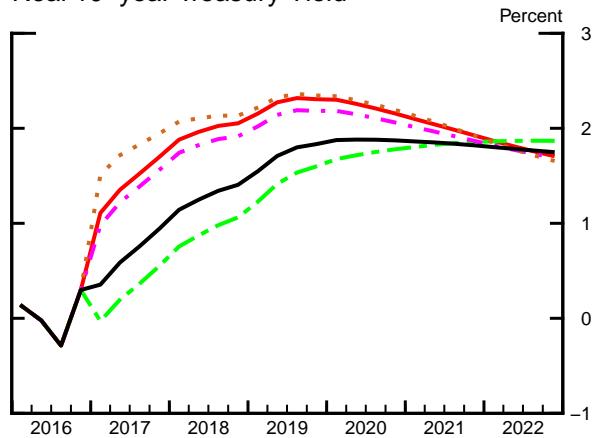
Note: Each set of lines corresponds to an optimal control policy under commitment in which policymakers minimize a discounted weighted sum of squared deviations of four–quarter headline PCE inflation from the Committee's 2 percent objective, of squared deviations of the unemployment rate from the staff's 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.

control under each of the four loss functions and their associated macroeconomic outcomes are nearly the same as in the December Tealbook.

- The first simulation, "Equal weights," presents the case in which policymakers are assumed to place the same weights on keeping headline PCE inflation close to the Committee's 2 percent objective, on keeping the unemployment rate close to the staff's estimate of the natural rate of unemployment, and on changes in the federal funds rate. Under this strategy, the path for the federal funds rate is significantly higher than the Tealbook baseline policy path. This higher path arises because, in the current baseline projection, the unemployment rate falls well below the staff's estimate of the natural rate over the next several years, an outcome that the "equal weights" loss function judges to be costly. A tighter policy results in a path of the unemployment rate that is substantially closer to the staff's estimate of the natural rate; headline PCE inflation is somewhat lower than in the Tealbook baseline forecast over the period shown, consistent with a limited response of inflation (in the model) to lower levels of resource utilization.

- The second 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 running below the natural rate, but that is identical to the specification with equal weights when the unemployment rate is above the natural rate. Under this strategy, the path of the federal funds rate is considerably below both the path for the case of equal weights and the Tealbook baseline path. With the asymmetric loss function, policymakers choose this relatively accommodative path for the policy rate because their desire to raise inflation to 2 percent is not tempered by an aversion to the undershooting of the natural rate of unemployment that helps achieve this outcome. The tighter labor market causes inflation to reach 2 percent more quickly than in the case of equal weights; inflation then runs 10 to 20 basis points above the Committee's longer-run objective for the next decade.[6]

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[6] The simultaneous overshooting of the longer-run inflation objective and undershooting of the natural rate of unemployment over the medium term is time inconsistent in the sense that, given the opportunity to reoptimize the path of the federal funds rate without regard to past policy commitments, policymakers in the future would choose to pursue a tighter monetary policy. Under the assumption of optimal control under discretion with "asymmetric weight on *ugap*" preferences, policy rates and

- The third simulation, "Large weight on inflation gap," posits a loss function that assigns a cost to deviations of inflation from 2 percent that is five times larger than the specification with equal weights but is otherwise identical. The resulting optimal strategy is only slightly more accommodative than in the "equal weights" case, even though the losses associated with undershooting the inflation objective in coming years are larger. The reason is that, in the FRB/US model, policymakers face an unappealing tradeoff because inflation responds little to resource utilization. Hence, policymakers would need to engineer a substantial undershooting of the natural rate of unemployment, which this specification of the loss function sees as costly, in order to raise inflation in the near term by a modest amount.

- The fourth simulation, "Minimal weight on rate adjustments," uses a loss function that assigns a very small cost to changes in the federal funds rate but is otherwise identical to the loss function with equal weights. In the resulting optimal strategy, the federal funds rate rises faster than under the specification with equal weights over the next few years in an effort to contain the projected undershooting of the natural rate of unemployment. The paths for the real federal funds rate and the real 10-year Treasury yield are also higher for a couple of years than in the case of equal weights. While this policy leaves the trajectory for inflation almost unaffected, it keeps the unemployment rate close to the staff's estimate of the natural rate.

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

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macroeconomic outcomes are between those under the Tealbook baseline and optimal control under commitment. For the other three specifications of the loss function, the simulation results under commitment and discretion are not much different from each other.

Outcomes of Simple Policy Rule Simulations

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

Measure and policy	2016 H2	2017	2018	2019	2020
Nominal federal funds rate[1]					
Taylor (1993)	0.4	2.9	3.4	3.7	3.8
Taylor (1999)	0.4	3.1	3.7	4.1	4.2
Inertial Taylor (1999)	0.4	1.8	2.8	3.5	3.9
First-difference	0.4	1.7	2.7	3.3	3.4
Extended Tealbook baseline	0.4	1.5	2.5	3.4	3.9
Real GDP					
Taylor (1993)	2.7	1.9	1.9	2.0	1.7
Taylor (1999)	2.7	1.7	1.8	1.9	1.7
Inertial Taylor (1999)	2.7	2.1	1.9	1.9	1.5
First-difference	2.7	2.3	2.2	2.0	1.7
Extended Tealbook baseline	2.7	2.1	2.0	1.8	1.5
Unemployment rate[1]					
Taylor (1993)	4.7	4.7	4.4	4.2	4.2
Taylor (1999)	4.7	4.7	4.5	4.4	4.4
Inertial Taylor (1999)	4.7	4.5	4.3	4.2	4.2
First-difference	4.7	4.5	4.1	3.9	3.9
Extended Tealbook baseline	4.7	4.5	4.2	4.1	4.2
Total PCE prices					
Taylor (1993)	1.8	1.7	1.9	2.0	2.2
Taylor (1999)	1.8	1.7	1.8	1.9	2.1
Inertial Taylor (1999)	1.8	1.7	1.8	1.9	2.1
First-difference	1.8	1.8	2.0	2.1	2.3
Extended Tealbook baseline	1.8	1.7	1.8	1.9	2.1
Core PCE prices					
Taylor (1993)	1.5	1.7	1.9	2.0	2.1
Taylor (1999)	1.5	1.6	1.8	2.0	2.0
Inertial Taylor (1999)	1.5	1.7	1.8	1.9	2.0
First-difference	1.5	1.8	2.0	2.1	2.2
Extended Tealbook baseline	1.5	1.7	1.9	2.0	2.0

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

Monetary Policy Strategies

Outcomes of Simple Policy Rule Simulations, Quarterly
(Four-quarter percent change, except as noted)

Measure and policy	2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Taylor (1993)	2.7	2.6	2.7	2.9	3.1	3.2	3.3	3.4
Taylor (1999)	3.0	2.8	2.9	3.1	3.3	3.4	3.5	3.7
Inertial Taylor (1999)	0.8	1.2	1.5	1.8	2.0	2.3	2.5	2.8
First-difference	0.7	1.0	1.4	1.7	2.0	2.2	2.5	2.7
Extended Tealbook baseline	0.7	0.9	1.2	1.5	1.7	2.0	2.3	2.5
Real GDP								
Taylor (1993)	2.2	2.2	1.9	1.9	1.8	2.0	1.9	1.9
Taylor (1999)	2.2	2.1	1.8	1.7	1.7	1.8	1.8	1.8
Inertial Taylor (1999)	2.2	2.3	2.0	2.1	2.1	2.1	2.0	1.9
First-difference	2.2	2.3	2.1	2.3	2.3	2.4	2.2	2.2
Extended Tealbook baseline	2.2	2.3	2.1	2.1	2.2	2.2	2.1	2.0
Unemployment rate[1]								
Taylor (1993)	4.7	4.7	4.8	4.7	4.6	4.5	4.5	4.4
Taylor (1999)	4.7	4.8	4.8	4.7	4.7	4.6	4.6	4.5
Inertial Taylor (1999)	4.7	4.7	4.6	4.5	4.5	4.4	4.4	4.3
First-difference	4.7	4.6	4.6	4.5	4.4	4.3	4.2	4.1
Extended Tealbook baseline	4.7	4.7	4.6	4.5	4.4	4.3	4.3	4.2
Total PCE prices								
Taylor (1993)	2.0	1.8	1.9	1.7	1.6	1.8	1.8	1.9
Taylor (1999)	1.9	1.8	1.8	1.7	1.6	1.7	1.7	1.8
Inertial Taylor (1999)	1.9	1.8	1.8	1.7	1.6	1.7	1.7	1.8
First-difference	2.0	1.8	1.9	1.8	1.7	1.8	1.9	2.0
Extended Tealbook baseline	1.9	1.8	1.8	1.7	1.6	1.7	1.8	1.8
Core PCE prices								
Taylor (1993)	1.6	1.6	1.6	1.7	1.8	1.8	1.9	1.9
Taylor (1999)	1.6	1.6	1.6	1.6	1.7	1.7	1.8	1.8
Inertial Taylor (1999)	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.8
First-difference	1.6	1.6	1.6	1.8	1.8	1.9	2.0	2.0
Extended Tealbook baseline	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9

1. Percent, average for the quarter.

Monetary Policy Strategies

Outcomes of Optimal Control Simulations under Commitment
(Percent change, annual rate, from end of preceding period except as noted)

Measure and policy	2016 H2	2017	2018	2019	2020
Nominal federal funds rate[1]					
Equal weights	0.4	2.6	4.2	5.2	5.4
Aymmetric weight on *ugap*	0.4	1.0	1.5	2.1	2.7
Large weight on inflation gap	0.4	2.5	4.1	4.9	5.1
Minimal weight on rate adjustments	0.4	4.6	4.8	5.2	5.6
Extended Tealbook baseline	0.4	1.5	2.5	3.4	3.9
Real GDP					
Equal weights	2.7	1.7	1.4	1.6	1.5
Aymmetric weight on *ugap*	2.7	2.4	2.3	2.0	1.5
Large weight on inflation gap	2.7	1.7	1.5	1.6	1.6
Minimal weight on rate adjustments	2.7	1.3	1.3	1.7	1.7
Extended Tealbook baseline	2.7	2.1	2.0	1.8	1.5
Unemployment rate[1]					
Equal weights	4.7	4.7	4.8	4.8	4.9
Aymmetric weight on *ugap*	4.7	4.4	4.0	3.7	3.8
Large weight on inflation gap	4.7	4.7	4.7	4.7	4.7
Minimal weight on rate adjustments	4.7	4.9	5.0	4.9	5.0
Extended Tealbook baseline	4.7	4.5	4.2	4.1	4.2
Total PCE prices					
Equal weights	1.8	1.6	1.6	1.8	1.9
Aymmetric weight on *ugap*	1.8	1.7	1.9	2.0	2.1
Large weight on inflation gap	1.8	1.6	1.7	1.8	2.0
Minimal weight on rate adjustments	1.8	1.6	1.6	1.8	1.9
Extended Tealbook baseline	1.8	1.7	1.8	1.9	2.1
Core PCE prices					
Equal weights	1.5	1.5	1.7	1.8	1.9
Aymmetric weight on *ugap*	1.5	1.7	1.9	2.0	2.1
Large weight on inflation gap	1.5	1.6	1.7	1.8	1.9
Minimal weight on rate adjustments	1.5	1.5	1.7	1.8	1.9
Extended Tealbook baseline	1.5	1.7	1.9	2.0	2.0

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

Monetary Policy Strategies

Outcomes of Optimal Control Simulations under Commitment, Quarterly
(Four-quarter percent change, except as noted)

Measure and policy	2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nominal federal funds rate[1]								
Equal weights	1.0	1.6	2.1	2.6	3.1	3.5	3.9	4.2
Asymmetric weight on *ugap*	0.6	0.7	0.8	1.0	1.1	1.2	1.4	1.5
Large weight on inflation gap	1.0	1.6	2.1	2.5	3.0	3.4	3.7	4.1
Minimal weight on rate adjustments	2.6	3.7	4.3	4.6	4.7	4.7	4.8	4.8
Extended Tealbook baseline	0.7	0.9	1.2	1.5	1.7	2.0	2.3	2.5
Real GDP								
Equal weights	2.2	2.2	1.8	1.7	1.5	1.5	1.4	1.4
Asymmetric weight on *ugap*	2.2	2.4	2.2	2.4	2.5	2.6	2.4	2.3
Large weight on inflation gap	2.2	2.2	1.8	1.7	1.6	1.6	1.5	1.5
Minimal weight on rate adjustments	2.2	2.0	1.5	1.3	1.1	1.2	1.2	1.3
Extended Tealbook baseline	2.2	2.3	2.1	2.1	2.2	2.2	2.1	2.0
Unemployment rate[1]								
Equal weights	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.8
Asymmetric weight on *ugap*	4.7	4.6	4.5	4.4	4.3	4.1	4.1	4.0
Large weight on inflation gap	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Minimal weight on rate adjustments	4.7	4.8	4.9	4.9	5.0	5.0	5.0	5.0
Extended Tealbook baseline	4.7	4.7	4.6	4.5	4.4	4.3	4.3	4.2
Total PCE prices								
Equal weights	1.9	1.8	1.8	1.6	1.5	1.6	1.6	1.6
Asymmetric weight on *ugap*	2.0	1.8	1.9	1.7	1.7	1.8	1.8	1.9
Large weight on inflation gap	1.9	1.8	1.8	1.6	1.5	1.6	1.6	1.7
Minimal weight on rate adjustments	1.9	1.8	1.8	1.6	1.5	1.5	1.6	1.6
Extended Tealbook baseline	1.9	1.8	1.8	1.7	1.6	1.7	1.8	1.8
Core PCE prices								
Equal weights	1.6	1.5	1.5	1.5	1.6	1.6	1.6	1.7
Asymmetric weight on *ugap*	1.6	1.6	1.6	1.7	1.8	1.8	1.9	1.9
Large weight on inflation gap	1.6	1.6	1.5	1.6	1.6	1.6	1.7	1.7
Minimal weight on rate adjustments	1.6	1.5	1.5	1.5	1.6	1.6	1.6	1.7
Extended Tealbook baseline	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9

1. Percent, average for the quarter.

Appendix

Implementation of the Simple Rules and Optimal Control Simulations

The monetary policy strategies considered in this section of Tealbook A typically fall into one of two categories. Under simple policy rules, policymakers set the federal funds rate according to a reaction function that includes a small number of macroeconomic factors. Under optimal control policies, policymakers compute a path for the federal funds rate that minimizes a loss function meant to capture policymakers' preferences over macroeconomic outcomes. Both approaches recognize the Federal Reserve's dual mandate. Unless otherwise noted, the simulations assume 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. 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, possibly along with others, as a means to assess the various tradeoffs policymakers may face when pursuing their mandated objectives.

POLICY RULES USED IN "MONETARY POLICY STRATEGIES"

The table "Simple Rules" gives the expressions for the four simple policy rules reported in the Monetary Policy Strategies section. R_t denotes the nominal federal funds rate for quarter t, and the right-hand-side variables include the staff's projection of trailing four-quarter core PCE 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 ($\Delta^4 ygap_{t+3|t}$). The value of policymakers' longer-run inflation objective, denoted π^{LR}, is 2 percent.

Simple Rules

Taylor (1993) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 0.5 ygap_t$
Taylor (1999) rule	$R_t = r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t$
Inertial Taylor (1999) rule	$R_t = 0.85 R_{t-1} + 0.15(r^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + ygap_t)$
First-difference rule	$R_t = R_{t-1} + 0.5(\pi_{t+3|t} - \pi^{LR}) + 0.5\Delta^4 ygap_{t+3|t}$

The first two of the selected rules were studied by Taylor (1993, 1999), while the inertial version of the Taylor (1999) rule has been featured prominently in analysis by Board staff.[1] The intercepts of these rules, denoted r^{LR}, are constant and chosen so that they are consistent with a 2 percent longer-run inflation objective and a longer-run real federal funds rate of 1 percent, a value used in the FRB/US model.[2] 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 from the four policy rules 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 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.

REAL FEDERAL FUNDS RATE ESTIMATES

The bottom panel of the exhibit "Policy Rules and the Staff Projection" provides an estimate of one notion of the equilibrium real federal funds rate. The "Tealbook-consistent FRB/US r^*" is an estimate of 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 using the output projection from FRB/US, the staff's large-scale econometric model of the U.S. economy.[3] This measure depends on a broad array of economic factors, some of

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[1] See, for example, Erceg and others (2012).

[2] All nominal and real federal funds rates reported in the Monetary Policy Strategies section are expressed on the same 360-day basis as the published federal funds rate. Consistent with the methodology in the FRB/US model, the simple rules are first implemented on a fully compounded, 365-day basis and then converted to a 360-day basis.

[3] For a discussion of this and other concepts of equilibrium interest rates, see Gust and others (2016).

which take the form of projected values of the model's exogenous variables. It is generated after the paths of exogenous variables in the FRB/US model are adjusted so that they match those in the extended Tealbook forecast. A model simulation then determines the value of the real federal funds rate that closes the output gap conditional on the exogenous variables in the extended baseline forecast.

The "Average projected real federal funds rate" reported in the panel is the average of the real federal funds rate under the Tealbook baseline projection calculated over the same 12-quarter period as the Tealbook-consistent FRB/US *r**. The average projected real federal funds rate and the Tealbook-consistent FRB/US *r** need not be associated with the same macroeconomic outcomes even when their values are identical. The reason is that, in the Tealbook-consistent FRB/US *r** simulations, the real federal funds rate is held constant over the entire 12-quarter period to close the output gap at the end of this time frame, whereas in the Tealbook baseline, the real federal funds rate can vary over time. Distinct paths of real short-term rates can, in turn, generate different paths for inflation and economic activity.

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 have perfect foresight 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.

COMPUTATION OF OPTIMAL CONTROL POLICIES UNDER COMMITMENT

The optimal control simulations posit that policymakers minimize a discounted weighted sum of squared inflation gaps (measured as the difference between four-quarter headline PCE 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 $\beta = 0.9963$:

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

The exhibit "Optimal Control Simulations under Commitment" considers four specifications of the weights on the inflation gap, the unemployment gap, and the rate change

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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 four specifications of the loss function.

The first specification, "Equal weights," assigns equal weights to all three components at all times. The second specification, "Asymmetric weight on *ugap*," uses the same weights as the equal-weights specification whenever the unemployment rate is above the staff's estimate of the natural rate, but it assigns no penalty to the unemployment rate falling below the natural rate. The third specification, "Large weight on inflation gap," attaches a relatively large weight to inflation gaps. The fourth specification, "Minimal weight on rate adjustments," places almost no weight on changes in the federal funds rate.[4] The table "Loss Functions" shows the weights used in the four specifications. The optimal control policy and associated outcomes depend on the relative (rather than the absolute) values of the weights.

Loss Functions

	λ_π	$\lambda_{u,t+\tau}$		λ_R
		$ugap_{t+\tau} < 0$	$ugap_{t+\tau} \geq 0$	
Equal weights	1	1	1	1
Asymmetric weight on *ugap*	1	0	1	1
Large weight on inflation gap	5	1	1	1
Minimal weight on rate adjustment	1	1	1	0.01

For each of these four specifications of the loss function, the optimal control policy is the path for the federal funds rate that minimizes the loss function in the FRB/US model, subject to the effective lower bound constraint on nominal interest rates, under the assumption of perfect foresight, and conditional on the staff's extended Tealbook projection. 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 policymakers in the model see this path as being a binding commitment on their future decisions; the optimal control policy takes as given the initial lagged value of the federal funds rate but is otherwise unconstrained by policy decisions made prior to the simulation period. The discounted losses are calculated over a period that ends sufficiently far in the future that extending that period further would not affect the policy prescriptions shown in the exhibits.

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

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Monetary Policy Strategies

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

Interval	Nominal GDP 12/07/16	Nominal GDP 01/18/17	Real GDP 12/07/16	Real GDP 01/18/17	PCE price index 12/07/16	PCE price index 01/18/17	Core PCE price index 12/07/16	Core PCE price index 01/18/17	Unemployment rate[1] 12/07/16	Unemployment rate[1] 01/18/17
Quarterly										
2016:Q1	1.3	1.3	.8	.8	.3	.3	2.1	2.1	4.9	5.0
Q2	3.7	3.7	1.4	1.4	2.0	2.0	1.8	1.8	4.9	4.9
Q3	4.8	5.0	3.3	3.5	1.4	1.5	1.7	1.7	4.9	4.9
Q4	4.3	4.6	1.6	2.0	2.3	2.1	1.4	1.2	4.8	4.7
2017:Q1	4.4	4.5	2.4	2.0	1.8	2.2	1.7	1.7	4.7	4.7
Q2	3.7	3.4	1.7	1.7	1.7	1.4	1.7	1.7	4.7	4.7
Q3	4.4	4.2	2.6	2.5	1.6	1.6	1.6	1.6	4.6	4.6
Q4	3.9	4.1	2.1	2.3	1.6	1.6	1.6	1.6	4.5	4.5
2018:Q1	4.0	4.1	1.9	2.0	1.9	1.8	1.9	1.9	4.5	4.4
Q2	4.1	4.0	2.0	2.0	1.8	1.8	1.9	1.9	4.4	4.4
Q3	3.9	3.8	2.0	1.9	1.7	1.7	1.8	1.8	4.4	4.3
Q4	3.9	3.9	2.0	2.0	1.8	1.8	1.8	1.8	4.3	4.2
Two-quarter[2]										
2016:Q2	2.5	2.5	1.1	1.1	1.1	1.1	1.9	1.9	-.1	-.1
Q4	4.5	4.8	2.4	2.7	1.9	1.8	1.6	1.5	-.1	-.2
2017:Q2	4.1	4.0	2.1	1.9	1.8	1.8	1.7	1.7	-.1	.0
Q4	4.2	4.1	2.3	2.4	1.6	1.6	1.6	1.6	-.2	-.2
2018:Q2	4.0	4.1	2.0	2.0	1.9	1.8	1.9	1.9	-.1	-.1
Q4	3.9	3.9	2.0	2.0	1.7	1.8	1.8	1.8	-.1	-.2
Four-quarter[3]										
2015:Q4	3.0	3.0	1.9	1.9	.4	.4	1.4	1.4	-.7	-.7
2016:Q4	3.5	3.6	1.8	1.9	1.5	1.5	1.7	1.7	-.2	-.3
2017:Q4	4.1	4.0	2.2	2.1	1.7	1.7	1.7	1.7	-.3	-.2
2018:Q4	4.0	4.0	2.0	2.0	1.8	1.8	1.8	1.9	-.2	-.3
2019:Q4	3.9	3.9	1.8	1.8	1.9	1.9	1.9	2.0	-.1	-.1
Annual										
2015	3.7	3.7	2.6	2.6	.3	.3	1.4	1.4	5.3	5.3
2016	2.9	3.0	1.6	1.6	1.1	1.1	1.7	1.7	4.9	4.9
2017	4.2	4.3	2.2	2.2	1.8	1.8	1.7	1.6	4.6	4.6
2018	4.0	4.0	2.1	2.1	1.7	1.7	1.8	1.8	4.4	4.3
2019	3.9	3.9	1.9	1.9	1.9	1.9	1.9	1.9	4.2	4.2

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.

Greensheets

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

Item	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2016[1]	2017[1]	2018[1]	2019[1]
Real GDP	1.4	3.5	2.0	2.0	1.7	2.5	2.3	2.0	2.0	1.9	2.0	1.9	2.1	2.0	1.8
Previous Tealbook	1.4	3.3	1.6	2.4	1.7	2.6	2.1	1.9	2.0	2.0	2.0	1.8	2.2	2.0	1.8
Final sales	2.6	3.0	1.8	1.9	1.8	2.5	2.5	2.0	1.9	1.9	2.0	2.2	2.2	1.9	2.0
Previous Tealbook	2.6	2.8	1.9	1.9	1.7	2.6	2.3	1.9	2.0	2.0	2.0	2.1	2.1	2.0	1.9
Priv. dom. final purch.	3.2	2.4	2.9	2.5	2.6	3.5	3.2	2.9	2.8	2.7	2.6	2.4	2.9	2.7	2.5
Previous Tealbook	3.2	2.1	2.5	2.8	2.5	3.5	2.9	2.8	2.9	2.7	2.6	2.2	2.9	2.8	2.4
Personal cons. expend.	4.3	3.0	2.8	2.2	2.6	3.7	3.0	2.8	2.8	2.7	2.7	2.9	2.9	2.7	2.5
Previous Tealbook	4.3	2.8	2.1	2.6	2.6	3.7	3.0	2.8	2.7	2.6	2.6	2.7	3.0	2.7	2.5
Durables	9.8	11.6	10.1	-.1	3.5	5.8	5.8	5.0	4.8	4.4	4.0	7.6	3.7	4.6	2.0
Nondurables	5.7	-.5	3.1	3.4	3.5	3.3	2.9	3.0	2.9	2.9	2.9	2.6	3.3	2.9	2.6
Services	3.0	2.7	1.5	2.2	2.1	3.5	2.6	2.4	2.4	2.4	2.4	2.3	2.6	2.4	2.6
Residential investment	-7.7	-4.1	10.7	1.6	-2.4	-.9	5.0	4.0	3.9	4.0	3.6	1.4	.8	3.9	5.2
Previous Tealbook	-7.7	-4.1	11.5	3.1	2.3	1.5	.1	3.2	6.5	6.6	6.1	1.5	1.7	5.6	3.7
Nonres. priv. fixed invest.	1.0	1.4	1.4	4.5	4.1	3.6	3.7	2.9	2.8	2.4	1.7	.1	4.0	2.4	1.6
Previous Tealbook	1.0	.3	1.9	4.1	2.4	3.4	3.1	2.8	2.6	2.1	1.5	-.1	3.3	2.3	1.6
Equipment & intangibles	1.8	-1.3	3.4	4.4	4.1	3.6	4.3	3.5	3.6	3.1	2.0	-.2	4.1	3.0	2.2
Previous Tealbook	1.8	-2.5	4.0	4.4	2.7	3.7	3.9	3.5	3.4	2.8	2.2	-.3	3.7	3.0	2.2
Nonres. structures	-2.1	12.0	-5.6	4.8	4.2	3.8	1.5	.6	-.1	.0	.3	.9	3.6	.2	-.4
Previous Tealbook	-2.1	11.6	-5.5	3.0	1.3	2.3	.1	.4	-.5	-.3	-.7	.8	1.7	-.3	-.7
Net exports[2]	-558	-522	-570	-593	-623	-652	-672	-702	-730	-756	-768	-554	-635	-739	-799
Previous Tealbook[2]	-558	-523	-551	-585	-618	-647	-667	-698	-724	-746	-758	-550	-629	-731	-796
Exports	1.8	10.0	-3.9	.3	.4	.8	1.4	1.8	2.0	2.2	2.3	1.7	.7	2.1	2.8
Imports	.2	2.2	4.0	3.7	4.8	4.9	3.9	5.8	5.4	5.3	3.4	1.4	4.3	5.0	3.8
Gov't. cons. & invest.	-1.7	.8	2.4	1.8	1.6	1.3	1.2	.9	.6	.5	.2	.8	1.5	.5	.6
Previous Tealbook	-1.7	.8	2.3	1.8	1.6	1.3	1.2	.9	.6	.5	.2	.7	1.5	.5	.6
Federal	-.4	2.4	2.4	2.3	2.0	1.3	.9	.4	-.4	-.6	-1.3	.7	1.6	-.5	-.4
Defense	-3.2	2.0	2.0	1.9	1.9	1.0	.8	.2	-.3	-.6	-1.5	-.6	1.4	-.5	-.3
Nondefense	3.8	3.0	3.0	2.8	2.1	1.8	.9	.7	-.5	-.7	-1.1	2.7	1.9	-.4	-.6
State & local	-2.5	-.2	2.4	1.5	1.5	1.3	1.4	1.1	1.2	1.2	1.2	.8	1.4	1.2	1.2
Change in priv. inventories[2]	-9	7	10	15	12	9	1	4	6	7	7	12	9	6	-9
Previous Tealbook[2]	-9	8	-4	14	15	14	7	8	9	9	8	9	13	9	2

1. Change from fourth quarter of previous year to fourth quarter of year indicated.
2. Billions of chained (2009) dollars.

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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Real GDP	2.7	1.7	1.3	2.7	2.5	1.9	1.9	2.1	2.0	1.8
Previous Tealbook	2.7	1.7	1.3	2.7	2.5	1.9	1.8	2.2	2.0	1.8
Final sales	2.0	1.5	1.7	2.0	2.7	2.0	2.2	2.2	1.9	2.0
Previous Tealbook	2.0	1.5	1.7	2.0	2.7	2.0	2.1	2.1	2.0	1.9
Priv. dom. final purch.	3.5	2.6	2.3	2.6	3.8	2.7	2.4	2.9	2.7	2.5
Previous Tealbook	3.5	2.6	2.3	2.6	3.8	2.7	2.2	2.9	2.8	2.4
Personal cons. expend.	3.1	1.5	1.3	2.0	3.5	2.6	2.9	2.9	2.7	2.5
Previous Tealbook	3.1	1.5	1.3	2.0	3.5	2.6	2.7	3.0	2.7	2.5
Durables	9.3	4.8	7.2	5.2	8.6	5.5	7.6	3.7	4.6	2.0
Nondurables	3.3	.4	.8	2.6	2.8	2.3	2.6	3.3	2.9	2.6
Services	2.0	1.4	.6	1.3	2.9	2.2	2.3	2.6	2.4	2.6
Residential investment	-5.2	6.0	15.7	6.8	6.2	13.1	1.4	.8	3.9	5.2
Previous Tealbook	-5.2	6.0	15.7	6.8	6.2	13.1	1.5	1.7	5.6	3.7
Nonres. priv. fixed invest.	8.1	9.0	5.2	4.8	5.0	.8	.1	4.0	2.4	1.6
Previous Tealbook	8.1	9.0	5.2	4.8	5.0	.8	-.1	3.3	2.3	1.6
Equipment & intangibles	12.0	9.2	5.5	4.5	4.1	3.8	-.2	4.1	3.0	2.2
Previous Tealbook	12.0	9.2	5.5	4.5	4.1	3.8	-.3	3.7	3.0	2.2
Nonres. structures	-4.0	8.0	4.1	5.8	8.0	-8.8	.9	3.6	.2	-.4
Previous Tealbook	-4.0	8.0	4.1	5.8	8.0	-8.8	.8	1.7	-.3	-.7
Net exports[1]	-459	-459	-447	-405	-426	-540	-554	-635	-739	-799
Previous Tealbook[1]	-459	-459	-447	-405	-426	-540	-550	-629	-731	-796
Exports	10.1	4.2	2.2	5.9	3.1	-2.2	1.7	.7	2.1	2.8
Imports	12.0	3.5	.3	2.5	6.1	2.5	1.4	4.3	5.0	3.8
Gov't. cons. & invest.	-1.1	-3.0	-2.2	-2.8	.3	2.2	.8	1.5	.5	.6
Previous Tealbook	-1.1	-3.0	-2.2	-2.8	.3	2.2	.7	1.5	.5	.6
Federal	3.2	-4.0	-2.1	-6.7	-1.3	1.7	.7	1.6	-.5	-.4
Defense	2.0	-4.1	-3.9	-7.1	-4.1	.6	-.6	1.4	-.5	-.3
Nondefense	5.5	-3.9	1.0	-6.0	3.4	3.4	2.7	1.9	-.4	-.6
State & local	-4.0	-2.3	-2.3	-.1	1.3	2.5	.8	1.4	1.2	1.2
Change in priv. inventories[1]	58	38	55	79	58	84	12	9	6	-9
Previous Tealbook[1]	58	38	55	79	58	84	9	13	9	2

1. Billions of chained (2009) dollars.

Greensheets

Greensheets

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

Item	2016			2017				2018				2016¹	2017¹	2018¹	2019¹
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Real GDP	1.4	3.5	2.0	2.0	1.7	2.5	2.3	2.0	2.0	1.9	2.0	1.9	2.1	2.0	1.8
Previous Tealbook	1.4	3.3	1.6	2.4	1.7	2.6	2.1	1.9	2.0	2.0	2.0	1.8	2.2	2.0	1.8
Final sales	2.6	3.0	1.8	1.9	1.8	2.5	2.5	2.0	1.9	1.9	2.0	2.2	2.2	1.9	2.0
Previous Tealbook	2.6	2.8	1.9	1.9	1.7	2.6	2.3	1.9	2.0	2.0	2.0	2.1	2.1	2.0	1.9
Priv. dom. final purch.	2.7	2.1	2.5	2.1	2.2	2.9	2.7	2.5	2.4	2.3	2.2	2.0	2.5	2.3	2.1
Previous Tealbook	2.7	1.8	2.1	2.4	2.1	3.0	2.5	2.4	2.4	2.3	2.2	1.9	2.5	2.4	2.1
Personal cons. expend.	2.9	2.0	1.9	1.5	1.8	2.5	2.1	1.9	1.9	1.9	1.8	2.0	2.0	1.9	1.7
Previous Tealbook	2.9	1.9	1.5	1.8	1.7	2.5	2.1	1.9	1.9	1.8	1.8	1.8	2.0	1.9	1.7
Durables	.7	.8	.7	.0	.3	.4	.4	.4	.4	.3	.3	.6	.3	.3	.1
Nondurables	.8	-.1	.4	.5	.5	.5	.4	.4	.4	.4	.4	.4	.5	.4	.4
Services	1.4	1.3	.7	1.0	1.0	1.6	1.2	1.1	1.1	1.1	1.1	1.0	1.2	1.1	1.2
Residential investment	-.3	-.2	.4	.1	-.1	.0	.2	.1	.2	.2	.1	.1	.0	.1	.2
Previous Tealbook	-.3	-.2	.4	.1	.1	.1	.0	.1	.2	.3	.2	.1	.1	.2	.1
Nonres. priv. fixed invest.	.1	.2	.2	.5	.5	.4	.5	.4	.3	.3	.2	.0	.5	.3	.2
Previous Tealbook	.1	.0	.2	.5	.3	.4	.4	.3	.3	.3	.2	.0	.4	.3	.2
Equipment & intangibles	.2	-.1	.3	.4	.4	.3	.4	.3	.3	.3	.2	.0	.4	.3	.2
Previous Tealbook	.2	-.2	.4	.4	.3	.4	.4	.3	.3	.3	.2	.0	.4	.3	.2
Nonres. structures	-.1	.3	-.2	.1	.1	.1	.0	.0	.0	.0	.0	.0	.1	.0	.0
Previous Tealbook	-.1	.3	-.2	.1	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
Net exports	.2	.9	-1.1	-.5	-.6	-.6	-.4	-.6	-.6	-.5	-.2	.0	-.5	-.5	-.3
Previous Tealbook	.2	.8	-.6	-.7	-.7	-.6	-.4	-.6	-.5	-.4	-.2	.1	-.6	-.5	-.3
Exports	.2	1.2	-.5	.0	.0	.1	.2	-.2	.2	.3	.3	.2	.1	.2	.3
Imports	.0	-.3	-.6	-.5	-.7	-.7	-.6	-.8	-.8	-.8	-.5	-.2	-.6	-.7	-.6
Gov't. cons. & invest.	-.3	.1	.4	.3	.3	.2	.2	.2	.1	.1	.0	.1	.3	.1	.1
Previous Tealbook	-.3	.1	.4	.3	.3	.2	.2	.2	.1	.1	.0	.1	.3	.1	.1
Federal	.0	.2	.2	.2	.1	.1	.1	.0	.0	.0	-.1	.0	.1	.0	.0
Defense	-.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	-.1	.0	.1	.0	.0
Nondefense	.1	.1	.1	.1	.1	.0	.0	.0	.0	.0	.0	.1	.1	.0	.0
State & local	-.3	.0	.3	.2	.2	.1	.1	.1	.1	.1	.1	.1	.2	.1	.1
Change in priv. inventories	-1.2	.5	.2	.1	-.1	-.1	-.2	.1	.1	.0	.0	-.2	-.1	.0	-.1
Previous Tealbook	-1.2	.5	-.3	.4	.0	.0	-.2	.0	.0	.0	.0	-.3	.1	.0	-.1

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

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

Item	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2016[1]	2017[1]	2018[1]	2019[1]
GDP chain-wt. price index	2.3	1.4	2.5	2.4	1.7	1.7	1.7	2.0	2.0	1.9	1.9	1.7	1.9	1.9	2.0
Previous Tealbook	2.3	1.4	2.6	2.0	2.0	1.8	1.8	2.0	2.0	1.9	1.9	1.7	1.9	1.9	2.0
PCE chain-wt. price index	2.0	1.5	2.1	2.2	1.4	1.6	1.6	1.8	1.8	1.7	1.8	1.5	1.7	1.8	1.9
Previous Tealbook	2.0	1.4	2.3	1.8	1.7	1.6	1.6	1.9	1.8	1.7	1.8	1.5	1.7	1.8	1.9
Energy	15.5	2.1	32.8	15.8	-6.0	-.5	-.1	.3	.1	-.2	.1	2.1	2.0	.1	.6
Previous Tealbook	15.5	2.1	30.9	5.6	1.4	.8	.7	.9	.4	.2	.3	1.7	2.1	.4	.8
Food	-1.8	-2.1	-1.2	1.1	2.1	2.3	2.0	2.2	2.2	2.2	2.2	-1.7	1.9	2.2	2.2
Previous Tealbook	-1.8	-2.1	-.5	1.2	1.4	1.9	2.1	2.2	2.2	2.2	2.2	-1.5	1.7	2.2	2.2
Ex. food & energy	1.8	1.7	1.2	1.7	1.7	1.6	1.6	1.9	1.9	1.8	1.8	1.7	1.7	1.9	2.0
Previous Tealbook	1.8	1.7	1.4	1.7	1.7	1.6	1.6	1.9	1.9	1.8	1.8	1.7	1.7	1.8	1.9
Ex. food & energy, market based	1.6	1.6	1.1	1.5	1.6	1.5	1.5	1.8	1.8	1.8	1.8	1.5	1.6	1.8	1.9
Previous Tealbook	1.6	1.6	1.3	1.6	1.6	1.5	1.5	1.8	1.8	1.7	1.7	1.5	1.6	1.8	1.9
CPI	2.5	1.6	3.4	3.2	1.9	2.2	2.2	2.3	2.2	2.2	2.2	1.8	2.4	2.2	2.3
Previous Tealbook	2.5	1.6	3.4	2.5	2.2	2.2	2.2	2.3	2.2	2.2	2.2	1.8	2.3	2.2	2.3
Ex. food & energy	2.1	1.9	2.0	2.6	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.2	2.4	2.4	2.5
Previous Tealbook	2.1	1.9	1.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.4
ECI, hourly compensation[2]	2.3	1.9	2.2	2.5	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.2	2.3	2.4	2.5
Previous Tealbook[2]	2.3	1.9	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.2	2.3	2.4	2.5
Business sector															
Output per hour	-.4	4.0	.7	.8	.5	1.3	1.2	.6	.9	.8	1.1	.9	1.0	.9	1.0
Previous Tealbook	-.4	3.7	.2	1.3	.3	1.4	.8	.7	.9	.9	1.1	.7	1.0	.9	1.1
Compensation per hour	5.6	4.1	1.6	3.0	2.9	3.0	3.0	3.1	3.1	3.2	3.2	2.5	3.0	3.2	3.4
Previous Tealbook	5.6	4.1	2.9	2.9	2.9	3.0	3.0	3.1	3.1	3.2	3.2	2.9	3.0	3.2	3.4
Unit labor costs	6.0	.0	.9	2.1	2.4	1.7	1.8	2.5	2.2	2.4	2.1	1.6	2.0	2.3	2.4
Previous Tealbook	6.0	.4	2.7	1.5	2.6	1.6	2.2	2.4	2.2	2.2	2.1	2.1	2.0	2.2	2.2
Core goods imports chain-wt. price index[3]	.5	2.0	-.5	-.3	1.0	1.4	.9	.8	.7	.7	.7	-.1	.8	.7	.7
Previous Tealbook[3]	.5	2.1	-.1	-.4	.5	1.0	.8	.7	.7	.7	.7	.1	.5	.7	.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.

Greensheets

Greensheets

Changes in Prices and Costs

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

Item	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
GDP chain-wt. price index	1.8	1.9	1.9	1.6	1.5	1.1	1.7	1.9	1.9	2.0
Previous Tealbook	1.8	1.9	1.9	1.6	1.5	1.1	1.7	1.9	1.9	2.0
PCE chain-wt. price index	1.3	2.7	1.8	1.2	1.2	.4	1.5	1.7	1.8	1.9
Previous Tealbook	1.3	2.7	1.8	1.2	1.2	.4	1.5	1.7	1.8	1.9
Energy	6.4	12.0	2.3	-2.5	-6.2	-15.8	2.1	2.0	.1	.6
Previous Tealbook	6.4	12.0	2.3	-2.5	-6.2	-15.8	1.7	2.1	.4	.8
Food	1.3	5.1	1.2	.7	2.7	.3	-1.7	1.9	2.2	2.2
Previous Tealbook	1.3	5.1	1.2	.7	2.7	.3	-1.5	1.7	2.2	2.2
Ex. food & energy	1.0	1.9	1.8	1.5	1.6	1.4	1.7	1.7	1.9	2.0
Previous Tealbook	1.0	1.9	1.8	1.5	1.6	1.4	1.7	1.7	1.8	1.9
Ex. food & energy, market based	.7	1.9	1.5	1.1	1.2	1.1	1.5	1.6	1.8	1.9
Previous Tealbook	.7	1.9	1.5	1.1	1.2	1.1	1.5	1.6	1.8	1.9
CPI	1.2	3.3	1.9	1.2	1.2	.4	1.8	2.4	2.2	2.3
Previous Tealbook	1.2	3.3	1.9	1.2	1.2	.4	1.8	2.3	2.2	2.3
Ex. food & energy	.6	2.2	1.9	1.7	1.7	2.0	2.2	2.4	2.4	2.5
Previous Tealbook	.6	2.2	1.9	1.7	1.7	2.0	2.2	2.3	2.3	2.4
ECI, hourly compensation[1]	2.1	2.2	1.8	2.0	2.3	1.9	2.2	2.3	2.4	2.5
Previous Tealbook[1]	2.1	2.2	1.8	2.0	2.3	1.9	2.2	2.3	2.4	2.5
Business sector										
Output per hour	1.6	.0	-.2	2.0	-.1	.5	.9	1.0	.9	1.0
Previous Tealbook	1.6	.0	-.2	2.0	-.1	.5	.7	1.0	.9	1.1
Compensation per hour	1.2	.5	5.8	.0	2.7	3.1	2.5	3.0	3.2	3.4
Previous Tealbook	1.2	.5	5.8	.0	2.7	3.1	2.9	3.0	3.2	3.4
Unit labor costs	-.4	.6	6.0	-2.0	2.8	2.6	1.6	2.0	2.3	2.4
Previous Tealbook	-.4	.6	6.0	-2.0	2.8	2.6	2.1	2.0	2.2	2.2
Core goods imports chain-wt. price index[2]	2.3	4.3	.1	-1.5	.5	-3.3	-.1	.8	.7	.7
Previous Tealbook[2]	2.3	4.3	.1	-1.5	.5	-3.3	.1	.5	.7	.7

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

Class II FOMC – Restricted (FR) January 23, 2017

Other Macroeconomic Indicators

Item	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2016[1]	2017[1]	2018[1]	2019[1]
Employment and production															
Nonfarm payroll employment[2]	.5	.6	.5	.5	.6	.6	.6	.5	.5	.5	.5	2.3	2.2	2.0	1.5
Unemployment rate[3]	4.9	4.9	4.7	4.7	4.7	4.6	4.5	4.4	4.4	4.3	4.2	4.7	4.5	4.2	4.1
Previous Tealbook[3]	4.9	4.9	4.8	4.7	4.7	4.6	4.5	4.5	4.4	4.4	4.3	4.8	4.5	4.3	4.2
Natural rate of unemployment[3]	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Previous Tealbook[3]	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Employment-to-Population Ratio[3]	59.7	59.8	59.7	59.8	59.8	59.7	59.8	59.7	59.7	59.7	59.7	59.7	59.8	59.7	59.4
Employment-to-Population Trend[3]	59.7	59.6	59.6	59.5	59.4	59.4	59.3	59.2	59.1	59.1	59.0	59.6	59.3	59.0	58.7
GDP gap[4]	.0	.3	.4	.6	.6	.9	1.1	1.2	1.3	1.4	1.5	.4	1.1	1.5	1.7
Previous Tealbook[4]	.0	.2	.3	.5	.6	.8	1.0	1.1	1.2	1.3	1.4	.3	1.0	1.4	1.6
Industrial production[5]	-.8	1.8	-.6	1.5	1.1	.3	.6	.9	.7	.5	1.1	-.3	.9	.8	1.0
Previous Tealbook[5]	-.8	2.0	-1.2	1.4	.5	.5	.6	.9	.9	1.1	1.1	-.4	.8	1.0	1.1
Manufacturing industr. prod.[5]	-1.1	.2	.7	.2	1.1	.3	.3	.4	.6	.7	.7	-.0	.5	.6	.9
Previous Tealbook[5]	-1.1	.5	.7	.3	.1	.4	.3	.6	.8	1.0	1.0	.1	.3	.8	1.0
Capacity utilization rate - mfg.[3]	74.9	74.8	74.8	74.7	74.7	74.6	74.5	74.4	74.4	74.4	74.4	74.8	74.5	74.4	74.6
Previous Tealbook[3]	74.9	74.9	74.9	74.8	74.7	74.6	74.5	74.4	74.4	74.4	74.5	74.9	74.5	74.5	74.8
Housing starts[6]	1.2	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.3	1.3
Light motor vehicle sales[6]	17.1	17.5	18.0	17.4	17.2	17.0	16.9	16.9	16.9	16.8	16.8	17.5	17.1	16.8	16.6
Income and saving															
Nominal GDP[5]	3.7	5.0	4.6	4.5	3.4	4.2	4.1	4.1	4.0	3.8	3.9	3.6	4.0	4.0	3.9
Real disposable pers. income[5]	2.9	2.6	.9	3.2	2.5	7.6	1.7	2.8	2.2	1.9	2.5	2.1	3.7	2.4	2.5
Previous Tealbook[5]	2.9	2.7	1.8	2.9	2.3	7.9	2.2	2.8	2.2	2.1	2.7	2.4	3.8	2.4	2.4
Personal saving rate[3]	5.9	5.8	5.4	5.6	5.6	6.5	6.2	6.1	6.0	5.8	5.8	5.4	6.2	5.8	5.7
Previous Tealbook[3]	5.9	5.9	5.8	5.9	5.9	6.8	6.6	6.5	6.4	6.3	6.3	5.8	6.6	6.3	6.2
Corporate profits[7]	-2.4	25.4	15.0	4.2	1.9	.9	.8	1.4	2.3	1.5	1.7	12.6	2.0	1.7	1.8
Profit share of GNP[3]	10.8	11.3	11.6	11.6	11.6	11.5	11.4	11.3	11.3	11.2	11.2	11.6	11.4	11.2	11.0
Gross national saving rate[3]	18.2	18.5	18.6	18.6	18.7	18.4	18.3	18.1	18.1	17.9	17.9	18.6	18.3	17.9	17.5
Net national saving rate[3]	3.1	3.6	3.9	3.9	4.0	3.7	3.5	3.3	3.3	3.1	3.0	3.9	3.5	3.0	2.4

1. Change from fourth quarter of previous year to fourth quarter of year indicated, unless otherwise indicated.
2. Change, millions.
3. Percent; annual values are for the fourth quarter of the year indicated.
4. Percent difference between actual and potential GDP; 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.

Greensheets

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Other Macroeconomic Indicators

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

Item	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Employment and production										
Nonfarm payroll employment[1]	.8	2.0	2.1	2.4	2.8	2.8	2.3	2.2	2.0	1.5
Unemployment rate[2]	9.5	8.7	7.8	7.0	5.7	5.0	4.7	4.5	4.2	4.1
Previous Tealbook[2]	9.5	8.7	7.8	7.0	5.7	5.0	4.8	4.5	4.3	4.2
Natural rate of unemployment[2]	5.9	5.9	5.6	5.4	5.1	5.0	5.0	5.0	5.0	5.0
Previous Tealbook[2]	5.9	5.9	5.6	5.4	5.1	5.0	5.0	5.0	5.0	5.0
Employment-to-Population Ratio[2]	58.3	58.5	58.7	58.5	59.2	59.4	59.7	59.8	59.7	59.4
Employment-to-Population Trend[2]	61.1	60.7	60.3	60.2	60.1	59.9	59.6	59.3	59.0	58.7
GDP gap[3]	-4.2	-3.7	-3.7	-2.5	-.9	.0	.4	1.1	1.5	1.7
Previous Tealbook[3]	-4.2	-3.7	-3.7	-2.5	-.9	.0	.3	1.0	1.4	1.6
Industrial production[4]	5.9	2.6	2.3	2.0	3.5	-1.6	-.3	.9	.8	1.0
Previous Tealbook[4]	5.9	2.6	2.3	2.0	3.5	-1.6	-.4	.8	1.0	1.1
Manufacturing industr. prod.[4]	5.9	2.5	1.7	.8	2.0	.0	.0	.5	.6	.9
Previous Tealbook[4]	5.9	2.5	1.7	.8	2.0	.0	.1	.3	.8	1.0
Capacity utilization rate - mfg.[2]	72.4	74.4	74.3	74.6	76.0	75.4	74.8	74.5	74.4	74.6
Previous Tealbook[2]	72.4	74.4	74.3	74.6	76.0	75.4	74.9	74.5	74.5	74.8
Housing starts[5]	.6	.6	.8	.9	1.0	1.1	1.2	1.2	1.3	1.3
Light motor vehicle sales[5]	11.6	12.7	14.4	15.5	16.5	17.4	17.5	17.1	16.8	16.6
Income and saving										
Nominal GDP[4]	4.6	3.6	3.2	4.3	4.1	3.0	3.6	4.0	4.0	3.9
Real disposable pers. income[4]	2.6	1.7	5.1	-2.8	4.5	3.0	2.1	3.7	2.4	2.5
Previous Tealbook[4]	2.6	1.7	5.1	-2.8	4.5	3.0	2.4	3.8	2.4	2.4
Personal saving rate[2]	5.5	5.8	9.2	4.7	5.6	6.0	5.4	6.2	5.8	5.7
Previous Tealbook[2]	5.5	5.8	9.2	4.7	5.6	6.0	5.8	6.6	6.3	6.2
Corporate profits[6]	18.0	6.8	.6	4.7	6.6	-11.2	12.6	2.0	1.7	1.8
Profit share of GNP[2]	12.0	12.3	12.0	12.0	12.4	10.7	11.6	11.4	11.2	11.0
Gross national saving rate[2]	15.2	16.1	18.0	18.2	19.2	18.8	18.6	18.3	17.9	17.5
Net national saving rate[2]	-.3	.8	2.9	3.1	4.3	3.9	3.9	3.5	3.0	2.4

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

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Staff Projections of Federal Sector Accounts and Related Items
(Billions of dollars except as noted)

Item	Fiscal year 2016	2017	2018	2019	2016 Q1a	Q2a	Q3a	Q4	2017 Q1	Q2	Q3	Q4	2018 Q1	Q2	Q3	Q4
Unified budget					Not seasonally adjusted											
Receipts	3,267	3,353	3,429	3,592	711	993	798	741	737	1,078	797	758	741	1,091	839	813
Outlays	3,854	3,975	4,148	4,441	956	932	984	949	1,058	991	977	1,024	1,103	1,050	972	1,125
Surplus/deficit	-587	-622	-720	-849	-245	61	-186	-208	-322	88	-180	-266	-362	41	-133	-313
Previous Tealbook	-587	-591	-716	-832	-245	61	-186	-187	-317	87	-175	-261	-367	38	-127	-306
Means of financing:																
Borrowing	1,052	398	865	970	251	8	241	259	-128	30	236	310	398	-8	165	343
Cash decrease	-155	180	-25	-2	20	-50	10	-46	314	-62	-27	-13	-7	-3	-2	-1
Other[1]	-310	44	-120	-120	-25	-18	-65	-113	135	-56	-30	-30	-30	-30	-30	-30
Cash operating balance, end of period	353	173	198	200	314	364	353	399	85	147	173	187	193	197	198	199
NIPA federal sector					Seasonally adjusted annual rates											
Receipts	3,495	3,560	3,597	3,762	3,442	3,485	3,536	3,557	3,593	3,624	3,467	3,508	3,586	3,629	3,665	3,707
Expenditures	4,124	4,291	4,502	4,763	4,111	4,137	4,189	4,201	4,293	4,311	4,360	4,386	4,498	4,540	4,585	4,640
Consumption expenditures	974	1,011	1,036	1,043	969	975	985	994	1,010	1,017	1,023	1,029	1,036	1,038	1,040	1,040
Defense	589	603	613	615	587	586	591	596	602	605	607	609	614	614	615	614
Nondefense	386	408	423	428	382	389	394	398	407	412	416	420	422	424	426	426
Other spending	3,150	3,280	3,466	3,720	3,142	3,163	3,204	3,208	3,284	3,293	3,337	3,357	3,462	3,502	3,545	3,600
Current account surplus	-629	-731	-905	-1,001	-668	-652	-653	-644	-701	-687	-893	-878	-912	-911	-920	-933
Gross investment	266	275	282	285	265	265	267	270	274	277	279	280	282	282	283	283
Gross saving less gross investment[2]	-624	-734	-913	-1,011	-662	-646	-648	-642	-702	-691	-899	-885	-920	-920	-929	-941
Fiscal indicators																
High-employment (HEB) surplus/deficit[3]	-637.4	-782.7	-1,005.4	-1,132.7	-670.3	-658.2	-673.5	-680.4	-744.6	-744.0	-961.7	-961.8	-1,006.0	-1,017.7	-1,036.3	-1,058.1
Change in HEB, percent of potential GDP	.4	.6	1.0	.4	.7	-.1	.1	.0	.3	.0	1.1	.0	.2	.0	.0	.1
Fiscal impetus (FI), percent of GDP[4]	.3	.5	.3	.3	.5	-.1	.3	.6	.4	.4	.9	.5	.4	.3	.3	.3
Previous Tealbook	.3	.5	.3	.3	.5	-.7	.3	.6	.4	.4	.9	.5	.4	.3	.3	.3
Federal purchases	.0	.1	.0	.0	-.1	.0	.2	.2	.2	.1	.1	.1	.0	.0	.0	-.1
State and local purchases	.1	.2	.1	.1	.4	-.3	.0	.3	.2	.1	.1	.1	.1	.1	.1	.1
Taxes and transfers	.2	.3	.2	.3	.2	.2	.2	.2	.1	.1	.7	.3	.2	.2	.2	.2

1. Other means of financing include checks issued less checks paid, accrued items, and changes in other financial assets and liabilities.
2. Gross saving is the current account surplus plus consumption of fixed capital of the general government as well as government enterprises.
3. HEB is gross saving less gross investment (NIPA) of the federal government in current dollars, with cyclically sensitive receipts and outlays adjusted to the staff's measure of potential output and the natural rate of unemployment. The sign on Change in HEB, as a percent of nominal potential GDP, is reversed. Quarterly figures for change in HEB are not at annual rates.
4. Fiscal impetus measures the contribution to growth of real GDP from fiscal policy actions at the general government level (excluding multiplier effects). It equals the sum of the direct contributions to real GDP growth from changes in federal purchases and state and local purchases, plus the estimated contribution from real consumption and investment that is induced by discretionary policy changes in transfers and taxes.
a Actual.

Greensheets

Greensheets

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

Measure and country	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4
Real GDP¹												
Total foreign	2.5	1.3	2.9	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6
Previous Tealbook	2.5	1.2	2.9	2.2	2.4	2.5	2.5	2.6	2.6	2.6	2.5	2.5
Advanced foreign economies	2.4	.3	2.2	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.7	1.7
Canada	2.7	-1.3	3.5	2.0	2.2	2.1	1.9	1.9	1.9	1.9	1.7	1.7
Japan	2.8	1.8	1.3	1.1	1.2	1.2	.9	.9	.9	.9	.8	.8
United Kingdom	1.4	2.6	2.3	1.9	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7
Euro area	2.0	1.2	1.4	1.9	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8
Germany	2.9	1.7	.8	2.9	2.1	1.9	1.8	1.8	1.7	1.6	1.6	1.6
Emerging market economies	2.6	2.1	3.6	2.8	2.9	3.2	3.2	3.3	3.4	3.4	3.4	3.4
Asia	4.2	5.1	4.9	4.6	4.6	4.7	4.6	4.6	4.5	4.5	4.5	4.4
Korea	2.1	3.2	2.5	2.4	2.7	3.0	3.1	3.0	3.0	3.0	3.0	3.0
China	6.5	7.1	6.8	6.7	6.4	6.2	6.1	6.0	5.9	5.9	5.8	5.8
Latin America	.9	-.6	2.6	1.4	1.5	2.0	2.0	2.3	2.5	2.4	2.5	2.5
Mexico	1.9	.2	4.0	2.0	1.6	2.0	1.9	2.2	2.4	2.4	2.5	2.5
Brazil	-1.8	-1.7	-3.3	-1.0	.8	1.6	2.0	2.0	2.1	2.1	2.1	2.1
Consumer prices²												
Total foreign	1.4	2.1	1.6	2.4	2.8	2.6	2.5	2.5	2.5	2.4	2.5	2.5
Previous Tealbook	1.6	2.0	1.7	2.2	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5
Advanced foreign economies	-.3	1.2	.7	1.4	1.7	1.6	1.5	1.5	1.5	1.5	1.6	1.6
Canada	.9	2.3	.9	1.5	2.1	2.1	1.9	1.8	1.9	1.9	1.9	1.9
Japan	-.5	-.5	-.9	.2	.6	.9	1.0	1.1	1.1	1.1	1.2	1.3
United Kingdom	.1	.9	1.9	2.0	3.6	3.0	2.6	2.3	2.1	2.0	2.0	2.0
Euro area	-1.2	1.2	1.1	1.9	1.6	1.3	1.3	1.4	1.4	1.4	1.5	1.5
Germany	-1.0	1.3	1.2	1.9	1.6	1.6	1.6	1.7	1.8	1.8	1.9	1.9
Emerging market economies	2.7	2.7	2.2	3.1	3.6	3.3	3.2	3.2	3.1	3.1	3.1	3.1
Asia	2.1	2.3	1.2	2.7	2.3	2.6	2.7	2.7	2.8	2.8	2.8	2.8
Korea	.5	1.0	.4	4.0	1.7	2.5	2.4	2.4	2.8	3.0	3.0	3.0
China	2.5	2.3	1.3	2.6	2.2	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Latin America	4.3	3.9	4.5	4.5	6.9	4.9	4.3	4.1	4.0	3.9	3.8	3.8
Mexico	2.8	2.4	3.6	4.1	6.5	4.2	3.5	3.4	3.2	3.2	3.2	3.2
Brazil	11.8	7.5	6.5	2.6	4.4	5.4	5.2	5.2	5.0	4.9	4.9	4.7

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

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

Measure and country	2011	2012	2013	2014	2015	2016	Projected 2017	Projected 2018	Projected 2019
Real GDP[1]									
Total foreign	3.2	2.3	2.9	2.5	1.9	2.3	2.5	2.6	2.6
Previous Tealbook	*3.2*	*2.3*	*2.9*	*2.5*	*1.9*	*2.2*	*2.5*	*2.6*	*2.6*
Advanced foreign economies	1.8	.3	2.4	1.8	1.2	1.7	1.8	1.7	1.7
Canada	3.1	.7	3.6	2.2	.4	1.7	2.0	1.8	1.9
Japan	.1	.3	2.7	-.3	1.2	1.8	1.1	.9	.1
United Kingdom	1.3	1.3	2.4	3.5	1.7	2.0	1.6	1.6	1.7
Euro area	.5	-1.1	.7	1.3	2.0	1.6	1.7	1.8	1.9
Germany	2.4	.2	1.6	1.6	1.3	2.0	1.9	1.6	1.6
Emerging market economies	4.6	4.3	3.4	3.3	2.7	2.8	3.2	3.4	3.5
Asia	5.1	5.7	5.3	5.0	4.4	4.7	4.6	4.5	4.4
Korea	2.9	2.1	3.5	2.7	3.1	2.5	2.9	3.0	2.9
China	8.7	8.0	7.6	7.1	6.8	6.8	6.2	5.8	5.7
Latin America	4.1	3.3	1.6	1.9	1.3	1.1	2.0	2.5	2.7
Mexico	4.2	3.4	1.1	2.7	2.5	2.0	1.9	2.5	2.8
Brazil	2.6	2.5	2.6	-.3	-5.8	-2.0	1.6	2.1	2.2
Consumer prices[2]									
Total foreign	3.4	2.3	2.4	2.0	1.4	1.9	2.6	2.5	2.6
Previous Tealbook	*3.4*	*2.3*	*2.4*	*2.0*	*1.4*	*1.9*	*2.4*	*2.5*	*2.6*
Advanced foreign economies	2.2	1.3	1.0	1.1	.5	.8	1.6	1.6	1.9
Canada	2.7	1.0	1.0	1.9	1.3	1.4	1.9	1.9	2.0
Japan	-.3	-.2	1.4	2.5	.3	-.5	.9	1.2	2.5
United Kingdom	4.6	2.6	2.1	.9	.1	1.2	2.9	2.0	1.9
Euro area	2.9	2.3	.8	.1	.2	.7	1.4	1.5	1.6
Germany	2.6	1.9	1.4	.4	.2	.8	1.6	1.8	1.9
Emerging market economies	4.3	3.1	3.4	2.7	2.1	2.7	3.3	3.1	3.1
Asia	4.4	2.6	3.1	1.8	1.5	2.1	2.6	2.8	2.9
Korea	3.9	1.7	1.1	1.0	.9	1.5	2.3	3.0	3.0
China	4.6	2.1	2.9	1.5	1.5	2.2	2.5	2.5	2.5
Latin America	4.1	4.4	4.1	4.8	3.4	4.3	5.0	3.9	3.6
Mexico	3.5	4.1	3.6	4.2	2.3	3.2	4.4	3.2	3.2
Brazil	6.7	5.6	5.8	6.5	10.4	7.1	5.0	4.9	4.5

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

Greensheets

Greensheets

U.S. Current Account

Quarterly Data

Billions of dollars, s.a.a.r.

	2016				2017				2018 (Projected)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
U.S. current account balance	**-527.4**	**-473.1**	**-451.8**	**-486.3**	**-537.9**	**-540.7**	**-582.9**	**-626.6**	**-687.4**	**-702.3**	**-739.9**	**-771.6**
Previous Tealbook	*-527.4*	*-477.5*	*-452.2*	*-480.9*	*-543.8*	*-545.4*	*-589.1*	*-626.1*	*-688.0*	*-698.7*	*-728.8*	*-758.1*
Current account as percent of GDP	-2.9	-2.6	-2.4	-2.6	-2.8	-2.8	-3.0	-3.2	-3.5	-3.5	-3.7	-3.8
Previous Tealbook	*-2.9*	*-2.6*	*-2.4*	*-2.5*	*-2.9*	*-2.8*	*-3.0*	*-3.2*	*-3.5*	*-3.5*	*-3.6*	*-3.7*
Net goods & services	-500.9	-499.0	-465.7	-506.6	-544.0	-559.3	-590.3	-619.5	-657.9	-671.4	-693.9	-713.0
Investment income, net	147.0	188.2	184.9	186.6	181.3	182.7	177.7	159.2	145.7	133.2	124.3	107.6
Direct, net	219.6	256.3	260.6	250.3	255.4	271.8	284.5	285.8	292.6	300.8	313.7	318.8
Portfolio, net	-72.6	-68.1	-75.7	-63.8	-74.1	-89.1	-106.8	-126.6	-146.9	-167.6	-189.4	-211.2
Other income and transfers, net	-173.5	-162.3	-171.0	-166.3	-175.2	-164.2	-170.3	-166.3	-175.2	-164.2	-170.3	-166.3

Annual Data

Billions of dollars

	2011	2012	2013	2014	2015	2016	2017 (Projected)	2018	2019
U.S. current account balance	**-460.4**	**-446.5**	**-366.4**	**-392.1**	**-463.0**	**-484.6**	**-572.0**	**-725.3**	**-839.8**
Previous Tealbook	*-460.4*	*-446.5*	*-366.4*	*-392.1*	*-463.0*	*-484.5*	*-576.1*	*-718.4*	*-825.3*
Current account as percent of GDP	-3.0	-2.8	-2.2	-2.3	-2.6	-2.6	-3.0	-3.6	-4.0
Previous Tealbook	*-3.0*	*-2.8*	*-2.2*	*-2.3*	*-2.6*	*-2.6*	*-3.0*	*-3.6*	*-3.9*
Net goods & services	-548.6	-536.8	-461.9	-490.2	-500.4	-493.0	-578.3	-684.1	-740.6
Investment income, net	229.0	224.4	228.4	234.3	193.4	176.7	175.2	127.7	69.7
Direct, net	298.6	293.8	296.3	289.0	265.4	246.7	274.4	306.5	336.1
Portfolio, net	-69.5	-69.4	-67.9	-54.8	-72.0	-70.0	-99.2	-178.8	-266.4
Other income and transfers, net	-140.8	-134.2	-132.9	-136.1	-156.0	-168.3	-169.0	-169.0	-169.0

Abbreviations

AFE	advanced foreign economy
BHC	bank holding company
BOE	Bank of England
CDS	credit default swap
C&I	commercial and industrial
CMBS	commercial mortgage-backed securities
CPI	consumer price index
CRE	commercial real estate
DGSE	dynamic stochastic general equilibrium
ECB	European Central Bank
E&I	equipment and intangibles
EME	emerging market economy
EU	European Union
FOMC	Federal Open Market Committee; also, the Committee
FX	foreign exchange
GDP	gross domestic product
JOLTS	Job Openings and Labor Turnover Survey
LFPR	labor force participation rate
LMCI	labor market conditions index
MBS	mortgage-backed securities
MMF	money market fund
Michigan survey	University of Michigan Surveys of Consumers
OIS	overnight index swap
ON RRP	overnight reverse repurchase agreement
OPEC	Organization of the Petroleum Exporting Countries

PCE	personal consumption expenditures
PMI	purchasing managers index
PPI	producer price index
repo	repurchase agreement
RMB	renminbi
SLOOS	Senior Loan Officer Opinion Survey on Bank Lending Practices
SOMA	System Open Market Account
S&P	Standard & Poor's
TIPS	Treasury Inflation-Protected Securities